

# Components

Power Capacitors and accessories



## LKT Power Capacitors

**FRAKO Power Capacitors are installed in power factor correction systems and in passive filters.**

FRAKO Power Capacitors have been developed and manufactured for decades solely at the company's Teningen production site in Germany. This has resulted in a consistently high product quality being maintained, the basis for assured operational reliability and a long service life.

### Application Recommendations

FRAKO offers Power Capacitors for a variety of applications. They are divided into four separate categories with different specifications:

- Basic Capacitors
- Standard Capacitors
- Premium Capacitors
- Heavy Duty Capacitors

FRAKO Power Capacitors with **UL/CSA certification:**

Please contact us if you require information on our UL/CSA series of Power Capacitors.

FRAKO Power Capacitors are available as single-phase and 3-phase versions.

Voltage and power ranges:

- Nominal voltage: 240–800 V, 50 / 60 Hz
- Nominal power: 1.0–40.0 kvar

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## Design & quality

FRAKO Power Capacitors are manufactured in a unique dry design. Each comprises up to three interconnected capacitor coils wound in a low-loss, metallized polypropylene film and enclosed in a cylindrical aluminium casing provided with an M12 mounting stud. In addition to a PCB-free, flame-resistant mineral filler material, the casings also contain an adhesive stabilizer. Discharge resistors, permanently connected in the factory, guarantee that the residual voltage falls to <math>< 50\text{ V}</math> within one minute after the capacitor has been disconnected. The electrical connections are by means of female slide connectors (IP00) or a patented spring-clamp connector (IP20) available separately.

The use of rigorously inspected materials and their careful processing guarantee excellent quality and a long product service life. FRAKO manufactures its Power Capacitors to its own in-house specifications, which are far more exacting than the requirements of the applicable standards.

Quality control inspections after each individual manufacturing step ensure that the final product is of a high quality. These demanding quality standards, together with specially developed manufacturing technology, enable FRAKO Power Capacitors to achieve a longer-than-average service life. At the end of the manufacturing process, each capacitor is inspected individually. The in-house requirements for this special inspection are considerably more stringent than those of the routine tests specified by the relevant standards.

## Standards

All FRAKO Power Capacitors comply with the international standards IEC 60831-1 and -2, and of course with EN 60831 1 and -2. In addition, a special series developed for the North American market complies with the requirements of UL 810 and CSA 22.2 No. 190.

## Four safety features ensure uninterrupted operation

The reliability of Power Capacitors is crucially important for the problem-free operation of power factor correction systems and passive filters. FRAKO's measures to ensure this are now fourfold: Power Capacitors nowadays usually use polypropylene as the dielectric material, its surfaces being metallized. This design has the important property that if local overloading occurs and punctures the substrate film, the fault automatically isolates itself, a phenomenon known as **self-healing**.

**Self-healing** is due to the heavy short-circuit current that flows between the films immediately vaporizing the very thin metal coating at the damaged location, thus ending the flow of current.



If several punctures occur in a small area of metallized film, the amount of energy involved might be too much for the **self-healing** action alone to cope with. This could lead to complete failure of the capacitor. However, in this case the second fail-safe function of the fourfold safety design comes into play: the **segmented metallization**.

In the manufacturing process, the polypropylene film for FRAKO Power Capacitors is metallized by vapour deposition to form a pattern of separate individual segments. Each segment is connected to the power supply by slender contact bridges, these being so dimensioned that when severely overloaded (several substrate punctures within one segment), they act as fuses by simply vaporizing, thereby securely isolating the damaged segment from the power supply.



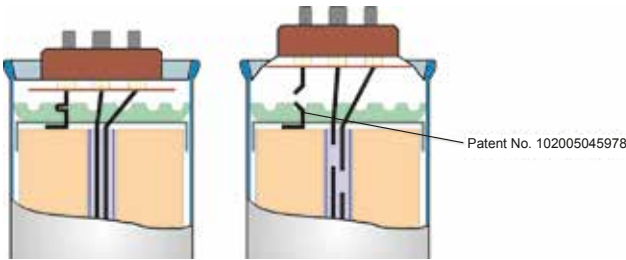
The **segmented metallization** technique increases the reliability of the capacitors and prolongs their service life.

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The third design feature for increases product safety is the three-phase **overpressure disconnecter**, a mechanical fuse included in every FRAKO capacitor.

If an excessive internal pressure develops due to overloading, or at the end of the capacitor's service life, the mechanical fuse isolates the capacitor safely from the power supply by disconnecting all poles. Should puncturing of the dielectric occur on a major scale, this results in the substrate film melting and generating gases inside the casing, thus building up pressure in the capacitor. This causes the diaphragm lid to bulge outwards, thereby tensioning the internal leads to the coils until they act as mechanical fuses, breaking cleanly at defined locations. The bulging of the lid also increases the internal volume, therefore reducing the pressure inside the capacitor.



Principle of the overpressure disconnection system

In 2015, FRAKO added the patented **contact ring** to the other safety and reliability features, thus making them fourfold.

These patented rings are stamped from a special alloy and are formed with a number of pointed teeth that press into the zinc end-face contact layers on the windings to make electrical contact. The internal connecting leads are spot-welded to the **contact rings** before final assembly of the capacitor.



The great advantage of this solder-free design: it has completely excluded the risk of damaging the capacitor windings at the manufacturing stage due to overheating during soldering of the connecting leads. The quality of the winding connection is significantly increased, and the reliability of the mechanical fuse that protects against excessive internal pressure is improved by its being securely spot-welded in place.

The **contact ring** also enables FRAKO to produce completely lead-free capacitors and make yet another improvement to their operating reliability.

### Special technical features

In our ongoing development work on FRAKO Power Capacitors, we always focus on those attributes that are called for in present-day applications. The three following factors are especially important:

- Overvoltage tolerance
- Current-carrying capacity
- Thermal endurance

### Overvoltage tolerance

As required by the standards IEC 60831-1 & -2, as with EN 60831-1 & -2, all FRAKO Power Capacitors are designed to withstand the following overvoltages:

8 hours daily:	1.10 × capacitor nominal voltage
30 minutes daily:	1.15 × capacitor nominal voltage
5 minutes:	1.20 × capacitor nominal voltage
1 minute:	1.30 × capacitor nominal voltage

The following table shows a selection of nominal voltage ratings and maximum overvoltages:

Capacitor nominal voltage	240	400	440	480	525	600	690	760	800
8 hours daily	264	440	484	528	578	660	759	836	880
30 min daily	276	460	506	552	604	690	794	874	920
5 minutes	288	480	528	576	630	720	828	912	960
1 minute	312	520	572	624	683	780	897	988	1040

All voltages in volts [V]

### Current-carrying capacity

All over the modern world, harmonics are polluting the electricity supply networks. The increasing use of devices such as frequency converters has a growing impact on capacitors. If these are operated in a power supply network contaminated by harmonics, dangerous resonances can result, which can again significantly increase the currents that the capacitors must withstand.

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The applicable standards call for a continuous current-carrying capacity of at least 1.3 times the nominal current to be designed for in Power Capacitors. In reality, however, even this value can be exceeded under conditions with extreme levels of harmonics.

For this reason, all FRAKO Power Capacitors are designed for a continuous current-carrying capacity of at least 1.5 times the nominal current. More information on ampacity is given in the specifications table on the following page.

### Thermal endurance

Excessive temperatures also have a negative impact on the service life of a capacitor. Storage or operation of capacitors above their permitted temperature limits results in a drastic shortening of their service life. Power Capacitors are assigned to different temperature classes according to the permitted ambient temperature as follows:

Temperature class	Maximum ambient temperature		
	Absolute maximum temp.	Max. average temp. over 1 day	Max. average over 1 year
B	45 °C	35 °C	25 °C
C	50 °C	40 °C	30 °C
D	55 °C	45 °C	35 °C

The temperatures stated above refer to the direct environment of the capacitors. This means the internal temperature in the enclosure or control cabinet that houses them. Experience shows that the limits given in the table for the temperature classes can easily be exceeded in practice. Higher temperatures are to be expected in particular in the case of power factor correction systems fitted with filter reactors.

Power Capacitors in the Standard, Premium and Heavy Duty categories are therefore designed for continuous ambient temperatures of at least 60 °C.

This continuously rated thermal endurance is helped by the compact construction of the capacitors, which is conducive to optimum heat dissipation.

### Patented capacitor connections

FRAKO Power Capacitors can be fitted either with standard slide connectors or, as optional extra, WAGO CAGE CLAMP® (AKD) connectors.

These patented, tried-and-tested connectors use special spring clamps that ensure a simple, vibration-resistant and maintenance-free electrical contact with the capacitor. They can be used to connect single-core, stranded or fine-filament copper cables. AKD connectors meet IP20 requirements and therefore provide protection against objects such as fingers inadvertently touching live conductors.

Article No.	Designation	Capacitor type and diameter
31-08000	AKD 25/3	3-phase, 60/70 mm
31-08002	AKD 25/2	1-phase, 60/70 mm
31-08003	AKD 30/3	3-phase, 85 mm
31-08004	AKD 30/2	1-phase, 85 mm
31-08005	AKD-UL	3-phase, 85 mm (specified as per UL)



### Accessories

FRAKO Power Capacitors with 60 and 70 mm diameters that use standard slide connectors can be provided with an insulating cap to cover their terminals. Using the insulating cap then increases ingress protection to IP54.

Article No.	Designation	Description
69-00352	LKK 60	Insulating cap for Ø 60 mm Power Capacitors
69-00350	LKK 70	Insulating cap for Ø 70 mm Power Capacitors
69-00353	LKK	Cable sleeve for insulating caps LKK 60/70

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## Specifications of FRAKO Power Capacitors

Category	Basic	Standard	Premium	Heavy Duty	
Type designation	LKT ...-DB	LKT ...-DP	LKT ...-DL	LKT ...-HD	
Nominal voltage	400–525 V	280–800 V	400–525 V	440–615 V <sup>1)</sup>	480–525 V
Nominal frequency	50/60 Hz				
Power rating	5.0–36 kvar	5.0–40 kvar	1.0–24 kvar	1.2–29 kvar	16.8–21.6 kvar
Capacitance tolerance <sup>2)</sup>	-5 / +5 %				
Dielectric losses	0.2 W / kvar				
Power loss	0.5 W / kvar				
Residual voltage after 60 seconds discharge time	≤50 V				
Maximum overvoltage	1.10 x V <sub>N</sub> – 8 hours daily 1.15 x V <sub>N</sub> – 30 minutes daily 1.20 x V <sub>N</sub> – 5 minutes 1.30 x V <sub>N</sub> – 1 minute				
Maximum continuous overcurrent at nominal voltage (50 Hz)	1.5 x I <sub>N</sub>	1.8 x I <sub>N</sub>	2.2 x I <sub>N</sub>	2.0 x I <sub>N</sub>	2.7 x I <sub>N</sub>
Maximum inrush current at nominal voltage (50 Hz)	200 x I <sub>N</sub>	250 x I <sub>N</sub>	300 x I <sub>N</sub>	272 x I <sub>N</sub>	450 x I <sub>N</sub>
Test voltage (metal film–metal film)	2.15 x V <sub>N</sub> , 2 seconds 1.85 x V <sub>N</sub> , 18 seconds				
Test voltage (metal film–casing)	V <sub>N</sub> < 600 V = 3.9 kV, 2 seconds V <sub>N</sub> > 600 V = 4.3 kV, 2 seconds				
Insulation voltage rating dependent on V <sub>N</sub> and diameter	3.9 / 8 kV 3.9 / 12 kV 4.3 / 8 kV 4.3 / 12 kV				
Temperature class	-25 / D	-40 / 60	-40 / 65	-40 / 60	-40 / 68
Min. / max. temperature <sup>3)</sup>	-25 / +55 °C	-40 / +60 °C	-40 / +65 °C	-40 / +60 °C	-40 / +68 °C
Max. casing temperature	+70 °C	+75 °C	+78 °C	+75 °C	+78 °C
Min. / max. storage temperature	-25 / +85 °C	-40 / +85 °C			
Max. humidity	95 % non-condensing				
Max. site altitude	4 000 metres				
Service life	100 000 h	130 000 h	170 000 h	130 000 h	200 000 h
Max. number of switching cycles per year	20 000	40 000	60 000	40 000	100 000

<sup>1)</sup> Capacitors of the Premium category can be operated above their nominal voltage if a reduced specification is acceptable. The tables on pages 18 and 19 give the maximum permissible continuous overvoltage for each capacitor type.

<sup>2)</sup> Other tolerances on request

<sup>3)</sup> The table of temperature classes on the previous page applies to capacitors of the Basic category. Capacitors of the categories Standard, Premium and Heavy Duty are specified for continuous operation at the stated maximum temperature.

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## Basic Capacitors (three-phase, $V_N$ : 400 V...525 V)

Type LKT...-DB for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu$ F]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			230V	300V	400V	415V	440V	480V	525V			
31-10414	LKT 5-400-DB	3 x 33.2	1.66 2.0	2.8 3.33	5.0 6.0					7.2 8.7	60 x 150 0.550	9
31-10400	LKT 6,25-400-DB	3 x 41.4	2.1 2.5	3.5 4.2	6.25 7.5					9.0 10.8	60 x 150 0.550	9
31-10415	LKT 7,5-400-DB	3 x 49.7	2.5 3.0	4.2 5.1	7.5 9.0					10.8 13.0	60 x 150 0.550	9
31-10416	LKT 10-400-DB	3 x 66.3	3.33 4.0	5.6 6.8	10.0 12.0					14.4 17.3	60 x 225 0.800	9
31-10401	LKT 12,5-400-DB	3 x 82.9	4.17 5.0	7.0 8.4	12.5 15.0					18.0 21.7	60 x 225 0.800	9
31-10417	LKT 15-400-DB	3 x 99.5	5.0 6.0	8.4 10.1	15.0 18.0					21.7 26.0	70 x 225 1.050	9
31-10418	LKT 20-400-DB	3 x 132.6	6.66 7.9	11.3 13.5	20.0 24.0					28.9 34.6	85 x 215 1.500	4
31-10402	LKT 25-400-DB	3 x 165.8	8.33 9.9	14.1 16.9	25.0 30.0					36.1 43.3	85 x 278 1.850	4
31-10403	LKT 30-400-DB	3 x 198.9	9.9 11.9	16.9 20.3	30.0 36.0					43.3 52.0	85 x 320 2.150	4
31-10404	LKT 6,25-440-DB	3 x 34.3	1.7 2.0	2.9 3.5	5.2 6.2	5.6 6.7	6.25 7.5			8.2 9.8	60 x 150 0.550	9
31-10412	LKT 10-440-DB	3 x 54.8	2.7 3.33	4.7 5.6	8.33 9.9	8.9 10.7	10.0 12.0			13.1 15.7	60 x 225 0.800	9
31-10379	LKT 12,5-440-DB	3 x 68.5	3.4 4.1	5.8 7.0	10.3 12.4	11.1 13.3	12.5 15.0			16.4 19.7	70 x 225 1.050	9
31-10406	LKT 15-440-DB	3 x 82.2	4.1 4.9	7.0 8.4	12.4 14.9	13.3 16.0	15.0 18.0			19.7 23.6	70 x 225 1.050	9
31-10436	LKT 20-440-DB	3 x 109.6	5.5 6.66	9.3 11.2	16.5 19.8	17.8 21.4	20.0 24.0			26.2 31.5	85 x 215 1.500	4
31-10407	LKT 25-440-DB	3 x 137.0	6.8 8.2	11.6 14.0	20.7 24.8	22.2 26.7	25.0 30.0			32.8 39.4	85 x 278 1.850	4
31-10437	LKT 28,2-440-DB	3 x 154.6	7.7 9.2	13.1 15.7	23.3 27.9	25.0 30.0	28.2 33.8			37.0 44.4	85 x 278 1.850	4
31-10408	LKT 30-440-DB	3 x 164.4	8.2 9.8	14.0 16.7	24.8 29.8	26.7 32.0	30.0 36.0			39.4 47.2	85 x 278 1.850	4
31-10438	LKT 33,3-480-DB	3 x 153.4	7.7 9.2	13.0 15.6	23.1 27.8	24.9 29.9	28.0 33.6	33.3 40.0		40.1 48.1	85 x 320 2.150	4
31-10409	LKT 6,25-525-DB	3 x 24.1	1.2 1.4	2.0 2.4	3.6 4.4	3.9 4.7	4.4 5.3	5.2 6.3	6.25 7.5	6.9 8.2	60 x 150 0.550	9
31-10435	LKT 10-525-DB	3 x 38.5	1.9 2.3	3.3 3.9	5.8 7.0	6.3 7.5	7.0 8.4	8.4 10.0	10.0 12.0	11.0 13.2	60 x 225 0.800	9
31-10410	LKT 12,5-525-DB	3 x 48.1	2.4 2.9	4.1 4.9	7.3 8.7	7.8 9.4	8.8 10.5	10.4 12.5	12.5 15.0	13.7 16.5	70 x 225 1.050	9
31-10419	LKT 15-525-DB	3 x 57.7	2.9 3.5	4.9 5.9	8.7 10.5	9.4 11.3	10.5 12.6	12.5 15.1	15.0 18.0	16.5 19.8	70 x 225 1.050	9
31-10434	LKT 17,2-525-DB	3 x 66.2	3.3 4.0	5.6 6.7	10.0 12.0	10.8 12.9	12.1 14.5	14.4 17.3	17.2 20.6	18.9 22.7	70 x 225 1.050	9
31-10420	LKT 20-525-DB	3 x 77.0	3.8 4.6	6.5 7.8	11.6 13.9	12.5 15.0	14.1 16.9	16.7 20.1	20.0 24.0	22.0 26.4	70 x 265 1.200	9
31-10411	LKT 25-525-DB	3 x 96.2	4.8 5.8	8.2 9.8	14.5 17.4	15.6 18.8	17.6 21.1	20.9 25.1	25.0 30.0	27.5 33.0	85 x 278 1.850	4
31-10439	LKT 30-525-DB	3 x 115.5	5.8 6.9	9.8 11.8	17.4 20.9	18.8 22.5	21.1 25.3	25.1 30.1	30.0 36.0	33.0 39.6	85 x 278 1.850	4



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## Standard Capacitors (three-phase, $V_N$ : 300 V...480 V)

Type LKT...-DP for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu$ F]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			230V	300V	400V	415V	440V	460V	480V			
31-10523	LKT 7,1-300-DP	3 x 83.7	4.17 5.0	7.1 8.5						13.7 16.4	60 x 225 0.800	9
31-10553	LKT 14,2-300-DP	3 x 167.1	8.33 10.0	14.2 17.0						27.3 32.7	85 x 215 1.500	4
31-10525	LKT 21,3-300-DP	3 x 251.1	12.5 15.0	21.3 25.5						41.0 49.2	85 x 278 1.850	4
31-10500	LKT 5-400-DP	3 x 33.2	1.66 2.0	2.8 3.33	5.0 6.0					7.2 8.7	60 x 150 0.550	9
31-10380	LKT 10-400-DP	3 x 66.3	3.33 4.0	5.6 6.8	10.0 12.0					14.4 17.3	70 x 225 1.050	9
31-10502	LKT 12,5-400-DP	3 x 82.9	4.17 5.0	7.0 8.4	12.5 15.0					18.0 21.7	70 x 225 1.050	9
31-10503	LKT 15-400-DP	3 x 99.5	5.0 6.0	8.4 10.1	15.0 18.0					21.7 26.0	70 x 265 1.200	9
31-10504	LKT 20-400-DP	3 x 132.6	6.66 8.0	11.3 13.5	20.0 24.0					28.9 34.6	85 x 278 1.850	4
31-10505	LKT 25-400-DP	3 x 165.8	8.33 9.9	14.1 16.9	25.0 30.0					36.1 43.3	85 x 278 1.850	4
31-10534	LKT 3,8-440-DP	3 x 20.8	1.0 1.25	1.8 2.1	3.1 3.8	3.4 4.1	3.8 4.6			5.0 6.0	60 x 150 0.550	9
31-10508	LKT 10-440-DP	3 x 54.8	2.7 3.33	4.7 5.6	8.33 9.9	8.9 10.7	10.0 12.0			13.1 15.7	60 x 225 0.800	9
31-10507	LKT 12,5-440-DP	3 x 68.5	3.4 4.1	5.8 7.0	10.3 12.4	11.1 13.3	12.5 15.0			16.4 19.1	70 x 225 1.050	9
31-10381	LKT 15-440-DP	3 x 82.2	4.1 4.9	7.0 8.33	12.4 14.9	13.3 16.0	15.0 18.0			19.7 23.6	70 x 265 1.200	9
31-10512	LKT 20-440-DP	3 x 109.6	5.5 6.66	9.3 11.2	16.5 19.8	17.8 21.4	20.0 24.0			26.2 31.5	85 x 278 1.850	4
31-10510	LKT 25-440-DP	3 x 137.0	6.8 8.2	11.6 14.0	20.7 24.8	22.2 26.7	25.0 30.0			32.8 39.4	85 x 278 1.850	4
31-10535	LKT 28,2-440-DP	3 x 154.6	7.7 9.2	13.1 15.7	23.3 27.9	25.0 30.0	28.2 33.8			37.0 44.4	85 x 320 2.150	4
31-10509	LKT 30-440-DP	3 x 164.4	8.2 9.8	14.0 16.7	24.8 29.8	26.7 32.0	30.0 36.0			39.4 47.2	85 x 320 2.150	4
31-10390	LKT 12,5-480-DP	3 x 57.6	2.9 3.4	4.9 5.9	8.7 10.4	9.3 11.2	10.5 12.6	11.5 13.8	12.5 15.0	15.0 18.0	70 x 225 1.050	9
31-10382	LKT 15,5-480-DP	3 x 71.4	3.6 4.3	6.1 7.3	10.8 13.0	11.6 13.9	13.1 15.7	14.2 17.1	15.5 18.6	18.6 22.4	70 x 265 1.200	9
31-10522	LKT 18-480-DP	3 x 82.9	4.17 5.0	7.0 8.4	12.5 15.0	13.5 16.2	15.1 18.2	16.5 19.8	18.0 21.6	21.7 26.0	70 x 265 1.200	9
31-10559	LKT 31-480-DP	3 x 142.8	7.1 8.5	12.1 14.5	21.5 25.8	23.2 27.8	26.1 31.3	28.5 34.2	31.0 37.2	37.3 44.7	85 x 320 2.150	4
31-10558	LKT 33,3-480-DP	3 x 153.4	7.7 9.2	13.0 15.6	23.1 27.8	24.9 29.9	28.0 33.6	30.6 36.7	33.3 40.0	40.1 48.1	85 x 320 2.150	4

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## Standard Capacitors (three-phase, $V_N = 525 V$ )

Type LKT...-DP for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu F$ ]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			230V	300V	400V	415V	440V	480V	525V			
31-10517	LKT 10-525-DP	3 x 38.5	1.9 2.3	3.3 3.9	5.8 7.0	6.3 7.5	7.0 8.33	8.33 10.0	10.0 12.0	11.0 13.2	70 x 225 1.050	9
31-10516	LKT 12,5-525-DP	3 x 48.1	2.4 2.9	4.1 4.9	7.3 8.7	7.8 9.4	8.8 10.5	10.4 12.5	12.5 15.0	13.7 16.5	70 x 225 1.050	9
31-10520	LKT 15-525-DP	3 x 57.7	2.9 3.5	4.9 5.9	8.7 10.4	9.4 11.3	10.5 12.6	12.5 15.0	15.0 18.0	16.5 19.8	70 x 265 1.200	9
31-10521	LKT 20-525-DP	3 x 77.0	3.8 4.6	6.5 7.8	11.6 13.9	12.5 15.0	14.1 16.9	16.7 20.1	20.0 24.0	22.0 26.4	85 x 278 1.850	4
31-10519	LKT 25-525-DP	3 x 96.2	4.8 5.8	8.2 9.8	14.5 17.4	15.6 18.8	17.6 21.1	20.9 25.1	25.0 30.0	27.5 33.0	85 x 278 1.850	4

## Standard Capacitors (three-phase, $V_N: 690 V...800 V$ )

Type LKT...-DP for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu F$ ]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			525V	570V	600V	615V	690V	760V	800V			
31-10560	LKT 5-690-DP	3 x 11.1	2.9 3.5	3.4 4.1	3.8 4.5	4.0 4.8	5.0 6.0			4.2 5.0	60 x 225 0.800	9
31-10561	LKT 10-690-DP	3 x 22.3	5.8 7.0	6.8 8.2	7.6 9.1	7.9 9.5	10.0 12.0			8.4 10.0	70 x 225 1.050	9
31-10562	LKT 12,5-690-DP	3 x 27.9	7.2 8.7	8.5 10.2	9.5 11.3	9.9 11.9	12.5 15.0			10.5 12.6	70 x 265 1.200	9
31-10563	LKT 15-690-DP	3 x 33.4	8.7 10.4	10.2 12.3	11.3 13.6	11.9 14.3	15.0 18.0			12.6 15.1	70 x 265 1.200	9
31-10564	LKT 20-690-DP	3 x 44.6	11.6 13.9	13.7 16.4	15.1 18.2	15.9 19.1	20.0 24.0			16.7 20.1	85 x 278 1.850	4
31-10565	LKT 25-690-DP	3 x 55.7	14.5 17.4	17.1 20.5	18.9 22.7	19.9 23.8	25.0 30.0			20.9 25.1	85 x 278 1.850	4
31-10569	LKT 28,2-760-DP	3 x 51.8	13.5 16.1	15.9 19.0	17.6 21.1	18.5 22.2	23.2 27.9	28.2 33.8		21.4 25.7	85 x 320 2.150	4
31-10570	LKT 6,7-800-DP	3 x 11.1	2.9 3.5	3.4 4.1	3.8 4.5	4.0 4.8	5.0 6.0	6.0 7.3	6.7 8.0	4.8 5.8	60 x 225 0.800	9
31-10571	LKT 10,5-800-DP	3 x 17.4	4.5 5.4	5.3 6.4	5.9 7.1	6.2 7.5	7.8 9.4	9.5 11.4	10.5 12.6	7.6 9.1	70 x 225 1.050	9
31-10572	LKT 13,3-800-DP	3 x 22.0	5.7 6.9	6.8 8.1	7.5 9.0	7.9 9.4	9.9 11.9	12.0 14.4	13.3 16.0	9.6 11.5	85 x 215 1.500	4
31-10573	LKT 21-800-DP	3 x 34.8	9.0 10.9	10.7 12.8	11.8 14.2	12.4 14.9	15.6 18.8	19.0 22.7	21.0 25.2	15.2 18.2	85 x 278 1.850	4
31-10574	LKT 26,7-800-DP	3 x 44.3	11.5 13.8	13.6 16.3	15.0 18.0	15.8 18.9	19.9 23.8	24.1 28.9	26.7 32.0	19.3 23.1	85 x 320 2.150	4



# Components

Power Capacitors and accessories

1

## Standard Capacitors (single-phase, $V_N$ : 280 V...525 V)

Type LKT...-EP for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu$ F]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			230V	280V	400V	415V	440V	480V	525V			
31-10547	LKT 5-280-EP	1 x 203.7	3.4 4.1	5.0 6.0						17.9 21.5	60 x 138 0.500	9
31-10548	LKT 10-280-EP	1 x 407.4	6.8 8.1	10.0 12.0						35.8 43.0	85 x 131 1.150	4
31-10526	LKT 3,33-440-EP	1 x 54.8	0.9 1.1	1.4 1.6	2.8 3.3	3.0 3.6	3.33 4.0			7.6 9.1	60 x 90 0.325	9
31-10527	LKT 4,17-440-EP	1 x 68.6	1.1 1.4	1.7 2.0	3.4 4.1	3.7 4.5	4.17 5.0			9.5 11.4	60 x 138 0.500	9
31-10528	LKT 5-440-EP	1 x 82.2	1.4 1.6	2.0 2.4	4.1 5.0	4.4 5.33	5.0 6.0			11.4 13.6	60 x 138 0.500	9
31-10384	LKT 9,4-440-EP	1 x 154.6	2.6 3.1	3.6 4.3	7.8 9.3	8.4 10.0	9.4 11.3			21.4 25.6	70 x 153 0.650	9
31-10529	LKT 2,4-480-EP	1 x 33.2	0.6 0.7	0.8 1.0	1.7 2.0	1.8 2.15	2.0 2.4	2.4 2.9		5.0 6.0	60 x 90 0.325	9
31-10530	LKT 3,33-480-EP	1 x 46.0	0.8 0.9	1.1 1.4	2.3 2.8	2.5 3.0	2.8 3.4	3.33 4.0		6.9 8.3	60 x 90 0.325	9
31-10531	LKT 3,6-480-EP	1 x 49.7	0.8 1.0	1.2 1.5	2.5 3.0	2.7 3.2	3.0 3.6	3.6 4.3		7.5 9.0	60 x 138 0.500	9
31-10515	LKT 4,8-480-EP	1 x 66.3	1.1 1.3	1.6 2.0	3.33 4.0	3.6 4.3	4.0 4.8	4.8 5.8		10.0 12.0	60 x 138 0.500	9
31-10514	LKT 6-480-EP	1 x 82.9	1.4 1.7	2.0 2.5	4.17 5.0	4.5 5.4	5.0 6.0	6.0 7.2		12.5 15.0	60 x 138 0.500	9
31-10532	LKT 2,8-525-EP	1 x 32.3	0.5 0.6	0.8 1.0	1.6 1.9	1.7 2.1	2.0 2.4	2.3 2.8	2.8 3.4	5.3 6.4	60 x 90 0.325	9
31-10533	LKT 3,33-525-EP	1 x 38.5	0.6 0.8	1.0 1.1	1.9 2.3	2.1 2.5	2.3 2.8	2.8 3.3	3.33 4.0	6.3 7.6	60 x 138 0.500	9
31-10385	LKT 8,33-525-EP	1 x 96.2	1.6 1.9	2.4 2.9	4.8 5.8	5.2 6.3	5.9 7.0	7.0 8.33	8.33 10.0	15.9 19.0	70 x 153 0.650	9

# Components

Power Capacitors and accessories

## Premium Capacitors (three-phase, $V_N$ : 400 V...480 V)

Type LKT...-DL for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu$ F]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz							Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			230V	400V	415V	440V	460V	480V	525V			
31-10598	LKT 1-400-DL	3 x 6.6	0.3 0.4	1.0 1.2	1.1 1.3	1.2 1.5				1.4 1.7	60 x 150 0.550	9
31-10599	LKT 1,5-400-DL	3 x 9.9	0.5 0.6	1.5 1.8	1.6 1.9	1.8 2.2				2.2 2.6	60 x 150 0.550	9
31-10600	LKT 5-400-DL	3 x 33.2	1.66 2.0	5.0 6.0	5.4 6.5	6.1 7.3				7.2 8.7	60 x 225 0.800	9
31-10601	LKT 6,25-400-DL	3 x 41.4	2.1 2.5	6.25 7.5	6.7 8.1	7.6 9.1				9.0 10.8	60 x 225 0.800	9
31-10602	LKT 9,3-400-DL	3 x 61.7	3.0 3.7	9.3 11.1	10.0 12.0	11.3 13.5				13.4 16.1	70 x 225 1.050	9
31-10603	LKT 10-400-DL	3 x 66.3	3.33 4.0	10.0 12.0	10.8 12.9	12.1 14.5				14.4 17.3	70 x 225 1.050	9
31-10604	LKT 11,7-400-DL	3 x 77.6	3.9 4.6	11.7 14.0	12.6 15.1	14.2 17.0				16.9 20.3	70 x 225 1.050	9
31-10386	LKT 12,5-400-DL	3 x 82.9	4.17 5.0	12.5 15.0	13.5 16.2	15.1 18.2				18.0 21.7	70 x 265 1.200	9
31-10606	LKT 20-400-DL	3 x 132.6	6.6 7.9	20.0 24.0	21.5 25.8	24.2 29.0				28.9 34.6	85 x 278 1.850	4
31-10607	LKT 5,0-440-DL	3 x 27.4	1.4 1.66	4.17 5.0	4.5 5.4	5.0 6.0	5.5 6.6	6.0 7.1		6.6 7.9	60 x 225 0.800	9
31-10608	LKT 7,6-440-DL	3 x 41.7	2.1 2.5	6.25 7.5	6.8 8.1	7.6 9.1	8.33 10.0	9.0 10.9		10.0 12.0	60 x 225 0.800	9
31-10387	LKT 9,1-440-DL	3 x 49.9	2.5 3.0	7.5 9.0	8.1 9.7	9.1 10.9	10.0 11.9	10.8 13.0		11.9 14.3	70 x 225 1.050	9
31-10610	LKT 12,1-440-DL	3 x 66.3	3.33 4.0	10.0 12.0	10.8 12.9	12.1 14.5	13.2 15.9	14.4 17.3		15.9 19.1	70 x 225 1.050	9
31-10612	LKT 17,6-440-DL	3 x 96.5	4.8 5.8	14.5 17.4	15.6 18.8	17.6 21.1	19.2 23.1	21.0 25.1		23.1 27.7	85 x 278 1.850	4
31-10613	LKT 3,6-480-DL	3 x 16.6	0.8 1.0	2.5 3.0	2.7 3.2	3.0 3.6	3.33 4.0	3.6 4.3	4.3 5.2	4.3 5.2	60 x 150 0.550	9
31-10388	LKT 4,5-480-DL	3 x 20.7	1.0 1.2	3.1 3.8	3.4 4.0	3.8 4.6	4.1 5.0	4.5 5.4	5.4 6.5	5.4 6.5	60 x 225 0.800	9
31-10615	LKT 7,2-480-DL	3 x 33.2	1.7 2.0	5.0 6.0	5.4 6.5	6.0 7.2	6.66 7.9	7.2 8.6	8.6 10.3	8.7 10.4	60 x 225 0.800	9
31-10616	LKT 7,8-480-DL	3 x 35.9	1.8 2.1	5.4 6.5	5.8 7.0	6.5 7.9	7.2 8.6	7.8 9.3	9.3 11.2	9.4 11.3	60 x 225 0.800	9
31-10617	LKT 10,4-480-DL	3 x 47.9	2.4 2.9	7.3 8.7	7.8 9.3	8.8 10.5	9.6 11.5	10.4 12.5	12.4 14.9	12.5 15.0	70 x 225 1.050	9
31-10618	LKT 12,5-480-DL	3 x 57.6	2.9 3.4	8.7 10.4	9.4 11.2	10.5 12.6	11.5 13.8	12.5 15.0	15.0 17.9	15.0 18.0	70 x 265 1.200	9
31-10389	LKT 15,5-480-DL	3 x 71.4	3.6 4.3	10.8 12.9	11.6 13.9	13.0 15.6	14.2 17.1	15.5 18.6	18.5 22.3	18.6 22.4	85 x 278 1.850	4

Generally, "Premium" (DL-type) capacitors can also be operated at higher voltages with the "Standard" (DP-type) specification. Please note that the DP values in the chart are shaded dark grey.

# Components

Power Capacitors and accessories

1

## Premium Capacitors (three-phase, $V_N = 525\text{ V}$ )

Typ LKT...-DL for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu\text{F}$ ]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz								Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			400V	415V	440V	480V	525V	570V	615V				
31-10619	LKT 4,17-525-DL	3x 16.1	2.4 2.9	2.6 3.1	2.9 3.5	3.5 4.2	4.17 5.0	4.9 5.9	5.7 6.9	4.6 5.5	60 x 225 0.800	9	
31-10620	LKT 5,9-525-DL	3x 22.7	3.4 4.1	3.7 4.4	4.17 4.97	5.0 5.9	5.9 7.1	7.0 8.4	8.1 9.7	6.5 7.8	60 x 225 0.800	9	
31-10621	LKT 7,7-525-DL	3x 29.6	4.5 5.4	4.8 5.8	5.4 6.5	6.5 7.8	7.7 9.3	9.1 10.9	10.6 12.7	8.5 10.2	70 x 225 1.050	9	
31-10622	LKT 8,33-525-DL	3x 32.1	4.8 5.8	5.2 6.2	5.8 7.0	7.0 8.33	8.33 10.0	9.8 11.8	11.4 13.7	9.2 11.0	70 x 225 1.050	9	

Generally, "Premium" (DL-type) capacitors can also be operated at higher voltages with the "Standard" (DP-type) specification. Please note that the DP values in the chart are shaded dark grey.

## Heavy Duty Capacitors (three-phase, $V_N$ : 480 V...525 V)

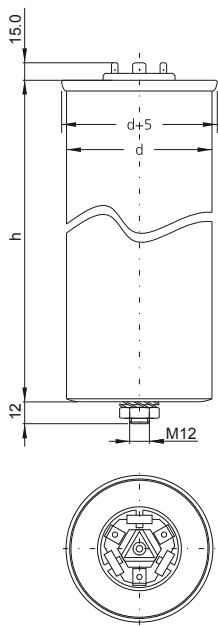
Typ LKT...-HD for 50 Hz / 60 Hz

Article-No.	Type	Capacitance [ $\mu\text{F}$ ]	Rated Reactive Power in kvar at Rated Voltage ( $V_N$ ) 50 Hz / 60 Hz								Rated current at $V_N$ 50 Hz / 60 Hz [A]	Dimensions (d x h) Weight (net) [mm] [kg]	Packing Unit (pcs.)
			400V	415V	440V	460V	480V	500V	525V				
31-10580	LKT 16,8-480-HD	3 x 77.4	11.7 14.0	12.6 15.1	14.1 16.9	15.4 18.5	16.8 20.2			20.2 24.2	85 x 215 1.500	4	
31-10581	LKT 18,0-480-HD	3 x 82.9	12.5 15.0	13.5 16.2	15.1 18.2	16.5 19.8	18.0 21.6			21.7 26.0	85 x 215 1.500	4	
31-10582	LKT 15,6-500-HD	3 x 66.2	10.0 12.0	10.8 12.9	12.1 14.5	13.2 15.8	14.4 17.3	15.6 18.7		18.0 21.6	85 x 215 1.500	4	
31-10583	LKT 16,1-500-HD	3 x 68.3	10.3 12.4	11.1 13.3	12.5 15.0	13.6 16.4	14.8 17.8	16.1 19.3		18.6 22.3	85 x 215 1.500	4	
31-10584	LKT 16,8-500-HD	3 x 71.3	10.8 12.9	11.6 13.9	13.0 15.6	14.2 17.1	15.5 18.6	16.8 20.2		19.4 23.3	85 x 215 1.500	4	
31-10585	LKT 18,0-525-HD	3 x 69.3	10.5 12.5	11.3 13.5	12.6 15.2	13.8 16.6	15.1 18.1	16.3 19.6	18.0 21.6	19.8 23.8	85 x 215 1.500	4	

# Components

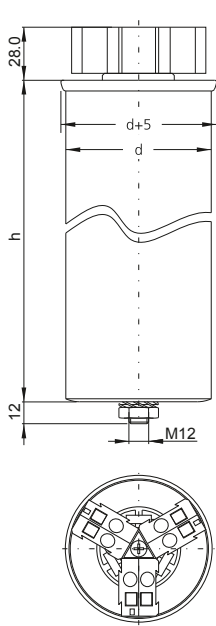
Power Capacitors and accessories

## Dimensions



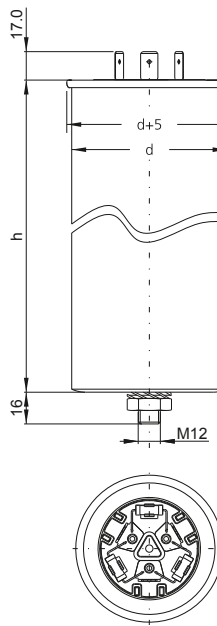
**Three-phase capacitor with d = 60/70 mm**

For connection with flat cable plug 6.3 x 0.8 mm



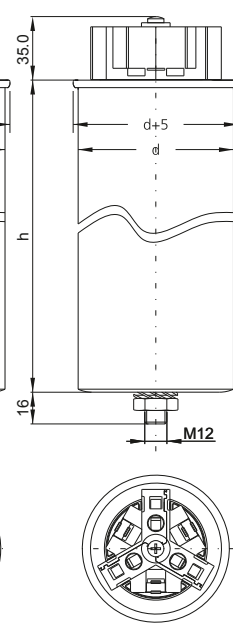
**Three-phase capacitor with d = 60/70 mm**

Spring tension terminal AKD 25/3 for 2 x 6 mm<sup>2</sup>  
 Art.-No. 31-08000



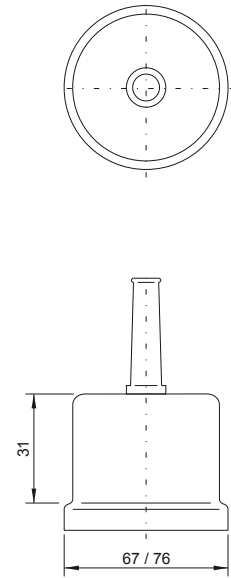
**Three-phase capacitor with d = 85 mm**

For connection with flat cable plug 9.5 x 1.2 mm



**Three-phase capacitor with d = 85 mm**

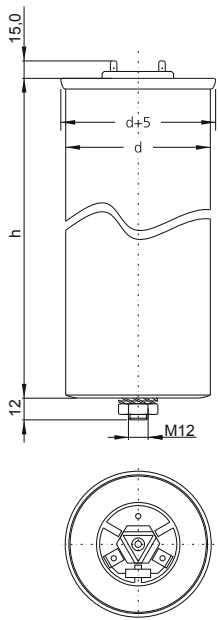
Spring tension terminal AKD 30/3 for 16 mm<sup>2</sup>  
 Art.-No. 31-08003



**Plastic cap and rubber sleeve LKK 60/70 for capacitors with:**

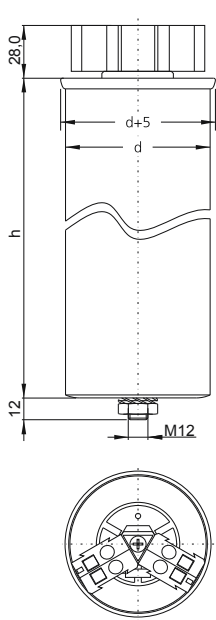
d = 60 mm (Art.-No. 69-00352) /  
 d = 70 mm (Art.-No. 69-00350)  
 (not available for capacitors with d = 85 mm)

Rubber sleeve for insulating cap  
 Art.-No. 69-00353



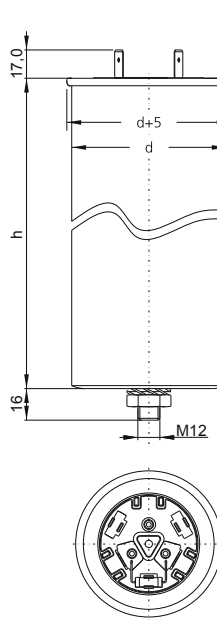
**Single-phase capacitor with d = 60/70 mm**

For connection with flat cable plug 6.3 x 0.8 mm



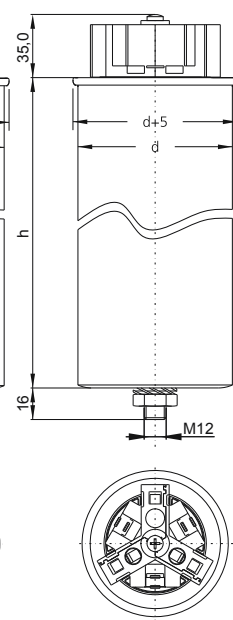
**Single-phase capacitor with d = 60/70 mm**

Spring tension terminal AKD 25/2 for 2 x 6 mm<sup>2</sup>  
 Art.-No. 31-08002



**Single-phase capacitor with d = 85 mm**

For connection with flat cable plug 9.5 x 1.2 mm



**Single-phase capacitor with d = 85 mm**

Spring tension terminal AKD 30/2 for 16 mm<sup>2</sup>  
 Art.-No. 31-08004