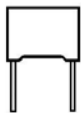
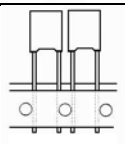


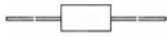
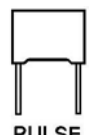
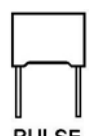
Contents

General information on Iskra Capacitors for use in electronics

			Page
KFU	-polyester capacitors	(KT)	12
KEU	-metallized polyester capacitors	(MKT)	15
KLI	-polypropylene capacitors	(KP)	25
KNI	-metallized polypropylene capacitors	(MKP)	32
KNU	-metallized polypropylene capacitors	(MKP)	39

Contents

Type	Version	Pitch (mm)	Dielectric	Capacitance range	Rated voltage	Page
KFU 1910		10; 15; 22.5; 27.5	Polyester film (KT)	0.022 μ F 1 μ F 0.015 μ F 0.47 μ F 4700 pF 0.33 μ F 1000 pF 0.22 μ F 1000 pF 0.068 μ F	100 V DC 250 V DC 400 V DC 630V DC 1000 V DC	13
KEU 1940		5	Metallized polyester film (MKT)	0.15 μ F ... 1.5 μ F 0.068 μ F ... 1 μ F 1000 pF 0.33 μ F 1000 pF 0.15 μ F 1000 pF 0.047 μ F	50 V DC 63 V DC 100 V DC 250 V DC 400 V DC	16
KEU 1940 taped						
KEU 1930		7.5	Metallized polyester film (MKT)	0.068 μ F ... 1 μ F 0.033 μ F ... 0.33 μ F 0.01 μ F 0.15 μ F 4700 pF 0.033 μ F 1000 pF 0.015 μ F	63 V DC 100 V DC 250 V DC 400 V DC 630 V DC	18
KEU 1930 taped						
KEU 1910		10; 15; 22.5; 27.5	Metallized polyester film (MKT)	0.22 μ F ... 22 μ F 0.068 μ F ... 10 μ F 0.033 μ F ... 10 μ F 0.01 μ F 4.7 μ F 4700 pF 1.5 μ F 1000 pF 0.68 μ F	63 V DC 100 V DC 250 V DC 400 V DC 630V DC 1000 V DC	20

Type	Version	Pitch (mm)	Dielectric	Capacitance range	Rated voltage	Page
KEU 1012		axial leads	Metallized polyester film (MKT)	0.15 μ F 10 μ F	63 V DC	23
				0.068 μ F ... 10 μ F	100 V DC	
				0.047 μ F ... 10 μ F	250 V DC	
				0.01 μ F 3.3 μ F	400 V DC	
				1000 pF 1 μ F	630 V DC	
				1000 pF 0.47 μ F	1000 V DC	
KLI 1910	 PULSE	7,5;10; 15; 22.5; 27.5	Polypropylene film (KP)C	6800 pF0.15 μ F	100 V DC	26
				3300 pF0.1 μ F	160 V DC	
				2200 pF0.047 μ F	250 V DC	
				1000 pF0.047 μ F	400 V DC	
				100 pF 0.22 μ F	630V DC	
				1000 pF ... 0.22 μ F	1000 V DC	
				1000 pF ... 0.1 μ F	1600 V DC	
				1000 pF ... 0.047 μ F	2000 V DC	
KNI 1910	 PULSE	7,5; 10; 15; 22.5	Metallized polypropylene film (MKP)	680 pF,2.2 μ F	250 V DC	33
				680 pF,1.8 μ F	400 V DC	
				680 pF,0.39 μ F	630 V DC	
				3300 pF ..., 0.33 μ F	1000 V DC	
				1000 pF ,... 0.15 μ F	1600 V DC	
				1000 pF,0.1 μ F	2000 V DC	
KNU 1910		10; 15; 22.5; 27.5	Metallized polypropylene film (MKP)	0.022 μ F ... 6.8 μ F	250 V DC	40
				0.01 μ F 2.2 μ F	400 V DC	
				4700 pF 1 μ F	630 V DC	
				0.01 μ F1 μ F	1000 V DC	
				1000 pF 0.33 μ F	1600 V DC	

General technical data

ISKRA capacitors for use in electronics are made of dielectric materials as follow:

- polypropylene film
- polyester (polyethyleneterephthalate)

Survey of specific properties of individual dielectrics and use:

Polyester (polyethyleneterephthalate) film

Dielectric constant (25 °C/1 kHz):

$\epsilon_r=3.25$; ASTM D 150-65T

Dielectric loss (25 °C/60 Hz):

$\tan\delta\leq 20\cdot 10^{-4}$; ASTM D 150-65T

Dielectric strength (25 °C/60 Hz):

295 kV/mm; ASTM D 149-64,
ASTM D 2305-67

Temperature coefficient of capacitance:

$TC \approx +500\cdot 10^{-6}/^{\circ}C$

Temperature range max.: + 125°C

Water absorption (sink for 24 h):

0.8 % max.; ASTM D 570-63

Dielectric absorption: 0.2 to 0.8 %

Polyester capacitors are used mainly in electronic devices where special characteristics of electrical parameters are not required and where wider temperature range is required. Mainly they are used as conjuctive or block capacitors.

Polypropylene film

Dielectric constant (25 °C/1 kHz):

$\epsilon_r=2.2$; ASTM D 150

Dielectric loss (25 °C/1 kHz):

$\tan\delta\leq 5\cdot 10^{-4}$; ASTM D 150

Dielectric strength (25 °C/1 kHz):

300 to 380 kV/mm; ASTM D 149

Temperature coefficient of capacitance:

$(-100 \leq TC \leq -300) \cdot 10^{-6}/^{\circ}C$

Temperature range max.: + 100 °C

Water absorption: < 0.05 %; ASTM D 202

Dielectric absorption: 0.03 %

Polypropylene capacitors are used mainly in electronic circuits, where following requirements appear:

- small dielectric losses
- high insulation resistance
- negative and defined temperature coefficient (temperature compensation at oscillating circles with ferrite coil)
- high pulse loading
- loading with AC voltage

Designation of dielectric in type code of capacitors

Type code is composed by three letters and four figures:

K	X	X		Y	Y	Y	Y
↓	↓	↓		↓	↓	↓	↓
1	2	3		4	5	6	7

1st Letter, "K" means capacitor

2nd Letter tells the type of dielectric (special for metallized version)

3rd Letter tells the purpose of use

4th 5th, 6th, 7th Figure describe construction and design of capacitor and leads

Survey of letter used for single kinds of dielectric:

F - polyester film

E - metallized polyester film

L - polypropylene film

N - metallized polypropylene film

Electrical characteristics

1. Rated capacitance

Rated capacitance C_R values are available according to E-ranges. Available E-ranges (E6, E12, E24, E48, E96, on request E192) are stated at type descriptions in catalogue. The values from range E6 are privileged.

The E-ranges are put down in accordance to IEC-publ. 60063 and DIN 41426.

Required values from E-range are all values from table below, multiplied by positive or negative whole number power exponent of the number 10.

E6 ±20%	E12 ±10%	E24 ±5%	E48 ±2%	E96 ±1%	E192 ±0.5%			
100	100	100	100	100	100			
					101			
					102			
					104			
				105	105			
					106			
			107					
			109					
			110	110	110	110		
						111		
						113		
						114		
		115			115			
					117			
				118				
				120				
				120	120	121	121	121
								123
		124						
		126						
		127	127					
			129					
		130	130					
			132					
	133		133					
			135					
			137					
			138					
	140	140						
		142						
		143						
		145						
150		150	150	150	150			
					152			
	154							
	156							
	158		158					
			160					
			160	162	162	162		
						164		
165								
167								
169	169	169						
		172						
		174						
		176						

E6 ±20%	E12 ±10%	E24 ±5%	E48 ±2%	E96 ±1%	E192 ±0.5%
	180	180	178	178	178
					180
					182
					184
			187	187	187
					189
					191
					193
		200	196	196	196
					198
					200
					203
			205	205	205
					208
					210
					213
	220	220	215	215	215
					218
					221
					223
			226	226	226
					229
					232
					234
		240	237	237	237
					240
			243	243	243
					246
			249	249	249
					252
					255
					258
	270	270	261	261	261
					264
					267
					271
			274	274	274
					277
					280
					284
		300	287	287	287
					291
					294
					298
			301	301	301
					305

E6 ±20%	E12 ±10%	E24 ±5%	E48 ±2%	E96 ±1%	E192 ±0.5%	
				309	309	
					312	
330	330	330	316	316	316	
					320	
				324	324	324
						328
			332	332	332	
					336	
				340	340	
					344	
			348	348	348	
					348	
				357	357	357
						361
		365		365	365	
					370	
				374	374	
					379	
		390	390	383	383	383
						388
					392	392
						397
				402	402	402
						407
					412	412
						417
	422			422	422	
					427	
				432	432	432
						437
			442	442	442	
					448	
				453	453	
					459	
470	470	470	464	464	464	
					470	
				475	475	
					481	
			487	487	487	
					493	
				499	499	
					505	
		510	511	511	511	
					517	
				523	523	
					530	
536	536	536				
		542				

E6 ±20%	E12 ±10%	E24 ±5%	E48 ±2%	E96 ±1%	E192 ±0.5%	
	560	560		549	549	
					556	
				562	562	562
					576	576
					583	
			590		590	590
					597	
				604	604	
				612		
		620	619	619	619	
					626	
				634	634	
					642	
			649	649	649	
					657	
				665	665	
				673		
	680	680	680	681	681	681
						690
					698	698
					706	
715				715	715	
					723	
				732	732	
					741	
750			750	750	750	
					759	
				768	768	
					777	
			787	787	787	
					796	
				806	806	
					816	
820		820	825	825	825	
					835	
				845	845	
					856	
	866		866	866		
				876		
			887	887		
				898		
910	909	909	909			
			920			
		931	931			
			942			
	953	953	953			
			965			
		976	976			
			988			

2. Tolerance of rated capacitance

Standard tolerances and belonging codes for marking tolerances of rated capacitances are as follow:

Tolerance	±20%	±10%	±5%	(±2.5%)	±2%	(±1.25%)	±1%	±0.5%
Code	M	K	J	(H)	G	(E)	F	D

The narrowest possible tolerance is ± 1 pF (Z). Available tolerances of rated capacitances are stated at type descriptions in catalogue.

3. Temperature dependence of capacitance

Temperature coefficient TC

Temperature coefficient TC is defined for temperature range $\vartheta_1 \dots \vartheta_2$ according to DIN 41380 as follows:

$$TC = \frac{C_2 - C_1}{C_3 (J_2 - J_1)}$$

C_1 - capacitance at temperature ϑ_1

C_2 - capacitance at temperature ϑ_2

C_3 - capacitance at temperature $(25 \pm 10)^\circ\text{C}$

Temperature coefficient for single type of capacitors is given in $10^{-6}/^\circ\text{C}$.

4. Rated voltage U_R

The rated voltage U_R is the maximum direct voltage which may be applied continuously to the terminals of a capacitor at any temperature between the lower category temperature and the rated temperature.

5. Category voltage U_C

Category voltage U_C is the maximum direct voltage which may be applied to the terminals of a capacitor at its upper category temperature. Adequate reducing of voltage for temperature range between upper rated temperature and category temperature is given at single types of capacitors in catalogue.

6. Alternating voltage loading

Allowed alternating voltage loading for single types is limited to frequency 50 to 60 Hz. The sum of applied alternating voltage (amplitude) and direct voltage to the terminals of a capacitor must not exceed category voltage U_C . In general mica and plastic foil capacitors are not suitable for connection to network, except special versions of capacitors, which are suitable also for such purposes.

7. Allowed self-heating because of alternating voltage loading

If capacitors are loaded with alternating voltages of higher frequencies with sinusoidal or unsinusoidal shape of alternating voltage, than self-heating and pulse loading is to consider.

Self heating of capacitor ($\Delta\vartheta$) is in operating of capacitor conditioned by belonging power loss

(P_i) and outer surface of capacitor (S), and is calculated by the following from:

$$\Delta J(K) = \frac{P_i (mW)}{S (cm^2) \cdot b}$$

where the base for thermoplastic case is used

$$b = 1 \left(\frac{mW}{K \cdot cm^2} \right)$$

Power loss of capacitor (P_i) at loading with sinusoidal voltage of higher frequencies is calculated as follows:

$$P_i = U_{ef}^2 \cdot 2p \cdot f \cdot C \cdot \tan \delta_{(f)}$$

where:

C = capacitance in F

U_{ef} = effective voltage in V

f = frequency in Hz

$\tan \delta_{(f)}$ = loss factor at frequency f

P_i = power loss in W

At un-sinusoidal alternating voltage it is to be dismantled according to Fourier's analysis to sinusoidal voltages and calculated the power loss as a sum of single partial sinusoidal power losses. For carrying-out the Fourier's analysis the voltage-time diagram is needed.

The sum of temperatures because of self-heating and temperature of surroundings of capacitor may be equal or lower than permitted category temperature with considering the category voltage U_C .

8. Pulse loading

The capacitors charged with un-sinusoidal voltage pulses with quick rise (high du/dt) will be loaded with high current pulses. Because of overloading of internal contacts and connections in capacitor the current must be limited. The boundary current for single types of capacitors depend on:

- amplitude and shape of pulse
- rated voltage of capacitor
- capacitance
- geometrical shape of capacitor.

At the repeating pulses the current loading will be limited by self-heating, surrounding temperature and cooling.

The limit of allowed current loading is given with allowed voltage rise in time (du/dt) in V/ μs (volts per microsecond)

$$I_{\max} = C_R \frac{du}{dt}$$

C_R = rated capacitance in μF

du/dt = allowed pulse loading in $\text{V}/\mu\text{s}$

At single types of capacitors the data of allowed pulse loading is valuable for unlimited number of pulses (charging and discharging of capacitors) up to rated voltage U_R . Minimum resistance in series with capacitor is then:

$$R = \frac{U_R}{C_R \cdot du/dt}$$

where:

U_R = rated voltage of the capacitor in V

C_R = rated capacitance in μF

R = min. series resistance in Ohm

At the pulses of lower voltage than rated voltage the given values of allowed pulse loading are to multiply with the relation factor rated voltage/pulse voltage.

If the demanded pulse loading of the capacitor comply with the requests in certain case, the control is needed to be sure that power loss is not exceeded, resp. self-heating is in area of allowed pulse loading max. 15°C . In critical cases the capacitor surface temperature is to measure and temperature fall of 5°C inside capacitor is to consider.

9. Disipation factor $\tan\delta$

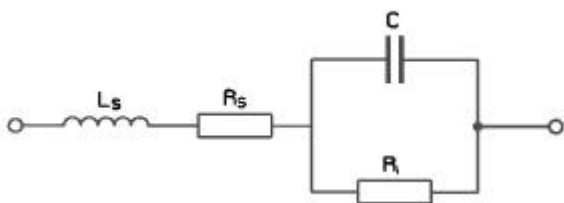
Every capacitor has beside desired capacitance also of her electrical properties, which are shown as constituent elements in following by connection:

L_s - serial inductance

R_s - serial resistnace

R_i - insulation resistance (parallel resistance)

C - capacitance



The real capacitor has always incorrecntnesses as serial inductance L_s and loss resistance R_s and R_i . The inductance can be reduced but not to zero. At certain frequency f_0 the capacitance and inductance reactances are equal:

$$\frac{1}{\omega_0 C} = \omega_0 L \quad \text{where} \quad \omega_0 = 2\pi \cdot f_0$$

At frequencys higher than f_0 (the resonant frequency) the inductive component prevail. The resistance R_s is the resistance of the capacitor's wires, transitional resistance of electrode contacting, the resistance of capacitor electrodes and polarisation losses in capacitor dielectric. Resistance R_i is insulating resistance depending on insulating properties of dielectric in capacitor.

Values R_s and R_i determine losses in capacitor and depend on temperature, frequency, voltage and capacitance and cause heating of capacitor. The resistance R_i is much bigger then the resistance R_s so we can change both resistances only with equivalent serial resistance of capacitor ESR.

The relation between equivalent serial resistance of capacitor ESR and his reactance $1/\omega C$ is dissipation factor of capacitor and is marked with $\tan\delta$.

$$\tan\delta = \text{ESR} \cdot \omega \cdot C$$

The values of dissipation factor ($\tan\delta$) are given at single types of capacitors in catalogue.

10. Insulation resistance R_i

Insulation resistance of capacitor is given as resistance R_i in $\text{M}\Omega$ or as time constant in seconds $R_i \cdot C_R = \text{M}\Omega \cdot \mu\text{F}$.

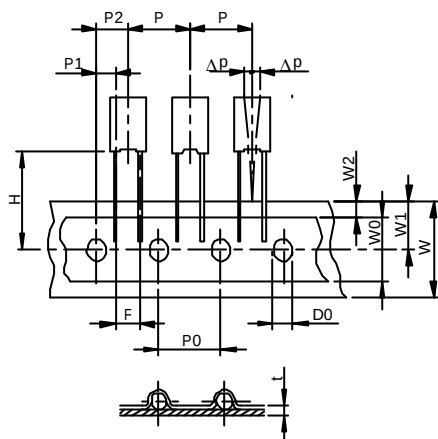
The insulation resistance is the relation between the applied direct voltage and the current, after precise determined time. The limited values for insulation resistance are given for testing time 60 sec. at 20°C .

Test voltages in accordance to rated voltages are as follow:

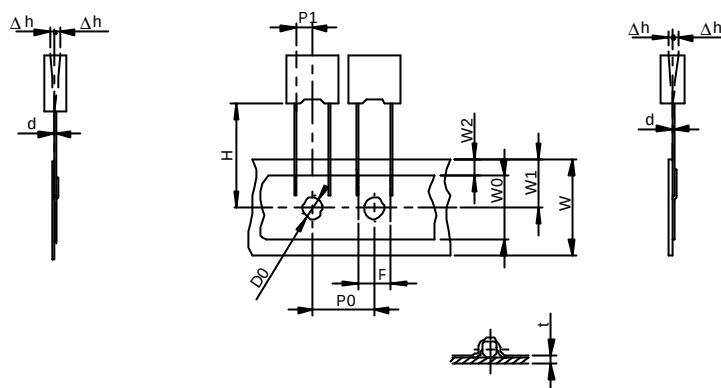
Rated voltage U_R	$< 100 \text{ V}$	$100 \text{ V} \leq U_R < 500 \text{ V}$	$\geq 500 \text{ V}$
Test voltage	10 V	100 V	500 V

Taping specification for radial capacitors acc. to IEC 60286-2

Lead spacing 5 mm



Lead spacing 7.5 mm

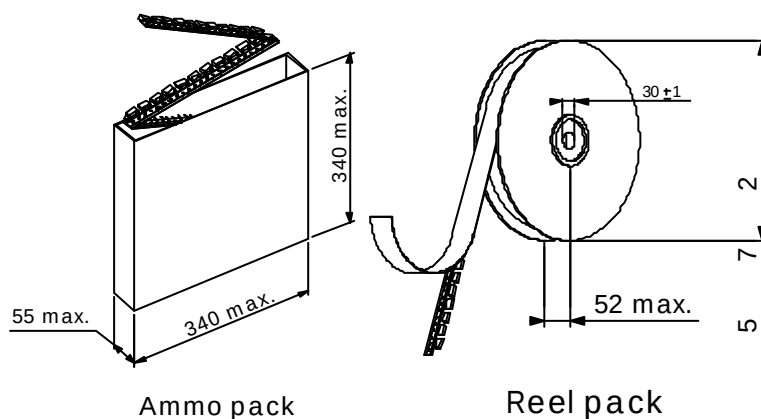


Descriptions	Symbol	Dimensions (mm)		
		Lead spacing 5 mm	Lead spacing 7.5 mm	Tolerances
Carrier tape width	W	18	18	+1/-0.5
Hold-down tape width	W ₀	12	12	±0.5
Hold-down position	W ₁	9	9	±0.5
Hold-down tape position	W ₂	3 max.	3 max.	
Feed hole diameter	D ₀	4	4	±0.2
Pitch of component	P	12.7	12.7	±1
Feed hole pitch	P ₀ *	12.7	12.7	±0.3
Feed hole centre to lead	P ₁	3.85	3.75	±0.7
Feed hole centre to component centre	P ₂	6.35	12.7	±1.3
Height from feed hole centre to the component body	H	18.5	18.5	±0.5
Component alignment	Δp	0	0	±1.3
	Δh	0	0	±2
Lead spacing	F	5	7.5	+0.6/-0.1
Lead wire diameter	d	0.5; 0.6	0.6	±0.5
Total tape thickness	t	0.7	0.7	±0.2

* Cumulative pitch error over any 20 pitches: max. ±1mm

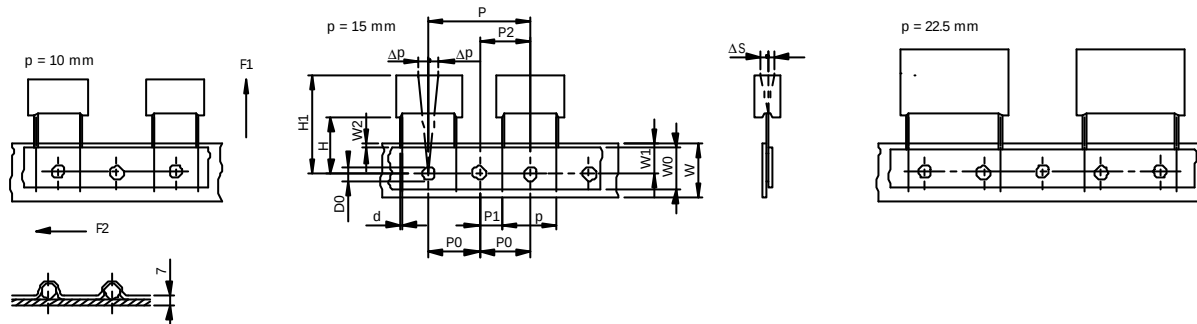
Package units for radial taped film capacitors:

KEU 1940 taped, KEU 1930 taped



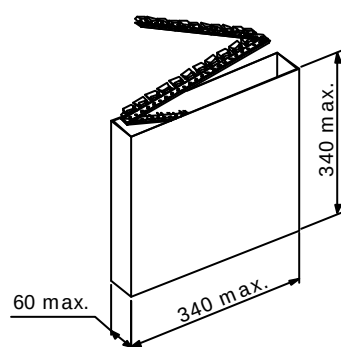
Capacitor thickness b (mm)	Ammo-pack (pcs/box)	Reel-pack (pcs/reel)
2.5	3100	1400
3.5	2250	1000
4	1900	850
4.5	1700	750
5	1550	700
6	1300	600

Taping specification for radial capacitors acc. to IEC 60286-2

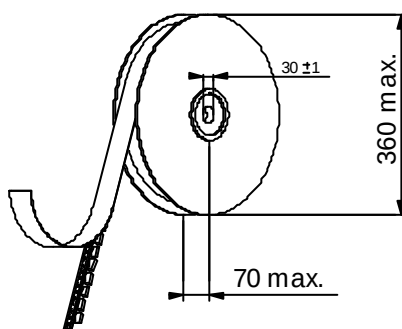


Descriptions	Symbol	Dimensions (mm)			
		Lead spacing 10 mm	Lead spacing 15 mm	Lead spacing 22.5 mm	Tolerances
Carrier tape width	W	18	18	18	+1/-0.5
Hold-down tape width	W ₀	12 or 6	12 or 6	12 or 6	±0.5
Hotel position	W ₁	9	9	9	±0.5
Hold-down tape position	W ₂	3	3	3	max
Feed hole diameter	D ₀	4	4	4	±0.2
Pitch of component	P	25.4	25.4	38.1	±1
Feed hole pitch	P ₀ *	12.7	12.7	12.7	±0.2
Feed hole centre to lead	P ₁	7.7	5.2	7.8	±0.7
Feed hole centre to component centre	P ₂	12.7	12.7	19.05	±1.3
Height from feed hole centre to the component body	H	18.5	18.5	18.5	±0.5
Component alignment	Δp	0	0	0	±1.3
	ΔS	0	0	0	±2
Lead spacing	p	10	15	22.5	+0.6/-0.1
Lead wire diameter	d	0.6	0.8	0.8	±0.5
Total tape thickness	t	0.7	0.7	0.7	±0.2
Extraction force for components	F ₁	5	5	5	min. (N)
Break force of the tape	F ₂	15	15	15	min. (N)
Component height	H ₁	31	34	39	max

* Cumulative pitch error over any 20 pitches: max. ±1mm



Ammo pack

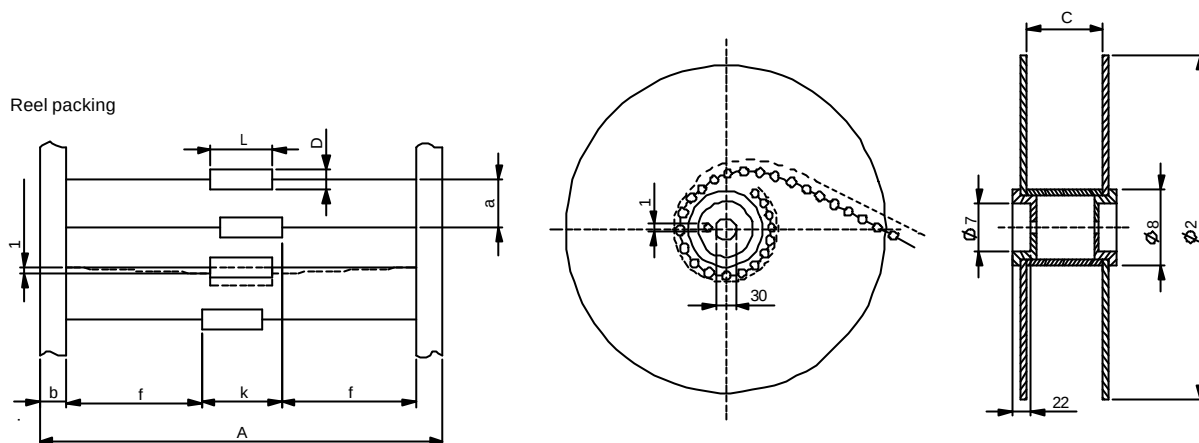


Reel pack

Taped package units

Pitch (mm)	Capacitor thickness b (mm)	Ammo-pack (pcs/box)	Reel-pack (pcs/reel)
10	4; 4.3	900	900
	5	768	700
	6	648	550
15	5	768	600
	5.5	696	600
	6	648	500
	7	552	450
	7.5	504	400
	8.5	444	350
22.5	9	420	350
	6	424	350
	6.5	392	350
	7	368	300
	8.5	304	250
	10	256	200
	10.5	240	200

Taping specification for axial capacitors acc. to IEC 60286-1



Reel packing

Description	Symbol	Dimensions (mm)
Capacitor diameter	D	4.5 ... 19.5
Body length of capacitor	L	11 ... 33.5
Outer spacing of tapes	A	See table II ⁵
Inner reel width	C	See table II
Tape width	b	6±1
Lead length from the capacitor body to the adhesive tape	f	≥ 20 mm
Body location (permissible lateral deviation)	k	$L_{\max} + 1.4$
Component spacing	a	See table I
Permissible deviation over 10 spacing	Δa	See table I

Table I

D (mm)	a (mm)	Δa (mm)
≤ 5	5±0.5	±2
5.1 ... 9.5	10±0.5	±2
9.6 ... 14.7	15±0.75	±3
14.8 ... 19.5	20±1	±4

Table II

L _{max} (mm) Body length	A (mm)	C (mm)
≤ 11	75±2	77
14 ... 21.5	85±2	87
≥ 26.5	95±2	97

5

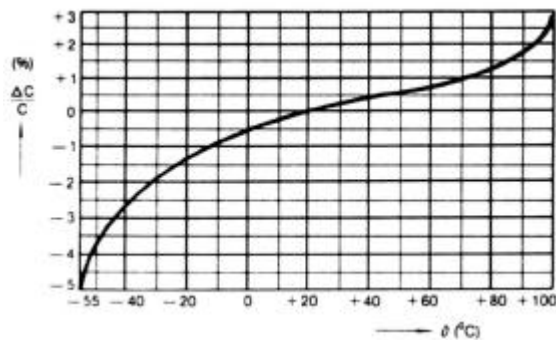
Capacitors: Type KFU Polyester capacitors

As dielectric high quality polyester film is used, electrodes are of tin or aluminium foil. The winding is extended foil design, terminals are electrically welded to electrodes on frontal side. Such version is little inductive and because of good contacting suitable for pulse loading operation.

Typical electrical characteristics of polyester capacitors KFU

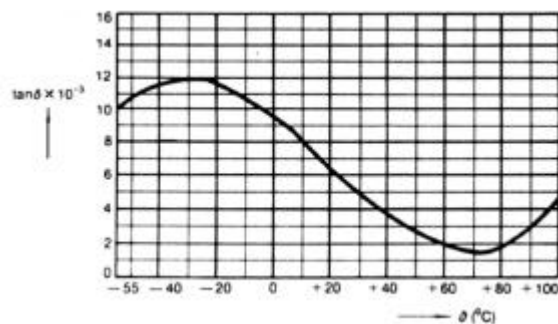
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(T) \text{ at } 1 \text{ kHz}$$



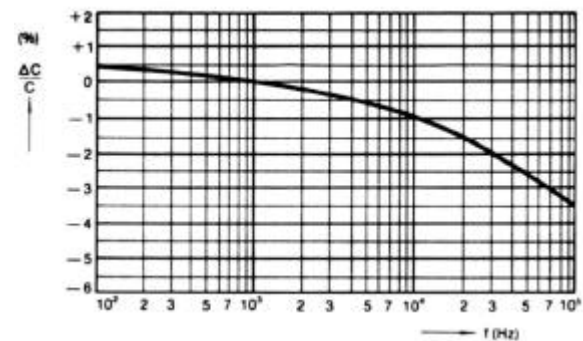
Variation of dissipation factor (tanδ) as a function of temperature

$$\tan \delta = f(T) \text{ at } 1 \text{ kHz}$$



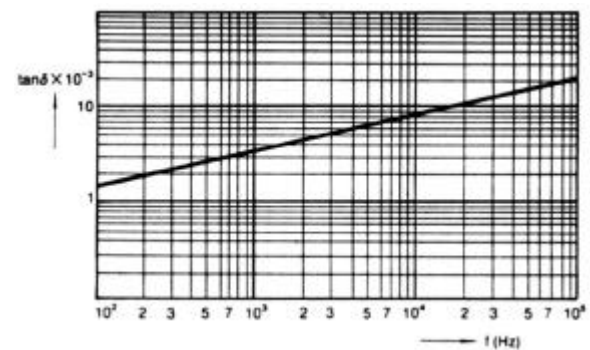
Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



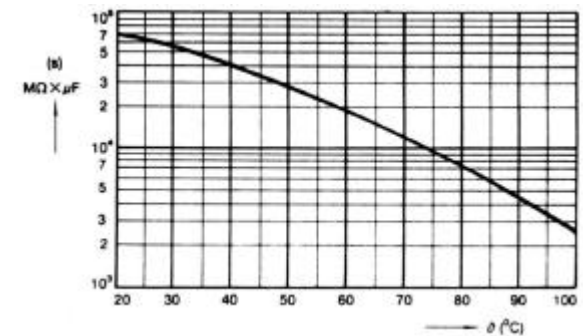
Variation of dissipation factor (tanδ) as a function of frequency

$$\tan \delta = f(f)$$



Variation of insulation resistance as a function of temperature

$$R_i = f(T)$$



Capacitors: Type **KFU 1910**

radial leads, pitch 10mm to 27.5 mm

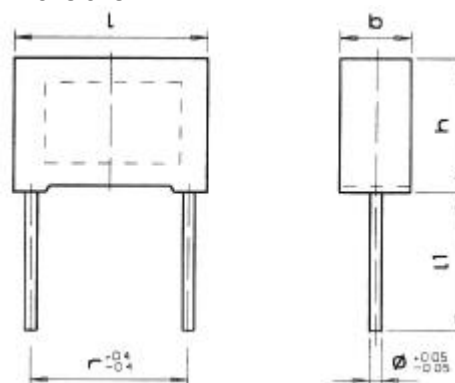
Technical data

General technical data

Dielectric: polyester (polyethyleneterephthalate) film
Electrodes: tin or aluminium foil
Winding: non-inductive construction, flat shape
Leads: tinned copper wire; standard lengths l_1 : $4^{\pm 0.5}$, 6^{-1} , $25^{\pm 5}$. Other lead lengths on request.
Encapsulation: flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking: Iskra symbol, capacitance, tolerance, rated voltage
Climatic category: 55/100/56, IEC 60068-1
Temperature range: -55°C to $+100^{\circ}\text{C}$
Complies with standards: IEC 60384-11



Dimensions in mm



Diameter of leads:

Pitch r (mm)	Diameter of leads: φ (mm)
10	0.6
15; 22.5; 27.5	0.8

Electrical data

Capacitance range: 1000 pF to 1 μF
Standard values of capacitance (C_R): range E6
Capacitance tolerance: $\pm 20\%$ (M), $\pm 10\%$ (K)
Rated voltage (U_R): 100 V DC, 250 V DC, 400 V DC, 630 V DC, 1000 V DC
Allowed alternative voltage up 60Hz: 63 V AC, 100 V AC, 160 V AC, 200 V AC, 250 V AC
Category voltage (U_C): to $+85^{\circ}\text{C}$ $U_C = U_R$; from $+85^{\circ}\text{C}$ to $+100^{\circ}\text{C}$ voltage U_R is lowered for 1.25% per 1°C
Test voltage: $2 \times U_R$, 2 s.
Dissipation factor ($\tan \delta$): $\leq 60 \times 10^{-4}$ at 1 kHz at 20°C
Insulation resistance (R_R): $\geq 30\,000\,\text{M}\Omega$ for $C_R \leq 0.33\,\mu\text{F}$;
 $R_i \times C_R \geq 10\,000\,\text{s.}$, for $C_R > 0.33\,\mu\text{F}$
Self inductance: appr. 10 nH/cm length of capacitor and leads
Soldering on printed circuit boards: temperature of soldering bath 265°C max. soldering time 5 s max.
Pulse loading (du/dt): 1000 V/μs

Type: KFU 1910

Dimensional data:

Capa- citan- ce	Rated voltage U_R																			
	100 V DC				250 V DC				400 V DC				630 V DC				1000 V DC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)			
1000 pF													13	9,5	4,3	10	18	11	5,5	15
1500 pF													13	9,5	4,3	10	18	11	5,5	15
2200 pF													13	9,5	4,3	10	18	11	5,5	15
3300 pF													13	9,5	4,3	10	18	13	7	15
4700 pF									13	9,5	4,3	10	13	10,5	5	10	18	13	7	15
6800 pF									13	9,5	4,3	10	13	11,5	6	10	18	14,5	9	15
0.01 μ F									13	10,5	5	10	13	11,5	6	10	18	14,5	9	15
0.015 μ F					13	10,5	5	10	13	11,5	6	10	18	13	7	15	27	16,5	7	22,5
0.022 μ F	13	9,5	4,3	10	13	10,5	5	10	18	11	5,5	15	18	13	7	15	27	18,5	8,5	22,5
0.033 μ F	13	10,5	5	10	18	11	5,5	15	18	13	7	15	18	14,5	9	15	27	19	10,5	22,5
0.047 μ F	13	11,5	6	10	18	11	5,5	15	18	14,5	9	15	27	15	6,5	22,5	32	20	11	27,5
0.068 μ F	18	11	5,5	15	18	13	7	15	27	15	6,5	22,5	27	18,5	8,5	22,5	32	22,5	13	27,5
0.1 μ F	18	13	7	15	18	14,5	9	15	27	18,5	8,5	22,5	27	19	10,5	22,5				
0.15 μ F	18	14,5	9	15	27	16,5	7	22,5	27	19	10,5	22,5	32	20	11	27,5				
0.22 μ F	18	14,5	9	15	27	18,5	8,5	22,5	32	20	11	27,5	32	22,5	13	27,5				
0.33 μ F	27	18,5	8,5	22,5	32	20	11	27,5	32	22,5	13	27,5								
0.47 μ F	27	19	10,5	22,5	32	22,5	13	27,5												
0.68 μ F	32	20	11	27,5																
0.82 μ F	32	20	11	27,5																
1 μ F	32	22,5	13	27,5																

Capacitors: Type KEU Metallized polyester capacitors

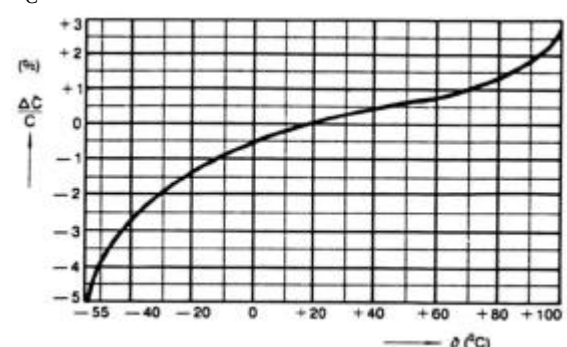
As a dielectric high quality polyester film with good electrical properties is used. Electrodes of capacitor are vacuum metallized aluminium. The thickness of aluminium is approximately 0.01 μm to 0.04 μm , so the capacitor is self-regenerative after break down. The weak point in dielectric because of un-homogeneous material in some microseconds regenerate with energy of current bow of charged capacitor. In this process metallized layer of aluminium in the area of weak point without any damage of dielectric burns out. The weak point is blameless insulated. So metallized capacitor withstands breakdowns without a permanent short circuit with considering self healing resp. regeneration. The majority of weak points are cleared during the high voltage burning-out in the manufacturing process.

Contact surface is made by spraying the parts of metal contact material. Leads are electrically welded on contact surface. The technology and control system in production assure high liability of capacitors also in use on low voltages and high frequencies. In the case of pulse loading or loading the capacitor with alternative voltage of high gradient of growth is to consider allowed pulse loading du/dt resp. maximal allowed current.

Typical electrical characteristics of metallized polyester capacitors KEU

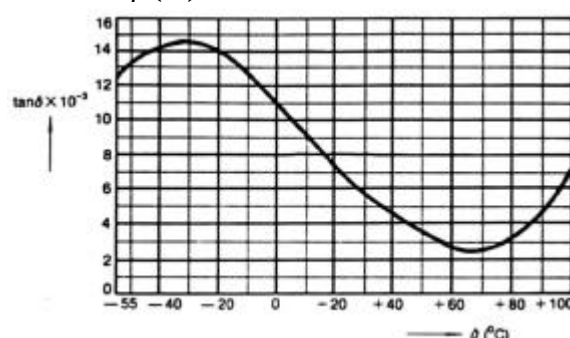
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(J) \text{ at } 1 \text{ kHz}$$



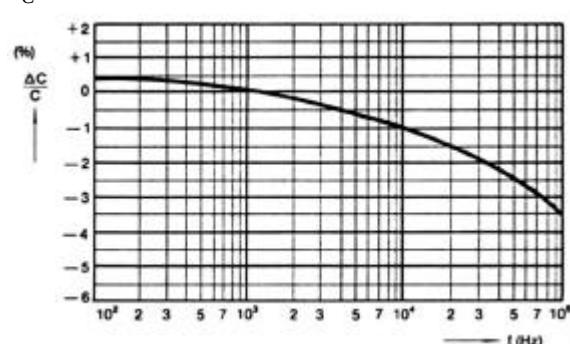
Variation of dissipation factor ($\tan\delta$) as a function of temperature

$$\tan \delta = f(J) \text{ at } 1 \text{ kHz}$$



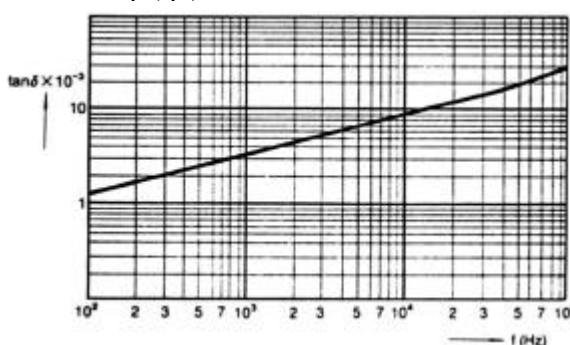
Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



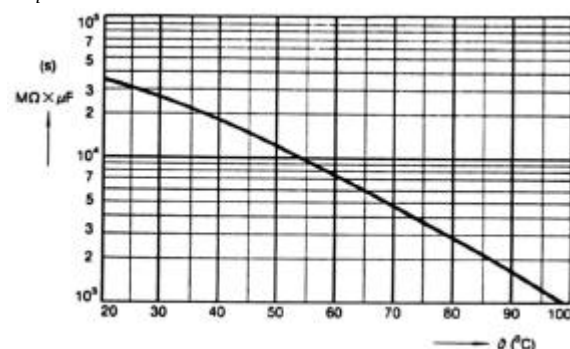
Variation of dissipation factor ($\tan\delta$) as a function of frequency

$$\tan \delta = f(f)$$



Variation of insulation resistance as a function of temperature

$$R_i = f(J)$$



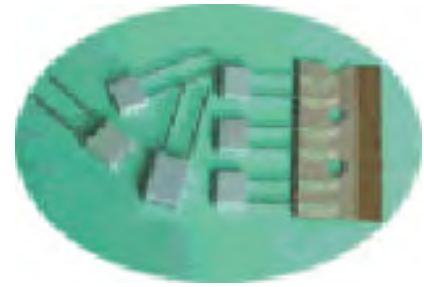
Capacitors: Type KEU 1940
Type KEU 1940 taped

radial leads, pitch 5mm

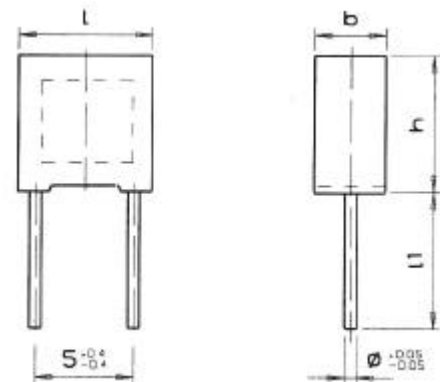
Technical data

General technical data

Dielectric: polyester (polyethyleneterephthalate) film
Electrodes: vacuum metallized aluminium on dielectric
Winding: non-inductive construction, flat shape
Leads: tinned copper wire; standard lengths l_1 : $4^{\pm 0.5}$; 6^{-1} ; $16^{+2.1}$. Other lead lengths on request.
Encapsulation: flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking: capacitance, tolerance, rated voltage
Climatic category: 55/100/56, IEC 60068-1
Temperature range: -55°C to $+100^{\circ}\text{C}$
Complies with standard: IEC 60384-2



Dimensions in mm
KEU 1940



b(mm)	ϕ (mm)
2.5	0.5
>2.5	0.6

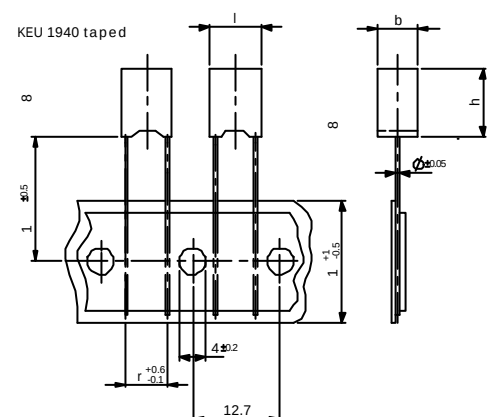
Electrical data

Capacitance range: 1000 pF to 1,5 μF
Standard values of capacitance (C_R): range E6
Capacitance tolerance: $\pm 20\%$ (M), $\pm 10\%$ (K) and $\pm 5\%$ (J) on special request
Rated voltage (U_R): 50 V DC, 63 V DC, 100 V DC, 250 V DC, 400 V DC
Allowed alternative voltage up to 60 Hz: 30 V AC, 40 V AC, 63 V AC, 160 V AC, 200 V AC
Category voltage (U_C): up to $+85^{\circ}\text{C}$ $U_C = U_R$; from $+85^{\circ}\text{C}$ to $+100^{\circ}\text{C}$ voltage U_R is lowered for 1.25% per 1°C
Test voltage: $1.6 \times U_R$, 2 s
Dissipation factor ($\tan \delta$): $\leq 80 \times 10^{-4}$ at 1 kHz and 20°C
Self inductance: ≤ 6 nH at leads length 2 mm
Soldering on printed circuit boards: temperature of soldering bath 270°C max., soldering time 5 s max.
Pulse loading (du/dt):
10 V/ μs for $U_R = 50$ V DC
15 V/ μs for $U_R = 63$ V DC
22 V/ μs for $U_R = 100$ V DC
35 V/ μs for $U_R = 250$ V DC
60 V/ μs for $U_R = 400$ V DC

Insulation resistance (R_i) at 20°C :

Rated capacitance	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100$ V DC	$U_R \leq 100$ V DC
$\leq 0.33 \mu\text{F}$	7500 M Ω	3750 M Ω
$> 0.33 \mu\text{F}$		1250 s

KEU 1940 taped



Type: KEU1940
Dimensional data:

Capa- citan- ce (μ F)	Rate voltage U_R														
	50 V DC			63 V DC			100 V DC			250 V DC			400 V DC		
	l	h	b	l	h	b	l	h	b	l	h	b	l	h	b
	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
	(mm)			(mm)			(mm)			(mm)			(mm)		
0,001							7,5	6,5	2,5	7,5	6,5	2,5	7,5	6,5	2,5
0,0015							7,5	6,5	2,5	7,5	6,5	2,5	7,5	6,5	2,5
0,0022							7,5	6,5	2,5	7,5	6,5	2,5	7,5	6,5	2,5
0,0033							7,5	6,5	2,5	7,5	6,5	2,5	7,5	6,5	2,5
0,0047							7,5	6,5	2,5	7,5	6,5	2,5	7,5	6,5	2,5
0,0068							7,5	6,5	2,5	7,5	6,5	2,5	7,5	8	3,5
0,01							7,5	6,5	2,5	7,5	6,5	2,5	7,5	8	3,5
0,015							7,5	6,5	2,5	7,5	6,5	2,5	7,5	9	4
0,022							7,5	6,5	2,5	7,5	8	3,5	7,5	10	4,5
0,033							7,5	6,5	2,5	7,5	8	3,5	7,5	10	5
0,047							7,5	6,5	2,5	7,5	9	4	7,5	11	6
0,068				7,5	6,5	2,5	7,5	8	3,5	7,5	10	4,5			
0,1				7,5	6,5	2,5	7,5	8	3,5	7,5	10	5			
0,15	7,5	6,5	2,5	7,5	8	3,5	7,5	9	4	7,5	11	6			
0,22	7,5	8	3,5	7,5	8	3,5	7,5	10	5						
0,33	7,5	8	3,5	7,5	10	4,5	7,5	11	6						
0,47	7,5	10	4,5	7,5	10	5									
0,68	7,5	10	5	7,5	11	6									
1	7,5	11	6												

Alternative dimensions on special request

0,22	7,5	6,5	2,5			
0,33				7,5	8	3,5
0,47	7,5	9	4	7,5	10	4,5
0,68	7,5	10	4,5	7,5	10	5
1	7,5	10	5	7,5	11	6
1,5	7,5	11	6			

Taped version details data see page 9

Capacitors: Type KEU 1930
Type KEU 1930 taped

radial leads, pitch 7.5mm

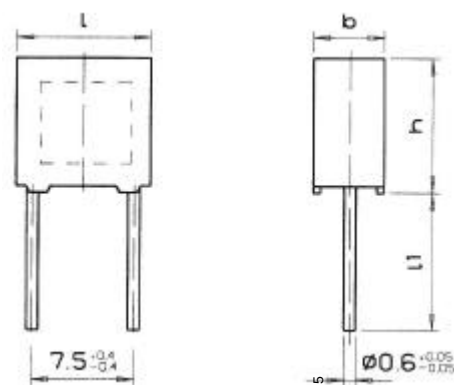
Technical data

General technical data

Dielectric: polyester (polyethyleneterephthalate) film
Electrodes: vacuum metallized aluminium on dielectric
Winding: non-inductive flat shape
Leads: tinned copper wire; standard lengths l_1 : $4^{\pm 0.5}$, 6^{-1} , $25^{\pm 5}$. Other lead lengths on request.
Encapsulation: flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking: capacitance, tolerance, rated voltage
Climatic category: 55/100/56, IEC 60068-1
Temperature range: -55°C to +100°C
Complies with standard: IEC 60384-2



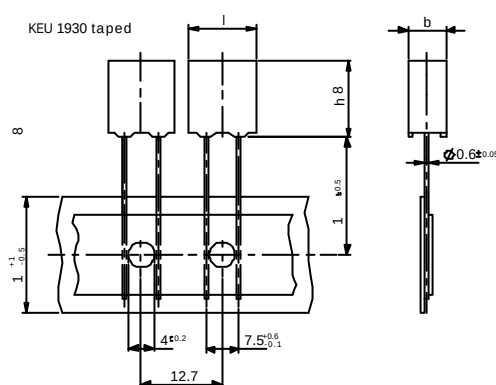
Dimensions in mm
KEU 1930



Electrical data

Capacitance range: 1000pF to 1µF
Standard values of capacitance (C_R): range E6
Capacitance tolerance: $\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J) on special request
Rated voltage (U_R): 63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC
Allowed alternative voltage up to 60 Hz: 40 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC
Category voltage (U_C): to +85°C $U_C = U_R$; from +85°C to +100°C voltage U_R is lowered for 1.25% per 1°C
Test voltage: $1.6 \times U_R$ 2 s
Dissipation factor ($\tan \delta$): $\leq 100 \times 10^{-4}$ at 1 kHz and 20°C
Self inductance ≤ 10 nH at leads length 2 mm
Soldering on printed circuit board: temperature of soldering bath 270°C max., soldering time 5 s max.
Pulse loading (du/dt):
10 V/µs for $U_R = 63$ V DC
15 V/µs for $U_R = 100$ V DC
30 V/µs for $U_R = 250$ V DC
50 V/µs for $U_R = 400$ V DC
70 V/µs for $U_R = 630$ V DC

KEU 1930 taped



Insulation resistance (R_i) at 20°C:

Rated capacitance	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100$ V DC	$U_R \leq 100$ V DC
$\leq 0.33\mu\text{F}$	7500 MΩ	3750 MΩ
$> 0.33\mu\text{F}$	2500 s	1250 s

KEU 1930
Dimensional data:

Capa- citan- ce (μ F)	Rated voltage U_R														
	63 V DC			100 V DC			250 V DC			400 V DC			630 V DC		
	l	h	b	l	h	b	l	h	b	l	h	b	l	h	b
	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
		(mm)		(mm)			(mm)			(mm)			(mm)		
0,001													10,5	6,5	3,5
0,0015													10,5	6,5	3,5
0,0022													10,5	6,5	3,5
0,0033													10,5	6,5	3,5
0,0047										10,5	6,5	3,5	70,5	9	4
0,0068										10,5	6,5	3,5	10,5	9	4
0,01							10,5	6,5	3,5	10,5	9	4	10,5	11	5
0,015							10,5	6,5	3,5	10,5	9	4	10,5	12	6
0,022							10,5	9	4	10,5	11	5			
0,033				10,5	6,5	3,5	10,5	9	4	10,5	12	6			
0,047				10,5	6,5	3,5	10,5	9	4						
0,068	10,5	6,5	3,5	10,5	9	4	10,5	11	5						
0,1	10,5	6,5	3,5	10,5	9	4	10,5	11	5						
0,15	10,5	6,5	3,5	10,5	9	4	10,5	12	6						
0,22	10,5	9	4	10,5	11	5									
0,33	10,5	9	4	10,5	12	6									
0,47	10,5	11	5												
0,68	10,5	11	5												
1	10,5	12	6												

Taped version details data see page 9

Capacitors: Type KEU 1910

radial leads, pitch 10mm to 27.5mm

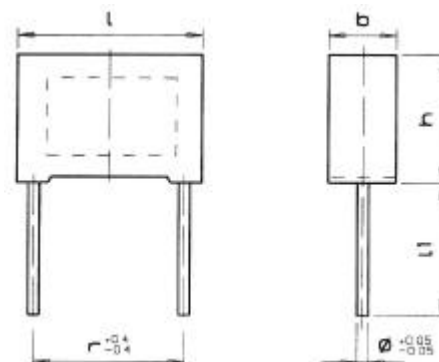
Technical data

General technical data

Dielectric:	polyester (polyethyleneterephthalate) film
Electrodes:	vacuum metallized aluminium on dielectric
Winding:	non-inductive construction flat shape
Leads:	tinned copper wire; standard lengths l_1 : $4^{\pm 0.5}$, 6^{-1} , $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking:	Iskra symbol, capacitance, tolerance, rated voltage
Climatic category:	55/100/56, IEC 68-1
Temperature range:	-55°C to $+100^{\circ}\text{C}$
Complies with standard:	IEC 60384-2



Dimensions in mm



Diameter of leads:

Pitch r (mm):	Diameter of leads ϕ (mm):
10	0.6
15; 22.5; 27.5	0.8

Electrical data

Capacitance range:	1000pF to 22 μF
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J) on special request
Rated voltage (U_R):	63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC, 1000VDC
Allowed alternative voltage up to 60Hz:	40 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC, 250 V AC
Category voltage (U_C):	up to $+85^{\circ}\text{C}$ $U_C = U_R$; from $+85^{\circ}\text{C}$ to $+100^{\circ}\text{C}$ voltage U_R is lowered for 1.25% per 1°C
Test voltage:	$1.6 \times U_R$, 2 s
Dissipation factor ($\tan \delta$):	$\leq 80 \times 10^{-4}$ at 1 kHz and 20°C
Self inductance:	10 nH/cm length of capacitor and leads
Soldering on printed circuit board:	temperature of soldering bath 270°C max., soldering time 5 s max.

Insulation resistance (R_i) at 20°C :

Rated capacitance	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100 \text{ V DC}$	$U_R \leq 100 \text{ V DC}$
$\leq 0.33\mu\text{F}$	30000 M Ω	15000 M Ω
$> 0.33\mu\text{F}$	10000 s	5000 s

Pulse loading (du/dt):

U_R	Pitch r (mm)			
	10	15	22.5	27.5
	Allowed pulse loading (V/ μs)			
63 V DC	9	6	3	2.5
100 V DC	12	8	5	4
250 V DC	22	14	9	7
400 V DC	35	20	12	10
630 V DC	45	32	17	13
1000 V DC	90	45	26	20

KEU 1910 Dimensional data:

Capa- cittance (μF)	Rated voltage U _R																							
	63 V DC				100 V DC				250 V DC				400 V DC				630 V DC				1000 V DC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0,001																					13	9	4	10
0,0015																					13	9	4	10
0,0022																					13	9	4	10
0,0033																					13	9	4	10
0,0047																	13	9	4	10	13	9	4	10
0,0068																	13	9	4	10	13	10,5	5	10
0,01													13	9	4	10	13	9	4	10	13	11,5	6	10
0,015													13	9	4	10	13	9	4	10				
0,022													13	9	4	10	13	10,5	5	10				
0,033									13	9	4	10	13	9	4	10	13	11,5	6	10				
0,047									13	9	4	10	13	9	4	10								
0,068					13	9	4	10	13	9	4	10	13	10,5	5	10								
0,1					13	9	4	10	13	9	4	10	13	11,5	6	10								
0,15					13	9	4	10	13	9,5	4,3	10												
0,22	13	9	4	10	13	10,5	5	10	13	10,5	5	10												
0,33	13	9	4	10	13	11,5	6	10																
0,47	13	9	4	10																				
0,68	13	9,5	4,3	10																				
1	13	10,5	5	10																				
1,5	13	11,5	6	10																				
0,01																					18	11	5	15
0,015																					18	11	5	15
0,022																					18	11	5,5	15
0,033																	18	11	5	15	18	13	7	15
0,047													18	11	5	15	18	11	5	15	18	15,5	8,5	15
0,068													18	11	5	15	18	12	6	15	18	16,5	8,5	15
0,1									18	11	5	15	18	11	5	15	18	13	7	15				
0,15									18	11	5	15	18	11	5	15	18	14,5	8,5	15				
0,22									18	11	5	15	18	12	6	15	18	18,5	9	15				
0,33					18	11	5	15	18	11	5	15	18	13	7	15								
0,47					18	11	5	15	18	12	6	15	18	14,5	8,5	15								
0,68	18	11	5	15	18	12	6	15	18	13	7	15												
1	18	11	5	15	18	13,5	7,5	15	18	14,5	8,5	15												
1,5	18	11	5	15	18	16,5	8,5	15																
2,2	18	12	6	15																				
3,3	18	13	7	15																				
4,7	18	14,5	8,5	15																				

Taped version details data see page 10

KEU 1910 Dimensional data:

Capa- citan- ce (μ F)	Rated voltage U_R																			
	63 V DC				100 V DC				250 V DC				400 V DC				630 V DC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max	max	max		max	max	max		max	max	max		max	max	max		max	max	max	
	(mm)				(mm)				(mm)				(mm)				(mm)			
0,033																				
0,047																				
0,068																				
0,1																				
0,15																	26,5	15	6	22,5
0,22																	26,5	15	6	22,5
0,33																	26,5	15	6	22,5
0,47																	26,5	16,5	8,5	22,5
0,68																	26,5	18,5	10	22,5
1																	26,5	20,5	11	22,5
1,5					26,5	16	7	22,5	26,5	16	7	22,5	26,5	15	6	22,5				
2,2					26,5	16,5	8,5	22,5	26,5	16,5	8,5	22,5	26,5	15	6	22,5				
3,3	26,5	15	6	22,5	26,5	18,5	10	22,5	26,5	18,5	9	22,5	26,5	16	7	22,5				
4,7	26,5	15	6	22,5																
6,8	26,5	16	7	22,5																
10	26,5	17	8,5	22,5																
15	26,5	20,5	11	22,5																
0,15																				
0,22																				
0,33																	32	17	9	27,5
0,47																	32	19	10	27,5
0,68																	32	21	12	27,5
1																	32	23,5	14	27,5
1,5																	32	26,5	17	27,5
2,2																				
3,3																				
4,7					32	20	11	27,5	32	17	9	27,5	32	19	10	27,5				
6,8					32	22	13	27,5	32	17	9	27,5	32	21	12	27,5				
10	32	17	9	27,5	32	24,5	15	27,5	32	19	10	27,5	32	24,5	15	27,5				
15	32	20	11	27,5	32	28,5	15	27,5	32	21	12	27,5	32	28	18	27,5				
22	32	21	12	27,5					32	28	18	27,5								

Taped version details data see page 10

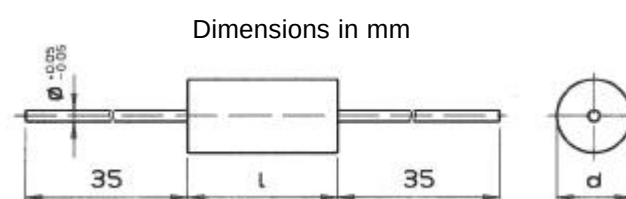
Capacitors: Type KEU 1012

axial leads

Technical data

General technical data

Dielectric:	polyester (polyethyleneterephthalate) film
Electrodes:	vacuum metallized aluminium on dielectric
Winding:	non-inductive construction, cylindric shape
Leads:	tinned cooper wire
Encapsulation:	polyester film, ends sealed with epoxy resin
Marking:	capacitance, tolerance, rated voltage (at larger dimensions also Iskra symbol, type designation)
Climatic category:	55/100/21, IEC 60068-1
Temperature range:	-55 ⁰ C to + 100 ⁰ C
Complies with standard:	IEC 60384-2



Diameter of leads:

Capacitor lenght l_{max} (mm)	Diameter of leads: ϕ (mm)
11;14; 19	0.6
26.5; 31.5	0.8

Electrical data

Capacitance range:	1000 pf to 10 μ F
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J) on special request
Rated voltage (U_R):	63 V DC, 100 V DC, 250 V DC, 400 V DC, 630 V DC, 1000 V DC
Allowed alternative voltage up to 60 Hz:	40 V AC, 63 V AC, 160 V AC, 200 V AC, 220 V AC, 250 V AC
Category voltage (U_C):	up to +85 ⁰ C $U_C = U_R$; from +85 ⁰ C to +100 ⁰ C voltage U_R is lowered for 1.25% per 1 ⁰ C
Test voltage:	$1.6 \times U_R$, 2 s
Dissipation factor ($\tan \delta$):	$\leq 80 \times 10^{-4}$ at 1 kHz and 20 ⁰ C
Self inductance:	10 nH/cm length of capacitor and leads
Soldering on printed circuit boards:	temperature of soldering bath 270 ⁰ C max., soldering time 5 s max.

Insulation resistance (R_i) at 20⁰ C:

Rated capacitance	Min. R_i or $R_i \times C_R$ between terminals	
	$U_R > 100$ V DC	$U_R \leq 100$ V DC
$\leq 0.33 \mu$ F	30000 M Ω	15000 M Ω
$> 0.33 \mu$ F	10000 s	5000 s

Pulse loading (du/dt):

U_R	l_{max} (mm)				
	11	14	19	26.5	31.5
Allowed pulse loading (V/ μ s)					
63 V DC	12	9	6	3	2.5
100 V DC	18	12	8	5	4
250 V DC	32	22	14	9	7
400 V DC	55	35	20	12	10
630 V DC	70	45	32	17	13
1000 V DC	-	90	45	26	20

Type: KEU 1012
Dimensional data:

Capa- citan- ce (μ F)	Rated voltage U_R											
	63 V DC		100 V DC		250 V DC		400 V DC		630 V DC		1000 V DC	
	d	l	d	l	d	l	d	l	d	l	d	l
	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
	(mm)		(mm)		(mm)		(mm)		(mm)		(mm)	
0,001									5	11	5	14
0,0015									5	11	5	14
0,0022									5	11	5	14
0,0033									5	11	5,5	14
0,0047									5	11	6	14
0,0068									5,5	11	7	14
0,01							5	11	5	14	6	19
0,015							5	11	5,5	14	6,5	19
0,022							5	11	6,5	14	7,5	19
0,033							5,5	11	6	19	8,5	19
0,047					5	11	5,5	14	6,5	19	10	19
0,068			5	11	5,5	11	6	14	7,5	19	9	26,5
0,1			5	11	5,5	14	7	14	9	19	10,5	26,5
0,15	5	11	5	11	6	14	6,5	19	8,5	26,5	11,5	31,5
0,22	5	11	6	11	7	14	7,5	19	10	26,5	13,5	31,5
0,33	5,5	11	6	14	6,5	19	9	19	12	26,5	16	31,5
0,47	6	14	6,5	14	7,5	19	8,5	26,5	12,5	31,5	18,5	31,5
0,68	6	14	7,5	14	8,5	19	10	26,5	14,5	31,5		
1	7	14	7	19	8,5	26,5	10,5	31,5	17,5	31,5		
1,5	6,5	19	8,5	19	10	26,5	12,5	31,5				
2,2	7,5	19	9,5	19	11	31,5	15	31,5				
3,3	9	19	9,5	26,5	13	31,5	18	31,5				
4,7	9	26,5	11	26,5	15	31,5						
6,8	10	26,5	12	31,5	18	31,5						
10	10,5	31,5	14	31,5	21	31,5						

Taped version details data see page 11

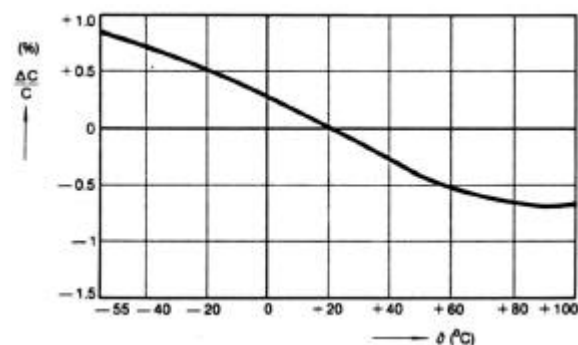
Capacitors: **Type KLI** **Polypropylene capacitors**

As a dielectric a high quality polypropylene film with excellent electrical properties is used. The electrodes are of aluminium foil and vacuum evaporated metal on polypropylene film for internal serial connection. Winding is extended foil design and enables contacting of leads on aluminium electrodes for high currents. Capacitors are suitable for operating in pulse circuits (for instance in TV sets in thyristor or transistor deflection steps) where high pulse loading appear.

Typical electrical characteristics of polypropylene capacitors KLI

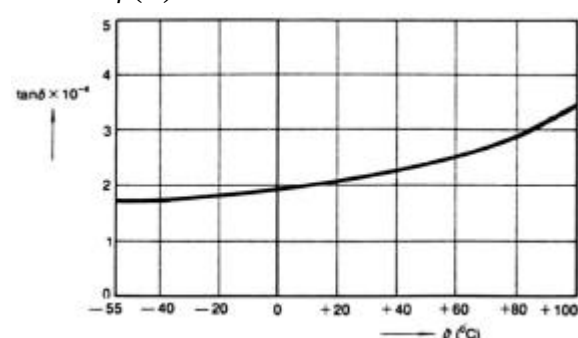
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(T) \text{ at } 1 \text{ kHz}$$



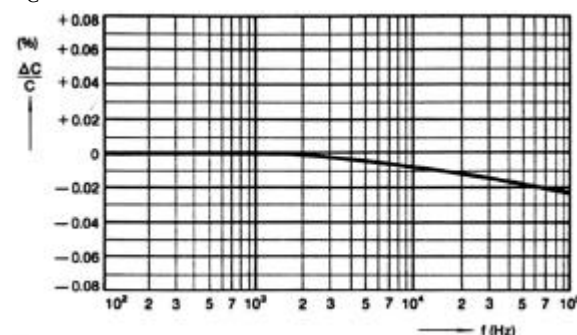
Variation of dissipation factor (tanδ) as a function of temperature

$$\tan \delta = f(T) \text{ at } 1 \text{ kHz}$$



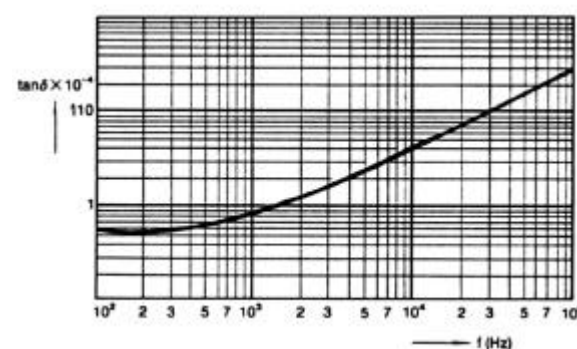
Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



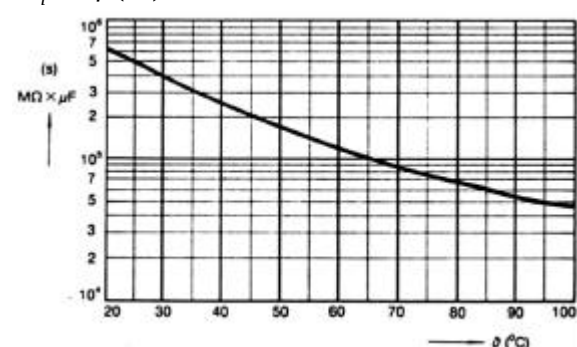
Variation of dissipation factor (tanδ) as a function of frequency

$$\tan \delta = f(f)$$



Variation of insulation resistance as a function of temperature

$$R_i = f(T)$$



Capacitors: Type KLI 1910

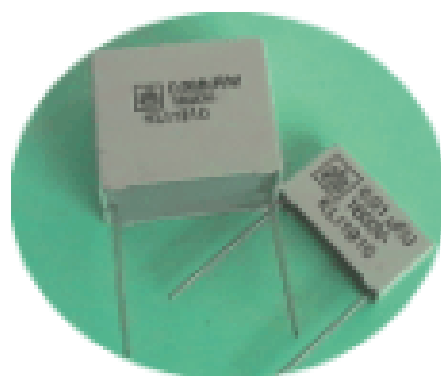
radial leads, pitch 7,5mm to 27.5mm

Typical application:

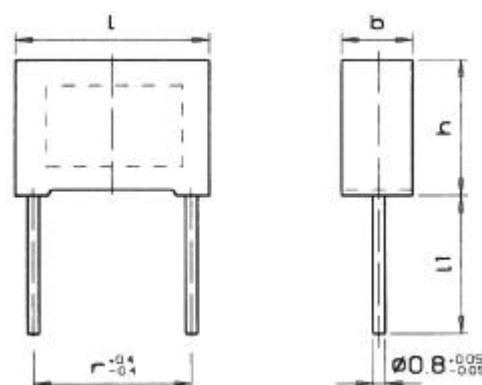
Deflection circuits in TV-sets; switching circuits in electronic ballast; applications with high voltage and very high current.

General technical data

Dielectric:	polypropylene film
Electrodes:	metal foil; metal foil and metallized polypropylene film (internal series connection for $U_R \geq 630V$ DC and $r \geq 15mm$)
Winding:	non-inductive construction, flat shape
Leads:	tinned copper wire, standard lengths l_1 : $4^{\pm 0.5}$; 6^{-1} ; $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking:	Iskra symbol, capacitance, tolerance, rated voltage, type designation
Climatic category:	55/100/56 IEC 60068-1
Temperature range:	$-55^{\circ}C$ to $+100^{\circ}C$
Complies with standard:	IEC 60384-13; IEC 60384-16



Dimensions in mm



Pitch r(mm)	Diameter of lead ϕ (mm)
7,5;10	0.6
15;22,5; 27,5	0.8

Electrical data

Capacitance range:	100 pF to 0.22 μF
Standard values of capacitance (C_R):	range E6 and E12
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J)
Rated voltage (U_R):	100V DC, 160V DC, 250V DC, 400V DC, 630 V DC, 1000 V DC, 1600 V DC, 2000 V DC
Allowed alternative voltage up to 60 Hz:	63V AC, 90V AC, 125V AC, 160V AC, 200V AC (for 630V DC, $r \geq 10mm$), 300 V AC, 400 V AC, 500 V AC, 600 V AC
Category voltage (U_C):	up to $+85^{\circ}C$ $U_C = U_R$; from $+85^{\circ}C$ to $+100^{\circ}C$ voltage U_R is lowered for 1.25% per $1^{\circ}C$
Test voltage:	$2 \times U_R$ (for $U_R \geq 630V$), 2s; $1.6 \times U_R$ (for $U_R \geq 630V$ and $r \geq 15mm$), 2s
Dissipation factor ($\tan \delta$):	$\leq 5 \times 10^{-4}$ at 1kHz and $20^{\circ}C$ $\leq 6 \times 10^{-4}$ at 10kHz and $20^{\circ}C$ $\leq 10 \times 10^{-4}$ at 100kHz and $20^{\circ}C$ for $C_R \leq 0.1\mu F$.
Insulation resistance (R_i) at $20^{\circ}C$:	$\geq 100000 M\Omega$
Soldering on printed circuit board:	temperature of soldering bath $270^{\circ}C$ max., soldering time 5 s max.
Pulse loading (du/dt):	

U_R (V DC)	Pitch r (mm)				
	7.5	10	15	22.5	27.5
	Allowed pulse loading (V/ μs)				
100	9000	4500	2200	-	-
160	11000	5500	2700	-	-
250	18000	9300	4500	-	-
400	25000	13000	6100	-	-
630	31000	16000	8000	3500	2700
1000	-	-	10900	4700	3600
1600	-	-	16400	8200	6100
2000	-	-	20500	10200	7700

Type KLI 1910
Dimensional data - r7,5mm

Capa- citance (μF)	Rated voltage UR																			
	100 V AC/63 V AC				160 V DC/90V AC				250 V DC/125V AC				400 V DC/160V AC				630V DC/200V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)							
0,0001																	10,5	9	4	7,5
0,00015																	10,5	9	4	7,5
0,00022																	10,5	9	4	7,5
0,00033																	10,5	9	4	7,5
0,00047																	10,5	9	4	7,5
0,00068																	10,5	9	4	7,5
0,001													10,5	9	4	7,5	10,5	9	4	7,5
0,0015													10,5	9	4	7,5	10,5	11	5	7,5
0,0022									10,5	9	4	7,5	10,5	11	5	7,5	10,5	12	6	7,5
0,0033					10,5	9	4	7,5	10,5	9	4	7,5	10,5	12	6	7,5				
0,0047					10,5	9	4	7,5	10,5	11	5	7,5								
0,0068	10,5	9	4	7,5	10,5	9	4	7,5	10,5	12	6	7,5								
0,01	10,5	9	4	7,5	10,5	11	5	7,5												
0,015	10,5	11	5	7,5	10,5	12	6	7,5												
0,022	10,5	12	6	7,5																

Taped version details data see page 9

Type KLI 1910

Dimensional data - r10mm in 15mm

Capa- citan- ce (μF)	Rated voltage UR																			
	100 V DC/63 V AC				160 V DC/90V AC				250 V DC/125V AC				400 V DC/160V AC				630V DC/V200 AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)							
0,0015																	13	9	4	10
0,0022													13	9	4	10	13	10,5	5	10
0,0033									13	9	4	10	13	10,5	5	10	13	11,5	6	10
0,0047									13	9	4	10	13	10,5	5	10	13	12	6	10
0,0068					13	9	4	10	13	10,5	5	10	13	11,5	6	10				
0.01					13	9	4	10	13	11,5	6	10								
0,015	13	9	4	10	13	10,5	5	10												
0,022	13	10,5	5	10	13	11,5	6	10												
0,033	13	11,5	6	10																
0,01													18	11	5	15				
0,015									18	11	5	15	18	12	6	15				
0,022									18	11	5,5	15	18	13,5	7,5	15				
0,033					18	11	5	15	18	12	7	15	18	16,5	8,5	15				
0,047	18	11	5	15	18	11	5,5	15	18	13,5	7,5	15	18	18,5	9	15				
0,068	18	12	6	15	18	12	7	15												
0,1	18	12	7	15	18	13,5	7,5	15												
0,15	18	14,5	8,5	15																

Taped version details data see page 10

Type KLI 1910

Dimensional data - r15mm - Interanl series connection

Capa- citan- ce (μF)	Rated voltage U _R															
	630 V DC/300 V AC				1000V DC/400V AC				1600 V DC/500V AC				2000 V DC/600V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)			
0,001					18	11	5	15	18	11	5	15	18	11	5	15
0,0012					18	11	5	15	18	11	5	15	18	11	5	15
0,0015					18	11	5	15	18	11	5	15	18	11	5	15
0,0018					18	11	5	15	18	11	5	15	18	11	5	15
0,0022					18	11	5	15	18	11	5	15	18	11	5,5	15
0,0027					18	11	5	15	18	11	5	15	18	12	6	15
0,0033	18	11	5	15	18	11	5	15	18	11	5,5	15	18	13	7	15
0,0039	18	11	5	15	18	11	5	15	18	12	6	15	18	13	7	15
0,0047	18	11	5	15	18	11	5	15	18	13	7	15	18	14,5	8,5	15
0,0056	18	11	5	15	18	11	5	15	18	13	7	15	18	14,5	9	15
0,0068	18	11	5	15	18	11	5,5	15	18	13,5	7,5	15				
0,0082	18	11	5	15	18	12	6	15	18	14,5	8,5	15				
0,01	18	11	5,5	15	18	13	7	15								
0,012	18	12	6	15	18	13,5	7,5	15								
0,015	18	13	7	15	18	14,5	8,5	15								
0,018	18	13	7	15	18	16,5	8,5	15								
0,022	18	14,5	8,5	15												
0,027	18	16,5	8,5	15												

Taped version details data see page 10

Type KLI 1910**Dimensional data - r22,5mm - Internal series connection**

Capa- citan- ce (μF)	Rated voltage U _R															
	630 V DC/300 V AC				1000V DC/400V AC				1600 V DC/500V AC				2000 V DC/600V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)			
0,0068													26,5	15	6	22,5
0,0082													26,5	16	7	22,5
0,01									26,5	15	6	22,5	26,5	16,5	7,5	22,5
0,012									26,5	16	7	22,5	26,5	17	8,5	22,5
0,015									26,5	16,5	7,5	22,5	26,5	18,5	9	22,5
0,018									26,5	17	8,5	22,5	26,5	20,5	11	22,5
0,022					26,5	15	6	22,5	26,5	18,5	9	22,5				
0,027					26,5	16	7	22,5	26,5	20,5	11	22,5				
0,033	26,5	15	6	22,5	26,5	16	7	22,5								
0,039	26,5	15	6	22,5	26,5	17	8,5	22,5								
0,047	26,5	16	7	22,5	26,5	18,5	9	22,5								
0,056	26,5	16,5	7,5	22,5	26,5	18,5	10	22,5								
0,068	26,5	17	8,5	22,5	26,5	20,5	11	22,5								
0,082	26,5	18,5	9	22,5												
0,1	26,5	20,5	11	22,5												

Taped version details data see page 10

Type KLI 1910

Dimensional data - r27,5mm - Internal series connection

Capa- citan- ce (μF)	Rated voltage UR															
	630 V DC/300 V AC				1000V DC/400V AC				1600 V DC/500V AC				2000 V DC/600V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)			
0,022													32	19	10	27,5
0,027													32	20	11	27,5
0,033									32	19	10	27,5	32	21	12	27,5
0,039									32	20	11	27,5	32	23,5	14	27,5
0,047									32	21	12	27,5	32	24,5	15	27,5
0,056									32	23,5	14	27,5				
0,068									32	24,5	15	27,5				
0,082					32	19	10	27,5	32	26,5	17	27,5				
0,1					32	21	12	27,5	32	28	18	27,5				
0,12	32	19	10	27,5	32	21	12	27,5								
0,15	32	20	11	27,5	32	23,5	14	27,5								
0,18	32	21	12	27,5	32	26,5	17	27,5								
0,22	32	23,5	14	27,5	32	26,5	17	27,5								

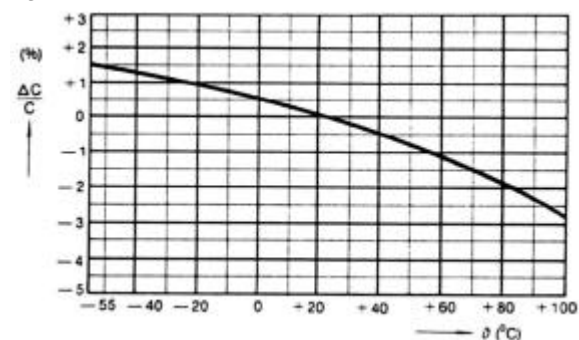
Capacitors: **Type KNI** **Metallized polypropylene capacitors**

As a dielectric a high quality polypropylene film of excellent electrical properties is used. Electrodes of capacitors are of double sides vacuum metallized aluminium on polyester film. Winding is cylindrical extended foil design. Such construction enables very good contacting and is able to translate higher currents. The capacitor has the property to regenerate after break-down. Capacitors are suitable for use in high pulse loading (for instance in TV sets for "S" correction) because of self regenerative properties and low loss angle, where common types of metallized capacitors do not comply the requirements.

Typical electrical characteristics of metallized polypropylene capacitors KNI

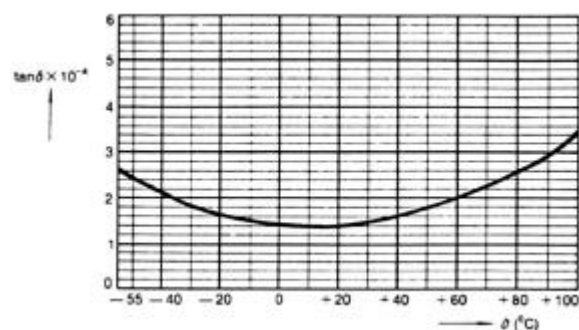
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(T) \text{ at } 1 \text{ kHz}$$



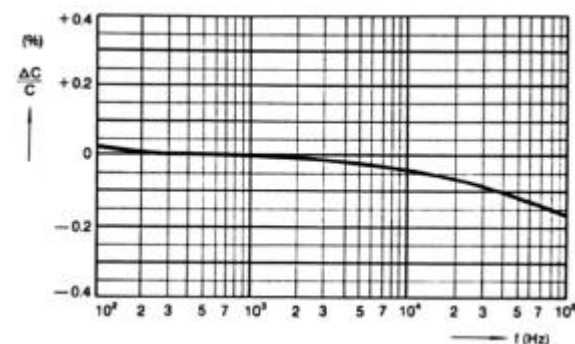
Variation of dissipation factor (tanδ) as a function of temperature

$$\tan \delta = f(T) \text{ at } 1 \text{ kHz}$$



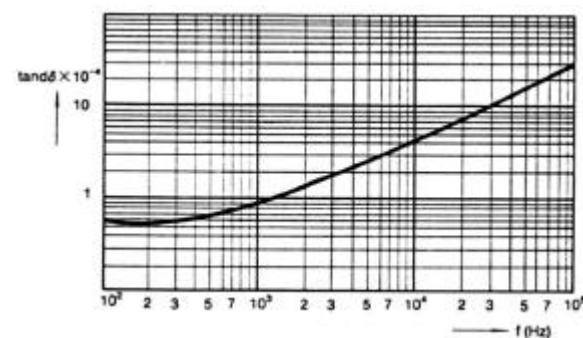
Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



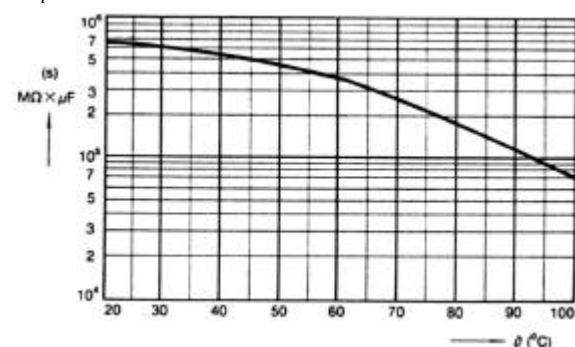
Variation of dissipation factor (tanδ) as a function of frequency

$$\tan \delta = f(f)$$



Variation of insulation resistance as a function of temperature

$$R_i = f(T)$$



Capacitors: Type KNI 1910

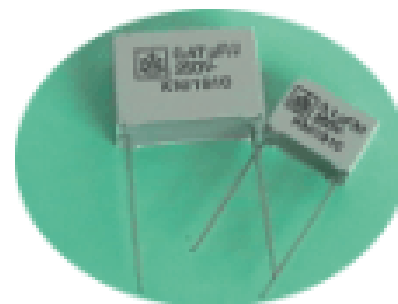
radial leads, pitch 7,5mm to 27.5mm
pulse type

Typical application:

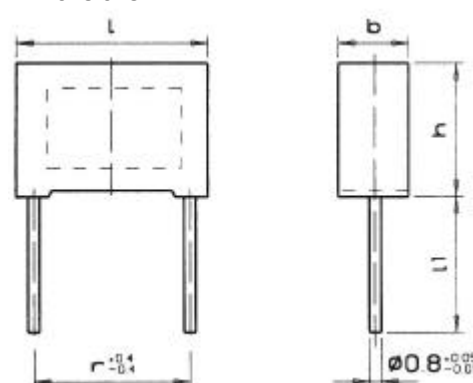
Deflection circuits in TV-sets; protection circuits in SMPS (switch mode power supplies) and in electronic ballast; applications with high voltage and current.

General technical data

Dielectric:	polypropylene film
Electrodes:	double-sided metallized polyester film and metallized polypropylene film (internal series connection for for $U_R \geq 630V$ DC and $r \geq 15mm$)
Winding:	non-inductive construction, flat shape
Leads:	tinned copper wire, standard lengths l_1 : $4^{\pm 0.5}$, 6^{-1} , $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0
Marking:	Iskra symbol, capacitance, tolerance, rated voltage, type designation
Climatic category:	55/100/56, IEC 60068-1
Temperature range:	$-55^{\circ}C$ to $+100^{\circ}C$
Complies with standard:	IEC 60384-16, IEC 60384-17



Dimensions in mm



Pitch r (mm)	Diameter of lead ϕ (mm)
7,5;10	0.6
15;22,5; 27,5	0.8

Electrical data

Capacitance range:	680pF to 2,2 μF
Standard values of capacitance(C_R):	range E12
Capacitance tolerance:	$\pm 20\%$ (M), $\pm 10\%$ (K), and $\pm 5\%$ (J)
Rated voltage (U_R):	250 V DC, 400 V DC, 630V DC, 1000V DC, 1600V DC, 2000V DC
Allowed alternative voltage up to 60Hz:	180 V AC, 250 V AC, 300V AC, 400 V AC, 500V AC, 630V AC, 650V AC
Category voltage (U_C):	up to $+85^{\circ}C$ $U_C = U_R$; from $+85^{\circ}C$ to $+100^{\circ}C$ voltage U_R is lowered for 1.25% per $1^{\circ}C$
Test voltage:	$1.6 \times U_R$, 2 s
Insulation resistance (R_i):	$\geq 100000 M\Omega$ at $20^{\circ}C$ for $C_R \leq 0.33 \mu F$ $R_i \times C_R \geq 30000$ s at $20^{\circ}C$ for $C_R > 0.33 \mu F$
Soldering on printed circuit boards:	temperature of soldering bath $270^{\circ}C$ max., soldering time 5 s max.
Dissipation factor ($\tan \delta$):	$\leq 3 \times 10^{-4}$ at 1 kHz and $20^{\circ}C$, $\leq 6 \times 10^{-4}$ at 10 kHz and $20^{\circ}C$ for $C_R \leq 1 \mu F$ $\leq 15 \times 10^{-4}$ at 100kHz and $20^{\circ}C$ for $C_R \leq 0,1 \mu F$.

Pulse loading (du/dt):

U_R (V DC)	Pitch r(mm)				
	7,5	10	15	22,5	27,5
	Allowed pulse loading (V/ μs)				
250	1500	1100	750	450	300
400	1800	1600	1000	600	500
630	2800	1800	2500	1500	1000
1000	-	-	3200	2000	1200
1600	-	-	4500	2500	1800
2000	-	-	7000	3200	2200

Type: **KNI 1910**

Dimensional data -7,5mm

Capa- citan- ce (uF)	Rated voltage U _R																							
	250V DC/180V AC				400V DC/250V AC				630V DC/300V AC				1000V DC/500V AC				1600V DC/630V AC				2000V DC/650V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0.00068	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.00082	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.001	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0012	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0015	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0018	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0022	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0027	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0033	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0039	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0047	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0056	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0068	10.5	8	4	7.5	10.5	8	4	7.5	10.5	8	4	7.5												
0.0082	10.5	8	4	7.5	10.5	8	4	7.5	10.5	9	4	7.5												
0.01	10.5	8	4	7.5	10.5	8	4	7.5	10.5	10	5	7.5												
0.012	10.5	8	4	7.5	10.5	8	4	7.5	10.5	10	5	7.5												
0.015	10.5	8	4	7.5	10.5	9	4	7.5	10.5	11	5	7.5												
0.018	10.5	8	4	7.5	10.5	9	4	7.5	10.5	11	5.5	7.5												
0.022	10.5	9	4	7.5	10.5	10	5	7.5	10.5	12	6	7.5												
0.027	10.5	10	5	7.5	10.5	11	5	7.5																
0.033	10.5	10	5	7.5	10.5	11	5.5	7.5																
0.039	10.5	11	5	7.5	10.5	12	6	7.5																
0.047	10.5	12	6	7.5																				
0.056	10.5	12	6	7.5																				

Type: KNI 1910

Dimensional data -r10mm

Capa- citan- ce (uF)	Rated voltage U _R																							
	250V DC/180V AC				400V DC/250V AC				630V DC/300V AC				1000V DC/500V AC				1600V DC/630V AC				2000V DC/650V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0.001									13	9	4	10												
0.0012									13	9	4	10												
0.0015									13	9	4	10												
0.0018									13	9	4	10												
0.0022									13	9	4	10												
0.0027									13	9	4	10												
0.0033									13	9	4	10												
0.0039									13	9	4	10												
0.0047									13	9	4	10												
0.0056									13	9	4	10												
0.0068									13	9	4	10												
0.0082									13	9	4	10												
0.01	13	9	4	10	13	9	4	10	13	9	4	10												
0.012	13	9	4	10	13	9	4	10	13	9	4	10												
0.015	13	9	4	10	13	9	4	10	13	9	4	10												
0.018	13	9	4	10	13	9	4	10	13	10.5	5	10												
0.022	13	9	4	10	13	9,5	4.3	10	13	10.5	5	10												
0.027	13	9	4	10	13	10.5	5	10	13	11.5	6	10												
0.033	13	10.5	5	10	13	10.5	5	10	13	12	6	10												
0.039	13	10.5	5	10	13	11.5	6	10	13	12	6	10												
0.047	13	11.5	6	10	13	12	6	10																
0.056	13	11.5	6	10																				
0.068	13	12	6	10																				

Type: KNI 1910
Dimensional data -r15mm

Capa- citan- ce (uF)	Rated voltage Ur																							
	250V DC/180V AC				400V DC/250V AC				630V DC/400V AC				1000V DC/500V AC				1600V DC/630V AC				2000V DC/650V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0.001																	18	11	5	15	18	11	5	15
0.0012																	18	11	5	15	18	11	5	15
0.0015																	18	11	5	15	18	11	5	15
0.0018																	18	11	5	15	18	11	5	15
0.0022																	18	11	5	15	18	11	5	15
0.0027																	18	11	5	15	18	11	5	15
0.0033													18	11	5	15	18	11	5	15	18	11	5.5	15
0.0039													18	11	5	15	18	11	5	15	18	12	6	15
0.0047													18	11	5	15	18	11	5.5	15	18	12	7	15
0.0056													18	11	5	15	18	12	6	15	18	13	7	15
0.0068													18	11	5	15	18	12	7	15	18	13.5	7.5	15
0.0082													18	11	5	15	18	13	7	15	18	14.5	8.5	15
0.01									18	11	5	15	18	11	5.5	15	18	13.5	7.5	15	18	16	9.5	15
0.012									18	11	5	15	18	12	6	15	18	14.5	8.5	15	18	18.5	9	15
0.015									18	12	6	15	18	12	7	15	18	16	9.5	15	18	18.5	11	15
0.018									18	12	7	15	18	13	7	15	18	18.5	9	15				
0.022									18	13	7	15	18	14.5	8.5	15	18	18.5	11	15				
0.027									18	13.5	7.5	15	18	16.5	8.5	15	18	20	12.5	15				
0.033					18	11	5	15	18	14.5	8.5	15	18	18.5	9	15								
0.039					18	11	5	15	18	16.5	8.5	15	18	18.5	11	15								
0.047	18	11	5	15	18	11	5	15	18	18.5	9	15												
0.056	18	11	5	15	18	11	5	15	18	18.5	11	15												
0.068	18	11	5	15	18	12	6	15	18	20	12.5	15												
0.082	18	11	5.5	15	18	12	6	15																
0.1	18	12	6	15	18	13	7	15																
0.12	18	12	7	15	18	13.5	7.5	15																
0.15	18	13.5	7.5	15	18	14.5	8.5	15																
0.18	18	14.5	8.5	15	18	16.5	8.5	15																
0.22	18	16.5	8.5	15	18	18.5	9	15																
0.27	18	18.5	9	15																				
0.33	18	18.5	11	15																				
0.39	18	20	12.5	15																				

Type: KNI 1910
Dimensional data -r22,5mm

Capa- citan- ce (uF)	Rated voltage UR																							
	250V DC/180V AC				400V DC/250V AC				630V DC/400V AC				1000V DC/500V AC				1600V DC/630V AC				2000V DC/650V AC			
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.	
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)			
0.0033																					26.5	14	6	22.5
0.0039																					26.5	14	6	22.5
0.0047																					26.5	14	6	22.5
0.0056																					26.5	14	6	22.5
0.0068																					26.5	14	6	22.5
0.0082																					26.5	14	6	22.5
0.01																	26.5	14	6	22.5	26.5	15	6	22.5
0.012																	26.5	14	6	22.5	26.5	15.5	7.5	22.5
0.015																	26.5	15	6	22.5	26.5	16.5	8.5	22.5
0.018																	26.5	15.5	7.5	22.5	26.5	17	8.5	22.5
0.022													26.5	14	6	22.5	26.5	16.5	7.5	22.5	26.5	18.5	10	22.5
0.027													26.5	14	6	22.5	26.5	17	8.5	22.5	26.5	20.5	11	22.5
0.033									26.5	14	6	22.5	26.5	15	6	22.5	26.5	18.5	10	22.5	26.5	21.5	12.5	22.5
0.039									26.5	15	6	22.5	26.5	16	7	22.5	26.5	20.5	11	22.5				
0.047									26.5	16	7	22.5	26.5	16.5	8.5	22.5	26.5	21.5	12.5	22.5				
0.056									26.5	16.5	7.5	22.5	26.5	17	8.5	22.5	26.5	21.5	12.5	22.5				
0.068									26.5	17	8.5	22.5	26.5	18.5	10	22.5								
0.082									26.5	18.5	9	22.5	26.5	20.5	11	22.5								
0.1									26.5	18.5	10	22.5	26.5	21.5	12.5	22.5								
0.12					26.5	14	6	22.5	26.5	20.5	11	22.5												
0.15					26.5	14	6	22.5	26.5	21.5	12.5	22.5												
0.18	26.5	14	6	22.5	26.5	15	6	22.5																
0.22	26.5	15	6	22.5	26.5	16	7	22.5																
0.27	26.5	16	7	22.5	26.5	16.5	8.5	22.5																
0.33	26.5	16.5	8.5	22.5	26.5	18.5	9	22.5																
0.39	26.5	17	8.5	22.5	26.5	18.5	10	22.5																
0.47	26.5	18.5	9	22.5	26.5	20.5	11	22.5																
0.56	26.5	18.5	10	22.5																				
0.68	26.5	20.5	11	22.5																				
0.82	26.5	21.5	12.5	22.5																				

Type: KNI 1910

Dimensional data -r27,5mm

Capa- citors (uF)	Rated voltage Ur																											
	250V DC/180V AC				400V DC/250V AC				630V DC/400V AC				1000V DC/500V AC				1600V DC/630V AC				2000V DC/650V AC							
	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r	l	h	b	r				
	max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.		max.	max.	max.					
	(mm)				(mm)				(mm)				(mm)				(mm)				(mm)							
0.022																					32	17	9	27.5				
0.027																					32	17	11	27.5				
0.033																	32	17	9	27.5	32	17	11	27.5				
0.039																	32	17	9	27.5	32	20	11	27.5				
0.047																	32	17	11	27.5	32	21	12	27.5				
0.056																	32	20	11	27.5	32	22	13	27.5				
0.068													32	17	9	27.5	32	21	12	27.5	32	24.5	15	27.5				
0.082													32	17	11	27.5	32	22	13	27.5	32	26.5	17	27.5				
0.1													32	17	11	27.5	32	24.5	15	27.5	32	28	18	27.5				
0.12													32	20	11	27.5	32	26.5	17	27.5								
0.15									32	20	11	27.5	32	22	13	27.5	32	28	18	27.5								
0.18									32	21	12	27.5	32	23.5	14	27.5												
0.22									32	23.5	14	27.5	32	24.5	15	27.5												
0.27									32	24.5	15	27.5	32	26.5	17	27.5												
0.33									32	26.5	17	27.5	32	28	18	27.5												
0.39					32	17	9	27.5	32	28	18	27.5																
0.47					32	17	11	27.5																				
0.56	32	17	9	27.5	32	20	11	27.5																				
0.68	32	17	11	27.5	32	20	11	27.5																				
0.82	32	20	11	27.5	32	22	13	27.5																				
1	32	21	12	27.5	32	23.5	14	27.5																				
1.2	32	22	13	27.5	32	24.5	15	27.5																				
1.5	32	24.5	15	27.5	32	26.5	17	27.5																				
1.8	32	26.5	17	27.5	32	28	18	27.5																				
2.2	32	26.5	17	27.5																								

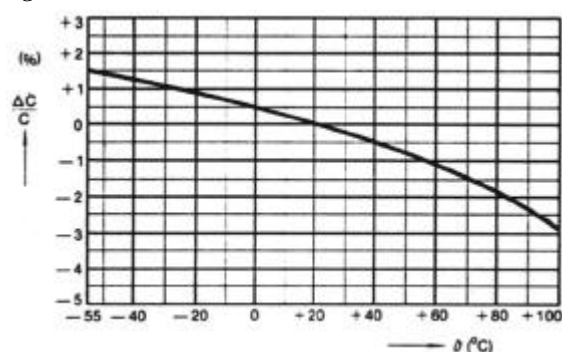
Capacitors: **Type KNU Metallized polypropylene capacitors**

As a dielectric a high quality polypropylene film of excellent electrical properties is used. Electrodes are of vacuum evaporated metal on dielectric. Leads are electrically welded on contact surface of capacitors. So the possibility for bad contact or even loss of contact during the operation of capacitors is excluded.

Typical electrical characteristics of metallized polypropylene capacitors KNU

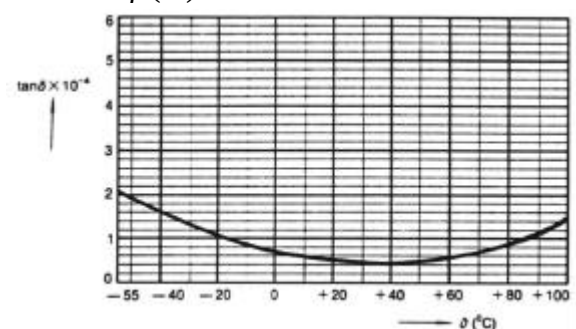
Variation of capacitance as a function of temperature

$$\frac{\Delta C}{C} = f(T) \text{ at } 1 \text{ kHz}$$



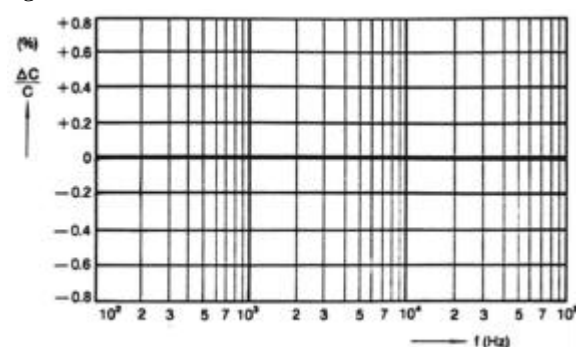
Variation of dissipation factor (tanδ) as a function of temperature

$$\tan \delta = f(T) \text{ at } 1 \text{ kHz}$$



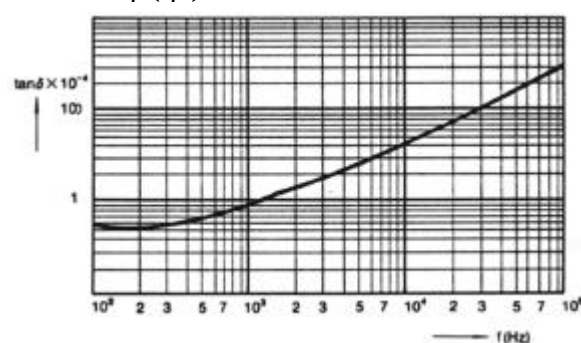
Variation of capacitance as a function of frequency

$$\frac{\Delta C}{C} = f(f)$$



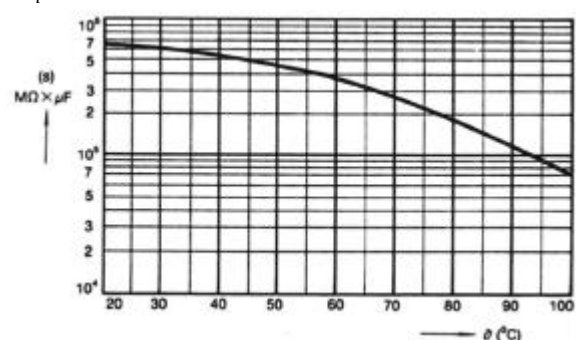
Variation of dissipation factor (tanδ) as a function of frequency

$$\tan \delta = f(f)$$



Variation of insulation resistance as a function of temperature

$$R_i = f(T)$$



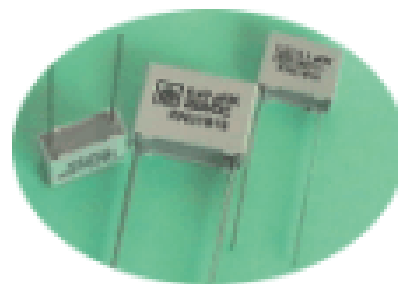
Capacitors: Type KNU 1910

radial leads, pitch 10mm to 27.5mm

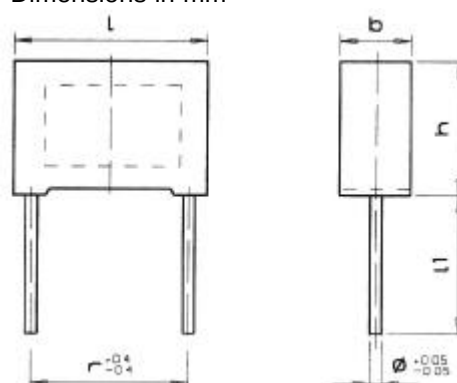
Technical data

General technical data

Dielectric:	polypropylene film
Electrodes:	vacuum metallized on dielectric
Winding:	non-inductive construction, flat shape
Leads:	tinned copper wire, standard lengths l_1 : $4^{\pm 0.5}$; 6^{-1} ; $25^{\pm 5}$. Other lead lengths on request.
Encapsulation:	flame-retardant plastic case with flame-retardant epoxy resin seal, UL94 V-0, resistant to wash in halogenated solvents
Marking:	Iskra symbol, capacitance, tolerance, rated voltage, type designation
Climatic category:	55/100/56, IEC 60068-1
Temperature range:	-55°C to +100°C
Complies with standard:	IEC 60384-16



Dimensions in mm



Diameter of leads

r (mm)	ϕ (mm)
10	0.6
15; 22.5; 27.5	0.8

Electrical data

Capacitance range:	1000 pF to 6.8 μ F
Standard values of capacitance (C_R):	range E6
Capacitance tolerance:	$\pm 20\%$ (M); $\pm 10\%$ (K) and $\pm 5\%$ (J) on special request
Temperature coefficient of capacitance (TC):	appr. $-200 \times 10^{-6}/^\circ\text{C}$
Rated voltage (U_R):	250 V DC, 400 V DC, 630 V DC, 1000 V DC, 1600 V DC
Allowed alternative voltage up to 60 Hz:	160 V AC, 220 V AC, 250 V AC, 300 V AC, 500 V AC
Category voltage (U_C):	up to +85°C $U_C = U_R$; from +85°C to +100°C voltage U_R is lowered for 1.35% per 1°C.
Test voltage:	$1.6 \times U_R$, 2 s

Dissipation factor ($\tan \delta$):

	$C_R \leq 0.1 \mu\text{F}$	$0.1 \mu\text{F} < C_R \leq 1 \mu\text{F}$	$C_R > 1 \mu\text{F}$
f = 1 kHz	$\leq 5 \times 10^{-4}$	$\leq 5 \times 10^{-4}$	$\leq 5 \times 10^{-4}$
f = 10 kHz	$\leq 10 \times 10^{-4}$	$\leq 20 \times 10^{-4}$	-
f = 100 kHz	$\leq 30 \times 10^{-4}$	-	-

Insulation resistance (R_i): $\geq 100\,000 \text{ M}\Omega$ at 20°C for $C_R \leq 0.33 \mu\text{F}$

$R_i \times C_R \geq 30\,000 \text{ s}$ at 20°C for $C_R > 0.33 \mu\text{F}$

Self inductance: appr. 10 nH/cm length of capacitor and leads

Soldering on printed circuit boards: temperature of soldering bath 270°C max., soldering time 5 s max.

Pulse loading (du/dt):

U_R	Pitch r (mm)			
	10	15	22.5	27.5
Allowed pulse loading (V/ μ s)				
250 V DC	180	120	60	45
400 V DC	200	150	90	65
630 V DC	230	180	120	90
1000 V DC	-	210	130	100
1600 V DC	-	450	190	140

Type KNU 1910

Dimensional data:

Capaci- tance (μF)	Rated voltage U _R																			
	250 V DC				400 V DC				630 V DC				1000 V DC				1600 V DC			
	l max.	h max.	b max.	r	l max.	h max.	b max.	r	l max.	h max.	b max.	r	l max.	h max.	b max.	r	l max.	h max.	b max.	r
	(mm)				(mm)				(mm)				(mm)				(mm)			
0.001																	18	11	5	15
0.0015																	18	11	5	15
0.0022																	18	11	5	15
0.0033																	18	11	5	15
0.0047									13	9	4	10					18	11	5	15
0.0068									13	9	4	10					18	11	5	15
0.01					13	9	4	10	13	9	4	10	18	11	5	15	18	11	5,5	15
0.015					13	9	4	10	13	9,5	4,3	10	18	11	5	15	18	13	7	15
0.022	13	9	4	10	13	9	4	10	13	10,5	5	10	18	11	5	15	18	14,5	8,5	15
0.033	13	9	4	10	13	9,5	4,3	10	13	11,5	6	10	18	11	5,5	15	26,5	15	6	22,5
0.047	13	9	4	10	13	10,5	5	10	18	11	5	15	18	13	7	15	26,5	16	7	22,5
0.068	13	9,5	4,3	10	13	11,5	6	10	18	11	5,5	15	18	13,5	7,5	15	26,5	18,5	9	22,5
0.1	13	10,5	5	10	18	11	5	15	18	13	7	15	26,5	15	6	22,5	26,5	20,5	11	22,5
0.15	13	11,5	6	10	18	11	5,5	15	18	14,5	8,5	15	26,5	16,5	7,5	22,5	31,5	21	12	27,5
0.22	18	11	5	15	18	13	7	15	26,5	15	6	22,5	26,5	18,5	9	22,5	31,5	23,5	14	27,5
0.33	18	12	6	15	18	14,5	8,5	15	26,5	16,5	7,5	22,5	31,5	19	10	27,5	31,5	26,5	17	27,5
0.47	18	13	7	15	26,5	16	7	22,5	26,5	18,5	9	22,5	31,5	21	12	27,5				
0.68	18	14,5	9	15	26,5	17	8,5	22,5	26,5	20,5	11	22,5	31,5	23,5	14	27,5				
1	26,5	15	6	22,5	26,5	18,5	10	22,5	31,5	21	12	27,5	31,5	26,5	17	27,5				
1.5	26,5	17	8,5	22,5	31,5	19	10	27,5												
2.2	26,5	20,5	11	22,5	31,5	23,5	14	27,5												
3.3	31,5	21	12	27,5																
4.7	31,5	23,5	14	27,5																
6.8	31,5	26,5	17	27,5																

Radio Interference Suppression Components



Capacitors

Contents

General information on Iskra Capacitors for Radio Interference Suppression Components

Type	Construction of capacitors	Class	Page
KNB	metallized polypropylene film capacitor	X2	10
KNR	metallized polypropylene film capacitor with resistor (RC unit)	X2	24
KNB	metallized polypropylene film capacitor	Y2	26
KNB	metallized polypropylene film capacitor	Y1	28
KNB	metallized polypropylene film capacitor	X1	30
KNB	metallized polypropylene film capacitor	X2Y2	34
KPB	impregnated paper capacitor	X1	35
KPR	impregnated paper capacitor with resistor (RC unit)	X1	37
KPB	impregnated paper capacitor	Y2	38
KPB	impregnated paper capacitor	X1Y2	39
KPL	impregnated paper capacitor (LC filter)	X1Y2	49
KNL	metallized polypropylene film capacitor (LC filter)	X2Y2	68

1. Origin and spreading of interference

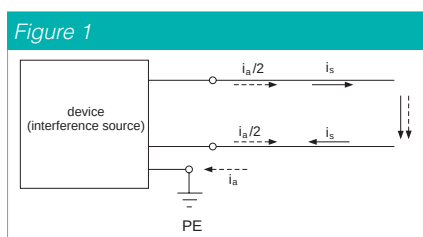
There are two main sources of radio interference:

- devices, which due to their construction produce RF energy. These include generators for use in industry, medicine and science, as well as oscillators, radio and TV receivers etc.
- devices, which produce a wide spectrum of frequencies due to rapid variations in electrical current intensity. These include devices with switching components, thyristors, triacs, commutators and similar.

Interference from source to receiver is spread in three ways: along conductors, by coupling and by radiation. To frequencies of 30 MHz approximately, interference is spread mainly along the installed electrical conductors. In this range inductive and capacitive coupling also occurs between the conductors and other metal parts of the devices acting as supports of interference transfer.

Frequencies higher than 30 MHz are spread by radiation since interference source dimensions and terminal conductors are in order of size to the wave length of the radiated interference. The metal parts therefore, act as antennas.

The device connected to the mains supply produces two kinds of interference currents, running along conductors as seen in figure 1.



Symmetrical interference current runs in different directions in the phase and neutral conductors.

Asymmetrical current runs in the same direction in both conductors and ends in the device via the earthing connection. An earthing connection can either be an earthing conductor or capacitance between the device and the surrounding.

Interference on long or medium radio waves is generally greater if the device is earthed. In this case impedance to the surrounding is short circuited and the asymmetrical interference current increases.

Two types of interference appear according to duration time; continuous interference and discontinuous interference. The latter occurs as impulses with less effect than continuous interference. They are treated and suppressed from continuous interference separately. Exact definitions are given in the regulations e.g. CISPR Publ.11, CISPR Publ.14, EN 55011; EN 55014.

2. Maximum permitted interference limits

In order to guarantee good operation of communicational and other equipment, radio interference must be tolerably limited.

Interference produced from the source are measured as follows:

- up to frequency 30 MHz, interference voltages are measured which spread along the terminal in the supply network,
- above 30 MHz, strength of radiated field or radiated power on the terminal in the supply network is measured.

Permitted levels of interference are given in the national and international regulations. Recommendations given by CISPR (Comite International Special de Perturbation Radioelectriques) are as follows: CISPR Publ.11, CISPR Publ.14, EN 55011; EN 55014; etc.

Operational methods during measurement are prescribed with individual stipulations and are given in the recommendations of the CISPR Publ. 14.

3. The interference suppression

Two methods:

- reducing interference origin,
- taking steps to prevent interference from spreading from the device of origin.

Spreading of interference is generally suppressed by suppression components connected to the terminal of the power source of the device (network, battery ...) and in certain cases, on the source of interference on the device (brushes of the motor, switches, relays ...) or by shielding the device.

As suppression components use is made of capacitors, chokes, filter sets consisting of capacitors, chokes and resistors.

4. Capacitors and filters for radio interference suppression

Requirements for capacitors and filters for radio interference suppression are given in national and international standards:

IEC60384-14; EN60384-14; UL1414;

UL1283; CSAC22.2 No.1; CSA C22.2 No.8; CSA E384-14;

GB/T14472; EN60939-2.

Definitions Taken From Standards:

Class X capacitors

Class X capacitors are suitable for applications where there is no danger of electrical shock in case of breakdown. Class X capacitors are divided into three subclasses (see table 1) according to the peak voltages of the pulses to which they are exposed during operation in addition to the line voltage. Such impulses can be caused by lightning in overhead lines, switching operations in neighbouring equipment or in the equipment which is shielded by the capacitor.

Class Y capacitors

Class Y capacitors are suitable for applications where the breakdown of the capacitor can lead to a dangerous electric shock. Class Y capacitors are subdivided into the 4 subclasses Y1, Y2, Y3, Y4 shown in table 2:

Note:

The increased electrical and mechanical safety is supposed to rule out short circuits in the capacitor; the current flowing through the capacitor when using alternating voltage and the energy content of the capacitor when using direct voltage, is supposed to be reduced to a safe level by limiting the capacity.

Y capacitors, by fulfilling their technical purpose in electrical equipment, machines and installations, bridge over the plant/industrial insulation whose safety together with additional precautionary measures will avert dangers for humans and animals.

Table 1

Sub-Class	Peak pulse voltage in service	Application	Peak value of the surge voltage to be added before endurance test
X1	> 2,5 kV ≤ 4,0 kV	use with high peak-voltages	for $C_R \leq 1,0 \mu\text{F}$: $U_p = 4,0 \text{ kV}$ for $C_R > 1,0 \mu\text{F}$: $U_p = (4/\sqrt{C_R}) \text{ kV}$
X2	≤ 2,5 kV	general requirements	for $C_R \leq 1,0 \mu\text{F}$: $U_p = 2,5 \text{ kV}$ for $C_R > 1,0 \mu\text{F}$: $U_p = (2,5/\sqrt{C_R}) \text{ kV}$
X3	≤ 1,2 kV	general requirements	none

Rated voltage X1, X2 and X3: ≤ 760 V

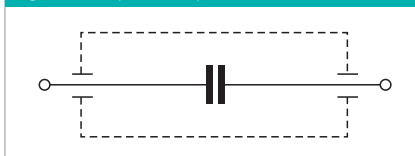
Table 2

Sub-Class	Type of the by-pass insulation	Rated voltage range	Peak impulse voltage before endurance test
Y1	double or reinforced insulation	≤ 500 V	8,0 kV
Y2	basic or supplementary insulation	≥ 150 V ≤ 300 V	5,0 kV
Y3	basic or supplementary insulation	≤ 250 V	none
Y4	basic or supplementary insulation	< 150 V	2,5 kV

Bipolar capacitors

A capacitor with 2 connections for suppression of electromagnetic interference, see fig. 2.

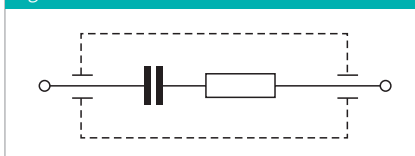
Figure 2: bipolar capacitor



RC Combination

An RC combination in series mounting is a functional unit of class X or Y, resistor and capacitor mounted in series, see fig. 3.

Figure 3: RC-combination



Four-polar capacitors

Four-polar capacitors (feed through capacitors/non-coaxial) have, for at least one coating, two electromagnetically mostly de-coupled feeding lines which supply the electrical current.

The active current either flows through the electrodes or is conducted around them.

Bypass capacitors

Bypass capacitors branch off high frequency currents. There are three models in use:

single-, delta- and T-controls. The single capacitor consists of a capacitor in a metal housing to which a connection is fastened according to fig. 5a. The delta construction consists of one X-, and two Y2 or Y3 capacitors which are connected in a triangle as in fig. 5b. The T construction consists of three capacitors C A, C B and C C - connected in T-shape as in fig. 5c.

Figure 4: feed through capacitor for symmetrical usage (non-coaxial)

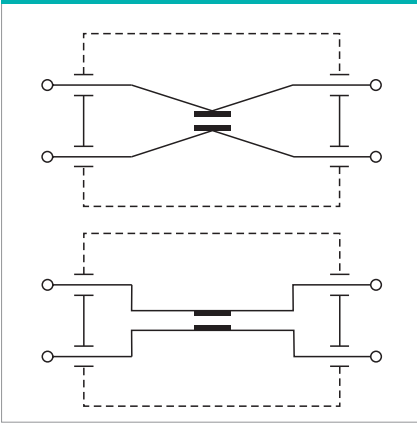


Figure 5a: single by-pass capacitor

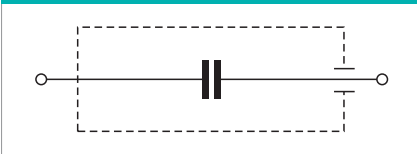


Figure 5b: delta by-pass capacitor

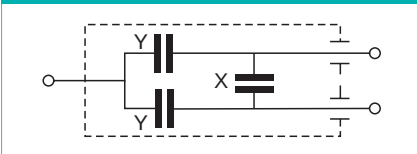
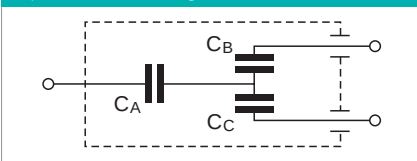


Figure 5c: example for a by-pass capacitor in T-wiring



Rated voltage

The rated voltage is either the RMS-value of the operating voltage at rated frequency or the operating direct current voltage which is allowed between the connections of the capacitor in the total temperature range between the upper and lower category temperatures.

Note:

The rated voltage of radio interference suppression capacitors is generally chosen as equal to or greater than the rated voltage of the network which is used. It has to be taken into account that the voltage of the network may temporarily be as much as 10 % above the rated voltage.

Rated frequency

The rated frequency is the rated supply frequency for which the capacitor is designed, by which it is described and to which other rated values relate.

Surge voltage

A surge voltage is an a-periodic single voltage of a certain profile as described in IEC 60060-1.

Rated current

The rated current of the feed-through conductor is the maximum allowable current which flows during the rated temperature in the feed-through conductor of the capacitor.

Note:

The current of the conductor is generally determined by the rated current of the screened equipment. In special cases the high frequency interfering current also has to be taken into account.

Rated capacitance

The rated capacitance of the capacitor is the capacitance value which characterizes its rating for a temperature of 23 °C and after which it is named.

Insulation resistance

The insulation resistance is the ratio of the applied DC voltage to the current flowing after a stipulated time interval.

Time constant

The self-discharging time constant of the capacitor in seconds is the product of the insulation resistance in MΩ and the capacitance in μF.

Dissipation factor

The dissipation factor tan delta is the ratio of the effective output to the wattles power of the capacitor at sinusoidal voltage of a designated frequency.

Insertion loss

The insertion loss is the ratio of the voltages both before and after the insertion of the attenuator measured at the connections.

Note:

If the insertion loss is measured in decibels, the value will be the voltage ratio logarithmised to the basis 10 multiplied by 20.

Category temperature range

The range of the ambient temperatures where the capacitor may be continuously operated based on its design is defined by the temperature limits of the corresponding category.

Upper category temperature

The upper category temperature is the maximum surface temperature for continuous operation for which the capacitor is designed.

Note:

For feed-through capacitors and RC-combinations the temperature of the outer surface may be influenced by the operating current passing through and causing internal heating. The capacitor connections are regarded as part of the outer surface.

Lower category temperature

The lower category temperature is the lowest temperature of the outer surface during continuous operation for which the capacitor is designed.

Climatic category

The climatic category defines the lower rated temperature/the upper rated temperature/the humidity class.

Passive Flammability

The ability of the capacitor to burn with a flame as a consequence of the application of an external source of heat. The capacitor of filter suppresses RF by representing an inpendance for the higher frequencies which generally

drop with frequency increase. By incorporating the capacitor in-parallel with the interference source, interferences are more or less short circuited. A capacitor incorporated in-parallel with power source terminal, suppresses symmetrical interferences, and between a power conductor terminal and the casing or earth it suppresses asymmetrical interferences. Impedance theoretically drops linearly with frequency. Due to shield inductance of the capacitor the capacitor has its own resonant frequency. Above this frequency the capacitor is no self-suppressing component for interference. The value of frequency is decidedly influenced by the inductance of the capacitor terminals.

Thus with two-terminal capacitors its own resonant frequency is lowered and the suppression range is reduced. For four-terminal capacitors the inductance of conductors has no importance since they are connected in series with the capacitor from the T unit. Four-terminal capacitors can be used for higher frequencies than two-terminal ones. Therefore the main characteristic of the two-terminal capacitor is its own resonant frequency and for the four-terminal

capacitor the insertion loss.

Minimum resonant frequency and minimum insertion loss are regulated by certain national standards (VDE 0565-1; 0565-3).

The filters consist of a combination of inductive and capacitive components. They are used especially where greater suppression is required. Their characteristic is insertion loss. They are developed for individual request depending on level of interference, frequency range and required suppression, all of which can be different to that regulated by standards.

5. Important notes

5.1. Special working conditions for metallized capacitors

The capacitors are intended for use as electromagnetic interference suppressions in AC 50Hz/60Hz applications. For all other applications please consults our company before. We do not guarantee or take any responsibility for inappropriate production processing or use for inappropriate applications.

Capacitors must not be used in very humid and warm ambient. In such case the capacitor might absorb humidity and this can change the characteristic of the capacitors.

5.2 Limited product liability

Iskra can not take a responsibility for products with brand mark Iskra which were delivered to customers through the third party for use in improper applications without any knowledge of Iskra for what purpose or application the products will be used.

Therefore we strongly recommend contacting us for any explanation or service regarding to our products and their applications for other use.

Iskra is either unfamiliar with individual customer application or less familiar with them than the customer themselves. For these reasons, it always ultimately incumbent on the customer to check and decide whether an Iskra product with the properties described in the product specification is suitable for use in a particular customer application.

6. Ordering for interference suppression components

When ordering, the following data should be given:

- type of capacitor or filter
- capacitance
- voltage
- inductance (for filters)
- requirement for discharging resistor
- terminal dimensions
- current (for filters and four terminal capacitors)
- special requirements for connecting components

An example for capacitor:

KNB1560 0.22 μ F $\pm$ 10% 275 VAC L30 R15 Dim: 18 x 13 x 7

LENGTH x HEIGHT x WIDTH (mm)

PITCH VALUE

LEAD WIRE LENGTH (mm)

NOMINAL VOLTAGE

CAPACITANCE TOLERANCE

CAPACITANCE

TYPE DESIGNATION

An example for filter:

KPL3524 0.47 μ F + 2x0.022 μ F + 2x1 mH + 470 k Ω 16 A 275 VAC

NOMINAL VOLTAGE

CURRENT

DISCHARGING RESISTOR

INDUCTANCE

CAPACITANCE Y2

CAPACITANCE X1

TYPE DESIGNATION

7. Production date code marking system according to IEC 60062, clause 5.1 Two-character code (year/month)

The production date code is indicated with two-characters. The 1st character (letter) indicates the year and the 2nd character (number/letter) indicates the month.

Examples:

2006 March = U3
2008 October = WO

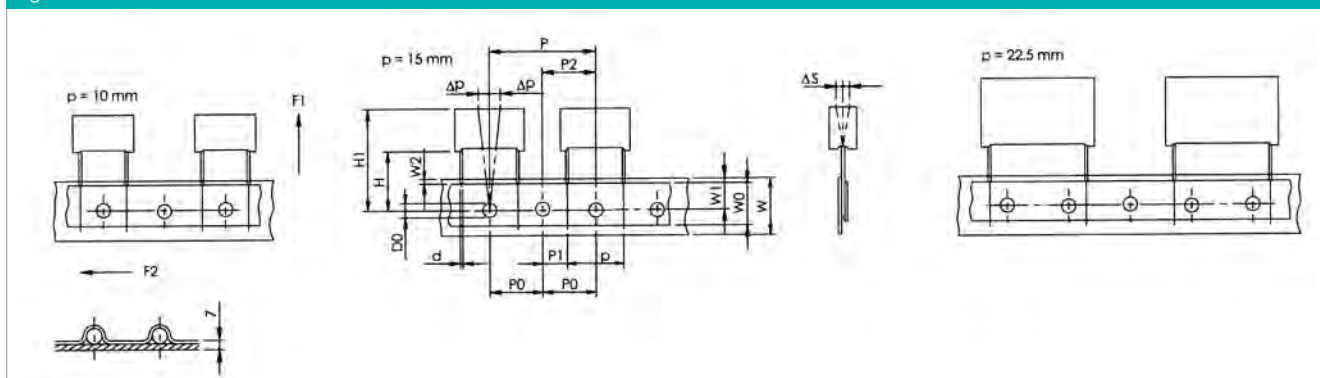
Year	1 st character (letter)	Month	2 nd character (number/letter)
2000	M	January	1
2001	N	February	2
2002	P	March	3
2003	R	April	4
2004	S	May	5
2005	T	June	6
2006	U	July	7
2007	V	August	8
2008	W	September	9
2009	X	October	O
2010	A	November	N
2011	B	December	D
2012	C		
2013	D		

Taping specification for radial capacitors acc. to IEC 60286-2 (Robotic insertion)

Descriptions	Symbol	Dimensions (mm)			
		Lead spacing 10 mm	Lead spacing 15 mm	Lead spacing 22,5 mm	Tolerances
Carrier tape width	W	18	18	18	+ 1 / - 0,5
Hold-down tape width	W ₀	12 or 6	12 or 6	12 or 6	± 0,5
Hotel position	W ₁	9	9	9	± 0,5
Hold-down tape position	W ₂	3	3	3	max
Feed hole diameter	D ₀	4	4	4	± 0,2
Pitch of component	P	25,4	25,4	38,1	± 1
Feed hole pitch	P ₀ *	12,7	12,7	12,7	± 0,2
Feed hole centre to lead	P ₁	7,7	5,2	7,8	± 0,7
Feed hole centre to component centre	P ₂	12,7	12,7	19,05	± 1,3
Height from feed hole centre to the component body	H	18,5	18,5	18,5	± 0,5
Component alignment	Δp	0	0	0	± 1,3
	ΔS	0	0	0	± 2
Lead spacing	p	10	15	22,5	+ 0,6 / - 0,1
Lead wire diameter	d	0,6	0,8	0,8	± 0,5
Total tape thickness	t	0,7	0,7	0,7	± 0,2
Extraction force for components	F ₁	5	5	5	min. (N)
Break force of the tape	F ₂	15	15	15	min. (N)
Component height	H ₁	31	34	39	max

* Cumulative pitch error over any 20 pitches: max. ±1 mm

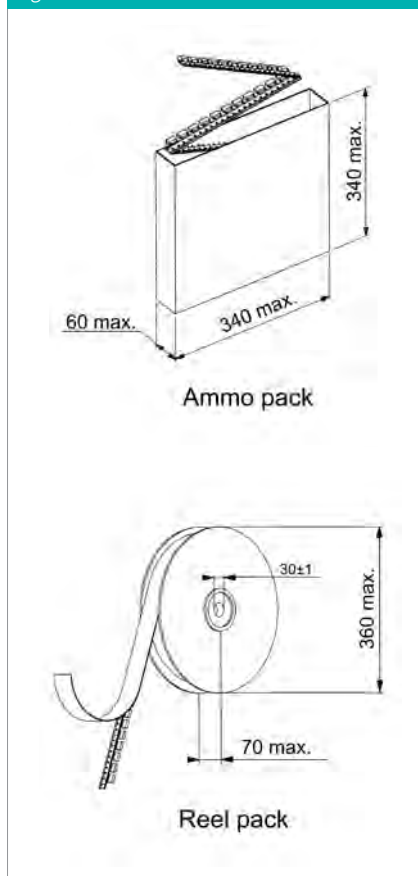
Figure 6



Taped package units

Pitch (mm)	Capacitor thickness b (mm)	Ammo-pack (pcs/box)	Reel-pack (pcs/reel)
10	4; 4,3	900	900
	5	768	700
	6	648	550
15	5	768	600
	5,5	696	600
	6	648	500
	7	552	450
	7,5	504	400
	8,5	444	350
22,5	9	420	350
	6	424	350
	6,5	392	350
	7	368	300
	8,5	304	250
	10	256	200
	10,5	240	200

Figure 7



Capacitors

Type KNB1530	275 V AC 300 V AC	class X2
Type KNB1532		
Type KNB1533		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	275 V A.C., 300 V A.C.
Capacitance tolerance:	$\pm 20\%$ for $C \leq 0,1 \mu\text{F}$ and $\pm 10\%$ for $C > 0,1 \mu\text{F}$
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Test voltage:	2635 V D.C., 1 s
Max. pulse rise time du/dt , at 390 V D.C. for 275 V A.C. and 425 V D.C. for 300 V A.C.:	900 V/ μs for PCM = 10 mm 400 V/ μs for PCM = 15 mm 200 V/ μs for PCM = 22,5 mm 160 V/ μs for PCM = 27,5 mm 100 V/ μs for PCM = 37,5 mm
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 15000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 5000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Dielectric loss $\tan\delta$ at $f = 1 \text{ kHz}$ and 20 °C:	$\leq 5 \times 10^{-4}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, UL 1283, UL1414, EN 60384-14, CSA C22.2 No.1, CSA E384-14, GB/T 14472 - 1998

KNB1530	KNB1532, KNB1533	Electrical connection
		Electrical connection

ø 0,6 mm for PCM = 10 mm
ø 0,8 mm for PCM > 10 mm

Casing: thermoplastic, sealed with synthetical resin		Thermoplastic material is self-extinguishing according to UL 94, class V-0.
Terminals		
Type	Terminal length	Type of terminals
KNB1530	3 ^{+0,5} , 4 ^{+0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1532	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1533	20 to 200 mm	Insulated solid wire ø 0,8 mm End terminals on request

Standard values KNB1530, KNB1532, KNB1533, 275 V AC, class X2

Capacitance C (µF)	Dimensions				 IEC 60384-14 275 V AC	For capacitors with insulated leads on request				
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		 UL 1283 300 V AC	 UL 1414 250 V AC	 C22.2 No.1 250 V AC	 GB/T14472 275 V AC	 E384-14-95 275 V AC
0,01*	13	9,5	4,3	10	•	•	•	•	•	•
0,015*	13	10,5	5	10	•	•	•	•	•	•
0,022*	13	11,5	6	10	•	•	•	•	•	•
0,01	18	11	5,5	15	•	•	•	•	•	•
0,015	18	11	5,5	15	•	•	•	•	•	•
0,022	18	11	5,5	15	•	•	•	•	•	•
0,033	18	11	5,5	15	•	•	•	•	•	•
0,047	18	11	5,5	15	•	•	•	•	•	•
0,068	18	12	6	15	•	•	•	•	•	•
0,1*	18	12	6	15	•	•	•	•	•	•
0,1	18	13	7	15	•	•	•	•	•	•
0,12	18	13,5	7,5	15	•					•
0,15*	18	14,5	9	15	•	•	•			•
0,22*	18	19	10	15	•	•	•			•
0,33*	18	20	12,5	15	•	•	•	•	•	•
0,15	27	15	6,5	22,5	•	•	•	•	•	•
0,22	27	16,5	7	22,5	•	•	•	•	•	•
0,27	27	18,5	8,5	22,5	•	•	•	•	•	•
0,33	27	18,5	8,5	22,5	•	•	•	•	•	•
0,47	27	20	10,5	22,5	•	•	•	•	•	•
0,47*	26	22	9,5	22,5	•	•	•	•	•	•
0,47	32	20	11	27,5	•	•	•	•	•	•
0,56	31,5	19	10	27,5	•	•				•
0,68	32	20	11	27,5	•	•	•	•	•	•
1	32	24,5	15	27,5	•	•	•	•	•	•
1*	31,5	22	13	27,5	•	•	•	•	•	•
1,5	32	28	18	27,5	•	•			•	•
2,2	32	33	20	27,5	•	•			•	•
1,5	41,5	23	14	37,5	•	•			•	•
2,2	41,5	26	18	37,5	•	•			•	•
2,2	41,5	31	18	37,5	•	•			•	•

* mini size
marking with 

Approvals in use = •
Approvals in pending = o

Note: KNB1532 and KNB1533 with PCM = 10 mm are not available with VDE-ENEC.

Standard values KNB1530, KNB1532, KNB1533, 300 V AC, class X2

Capacitance C (μF)	Dimensions				 IEC 60384-14 300 V AC	For capacitors with insulated leads on request			
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		 UL 1283 300 V AC	 UL 1414 250 V AC	 C22.2 No.1 250 V AC	 E384-14-95 300 V AC
0,01	13	9	4	10	•	•	•	•	•
0,015	13	9	4	10	•	•	•	•	•
0,022	13	10,5	5	10	•	•	•	•	•
0,033	13	11,5	6	10	•	•	•	•	•
0,047	13	13,5	6	10	•	•	•	•	•
0,01	18	11	5	15	•	•	•	•	•
0,015	18	11	5	15	•	•	•	•	•
0,022	18	11	5	15	•	•	•	•	•
0,033	18	11	5	15	•	•	•	•	•
0,047	18	11	5	15	•	•	•	•	•
0,068	18	11	5,5	15	•	•	•	•	•
0,1	18	12	6	15	•	•	•	•	•
0,12	18	13	7	15	•	•	•		•
0,15	18	13,5	7,5	15	•	•	•	•	•
0,22	18	16,5	8,5	15	•	•	•	•	•
0,27	18	18,5	11	15	•	•	o	•	•
0,33	18	18,5	11	15	•	•	•	•	•
0,1	26,5	14	6	22,5	•	•	o	•	•
0,15	26,5	14	6	22,5	•	•	•	•	•
0,22	27	15	6,5	22,5	•	•	•	•	•
0,33	26,5	16,5	8,5	22,5	•	•	•	•	•
0,47	26,5	18,5	10	22,5	•	•	•	•	•
0,56	27	20	10,5	22,5	•	•	•		•
0,33	31,5	16	7,5	27,5	•	•	o	•	•
0,47	32	17	9	27,5	•	•	•	•	•
0,68	32	18,5	11	27,5	•	•	•	•	•
1	31,5	22	13	27,5	•	•	•	•	•
1,5	31,5	26,5	17	27,5	•	•			•
2,2	31,5	32	18	27,5	•	•			•
2,7	31,5	32	18	27,5	•	•			
3,3	31,5	32	18	27,5	•	•			
3,3	31,5	33	20	27,5	•	•			•
3,9	31,5	33	20	27,5	•	•			
4,7	32	39	24	27,5	•	•			
5,6	32	39	24	27,5	•	•			
1,5	41,5	22	14	37,5	•	•			•
2,2	41,5	27	16	37,5	•	•			•
2,2	41,5	26	18	37,5	•	•			•
3,3	41,5	26	18	37,5	•	•			
3,9	41,5	31	18	37,5	•	•			
4,7	41,5	32	19	37,5	•	•			
3,6	41,5	38	21	37,5	•	•			
6,8	41,5	38	21	37,5	•	•			
8,2	41,5	43	28	37,5	•	•			
10	41,5	43	28	37,5	•	•			
10	42	45	30	37,5	•	•			

* mini size
marking with 

Approvals in use = •
Approvals in pending = o

Note: KNB1532 and KNB1533 with PCM = 10 mm are not available with VDE-ENEC.

Capacitors with discharge resistor

Type KNB1530	275 V AC 300 V AC	class X2
Type KNB1532		
Type KNB1533		



TECHNICAL DATA

Construction:	- capacitor: polypropylene film, metallized - resistor: metaloxide film
Rated voltage:	275 V A.C., 300 V A.C.
Capacitance tolerance:	± 20 % for C ≤ 0,1 µF, ± 10 % for C > 0,1 µF
Resistance tolerance:	± 5 %
Resistance power:	0,6 W
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Test voltage:	2635 V D.C., 2 s
Max. pulse rise time du/dt, at 425 V D.C.:	400 V/µs for PCM = 15 mm 200 V/µs for PCM = 22,5 mm 160 V/µs for PCM = 27,5 mm 100 V/µs for PCM = 37,5 mm
Insulation resistance at 20 °C, U _m = 100V D.C., t = 1 min:	R _i ≥ 15000 MΩ for C ≤ 0,33 µF R _i × C _n ≥ 5000 s for C > 0,33 µF
Dielectric loss tanδ at f = 1 kHz and 20 °C:	≤ 5 × 10 ⁻⁴
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14, CSA E384-14

KNB1530	KNB1532, KNB1533	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1530	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1532	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1533	20 to 200 mm	Insulated solid wire $\varnothing$ 0,8 mm End terminals on request

Standard values KNB1530, KNB1532, KNB1533, 275 V AC, class X2, with discharge resistor

Capacitance C (μF)	Resistance R (kΩ)	Dimensions				 IEC 60384-14	 E384-14-95
		L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		
0,047		18	13	7	15	•	•
0,068		18	13	7	15	•	•
0,1		18	14,5	9	15	•	•
0,15	470	27	16,5	7	22,5	•	•
0,22	to	26,5	16,5	8,5	22,5	•	•
0,22	2700	27	18,5	8,5	22,5	•	•
0,33		26,5	18,5	10	22,5	•	•
0,47		26,5	20,5	11	22,5	•	•
0,47		32	20	11	27,5	•	•

Resistance values according to IEC 60063 range E12.

Approvals in use = •
Approvals in pending = o

Standard values KNB1530, KNB1532, KNB1533, 300 V AC, class X2, with discharge resistor

Capacitance C (μF)	Resistance R (kΩ)	Dimensions				 IEC 60384-14	 E384-14-95
		L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		
0,047		18	12	6	15	•	•
0,068		18	13	7	15	•	•
0,1		18	13,5	7,5	15	•	•
0,15		18	16,5	8,5	15	•	•
0,22	470	18	18,5	9	15	•	•
0,33	to	18	20	12,5	15	•	•
0,15	2700	27	15	6,5	22,5	•	•
0,22		27	16,5	7	22,5	•	•
0,33		27	18,5	8,5	22,5	•	•
0,47		27	20	10,5	22,5	•	•
0,47		31,5	19	10	27,5	•	•

Resistance values according to IEC 60063 range E12.

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNB1560	275 V AC	class X2
Type KNB1562		
Type KNB1563		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	275 V A.C.
Capacitance tolerance:	$\pm 20\%$ for $C \leq 0,1\ \mu\text{F}$, $\pm 10\%$ for $C > 0,1\ \mu\text{F}$
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 110 °C
Test voltage:	2200 V D.C., 1 s for $C < 1\ \mu\text{F}$ 1900 V D.C., 1 s for $C \geq 1\ \mu\text{F}$
Max. pulse rise time du/dt, at 390 V D.C. according to IEC 60384-14:	500 V/ μs for PCM = 10 mm 400 V/ μs for PCM = 15 mm $C \leq 0,022\ \mu\text{F}$ 250 V/ μs for PCM = 15 mm $C > 0,022\ \mu\text{F}$ 150 V/ μs for PCM = 22,5 mm 100 V/ μs for PCM = 27,5 mm 550 V/ μs for PCM = 7,5 mm miniature version 350 V/ μs for PCM = 10 mm miniature version
Insulation resistance at 20 °C, $U_m = 100\text{ V D.C.}$, $t = 1\text{ min}$:	$R_i \geq 15000\text{ M}\Omega$ for $C \leq 0,33\ \mu\text{F}$ $R_i \times C_n \geq 5000\text{ s}$ for $C > 0,33\ \mu\text{F}$
Dielectric loss $\tan\delta$ at $f = 1\text{ kHz}$ and 20 °C:	$\leq 1 \times 10^{-3}$
Soldering:	IEC publ, 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14 UL 1283, UL 1414, CSA C22.2 No.1, GB/T14472-1998

KNB1560	KNB1562, KNB1563	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1560	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1562	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1563	20 to 200 mm	Insulated solid wire ø 0,8 mm

Standard values KNB1560, KNB1562, KNB1563, 275 V AC, class X2

Capacitance C (µF)	Dimensions					 IEC 60384-14 275 V AC	For capacitors with insulated leads on request		
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	ø (mm)		 UL 1283 275 V AC	 UL 1414 250 V AC	 GB/T14472 275 V AC
0,01	13	9	4	10	0,6	•	•	•	•
0,015	13	9	4	10	0,6	•	•	•	•
0,022	13	9	4	10	0,6	•	•	•	•
0,033	13	9	4	10	0,6	•	•		•
0,033	13	10,5	5	10	0,6	•	•	•	•
0,047	13	10,5	5	10	0,6	•	•		•
0,047	13	11,5	6	10	0,6	•	•	•	•
0,068	13	11	5,5	10	0,6	•	•	•	•
0,1	13	12	6	10	0,6	•	•	•	•
0,01	18	11	5	15	0,8	•	•	•	•
0,015	18	11	5	15	0,8	•	•	•	•
0,022	18	11	5	15	0,8	•	•	•	•
0,033	18	11	5	15	0,8	•	•	•	•
0,047	18	11	5	15	0,8	•	•	•	•
0,068	18	11	5	15	0,8	•	•	•	•
0,1	18	11	5,5	15	0,8	•	•	•	•
0,12	18	12	6	15	0,8	•	•	•	•
0,15	18	13	7	15	0,8	•	•	•	•
0,22	18	14,5	8,2	15	0,8	•	•	•	•
0,27	18	14,5	9	15	0,8	•	•	•	•
0,33	18	16	9,5	15	0,8	•	•	•	•
0,33	18	19,5	7,5	15	0,8	•	•	•	•
0,47	18	18,5	11	15	0,8	•	•	•	•
0,56	18	20	12,5	15	0,8	•	•		•
0,15	26,5	14	6	22,5	0,8	•	•	•	•
0,22	26,5	14	6	22,5	0,8	•	•	•	•
0,27	26,5	15	6	22,5	0,8	•	•	•	•
0,33	26,5	16	7	22,5	0,8	•	•	•	•
0,47	26,5	17	8,5	22,5	0,8	•	•	•	•
0,56	26,5	18,5	9	22,5	0,8	•	•	•	•
0,68	26,5	18,5	10	22,5	0,8	•	•	•	•
1	26,5	21,5	12,5	22,5	0,8	•	•	•	•
0,47	31,5	16	7,5	27,5	0,8	•	•	•	•
0,56	32	17	9	27,5	0,8	•	•	•	•
0,68	32	17	9	27,5	0,8	•	•	•	•
1	32	20	11	27,5	0,8	•	•	•	•
1,5	31,5	23,5	14	27,5	0,8	•	•		•
2,2	31,5	26,5	17	27,5	0,8	•	•		•

Approvals in use = •
Approvals in pending = o

Standard values KNB1560, KNB1562, KNB1563, 275 V AC, class X2, miniature version

Capacitance		Dimensions					 IEC 60384-14 275 V AC	For capacitors with insulated leads on request		
C (μF)	Tolerance ± (%)	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	ø (mm)		 UL 1283 275 V AC	 UL 1414 250 V AC	 GB/T14472 275 V AC
0,01	20	10,5	9	4	7,5	0,6	•	•	•	•
0,015	20	10,5	9	4	7,5	0,6	•	•	•	•
0,022	20	10,5	9	4	7,5	0,6	•	•	•	•
0,033	20	10,5	10	5	7,5	0,6	•	•	•	•
0,047	20	10,5	11	5,5	7,5	0,6	•	•	•	•
0,1	20	13	11	5	10	0,6	•	o	o	o
0,1	10, 20	13	11	5,5	10	0,6	•	o	o	o
0,1	10, 20	18	11	5	15	0,8	•	•	•	•
0,12	20	18	11	5	15	0,8	•	•	•	•
0,12	10, 20	18	11	5,5	15	0,8	•	•	•	•
0,15	20	18	11	5,5	15	0,8	•	•	•	•
0,15	10, 20	18	12	6	15	0,8	•	•	•	•
0,18	10, 20	18	12	6	15	0,8	•	•	•	•
0,22	20	18	12,5	6,5	15	0,8	•	•	•	•
0,22	10, 20	18	13	7	15	0,8	•	•	•	•
0,27	20	18	13	7	15	0,8	•	•	•	•
0,27	10, 20	18	13,5	7,5	15	0,8	•	•	•	•
0,33	10, 20	18	16	7,5	15	0,8	•	•	•	•
0,33	10, 20	18	14,5	8,2	15	0,8	•	•	•	•
0,39	20	18	19,5	7,5	15	0,8	•	•	•	•
0,39	10, 20	18	16,5	8,5	15	0,8	•	•	•	•
0,47	20	18	16	9,5	15	0,8	•	•	•	•
0,47	10, 20	18	18,5	9	15	0,8	•	•	•	•
0,56	20	18	18,5	9	15	0,8	•	•	•	•
0,56	10, 20	18	19	10	15	0,8	•	•	•	•
0,56	10, 20	18	18,5	11	15	0,8	•	•	•	•
0,68	20	18	18,5	11	15	0,8	•	•	•	•
0,68	10, 20	18	22	10	15	0,8	•	•	•	•
0,68	10, 20	18	20	11	15	0,8	•	•	•	•
0,68	10, 20	18	20	12,5	15	0,8	•	•	•	•
0,82	10, 20	18	20	12,5	15	0,8	•	o	o	o
1	10, 20	18	25	12,5	15	0,8	•	o	o	o
1	10, 20	18	17	19,5	15	0,8	•	o	o	o
0,47	10, 20	26,5	16	7	22,5	0,8	•	o	o	o
0,56	10, 20	26,5	16,5	7,5	22,5	0,8	•	o	o	o
0,68	10, 20	26,5	17	8,5	22,5	0,8	•	o	o	o
0,82	10, 20	26,5	18,5	9	22,5	0,8	•	o	o	o
1	10, 20	26,5	19,5	10	22,5	0,8	•	o	o	o
1	10, 20	27	20	10,5	22,5	0,8	•	o	o	o
1,2	10, 20	26,5	20,5	11	22,5	0,8	•	o		o
1,5	10, 20	26,5	21,5	12,5	22,5	0,8	•	o		o
1,8	10, 20	27	23	14	22,5	0,8	•	o		o
2,2	10, 20	26,5	26,5	14,5	22,5	0,8	•	o		o
2,2	10, 20	27	25	16	22,5	0,8	•	o		o
1	10, 20	31,5	19	10	27,5	0,8	•	o	o	o
1,5	10, 20	31,5	21	12	27,5	0,8	•	o		o
2,2	10, 20	31,5	23,5	14	27,5	0,8	•	o		o
2,7	10, 20	32	28,5	15	27,5	0,8	•	o		o
3,3	10, 20	31,5	26,5	17	27,5	0,8	•	o		o
3,9	10, 20	31,5	32	18	27,5	0,8	•	o		o
4,7	10, 20	31,5	33	20	27,5	0,8	•	o		o
5,6	10, 20	31,5	35,5	24	27,5	0,8	•	o		o
6,8	10, 20	32	39	24	27,5	0,8	•	o		o

marking with  except PCM 7,5 mm
 Note: Bold-face printed alternative body dimensions upon request.

Approvals in use = •
 Approvals in pending = o

Capacitors

Type KNB1560
Type KNB1562
Type KNB1563

275 V AC
+ 125 °C

class **X2**

NEW



TECHNICAL DATA

Construction:	polypropylene film
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %, ± 10 %
Climatic category:	40/125/56 according to IEC publ. 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 125 °C
Test voltage:	2200 V D.C. for 1s
Max. pulse rise time du/dt, at 390 V D.C.:	550 V/ms for PCM = 7,5mm 350 V/ms for PCM = 10mm 200 V/ms for PCM = 15mm pulse test conditions according to IEC 60384-14
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 15000 MΩ for C _x ≤ 0,33 μF R _i × C _x ≥ 5000 s for C _x > 0,33 μF
Dielectric loss tanδ at f = 1 kHz and 20 °C:	≤ 1 × 10 ⁻³
Soldering:	IEC publ. 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC publ. 60384-14, EN 132 400, UL 1283, UL 1414, CSA C22.2 No.1, GB/T 14472-1998

KNB1560	KNB1562, KNB1563	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1560	4 ^{+0,5} , 6 ⁻¹ , 25 ⁺⁵ mm, other on request	Tinned copper wire
KNB1562	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1563	20 to 200 mm	Insulated solid wire 0,8 mm End terminals on request

Standard values KNB1560, KNB1562, KNB1563, 275 V AC, class X2, + 125 °C, miniature version

C (μF)	Tolerance ± (%)	Dimensions					For capacitors with insulated leads on request.			
		L _{max} , (mm)	H _{max} , (mm)	W _{max} , (mm)	PCM (mm)	ø (mm)	 IEC 60384-14 275VAC	 UL1283 275VAC	 UL1414 250 V AC	 GB/T14472 275VAC
0,01	20	10,5	9,0	4,0	7,5	0,6	•	•	•	•
0,015	20	10,5	9,0	4,0	7,5	0,6	•	•	•	•
0,022	20	10,5	9,0	4,0	7,5	0,6	•	•	•	•
0,033	20	10,5	10,0	5,0	7,5	0,6	•	•	•	•
0,047	20	10,5	11,0	5,5	7,5	0,6	•	•	•	•
0,068	20	13	11,0	5,5	10	0,6	•	•	•	•
0,1	20	13	12,0	6,0	10	0,6	•	•	•	•
0,1	10, 20	18	11,0	5,0	15	0,8	•	•	•	•
0,12	20	18	11,0	5,0	15	0,8	•	•	•	•
0,12	10, 20	18	11,0	5,5	15	0,8	•	•	•	•
0,15	20	18	11,0	5,5	15	0,8	•	•	•	•
0,15	10, 20	18	12,0	6,0	15	0,8	•	•	•	•
0,18	10, 20	18	12,0	6,0	15	0,8	•	•	•	•
0,22	20	18	12,5	6,5	15	0,8	•	•	•	•
0,22	10, 20	18	13,0	7,0	15	0,8	•	•	•	•
0,27	20	18	13,0	7,0	15	0,8	•	•	•	•
0,27	10, 20	18	13,5	7,5	15	0,8	•	•	•	•
0,33	10, 20	18	16,0	7,5	15	0,8	•	•	•	•
0,33	10, 20	18	14,5	8,2	15	0,8	•	•	•	•
0,39	20	18	19,5	7,5	15	0,8	•	•	•	•
0,39	10, 20	18	16,5	8,5	15	0,8	•	•	•	•
0,47	20	18	16,0	9,5	15	0,8	•	•	•	•
0,47	10, 20	18	18,5	9,0	15	0,8	•	•	•	•
0,56	20	18	18,5	9,0	15	0,8	•	•	•	•
0,56	10, 20	18	19,0	10,0	15	0,8	•	•	•	•
0,56	10, 20	18	18,5	11,0	15	0,8	•	•	•	•
0,68	20	18	18,5	11,0	15	0,8	•	•	•	•
0,68	10, 20	18	22,0	10,0	15	0,8	•	•	•	•
0,68	10, 20	18	20,0	11,0	15	0,8	•	•	•	•
0,68	10, 20	18	20,0	12,5	15	0,8	•	•	•	•

marking with  except PCM 7,5 mm

Note: Bold-face printed alternative body dimensions upon request.

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNB1560	300 V AC + 125 °C	class X2
Type KNB1562		
Type KNB1563		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	300 V A.C.
Capacitance tolerance:	± 20 % for C ≤ 0,1 µF and ± 10 % for C > 0,1 µF
Climatic category:	40/125/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 125 °C
Test voltage:	2200 V D.C., 1 s for C < 1µF 1900 V D.C., 1 s for C ≥ 1µF
Max. pulse rise time du/dt, at 425 V D.C.:	500 V/µs for PCM = 10 mm 400 V/µs for PCM = 15 mm C ≤ 0,022 µF 250 V/µs for PCM = 15 mm C ≤ 0,022 µF 150 V/µs for PCM = 22,5 mm 100 V/µs for PCM = 27,5 mm pulse test according to IEC 60384-14
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 15000 MΩ for C ≤ 0,33 µF R _i × C _n ≥ 5000 s for C > 0,33 µF
Dielectric loss tanδ at f = 1 kHz and 20 °C:	≤ 1 × 10 ⁻³
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14, UL 1283, UL 1414, CSA C22.2 No.1, GB/T 14472-1998

KNB1560	KNB1562, KNB1563	Electrical connection
		Electrical connection:

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1560	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1562	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1563	20 to 200 mm	Insulated solid wire $\varnothing$ 0,8 mm End terminals on request

Standard values KNB1560, KNB1562, KNB1563, 300 V AC, class X2, + 125 °C

Capacitance C (μF)	Dimensions					 IEC 60384-14 300 V AC	For capacitors with insulated leads on request		
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	ø (mm)		 UL 1283 310 V AC	 UL 1414 250 V AC	 GB/T14472 300 V AC
0,01	13	9	4	10	0,6	•	•	•	•
0,015	13	9	4	10	0,6	•	•	•	•
0,022	13	9	4	10	0,6	•	•	•	•
0,033	13	9	4	10	0,6	•	•	•	•
0,033	13	10,5	5	10	0,6	•	•	•	•
0,047	13	10,5	5	10	0,6	•	•	•	•
0,047	13	11,5	6	10	0,6	•	•	•	•
0,068	13	11	5,5	10	0,6	•	•	•	•
0,1	13	12	6	10	0,6	•	•	•	•
0,01	18	11	5	15	0,8	•	•	•	•
0,015	18	11	5	15	0,8	•	•	•	•
0,022	18	11	5	15	0,8	•	•	•	•
0,033	18	11	5	15	0,8	•	•	•	•
0,047	18	11	5	15	0,8	•	•	•	•
0,068	18	11	5	15	0,8	•	•	•	•
0,1	18	11	5,5	15	0,8	•	•	•	•
0,12	18	12	6	15	0,8	•	•	•	•
0,15	18	13	7	15	0,8	•	•	•	•
0,22	18	14,5	8,2	15	0,8	•	•	•	•
0,27	18	14,5	9	15	0,8	•	•	•	•
0,33	18	16	9,5	15	0,8	•	•	•	•
0,33	18	19,5	7,5	15	0,8	•	•	•	•
0,47	18	18,5	11	15	0,8	•	•	•	•
0,56	18	20	12,5	15	0,8	•	•	•	•
0,15	26,5	14	6	22,5	0,8	•	•	•	•
0,22	26,5	14	6	22,5	0,8	•	•	•	•
0,27	26,5	15	6	22,5	0,8	•	•	•	•
0,33	26,5	16	7	22,5	0,8	•	•	•	•
0,47	26,5	17	8,5	22,5	0,8	•	•	•	•
0,56	26,5	18,5	9	22,5	0,8	•	•	•	•
0,68	26,5	18,5	10	22,5	0,8	•	•	•	•
1	26,5	21,5	12,5	22,5	0,8	•	•	•	•
0,47	31,5	16	7,5	27,5	0,8	•	•	•	•
0,56	32	17	9	27,5	0,8	•	•	•	•
0,68	32	17	9	27,5	0,8	•	•	•	•
1	32	20	11	27,5	0,8	•	•	•	•
1,5	31,5	23,5	14	27,5	0,8	•	•	•	•
2,2	31,5	26,5	17	27,5	0,8	•	•	•	•

Approvals in use = •
Approvals in pending = o

Capacitors with discharge resistor

Type KNB1560	275 V AC	class X2
Type KNB1562		
Type KNB1563		



TECHNICAL DATA

Construction: - capacitor:	polypropylene film, metallized
- resistor:	metaloxide film
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 % for $C \leq 0,1 \mu\text{F}$ and ± 10 % for $C > 0,1 \mu\text{F}$
Resistance tolerance:	± 5 %
Resistance power:	0,6 W
Climatic category:	40/110/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 110 °C
Test voltage:	1700 V D.C., 1 s
Max. pulse rise time du/dt , at 390 V D.C.:	250 V/ μs for PCM = 15mm 150 V/ μs for PCM = 22,5 mm pulse test according to IEC 60384-14
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14, UL 1283, UL 1414, CSA C22.2 No.1, GB/T 14472-1998

KNB1560	KNB1562, KNB1563	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1560	3 ^{+0,5} , 4 ^{+0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1562	20 to 200 mm	Insulated stranded wire 0,5 mm²
KNB1563	20 to 200 mm	Insulated solid wire Ø 0,8 mm End terminals on request

Standard values KNB1560, KNB1562, KNB1563, 275 V AC, class X2, with discharge resistor

Capacitance C (μF)	Resistance R (kΩ)	Dimensions				 IEC 60384-14 275 V AC	For capacitors with insulated leads on request		
		L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		 UL 1283 275 V AC	 UL 1414 250 V AC	 GB/T14472 275 V AC
0,047		18	12	6	15	•	•	•	•
0,068		18	12	6	15	•	•	•	•
0,1	470	18	13	7	15	•	•	•	•
0,15	to	18	14,5	8,2	15	•	•	•	•
0,22	2700	18	16,5	8,5	15	•	•	•	•
0,33		18	18,5	11	15	•	•		•
0,33		26,5	16,5	8,5	22,5	•	•	•	•
0,47		26,5	18,5	9	22,5	•	•	•	•

Resistance values according to IEC 60063 range E12.

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNR1530	275 V AC	class X2 RC units
Type KNR1532		
Type KNR1533		



TECHNICAL DATA

Construction: - capacitor: - resistor:	polypropylene film, metallized carbon film or wire-wound
Rated voltage:	275 V A.C.
Capacitance tolerance:	$\pm 20\%$ for $C \leq 0,1 \mu\text{F}$ and $\pm 10\%$ for $C > 0,1 \mu\text{F}$ other on request
Climatic category:	40/085/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 85 °C
Test voltage:	1700 V D.C., 2 s
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 15000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 5000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Resistance tolerance:	$\pm 10\%$
Resistor power:	0,5 W
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Complies to:	IEC 60384-14, EN 60384-14

KNR1530	KNR1532, KNR1533	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNR1530	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNR1532	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNR1533	20 to 200 mm	Insulated solid wire ø 0,8 mm End terminals on request

Standard values KNR1530, KNR1532, KNR1533, 275 V AC, class X2

Capacitance C (μF)	Resistance R (kΩ)	Dimensions				
		L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	
0,01		21	16,5	8	17,5	•
0,01		27	15	6	22,5	•
0,015		21	16,5	8	17,5	•
0,015		27	15	6	22,5	•
0,022		21	16,5	8	17,5	•
0,022		27	15	6	22,5	•
0,033		21	16,5	8	17,5	•
0,033		27	15	6	22,5	•
0,047	2,2	21	16,5	8	17,5	•
0,047	to	27	15	6	22,5	•
0,068	470	21	16,5	8	17,5	•
0,068		27	15	6	22,5	•
0,1		21	16,5	8	17,5	•
0,1		27	16,5	7	22,5	•
0,15		27	17	8,5	22,5	•
0,15		30	18	8	25	•
0,22		27	19	10,5	22,5	•
0,22		30	18	8	25	•
0,27	2,2 to 330	32	19	10	27,5	•
0,33	2,2 to 220	32	19	10	27,5	•
0,47		32	20	11	27,5	•

Resistance values according to IEC 60063 range E12.

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNB2520	250 V AC	class Y2
Type KNB2522	300 V AC	
Type KNB2523		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	250 V A.C., 300 V A.C.
Capacitance tolerance:	$\pm 20\%$, $\pm 10\%$
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Test voltage:	4000 V D.C., 1 s
Max. pulse rise time du/dt, at 425 V D.C.:	3000 V/ μ s for 1000 pF 2500 V/ μ s for 1500 pF 2000 V/ μ s for 2200 pF up to 6800 pF PCM10 1500 V/ μ s for PCM ≥ 15 according to IEC 60384-14
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 15000 \text{ M}\Omega$
Dielectric loss $\tan\delta$ at $f = 1$ kHz and 20 °C:	$\leq 15 \times 10^{-4}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10nH/cm of capacitors length and terminals
Complies to:	IEC 60384-14, EN 60384-14, UL 1283, UL 1414, CSA C22.2 No.1, CSA E384-14, CSA C22.2 No.8, GB/T 14472-1998

KNB2520	KNB2522, KNB2523	Electrical connection
		Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB2520	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB2522	20 to 200 mm	Insulated stranded wire 0,5 mm²
KNB2523	20 to 200 mm	Insulated solid wire Ø 0,8 mm End terminals on request

Standard values KNB2520, KNB2522, KNB2523, 250 V AC, 300 V AC, class Y2

Capacitance C (pF)	Dimensions					 IEC 60384-14 300 V AC	For capacitors with insulated leads on request					
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	ø (mm)		 UL 1283 300 V AC	 UL 1414 250 V AC	 C22.2 No.8 275 V AC	 GB/T14472 250 V AC	 C22.2 No.1 125 V/250 V	 E384-14-95 300 V AC
1000	13	9,5	4,3	10	0,6	•	•	•	•	•	•	•
1500	13	9,5	4,3	10	0,6	•	•	•	•	•	•	•
2200	13	9,5	4,3	10	0,6	•	•	•	•	•	•	•
2500	13	9,5	4,3	10	0,6	•						•
2700	13	9,5	4,3	10	0,6	•	•	•	•	•	•	•
2800	13	9,5	4,3	10	0,6	•	•	•	•	•	•	•
3300	13	10,5	5	10	0,6	•	•	•	•	•	•	•
4700	13	11,5	6	10	0,6	•	•	•	•	•	•	•
5000	13	11,5	6	10	0,6	•	•	•	•	•	•	•
6800	13	12	6	10	0,6	•	•	•	•		•	•
6800	18	11	5,5	15	0,8	•	•	•	•	•	•	•
10000	18	11	5,5	15	0,8	•	•	•	•	•	•	•
15000	18	12	6	15	0,8	•	•	•	•	•	•	•
22000	18	13	7	15	0,8	•	•	•	•	•	•	•
25000	18	13,5	7,5	15	0,8	•	•	•	•			•
27000	18	13,5	7,5	15	0,8	•	•	•	•			•
33000	18	14,5	9	15	0,8	•	•	•	•			•
39000	18	18,5	9	15	0,8	•	•	•	•			•
47000	18	18,5	9	15	0,8	•	•	•	•			•
33000	26,5	14	6	22,5	0,8	•	•	•	•			•
39000	26,5	15	6	22,5	0,8	•	•	•	•			•
47000	26,5	16	7	22,5	0,8	•	•	•	•			•
56000	26,5	16,5	8,5	22,5	0,8	•	•	•	•			•
68000	26,5	17	8,5	22,5	0,8	•	•	•	•			•
100000	27	19	10,5	22,5	0,8	•	•	•	•			•
120000	26,5	21,5	11	22,5	0,8	•	•	•	•			•
150000	26,5	21,5	18,5	22,5	0,8	•	•	•	•			•

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNB2530	440 V AC	class Y1
Type KNB2532		
Type KNB2533		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	440 V A.C.
Capacitance tolerance:	$\pm 20 \%$, $\pm 10 \%$
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	category B according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Test voltage:	4000 V A.C., 2 s
Max. pulse rise time du/dt, at 622 V D.C.:	6000 V/ μ s for PCM = 15 mm 3500 V/ μ s for PCM = 22,5 mm according to IEC 60384-14
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 15000 \text{ M}\Omega$
Dielectric loss $\tan \delta$ at $f = 1$ kHz and 20 °C:	$\leq 1 \times 10^{-3}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14 UL 1283, UL 1414, CSA C22.2 No.8, CSA C22.2 No.1
Permissible continuous A.C. voltage:	750 V 50/60Hz
Permissible continuous D.C. voltage:	3000 V

KNB2530	KNB2532, KNB2533	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB2520	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ⁺² , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ⁺⁵ mm, other on request	Tinned copper wire
KNB2522	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB2523	20 to 200 mm	Insulated solid wire $\varnothing$ 0,8 mm End terminals on request

Standard values KNB2530, KNB2532, KNB2533, 440 V AC, class Y1

Capacitance C (pF)	Dimensions					 IEC 60384-14 440 V AC	 UL 1414 C22.2 No.1 250 V AC	 UL 1283 C22.2 No.8 440 V AC
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	ø (mm)			
470	18	11	5	15	0.8	•	•	•
680	18	11	5	15	0.8	•	•	•
1000	18	11	5	15	0.8	•	•	•
1500	18	11	5	15	0.8	•	•	•
2200	18	12	6	15	0.8	•	•	•
2700	18	13	7	15	0.8	•	•	•
2800	18	13	7	15	0.8	•	•	•
3300	18	13	7	15	0.8	•	•	•
4700	18	14.5	8.2	15	0.8	•	•	•
5000	18	14.5	8.2	15	0.8	•	•	•
5600	18	16.5	8.5	15	0.8	•	•	•
6800	18	18.5	9	15	0.8	•	•	•
10000	18	20	12.5	15	0.8	•	•	•
5600	26.5	14	6	22.5	0.8	•	•	•
6800	26.5	16	7	22.5	0.8	•	•	•
10000	26.5	16.5	8.5	22.5	0.8	•	•	•
15000	26.5	18.5	10	22.5	0.8	•	•	•
22000	26.5	21.5	12.5	22.5	0.8	•	•	•

Approvals in use = •

Approvals in pending = o

Capacitors

Type KNB1540	440 V AC	class X1
Type KNB1542		
Type KNB1543		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	440 V A.C.
Capacitance tolerance:	$\pm 20\%$ for $C \leq 0,1 \mu\text{F}$ $\pm 10\%$ for $C > 0,1 \mu\text{F}$
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Test voltage:	3500 V D.C., 1 s
Max. pulse rise time du/dt, at 622 V D.C.:	3000 V/ μs for PCM = 15 mm 1500 V/ μs for PCM = 22,5 mm 1100 V/ μs for PCM = 27,5 mm according to IEC 60384-14
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 15000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 5000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Dielectric loss $\tan\delta$ at $f = 1 \text{ kHz}$ and 20 °C:	$\leq 5 \times 10^{-4}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14, UL 1283, UL 1414, CSA C22.2 No.1

KNB1540	KNB1542, KNB1543	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1540	3 ^{+0,5} , 4 ^{±0,5} , 6 ⁻¹ , 9 ⁺¹ , 15 ^{±2} , 20 ^{±2} , 25 ⁺⁵ , 30 ⁺⁵ , 50 ^{±5} mm, other on request	Tinned copper wire
KNB1542	20 to 200 mm	Insulated stranded wire 0,5 mm²
KNB1543	20 to 200 mm	Insulated solid wire ø 0,8 mm End terminals on request

Standard values KNB1540, KNB1542, KNB1543, 440 V AC, class X1

Capacitance C (μ F)	Dimensions				 IEC 60384-14 440 V AC	For capacitors with insulated leads on request		
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)		 UL 1283 440 V AC	 UL 1414 250 V AC	 C22.2 No. 1 250 V AC
0,0022	18	11	5,5	15	•	•	•	•
0,0033	18	11	5,5	15	•	•	•	•
0,0047	18	11	5,5	15	•	•	•	•
0,0068	18	11	5,5	15	•	•	•	•
0,01	18	12	6	15	•	•	•	•
0,015	18	13	7	15	•	•	•	•
0,022	18	14,5	8,5	15	•	•	•	•
0,033	18	18,5	9	15	•	•	•	•
0,047	18	20	12,5	15	•	•	•	•
0,015	27	15	6,5	22,5	•	•	•	•
0,022	27	15	6,5	22,5	•	•	•	•
0,033	27	15	6,5	22,5	•	•	•	•
0,047	27	16,5	7	22,5	•	•	•	•
0,068	27	18,5	8,5	22,5	•	•	•	•
0,1	27	20	10,5	22,5	•	•	•	•
0,15	27	23	14	22,5	•	•	•	•
0,22	27	25	16	22,5	•	•	•	•
0,1	32	19	10	27,5	•	•	•	•
0,15	32	20	11	27,5	•	•	•	•
0,22	32	23,5	14	27,5	•	•	•	•
0,27	32	24,5	15	27,5	•	•	•	•
0,33	32	28	18	27,5	•	•	•	•
0,47	32	33	20	27,5	•	•	•	•
0,68	32	39	24	27,5				

Approvals in use = •
Approvals in pending = o

Capacitors

Type KNB1550	310 V AC 110 °C	class X1
Type KNB1552		
Type KNB1553		



TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	310 V A.C.
Capacitance tolerance:	± 20 % for $C \leq 0,1 \mu\text{F}$ ± 10 % for $C > 0,1 \mu\text{F}$
Climatic category:	40/110/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 110 °C
Test voltage:	3000 V D.C., 1s for $C < 1 \mu\text{F}$ 2800 V D.C., 1s for $C \geq 1 \mu\text{F}$
Max. pulse rise time du/dt , at 438 V D.C.:	600 V/ μs for PCM = 10 mm 500 V/ μs for PCM = 15 mm 400 V/ μs for PCM = 22,5 mm 200 V/ μs for PCM = 27,5 mm pulse test according to IEC 60384-14
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 15000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 5000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Dielectric loss $\tan\delta$ at $f = 1 \text{ kHz}$ and 20 °C:	$\leq 1 \times 10^{-3}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Self inductance:	approx. 10 nH/cm of capacitor length and terminals
Complies to:	IEC 60384-14, EN 60384-14, UL 1283, CSA E384-14

KNB1550	KNB1552, KNB1553	Electrical connection

Casing: thermoplastic, sealed with synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.	
Terminals		
Type	Terminal length	Type of terminals
KNB1550	4 ^{±0,5} , 6 ⁻¹ , 25 ⁺⁵ , 30 ⁺⁵ mm, other on request	Tinned copper wire
KNB1552	20 to 200 mm	Insulated stranded wire 0,5 mm ²
KNB1553	20 to 200 mm	Insulated solid wire $\varnothing$ 0,8 mm End terminals on request

Standard values KNB1550, KNB1552, KNB1553, 310 V AC, +110 °C, class X1

Capacitance C (μ F)	Dimensions					 IEC 60384-14 310 V AC	For capacitors with insulated leads on request			
	L _{max} (mm)	H _{max} (mm)	W _{max} (mm)	PCM (mm)	$\varnothing$ (mm)		 UL 1283 310 V AC	 UL 1414 250 V AC	 E384-14 310 V AC	 GB/T14472 310 V AC
0.01	13	9.5	4.3	10	0.6	•	•	o	o	o
0.015	13	10.5	5	10	0.6	•	•	o	o	o
0.022	13	11.5	6	10	0.6	•	•	o	o	o
0.033	13	13.5	6	10	0.6	•	•	o	o	o
0.01	18	11	5	15	0.8	•	•	o	o	o
0.015	18	11	5	15	0.8	•	•	o	o	o
0.022	18	11	5	15	0.8	•	•	o	o	o
0.033	18	11	5	15	0.8	•	•	o	o	o
0.047	18	12	6	15	0.8	•	•	o	o	o
0.068	18	13	7	15	0.8	•	•	o	o	o
0.1	18	13.5	7.5	15	0.8	•	•	o	o	o
0.15	18	16	9.5	15	0.8	•	•	o	o	o
0.22	18	18.5	11	15	0.8	•	•	o	o	o
0.1	26.5	14	6	22.5	0.8	•	•	o	o	o
0.15	26.5	14	6	22.5	0.8	•	•	o	o	o
0.22	26.5	16.4	8.5	22.5	0.8	•	•	o	o	o
0.33	26.5	18.5	10	22.5	0.8	•	•	o	o	o
0.47	26.5	21.5	12.5	22.5	0.8	•	•	o	o	o
0.33	31.5	17	9	27.5	0.8	•	•	o	o	o
0.47	31.5	19	10	27.5	0.8	•	•	o	o	o
0.68	31.5	22	13	27.5	0.8	•	•	o	o	o
1	32	24.5	15	27.5	0.8	•	•	o	o	o
1.5	31.5	32	18	27.5	0.8	•	•	o	o	o
2.2	31.5	35.5	24	27.5	0.8	•	•		o	o

Approvals in use = •
Approvals in pending = o

Capacitors

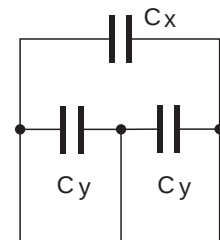
Type KNB753x	275 V AC	class X2Y2
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TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	275 V A.C.
Capacitance tolerance:	$\pm 20\%$ ($\pm 10\%$ on request)
Climatic category:	40/100/56 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 40 °C to + 100 °C
Max. pulse rise time du/dt , at 438 V D.C.:	100 V/ μ s at 390 V D.C. according to IEC 60384-14
Test voltage:	X2 - capacitors 1700 V D.C., 2 s Y2 - capacitors 2700 V D.C., 2 s
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 15000 \text{ M}\Omega$
Dielectric loss $\tan\delta$ at $f = 1$ kHz and 20 °C:	$\leq 20 \times 10^{-4}$
Soldering:	IEC 60068-2-20, max. 2 s
Soldering time on printed circuit:	max. 5 s at 270 °C
Complies to:	IEC 60384-14



Electrical connection



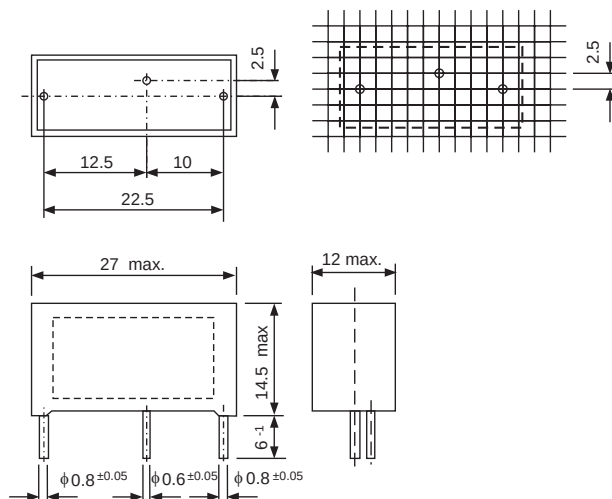
Standard values KNB753x,
275 V AC, class X2Y2

Capacitance C_x (μ F)	Capacitance C_y (pF)
0,1	2×1000
0,1	2×1500
0,1	2×2200
0,1	2×3300
0,1	2×4700
0,15	2×1000
0,15	2×1500
0,15	2×2200
*0,15	2×2700
0,15	2×3300
*0,15	2×4700
0,22	2×1000
0,22	2×1500
0,22	2×2200
*0,22	2×3300
0,22	2×4700
0,25	2×1000
0,25	2×1500
0,25	2×2200
0,25	2×3300
0,25	2×4700

Approval only for values marked with *



KNB753x



Casing: thermoplastic, sealed in synthetical resin	Thermoplastic material is self-extinguishing according to UL 94, class V-0.
Terminals	
Type	Type of terminals
KNB753x	Solid copper tinned wire or insulated stranded wire

Capacitors

Type KPB23xx	two-pole	class X1
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Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.

TECHNICAL DATA

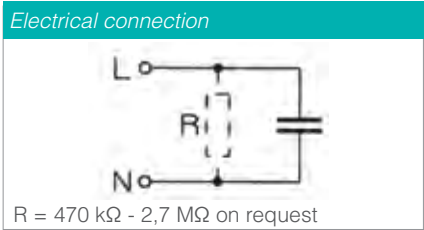
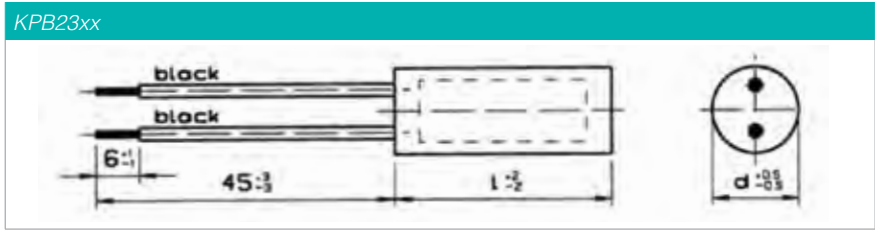
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/100/21 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 25 °C to + 100 °C
Test voltage:	1790 V D.C., 2 s
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n fi 2000 s for C > 0,33 μF
Complies to:	IEC 60384-14, EN 60384-14



Standard values KPB23xx

Capacitance C _{x1} (μF)	Dimensions d × l (mm)	 IEC 60384-14 (25/100/21)
0,01	8 × 30	•
0,022	9,5 × 30	•
0,027	9,5 × 30	•
0,033	9,5 × 30	•
0,047	11 × 30	•
0,068	12 × 30	•
0,1	14 × 35	•
0,15	16 × 35	•
0,22	18 × 35	•
0,22	18 × 40	•
0,27	20 × 35	•
0,27	20 × 40	•
0,33	20 × 40	•
0,47	25 × 40	•

Other values upon request



R = 470 kΩ - 2,7 MΩ on request

Casing: thermoplastic, sealed with synthetical resin, flame retardant	Wire dimensions on drawing correspond with type KPB2300 - standard version.
Terminals	
Type	Type of terminals
KPB23xx	insulated stranded wire 0,5 mm ² , or insulated solid wire ø 0,8 mm Non-insulated part is soldered. Wires can be equipped with connection terminals on request.

Capacitors

Type KPB2325

four-pole

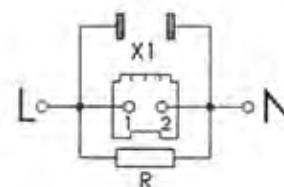
class **X1**

TECHNICAL DATA

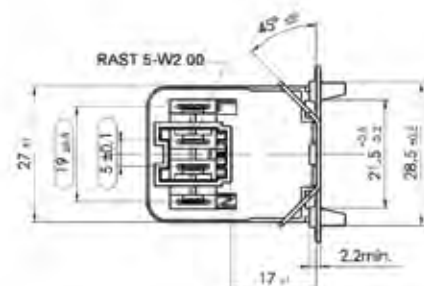
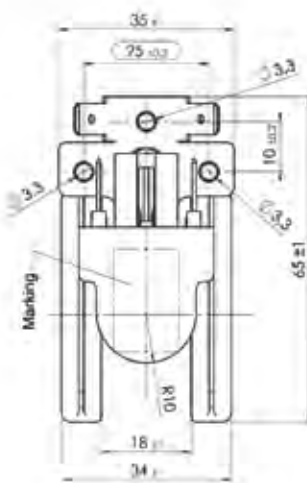
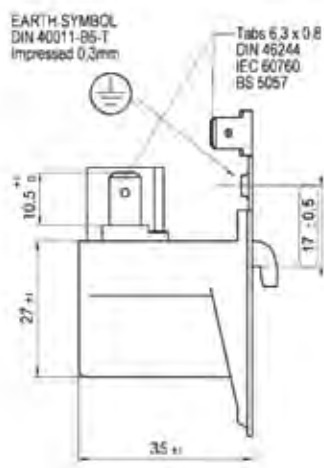
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	$\pm 20 \%$
Climatic category + letter indicating passive flammability category:	25/100/21B
Temperature range:	- 25 °C to + 100 °C
Test voltage:	X1-capacitor 1790 V D.C., 2 s
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$
Casing:	Thermoplastic can, sealed with synthetical resin, flame retardant
Terminals:	fast-on connectors 6,3 × 0,8 CuZn/Sn
Complies to:	IEC 60384-14, EN 60384-14



Electrical connection



KPB2325



Standard value KPB23xx

Capacitance C_{X1} (μF)	Discharge resistor R ($\text{M}\Omega$)
0,1	1

Approval:



IEC 60384-14

Other values upon request

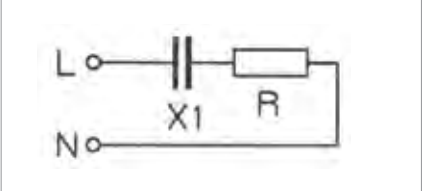
Capacitors

Type KPR23xx	two-pole	class X1 RC unit
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Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.



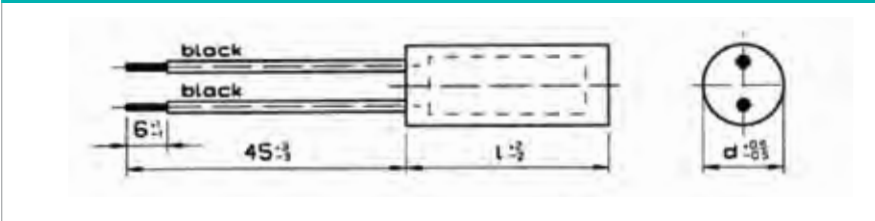
Electrical connection



TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 25 °C to + 85 °C
Test voltage:	1790 V D.C., 2 s
Complies to:	IEC 60384-14, EN 60384-14

KPR23xx



Casing: thermoplastic, sealed with synthetical resin, flame retardant	Wire dimensions on drawing correspond with type KPR2300 - standard version.
Terminals	
Type	Type of terminals
KPB23xx	Insulated stranded wire 0,5 mm², or insulated solid wire $\varnothing$ 0,8 mm Non-insulated part is soldered. Wires can be equipped with connection terminals on request.

Standard values KPR23xx

Capacitance C_{x1} (µF)	Resistor R (MΩ)	Dimensions d × l (mm)
0,01	50	12 × 30
0,1	50	16 × 35

Other values upon request



Capacitors

Type KPB53xx	two-pole	class Y2
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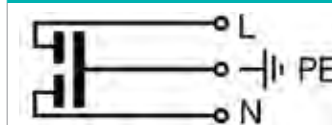
Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.



TECHNICAL DATA

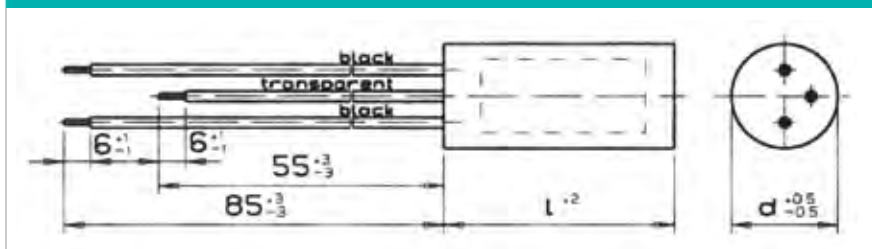
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	Y2 - capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}, t = 1 \text{ min:}$	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ ($R_i \geq 2 \times 10^5 \text{ M}\Omega$)
Complies to:	IEC 60384-14, EN 132400

Electrical connection



$R = 470 \text{ k}\Omega \div 2,7 \text{ M}\Omega$ on request

KPB53xx



Casing: thermoplastic, sealed with synthetical resin, flame retardant

Wire dimensions on drawing correspond with type KPB5300 - standard version.

Terminals

Type	Type of terminals
KPB53xx	Insulated stranded wire 0,5 mm ² , or insulated solid wire $\varnothing$ 0,8 mm. Non-insulated part is soldered. Wires can be equipped with connection terminals on request.

Standard values KPB53xx

Capacitance class Y2	Dimensions	
(μF)	D (mm)	L (mm)
$2 \times 0,0010$	11	30
$2 \times 0,0022$	11	30
$2 \times 0,0025$	11	30
$2 \times 0,0027$	11	30
$2 \times 0,0033$	11	30
$2 \times 0,0047$	11	30
$2 \times 0,0050$	11	30
$2 \times 0,0068$	12	30
$2 \times 0,010$	12	30
$2 \times 0,015$	12	30

Capacitance class Y2	Dimensions	
(μF)	D (mm)	L (mm)
$2 \times 0,010$	12	35
$2 \times 0,015$	12	35
$2 \times 0,022$	14	35
$2 \times 0,027$	14	35
$2 \times 0,033$	16	35
$2 \times 0,047$	18	35
$2 \times 0,068$	20	35

Approval:



Capacitors

Type KPB70xx	two-pole	class X1Y2
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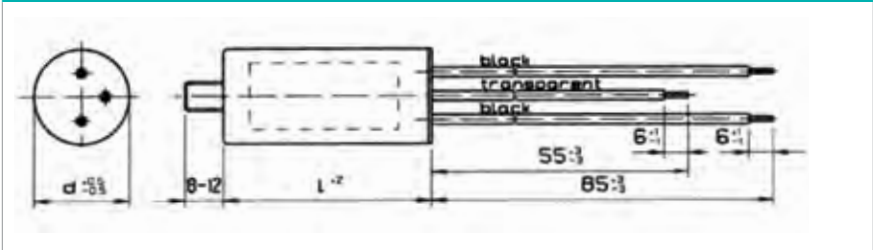
Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.

TECHNICAL DATA

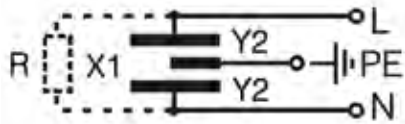
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C. (X1) 250V A.C. (Y2)
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 µF R _i × C _n ≥ 2000 s for C > 0,33 µF
Complies to:	IEC 60384-14, EN 60384-14

Passive flammability category:A

KPB70xx



Electrical connection



R = 470 kΩ ÷ 2,7 MΩ on request

Standard values KPB70xx

Capacitance		Dimensions
class X1 (µF)	class Y2 (pF)	d x l (mm)
0,27	2 × 27000	20 × 50
0,33	2 × 2700	22 × 40
0,33	2 × 2700	25 × 40
0,33	2 × 4700	22 × 40
0,33	2 × 4700	25 × 40
0,33	2 × 10000	25 × 40
0,33	2 × 15000	25 × 40
0,33	2 × 22000	25 × 40
0,33	2 × 27000	25 × 40
0,47	2 × 2700	25 × 40
0,47	2 × 2700	30 × 40
0,47	2 × 4700	25 × 40
0,47	2 × 4700	30 × 40
0,47	2 × 10000	25 × 40
0,47	2 × 10000	30 × 40
0,47	2 × 15000	30 × 40
0,47	2 × 22000	30 × 40
0,47	2 × 27000	30 × 40

Other values upon request

Approval:



class**X1Y2**

Note: C = CSA C22.2 No.8; US = UL 1283

Casing: aluminium can, closed with sealing washer, sealed with synthetical resin, flame retardant.	Wire dimensions on drawing correspond with type KPB7000 - standard version.
Terminals	
Type	Type of terminals
KPB70xx	Insulated stranded wire 0,5 mm ² , or insulated solid wire ø 0,8 mm Non-insulated part is soldered. Connection terminals provided on request.

Capacitors

Type KPB7077

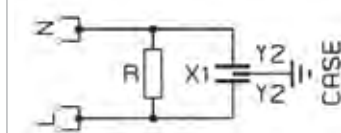
four-pole

class **X1Y2**

TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \text{ }\mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \text{ }\mu\text{F}$
Complies to:	IEC 60384-14, EN 60384-14, CSA C22.2 No.8, UL 1283

Electrical connection



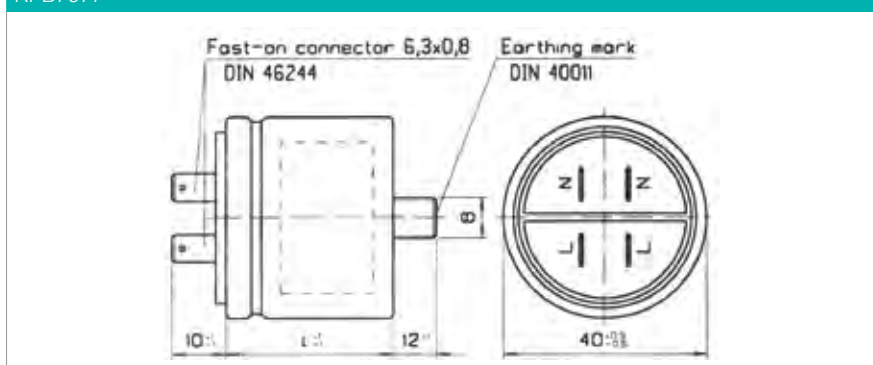
$R = 470 \text{ k}\Omega \div 2,7 \text{ M}\Omega$ on request

Terminals

2 × double fast-on connectors CuZn/Sn

Passive flammability category:A

KPB7077



Standard values KPB7077

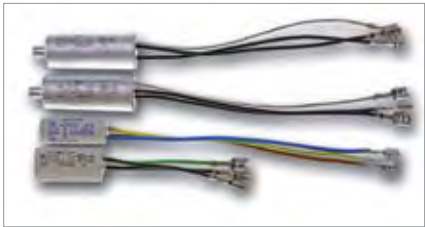
Capacitance		Dimensions	 IEC 60384-14	 UL 1283
class X1 (μF)	class Y2 (pF)	d x l (mm)		
0,1	2 × 5000	30	•	
0,1	2 × 10000	30	•	
0,1	2 × 15000	30	•	
0,1	2 × 27000	30	•	
0,25	2 × 5000	30	•	
0,25	2 × 10000	30	•	
0,25	2 × 15000	30	•	
0,25	2 × 27000	33	•	
0,3	2 × 5000	30	•	•
0,3	2 × 10000	30	•	•
0,3	2 × 15000	33	•	
0,3	2 × 27000	33	•	
0,47	2 × 5000	33	•	
0,47	2 × 10000	33	•	
0,47	2 × 15000	33	•	
0,47	2 × 27000	33	•	•
0,5	2 × 10000	33	•	•

Other values upon request

Note: C = CSA C22.2 No.8; US = UL 1283

Capacitors

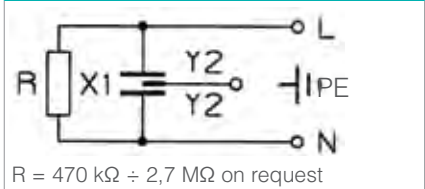
Type KPB7012	two-pole	class X1Y2
Type KPB7312		



TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60384-14, EN 60384-14

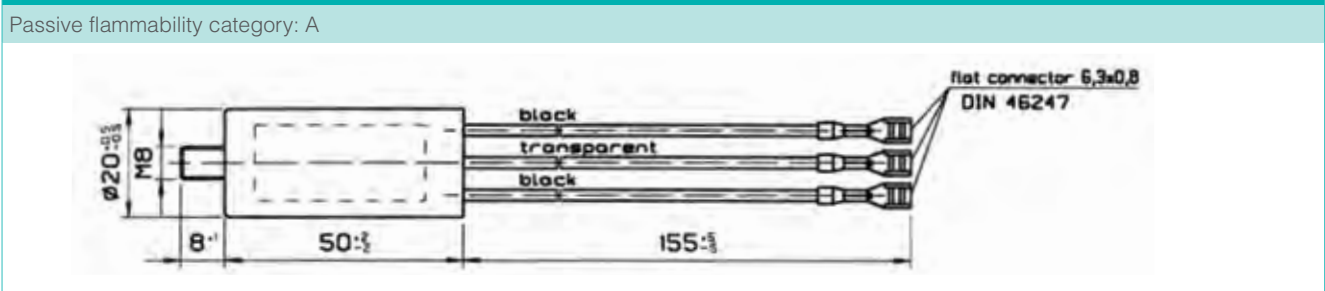
Electrical connection



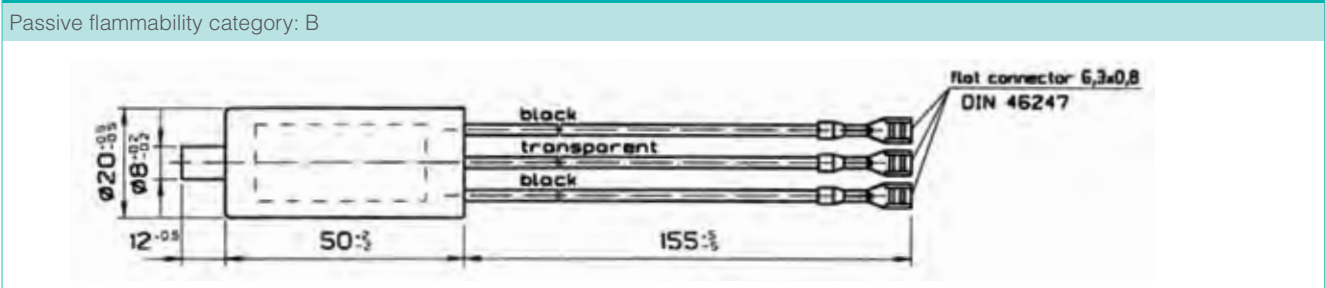
Terminals

stranded copper wire type H05V2-K
0,5 mm² 105 °C and flat connectors

Type KPB7012 - aluminium can, closed with sealing washer.



Type KPB7312 - thermoplastic can sealed with synthetical resin, flame retardant.



Standard value KPB7012, KPB7312

Capacitance		Discharging
class X1 (μF)	class Y2 (μF)	R (MΩ)
0.27	2 × 0,027	1

Other values upon request

Approval:



Capacitors

Type KPB73xx	two-pole	class X1Y2
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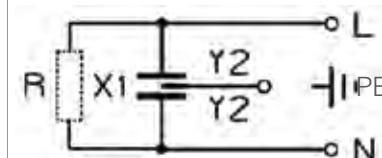
Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.



TECHNICAL DATA

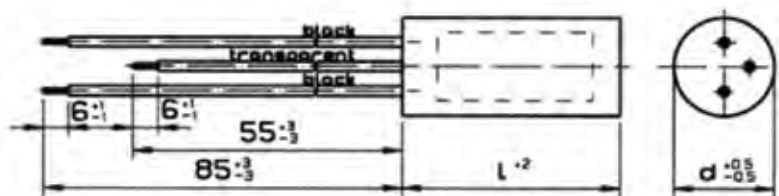
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	$\pm 20 \%$
Climatic category:	25/100/21 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 25 °C to + 100 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}, t = 1 \text{ min}:$	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Complies to:	IEC 60384-14, EN 60384-14, CSA C22.2 No.8, UL 1283

Electrical connection



$R = 470 \text{ k}\Omega \div 2,7 \text{ M}\Omega$ on request

KPB73xx



Casing: thermoplastic, sealed with synthetical resin, flame retardant.	Wire dimensions on drawing correspond with type KPB7300 - standard version.
Terminals	
Type	Type of terminals
KPB73xx	Insulated stranded wire 0,5 mm ² , or insulated solid wire $\varnothing 0,8 \text{ mm}$. Non-insulated part is soldered. Connection terminals provided on request.

Standard values KPB73xx

Capacitance		Dimensions		
class X1 (μF)	class Y2 (pF)	d x l (mm)	IEC 60384-14	On request
0,022	2 x 2700	11 x 30	•	•
0,022	2 x 4700	12 x 30	•	
0,022	2 x 5000	14 x 35	•	
0,022	2 x 22000	16 x 35	•	
0,022	2 x 22000	18 x 35	•	
0,027	2 x 2700	11 x 30	•	•
0,047	2 x 2700	12 x 30	•	•
0,047	2 x 4700	14 x 30	•	•
0,047	2 x 5000	14 x 30	•	•
0,068	2 x 2700	14 x 35	•	•
0,068	2 x 4700	14 x 35	•	•
0,068	2 x 5000	14 x 35	•	•
0,1	2 x 2500	14 x 35	•	
0,1	2 x 2700	14 x 35	•	•
0,1	2 x 4700	14 x 35	•	•
0,1	2 x 4700	16 x 35	•	•
0,1	2 x 5000	14 x 35	•	•
0,1	2 x 5000	16 x 35	•	•
0,1	2 x 10000	16 x 35	•	•
0,1	2 x 15000	16 x 35	•	•
0,1	2 x 22000	18 x 35	•	•
0,1	2 x 27000	18 x 40	•	•
0,1	2 x 27000	20 x 35	•	•
0,15	2 x 2700	16 x 35	•	•
0,15	2 x 4700	16 x 35	•	•
0,15	2 x 5000	16 x 35	•	•
0,15	2 x 5000	18 x 35	•	•
0,15	2 x 5000	18 x 40	•	•
0,15	2 x 10000	18 x 35	•	•
0,15	2 x 15000	18 x 35	•	•
0,15	2 x 22000	20 x 35	•	•
0,15	2 x 27000	18 x 40	•	•
0,15	2 x 27000	20 x 35	•	•
0,22	2 x 2700	18 x 40	•	•
0,22	2 x 2700	20 x 35	•	•
0,22	2 x 4700	18 x 40	•	•
0,22	2 x 5000	18 x 40	•	•
0,22	2 x 10000	20 x 40	•	•
0,22	2 x 15000	20 x 40	•	•
0,22	2 x 22000	22 x 40	•	•
0,22	2 x 27000	22 x 40	•	•

Capacitance		Dimensions		
class X1 (μF)	class Y2 (pF)	d x l (mm)	IEC 60384-14	On request
0,25	2 x 2500	20 x 40	•	
0,25	2 x 2700	20 x 40	•	
0,25	2 x 4700	20 x 40	•	
0,25	2 x 5000	20 x 40	•	
0,25	2 x 10000	20 x 40	•	
0,25	2 x 15000	22 x 40	•	
0,25	2 x 22000	22 x 40	•	
0,25	2 x 27000	22 x 40	•	
0,27	2 x 2700	20 x 40	•	•
0,27	2 x 4700	20 x 40	•	•
0,27	2 x 5000	20 x 40	•	•
0,27	2 x 10000	22 x 40	•	•
0,27	2 x 15000	22 x 40	•	•
0,27	2 x 22000	22 x 40	•	•
0,27	2 x 27000	20 x 50	•	•
0,27	2 x 27000	22 x 40	•	•
0,33	2 x 2700	22 x 40	•	•
0,33	2 x 2700	25 x 40	•	•
0,33	2 x 4700	22 x 40	•	•
0,33	2 x 4700	25 x 40	•	•
0,33	2 x 10000	25 x 40	•	•
0,33	2 x 15000	25 x 40	•	•
0,33	2 x 22000	25 x 40	•	•
0,33	2 x 27000	25 x 40	•	•
0,47	2 x 2700	25 x 40	•	•
0,47	2 x 2700	30 x 40	•	•
0,47	2 x 4700	25 x 40	•	•
0,47	2 x 4700	30 x 40	•	•
0,47	2 x 10000	25 x 40	•	•
0,47	2 x 10000	30 x 40	•	•
0,47	2 x 15000	30 x 40	•	•
0,47	2 x 22000	30 x 40	•	•
0,47	2 x 27000	30 x 40	•	•

Other values upon request

Note: C = CSA C22.2 No.8; US = UL 1283

Capacitors

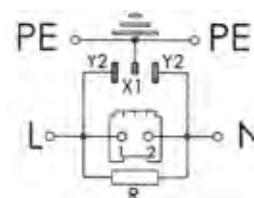
Type KPB7325	four-pole	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Rated current:	16 A
Capacitance tolerance:	$\pm 20 \%$
Climatic category + letter indicating passive flammability category:	25/100/21/B
Temperature range:	- 25 °C to + 100 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000$ M Ω
Casing:	thermoplastic can, sealed with synthetical resin, flame retardant
Terminals:	fast-on connectors 6,3 $\times$ 0,8 CuZn/Sn
Complies to:	IEC 60384-14, EN 60384-14, CSA C22.2 No.8, UL 1283

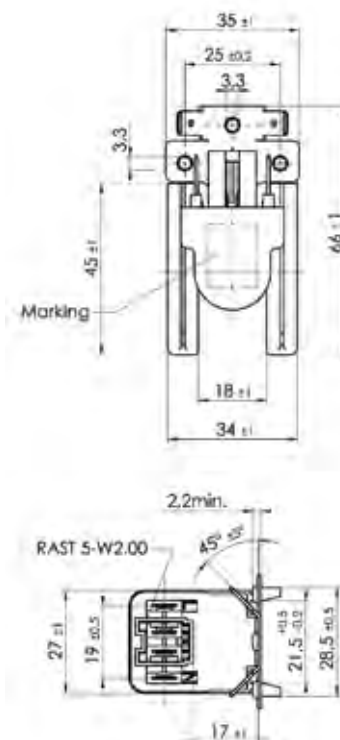


Electrical connection



$R = 470$ k Ω $\div$ 2,7 M Ω on request

KPB 7325



Standard values KPB7325

Capacitance		Capacitance	
class X1 (μ F)	class Y2 (pF)	class X1 (μ F)	class Y2 (pF)
0,1	2 $\times$ 2500	0,22	2 $\times$ 22000
0,1	2 $\times$ 2700	0,22	2 $\times$ 27000
0,1	2 $\times$ 4700	0,24	2 $\times$ 15000
0,1	2 $\times$ 5000	0,24	2 $\times$ 27000
0,1	2 $\times$ 10000	0,25	2 $\times$ 2500
0,1	2 $\times$ 15000	0,25	2 $\times$ 2700
0,1	2 $\times$ 22000	0,25	2 $\times$ 4700
0,1	2 $\times$ 27000	0,25	2 $\times$ 5000
0,15	2 $\times$ 2500	0,25	2 $\times$ 10000
0,15	2 $\times$ 2700	0,25	2 $\times$ 15000
0,15	2 $\times$ 5000	0,25	2 $\times$ 22000
0,15	2 $\times$ 10000	0,25	2 $\times$ 27000
0,15	2 $\times$ 15000	0,27	2 $\times$ 2500
0,15	2 $\times$ 22000	0,27	2 $\times$ 2700
0,15	2 $\times$ 27000	0,27	2 $\times$ 4700
0,22	2 $\times$ 2500	0,27	2 $\times$ 5000
0,22	2 $\times$ 2700	0,27	2 $\times$ 10000
0,22	2 $\times$ 4700	0,27	2 $\times$ 15000
0,22	2 $\times$ 5000	0,27	2 $\times$ 22000
0,22	2 $\times$ 10000	0,27	2 $\times$ 27000
0,22	2 $\times$ 15000		

Note: C = CSA C22.2 No.8; US = UL 1283

Approvals:



Capacitors

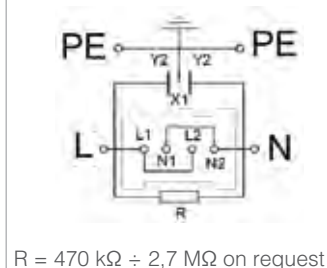
Type KPB7341	four-pole	class X1Y2
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TECHNICAL DATA

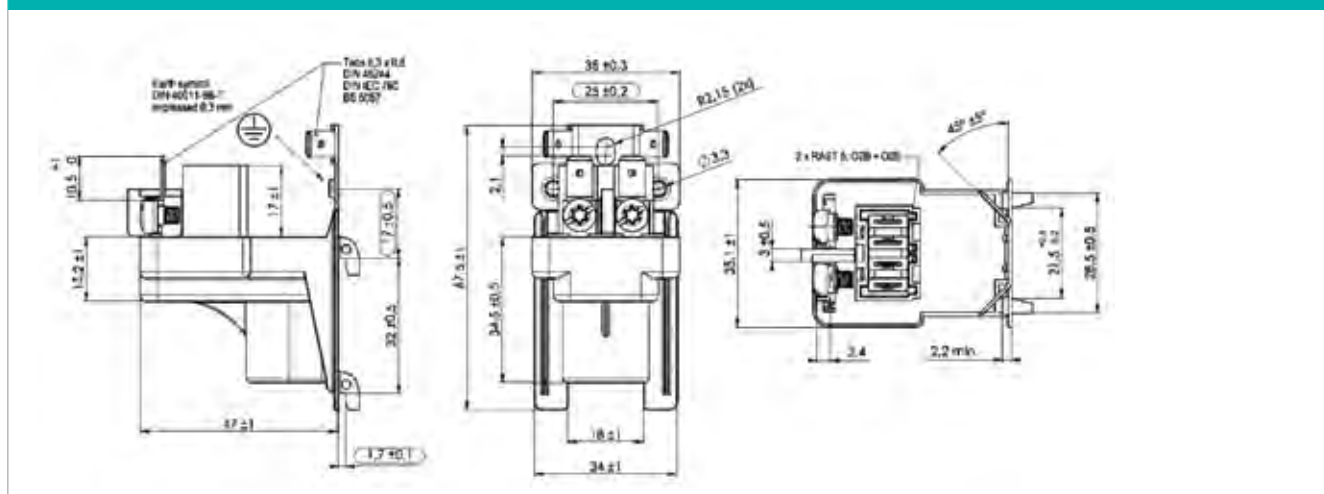
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Rated current:	16 A
Capacitance tolerance:	$\pm 20 \%$
Climatic category + letter indicating passive flammability category:	25/085/21/B
Temperature range:	- 25 °C to + 100 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}, t = 1 \text{ min.}$	$R_i \geq 6000 \text{ M}\Omega$
Casing:	thermoplastic can, sealed with synthetical resin, flame retardant
Terminals:	fast-on connectors $6,3 \times 0,8 \text{ CuZn/Sn}$
Complies to:	IEC 60384-14, EN 60384-14, CSA C22.2 No.8, UL 1283



Electrical connection



KPB7341



Standard value KPB7341

Capacitance		Discharge
class X1 (μF)	class Y2 (pF)	R (MΩ)
0,1	2 × 0,015	1

Approval:



250 V AC

275 V AC

Note: C = CSA C22.2 No.8; US = UL 1283

Capacitors

Type KPB7426	two-pole	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	$\pm 20 \%$
Climatic category + letter indicating passive flammability category:	25/085/21/B
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 2050 V A.C., 2 s
Insulation resistance	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$
Casing:	thermoplastic can, sealed with synthetical resin, flame retardant
Terminals:	3 $\times$ fast-on connectors 2 $\times$ 0,8 CuZn/Sn
Complies to:	IEC 60384-14, EN 60384-14

Standard values KPB7426

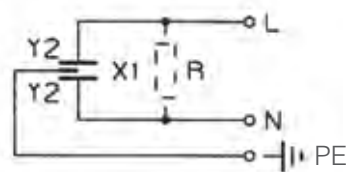
Capacitance	
class X1 (μF)	class Y2 (pF)
0,1	2 × 2500
0,1	2 × 2700
0,1	2 × 4700
0,1	2 × 5000
0,1	2 × 10000
0,1	2 × 15000
0,15	2 × 2500
*0,15	2 × 2700
0,15	2 × 4700
0,15	2 × 5000

Other values upon request

Approval:

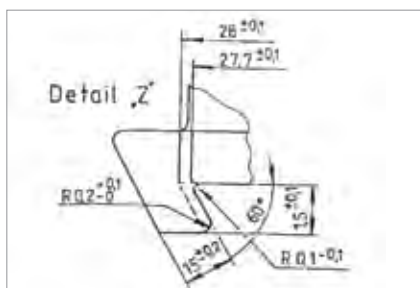
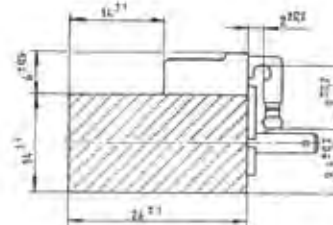
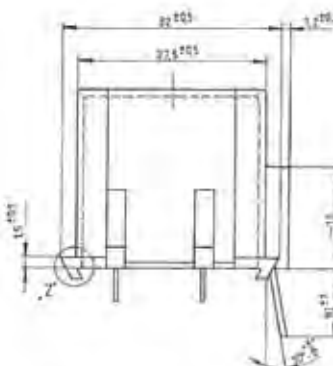
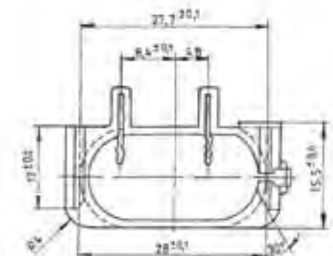


Electrical connection



R = 470 kΩ ÷ 2,7 MΩ on request

KPB 7426



Capacitors

Type KPB83xx

four-pole

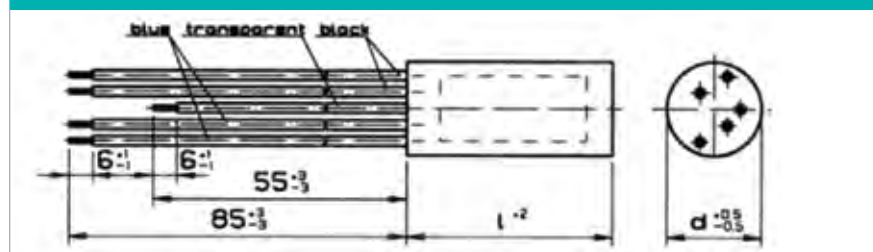
class **X1Y2**

Last two numbers in the type designation (xx = 00 to 49) indicate the type of terminals and connectors.

TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated current:	6 A
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Climatic category:	25/085/21 according to IEC 60068-1
Passive flammability:	according to IEC 60384-14
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 1800 V A.C., 2 s
Insulation resistance at 20 °C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \text{ }\mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \text{ }\mu\text{F}$
Complies to:	IEC 60384-14, EN 60384-14, CSA C22.2 No.8, UL 1283

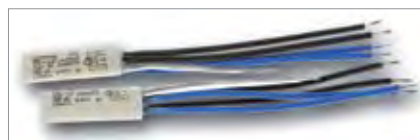
KPB83xx



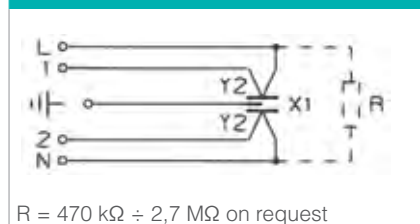
Casing: thermoplastic, sealed with synthetical resin, flame retardant.	Wire dimensions on drawing correspond with type KPB8300 - standard version.
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Terminals

Type	Type of terminals
KPB83xx	Insulated stranded wire 0,5 mm ² , or insulated solid wire $\varnothing$ 0,8 mm. Non-insulated part is soldered. Connection terminals provided on request.



Electrical connection



Standard values KPB83xx

Capacitance		Dimensions
class X1 (μF)	class Y2 (pF)	d x l (mm)
0,022	2 x 2700	11 x 30
0,027	2 x 2700	11 x 30
0,047	2 x 2700	12 x 30
0,047	2 x 4700	14 x 30
0,047	2 x 5000	14 x 30
0,068	2 x 2700	14 x 35
0,068	2 x 4700	14 x 35
0,068	2 x 5000	14 x 35
0,1	2 x 2700	14 x 35
0,1	2 x 4700	14 x 35
0,1	2 x 4700	16 x 35
0,1	2 x 5000	14 x 35
0,1	2 x 10000	16 x 35
0,1	2 x 15000	16 x 35
0,1	2 x 22000	18 x 35
0,1	2 x 27000	18 x 40
0,15	2 x 2700	16 x 35
0,15	2 x 4700	16 x 35
0,15	2 x 5000	16 x 35
0,15	2 x 5000	18 x 35
0,15	2 x 5000	18 x 40
0,15	2 x 10000	18 x 35
0,15	2 x 15000	18 x 35
0,15	2 x 22000	20 x 35
0,15	2 x 27000	20 x 35
0,15	2 x 27000	22 x 40
0,22	2 x 2700	18 x 40
0,22	2 x 2700	20 x 35
0,22	2 x 4700	18 x 40
0,22	2 x 5000	18 x 40
0,22	2 x 10000	20 x 40
0,22	2 x 15000	20 x 40
0,22	2 x 22000	22 x 40
0,22	2 x 27000	22 x 40
0,27	2 x 2700	20 x 40
0,27	2 x 4700	20 x 40
0,27	2 x 5000	20 x 40
0,27	2 x 10000	22 x 40
0,27	2 x 15000	22 x 40
0,27	2 x 22000	22 x 40
0,27	2 x 27000	20 x 50
0,27	2 x 27000	22 x 40

Other values upon request



Capacitors

Type KPB 835x

four-pole

class **X1Y2**

Last two numbers in the type designation (xx = 00 to 49)
indicate the type of terminals and connectors.

TECHNICAL DATA

Dielectric: paper impregnated

Electrodes: aluminium foil

Rated current: 6 A

Rated voltage: 275 V A.C.

Capacitance tolerance: $\pm 20\%$

Climatic category: 25/085/21 according to
IEC 60068-1

Passive flammability: according to IEC 60384-14

Temperature range: - 25 °C to + 85 °C

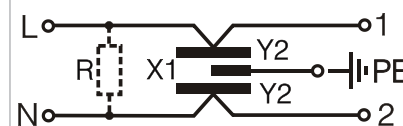
Test voltage: X1 capacitor 1790 V D.C., 2 s
Y2 capacitor 2050 V A.C., 2 s

Insulation resistance at 20 °C,
 $U_m = 100\text{ V D.C.}, t = 1\text{ min:}$
 $R_i \geq 6000\text{ M}\Omega$ for $C \leq 0,33\text{ }\mu\text{F}$
 $R_i \times C_n \geq 2000\text{ s}$ for $C > 0,33\text{ }\mu\text{F}$

Complies to: IEC 60384-14, EN 60384-14

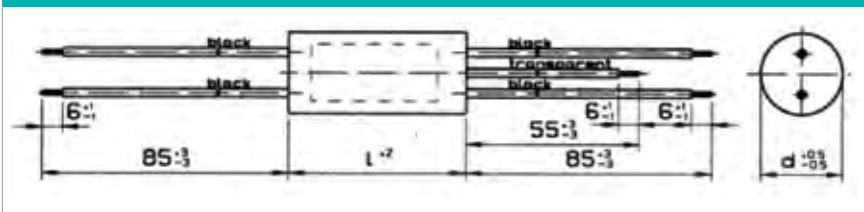


Electrical connection



$R = 470\text{ k}\Omega \div 2,7\text{ M}\Omega$ on request

KPB835x



Casing: thermoplastic, sealed with
synthetical resin, flame retardant.

Wire dimensions on drawing correspond
with type KPB8350 - standard version.

Terminals

Type

Type of terminals

KPB835x

Insulated stranded wire 0,5 mm², or
insulated solid wire $\varnothing$ 0,8 mm.
Non-insulated part is soldered.
Connection terminals provided on
request.

Standard values KPB835x

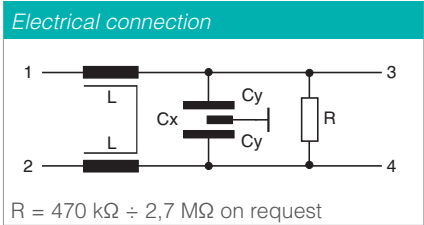
Capacitance		Dimensions
class X1 (μF)	class Y2 (pF)	d x l (mm)
0,022	2 x 2500	12 x 33
0,022	2 x 2700	12 x 33
0,027	2 x 2500	12 x 33
0,027	2 x 2700	12 x 33
0,047	2 x 2500	12 x 40
0,047	2 x 2700	12 x 40
0,047	2 x 4700	12 x 40
0,068	2 x 2500	14 x 40
0,068	2 x 2700	14 x 40
0,068	2 x 4700	14 x 40
0,1	2 x 2500	14 x 43
0,1	2 x 2700	14 x 43
0,1	2 x 4700	14 x 43
0,1	2 x 5000	16 x 43
0,1	2 x 10000	16 x 43
0,1	2 x 15000	16 x 43
0,15	2 x 2500	16 x 43
0,15	2 x 2700	16 x 43
0,15	2 x 4700	18 x 43
0,15	2 x 5000	18 x 43
0,15	2 x 10000	18 x 43
0,15	2 x 15000	18 x 43
0,22	2 x 2500	18 x 43
0,22	2 x 2700	18 x 43
0,22	2 x 4700	20 x 43
0,22	2 x 5000	20 x 43
0,22	2 x 10000	20 x 43
0,22	2 x 15000	20 x 43

Filters for radio interference suppression:

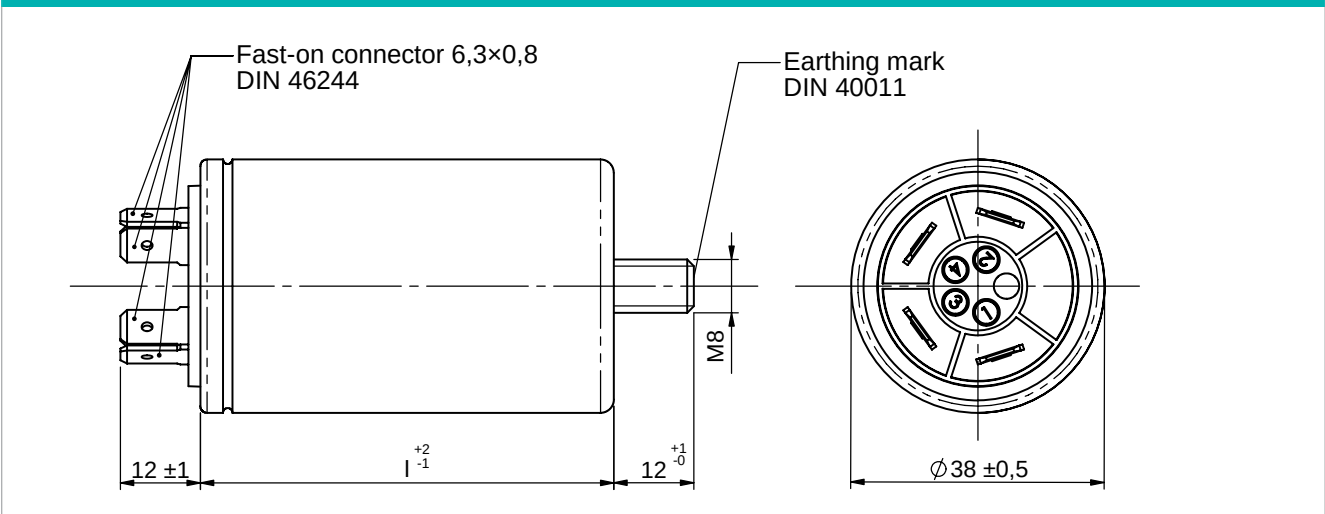
Type KPL3008	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (or 2050 V A.C., 2 s)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



KPL3008



Casing: aluminium can, closed with sealing washer.	
Terminals	
Type	Type of terminals
KPL3008	4 fast-on connectors

Standard values: KPL3008 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X1 (μF)	Y2 (pF)					
7/40		2×2200	0,5	1,5	38	•	•
7/40	0,15	to	1	1,5	44	•	•
10/40		2×15000	0,5	1,5	44	•	•
10/40			1	1,5	44	•	•
16/40			0,3	1	58	•	•
16/40			0,5	1	58	•	•
16/40			1	1	62	•	•
16/40		2×2200	1,5	1	72	•	•
10/70	0,25	to	0,3	1	58	•	
10/70		2×27000	0,5	1	58	•	
10/70			1	1	62	•	
10/70			1,5	1	72	•	
10/40			0,5	0,68	62	•	•
10/40			1	0,68	62	•	
12,5/40			0,3	0,68	62	•	
12,5/40			0,5	0,68	62	•	
12,5/40			1	0,68	62	•	•
12,5/40			1,3	0,68	62	•	•
12,5/40			1,5	0,68	67	•	•
12,5/40		2×2200	2	0,68	67		•
16/40	0,47	to	0,3	0,68	62	•	•
16/40		2×27000	0,5	0,68	62	•	•
16/40			1	0,68	67	•	•
16/40			1,3	0,68	67	•	
16/40			1,5	0,68	72	•	
10/70			0,3	0,68	62	•	
10/70			0,5	0,68	62	•	
10/70			1	0,68	67	•	
10/70			1,3	0,68	67	•	
10/70			1,5	0,68	72	•	
3/40	0,15	2×6800	10	0,68	58	•	
12,5/40	0,47	2×25000	1,3	0,68	58		•
3/40	1	2×10000	1	0,47	80	•	
10/40			0,5	0,47	80	•	
10/40			1	0,47	80	•	
12,5/40			0,3	0,47	80	•	
12,5/40			0,5	0,47	80	•	
12,5/40			1	0,47	80	•	
12,5/40			1,3	0,47	80	•	
12,5/40		2×2200	1,5	0,47	85	•	
16/40	1	to	0,3	0,47	80	•	
16/40		2×27000	0,5	0,47	80	•	
16/40			1	0,47	85	•	
16/40			1,3	0,47	85	•	
16/40			1,5	0,47	90	•	
10/70			0,3	0,47	80	•	
10/70			0,5	0,47	80	•	
10/70			1	0,47	85	•	
10/70			1,3	0,47	85	•	
10/70			1,5	0,47	90	•	

**Nominal values
for capacitance:**

* 0,15μF+2×2200pF
0,15μF+2×2700pF
* 0,15μF+2×4700pF
0,15μF+2×5000pF
0,15μF+2×10000pF
0,15μF+2×15000pF

* 0,25μF+2×2200pF
0,25μF+2×2700pF
* 0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
* 0,25μF+2×15000pF
* 0,25μF+2×18000pF
0,25μF+2×20000pF
* 0,25μF+2×22000pF
* 0,25μF+2×25000pF
0,25μF+2×27000pF

* 0,47μF+2×2200pF
* 0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
* 0,47μF+2×18000pF
0,47μF+2×20000pF
* 0,47μF+2×22000pF
0,47μF+2×25000pF
0,47μF+2×27000pF

1μF+2×2200pF
1μF+2×2700pF
1μF+2×4700pF
1μF+2×5000pF
1μF+2×10000pF
1μF+2×15000pF
1μF+2×18000pF
1μF+2×20000pF
1μF+2×22000pF
1μF+2×25000pF
1μF+2×27000pF

* Only for IEC 60939-2

Approval:



Approvals in use = •
Approvals in pending = o

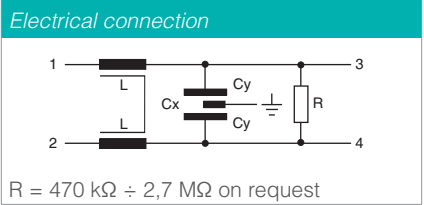
Approval for climatic category 40/100/56 according to IEC 60068-1

Filters for radio interference suppression:

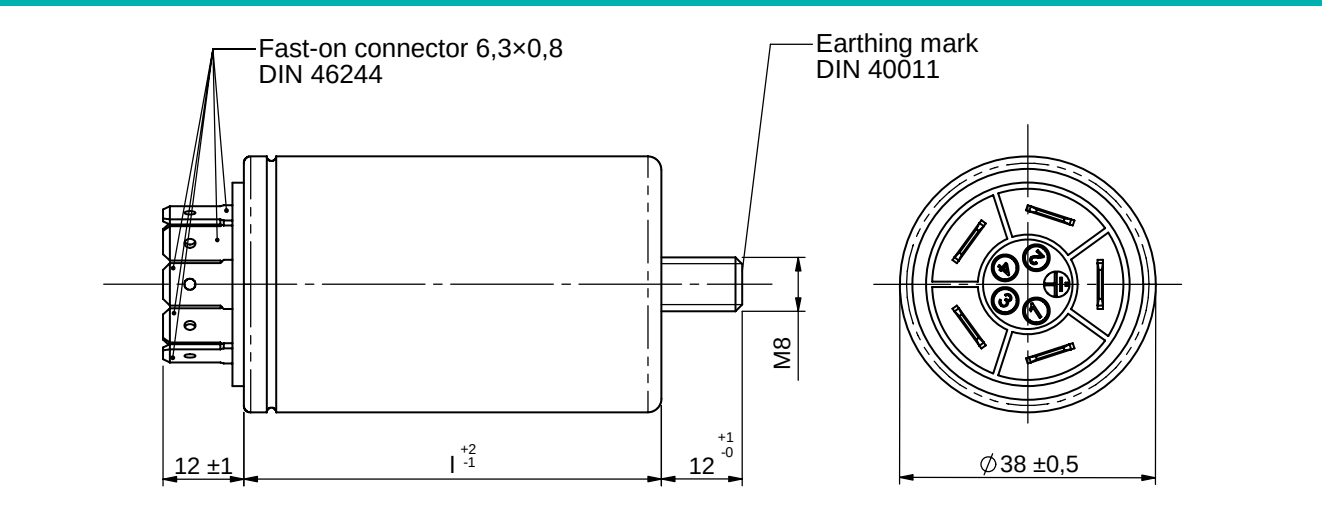
Type KPL3009	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (or 2050 V A.C., 2 s) shields against casing 2500 V A.C., 2 s (only filters, where Y2 - capacitor is not connected to casing)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



KPL3009



Casing: aluminium can, closed with sealing washer	
Terminals	
Type	Type of terminals
KPL3009	5 fast-on connectors

Standard values: KPL3009 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X1 (μF)	Y2 (pF)					
7/40		2×2200	0,5	1,5	38	•	•
7/40	0,15	to	1	1,5	44	•	•
10/40		2×15000	0,5	1,5	44	•	•
10/40			1	1,5	44	•	•
16/40			0,3	1	58	•	•
16/40			0,5	1	58	•	•
16/40			1	1	62	•	•
16/40		2×2200	1,5	1	72	•	•
10/70	0,25	to	0,3	1	58	•	
10/70		2×27000	0,5	1	58	•	
10/70			1	1	62	•	
10/70			1,5	1	72	•	
10/40			0,5	0,68	62	•	•
10/40			1	0,68	62	•	
12,5/40			0,3	0,68	62	•	
12,5/40			0,5	0,68	62	•	
12,5/40			1	0,68	62	•	•
12,5/40			1,3	0,68	62	•	•
12,5/40			1,5	0,68	67	•	•
12,5/40		2×2200	2	0,68	67		•
16/40	0,47	to	0,3	0,68	62	•	•
16/40		2×27000	0,5	0,68	62	•	•
16/40			1	0,68	67	•	•
16/40			1,3	0,68	67	•	
16/40			1,5	0,68	72	•	
10/70			0,3	0,68	62	•	
10/70			0,5	0,68	62	•	
10/70			1	0,68	67	•	
10/70			1,3	0,68	67	•	
10/70			1,5	0,68	72	•	
3/40	0,15	2×6800	10	0,68	58	•	
12,5/40	0,47	2×25000	1,3	0,68	58		•
3/40	1	2×10000	1	0,47	80	•	
10/40			0,5	0,47	80	•	
10/40			1	0,47	80	•	
12,5/40			0,3	0,47	80	•	
12,5/40			0,5	0,47	80	•	
12,5/40			1	0,47	80	•	
12,5/40			1,3	0,47	80	•	
12,5/40		2×2200	1,5	0,47	85	•	
16/40	1	to	0,3	0,47	80	•	
16/40		2×27000	0,5	0,47	80	•	
16/40			1	0,47	85	•	
16/40			1,3	0,47	85	•	
16/40			1,5	0,47	90	•	
10/70			0,3	0,47	80	•	
10/70			0,5	0,47	80	•	
10/70			1	0,47	85	•	
10/70			1,3	0,47	85	•	
10/70			1,5	0,47	90	•	

**Nominal values
for capacitance:**

* 0,15μF+2×2200pF
0,15μF+2×2700pF
* 0,15μF+2×4700pF
0,15μF+2×5000pF
0,15μF+2×10000pF
0,15μF+2×15000pF

* 0,25μF+2×2200pF
0,25μF+2×2700pF
* 0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
* 0,25μF+2×15000pF
* 0,25μF+2×18000pF
0,25μF+2×20000pF
* 0,25μF+2×22000pF
* 0,25μF+2×25000pF
0,25μF+2×27000pF

* 0,47μF+2×2200pF
* 0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
* 0,47μF+2×18000pF
0,47μF+2×20000pF
* 0,47μF+2×22000pF
0,47μF+2×25000pF
0,47μF+2×27000pF

1μF+2×2200pF
1μF+2×2700pF
1μF+2×4700pF
1μF+2×5000pF
1μF+2×10000pF
1μF+2×15000pF
1μF+2×18000pF
1μF+2×20000pF
1μF+2×22000pF
1μF+2×25000pF
1μF+2×27000pF

* Only for IEC 60939-2

Approval:



Approvals in use = •

Approvals in pending = o

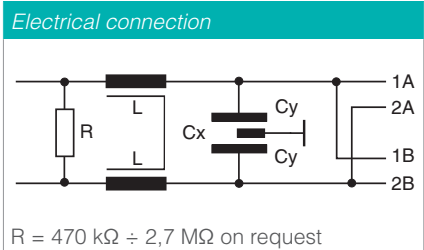
Approval for climatic category 40/100/56 according to IEC 60068-1

Filters for radio interference suppression:

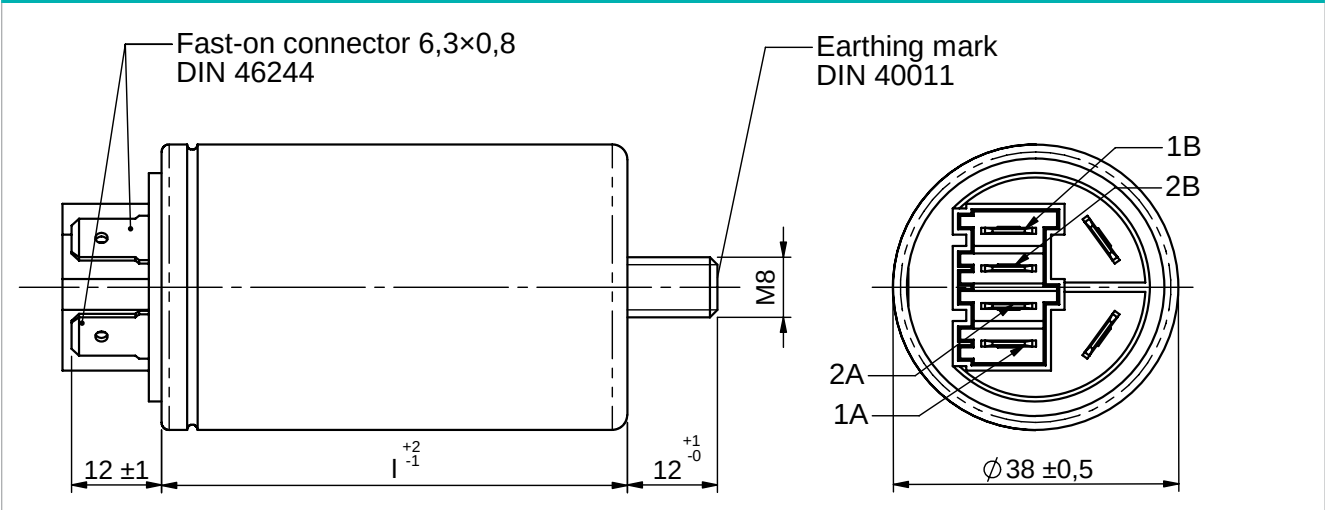
Type KPL3023	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



KPL3023



Casing: aluminium can, closed with sealing washer	
Terminals	
Type	Type of terminals
KPL3023	- 1A, 2A and 1B, 2B for RAST 5 - 2 × fast-on connectors

Standard values: KPL3023 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X1 (μF)	Y2 (pF)					
7/40		2×2200	0,5	1,5	41	•	•
7/40	0,15	to	1	1,5	47	•	•
10/40		2×15000	0,5	1,5	47	•	•
10/40			1	1,5	47	•	•
16/40			0,3	1	61	•	•
16/40			0,5	1	61	•	•
16/40			1	1	65	•	•
16/40		2×2200	1,5	1	75	•	•
10/70	0,25	to	0,3	1	61	•	
10/70		2×27000	0,5	1	61	•	
10/70			1	1	65	•	
10/70			1,5	1	75	•	
10/40			0,5	0,68	65	•	•
10/40			1	0,68	65	•	
12,5/40			0,3	0,68	65	•	
12,5/40			0,5	0,68	65	•	
12,5/40			1	0,68	65	•	•
12,5/40			1,3	0,68	65	•	•
12,5/40			1,5	0,68	70	•	•
12,5/40			2	0,68	70		•
16/40		2×2200	0,3	0,68	65	•	•
16/40	0,47	to	0,5	0,68	65	•	•
16/40		2×27000	1	0,68	70	•	•
16/40			1,3	0,68	70	•	
16/40			1,5	0,68	75	•	
10/70			0,3	0,68	65	•	
10/70			0,5	0,68	65	•	
10/70			1	0,68	70	•	
10/70			1,3	0,68	70	•	
10/70			1,5	0,68	75	•	
3/40	0,15	2×6800	10	0,68	61	•	
12,5/40	0,47	2×25000	1,3	0,68	61	•	•
16/40	0,5	2×600	1	0,68	67		•
3/40	1	2×10000	1	0,47	83	•	
10/40			0,5	0,47	83	•	
10/40			1	0,47	83	•	
12,5/40			0,3	0,47	83	•	
12,5/40			0,5	0,47	83	•	
12,5/40			1	0,47	83	•	
12,5/40			1,3	0,47	83	•	
12,5/40		2×2200	1,5	0,47	88	•	
16/40	1	to	0,3	0,47	83	•	
16/40		2×27000	0,5	0,47	83	•	
16/40			1	0,47	88	•	
16/40			1,3	0,47	88	•	
16/40			1,5	0,47	93	•	
10/70			0,3	0,47	83	•	
10/70			0,5	0,47	83	•	
10/70			1	0,47	88	•	
10/70			1,3	0,47	88	•	
10/70			1,5	0,47	93	•	

**Nominal values
for capacitance:**

- * 0,15μF+2x2200pF
- * 0,15μF+2x2700pF
- 0,15μF+2x4700pF
- 0,15μF+2x5000pF
- 0,15μF+2x10000pF
- 0,15μF+2x15000pF
- * 0,25μF+2x2700pF
- 0,25μF+2x4700pF
- 0,25μF+2x5000pF
- * 0,25μF+2x10000pF
- * 0,25μF+2x15000pF
- 0,25μF+2x18000pF
- * 0,25μF+2x20000pF
- 0,25μF+2x22000pF
- 0,25μF+2x25000pF
- 0,25μF+2x27000pF
- * 0,47μF+2x2700pF
- 0,47μF+2x4700pF
- 0,47μF+2x5000pF
- 0,47μF+2x10000pF
- * 0,47μF+2x15000pF
- 0,47μF+2x18000pF
- * 0,47μF+2x20000pF
- 0,47μF+2x22000pF
- 0,47μF+2x25000pF
- 0,47μF+2x27000pF

- * 1μF+2x2200pF
- * 1μF+2x2700pF
- * 1μF+2x4700pF
- * 1μF+2x5000pF
- * 1μF+2x10000pF
- * 1μF+2x15000pF
- * 1μF+2x18000pF
- * 1μF+2x20000pF
- * 1μF+2x22000pF
- * 1μF+2x25000pF
- * 1μF+2x27000pF

* Only for IEC 60939-2

Approval:



Approvals in use = •

Approvals in pending = o

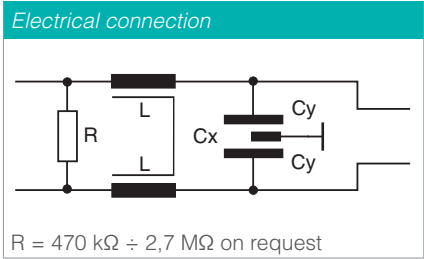
Approval for climatic category 40/100/56 according to IEC 60068-1

Filters for radio interference suppression:

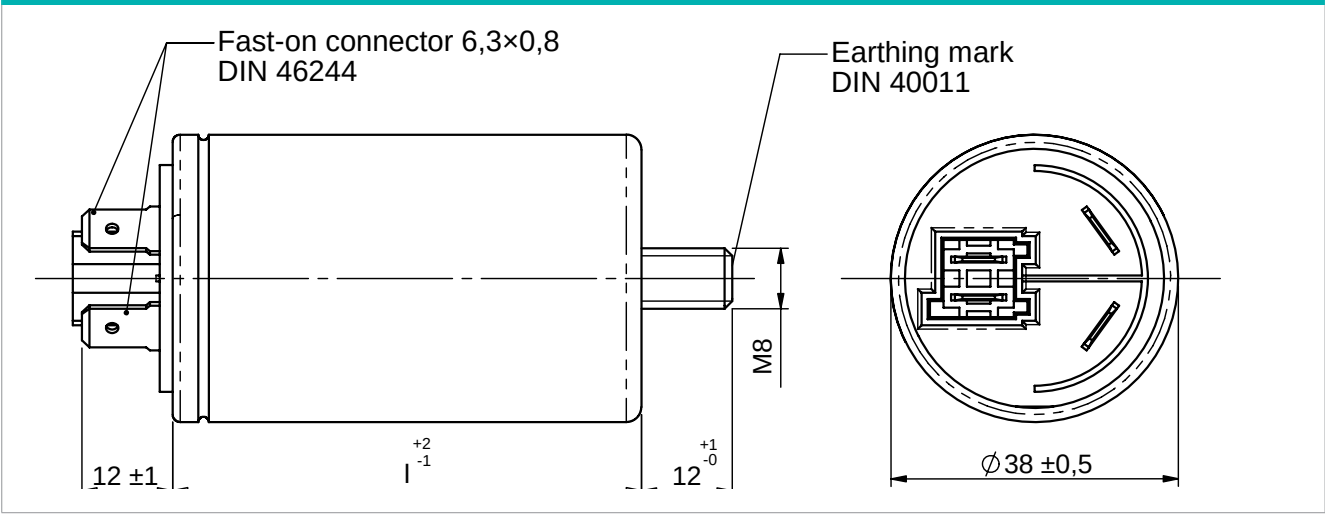
Type KPL3024	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



KPL3024



Casing: aluminium can, closed with sealing washer	
Terminals	
Type	Type of terminals
KPL3024	- for RAST 5 - 2 × fast-on connectors

Standard values: KPL3024 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X1 (μF)	Y2 (pF)					
7/40		2×2200	0,5	1,5	38	•	•
7/40	0,15	to	1	1,5	44	•	•
10/40		2×15000	0,5	1,5	44	•	•
10/40			1	1,5	44	•	•
16/40			0,3	1	58	•	•
16/40			0,5	1	58	•	•
16/40			1	1	62	•	•
16/40		2×2200	1,5	1	72	•	•
10/70	0,25	to	0,3	1	58	•	
10/70		2×27000	0,5	1	58	•	
10/70			1	1	62	•	
10/70			1,5	1	72	•	
10/40			0,5	0,68	62	•	•
10/40			1	0,68	62	•	
12,5/40			0,3	0,68	62	•	
12,5/40			0,5	0,68	62	•	
12,5/40			1	0,68	62	•	•
12,5/40			1,3	0,68	62	•	•
12,5/40			1,5	0,68	67	•	•
12,5/40		2×2200	2	0,68	67		•
16/40	0,47	to	0,3	0,68	62	•	•
16/40		2×27000	0,5	0,68	62	•	•
16/40			1	0,68	67	•	•
16/40			1,3	0,68	67	•	
16/40			1,5	0,68	72	•	
10/70			0,3	0,68	62	•	
10/70			0,5	0,68	62	•	
10/70			1	0,68	67	•	
10/70			1,3	0,68	67	•	
10/70			1,5	0,68	72	•	
3/40	0,15	2×6800	10	0,68	58	•	
12,5/40	0,47	2×25000	1,3	0,68	58		•
16/40	0,5	2×600	1	0,68	67		•
3/40	1	2×10000	1	0,47	80	•	
10/40			0,5	0,47	80	•	
10/40			1	0,47	80	•	
12,5/40			0,3	0,47	80	•	
12,5/40			0,5	0,47	80	•	
12,5/40			1	0,47	80	•	
12,5/40			1,3	0,47	80	•	
12,5/40		2×2200	1,5	0,47	85	•	
16/40	1	to	0,3	0,47	80	•	
16/40		2×27000	0,5	0,47	80	•	
16/40			1	0,47	85	•	
16/40			1,3	0,47	85	•	
16/40			1,5	0,47	90	•	
10/70			0,3	0,47	80	•	
10/70			0,5	0,47	80	•	
10/70			1	0,47	85	•	
10/70			1,3	0,47	85	•	
10/70			1,5	0,47	90	•	

**Nominal values
for capacitance:**

* 0,15μF+2×2200pF
0,15μF+2×2700pF
* 0,15μF+2×4700pF
0,15μF+2×5000pF
0,15μF+2×10000pF
0,15μF+2×15000pF

* 0,25μF+2×2200pF
0,25μF+2×2700pF
* 0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
* 0,25μF+2×15000pF
* 0,25μF+2×18000pF
0,25μF+2×20000pF
* 0,25μF+2×22000pF
* 0,25μF+2×25000pF

* 0,47μF+2×2200pF
* 0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
* 0,47μF+2×18000pF
0,47μF+2×20000pF
* 0,47μF+2×22000pF
0,47μF+2×25000pF

* 1μF+2×2200pF
* 1μF+2×2700pF
* 1μF+2×4700pF
* 1μF+2×5000pF
* 1μF+2×10000pF
* 1μF+2×15000pF
* 1μF+2×18000pF
* 1μF+2×20000pF
* 1μF+2×22000pF
* 1μF+2×25000pF
* 1μF+2×27000pF

* Only for IEC 60939-2

Approval:



Approvals in use = •

Approvals in pending = o

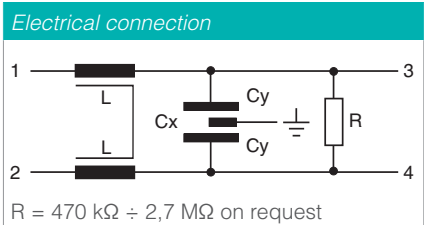
Approval for climatic category 40/100/56 according to IEC 60068-1

Filters for radio interference suppression:

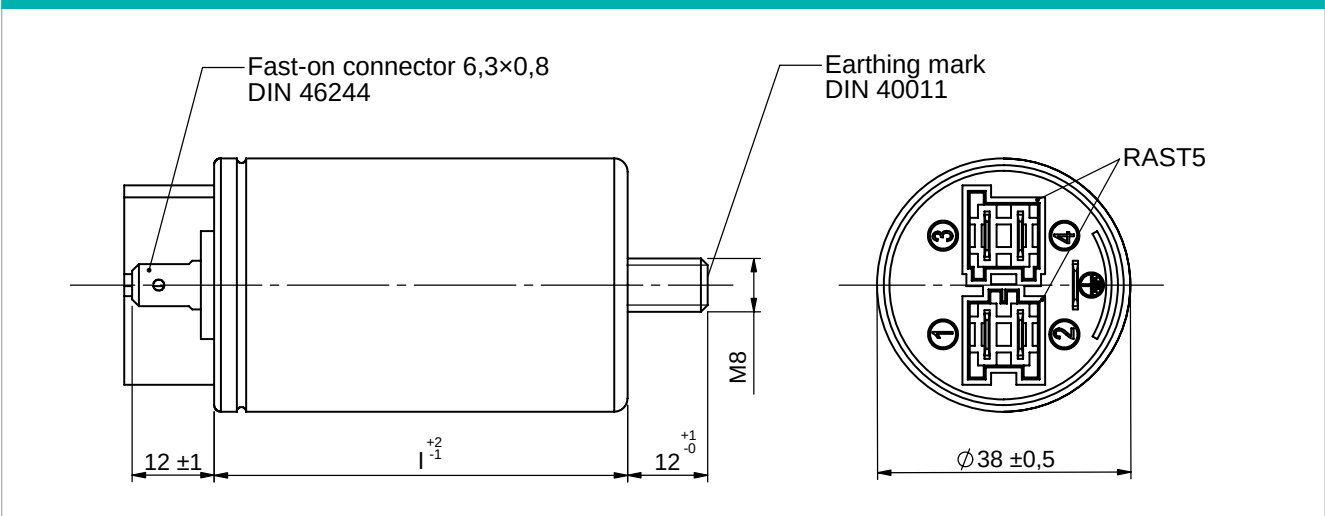
Type KPL3028	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



KPL 3028



Casing: aluminium can, closed with sealing washer	
Terminals	
Type	Type of terminals
KPL3028	- for RAST 5

Standard values: KPL3028 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X1 (μF)	Y2 (pF)					
7/40		2×2200	0,5	1,5	38	•	•
7/40	0,15	to	1	1,5	44	•	•
10/40		2×15000	0,5	1,5	44	•	•
10/40			1	1,5	44	•	•
16/40			0,3	1	58	•	•
16/40			0,5	1	58	•	•
16/40			1	1	62	•	•
16/40	0,25	2×2200	1,5	1	72	•	•
10/70		to	0,3	1	58	•	
10/70		2×27000	0,5	1	58	•	
10/70			1	1	62	•	
10/70			1,5	1	72	•	
10/40			0,5	0,68	62	•	•
10/40			1	0,68	62	•	
12,5/40			0,3	0,68	62	•	
12,5/40			0,5	0,68	62	•	
12,5/40			1	0,68	62	•	•
12,5/40			1,3	0,68	62	•	•
12,5/40			1,5	0,68	67	•	•
16/40		2×2200	0,3	0,68	62	•	•
16/40	0,47	to	0,5	0,68	62	•	•
16/40		2×27000	1	0,68	67	•	•
16/40			1,3	0,68	67	•	
16/40			1,5	0,68	72	•	
10/70			0,3	0,68	62	•	
10/70			0,5	0,68	62	•	
10/70			1	0,68	67	•	
10/70			1,3	0,68	67	•	
10/70			1,5	0,68	72	•	
10/40			0,5	0,47	80	•	
10/40			1	0,47	80	•	
12,5/40			0,3	0,47	80	•	
12,5/40			0,5	0,47	80	•	
12,5/40			1	0,47	80	•	
12,5/40			1,3	0,47	80	•	
12,5/40		2×2200	1,5	0,47	85	•	
16/40	1	to	0,3	0,47	80	•	
16/40		2×27000	0,5	0,47	80	•	
16/40			1	0,47	85	•	
16/40			1,3	0,47	85	•	
16/40			1,5	0,47	90	•	
10/70			0,3	0,47	80	•	
10/70			0,5	0,47	80	•	
10/70			1	0,47	85	•	
10/70			1,3	0,47	85	•	
10/70			1,5	0,47	90	•	

**Nominal values
for capacitance:**

* 0,15μF+2×2200pF
0,15μF+2×2700pF
* 0,15μF+2×4700pF
0,15μF+2×5000pF
* 0,15μF+2×6800pF
0,15μF+2×10000pF
0,15μF+2×15000pF

* 0,25μF+2×2200pF
0,25μF+2×2700pF
* 0,25μF+2×4700pF
0,25μF+2×5000pF
* 0,25μF+2×10000pF
* 0,25μF+2×15000pF
0,25μF+2×18000pF
0,25μF+2×20000pF
* 0,25μF+2×22000pF
* 0,25μF+2×25000pF
0,25μF+2×27000pF

* 0,47μF+2×2200pF
* 0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
* 0,47μF+2×18000pF
0,47μF+2×20000pF
* 0,47μF+2×22000pF
0,47μF+2×25000pF
0,47μF+2×27000pF

* 1μF+2×2200pF
* 1μF+2×2700pF
* 1μF+2×4700pF
* 1μF+2×5000pF
* 1μF+2×10000pF
* 1μF+2×15000pF
* 1μF+2×18000pF
* 1μF+2×20000pF
* 1μF+2×22000pF
* 1μF+2×25000pF
* 1μF+2×27000pF

* Only for IEC 60939-2

Approval:



Approvals in use = •

Approvals in pending = o

Approval for climatic category 40/100/56 according to IEC 60068-1

Filters for radio interference suppression:

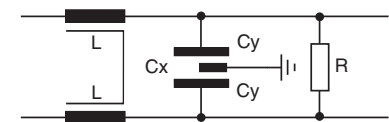
Type KPL3508	class X1Y2
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TECHNICAL DATA

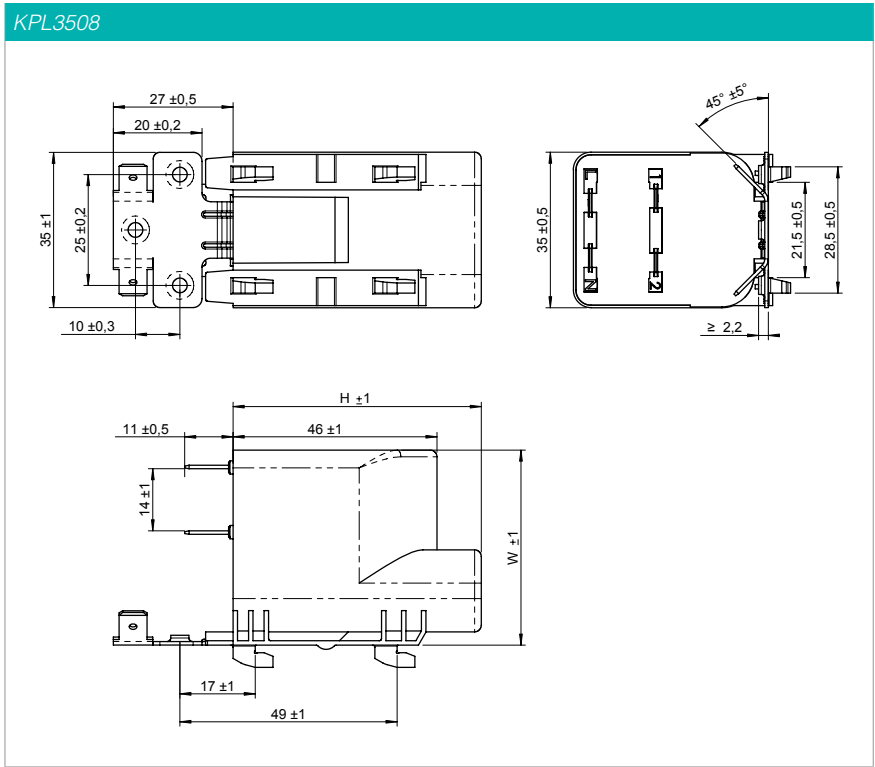
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, U _m = 100 V D.C., t = 1 min:	R _i ≥ 6000 MΩ for C ≤ 0,33 μF R _i × C _n ≥ 2000 s for C > 0,33 μF
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



Electrical connection



R = 470 kΩ ÷ 2,7 MΩ on request



Casing: thermoplastic can, sealed with synthetical resin, flame retardant	
Terminals	
Type	Type of terminals
KPL3508	fast-on connectors

Standard values: KPL3508 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	1	46	41	•	•
10/40			0,5	1	46	41	•	•
10/40			1	1	46	41	•	•
10/40			1,8	1	46	41	•	•
12,5/40			0,3	1	46	41	•	•
12,5/40			0,47	1	46	41	•	•
12,5/40			1	1	46	41	•	•
12,5/40		2×2200	1,3	1	46	41	•	•
12,5/40	0,25	to	1,5	1	46	41	•	•
12,5/40		2×27000	1,8	1	46	41	•	•
16/40			0,3	1	46	41	•	•
16/40			0,47	1	46	41	•	•
16/40			1	1	46	41	•	•
10/70			0,3	1	46	41	•	•
10/70			0,47	1	46	41	•	•
10/70			1	1	46	41	•	•
10/40			0,47	0,68	46	41	•	•
10/40			0,5	0,68	46	41	•	
10/40			1	0,68	46	41	•	
10/40			1,8	0,68	46	41	•	
12,5/40			0,3	0,68	46	41	•	
12,5/40			0,47	0,68	46	41	•	
12,5/40			1	0,68	46	41	•	
12,5/40		2×2200	1,3	0,68	46	41	•	
12,5/40	0,33	to	1,5	0,68	46	41	•	
12,5/40		2×27000	1,8	0,68	46	41	•	
16/40			0,3	0,68	46	41	•	
16/40			0,47	0,68	46	41	•	
16/40			1	0,68	46	41	•	
10/70			0,3	0,68	46	41	•	
10/70			0,47	0,68	46	41	•	
10/70			1	0,68	46	41	•	
10/40			0,47	0,68	46	41	•	•
10/40			0,5	0,68	46	41	•	•
10/40			1	0,68	46	41	•	•
10/40			1,8	0,68	46	41	•	•
12,5/40			0,3	0,68	46	41	•	•
12,5/40			0,47	0,68	46	41	•	•
12,5/40			1	0,68	46	41	•	•
12,5/40		2×2200	1,3	0,68	46	41	•	•
12,5/40	0,47	to	1,5	0,68	46	41	•	•
12,5/40		2×27000	1,8	0,68	46	41	•	•
16/40			0,3	0,68	46	41	•	•
16/40			0,47	0,68	46	41	•	•
16/40			1	0,68	46	41	•	•
10/70			0,3	0,68	46	41	•	
10/70			0,47	0,68	46	41	•	
10/70			1	0,68	46	41	•	

**Nominal values
for capacitance:**

0,25μF+2x2200pF
0,25μF+2x2700pF
0,25μF+2x4700pF
0,25μF+2x5000pF
0,25μF+2x10000pF
0,25μF+2x15000pF
0,25μF+2x20000pF
0,25μF+2x22000pF
0,25μF+2x25000pF
0,25μF+2x27000pF

0,33μF+2x2200pF
0,33μF+2x2700pF
0,33μF+2x4700pF
0,33μF+2x5000pF
0,33μF+2x10000pF
0,33μF+2x15000pF
0,33μF+2x20000pF
0,33μF+2x22000pF
0,33μF+2x25000pF
0,33μF+2x27000pF

0,47μF+2x2200pF
0,47μF+2x2700pF
0,47μF+2x4700pF
0,47μF+2x5000pF
0,47μF+2x10000pF
0,47μF+2x15000pF
0,47μF+2x20000pF
0,47μF+2x22000pF
0,47μF+2x25000pF
0,47μF+2x27000pF

Continued on the next page

Standard values: KPL3508 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	0,68	56	44	•	
10/40			0,5	0,68	56	44	•	
10/40			1	0,68	56	44	•	
10/40			1,8	0,68	56	44	•	
12,5/40			0,3	0,68	56	44	•	
12,5/40			0,47	0,68	56	44	•	
12,5/40			1	0,68	56	44	•	
12,5/40		2×2200	1,3	0,68	56	44	•	
12,5/40	0,56	to	1,5	0,68	56	44	•	
12,5/40		2×27000	1,8	0,68	56	44	•	
16/40			0,3	0,68	56	44	•	
16/40			0,47	0,68	56	44	•	
16/40			1	0,68	56	44	•	
10/70			0,3	0,68	56	44	•	
10/70			0,47	0,68	56	44	•	
10/70			1	0,68	56	44	•	
10/40			0,47	0,68	56	44	•	•
10/40			0,5	0,68	56	44	•	•
10/40			1	0,68	56	44	•	•
10/40			1,8	0,68	56	44	•	•
12,5/40			0,3	0,68	56	44	•	•
12,5/40			0,47	0,68	56	44	•	•
12,5/40			1	0,68	56	44	•	•
12,5/40		2×2200	1,3	0,68	56	44	•	•
12,5/40	0,68	to	1,5	0,68	56	44	•	•
12,5/40		2×27000	1,8	0,68	56	44	•	•
16/40			0,3	0,68	56	44	•	•
16/40			0,47	0,68	56	44	•	•
16/40			1	0,68	56	44	•	•
10/70			0,3	0,68	56	44	•	
10/70			0,47	0,68	56	44	•	
10/70			1	0,68	56	44	•	
10/40			0,47	0,68	56	44	•	•
10/40			0,5	0,68	56	44	•	•
10/40			1	0,68	56	44	•	•
10/40			1,8	0,68	56	44	•	•
12,5/40			0,3	0,68	56	44	•	•
12,5/40			0,47	0,68	56	44	•	•
12,5/40			1	0,68	56	44	•	•
12,5/40		2×2200	1,3	0,68	56	44	•	•
12,5/40	1	to	1,5	0,68	56	44	•	•
12,5/40		2×27000	1,8	0,68	56	44	•	•
16/40			0,3	0,68	56	44	•	•
16/40			0,47	0,68	56	44	•	•
16/40			1	0,68	56	44	•	•
10/70			0,3	0,68	56	44	•	
10/70			0,47	0,68	56	44	•	
10/70			1	0,68	56	44	•	

**Nominal values
for capacitance:**

0,56μF+2x2200pF
0,56μF+2x2700pF
0,56μF+2x4700pF
0,56μF+2x5000pF
0,56μF+2x10000pF
0,56μF+2x15000pF
0,56μF+2x20000pF
0,56μF+2x22000pF
0,56μF+2x25000pF
0,56μF+2x27000pF

0,68μF+2x2200pF
0,68μF+2x2700pF
0,68μF+2x4700pF
0,68μF+2x5000pF
0,68μF+2x10000pF
0,68μF+2x15000pF
0,68μF+2x20000pF
0,68μF+2x22000pF
0,68μF+2x25000pF
0,68μF+2x27000pF

1μF+2x2200pF
1μF+2x2700pF
1μF+2x4700pF
1μF+2x5000pF
1μF+2x10000pF
1μF+2x15000pF
1μF+2x20000pF
1μF+2x22000pF
1μF+2x25000pF
1μF+2x27000pF

Approvals in use = •
Approvals in pending = o

Filters for radio interference suppression:

Type KPL3523

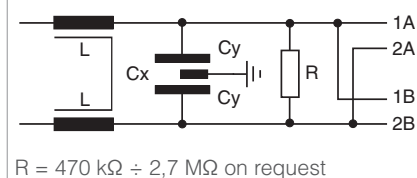
class **X1Y2**

TECHNICAL DATA

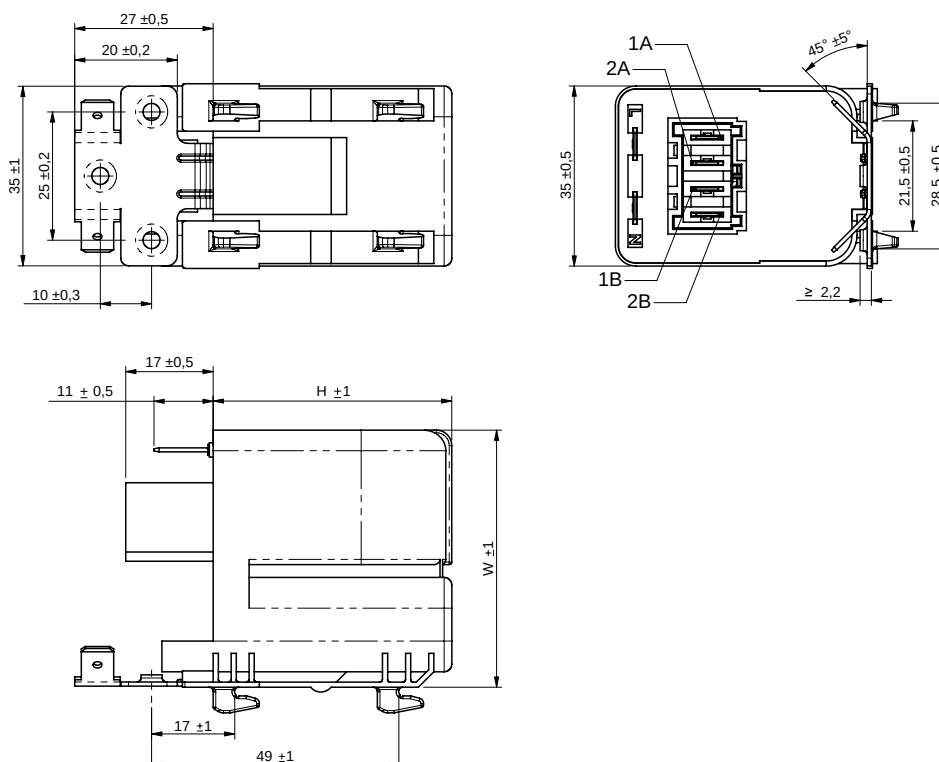
Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	$\pm 20 \%$
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}, t = 1 \text{ min}:$	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \mu\text{F}$
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14



Electrical connection



KPL3523



Casing: thermoplastic can, sealed with
synthetical resin, flame retardant

Terminals

Type	Type of terminals
KPL3523	- 1A, 2A and 1B, 2B for RAST 5 - 2 x fast-on connectors

Standard values: KPL3523 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	1	46	50	•	•
10/40			0,5	1	46	50	•	•
10/40			1	1	46	50	•	•
10/40			1,8	1	46	50	•	•
12,5/40			0,3	1	46	50	•	•
12,5/40			0,47	1	46	50	•	•
12,5/40			1	1	46	50	•	•
12,5/40		2×2200	1,3	1	46	50	•	•
12,5/40	0,25	to	1,5	1	46	50	•	•
12,5/40		2×27000	1,8	1	46	50	•	•
16/40			0,3	1	46	50	•	•
16/40			0,47	1	46	50	•	•
16/40			1	1	46	50	•	•
10/70			0,3	1	46	50	•	
10/70			0,47	1	46	50	•	
10/70			1	1	46	50	•	
10/40			0,47	0,68	46	50	•	
10/40			0,5	0,68	46	50	•	
10/40			1	0,68	46	50	•	
10/40			1,8	0,68	46	50	•	
12,5/40			0,3	0,68	46	50	•	
12,5/40			0,47	0,68	46	50	•	
12,5/40			1	0,68	46	50	•	
12,5/40		2×2200	1,3	0,68	46	50	•	
12,5/40	0,33	to	1,5	0,68	46	50	•	
12,5/40		2×27000	1,8	0,68	46	50	•	
16/40			0,3	0,68	46	50	•	
16/40			0,47	0,68	46	50	•	
16/40			1	0,68	46	50	•	
10/70			0,3	0,68	46	50	•	
10/70			0,47	0,68	46	50	•	
10/70			1	0,68	46	50	•	
10/40			0,47	0,68	56	50	•	•
10/40			1	0,68	56	50	•	•
10/40			1,8	0,68	56	50	•	•
12,5/40			0,3	0,68	56	50	•	•
12,5/40			0,47	0,68	56	50	•	•
12,5/40		2×2200	1	0,68	56	50	•	•
12,5/40	0,47	to	1,3	0,68	56	50	•	•
12,5/40		2×27000	1,5	0,68	56	50	•	•
12,5/40			1,8	0,68	56	50	•	•
16/40			0,3	0,68	56	50	•	•
16/40			0,47	0,68	56	50	•	•
16/40			1	0,68	56	50	•	•
10/70			0,3	0,68	56	50	•	
10/70			0,47	0,68	56	50	•	
10/70			1	0,68	56	50	•	

**Nominal values
for capacitance:**

0,25μF+2×2200pF
0,25μF+2×2700pF
0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
0,25μF+2×15000pF
0,25μF+2×20000pF
0,25μF+2×22000pF
0,25μF+2×25000pF
0,25μF+2×27000pF

0,33μF+2×2200pF
0,33μF+2×2700pF
0,33μF+2×4700pF
0,33μF+2×5000pF
0,33μF+2×10000pF
0,33μF+2×15000pF
0,33μF+2×20000pF
0,33μF+2×22000pF
0,33μF+2×25000pF
0,33μF+2×27000pF

0,47μF+2×2200pF
0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
0,47μF+2×20000pF
0,47μF+2×22000pF
0,47μF+2×25000pF
0,47μF+2×27000pF

Standard values: KPL3523 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	 UL
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	0,68	46	50	•	
10/40			0,5	0,68	46	50	•	
10/40			1	0,68	46	50	•	
10/40			1,8	0,68	46	50	•	
12,5/40			0,3	0,68	46	50	•	
12,5/40			0,47	0,68	46	50	•	
12,5/40			1	0,68	46	50	•	
12,5/40		2×2200	1,3	0,68	46	50	•	
12,5/40	0,56	to	1,5	0,68	46	50	•	
12,5/40		2×27000	1,8	0,68	46	50	•	
16/40			0,3	0,68	46	50	•	
16/40			0,47	0,68	46	50	•	
16/40			1	0,68	46	50	•	
10/70			0,3	0,68	46	50	•	
10/70			0,47	0,68	46	50	•	
10/70			1	0,68	46	50	•	
10/40			0,47	0,47	56	50	•	•
10/40			1	0,47	56	50	•	•
10/40			1,8	0,47	56	50	•	•
12,5/40			0,3	0,47	56	50	•	•
12,5/40			0,47	0,47	56	50	•	•
12,5/40			1	0,47	56	50	•	•
12,5/40		2×2200	1,3	0,47	56	50	•	•
12,5/40	0,68	to	1,5	0,47	56	50	•	•
12,5/40		2×27000	1,8	0,47	56	50	•	•
16/40			0,3	0,47	56	50	•	•
16/40			0,47	0,47	56	50	•	•
16/40			1	0,47	56	50	•	•
10/70			0,3	0,47	56	50	•	
10/70			0,47	0,47	56	50	•	
10/70			1	0,47	56	50	•	
10/40			0,47	0,47	56	50	•	•
10/40			1	0,47	56	50	•	•
10/40			1,8	0,47	56	50	•	•
12,5/40			0,3	0,47	56	50	•	•
12,5/40			0,47	0,47	56	50	•	•
12,5/40			1	0,47	56	50	•	•
12,5/40		2×2200	1,3	0,47	56	50	•	•
12,5/40	1	to	1,5	0,47	56	50	•	•
12,5/40		2×27000	1,8	0,47	56	50	•	•
16/40			0,3	0,47	56	50	•	•
16/40			0,47	0,47	56	50	•	•
16/40			1	0,47	56	50	•	•
10/70			0,3	0,47	56	50	•	
10/70			0,47	0,47	56	50	•	
10/70			1	0,47	56	50	•	
16/40	0,47	-	0,47	0,68	46	50	•	•

**Nominal values
for capacitance:**

0,56μF+2×2200pF
0,56μF+2×2700pF
0,56μF+2×4700pF
0,56μF+2×5000pF
0,56μF+2×10000pF
0,56μF+2×15000pF
0,56μF+2×20000pF
0,56μF+2×22000pF
0,56μF+2×25000pF
0,56μF+2×27000pF

0,68μF+2×2200pF
0,68μF+2×2700pF
0,68μF+2×4700pF
0,68μF+2×5000pF
0,68μF+2×10000pF
0,68μF+2×15000pF
0,68μF+2×20000pF
0,68μF+2×22000pF
0,68μF+2×25000pF
0,68μF+2×27000pF

1μF+2×2200pF
1μF+2×2700pF
1μF+2×4700pF
1μF+2×5000pF
1μF+2×10000pF
1μF+2×15000pF
1μF+2×20000pF
1μF+2×22000pF
1μF+2×25000pF
1μF+2×27000pF

Approvals in use = •
Approvals in pending = o

Filters for radio interference suppression:

Type KPL3524

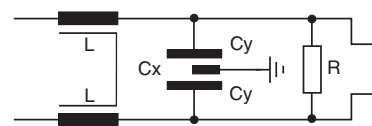
class **X1Y2**

TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	$\pm 20 \%$
Inductance tolerance:	- 30 % to + 50 %
Test voltage:	X1 capacitor 1790 V D.C., 2 s Y2 capacitor 3000 V A.C., 2 s (2050 V A.C., 2 s)
Insulation resistance at 20 °C, $U_m = 100 \text{ V D.C.}$, $t = 1 \text{ min}$:	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \text{ }\mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \text{ }\mu\text{F}$
Complies to:	IEC 60939-2, EN 60939-2, UL1283, CSA C22.2 No.8, capacitor part to IEC 60384-14

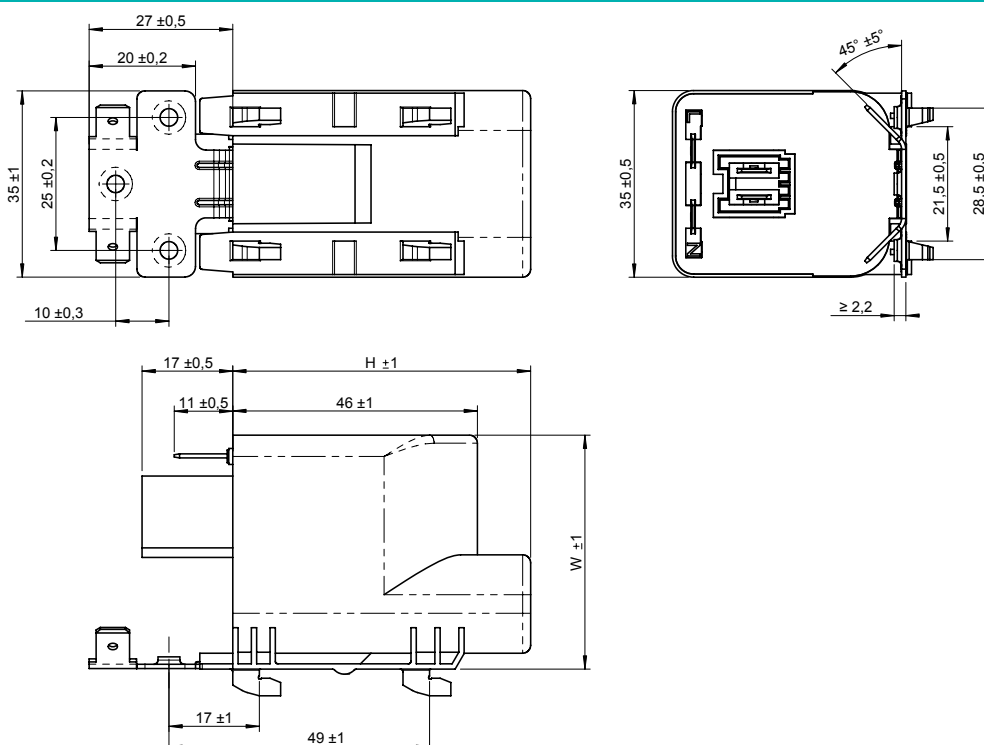


Electrical connection



$R = 470 \text{ k}\Omega \div 2,7 \text{ M}\Omega$ on request

KPL3524



Casing: thermoplastic can, sealed with
synthetical resin, flame retardant

Terminals

Type	Type of terminals
KPL3524	- for RAST 5 - 2 x fast-on connectors

Standard values: KPL3524 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	1	46	41	•	•
10/40			0,5	1	46	41	•	•
10/40			1	1	46	41	•	•
10/40			1,8	1	46	41	•	•
12,5/40			0,3	1	46	41	•	•
12,5/40			0,47	1	46	41	•	•
12,5/40			1	1	46	41	•	•
12,5/40		2×2200	1,3	1	46	41	•	•
12,5/40	0,25	to	1,5	1	46	41	•	•
12,5/40		2×27000	1,8	1	46	41	•	•
16/40			0,3	1	46	41	•	•
16/40			0,47	1	46	41	•	•
16/40			1	1	46	41	•	•
10/70			0,3	1	46	41	•	
10/70			0,47	1	46	41	•	
10/70			1	1	46	41	•	
10/40			0,47	0,68	46	41	•	
10/40			0,5	0,68	46	41	•	
10/40			1	0,68	46	41	•	
10/40			1,8	0,68	46	41	•	
12,5/40			0,3	0,68	46	41	•	
12,5/40			0,47	0,68	46	41	•	
12,5/40			1	0,68	46	41	•	
12,5/40		2×2200	1,3	0,68	46	41	•	
12,5/40	0,33	to	1,5	0,68	46	41	•	
12,5/40		2×27000	1,8	0,68	46	41	•	
16/40			0,3	0,68	46	41	•	
16/40			0,47	0,68	46	41	•	
16/40			1	0,68	46	41	•	
10/70			0,3	0,68	46	41	•	
10/70			0,47	0,68	46	41	•	
10/70			1	0,68	46	41	•	
10/40			0,47	0,47	56	44	•	•
10/40			1	0,47	56	44	•	•
10/40			1,8	0,47	56	44	•	•
12,5/40		2×2200	0,3	0,47	56	44	•	•
12,5/40	0,47	to	0,47	0,47	56	44	•	•
12,5/40		2×27000	1	0,47	56	44	•	•
12,5/40			1,3	0,47	56	44	•	•
12,5/40			1,5	0,47	56	44	•	•
12,5/40			1,8	0,47	56	44	•	•
16/40			0,3	0,47	56	44	•	•
16/40			0,47	0,47	56	44	•	•
16/40			1	0,47	56	44	•	•
10/70			0,3	0,47	56	44	•	
10/70			0,47	0,47	56	44	•	
10/70			1	0,47	56	44	•	

**Nominal values
for capacitance:**

0,25μF+2×2200pF
0,25μF+2×2700pF
0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
0,25μF+2×15000pF
0,25μF+2×20000pF
0,25μF+2×22000pF
0,25μF+2×27000pF

0,33μF+2×2200pF
0,33μF+2×2700pF
0,33μF+2×4700pF
0,33μF+2×5000pF
0,33μF+2×10000pF
0,33μF+2×15000pF
0,33μF+2×20000pF
0,33μF+2×22000pF
0,33μF+2×27000pF

0,47μF+2×2200pF
0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
0,47μF+2×20000pF
0,47μF+2×22000pF
0,47μF+2×27000pF

Continued on the next page

Standard values: KPL3524 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X1 (μF)	Y2 (pF)			H (mm)	W (mm)		
10/40			0,47	0,68	56	44	•	
10/40			0,5	0,68	56	44	•	
10/40			1	0,68	56	44	•	
10/40			1,8	0,68	56	44	•	
12,5/40			0,3	0,68	56	44	•	
12,5/40			0,47	0,68	56	44	•	
12,5/40			1	0,68	56	44	•	
12,5/40		2×2200	1,3	0,68	56	44	•	
12,5/40	0,56	to	1,5	0,68	56	44	•	
12,5/40		2×27000	1,8	0,68	56	44	•	
16/40			0,3	0,68	56	44	•	
16/40			0,47	0,68	56	44	•	
16/40			1	0,68	56	44	•	
10/70			0,3	0,68	56	44	•	
10/70			0,47	0,68	56	44	•	
10/70			1	0,68	56	44	•	
10/40			0,47	0,47	56	44	•	•
10/40			0,5	0,47	56	44	•	•
10/40			1	0,47	56	44	•	•
10/40			1,8	0,47	56	44	•	•
12,5/40			0,3	0,47	56	44	•	•
12,5/40			0,47	0,47	56	44	•	•
12,5/40			1	0,47	56	44	•	•
12,5/40		2×2200	1,3	0,47	56	44	•	•
12,5/40	0,68	to	1,5	0,47	56	44	•	•
12,5/40		2×27000	1,8	0,47	56	44	•	•
16/40			0,3	0,47	56	44	•	•
16/40			0,47	0,47	56	44	•	•
16/40			1	0,47	56	44	•	•
10/70			0,3	0,47	56	44	•	
10/70			0,47	0,47	56	44	•	
10/70			1	0,47	56	44	•	
10/40			0,47	0,47	56	44	•	•
10/40			1	0,47	56	44	•	•
10/40			1,8	0,47	56	44	•	•
12,5/40			0,3	0,47	56	44	•	•
12,5/40			0,47	0,47	56	44	•	•
12,5/40		2×2200	1	0,47	56	44	•	•
12,5/40	1	to	1,3	0,47	56	44	•	•
12,5/40		2×27000	1,5	0,47	56	44	•	•
12,5/40			1,8	0,47	56	44	•	•
16/40			0,3	0,47	56	44	•	•
16/40			0,47	0,47	56	44	•	•
16/40			1	0,47	56	44	•	•
10/70			0,3	0,47	56	44	•	
10/70			0,47	0,47	56	44	•	
10/70			1	0,47	56	44	•	

**Nominal values
for capacitance:**

0.56μF+2×2200pF
0.56μF+2×2700pF
0.56μF+2×4700pF
0.56μF+2×5000pF
0.56μF+2×10000pF
0.56μF+2×15000pF
0.56μF+2×20000pF
0.56μF+2×22000pF
0.56μF+2×27000pF

0.68μF+2×2200pF
0.68μF+2×2700pF
0.68μF+2×4700pF
0.68μF+2×5000pF
0.68μF+2×10000pF
0.68μF+2×15000pF
0.68μF+2×20000pF
0.68μF+2×22000pF
0.68μF+2×27000pF

1μF+2×2200pF
1μF+2×2700pF
1μF+2×4700pF
1μF+2×5000pF
1μF+2×10000pF
1μF+2×15000pF
1μF+2×20000pF
1μF+2×22000pF
1μF+2×27000pF

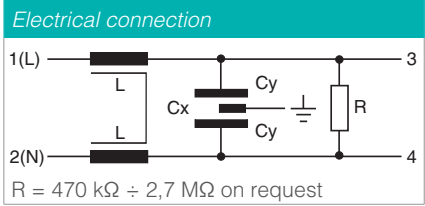
Approvals in use = •
Approvals in pending = o

Filters for radio interference suppression:

Type KNL3309	class X2Y2
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TECHNICAL DATA

Construction:	polypropylene film, metallized
Rated voltage:	275 V A.C., 50 / 60 Hz
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Resistor tolerance:	± 10 %
Climatic category:	25/100/21
Test voltage:	X2 - capacitor 1790 V D.C., 2 s Y2 - capacitor 3000 V D.C., 2 s
Complies to:	IEC 60939-2, EN 60939-2, UL 1283, CSA C22.2 No.8



KNL3309	
Dimension (mm) and connections:	Fast-on connector 6,3x0,8 DIN 46244

Casing: thermoplastic can, closed with sealing washer	
Terminals	
Type	Type of terminals
KNL3309	- 2 x fast-on connectors DIN 46244

Standard values: KNL3309 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X2 (μF)	Y2 (pF)					
7/40			0,5	1,5	38	•	•
7/40			1	1,5	38	•	•
10/40			0,5	1,5	38	•	•
10/40			1	1,5	38	•	•
10/40			1,3	1,5	38	•	•
10/40			1,5	1,5	38	•	•
10/40			1,8	1,5	38	•	•
10/40			2	1,5	38	•	•
12,5/40			0,3	1,5	38	•	o
12,5/40			0,5	1,5	38	•	o
12,5/40			1	1,5	38	•	o
12,5/40			1,3	1,5	38	•	o
12,5/40		2×2200	1,5	1,5	38	•	o
12,5/40	0,15	to	1,8	1,5	38	•	o
12,5/40		2×27000	2	1,5	38	•	o
16/40			0,3	1,5	38	•	o
10/70			0,3	1,5	38	•	o
16/40			0,5	1,5	38	•	o
10/70			0,5	1,5	38	•	o
16/40			1	1,5	38	•	o
10/70			1	1,5	38	•	o
16/40			1,3	1,5	38	•	o
10/70			1,3	1,5	38	•	o
16/40			1,5	1,5	38	•	o
10/70			1,5	1,5	38	•	o
7/40			0,5	1	38	•	•
7/40			1	1	38	•	•
10/40			0,5	1	38	•	•
10/40			1	1	38	•	•
10/40			1,3	1	38	•	•
10/40			1,5	1	38	•	•
10/40			1,8	1	38	•	•
10/40			2	1	38	•	•
12,5/40			0,3	1	38	•	o
12,5/40			0,5	1	38	•	o
12,5/40			1	1	38	•	o
12,5/40			1,3	1	38	•	o
12,5/40		2×2200	1,5	1	38	•	o
12,5/40	0,25	to	1,8	1	38	•	o
12,5/40		2×27000	2	1	38	•	o
16/40			0,3	1	38	•	o
10/70			0,3	1	38	•	o
16/40			0,5	1	38	•	o
10/70			0,5	1	38	•	o
16/40			1	1	38	•	o
10/70			1	1	38	•	o
16/40			1,3	1	38	•	o
10/70			1,3	1	38	•	o
16/40			1,5	1	38	•	o
10/70			1,5	1	38	•	o

**Nominal values
for capacitance:**

0,15μF+2×2200pF
0,15μF+2×2700pF
0,15μF+2×4700pF
0,15μF+2×5000pF
0,15μF+2×10000pF
0,15μF+2×15000pF
0,15μF+2×20000pF
0,15μF+2×22000pF
0,15μF+2×27000pF

0,25μF+2×2200pF
0,25μF+2×2700pF
0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
0,25μF+2×15000pF
0,25μF+2×20000pF
0,25μF+2×22000pF
0,25μF+2×27000pF

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Standard values: KNL3309 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values					 IEC 60939-2	 UL
	Capacitance		Inductance L (mH)	Discharging resistor R (MΩ)	Dimensions l (mm)		
	X2 (μF)	Y2 (pF)					
7/40			0,5	0,68	38	•	•
7/40			1	0,68	38	•	•
10/40			0,5	0,68	38	•	•
10/40			1	0,68	38	•	•
10/40			1,3	0,68	38	•	•
10/40			1,5	0,68	38	•	•
10/40			1,8	0,68	38	•	•
10/40			2	0,68	38	•	•
12,5/40			0,3	0,68	38	•	o
12,5/40			0,5	0,68	38	•	o
12,5/40			1	0,68	38	•	o
12,5/40			1,3	0,68	38	•	o
12,5/40		2×2200	1,5	0,68	38	•	o
12,5/40	0,33	to	1,8	0,68	38	•	o
12,5/40		2×27000	2	0,68	38	•	o
16/40			0,3	0,68	38	•	o
10/70			0,3	0,68	38	•	o
16/40			0,5	0,68	38	•	o
10/70			0,5	0,68	38	•	o
16/40			1	0,68	38	•	o
10/70			1	0,68	38	•	o
16/40			1,3	0,68	38	•	o
10/70			1,3	0,68	38	•	o
16/40			1,5	0,68	38	•	o
10/70			1,5	0,68	38	•	o
7/40			0,5	0,68	38	•	•
7/40			1	0,68	38	•	•
10/40			0,5	0,68	38	•	•
10/40			1	0,68	38	•	•
10/40			1,3	0,68	38	•	•
10/40			1,5	0,68	38	•	•
10/40			1,8	0,68	38	•	•
10/40			2	0,68	38	•	•
12,5/40			0,3	0,68	38	•	o
12,5/40			0,5	0,68	38	•	o
12,5/40			1	0,68	38	•	o
12,5/40			1,3	0,68	38	•	o
12,5/40		2×2200	1,5	0,68	38	•	o
12,5/40	0,47	to	1,8	0,68	38	•	o
12,5/40		2×27000	2	0,68	38	•	o
16/40			0,3	0,68	38	•	o
10/70			0,3	0,68	38	•	o
16/40			0,5	0,68	38	•	o
10/70			0,5	0,68	38	•	o
16/40			1	0,68	38	•	o
10/70			1	0,68	38	•	o
16/40			1,3	0,68	38	•	o
10/70			1,3	0,68	38	•	o
16/40			1,5	0,68	38	•	o
10/70			1,5	0,68	38	•	o

Nominal values
for capacitance:

0,33μF+2×2200pF
0,33μF+2×2700pF
0,33μF+2×4700pF
0,33μF+2×5000pF
0,33μF+2×10000pF
0,33μF+2×15000pF
0,33μF+2×20000pF
0,33μF+2×22000pF
0,33μF+2×27000pF

0,47μF+2×2200pF
0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
0,47μF+2×20000pF
0,47μF+2×22000pF
0,47μF+2×27000pF

Approvals in use = •
Approvals in pending = o

Filters for radio interference suppression:

Type KNL3508

class **X2Y2**

TECHNICAL DATA

Construction: polypropylene film, metallized

Rated voltage: 275 V A.C., 50 / 60 Hz

Capacitance tolerance: $\pm 20 \%$

Inductance tolerance: -30% to $+50 \%$

Resistor tolerance: $\pm 10 \%$

Climatic category: 25/100/21

Test voltage: X2 - capacitor 1790 V D.C., 2 s
Y2 - capacitor 3000 V D.C., 2 s
or 2050 V D.C., 2 s

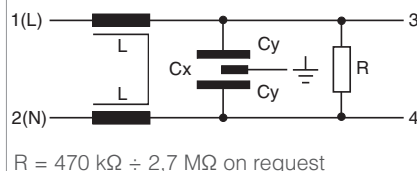
Complies to: IEC 60939-2, EN 60939-2,
UL 1283, CSA C22.2 No.8

Terminals: fast-on connectors DIN 46244

Casing: thermoplastic can closed
with sealing washer



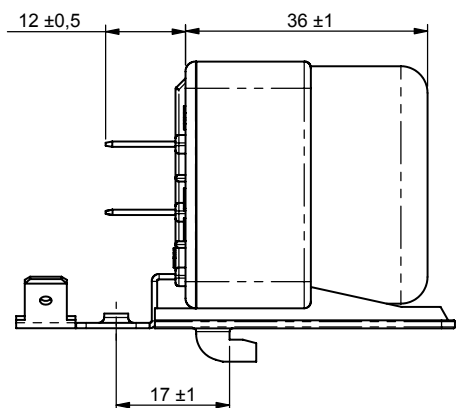
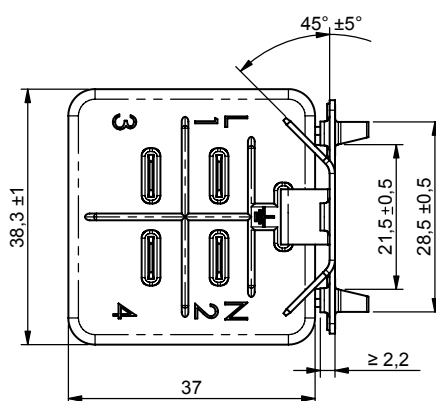
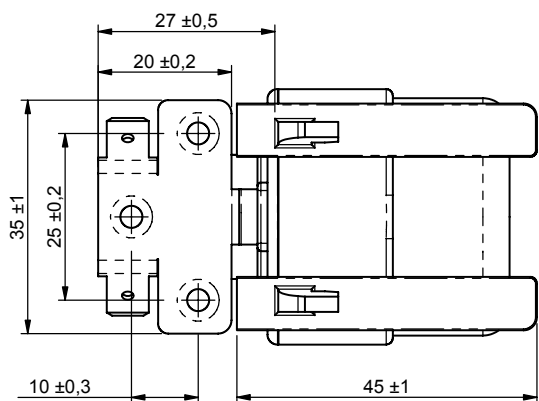
Electrical connection



KNL3508

Dimension (mm) and connections:

Fast-on connector 6,3x0,8 DIN 46244



Standard values: KNL3508 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X2 (μF)	Y2 (pF)			H (mm)	W (mm)		
7/40			0,5	1,5	36	37	•	•
7/40			1	1,5	36	37	•	•
10/40			0,5	1,5	36	37	•	•
10/40			1	1,5	36	37	•	•
10/40			1,3	1,5	36	37	•	•
10/40			1,5	1,5	36	37	•	•
10/40			1,8	1,5	36	37	•	•
10/40			2	1,5	36	37	•	•
12,5/40			0,3	1,5	36	37	•	o
12,5/40			0,5	1,5	36	37	•	o
12,5/40			1	1,5	36	37	•	o
12,5/40		2×2200	1,3	1,5	36	37	•	o
12,5/40	0,15	to	1,5	1,5	36	37	•	o
12,5/40		2×27000	1,8	1,5	36	37	•	o
12,5/40			2	1,5	36	37	•	o
16/40			0,3	1,5	36	37	•	o
10/70			0,3	1,5	36	37	•	o
16/40			0,5	1,5	36	37	•	o
10/70			0,5	1,5	36	37	•	o
16/40			1	1,5	36	37	•	o
10/70			1	1,5	36	37	•	o
16/40			1,3	1,5	36	37	•	o
10/70			1,3	1,5	36	37	•	o
16/40			1,5	1,5	36	37	•	o
10/70			1,5	1,5	36	37	•	o
7/40			0,5	1,5	36	37	•	•
7/40			1	1,5	36	37	•	•
10/40			0,5	1,5	36	37	•	•
10/40			1	1,5	36	37	•	•
10/40			1,3	1,5	36	37	•	•
10/40			1,5	1,5	36	37	•	•
10/40			1,8	1,5	36	37	•	•
10/40			2	1,5	36	37	•	•
12,5/40			0,3	1,5	36	37	•	o
12,5/40			0,5	1,5	36	37	•	o
12,5/40			1	1,5	36	37	•	o
12,5/40		2×2200	1,3	1,5	36	37	•	o
12,5/40	0,25	to	1,5	1,5	36	37	•	o
12,5/40		2×27000	1,8	1,5	36	37	•	o
12,5/40			2	1,5	36	37	•	o
16/40			0,3	1,5	36	37	•	o
10/70			0,3	1,5	36	37	•	o
16/40			0,5	1,5	36	37	•	o
10/70			0,5	1,5	36	37	•	o
16/40			1	1,5	36	37	•	o
10/70			1	1,5	36	37	•	o
16/40			1,3	1,5	36	37	•	o
10/70			1,3	1,5	36	37	•	o
16/40			1,5	1,5	36	37	•	o
10/70			1,5	1,5	36	37	•	o

Nominal values
for capacitance:

0,15μF+2×2200pF
0,15μF+2×2700pF
0,15μF+2×4700pF
0,15μF+2×5000pF
0,15μF+2×10000pF
0,15μF+2×15000pF
0,15μF+2×20000pF
0,15μF+2×22000pF
0,15μF+2×27000pF

0,25μF+2×2200pF
0,25μF+2×2700pF
0,25μF+2×4700pF
0,25μF+2×5000pF
0,25μF+2×10000pF
0,25μF+2×15000pF
0,25μF+2×20000pF
0,25μF+2×22000pF
0,25μF+2×27000pF

Continued on the next page

Standard values: KNL3508 for upper temperature 100 °C

Current I(A)/T(°C)	Nominal values						 IEC 60939-2	
	Capacitance		Inductance L (mH)	Discharg- ing resistor R (MΩ)	Dimensions			
	X2 (μF)	Y2 (pF)			H (mm)	W (mm)		
7/40			0,5	1,5	36	37	•	•
7/40			1	1,5	36	37	•	•
10/40			0,5	1,5	36	37	•	•
10/40			1	1,5	36	37	•	•
10/40			1,3	1,5	36	37	•	•
10/40			1,5	1,5	36	37	•	•
10/40			1,8	1,5	36	37	•	•
10/40			2	1,5	36	37	•	•
12,5/40			0,3	1,5	36	37	•	o
12,5/40			0,5	1,5	36	37	•	o
12,5/40			1	1,5	36	37	•	o
12,5/40		2×2200	1,3	1,5	36	37	•	o
12,5/40	0,33	to	1,5	1,5	36	37	•	o
12,5/40		2×27000	1,8	1,5	36	37	•	o
12,5/40			2	1,5	36	37	•	o
16/40			0,3	1,5	36	37	•	o
10/70			0,3	1,5	36	37	•	o
16/40			0,5	1,5	36	37	•	o
10/70			0,5	1,5	36	37	•	o
16/40			1	1,5	36	37	•	o
10/70			1	1,5	36	37	•	o
16/40			1,3	1,5	36	37	•	o
10/70			1,3	1,5	36	37	•	o
16/40			1,5	1,5	36	37	•	o
10/70			1,5	1,5	36	37	•	o
7/40			0,5	1,5	36	37	•	•
7/40			1	1,5	36	37	•	•
10/40			0,5	1,5	36	37	•	•
10/40			1	1,5	36	37	•	•
10/40			1,3	1,5	36	37	•	•
10/40			1,5	1,5	36	37	•	•
10/40			1,8	1,5	36	37	•	•
10/40			2	1,5	36	37	•	•
12,5/40			0,3	1,5	36	37	•	o
12,5/40			0,5	1,5	36	37	•	o
12,5/40			1	1,5	36	37	•	o
12,5/40		2×2200	1,3	1,5	36	37	•	o
12,5/40	0,47	to	1,5	1,5	36	37	•	o
12,5/40		2×27000	1,8	1,5	36	37	•	o
12,5/40			2	1,5	36	37	•	o
16/40			0,3	1,5	36	37	•	o
10/70			0,3	1,5	36	37	•	o
16/40			0,5	1,5	36	37	•	o
10/70			0,5	1,5	36	37	•	o
16/40			1	1,5	36	37	•	o
10/70			1	1,5	36	37	•	o
16/40			1,3	1,5	36	37	•	o
10/70			1,3	1,5	36	37	•	o
16/40			1,5	1,5	36	37	•	o
10/70			1,5	1,5	36	37	•	o

Nominal values
for capacitance:

0,33μF+2×2200pF
0,33μF+2×2700pF
0,33μF+2×4700pF
0,33μF+2×5000pF
0,33μF+2×10000pF
0,33μF+2×15000pF
0,33μF+2×20000pF
0,33μF+2×22000pF
0,33μF+2×27000pF

0,47μF+2×2200pF
0,47μF+2×2700pF
0,47μF+2×4700pF
0,47μF+2×5000pF
0,47μF+2×10000pF
0,47μF+2×15000pF
0,47μF+2×20000pF
0,47μF+2×22000pF
0,47μF+2×27000pF

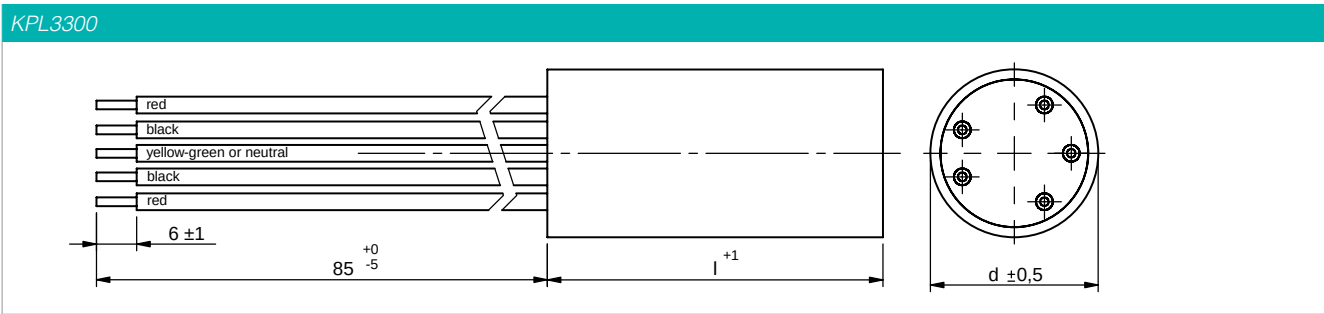
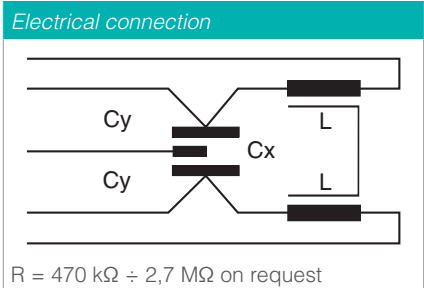
Filters for radio interference suppression:

Type KPL3300	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 - capacitor 1625 V D.C., 2 s for $U_R = 250$ V X1 - capacitor 1790 V D.C., 2 s for $U_R = 275$ V Y2 - capacitor 2700 V D.C., 2 s (or 1800 V A.C., 2 s)
Insulation resistance at 20°C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000$ M Ω for $C \leq 0,33$ μ F $R_i \times C_n \geq 2000$ s for $C > 0,33$ μ F
Complies to:	IEC 60939-2, EN 60939-2, capacitor section IEC 60384-14



Casing: thermoplastic, sealed with synthetical resin.	
Terminals	
Type	Type of terminals
KPL3300	stranded wire 0,5 mm ² with PVC insulation

Standard values: KPL3300

Rated current I (A)	Rated values			
	Capacitance		Inductance L (mH)	Dimensions d x l (mm)
	X1 (μ F)	Y2 (pF)		
4	0,1	2 x 2500	2 x 1	25 x 50
6	0,1	2 x 2500	2 x 1	25 x 50
3	0,1	2 x 2500	2 x 4	25 x 50
4	0,1	2 x 2500	2 x 2	25 x 50
2	0,1	2 x 2500	2 x 6	25 x 50

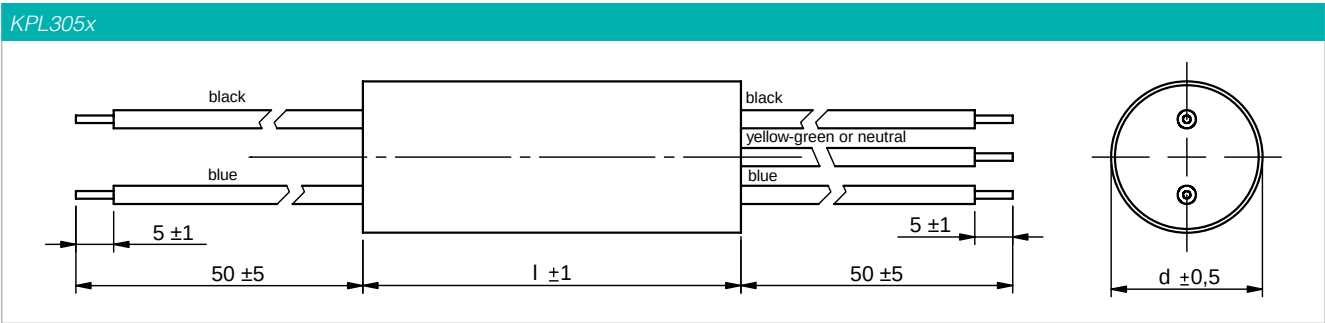
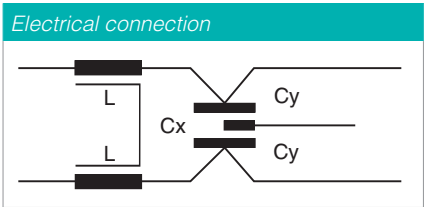
Filters for radio interference suppression:

Type KPL305x	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 - capacitor 1625 V D.C., 2 s for $U_R = 250$ V X1 - capacitor 1790 V D.C., 2 s for $U_R = 275$ V Y2 - capacitor 2700 V D.C., 2 s (or 1800 V A.C., 2 s)
Insulation resistance at 20°C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000 \text{ M}\Omega$ for $C \leq 0,33 \text{ }\mu\text{F}$ $R_i \times C_n \geq 2000 \text{ s}$ for $C > 0,33 \text{ }\mu\text{F}$
Complies to:	IEC 60939-2, EN 60939-2, capacitor section IEC 60384-14



Casing: aluminium, sealed with synthetical resin. Casing also available with bracket.	
Terminals	
Type	Type of terminals
KPL305x	stranded wire 0,5 mm ² up to 6 A or 1,5 mm ² up to 16 A with PVC insulation

Standard values: KPL305x

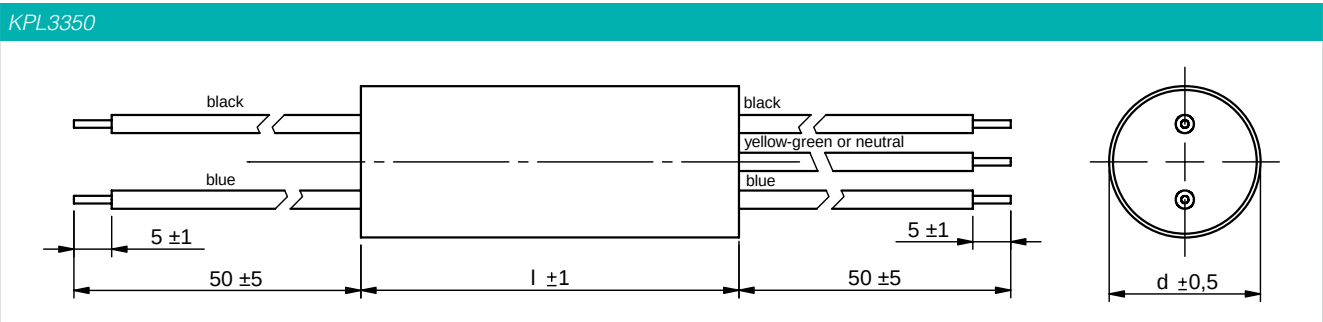
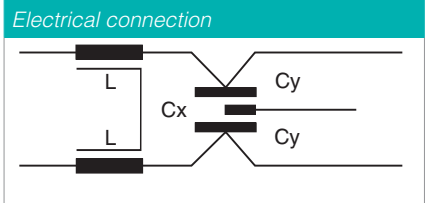
Rated current I (A)	Rated values			
	Capacitance		Inductance	Dimensions
	X1 (μF)	Y2 (pF)	L (mH)	d x l (mm)
1	0,1	2 × 2500	2 × 4	20 × 50
2	0,1	2 × 2500	2 × 1	20 × 50
2	0,1	2 × 2500	2 × 2	20 × 50
2	0,1	2 × 2500	2 × 6	25 × 55
3	0,1	2 × 2500	2 × 4	25 × 55
4	0,1	2 × 2500	2 × 2	25 × 55
5	0,1	2 × 2500	2 × 2	30 × 60
6	0,1	2 × 2500	2 × 1	25 × 55
6	0,1	2 × 2500	2 × 4	35 × 60
10	0,1	2 × 2500	2 × 2	35 × 60
16	0,1	2 × 2500	2 × 1	35 × 60

Filters for radio interference suppression:

Type KPL3350	class X1Y2
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TECHNICAL DATA

Dielectric:	paper impregnated
Electrodes:	aluminium foil
Rated voltage:	250 V A.C., 275 V A.C.
Capacitance tolerance:	± 20 %
Inductance tolerance:	- 30 % to + 50 %
Climatic category:	25/085/21 according to IEC 60068-1
Temperature range:	- 25 °C to + 85 °C
Test voltage:	X1 - capacitor 1625 V D.C., 2 s for $U_R = 250$ V X1 - capacitor 1790 V D.C., 2 s for $U_R = 275$ V Y2 - capacitor 2700 V D.C., 2 s (or 1800 V A.C., 2 s)
Insulation resistance at 20°C, $U_m = 100$ V D.C., $t = 1$ min:	$R_i \geq 6000$ MΩ for $C \leq 0,33$ μF $R_i \times C_n \geq 2000$ s for $C > 0,33$ μF
Complies to:	IEC 60939-2, EN 60939-2, capacitor section IEC 60384-14

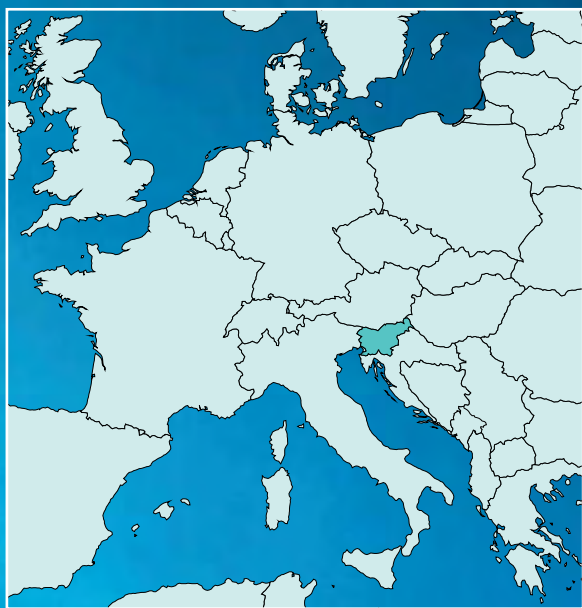


Casing: thermoplastic tube, sealed with synthetical resin.	
Terminals	
Type	Type of terminals
KPL3350	Stranded wire 0,5 mm² with PVC insulation.

Standard values: KPL3350

Rated current I (A)	Rated values			
	Capacitance		Inductance L (mH)	Dimensions $d \times l$ (mm)
	X1 (μF)	Y2 (pF)		
1	0,1	2×2500	2×2	18×48
2	0,1	2×2500	2×1	18×48

W8



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