



功率因數調整用電容器型錄

KEY COMPONENTS FOR POWER FACTOR CORRECTION



FACTORY MATCHED TO OPERATE IN PERFECT HARMONY

ELECTRONICON[®]

100% 德國原裝進口防爆型電容器 *always in charge*

定義與選擇標準 DEFINITIONS AND SELECTION CRITERIA



Rated Voltage U_N

Root mean square of the max. permissible value of sinusoidal AC voltage in continuous operation.

The rated voltage of the capacitors indicated in the data charts must not be exceeded even in cases of malfunction. Bear in mind that capacitors in detuned equipment are exposed to a higher voltage than that of the rated mains voltage; this is caused by the connection of detuning reactor and capacitor in series. Consequently, capacitors used with reactors must have a voltage rating higher than that of the regular mains voltage.

The voltage at a detuned capacitor's terminals can be calculated as follows:

$$U_C = \frac{U_N}{\left(1 - \frac{p}{100\%}\right)}$$

U_N = rated mains voltage 額定系統電壓
 U_C = capacitor voltage 電容器端電壓
 p = detuning factor 電抗器/電容器 匹配比(%)



Test Voltage Between Terminals U_{BB}

Routine test of all capacitors conducted at room temperature, prior to delivery. A further test with 80 % of the test voltage stated in the data sheet may be carried out once at the user's location.



Voltage test between terminals and case U_{BG}

Routine test of all capacitors between short-circuited terminals and case, conducted at room temperature. May be repeated at the user's location.



Rated Power Q_C

Reactive power resulting from the ratings of capacitance, frequency, and voltage.



Current Rating I_N

RMS value of the current at rated voltage and frequency, excluding harmonic distortion, switching transients, and capacitance tolerance.



Maximum RMS Current Rating I_{max}

Maximum rms value of permissible current in continuous operation. The maximum permitted rms current for each particular capacitor is specified in the data charts and is related to either construction features or the current limits of the terminals. In accordance with IEC 60831 all ELECTRONICON capacitors are rated at **least** $1.3 \times I_N$, allowing for the current rise from permissible voltage and capacitance tolerances as well as harmonic distortion. The exact value for each capacitor can be found in the data charts. Higher rms values than stated in the data charts require adjustments in construction and are available on request.

額定電壓 U_N

在連續操作下，正弦曲線交流電壓所允許的最大均方根電壓值。在資料表中所指示的電容器額定電壓值，就算在故障時，也必須不能被超過。切記，在失調的設備中，電容器是暴露在較高的電壓下。(高於額定電壓)；這是由於電容器與電抗器串連所導致。在電容器搭配電抗器使用時，必須使用高於標準電壓的額定電壓，這是必然的結果。使用中的電容器，其端子的電壓可以利用下列公式來換算：

端子間測試電壓 U_{BB}

在出貨前，會於室溫下針對所有電容器的端子進行例行性的試驗。進一步的測試，會在使用者的所在地進行一次，利用80%的測試電壓來完成，並在資料頁中敘述之。

端子與外殼間測試電壓 U_{BG}

電容器將端子與外殼短接後進行的例行性測試。所有電容器均在室溫下進行測試。也可在使用者所在地進行重複性測試。

額定功率 Q_C

根據電容值、頻率和電壓的規格，會形成不同的虛功。

額定電流 I_N

在額定電壓與頻率下的均方根電流值。不考慮諧波分佈、開關切換瞬間電流和電容值誤差。

最大RMS額定電流 I_{max}

在連續操作下的允許最大均方根電流值。每個品項的電容器最大允許均方根電流規範均在資料表中，且與不同的構造特色或端子台的電流限制有關。所有ELECTRONICON的電容器均根據 IEC60831標準，在允許電壓與電容誤差值以及諧波失真下，可耐受電流升高最少也有 1.3倍額定電流。詳細的數值可從資料表中查到。高於資料表中所述的均方根值需求，可根據結構判斷訂製。

Continuous currents that exceed these values will lead to a build-up of heat in the capacitor and - as a result - reduced lifetime or premature failure. Permanent excess current may even result in failure of the capacitor's safety mechanisms, i.e. bursting or fire

假如連續電流超過這些數值，將會導致電容器過熱，也因此會減少電容器壽命或提早發生故障。固定超額的電流也會導致電容器的安全機構故障，諸如：爆裂或起火。

Care must be taken not to exceed the maximum voltage and current ratings when installing capacitors in close-tuned or detuned equipment (see data sheets for maximum ratings). The thermal monitoring of reactors, or the use of overcurrent protection relays in the capacitor circuit is recommended to protect against overloads.

安裝電容器在需協調的設備時，請注意不可超過最大電壓與電流額定值。(詳見資料表或最高額定值)
建議在電容電路上外加電抗器的熱監控或過電流保護電驛，針對過載來做保護。

Pulse Current Strength I_s

Depending on construction and voltage rating, the design of our capacitors permits short term inrush currents of 100...400 x I_N and - in accordance with IEC 60831 - up to 5000 switching operations per annum as standard. However, when switching capacitors in automatic capacitor banks without detuning reactors, higher loads are very often the case. This may have a negative effect on the operational life, especially of capacitors which are frequently connected and disconnected (e.g. primary stages). Moreover, even detuned capacitors may experience switching currents exceeding the permissible maximum current of the reactor and causing consequential damage.

耐衝擊電流強度 I_s

根據結構與電壓範圍，我們的電容器設計符合IEC 60831之標準，可允許瞬間衝擊電流100-400倍額定電流和每年5000次的開關動作。但是，當電容器的自動切換沒有搭配電抗器時，會時常發生較高的負載。這點對電容器的壽命有負面的影響，尤其是電容器組非常頻繁的做投入與跳脫動作時(如：主盤)。更甚者，電容器可能頻繁的切換電抗器所允許的最高電流，從而導致受損。

We therefore strongly recommend the use of special capacitor contactors with inrush limiting resistors, or other adequate devices for limitation of the peak inrush currents.

因此，我們強烈建議使用特殊的、具有衝擊電流阻抗的電容器專用電磁接觸器，或者其他可以滿足限制峰值衝擊電流的設備。

Temperature Category

The average useful life of a capacitor depends very much on the ambient temperatures it is operated at. The permissible operating temperatures are defined by the temperature class stated on label which contains the lower limit temperature (-40°C for all ELECTRONICON power capacitors) and a letter, which describes the values of the upper limit temperatures. The following chart details the maximum permitted ambient temperatures for capacitors for each temperature category acc. to IEC 60831.

溫度種類

電容器的平均有效壽命與其工作的環境溫度有著非常大的關係。允許的工作溫度乃是由溫度的等級來定義，包含最低溫度限制(-40°C：所有ELECTRONICON電容器通用)和一個代表最高溫度限制的字母。左邊的圖表詳細的列出電容器允許的最高環境溫度，每個溫度的種類乃是根據IEC 60831所制訂。

temperature category 溫度種類	ambient temperature limits 環境溫度限制		
	Maximum 最高	max. average over 24hrs 24小時最高平均	
		max. average over 365 days 一年最高平均	
B	45°C	35°C	25°C
C	50°C	40°C	30°C
D	55°C	45°C	35°C
60	60°C	50°C	40°C

注意：不遵守此用法說明，會導致嚴重的工作壽命減短和電容器故障，更嚴重時，可能會由於安全裝置故障而導致爆炸或失火的情形。



安裝方法說明

MOUNTING INSTRUCTIONS

VORSCHRIFTEN ZU EINBAU UND BETRIEB

ZVEI:

Starkstromkondensatoren
see also pg 78
siehe auch Seite 78

Safe operation of the capacitors can be expected only if all electrical and thermal specifications as stated on the label, in the data sheets or catalogues and the following instructions are strictly observed.

ELECTRONICON does not accept responsibility for whatever damage may arise out of a non-observance.



Mounting Position

Resin-filled MKP-276-capacitors shall be installed upright with terminals facing upwards. Gas-filled MKPg-275-capacitors can be mounted in any position without restrictions, however, a position with terminals pointing downwards shall be avoided!



Mounting Location/Cooling

The useful life of a capacitor may be reduced dramatically if exposed to excessive heat. Typically an increase in the ambient temperature of 7°C will halve the expected life of the capacitor.

The permitted temperature category of the capacitor (B,C or D) is stated on the label. If extenuating circumstances give cause for doubt, special tests should be conducted to ensure that the permitted maximum ambient temperature of the capacitor is not exceeded. It should be noted that the internal heat balance of large capacitors is only reached after a couple of hours.



To avoid overheating the capacitors must be allowed to cool unhindered and should be shielded from external heat sources. We recommend forced ventilation for all applications with detuning reactors. Give at least 20mm clearance between the capacitors for natural or forced ventilation.

Do not place the capacitors directly above or next to heat sources such as detuning or tuning reactors, bus bars, etc.

Vibration stress according to DIN IEC 68-2-6

Please consult us for details of permitted vibration stress in your application. Note that capacitors fitted with the EL-Dr discharge reactor must not be exposed to any vibration stress at all.

All cylindrical capacitors can be fixed sufficiently using the mounting stud at the bottom of the can. It is recommended to insert the washer which is delivered together with the mounting nut before fixing the nut.



Connection

Fuses and cross section of the leads shall be sized for at least 1.5 times of the rated capacitor current (I_N). Please note that the permitted maximum current according to data chart (I_{max}) must not be exceeded. Do not exceed

僅有在所有電氣和熱能規範如標示所示時，於資料頁或目錄中，直接遵守下列的使用方法，才可預期電容器可安全的工作。

ELECTRONICON不承認由於不遵守使用方法而導致電容器損傷的相關責任。

安裝位置

填充(Resin)樹脂的MKP-276電容器，安裝時必須將端子朝上安裝。填充氣體(N₂)氮氣的MKPg-275電容器則沒有限定安裝的方向。然而，將壓接端子朝下安裝的方式還是要避免。

安裝地點/散熱

假如電容器暴露在極度的溫度中，其有效壽命會戲劇性的降低。一般來說，環境溫度增加7度將會使電容器的壽命減半。

電容器的允許溫度種類(B,C,D)會標示在標籤上。假如因為懷疑而企圖降低環境溫度，應該要實施特殊的測試來確保電容器允許的最高環境溫度沒有被超過。大型電容器要特別注意內部的熱平衡，其僅需要幾個小時就會達到限制的溫度。

為了防止電容器過熱，必須考慮未受阻撓的冷卻和隔離外部熱源。我們建議對外加通風和電抗器。在自然環境下每個電容器之間至少保持20mm的距離，或者外加通風設備。請勿直接將電容器放置在發熱源旁邊或上面。諸如電抗器、銅排...等等。

根據DIN IEC68-2-6震動應力

詳細的允許震動應力運用請與我們商量。要注意的是，電容器搭配EL-Dr放電電抗器時，必須防止暴露在任何震動應力之下。

所有圓柱型的電容器均可充分的利用下方的螺栓固定安裝在盤內。我們建議要外加原廠所隨配的墊片於使用螺帽安裝固定時。

接線

保險絲和引線的截面尺寸至少要是電容器額定電流的1.5倍。請注意根據資料表所允許的最大電壓值必須不能超過。

Fixing torque

Do not exceed the permitted torque of the terminal screws (design K, L, M) and the mounting studs. The test values specified by IEC must be guaranteed as a minimum value.

All cylindrical capacitors are fitted with a "break action" safety mechanism (see page 9) which may cause the case to expand, especially at the crimp and at the lid.

- The capacitors shall only be connected with flexible cables or elastic copper bands.
- The folded crimps must not be held by retaining clamps.
- A clearance of at least 35mm above the terminations shall be accommodated.

Required clearances according to applicable voltage category must be maintained even after a prolongation of the can.

The hermetic sealing of the capacitors is extremely important for a long operating life and for the correct functioning of the break action mechanism. Please pay special attention not to damage the following critical sealing points:

- the bordering of the lid
- the connection between screw terminal and lid (design K, L, M)
- the rubber seal at the base of the tab connectors (design D)
- the soldering at the base of the tab connectors (design D)

The soldering must not be exposed to excessive heat. It is not recommended to solder cables to the terminals (design D). Where possible use appropriate tab connectors (6.3mm) to connect the cables. The connection terminals (design K, L, M) and the tab connectors (design D) must not be bent, turned or moved in any way.

The bordering and the connection terminals must not be hit with heavy or sharp objects or tools (e.g. hammer, screw driver).

焊接處請勿暴露在極高的溫度下。也不建議將導線直接焊在端子上(D型)。盡可能使用合適的突出接點(6.3mm)來連接導線。至於連接端子座(K,L,M型式)和突出接點(D型式)，請勿使用任何型式使其彎曲、轉向或移動。

電容器的邊緣和端子台請勿使用重物或尖銳的物品、工具來敲擊，諸如：榔頭、螺絲起子。

固定扭力

請勿超過端子螺絲和安裝螺桿的最大允許扭力值(K,L,M型式)。IEC所規範的測試值必須是最小的保證值。

所有的圓柱型電容器均配置"啟斷動作"安全機構(如9頁所示)。會因為外殼膨脹，特別是綳折處和瓶蓋處，而動作。




電容器應該只能連接到軟性的電纜和有彈性的銅排上。
瓶蓋處必須不能被固定夾住或限制住。
端子座上方應該要考量保持至少35mm的空間。

根據可以使用的電壓種類，必須保持一定的空間，就算在罐子在拉開啟斷延長之後。

電容器的密封對長期工作壽命和電容器機械運作的正確功能是非常重要的。請特別注意，不要使下列的重要密封點受到損傷：

蓋子邊緣處。
端子螺絲和蓋子的連接點(K,L,M型式)。
突出接點底部的橡膠密封處(D型式)。
突出接點底部的焊接處(D型式)。



design Ausführung			
端子型式	mm ² 線徑	A 最大電流	Nm 扭力
D	6	16 each plug _ je Stecker	
K	6* 10**	30	1.2 ... 2.0
L	25*	43	2.5 ... 3.0
M	35* 50**	80	3.2 ... 3.7

* (with ferrule _ mit Aderendhülse) ** (without ferrule _ ohne Aderendhülse)



Discharge

Capacitors should be discharged to $\leq 10\%$ of the rated voltage prior to being re-energised. For this purpose, special discharge modules are offered which can be selected in accordance with the applied operating voltage and the desired discharge period. Standard IEC 60831 requires a discharge to 75V or less within 3 minutes. Note that in automatic capacitor banks shorter discharge cycles may be required.



Use rapid discharge reactors or switchable discharge resistors for very short discharge cycles (see chapter "Accessories", pgs. 45ff).



Capacitors must be discharged and short-circuited before working on the terminals.

Discharge Modules

For capacitors in **design L/M**, six separate discharge modules (3 x 68k Ω , 82 k Ω , 100 k Ω , 120 k Ω , 180 k Ω , 300 k Ω) are available for the discharge of single capacitors or groups of several connected capacitors. The resistors are allocated in a finger-proof housing (IP20).

The correct size of the module to be applied can be taken from the recommendations given in the capacitor data charts. The values recommended there have been designed for a discharge below 50V within no more than 60 seconds.

For **design D** capacitors, similar discharge sets are available (IP00). The correct size of the module to be applied can be taken from the recommendations given in the capacitor data charts. The values recommended there have been designed for a discharge below 50V within no more than 70 seconds.

Capacitors in **design K** are provided with internal discharge resistors for a discharge below 50V within no more than 60 seconds as standard.

Alternatively, the resistors to be used can be calculated with the following formula:



t	discharge period 放電時間 in (s)
C_T	partial capacitance of one phase 單相的部分電容值
C_{total}	total capacitance 全部的電容值

1. three-phase capacitors 三相電容器

$$R = \frac{t}{C_T \times \ln \frac{U_B \times \sqrt{2}}{U_E}}$$

In all cases, the closest smaller discharge module shall be applied.

U_B	operating voltage 工作電壓
U_E	maximum permissible voltage after period t 經過時間t後允許的最大電壓
R	module resistance value 模組電阻值

2. single-phase capacitors 單相電容器

$$R = \frac{t \times 1.5}{C_{total} \times \ln \frac{U_B \times \sqrt{2}}{U_E}}$$

Sollte das Ergebnis nicht mit den o. g. Standardwerten übereinstimmen, dann ist immer das nächstkleinere Entlademodul auszuwählen.

⚠ The discharge resistors may become very hot (up to 200°C) during continuous operation.

⚠ For design L/M only: Remove the lid of the discharge module if applying protective caps to the capacitors.

放電

電容器必須在再次投入動作之前將電壓放電到額定電壓的10%以下。因此，我們提供特殊的放電模組，針對使用的額定電壓和所需的放電時間提供不同的選擇。根據 IEC 60831 標準，要求必須在3分鐘內放電到75V以下。需注意的是，在一般自動電容器組上，會要求更短的放電時間。

使用快速放電電抗器或可開關的放電電阻，來達成非常短的放電時間(另行提供資料)

在開始端子台接線動作前，請先將電容器放電和短接。

放電模組

針對電容器L/M型式，有六個不同的放電模組可供選擇 (3x68K ,82K ,100K ,120K ,180K ,300K)。可用在單一電容器或是數個電容器所組成的群組。電阻被配置在具有手指保護的外殼中(IP20)。

正確的電阻大小，可以根據電容器資料表得到建議的數值來做選擇。

在資料表中所建議的數值乃是基於能在60秒內將電容器放電至50V以下的設計。

至於電容器D型式，可以使用類似的放電模組(IP00)。正確的電阻大小，可以根據電容器資料表得到建議的數值。在資料表中所建議的數值乃是基於能在70秒內將電容器放電至50V以下的設計。

至於電容器K型式，乃是內建放電電阻，標準的配置乃是設計為能在60秒內將電容器放電到50V以下。

或者，使用電阻的大小可以利用下列公式來算出：

⚠ 在電容器連續操作下，放電電阻的溫度會變的非常的高。(約高達200)

⚠ 僅有L/M型式才可使用：如果有在電容器上使用保護蓋，則請移除放電模組的蓋子。

Earthing

Capacitors with a metal case must be earthed at the mounting stud or by means of a separate metal strap or clamp.

Environment

Our capacitors do not contain PCB, solvents, or any other toxic or banned materials. They do not contain hazardous substances acc. to „Chemische Verbotverordnung“ (based on European guidelines 2003/53/EG and 76/769/EWG), „Gefahrstoffverordnung“ (GefStoffV) and „Bedarfsgegenstaendeverordnung (BedGgstV)“.

Not classified as „dangerous goods“ acc. to transit rules. The capacitors do not have to be marked under the Regulations for Hazardous Goods. They are rated WGK 0 (water risk category 0 "no general threat to water").

No danger for health if applied properly. In case of skin contact with filling liquids, clean with water and soap.

All capacitors manufactured after 1st January, 2006 are made with lead-free solder tin.

Disposal

The impregnants and filling materials contain vegetable oil or polyurethane mixtures. The gas-filled MKPg capacitors contain only neutral, ecologically sound insulation gasses. A data sheet about the impregnant utilised can be provided by the manufacturer on request.

We recommend disposing of the capacitors through professional recycling centres for electric/electronic waste.

The capacitors can be disposed of as follows:

- Disposal acc. to waste catalogue 160205 (capacitors filled with plant oil/resin).
- Solid filling materials: acc. to EWC No. 080404 ("Solid adhesives and sealants").
- Liquid filling materials which may have emerged from the capacitor shall be absorbed by proper granules and disposed of in accordance with European Waste Catalogue 080410 (PUR resin residues, not solidified).

Caution: When touching or wasting capacitors with activated break-action mechanism, please consider that even after days and weeks these capacitors may still be charged with high voltages!

Consult your national rules and restrictions for waste and disposal.

接地

因電容器為金屬外殼，故必須要在底部安裝螺絲或外加的金屬帶或金屬夾來接地。

環境

我們的電容器不含PCB、溶劑或任何其他有毒或禁用的材料。根據《Chemische Verbotverordnung》，沒有含有危險性物質。[根據歐盟方針2003/53/EG和76/769/EWG]，《Gefahrstoffverordnung(GefStoffV)》和《Bedarfsgegenstaendeverordnung (BedGgstV)》。

根據運送法，並非歸類為"危險物品"。電容器不需要在規範下標示危害性物品。規範為WGK0（防水等級為0，沒有一般防水功能）。正確的使用下不會有危害健康的危險。當肌膚接觸到填充的液體時，使用清水和肥皂清洗即可。

所有2006年1月1號後所生產的電容器均為無鉛產品。

棄置

溶劑與填充材料包含植物油或聚氨酯混合物。而氣體填充的MKPg電容器僅包含中性、生態安全的絕緣氣體。相關溶劑的內容，如果需要，原廠可以提供。我們建議棄置廢棄的電容器給專業的電子/電力垃圾回收廠商。

電容器可依下列規範棄置：

根據垃圾分類160205（電容器使用植物油/合成樹脂填充）來棄置。固體填充材料根據EWC No.080404（固體黏著劑與密封劑）。液體填充材料可能從電容器內溢出，該被合適的顆粒吸收並根據歐盟垃圾分類080410(PUR合成樹脂殘渣，非凝固物)。

注意：當接觸或丟棄放斷動作機構已經做動過的電容器時，請注意，就算已經經過幾天或幾個禮拜，這些電容器可能還是保有相當高的電壓。

請參考您國家的垃圾與棄置法律和限制。





Protection against Overvoltages and Short Circuits: Self-Healing Dielectric

All dielectric structures used in our power capacitors are “self-healing”: In the event of a voltage breakdown the metal layers around the breakdown channel are evaporated by the temperature of the electric arc that forms between the electrodes. They are removed within a few microseconds and pushed apart by the pressure generated in the centre of the breakdown spot. An insulation area is formed which is reliably resistive and voltage proof for all operating requirements of the capacitor. The capacitor remains fully functional during and after the breakdown.

For voltages within the permitted testing and operating limits the capacitors are short-circuit- and overvoltage-proof.

They are also proof against external short circuits as far as the resulting surge discharges do not exceed the specified surge current limits.

針對過壓和短路的保護： 自愈介電性

我們的電容器所使用的所有介電結構均具有“自愈”：當發生電壓擊穿金屬層的事件時，擊穿的通道會因為兩極間電弧的溫度而蒸發。他們會在幾微秒之內被移除，並藉由擊穿點中心所產生的壓力被推走。此時便形成一個具可靠阻抗性和對電容器內所有工作原件的電壓保護絕緣的區域。因此，電容器可以在擊穿事件發生時或發生後維持完全的功能。

在允許的測試與工作電壓限制下，電容器具有短路和過電壓保護。

也針對沒有超過額定電湧電流限制的電湧所導致的外部短路做保護。

Self-healing breakdown 自愈功能



Protection Against Accidental Contact

All capacitors are checked by routine test (voltage test between shorted terminations and case: $U_{BG} \geq 2 \times U_N + 2000V$ (at least 3000V) in accordance with IEC 60831. Accessible capacitors must be earthed at the bottom stud or with an additional earthing clamp.



The terminal block of designs K, L and M is rated IP20, i.e. it is protected against accidental finger contact with live parts. The discharge modules are designed in the same way (compare page 47). Unused contact cages of design M terminal blocks must be covered by a proper blank (available as standard accessory, see page 48).

意外接觸保護

所有電容器均經過例行性測試確認(短接端子和外殼電壓測試： $U_{BG} > 2 \times U_N + 2000V$ (最少3000V)根據IEC60831)。組裝的電容器必須要在底部接地或是外加接地夾。



Capacitors in design D are not provided with protection against accidental contact as standard. They are available with protective caps on request (see page 50).

K,L,M型式的端子台座設計為IP20。針對意外的手指接觸活線中的部分進行保護。放電電阻模組也是針對相同的方法作設計。M型式的端子台在沒有使用接點防護籠時，必須保持適當的空間來保護。

D型式的電容器並沒有針對意外碰觸提供標準的保護。但可以依需求外加保護蓋來進行保護。

Protection against Overload and Failure at the end of Service Life

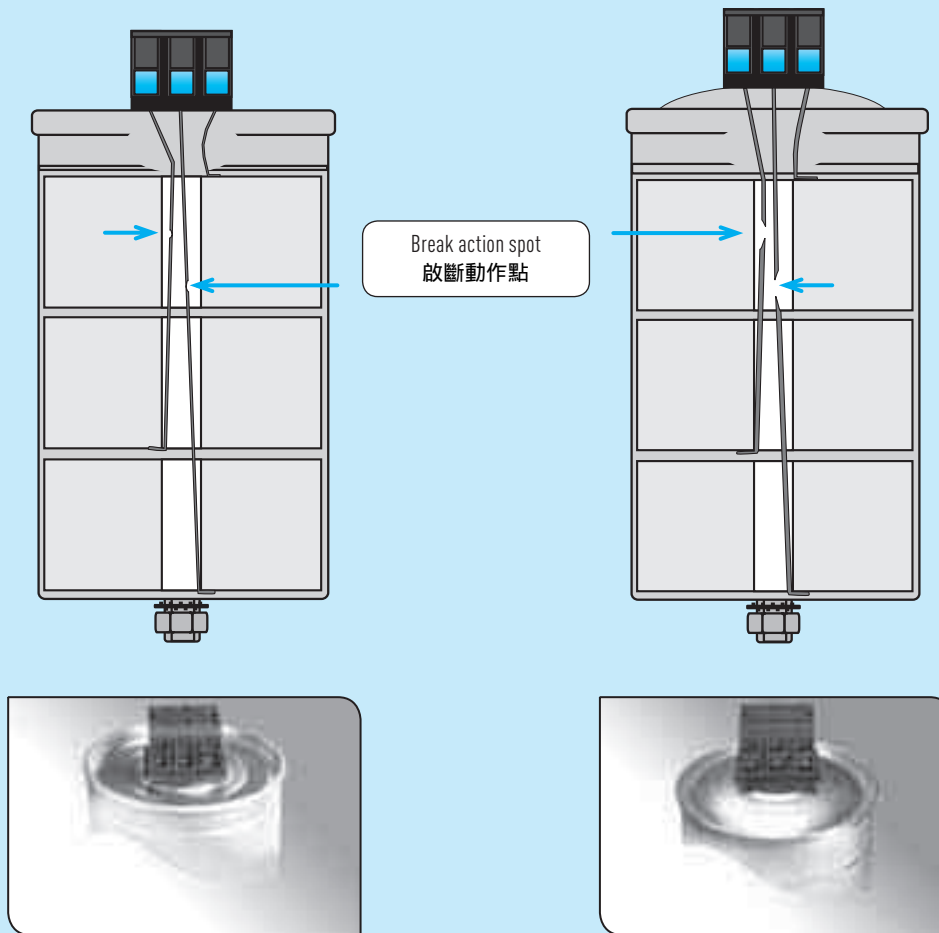


In the event of overvoltage or thermal overload or ageing at the end of the capacitor's useful service life, an increasing number of self-healing breakdowns may cause rising pressure inside the capacitor. To prevent it from bursting, the capacitor is fitted with an obligatory «break action mechanism» (BAM). This safety mechanism is based on an attenuated spot at one, two, or all of the connecting wires inside the capacitor. With rising pressure the case begins to expand, mainly by opening the folded crimp and pushing the lid upwards. As a result, the prepared connecting wires are separated at the attenuated spot, and the current path is interrupted irreversibly. It has to be noted that this safety system can act properly only within the permitted limits of loads and overloads.

工作壽命終點的過載與故障保護

在發生過壓或過熱或老化事件於電容器的壽命終點時，自愈的次數會增加且引起電容器內部壓力增高。為了防止電容器發生爆炸，電容器內部有安裝一個保護機構 啟斷動作 (BAM)。此一安全機構乃是基於一較細的點於單相、兩相或所有電容器內部接線。因為壓力的增加會使電容器開始擴張，主要會使綑折處拉開和將上蓋向上推出。因此，準備的連接線會因為較細的點被拉斷而分離，進而使電路被中斷。必須注意的地方是，此一機構必須在允許的負載與過載限制下才可以正常的運作。

Principle of the break action mechanism (exemplaric sketch)
 啟斷動作機構的原理



Capacitor before functioning of the BAM
 BAM動作前的電容器

Capacitor after functioning of the BAM
 BAM動作後的電容器(中間凸起)

⚠ Mind hazards of explosion and fire

Capacitors consist mainly of polypropylene (up to 90%), i.e. their energy content is relatively high. They may rupture and ignite as a result of internal faults or external overload (e.g. temperature, over-voltage, harmonic distortion). It must therefore be ensured, by appropriate measures, that they do not form any hazard to their environment in the event of failure or malfunction of the safety mechanism.

Fire Load: approx. 40 MJ/kg

Extinguish with: dry extinguisher (CO₂, foam)

⚠ 注意爆炸與失火的危害

電容器主要內容包含聚丙烯(高於90%)，其能量容量相對較高。此物質會因為內部故障或外部過載(諸如：溫度、過壓、諧波失真)而破裂和燃燒。因此，必須藉由合適的量測來確認，這些物質不會在安全機構故障或異常發生時，形成足以產生危害的環境。

火災承受：接近40MJ/Kg

滅火方式：乾式滅火器(二氧化碳,泡沫)



內部結構 INTERNAL CONSTRUCTION



Dielectric

MKP-/MKPg-/MKPS-type capacitors are based on a low-loss dielectric formed by pure polypropylene film. A thin self-healing mixture of zinc and aluminium is metallized directly on one side of the PP-film under vacuum. Our long-term experience as well as on-going research and improvements in this technology ensure the excellent self-healing characteristics of the dielectric and a long operating life of our capacitors.

The plastic film is wound into stable cylindrical windings on the most modern automated equipment. The ends of the capacitor windings are contacted by spraying with a metal contact layer, facilitating a high current load and ensuring a low-inductance connection between the terminals and windings.

The link between PP-film and zinc contact layer is highly stressed during high surge or rms currents and therefore considered very critical for operating life and reliability of the capacitor. By cutting the film for selected types in a wavelike manner, we increase the contact surface between film and zinc layer which substantially reduces this strain.



Impregnants

The use of impregnants and/or filling materials in capacitors is necessary in order to insulate the capacitor electrodes from oxygen, humidity, and other environmental interference. Without such insulation, the metal coating would corrode, an increasing number of partial discharges would occur, the capacitor would lose more and more of its capacitance, and suffer increased dielectric losses and a reduced operating life. Therefore, an elaborate vacuum-drying procedure is initiated immediately after insertion of the capacitor elements into the aluminium case and dried insulation gas (MKPg 275), or biologically degradable plant oil (MKP 276), is introduced. Both protect the winding from environmental influence and provide an extended life-expectancy and stable capacitance.

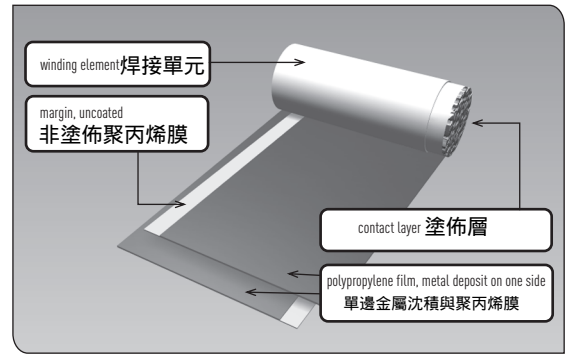


MKPg 275- Leakage Proof and Environmentally Friendly

The gas in our MPKg-Capacitors is inert and entirely harmless to environment. When disposing of the capacitors, no liquids or toxic gasses need to be considered.

A leakage of gas is extremely unlikely if the capacitors are handled and operated properly. It is possible to mount these capacitors in any desired position. However, should leakage occur, the leaking gas would escape into the atmosphere causing no undesirable effects to the adjacent equipment, e.g. damage, pollution, or staining. In the long run, such an unlikely event would result in a degradation of the capacitance; however, this process would take many months, during which the capacitor remains functional.

By using gas, we are reducing the weight of a capacitor on average by 15...20% compared with resin or oil filled capacitors. This makes transportation and handling of the units easier. It also supports the new concept of mounting the capacitors in almost any position.



介電性

MKP-/MKPg-/MKPS型電容器均是以低損失介電材質：純聚丙烯膜所製造。一層薄的自愈層乃是在真空下，直接在PP膜的一邊金屬化濺鍍上鋅與鋁的混合物。根據我們長期的經驗和不斷研究與進步的技術，可確保電容器長時間操作下的壽命以及介電質完美的自愈功能。使用最先進的自動化工具將塑膠膜捲曲到穩定的直桶狀繞組。電容器的捲曲終點乃是藉由金屬噴灑接觸層，可幫助高電流負載和確保端子座與接點的低電感性。

鋅層與PP膜之間的連接上在高電湧或電流時具有高應力，因此也非常嚴苛的考量了電容器的工作壽命和可靠性。藉由選擇的波浪型式來裁切薄膜，我們增加了鋅層與PP膜之間的接觸面積，可以幫助降低這些應力。

溶劑

為了使電容器的電極絕緣和抗氧化、濕度和其他環境的影響，電容器內填充溶劑或填充材料是必須的。如果沒有這層絕緣保護，金屬的塗佈將會腐蝕，進而導致局部放電的發生次數大量增加。電容器便會損失越來越多的電容值，並會增加介電性的損失和減少工作壽命。因此，在一開始電容器安裝進鋁質外殼時，必須馬上使用抽真空的乾式製程，且灌入想要的絕緣氣體N₂氮氣(MKPg 275)或可生物分解的植物油Resin軟性樹脂(MKP 276)。兩者都可以保護不受環境影響和提供更長的預期使用壽命、穩定的電容值。

MKPg275-洩漏保護和環境無害

我們的MKPg電容器使用的氣體N₂為惰性的且完全對環境無害的。當要廢棄電容器時，沒有任何液體或有毒氣體需要被考量。

如果電容器在正常的操作與處理之下，是不會發生氣體洩漏的情形。電容器可以被安裝在任何位置。如果氣體洩漏還是發生了，氣體會洩漏到大氣之中，不會對器材造成任何的影響(諸如：損傷、污染或變色)。

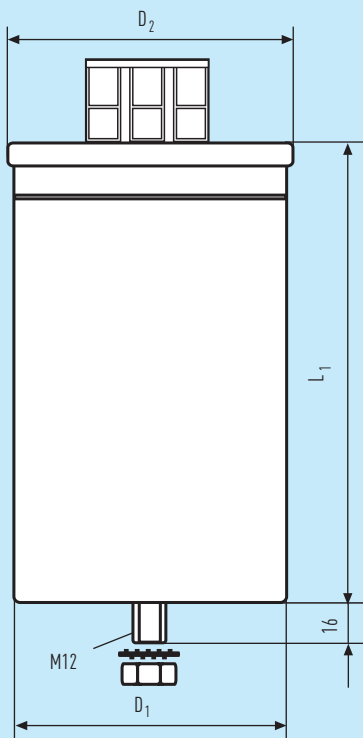
在長期使用下，這種不願意發生洩漏事件會造成電容值降低，但是，這個電容值降低的過程需要好幾個月的時間，因此在這一期間電容器依舊保有正常的工作功能。

藉由使用氣體，相較於合成樹脂或油式電容器而言，我們可以減輕電容器平均的重量約15~20%。這也使得運送與使用上更加方便。另外也提供新的安裝方式：電容器沒有方向性，可以安裝在各種位置。



端子台設計 TERMINATION DESIGNS

CAPAGRIP™ K/L/M



Diameter (mm)
直徑(mm)

D ₁	D ₂
60	64.5
75	79.5
85	89.5
95	99.5
100	104.5
116	120.5
136	140.5

CAPAGRIP™ K, L, M: Ease of Assembly with High Degree of Protection

高保護等級且易於安裝之端子

The CAPAGRIP™ designs K, L, and M guarantee optimum sealing of the capacitors, and offer convenient connection of cables up to 50mm². A special spring system guarantees reliable and durable operation of the clamp.

Designs L and M also permit the direct connection of discharge reactors and discharge resistor modules, as well as easy parallel connection of additional capacitors.

For single phase versions the central screw has no contact.

CAPAGRIP所設計的K、L和M型端子台可以保證電容器的最佳密封性，且提供接線時的便利性，最大可到50mm²的電纜線。特殊的彈簧設計系統可以確保夾頭操作時的可靠性和耐用性。L型與M型端子可以允許連接放電電阻和放電電抗模組，也易於併聯額外的電容器組。

針對單相電容器，端子座中間的螺絲是沒有接點的。

Series 系列 MKPg 275, MKP 276, MKPc 277

Protection 保護等級 IP20

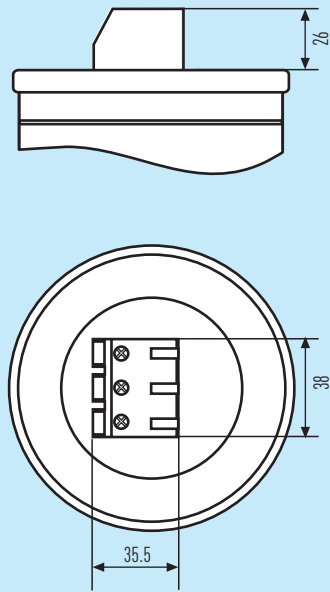
Humidity class 濕度等級 C

Creepage distance 爬電距離 .. 16 mm

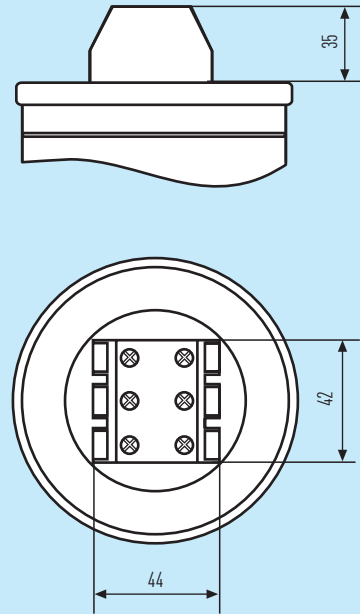
Air clearance 氣隙 16 mm



CAPAGRIP™ K



CAPAGRIP™ L



Design K

CAPACITORS WITH A DIAMETER OF 60...85 mm.

Case: extruded aluminium with base mounting stud M12, hermetically sealed by aluminium lid (press-rolled)

Terminal block:

max.cable cross section: 1 x 10 mm² per contact (with ferrule)

I_N: up to 30 A/phase

Discharge resistors: internal (installed as standard for discharge <50V within ≤60s)

直徑在60 85mm之電容器

外殼：擠壓成型並具備安裝螺絲M12之鋁殼，並利用鋁蓋密封(壓軋法)

端子座：

最大電線截面：..... 1 x 10 mm² 每個接點(帶金屬包頭)

電流I_N: 最高到30A/相

放電電阻：..... 內含(根據放電時間標準，在60秒內低於50V所設計安裝。)

Design L

CAPACITORS WITH A DIAMETER OF 85...116 mm.

Case: extruded aluminium with base mounting stud M12, hermetically sealed by aluminium lid (press-rolled)

Terminal block:

max.cable cross section: 2 x 25 mm² per contact (with ferrule)

I_N: up to 43A/phase

Discharge resistors: available as separate item

直徑在85 116mm之電容器

外殼：擠壓成型並具備安裝螺絲M12之鋁殼，並利用鋁蓋密封(壓軋法)

端子座：

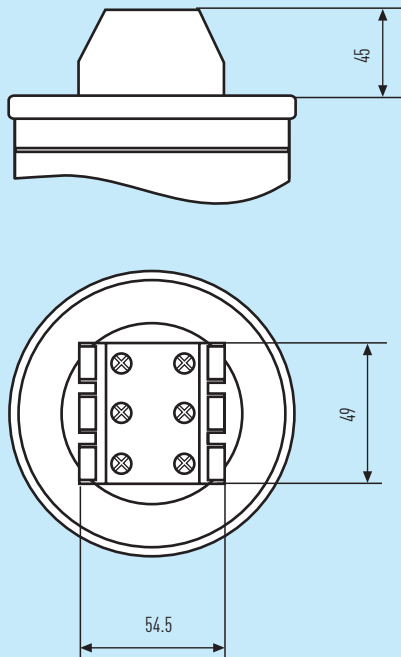
最大電線截面：..... 2 x 25 mm² 每個接點(帶金屬包頭)

電流I_N: 最高到43A/相

放電電阻：..... 可允許外加獨立的放電模組



CAPAGRIP™ M



Design M

CAPACITORS WITH A DIAMETER OF 116...136 mm.

Case: extruded aluminium with base mounting stud M12, hermetically sealed by aluminium lid (press-rolled)

Terminal block:

max.cable cross section: 2 x 50 mm² per contact
(with ferrule: 2 x 35 mm²)

I_N: up to 80A/phase

Discharge resistors: available as separate item

直徑在 116 136mm 之電容器

外殼：擠壓成型並具備安裝螺絲M12之鋁殼，並利用鋁蓋密封(壓軋法)

端子座：

最大電線截面：..... 2 x 50 mm² 每個接點
(帶金屬包頭: 2 x 35 mm²)

電流I_N: 最高到80A/相

放電電阻：..... 可允許外加獨立的放電模組

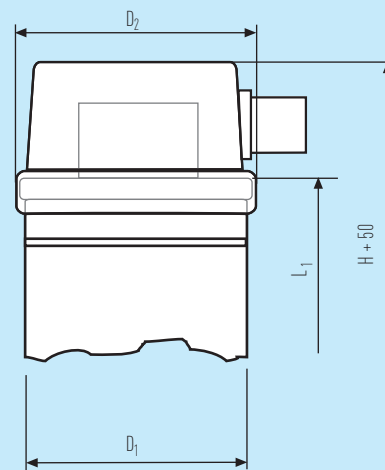
CAPAGRIP™ K, L, M Capacitors

For capacitors with diameters of 85, 95, 100, and 116mm, the caps are supplied loose if ordered. Note that these caps do not comply with an IP classification.

CAPAGRIP™ K, L, M 防塵保護蓋

針對直徑85、95、100和116mm產品，可以額外訂購防塵保護蓋。提供高IP等級的保護。

CAPAGRIP™ K, L, M capacitors Kondensatoren CAPAGRIP™ K, L, M



D ₁ (mm)	D ₂ (mm)	order no. Bestell-Nr.
85	93.5	275.157-10010
95	104	275.167-10010
100	109	275.177-10010
116	125	275.187-10010

通用技術資料

GENERAL TECHNICAL DATA

製造標準

Standards	IEC 60831 (2003), VDE 0560-46/47
	CSA C22.2 No. 190-M1985
	UL Standard No. 810
	GOST 1282-88

approval marks 認證標章



*only design K/L/M 5...60kvar, <660V_*nur Bauform K/L/M 5...60kvar, <660V

CE Conformity CE 認證

All capacitors in this brochure are declared to conform to the following European Directives:

本目錄中所有電容器均經公開確認依循下列歐盟指令：

73/23/EWG	Low-Voltage Directive
93/68/EWG	Directive for amendment of directive 73/23/EWG (CE-Conformity Mark)



rated voltages 額定電壓	230 ... 850 V, 50/60 Hz
rated overvoltages 允許連續過電壓	>110% rating continuum voltage
maximum permissible current 最大允許電流	
MKPg, MKP	1.5...2 I _N
MKPc	1.3...1.4 I _N

details see data charts, higher values on request
詳細資料請參考資料表，更高的需求可訂製

tolerance of capacitance 電容值誤差	- 5 ... + 10%, ± 5%, 0 ... + 10%
internal connection 內部接線	delta 三角接

filling material 填充材質

MKPg 275	inert insulation gas (N ₂) 絕緣氣體(氮氣)
MKPc 277	inert insulation gas (N ₂) 絕緣氣體(氮氣)

All our capacitors are gas insert (dry type dielectric) without oil inside structure.

本電容器為氣體填充(乾式介質)無油式構造。

dissipation losses 耗能

dielectric 介電值	< 0.2 W/kvar
total capacitor 整組電容器組	0.25 ... 0.4 W/kvar

temperature class 溫度等級 **

MKP/MKPg ≤ 20 kvar	-40°C/60
MKP/MKPg > 20 kvar	-40°C/D
MKPc	-40°C/D

higher values on request

humidity 濕度	95%
altitude abv.s.l. 海拔	≤ 4000m

life expectancy 壽命 *

MKPg, MKP	> 150 000 h
MKPc	> 100 000 h

*(permitted failure rate 3%) (允許的誤差值 3%)

** (see page 3) (請參考第3頁)

For operation in non-detuned or low-detuned systems
適合運用在無或低電抗選配系統上
5.67% ... 7% (<230 V)



CAPAGRIP™

Permitted operating voltages 允許工作電壓

24h:	260 V
8h/d:	290 V
30min/d:	300 V
5min (200x):	315 V
1min (200x):	340 V
max. peak rating 最大峰值額定	800 V

Test voltages 測試電壓

U _{BB}	560V AC/10s
U _{BG}	3600 V AC/2s

Temperature class 溫度等級 :

≤ 20 kvar	-40°C/60
> 20 kvar	-40°C/D

Dissipation losses 損失

Dielectric 介電質	< 0.2 W/kvar
Total capacitor 整個電容器	0.25 ... 0.4 W/kvar

容量誤差

Capacitance tolerance -5% ... +10%

Life expectancy 預期壽命 * > 150000 h

* (permitted failure rate_ bei einer Ausfallrate ≤3%)

Mind Mounting and Operating
Instructions on pgs 4 ff!

Q _C (kvar)	C _N (µF)	I _N (A)	I _{max} (A)	D ₁ × L ₁ (mm)	m (kg)	Design	order no. Bestell-Nr.	pcs./box Stk/Box	box Karton	resistor module Entladeset (<50 V in **s)
230V 60Hz										
1.25	3 × 21	3 × 3.1	3 × 4.0	60 × 164	0.4	K	275.525-502100	10	FB7	inclusive (24)
5	3 × 84	3 × 13	3 × 16	85 × 164	1.0	K	275.555-308400	5	FB8	inclusive (47)
6.25	3 × 104	3 × 16	3 × 20	75 × 230	1.0	K	275.546-310403	5	FB9	inclusive (48)
10	3 × 167	3 × 25	3 × 38	85 × 230	1.3	L	275.156-316700	5	FB9	275.100-10180 (60)
12.5	3 × 209	3 × 31	3 × 47	95 × 230	1.5	L	275.166-320903	3	FB9	275.100-10120 (50)
15	3 × 251	3 × 38	3 × 56	100 × 230	1.7	L	275.176-325100	3	FB9	275.100-10120 (60)
20	3 × 333	3 × 50	3 × 75	116 × 230	2.3	M	275.386-333303	3	FB9	275.100-10082 (55)
260V 60Hz										
5	3 × 63	3 × 11	3 × 15	75 × 164	0.7	K	275.545-306300	5	FB8	inclusive (38)
10	3 × 131	3 × 22	3 × 29	75 × 230	1.0	K	275.546-313100	5	FB8	inclusive (60)
15	3 × 196	3 × 33	3 × 50	95 × 230	1.5	L	275.166-319600	3	FB9	275.100-10120 (47)
20	3 × 262	3 × 44	3 × 67	116 × 230	2.3	M	275.386-326200	3	FB9	275.100-10082 (43)
25	3 × 333	3 × 57	3 × 83	116 × 230	2.3	M	275.386-333303	3	FB9	275.100-10082 (55)

Permitted operating voltages 允許工作電壓

24h:	300 V
8h/d:	310 V
30min/d:	325 V
5min (200x):	340 V
1min (200x):	365 V
max. peak rating 最大峰值額定	850 V

Test voltages 測試電壓

U _{BB}	605V AC/10s
U _{BG}	3600 V AC/2s

Temperature class 溫度等級 :

≤ 20 kvar	-40°C/60
> 20 kvar	-40°C/D

Dissipation losses 損失

Dielectric 介電質	< 0.2 W/kvar
Total capacitor 整個電容器	0.25 ... 0.4 W/kvar

容量誤差

Capacitance tolerance -5% ... +10%

Life expectancy 預期壽命 * > 150000 h

* (permitted failure rate_ bei einer Ausfallrate ≤3%)

Q _C (kvar)	C _N (µF)	I _N (A)	I _{max} (A)	D ₁ × L ₁ (mm)	m (kg)	Design	order no. Bestell-Nr.	pcs./box Stk/Box	box Karton	resistor module Entladeset (<50 V in **s)
280V 60Hz										
10	3 × 113	3 × 21	3 × 31	75 × 230	1.1	L	275.146-311200	5	FB9	275.100-10120 (28)
15	3 × 167	3 × 31	3 × 46	85 × 230	1.3	L	275.156-316700	5	FB9	275.100-10120 (41)
20	3 × 226	3 × 41	3 × 70	116 × 196	2.0	M	275.383-322500	3	FB9	275.100-10082 (38)
30	3 × 333	3 × 62	3 × 93	116 × 230	2.3	M	275.386-333303	3	FB9	275.100-10082 (57)

Single phase capacitors are available on request in same design.

275.***
GAS-FILLED
400V

For operation in non-detuned or low-detuned systems
適合運用在無或低電抗選配系統上
5.67% ...7% (≤400V)



CAPAGRIP™

Permitted operating voltages 允許工作電壓

24h:	440 V
8h/d:	485 V
30min/d:	510 V
5min (200x):	530 V
1min (200x):	575 V
max. peak rating 最大峰值額定	1350 V

Test voltages 測試電壓

U _{BB}	950V AC/10s
U _{BG}	3600 V AC/2s

Temperature class 溫度等級 :

≤ 20 kvar	-40°C/60
> 20 kvar	-40°C/D

Dissipation losses 損失

Dielectric 介電質 :	< 0.2 W/kvar
Total capacitor 整個電容器 :	0.25 ... 0.4 W/kvar

容量誤差

Capacitance tolerance

Life expectancy 預期壽命 *

* (permitted failure rate_ bei einer Ausfallrate ≤3%)

Mind Mounting and Operating Instructions on pgs 4 ff!

Q _c (kvar)	C _N (µF)	I _N (A)	I _{max} (A)	D ₁ × L ₁ (mm)	m (kg)	Design	order no. Bestell-Nr.	pcs./bo× Stk/Bo×	bo× Karton	resistor module Entladeset (<50V in **s)
400V 50Hz										
2.5	3 × 17	3 × 3.6	3 × 6.0	60 × 164	0.4	K	275.525-601700	10	FB7	inclusive (38)
5	3 × 33	3 × 7.2	3 × 17	75 × 164	0.7	K	275.545-503300	5	FB8	inclusive (48)
6.25	3 × 40	3 × 9.0	3 × 17	75 × 164	0.7	K	275.545-504000	5	FB8	inclusive (30)
7.5	3 × 51	3 × 11	3 × 19	85 × 164	1.0	K	275.555-505100	5	FB8	inclusive (38)
8.3	3 × 57	3 × 12	3 × 25	75 × 230	1.3	K	275.546-505700	5	FB8	inclusive (43)
10	3 × 68	3 × 15	3 × 30	75 × 230	1.3	K	275.546-506800	5	FB9	inclusive (51)
12.5	3 × 82	3 × 18	3 × 30	85 × 230	1.3	K	275.556-508200	5	FB9	inclusive (50)
15	3 × 100	3 × 22	3 × 44	95 × 230	1.5	L	275.166-510000	3	FB9	275.100-10180 (45)
16.6	3 × 111	3 × 24	3 × 49	95 × 230	1.5	L	275.166-511100	3	FB9	275.100-10180 (50)
20	3 × 137	3 × 29	3 × 56	100 × 230	1.7	L	275.176-513700	3	FB9	275.100-10180 (60)
25	3 × 166	3 × 36	3 × 56	116 × 230	2.3	L	275.186-516600	3	FB9	275.100-10120 (50)
30	3 × 199	3 × 43	3 × 56	116 × 280	2.6	L	275.189-519900	3	FB10	275.100-10120 (60)
33.3	3 × 221	3 × 48	3 × 75	116 × 280	2.6	M	275.389-522100	3	FB10	275.100-10082 (44)
40	3 × 265	3 × 58	3 × 75	136 × 280	3.7	M	275.399-526500	2	FB10	275.100-10082 (53)
400V 60Hz										
2.5	3 × 14	3 × 3.6	3 × 5.0	60 × 164	0.4	K	275.525-701400	10	FB8	inclusive (32)
5	3 × 28	3 × 7.2	3 × 12	60 × 230	0.5	K	275.526-502800	10	FB9	inclusive (42)
6.25	3 × 33	3 × 9.0	3 × 17	75 × 164	0.7	K	275.545-503300	5	FB8	inclusive (48)
8.3	3 × 46	3 × 12	3 × 17	85 × 164	1.0	K	275.555-504600	5	FB8	inclusive (35)
10	3 × 57	3 × 15	3 × 25	75 × 230	1.3	K	275.546-505700	3	FB8	inclusive (43)
12.5	3 × 68	3 × 18	3 × 30	75 × 230	1.3	K	275.546-506800	5	FB9	inclusive (51)
15	3 × 82	3 × 22	3 × 30	85 × 230	1.3	K	275.556-508200	5	FB9	inclusive (50)
16.6	3 × 92	3 × 24	3 × 39	85 × 230	1.3	K	275.556-509200	5	FB9	inclusive (56)
20	3 × 111	3 × 29	3 × 49	95 × 230	1.5	L	275.166-511100	3	FB9	275.100-10180 (50)
25	3 × 137	3 × 36	3 × 56	100 × 230	1.7	L	275.176-513700	3	FB9	275.100-10180 (60)
30	3 × 166	3 × 43	3 × 56	116 × 230	2.3	L	275.186-516600	3	FB9	275.100-10120 (50)
40	3 × 221	3 × 58	3 × 75	116 × 280	2.6	M	275.389-522100	3	FB10	275.100-10082 (44)
400V 60Hz (New)										
20	3 × 110	3 × 29	3 × 49	85 × 245	1.5	K	275.558-510901	3	FB9	275.100-10180 (50)
25	3 × 137	3 × 36	3 × 56	95 × 245	1.7	L	275.168-513700	3	FB9	275.100-10180 (60)
30	3 × 166	3 × 43	3 × 56	95 × 280	2.3	L	275.169-516600	3	FB9	275.100-10120 (50)
400V 60Hz (MKPc™)										
15	3 × 82	3 × 22	3 × 30	75 × 230	1.0	K	277.546-408200	5	FB9	inclusive (50)
20	3 × 110	3 × 29	3 × 49	75 × 280	1.3	K	277.549-411000	5	FB9	inclusive (50)
25	3 × 137	3 × 36	3 × 56	85 × 280	1.5	L	277.159-413700	5	FB9	inclusive (60)
30	3 × 166	3 × 43	3 × 56	95 × 280	2.0	L	277.169-516600	3	FB9	275.100-10120 (50)

Single phase capacitors are available on request in same design.

For operation in non-detuned or low-detuned systems
適合運用在無或低電抗選配系統上
5.67% ... 7% (<400 V)



CAPAGRIP™

Permitted operating voltages 允許工作電壓

24h:	440 V
8h/d:	485 V
30min/d:	510 V
5min (200x):	530 V
1min (200x):	575 V
max. peak rating 最大峰值額定	1350 V

Test voltages 測試電壓

U _{BB}	950V AC/10s
U _{BG}	3600 V AC/2s

Temperature class 溫度等級 :

≤ 20 kvar	-40°C/60
> 20 kvar	-40°C/D

Dissipation losses 損失

Dielectric 介電質 :	< 0.2 W/kvar
Total capacitor 整個電容器 :	0.25 ... 0.4 W/kvar

容量誤差

Capacitance tolerance

Life expectancy 預期壽命 *

*(permitted failure rate bei einer Ausfallrate <3%)

Mind Mounting and Operating
Instructions on pgs 4 ff!

Q _C (kvar)	C _N (µF)	I _N (A)	I _{max} (A)	D ₁ × L ₁ (mm)	m (kg)	Design	order no. Bestell-Nr.	pcs./box Stk/Box	box Karton	resistor module Entladeset (<50V in **s)
440V 50Hz										
2.5	3 × 14	3 × 3.3	3 × 5.6	60 × 164	0.4	K	275.525-701400	10	FB8	inclusive (33)
5	3 × 28	3 × 6.6	3 × 12	60 × 230	0.5	K	275.526-502800	10	FB9	inclusive (42)
6.25	3 × 33	3 × 8.0	3 × 17	75 × 164	0.7	K	275.545-503300	5	FB8	inclusive (50)
7.5	3 × 40	3 × 10	3 × 17	75 × 164	0.7	K	275.545-504000	5	FB8	inclusive (30)
8.3	3 × 46	3 × 11	3 × 22	85 × 164	1.0	K	275.555-504600	5	FB8	inclusive (35)
10	3 × 57	3 × 14	3 × 25	75 × 230	1.3	K	275.546-505700	5	FB8	inclusive (43)
11.2	3 × 62	3 × 15	3 × 27	75 × 230	1.0	K	275.546-506200	5	FB9	inclusive (48)
12.5	3 × 68	3 × 16	3 × 30	75 × 230	1.0	K	275.546-506800	5	FB9	inclusive (53)
14.1	3 × 77	3 × 19	3 × 33	85 × 230	1.3	K	275.556-507700	5	FB9	inclusive (49)
15	3 × 82	3 × 20	3 × 30	85 × 230	1.3	K	275.556-508200	5	FB9	inclusive (52)
16.6	3 × 92	3 × 22	3 × 39	85 × 230	1.3	K	275.556-509200	5	FB9	inclusive (58)
20	3 × 111	3 × 27	3 × 49	95 × 230	1.5	L	275.166-511100	3	FB9	275.100-10180 (50)
22.5	3 × 123	3 × 30	3 × 46	95 × 230	1.5	L	275.166-512300	3	FB9	275.100-10180 (56)
25	3 × 137	3 × 33	3 × 56	100 × 230	1.7	L	275.176-513700	3	FB9	275.100-10120 (41)
28.2	3 × 154	3 × 37	3 × 56	116 × 230	2.3	L	275.186-515400	3	FB9	275.100-10120 (47)
30	3 × 166	3 × 40	3 × 56	116 × 230	2.3	L	275.186-516600	3	FB9	275.100-10120 (50)
33.3	3 × 185	3 × 44	3 × 68	116 × 280	2.6	M	275.389-518500	3	FB10	275.100-10120 (56)
40	3 × 221	3 × 53	3 × 75	116 × 280	2.6	M	275.389-522100	3	FB10	275.105-10100 (55)
440V 60Hz										
2.5	3 × 11	3 × 3.3	3 × 5.6	60 × 164	0.4	K	275.525-801100	10	FB8	inclusive (26)
5	3 × 22	3 × 6.6	3 × 11	60 × 164	0.4	K	275.525-502200	10	FB8	inclusive (34)
6.25	3 × 28	3 × 8.2	3 × 12	60 × 230	0.5	K	275.526-502800	10	FB9	inclusive (43)
7.5	3 × 33	3 × 10	3 × 17	75 × 164	0.7	K	275.545-503300	5	FB8	inclusive (51)
10	3 × 46	3 × 13	3 × 22	85 × 164	1.0	K	275.555-504600	5	FB8	inclusive (36)
12.5	3 × 57	3 × 16	3 × 25	75 × 230	1.3	K	275.546-505700	3	FB8	inclusive (44)
13.3	3 × 62	3 × 18	3 × 27	75 × 230	1.0	K	275.546-506200	5	FB9	inclusive (48)
15	3 × 68	3 × 20	3 × 30	75 × 230	1.0	K	275.546-506800	5	FB9	inclusive (52)
16.6	3 × 77	3 × 22	3 × 33	85 × 230	1.3	K	275.556-507700	5	FB9	inclusive (49)
20	3 × 92	3 × 26	3 × 39	85 × 230	1.3	K	275.556-509200	5	FB9	inclusive (58)
22.5	3 × 100	3 × 29	3 × 44	95 × 230	1.5	L	275.166-510000	3	FB9	275.100-10180 (45)
25	3 × 111	3 × 33	3 × 49	95 × 230	1.5	L	275.166-511100	3	FB9	275.100-10180 (50)
30	3 × 137	3 × 40	3 × 56	100 × 230	1.7	L	275.176-513700	3	FB9	275.100-10120 (41)
40	3 × 185	3 × 52	3 × 68	116 × 280	2.6	M	275.389-518500	3	FB10	275.100-10120 (56)
440V 60Hz (New)										
30	3 × 137	3 × 40	3 × 56	95 × 245	1.7	L	275.168-513700	3	FB9	275.100-10120 (41)

Single phase capacitors are available on request in same design.

275.***
GAS-FILLED
480V

For operation in non-detuned or low-detuned systems
適合運用在無或低電抗選配系統上
5.67% ...7% (≤440 V), 14% (≤415 V)



CAPAGRIP™

Permitted operating voltages 允許工作電壓
 24h: 480 V
 8h/d: 530 V
 30min/d: 555 V
 5min (200x): 580 V
 1min (200x): 625 V
 max. peak rating 最大峰值額定 1450 V

Test voltages 測試電壓
 U_{BB} 1030V AC/10s
 U_{BG} 3600 V AC/2s

Temperature class 溫度等級 :
 ≤ 20 kvar -40°C/60
 > 20 kvar -40°C/D

Dissipation losses 損失
 Dielectric 介電質 : < 0.2 W/kvar
 Total capacitor 整個電容器 : 0.25 ... 0.4 W/kvar

容量誤差
 Capacitance tolerance -5% ... +10%

Life expectancy 預期壽命 * > 150000 h

* (permitted failure rate_ bei einer Ausfallrate ≤3%)

Mind Mounting and Operating
Instructions on pgs 4 ff!

Q _C (kvar)	C _N (µF)	I _N (A)	I _{max} (A)	D ₁ × L ₁ (mm)	m (kg)	design	order no. Bestell-Nr.	pcs./box Stk/Box	box Karton	resistor module Entladeset (<50V in **s)
480V 50Hz										
12.5	3 × 58	3 × 15	3 × 23	85 × 230	1.3	K	275.556-705800	5	FB9	inclusive (48)
14.7	3 × 68	3 × 18	3 × 27	85 × 230	1.3	K	275.556-606800	5	FB9	inclusive (56)
15.4	3 × 71	3 × 19	3 × 28	95 × 230	1.5	L	275.166-707100	3	FB9	275.100-10300 (56)
16.7	3 × 77	3 × 20	3 × 36	95 × 230	1.5	L	275.166-607700	3	FB9	275.100-10300 (60)
18	3 × 83	3 × 22	3 × 36	95 × 230	1.5	L	275.166-608300	3	FB9	275.100-10180 (40)
25	3 × 115	3 × 30	3 × 54	116 × 230	2.3	L	275.186-611500	3	FB9	275.100-10180 (54)
26.7	3 × 123	3 × 32	3 × 48	116 × 230	2.3	L	275.186-612300	3	FB9	275.100-10180 (58)
31	3 × 143	3 × 37	3 × 56	116 × 230	2.3	L	275.186-614300	3	FB9	275.100-10120(45)
33.3	3 × 154	3 × 40	3 × 56	116 × 245	2.5	L	275.188-615400	3	FB12	275.100-10120(48)
36	3 × 166	3 × 43	3 × 56	136 × 230	3.0	L	275.196-616601	2	FB9	275.100-10120(52)
480V 60Hz										
12.5	3 × 48	3 × 15	3 × 23	75 × 230	1.0	K	275.546-604800	5	FB9	inclusive (51)
15	3 × 58	3 × 18	3 × 27	85 × 230	1.3	K	275.556-705800	5	FB9	275.100-10300 (60)
20	3 × 77	3 × 24	3 × 36	95 × 230	1.5	L	275.166-607700	3	FB9	275.100-10300 (60)
25	3 × 96	3 × 30	3 × 45	100 × 230	1.7	L	275.176-609600	3	FB9	275.100-10180 (45)
30	3 × 115	3 × 36	3 × 54	116 × 230	2.3	L	275.186-611500	3	FB9	275.100-10180 (54)

Single phase capacitors are available on request in same design.

For operation in non-detuned or low-detuned systems
適合運用在無或低電抗選配系統上
5.67% ... 7% (≤ 480 V), 14% (≤ 440 V)



CAPAGRIP™

Permitted operating voltages 允許工作電壓

24h:	525 V
8h/d:	580 V
30min/d:	600 V
5min (200x):	630 V
1min (200x):	680 V
max. peak rating 最大峰值額定	1600 V

Test voltages 測試電壓

U_{BB}	1130V AC/10s
U_{BG}	4500 V AC/2s

Temperature class 溫度等級 :

≤ 20 kvar	-40°C/60
> 20 kvar	-40°C/D

Dissipation losses 損失

Dielectric 介電質 :	< 0.2 W/kvar
Total capacitor 整個電容器 :	$0.25 \dots 0.4$ W/kvar

容量誤差

Capacitance tolerance

Life expectancy 預期壽命 *

* (permitted failure rate_ bei einer Ausfallrate $\leq 3\%$)

Mind Mounting and Operating
Instructions on pgs 4 ff!

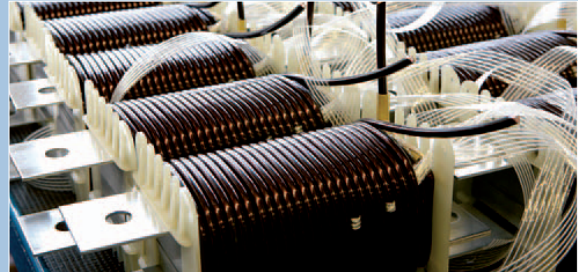
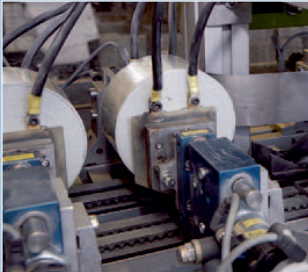
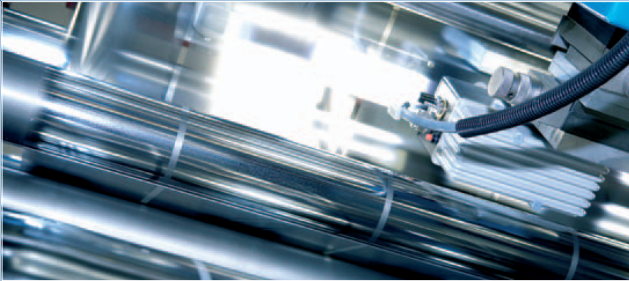
Q_C (kvar)	C_N (μ F)	I_N (A)	I_{max} (A)	$D_1 \times L_1$ (mm)	m (kg)	Design	order no. Bestell-Nr.	pcs./box Stk/Box	box Karton	resistor module Entladeset ($< 50V$ in **s)
480V 60Hz										
2.5	3 × 10	3 × 3.0	3 × 5.0	60 × 164	0.5	K	275.525-801000	10	FB7	inclusive (25)
5	3 × 19	3 × 6.0	3 × 9.0	60 × 230	0.7	K	275.526-801900	10	FB9	inclusive (46)
7.5	3 × 29	3 × 9.0	3 × 15	85 × 164	0.9	K	275.555-702900	5	FB8	inclusive (47)
10	3 × 38	3 × 12	3 × 20	75 × 230	1.0	K	275.546-703803	5	FB9	inclusive (31)
12.5	3 × 48	3 × 15	3 × 25	85 × 230	1.3	K	275.556-704803	5	FB9	inclusive (39)
15	3 × 58	3 × 18	3 × 30	85 × 230	1.3	K	275.556-705800	5	FB9	inclusive (47)
20	3 × 77	3 × 24	3 × 40	100 × 230	1.7	L	275.176-707700	3	FB9	275.100-10180 (37)
25	3 × 96	3 × 30	3 × 50	116 × 230	2.3	L	275.186-809600	3	FB9	275.100-10180 (45)
30	3 × 115	3 × 36	3 × 56	116 × 280	2.6	L	275.189-811503	3	FB10	275.100-10180 (55)
40	3 × 154	3 × 48	3 × 72	136 × 245	3.7	M	275.398-715401	2	FB12	275.100-10120 (50)
525V 50Hz										
2.5	3 × 10	3 × 2.7	3 × 5.0	60 × 164	0.5	K	275.525-801000	10	FB7	inclusive (24)
5	3 × 19	3 × 5.5	3 × 9.0	60 × 230	0.7	K	275.526-801900	10	FB9	inclusive (47)
7.5	3 × 29	3 × 8.2	3 × 15	85 × 164	0.9	K	275.555-702900	5	FB8	inclusive (48)
10	3 × 38	3 × 11	3 × 20	75 × 230	1.0	K	275.546-703803	5	FB9	inclusive (32)
12.5	3 × 48	3 × 14	3 × 25	85 × 230	1.3	K	275.556-704803	5	FB9	inclusive (40)
15	3 × 58	3 × 17	3 × 30	85 × 230	1.3	K	275.556-705800	5	FB9	inclusive (48)
18.5	3 × 71	3 × 20	3 × 30	95 × 230	2.1	L	275.166-707100	3	FB9	275.100-10300 (57)
20	3 × 77	3 × 22	3 × 40	100 × 230	1.7	L	275.176-707700	3	FB9	275.100-10180 (37)
22	3 × 84	3 × 24	3 × 36	116 × 230	2.3	L	275.186-808401	3	FB9	275.100-10180 (41)
25	3 × 96	3 × 28	3 × 50	116 × 230	2.3	L	275.186-809600	3	FB9	275.100-10180 (47)
30	3 × 115	3 × 33	3 × 56	116 × 280	2.6	L	275.189-811503	3	FB10	275.100-10180 (56)
37	3 × 143	3 × 41	3 × 56	116 × 280	2.6	L	275.189-714301	3	FB10	275.105-10120 (45)
40	3 × 154	3 × 44	3 × 72	136 × 245	3.7	M	275.398-715401	2	FB12	275.105-10120 (50)
525V 60Hz										
10	3 × 32	3 × 11	3 × 19	85 × 196	1.1	K	275.553-703200	5	FB9	inclusive (32)
15	3 × 48	3 × 17	3 × 25	85 × 230	1.3	K	275.556-704803	5	FB9	inclusive (40)
20	3 × 64	3 × 22	3 × 33	95 × 230	1.5	L	275.166-706400	3	FB9	275.100-10180 (32)
25	3 × 80	3 × 28	3 × 41	116 × 230	2.3	L	275.186-708000	3	FB9	275.100-10180 (37)
30	3 × 96	3 × 33	3 × 50	116 × 230	2.3	L	275.186-809600	3	FB9	275.100-10180 (47)
40	3 × 126	3 × 44	3 × 65	136 × 245	3.7	M	275.398-812600	2	FB12	275.105-10120 (40)

Single phase capacitors are available on request in same design.

超過70年的電容器製造經驗

德國格拉市自1938年以來，已經成為電容器製造的中心。西元1992年，由原本的RFT/VEB ELECTRONIK Gera公司改名為ELECTRONICON公司，並成為歐洲電容器的領導品牌之一，供應分佈全球的顧客群，成為功率因數矯正儀器、傳動設備、電力電子、家用設備和電力工業製造商與使用者的開放且稱職的合作伙伴。

透過持續的投資以及提升對環境友善的噪音防制技術的發展，ELECTRONICON確保了高度水平的製造與品質標準，並通過領導認證單位的認證與監控。



在今日全球化競爭之下，我們藉由下列特點與其他廠牌作區分，我們的產品提供絕對的可靠度與安全性。

製造原廠與客戶間密切的合作關係，以達到雙方在技術上以及商業上的需求。

改進與發展本身對電容器設計與製造的相關科技知識，同時也重視薄膜塗佈技術的發展。在MKPg(氮氣充填)部分，更是付出特別多的心力於相關技術的發展。

具遠見的早期認證與採納新的電容器製造相關的新趨勢與新方法，具彈性且可以正確履行的業務責任。

我們經驗豐富的產品開發工程師對於最新技術潮流運用與確保我們的產品可以適應傳統市場或新市場的挑戰方面，是非常有能力和非常可靠的。

在市場與銷售部門、研究開發部門和產品部門之間密切且積極的合作之下，奠定了我們之所以會成功的基石。

ELECTRONICON也持續努力的在我們國內與國外市場的經銷商和直接客戶之間建立一個相同的密切與積極的關係，為了成為不僅僅是您眾多供應商之一，而是您的理念與解決方案的最佳伙伴。



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