



## // DUCATI - Kondensatoren für die Leistungselektronik



amelec Electronic GmbH  
Brunnwiesenstrasse 6A  
8157 Dielsdorf



Tel.: 044 862 00 62  
Fax: 044 862 00 63



info@amelec.ch  
www.amelec.ch  
shop.amelec.ch





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## Customized products for Electric Vehicle and Special Applications

CUSTOMIZED PRODUCTS  
DESIGNED TO LEVERAGE THE  
ADVANTAGES OF DUCATI  
HIGH CRYSTALLINITY FILM  
TECHNOLOGY FOR EV/HEV  
APPLICATIONS

### TECHNICAL ASPECTS

### SMART FEATURES

There are applications for which is necessary to **develop with the customer** the appropriate product to **fulfill the expected performances**. Combining the **long experience** of Ducati Energia in **designing film capacitor** with the **advantages of Ducati's High-Crystallinity Films**, it's possible to **reach** these aspiring goals while maintaining the **excellent cost/performance** ratio of Metallized Polypropylene Film Capacitors.

- Ducati High-Crystallinity Film Technology
- PA66 or TPS Cases
- Dry-Winding – Dry-Potting Technology

- Special Multi-Core Assembly minimizes field effects for extremely low ESL
- Bare/Tinned Copper or Laminated Busbars for maximum project flexibility
- Proprietary Metallization Pattern/Profiles maximize safety and optimize capacity changes across the useful life



### CUSTOMIZED APPROACH

The rapidly evolving market for these technologies demands **project-specific developments**. **Ducati Energia** studies each specification and mission-profile applying its expertise to provide the most suitable solution for each case.

## GP81 and DC81 Series

To expand its Power Electronic Capacitors' product line, Ducati Energia is introducing the **GP81 and DC81 series**. They combine different capacitance and voltage values providing to customers a modular solution on which to **develop and scale their projects**, both for **AC filtering** and for **DC applications**. A special internal construction allows the minimization of field effects, thus guaranteeing real-life low ESL.



## GPX 84 series: High Performances for High Power Applications

Ducati is proud to introduce the single-phase, cylindrical AC & DC Capacitor, GPX 84 as the ideal solution for **High Performance** applications, in terms of **high current capability**, **higher operating temperatures** and **stable capacity** values during its lifecycle.

GPX 84 has got a **fortified internal construction** based on busbar connections that, alongside the special metallized film used, allows the capacitor to reach high current and high temperatures, while having high stability parameters in terms of capacity.

GPX 84 is designed to be used in **high demanding applications**. The **safety features** are based on integrated overpressure disconnectors and DRY resin impregnation, enclosed in the high quality aluminum case.



## Series with High Temperature & Extended Life Configurations

By using its new **High Crystallinity Film Technology** Ducati achieves high Capacity Density without compromising the expected performance or imposing hidden operating condition limitations and obtaining **reinforced series** with **extended operating capabilities**:

- Operating (Case) Temperature Range: -40°C ÷ 85°C without derating
- Operating Life Range: 100.000hrs @ UN DC & 70°C HotSpot
- Ducati High-Crystallinity Film Technology
- Same Dimensions & General Specs as DC 85 C (pages 38) and DC 86 PS (pages 56)

DUCATI HIGH CRYSTALLINITY  
FILM TECHNOLOGY USED  
TO EXTEND THE OPERATING  
TEMPERATURE RANGE  
OR THE OPERATING LIFE

TECHNICAL ASPECTS

IEC 61071 UL-STD-94, UL 810, UL Approval

STANDARDS / APPROVAL

## Fire and smoke safety testing: EN 45545-2 Approved DC-Link Capacitors

EN 45545-2 is an important international standard that defines a classification system that specifies requirements for fire behavior of materials and products used in trains.

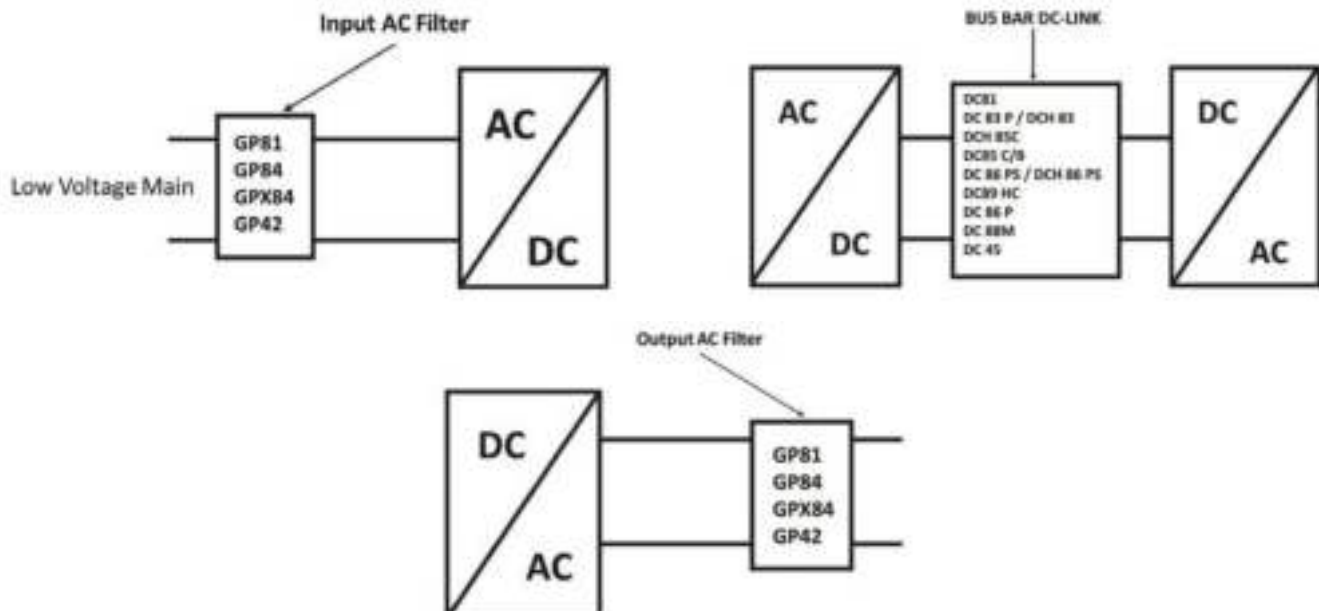
Ducati is proud to announce that DC-Link capacitors as DC 83, DCH 83, DCH 85 B, DC 86 P, DC 86 PS, DC 89 HC and DC H 85 C/DC 85 C are certified and compliant EN 45545-2, in order to achieve the maximum security level in case of fire on railway vehicles.





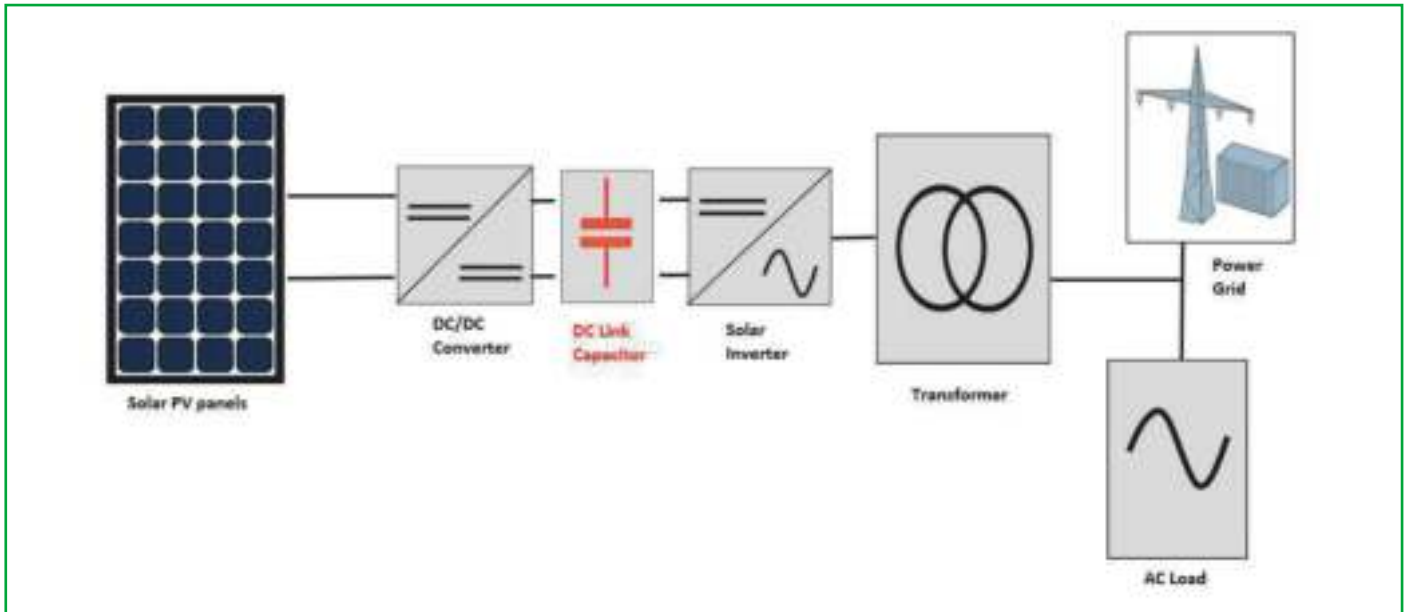
## MAIN TYPES OF CAPACITORS

| CAPACITOR TYPE   | SERIES  | APPLICATIONS                        |   |
|--|---|-------------------------------------|---|
|   | GENERAL PURPOSE                                 | GP81 - 416.81                       | switching, high performance lighting, UPS filter, AC-link, resonant circuit, PFC with high harmonics, DC-link, filter |
|  |   | GP 42 - 416.42                      |   |
|  |   | GP 84 - 416.84<br>GPX 84 - 416.84 H |   |
|  |   |                                     |   |
|   | HIGH-DENSITY<br>HIGH-TEMPERATURE DC APPLICATION | DCH 85C - 416.85.V/H                | High-Density / High-Temperature DC-Link, Filtering and Storage  |
|  |   | DCH 86 - 416.86.V.                  |   |
|  |   | DCH 83 - 416.83.V.                  |   |
|  | DC APPLICATION                                  | DC81 - 416.81                       | DC-Link, Filtering and Storage  |
|  |   | DC 85 C/B - 416.85                  |   |
|  |   | DC 86 P - 416.86                    |   |
|  |   | DC 86 PS - 416.86                   |   |
|  |   | DC89 HC - 416.89                    |   |
|  |   | DC 88 M - 416.88                    |   |
|  |   | DC 45 - 415.45                      |   |
|  |   | DC 83 P - 416.83                    |   |

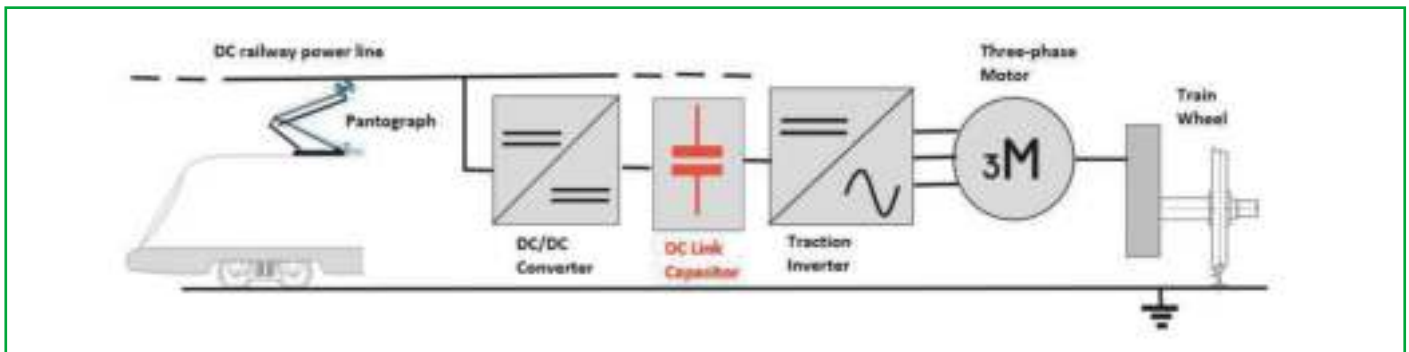


## APPLICATIONS FOR POWER ELECTRONICS CAPACITORS

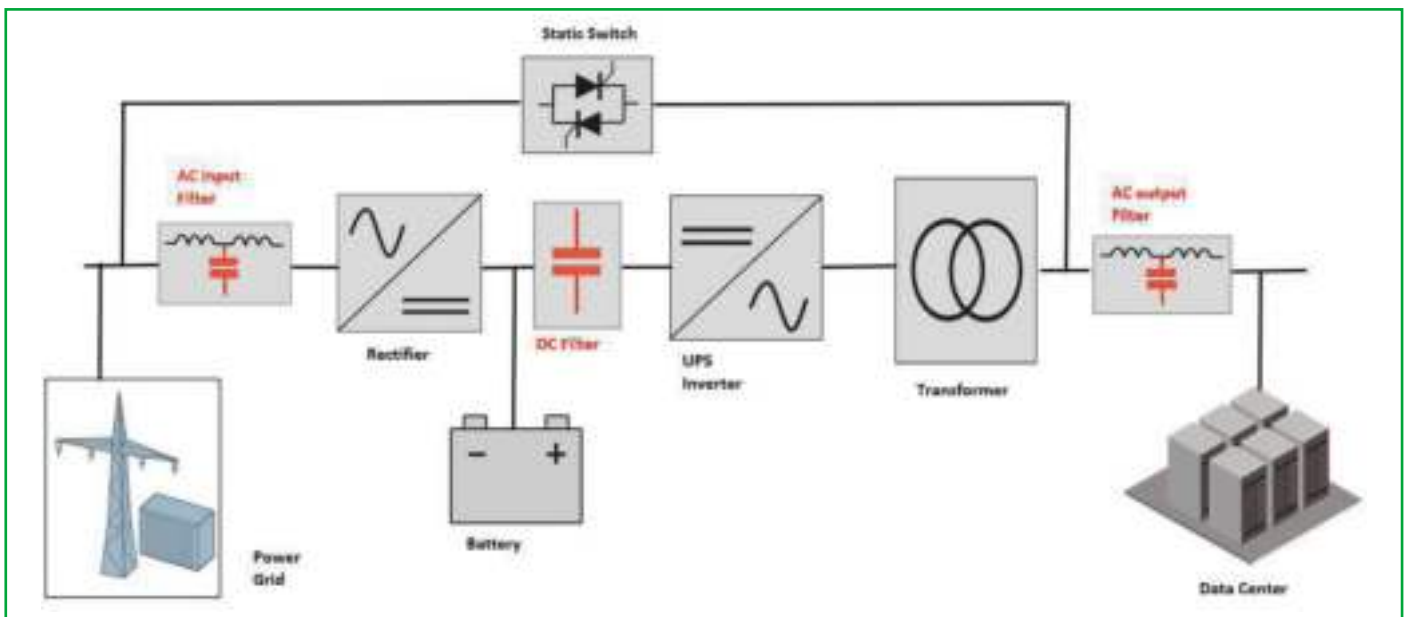
### Solar PV system



### Traction system



### UPS





## CROSS REFERENCE TABLE

Rated DC / AC voltage (V) versus Capacitance (µF)

| DC rated voltage Un [V]   | 400 - 800    | 800 - 1400  | 1400 - 2000   | 2000 - 2500   | 2500 - 3000   | 3000 - 4000         | 4000 - 6800 |         |
|---------------------------|--------------|---|---|---|---|---------------------|-------------|---------|
| AC rated voltage Urms [V] | 250 - 550    | 690 - 930   | -   | -   | -   | -                   | -           |         |
| CAPACITANCE Cn [µF]       | 0 - 50       | DC 81<br>GP 42<br>GP 84 - GPX 84<br>GP 81                         | DC 81<br>DC8 9 HC<br>GP 42<br>GP 84 - GPX 84  | DC 81<br>DC 89 HC   |   | DC 85 B             | DC 85 B     | DC 85 B |
|                           | 50 - 100     | DC89 HC<br>GP 42<br>GP 84 - GPX 84                                | DC89 HC<br>GP 84 - GPX 84   | DCH 85 C<br>DC 85 C   | DCH 85 C  | DC 85 B             | DC 85 B     | DC86 P  |
|                           | 100 - 150    | DC 89 HC<br>GP 84 - GPX 84  | DC 89 HC<br>GP 84 - GPX 84  | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 B   | DC 85 B<br>DC 86 PS |             | DC 86 P |
|                           | 150 - 200    | DC 89 HC<br>GP 84 - GPX 84  | DC 89 HC<br>DCH 85 C  | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 B<br>DC 83 P                                      | DC 85 B             | DC 86 P     | DC 86 P |
|                           | 200 - 250    | DC89 HC<br>GP84 - GPX84   | DCH 85 C  | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 B<br>DC 86 PS<br>DCH 86 PS<br>DC 83 P<br>DCH 83 P |                     | DC 86 P     | DC 86 P |
|                           | 250 - 300    | GP84 - GPX84  | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 C   | DCH 85 C  |                     | DC 86 P     |         |
|                           | 300 - 400    | DC 85 C<br>GP84 - GPX84   | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 C<br>DC 86 PS<br>DCH 86 PS<br>DC 83 P<br>DCH 83 P | DCH 85 C<br>DCH 86 PS   |                     | DC 86 P     |         |
|                           | 400 - 500    | DCH 85 C<br>DC 85 C<br>GP84 - GPX84                               | DCH 85 C<br>DC 85 C<br>DC 83 P  | DCH 85 C<br>DC 85 C<br>DCH 83 P                                     | DCH 85 C  | DC 86 P             | DC 86 P     |         |
|                           | 500 - 600    | DC 85 C<br>GP84 - GPX84   | DCH 85 C<br>DC 85 C<br>DC 83 P  | DCH 85 C<br>DC 85 C<br>DCH 83 P<br>DC 86 PS<br>DCH 86 PS            | DCH 85 C  | DC 86 P             |             | DC 45   |
|                           | 600 - 1000   | DCH 85 C<br>DC 85 C   | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 86 PS<br>DCH 86 PS<br>DC 83 P<br>DCH 83 P            | DCH85 C<br>DC 85 C<br>DC 86 P                                       | DCH 85 C<br>DC 86 P   | DC86 P              | DC 45       |         |
|                           | 1000 - 2000  | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 83 P<br>DCH 83 P<br>DC 86 PS | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 86 P<br>DCH 83 P<br>DC 83 P<br>DC 86 PS<br>DCH 86 PS | DCH 85 C<br>DC 85 C<br>DC 86 P                                      | DC 86 P   | DC 88 M<br>DC 45    |             |         |
|                           | 2000 - 3000  | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 86 PS<br>DCH 86 PS           | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 86 P   | DC 86 P   | DC 88 M<br>DC 45  |                     |             |         |
|                           | 3000 - 6000  | DCH 85 C<br>DC 85 C<br>DC 85 B<br>DC 86 P                         | DCH 85 C<br>DC 85 C<br>DC 86 P  | DC 88 M   |   |                     |             |         |
|                           | 6000 - 10000 | DC 86 P   | DC 86 P<br>DC 88 M<br>DC 45   |   |   |                     |             |         |

**DC - series:** - DC Application: expressly designed for operation with DC voltage.

**GPX - series:** - General purpose application: designed for operation both AC and DC voltage.



## DUCATI ENERGIA

### Capacitor excellence since 1926

DUCATI, founded in 1926 by Ducati brothers, has been among the first in the world to start industrial production of capacitors, and has been a market leader ever since.

Since its foundation, DUCATI Energia has always been in the forefront of technical and industrial development, leading the research shaping today's technology and cooperating to the upgrades and improvements leading to the current IEC and EN Standards for Capacitors.

DUCATI energia firstly introduced the Metallised Polypropylene Film technology and its innovative PPM and PPMh film set the reference for this technology, outclassing the obsolete paper/oil and gas technology in terms of superior performance and reduced dimensions.



DUCATI energia Group main fields of activities are:

- Motor Lighting Capacitors
- Power Electronics Capacitors
- Power Factor Correction Capacitors and Systems (LV and MV)
- Alternators and Ignition Systems
- Electrical Vehicles and Charging Stations for Electrical Vehicles
- Energy Analysers
- Control Systems for energy grids
- Railways Signalling systems
- Ticketing and Transport Automation systems

#### Quality

Utmost attention to product quality and customer service are constants in DUCATI's history and the main factors contributing to its success worldwide. DUCATI has always been one of the first companies in its field, in Italy and in Europe, to adopt the most modern standards and procedures in order to assure the highest level of product quality and reliability.

The QUALITY SYSTEM of DUCATI Energia SpA, capacitor division, as described in the Quality Manual, was one of the first in Italy to be approved by the BSI in accordance with ISO 9002 (EN 29002) procedures: Certificate of Registration N. FM22004. DUCATI Energia is fully certified following ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 27001: 2013, Iso 37001:2016, ISO 50001: 2018 and the SA8000: 2014.

All this has been achieved thanks to fully automated and integrated production processes, completely new and innovative machines, production process control methods based on accurate specifications and the assigning of responsibility to operators at all levels.

Capacitors, systems and relays comply with the requirements set forth in EC Directives 2014/35 ("Low Voltage Directive"), when applicable.

Nearly all models are certified by international institutes and all are manufactured in full compliance with the requirements of said standards.



Certification of Quality Management System ISO 9001:2015



Certification of Environmental Management System ISO 14001:2018



Certification of Energy Management System ISO 50001:2018



Certification of Occupational Health and Safety Management System ISO 45001:2018



Certification of Information Security Management ISO 27001:2013



Certification of Certification of Information Security Management ISO 37001:2016



SA8000:2014





# CAPACITORS FOR AC FILTER & GENERAL PURPOSE





## GP 84 series

### General purpose capacitors Cylindrical Aluminum Case

GP84 single-phase, cylindrical AC & DC Capacitors are the ideal solution for most AC Filter requirements as well as special PFC projects.

The sturdy construction with Aluminum case and plastic lid, the wide range of available connections and the safety features based on the integrated UL-approved overpressure disconnecter and DRY resin impregnation ensure GP84 can be easily and reliably integrated into any application and environmental condition.

Main characteristics:

- Self-Healing Metallized Polypropylene Film
- UL-Approved Overpressure Safety Device
- Aluminum Case
- DRY Resin filling
- Wide range of connections with high current capability

Main applications:

- AC Filtering
- High-Performance PFC (high harmonics, voltage and RMS/surge current)
- UPS and Wind-Power Applications



#### General Characteristics

|  |  |
|--|--|
| RMS Voltage range                                      | 250 ÷ 930 V  |
| Capacitance range                                      | 10 ÷ 600 µF  |
| Capacitance tolerance                                  | ±5% / ±10%   |
| Max. RMS current                                       | 80 A   |
| Series resistance (Rs)                                 | < 8 mΩ   |
| Thermal resistance natural cooling (R <sub>THC</sub> ) | < 3.0 °C/W   |
| Max. voltage raise of rise (dV/dT)                     | ≤ 100 V/µs   |
| Terminals  | M6 or M10 screw-type bolts or double tag 6.3 x 0.8 mm                              |
| Working temperature                                    | -40 / +85 °C   |
| Storage temperature                                    | -40 / +85 °C   |
| Test voltage   | U <sub>tc</sub> = 3 kVac / 6 kVac @50 Hz 10 s<br>U <sub>tt</sub> = 1.5 x UnDC 10 s |
| Filling  | Dry polyurethane resin   |
| Dielectric   | Metallized PPMh film   |
| Cylindrical case                                       | Aluminum   |
| Life expectancy  | 100.000 h (*)  |
| Failure quota  | 50 / 10E9  |
| Reference standards                                    | IEC 61071 - UL 810   |
| UL-CSA approved ( c  us )<br>-10 kA AFC                | File n. E102953 (**)   |
| M6 Screw Terminals                                     | 3 Nm   |
| M10 Screw Terminals                                    | 6 Nm   |
| M12 fixing bolt  | Max 10 Nm  |

| Life expectancy          | 4.16.84.2xxx Series | 4.16.84.3xxx Series | 4.16.84.4xxx Series | 4.16.84.5xxx Series | 4.16.84.6xxx Series | 4.16.84.9xxx Series |
|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>100.000 h (rated)</b> | 250 V               | 330 V               | 450 V               | 550 V               | 690 V               | 930 V               |
| 50.000 h                 | 275 V               | 360 V               | 500 V               | 575 V               | 760 V               | 1025 V              |
| 25.000 h                 | 300 V               | 400 V               | 540 V               | 630 V               | 830 V               | 1120 V              |
| 12.500 h                 | 330 V               | 450 V               | 600 V               | 690 V               | 930 V               | 1250 V              |

(\*) Life Derating at operating voltage (according to the chart on page 83)  
(\*\*) UL Approved for A, C and F solution (excepted series 690 V - 930 V solution A).



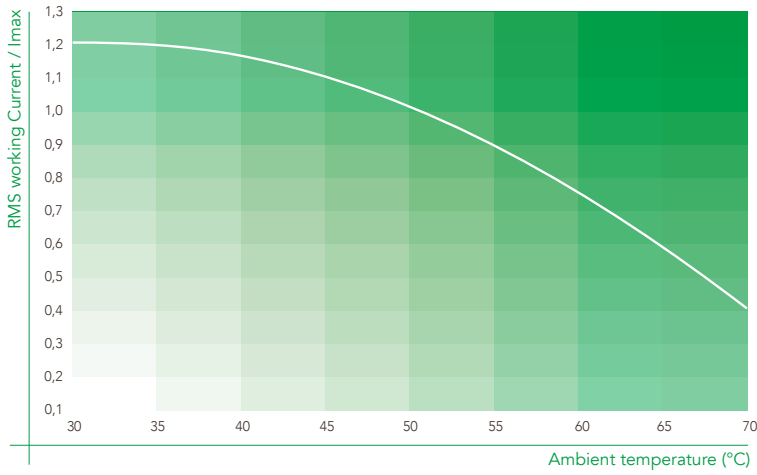
| Cn<br>[μF]  | I <sub>MAX</sub> *<br>[A] | I <sub>PK</sub> C <sub>w</sub><br>[A] | I <sub>PK</sub><br>I <sub>w</sub><br>[kA] | I <sub>s</sub><br>[kA] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | ESL<br>[nH] | Tan MAX<br>@50Hz<br>[10-4] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Mechanical<br>solution | Part n.<br>416.84. | Pcs. /<br>box | Box<br>type |
|---|---------------------------|---------------------------------------|---|------------------------|---|-------------|----------------------------|-----------|-----------|---------------|------------------------|--------------------|---------------|-------------|
| <b>Urms= 250 V Un<sub>AC</sub> = 350 V Un<sub>DC</sub> = 490 V Us= 950 V</b>  |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 60  | 22                        | 33                                    | 1.7                                       | 9                      | 2.7   | 130         | 5.0                        | 55        | 115       | 300           | A / C                  | 2.1x.y             | 28            | 1           |
| 80  | 22                        | 33                                    | 1.7                                       | 9                      | 2.7   | 130         | 5.0                        | 55        | 115       | 340           | A / C                  | 2.1x.y             | 28            | 1           |
| 100   | 25                        | 38                                    | 1.9                                       | 11                     | 2.2   | 160         | 5.0                        | 55        | 150       | 370           | A / C                  | 2.2x.y             | 21            | 1           |
| 120   | 25                        | 38                                    | 1.9                                       | 11                     | 2.2   | 160         | 5.0                        | 55        | 150       | 390           | A / C                  | 2.2x.y             | 21            | 1           |
| 150   | 32                        | 48                                    | 2.4                                       | 13                     | 2.0   | 160         | 5.5                        | 60        | 150       | 450           | A / C / D              | 2.3x.y             | 18            | 1           |
| 175   | 36                        | 54                                    | 2.7                                       | 16                     | 1.8   | 170         | 6.0                        | 65        | 150       | 520           | A / C / E              | 2.4x.y             | 16            | 1           |
| 200   | 38                        | 57                                    | 2.9                                       | 12                     | 1.7   | 180         | 6.5                        | 65        | 165       | 580           | A / C / E              | 2.5x.y             | 16            | 1           |
| 230   | 40                        | 60                                    | 3.0                                       | 20                     | 1.3   | 200         | 7.0                        | 75        | 180       | 820           | F                      | 2.6x.7             | 6             | 2           |
| 250   | 40                        | 60                                    | 3.0                                       | 20                     | 1.3   | 200         | 7.0                        | 75        | 180       | 830           | F                      | 2.6x.7             | 6             | 2           |
| 300   | 40                        | 60                                    | 3.0                                       | 20                     | 1.3   | 200         | 7.0                        | 75        | 180       | 860           | F                      | 2.6x.7             | 6             | 2           |
| 350   | 45                        | 68                                    | 3.4                                       | 20                     | 1.1   | 210         | 7.5                        | 85        | 180       | 980           | F                      | 2.7x.7             | 6             | 2           |
| 400   | 45                        | 68                                    | 3.4                                       | 20                     | 1.1   | 210         | 7.5                        | 85        | 180       | 1050          | F                      | 2.7x.7             | 6             | 2           |
| 500   | 78                        | 117                                   | 5.9                                       | 20                     | 0.9   | 230         | 8.5                        | 90        | 210       | 1400          | F                      | 2.9x.7             | 6             | 3           |
| 600   | 80                        | 120                                   | 6.0                                       | 18                     | 0.8   | 300         | 9.0                        | 85        | 280       | 1700          | F                      | 2.9x.7             | 6             | 4           |
| <b>Urms= 330 V Un<sub>AC</sub> = 470 V Un<sub>DC</sub> = 600 V Us= 1150 V</b> |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 50  | 22                        | 33                                    | 1.7                                       | 7                      | 2.7   | 160         | 5.0                        | 55        | 115       | 320           | A / C                  | 3.1x.y             | 28            | 1           |
| 80  | 26                        | 39                                    | 2.0                                       | 8                      | 2.2   | 160         | 6.0                        | 55        | 150       | 390           | A / C                  | 3.2x.y             | 21            | 1           |
| 100   | 26                        | 39                                    | 2.0                                       | 8                      | 2.2   | 160         | 6.0                        | 55        | 150       | 400           | A / C                  | 3.2x.y             | 21            | 1           |
| 120   | 30                        | 45                                    | 2.3                                       | 10                     | 2.0   | 160         | 6.0                        | 60        | 150       | 460           | A / C / D              | 3.3x.y             | 18            | 1           |
| 150   | 34                        | 51                                    | 2.6                                       | 13                     | 1.8   | 170         | 6.5                        | 65        | 150       | 540           | A / C / E              | 3.4x.y             | 16            | 1           |
| 175   | 38                        | 57                                    | 2.9                                       | 10                     | 1.7   | 180         | 7.0                        | 65        | 165       | 600           | A / C / E              | 3.5x.y             | 16            | 1           |
| 200   | 40                        | 60                                    | 3.0                                       | 14                     | 1.3   | 200         | 7.5                        | 75        | 180       | 860           | F                      | 3.6x.7             | 6             | 2           |
| 250   | 40                        | 60                                    | 3.0                                       | 14                     | 1.3   | 200         | 7.5                        | 75        | 180       | 860           | F                      | 3.6x.7             | 6             | 2           |
| 300   | 45                        | 68                                    | 3.4                                       | 18                     | 1.1   | 210         | 7.5                        | 85        | 180       | 1100          | F                      | 3.7x.7             | 6             | 2           |
| 350   | 70                        | 105                                   | 5.3                                       | 16                     | 1.0   | 230         | 8.0                        | 85        | 210       | 1350          | F                      | 3.8x.7             | 6             | 3           |
| 400   | 75                        | 113                                   | 5.6                                       | 18                     | 0.9   | 230         | 8.5                        | 90        | 210       | 1450          | F                      | 3.9x.7             | 6             | 3           |
| 450   | 80                        | 120                                   | 6.0                                       | 13                     | 0.8   | 300         | 9.0                        | 85        | 280       | 1750          | F                      | 3.9x.7             | 6             | 4           |
| <b>Urms= 450 V Un<sub>AC</sub> = 630 V Un<sub>DC</sub> = 825 V Us= 1600 V</b> |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 20  | 20                        | 30                                    | 1.5                                       | 4                      | 2.7   | 130         | 5.0                        | 55        | 115       | 250           | A / C                  | 4.0x.y             | 28            | 1           |
| 30  | 20                        | 30                                    | 1.5                                       | 4                      | 2.7   | 130         | 5.0                        | 55        | 115       | 300           | A / C                  | 4.0x.y             | 28            | 1           |
| 40  | 24                        | 36                                    | 1.8                                       | 4.5                    | 2.2   | 160         | 6.0                        | 55        | 150       | 370           | A / C                  | 4.1x.y             | 21            | 1           |
| 50  | 24                        | 36                                    | 1.8                                       | 4.5                    | 2.2   | 160         | 6.0                        | 55        | 150       | 400           | A / C                  | 4.1x.y             | 21            | 1           |
| 70  | 28                        | 42                                    | 2.1                                       | 6.8                    | 1.8   | 170         | 6.5                        | 65        | 150       | 530           | A / C / E              | 4.3x.y             | 16            | 1           |
| 80  | 28                        | 42                                    | 2.1                                       | 6.8                    | 1.8   | 170         | 6.5                        | 65        | 150       | 550           | A / C / E              | 4.3x.y             | 16            | 1           |
| 90  | 32                        | 48                                    | 2.4                                       | 5.2                    | 1.7   | 180         | 7.0                        | 65        | 165       | 590           | A / C / E              | 4.4x.y             | 16            | 1           |
| 100   | 38                        | 57                                    | 2.9                                       | 7.4                    | 1.3   | 200         | 7.5                        | 75        | 180       | 860           | F                      | 4.5x.7             | 6             | 2           |
| 150   | 42                        | 63                                    | 3.2                                       | 9.9                    | 1.1   | 210         | 8.0                        | 85        | 180       | 1100          | F                      | 4.6x.7             | 6             | 2           |
| 200   | 70                        | 105                                   | 5.3                                       | 9.7                    | 0.9   | 230         | 8.5                        | 90        | 210       | 1450          | F                      | 4.8x.7             | 6             | 3           |
| 250   | 75                        | 113                                   | 5.6                                       | 7.9                    | 0.8   | 300         | 9.0                        | 85        | 280       | 1710          | F                      | 4.9x.7             | 6             | 4           |
| 300   | 78                        | 117                                   | 5.9                                       | 9.1                    | 0.7   | 300         | 9.0                        | 90        | 280       | 1920          | F                      | 4.9x.7             | 6             | 4           |



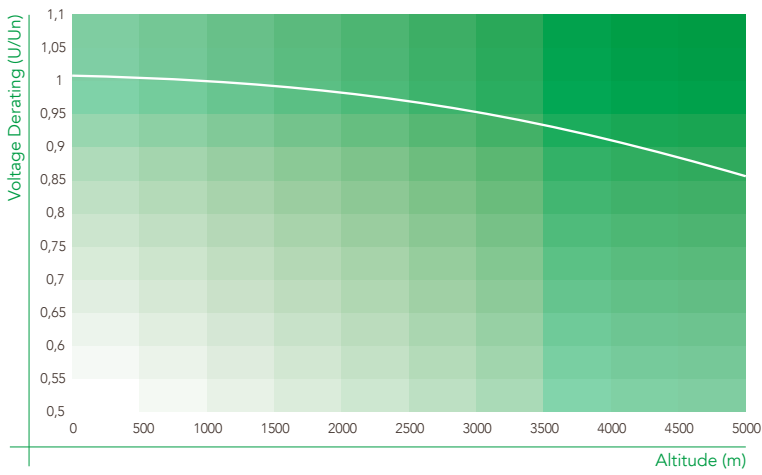
| Cn<br>[μF]  | I <sub>MAX</sub> *<br>[A] | I <sub>PK</sub> C <sub>w</sub><br>[A] | I <sub>PK</sub><br>I <sub>w</sub><br>[kA] | I <sub>s</sub><br>[kA] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | ESL<br>[nH] | Tan MAX<br>@50Hz<br>[10-4] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Mechanical<br>solution | Part n.<br>416.84. | Pcs. /<br>box | Box<br>type |
|---|---------------------------|---------------------------------------|---|------------------------|---|-------------|----------------------------|-----------|-----------|---------------|------------------------|--------------------|---------------|-------------|
| <b>Urms= 550 V Un<sub>AC</sub>= 790 V Un<sub>DC</sub>= 940 V Us= 1800 V</b>   |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 20  | 18                        | 27                                    | 1.4                                       | 2.9                    | 2.7   | 130         | 5.0                        | 55        | 115       | 300           | A / C                  | 5.0x.y             | 28            | 1           |
| 30  | 20                        | 30                                    | 1.5                                       | 3.3                    | 2.2   | 160         | 5.5                        | 55        | 150       | 350           | A / C                  | 5.1x.y             | 21            | 1           |
| 40  | 20                        | 30                                    | 1.5                                       | 3.3                    | 2.2   | 160         | 5.5                        | 55        | 150       | 390           | A / C                  | 5.1x.y             | 21            | 1           |
| 50  | 22                        | 33                                    | 1.7                                       | 4.1                    | 2.0   | 160         | 6.0                        | 60        | 150       | 460           | A / C / D              | 5.2x.y             | 18            | 1           |
| 70  | 26                        | 39                                    | 2.0                                       | 3.9                    | 1.7   | 180         | 7.0                        | 65        | 165       | 590           | A / C / E              | 5.4x.y             | 16            | 1           |
| 80  | 34                        | 51                                    | 2.6                                       | 5.3                    | 1.3   | 200         | 7.5                        | 75        | 180       | 820           | F                      | 5.5x.7             | 6             | 2           |
| 100   | 38                        | 57                                    | 2.9                                       | 7.2                    | 1.1   | 210         | 8.0                        | 85        | 180       | 950           | F                      | 5.6x.7             | 6             | 2           |
| 125   | 38                        | 57                                    | 2.9                                       | 7.2                    | 1.1   | 210         | 8.0                        | 85        | 180       | 1050          | F                      | 5.6x.7             | 6             | 2           |
| 150   | 70                        | 105                                   | 5.3                                       | 5.7                    | 0.8   | 300         | 8.5                        | 85        | 280       | 1550          | F                      | 5.8x.7             | 6             | 4           |
| 200   | 70                        | 105                                   | 5.3                                       | 5.7                    | 0.8   | 300         | 8.5                        | 85        | 280       | 1700          | F                      | 5.8x.7             | 6             | 4           |
| 250   | 76                        | 114                                   | 5.7                                       | 8.3                    | 0.6   | 320         | 9.0                        | 100       | 280       | 2100          | F                      | 5.9x.7             | 6             | 5           |
| 300   | 76                        | 114                                   | 5.7                                       | 8.3                    | 0.6   | 320         | 9.0                        | 100       | 280       | 2400          | F                      | 5.9x.7             | 6             | 5           |
| <b>Urms= 690 V Un<sub>AC</sub>= 990 V Un<sub>DC</sub>= 1350 V Us= 2600 V</b>  |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 10  | 20                        | 30                                    | 1.0                                       | 1.8                    | 2.2   | 160         | 5.0                        | 55        | 150       | 310           | A / C                  | 6.0x.y             | 21            | 1           |
| 15  | 20                        | 30                                    | 1.0                                       | 1.8                    | 2.2   | 160         | 5.0                        | 55        | 150       | 350           | A / C                  | 6.0x.y             | 21            | 1           |
| 20  | 22                        | 33                                    | 1.1                                       | 2.8                    | 1.8   | 170         | 5.0                        | 65        | 150       | 500           | A / C / E              | 6.1x.y             | 16            | 1           |
| 30  | 26                        | 39                                    | 1.3                                       | 2.9                    | 1.7   | 180         | 5.0                        | 65        | 165       | 560           | A / C / E              | 6.2x.y             | 16            | 1           |
| 40  | 30                        | 45                                    | 1.5                                       | 4.0                    | 1.3   | 200         | 5.5                        | 75        | 180       | 780           | F                      | 6.3x.7             | 6             | 2           |
| 50  | 30                        | 45                                    | 1.5                                       | 4.0                    | 1.3   | 200         | 5.5                        | 75        | 180       | 850           | F                      | 6.3x.7             | 6             | 2           |
| 70  | 34                        | 51                                    | 1.7                                       | 4.9                    | 1.0   | 210         | 6.0                        | 85        | 210       | 1150          | F                      | 6.5x.7             | 6             | 3           |
| 85  | 36                        | 54                                    | 1.8                                       | 5.5                    | 0.9   | 220         | 6.5                        | 90        | 210       | 1400          | F                      | 6.6x.7             | 6             | 3           |
| 100   | 38                        | 57                                    | 1.9                                       | 7.1                    | 0.8   | 220         | 7.0                        | 100       | 210       | 1680          | F                      | 6.7x.7             | 6             | 5           |
| 125   | 40                        | 60                                    | 2.0                                       | 4.2                    | 0.7   | 300         | 7.5                        | 90        | 280       | 1860          | F                      | 6.8x.7             | 6             | 4           |
| 150   | 45                        | 68                                    | 2.3                                       | 5.3                    | 0.6   | 300         | 8.0                        | 100       | 280       | 2150          | F                      | 6.9x.7             | 6             | 5           |
| 175   | 45                        | 68                                    | 2.3                                       | 5.3                    | 0.6   | 300         | 8.0                        | 100       | 280       | 2360          | F                      | 6.9x.7             | 6             | 5           |
| <b>Urms= 930 V Un<sub>AC</sub>= 1300 V Un<sub>DC</sub>= 1700 V Us= 3250 V</b> |                           |                                       |   |                        |   |             |                            |           |           |               |                        |                    |               |             |
| 10  | 18                        | 27                                    | 0.9                                       | 1.2                    | 2.2   | 160         | 4.5                        | 55        | 150       | 360           | A / C                  | 9.0x.y             | 21            | 1           |
| 15  | 20                        | 30                                    | 1.0                                       | 1.8                    | 1.8   | 170         | 4.7                        | 65        | 150       | 480           | A / C / E              | 9.1x.y             | 16            | 1           |
| 20  | 22                        | 33                                    | 1.1                                       | 2.6                    | 1.7   | 180         | 5.0                        | 65        | 165       | 550           | A / C / E              | 9.2x.y             | 16            | 1           |
| 30  | 24                        | 36                                    | 1.2                                       | 2.3                    | 1.3   | 200         | 5.3                        | 75        | 180       | 840           | F                      | 9.3x.7             | 6             | 2           |
| 35  | 28                        | 42                                    | 1.4                                       | 3.1                    | 1.1   | 210         | 5.5                        | 75        | 210       | 980           | F                      | 9.4x.7             | 6             | 3           |
| 40  | 30                        | 45                                    | 1.5                                       | 3.1                    | 1.0   | 210         | 5.5                        | 85        | 210       | 1150          | F                      | 9.5x.7             | 6             | 3           |
| 45  | 30                        | 45                                    | 1.5                                       | 3.1                    | 1.0   | 210         | 5.5                        | 85        | 210       | 1220          | F                      | 9.5x.7             | 6             | 3           |
| 50  | 30                        | 45                                    | 1.5                                       | 3.1                    | 1.0   | 210         | 5.5                        | 85        | 210       | 1280          | F                      | 9.5x.7             | 6             | 3           |
| 55  | 34                        | 51                                    | 1.7                                       | 3.5                    | 0.9   | 220         | 5.7                        | 90        | 210       | 1380          | F                      | 9.6x.7             | 6             | 3           |
| 70  | 38                        | 57                                    | 1.9                                       | 4.5                    | 0.8   | 220         | 5.7                        | 100       | 210       | 1720          | F                      | 9.7x.7             | 6             | 5           |
| 85  | 42                        | 63                                    | 2.1                                       | 2.7                    | 0.7   | 300         | 6.0                        | 90        | 280       | 1840          | F                      | 9.8x.7             | 6             | 4           |
| 100   | 45                        | 68                                    | 2.3                                       | 3.4                    | 0.6   | 300         | 6.5                        | 100       | 280       | 2250          | F                      | 9.9x.7             | 6             | 5           |

(Cn) Standard values, other values on request. Code "x": internal reference. Code "y": mechanical solution.

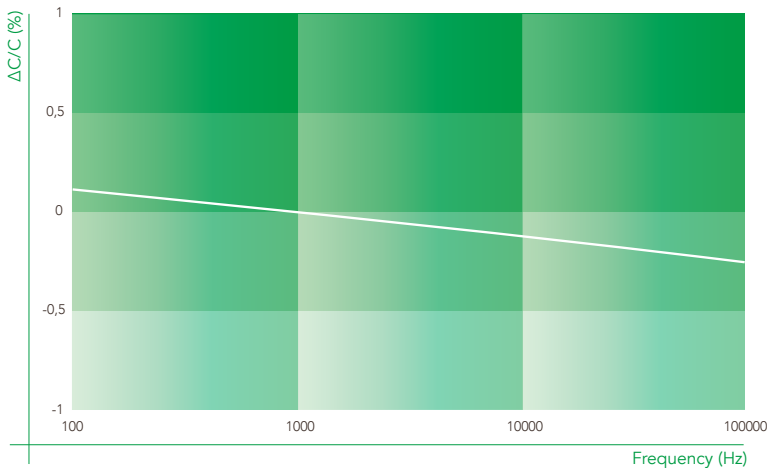
(\*) The maximum rms current is referred to A or F solutions. I<sub>max</sub> ≤ 16 A for C solution.



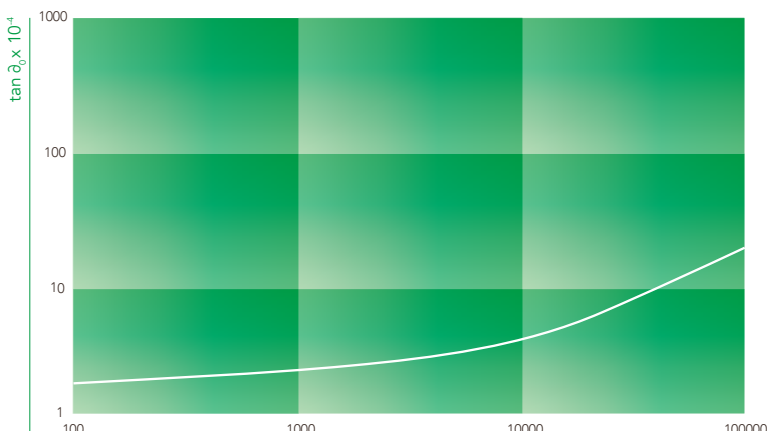
**RMS working current vs Ambient temperature**



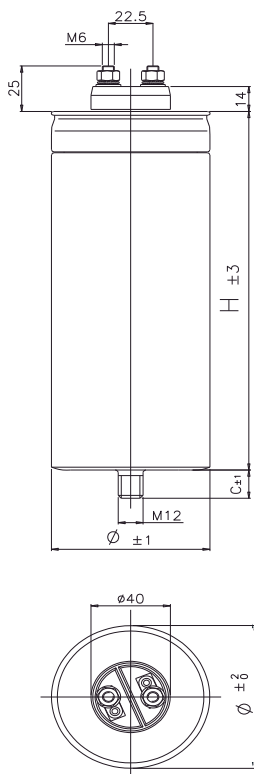
**Voltage Derating vs Altitude**



**Capacitance change vs Frequency (25°C)**

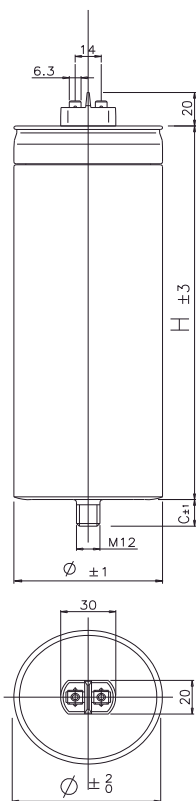


**Dissipation factor change vs Frequency (25°C)**



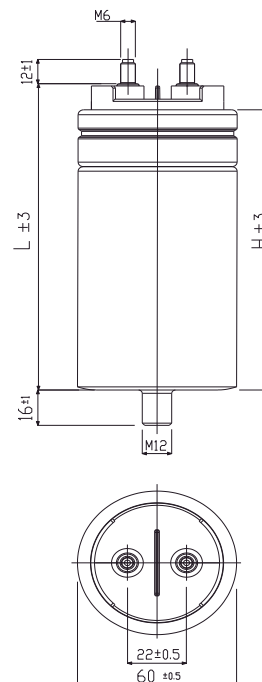
### A SOLUTION

M6 Screw-type bolts  
CODE: 41684.xxx.y  
code "y" = 0



### C SOLUTION

Double tag 6,3x0,8 mm  
CODE: 41684.xxx.y  
code "y" = 2

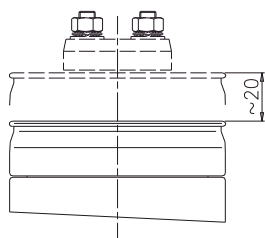


### D SOLUTION (\*) - Ø60

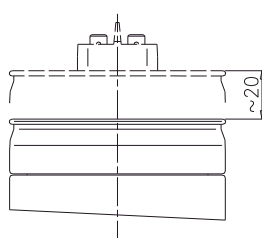
M6 screw -type bolts.  
UL94 V0 plastic cover  
CODE: 41684.xxx.y  
code "y" = 5

### Overpressure safety device

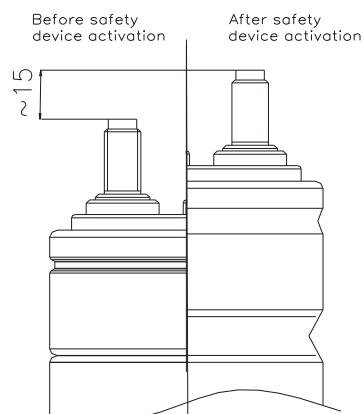
In order to ensure proper device operation, when the capacitor is installed, a clearance of at least the values given on drawing below must be left above terminals.



Dimension with overpressure device activated

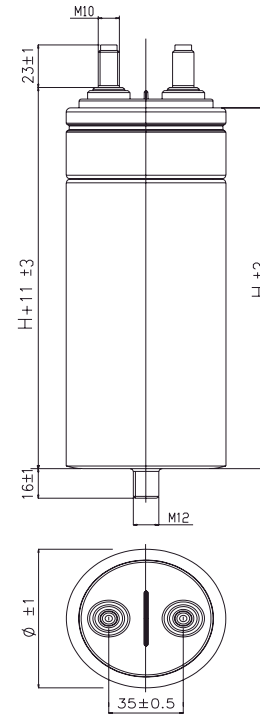
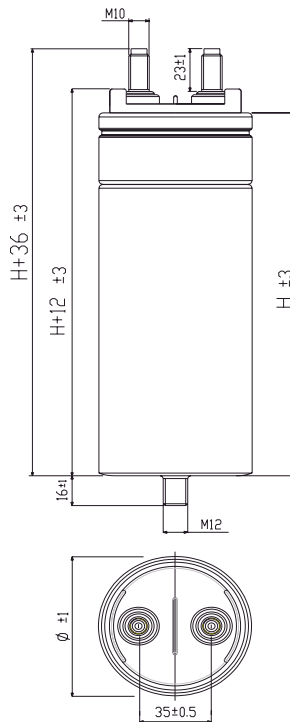
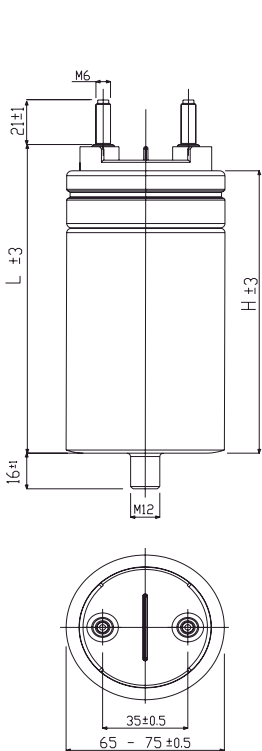


Dimension with overpressure device activated



Dimension with overpressure device activated





**E SOLUTION (\*)** - Ø65/75 mm

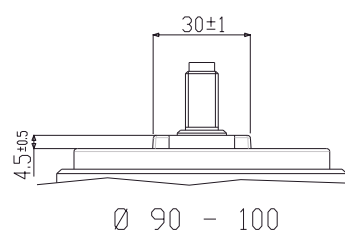
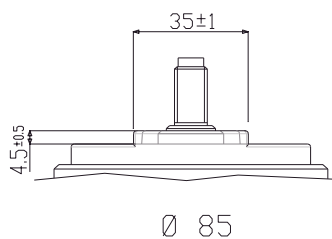
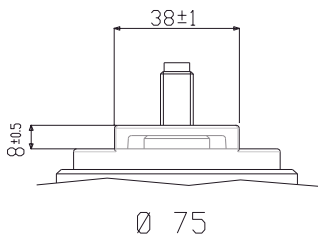
M6 screw -type bolts.  
UL94 V0 plastic cover  
CODE: 41684.xxx.y  
code "y" = 6

**F SOLUTION** - Ø75/85 mm

M10 Screw-type bolts  
UL94 V0 plastic cover  
CODE: 41684.xxx.y  
code "y" = 7

**F SOLUTION** - Ø90/100 mm

M10 Screw-type bolts  
UL94 V0 plastic cover  
CODE: 41684.xxx.y  
code "y" = 7



**F SOLUTION**

different mechanical spacing  
M10 screw -type bolts, Ø75-Ø100 mm.  
UL94 V0 plastic cover

| Box TYPE | Standard box dimensions |
|----------|-------------------------|
| 1        | mm 250 x 386 x 190      |
| 2        | mm 190 x 285 x 265      |
| 3        | mm 190 x 285 x 325      |
| 4        | mm 190 x 285 x 375      |
| 5        | mm 335 x 220 x 375      |

(\*) On request, available also on different diameters.



## GPX 84 series

### High Performance General Purpose Capacitor Cylindrical Aluminum Case

GPX 84 single-phase, cylindrical AC & DC Capacitors are the ideal solution for High Performance applications requiring very high current capability, higher operating temperatures and a lifecycle characterised by very stable capacity values.

In addition to the sturdy construction with Aluminum case and plastic lid, the wide range of available connections and the safety features based on the integrated UL-approved overpressure disconnecter and DRY resin impregnation, GPX 84 includes a fortified internal construction based on busbar connections and a special metallised film design resulting in superior current, temperature and capacity stability parameters.

Main characteristics:

- Self-Healing Metallized Polypropylene Film
- Overpressure Safety Device
- Aluminum Case
- DRY Resin filling
- Wide range of connections with high current capability

Main applications:

- AC Filtering
- High-Performance PFC (high harmonics, voltage and RMS/surge current)
- UPS and Wind-Power Applications



#### General Characteristics

|   |  |
|---|--|
| Rated AC voltage ( $U_{RMS}$ ) - effective                  | 250V - 950V                                |
| Rated DC voltage ( $U_N$ )                                  | 490V - 1850V                               |
| Maximum effective current ( $I_{max}$ ) - continuous        | 120 Arms                                   |
| Capacitance tolerance                                       | ±10%                                       |
| Series resistance (RS)                                      | 1 - 10 mΩ                                  |
| Terminals   | Screw type bolts - M6 / M10                |
| Container   | Aluminum                                   |
| Cover   | UL 94 V0 plastic cover                     |
| Film Dielectric type  | Self-healing metallized polypropylene film |
| Maximum altitude  | 2000 m a.s.l.                              |
| Mounting  | Any position / Indoor                      |
| Maximum torque for fixing stud                              | 10 Nm                                      |
| Maximum torque for M6 terminals                             | 3 Nm                                       |
| Maximum torque for M10 terminals                            | 6 Nm                                       |
| Working ambient temperature                                 | -40 .. +50 °C                              |
| Operating temperature MIN/ MAX (case)                       | -25 .. +70 °C                              |
| Maximum Hotspot temperature                                 | +85 °C                                     |
| Storage temperature   | -40 .. +85 °C                              |
| Humidity category class (DIN 40040)                         | F  |
| AC test Voltage between terminals and container (to ground) | AC: 3 - 5 KV 50Hz 10 s                     |
| Life expectancy (@ $U_N$ / 70°C hot spot)                   | > 120.000 h                                |
| Failure quota   | 50FIT                                      |
| Reference standards   | IEC 61071                                  |
| Material and insulation distance designed according to:     | UL 810                                     |



| Cn<br>[μF]  | I <sub>MAX</sub><br>[A] | I <sub>PK</sub><br>[kA] | I <sub>S</sub><br>[kA] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | R <sub>S</sub><br>[mΩ] | ESL<br>[nH] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Technical<br>solution | Code n.<br>416.84H | Pcs. /<br>box | Box<br>type |
|---|-------------------------|-------------------------|------------------------|---|------------------------|-------------|-----------|-----------|---------------|-----------------------|--------------------|---------------|-------------|
| <b>Urms= 250 V Un<sub>AC</sub> = 350 V Un<sub>DC</sub> = 490 V Us= 950 V</b>  |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 100   | 45                      | 3.0                     | 11                     | 2.2   | 4.5                    | 150         | 60        | 145       | 390           | D                     | 2255               | 18            | A           |
| 150   | 50                      | 3.5                     | 13                     | 2.0   | 4.0                    | 160         | 60        | 164       | 530           | D                     | 2355               | 18            | A           |
| 200   | 55                      | 4.5                     | 15                     | 1.8   | 3.7                    | 180         | 65        | 164       | 560           | E1                    | 2556               | 16            | A           |
| 250   | 60                      | 5.0                     | 20                     | 1.4   | 4.0                    | 190         | 75        | 176       | 850           | E2                    | 2656               | 6             | B           |
| 300   | 70                      | 6.0                     | 20                     | 1.2   | 3.5                    | 210         | 75        | 205       | 1100          | F1                    | 2657               | 6             | B           |
| 400   | 80                      | 8.0                     | 20                     | 1.1   | 2.9                    | 230         | 85        | 205       | 1300          | F2                    | 2757               | 6             | B           |
| 500   | 90                      | 10.0                    | 20                     | 0.9   | 2.8                    | 240         | 90        | 220       | 1600          | F3                    | 2857               | 6             | C           |
| <b>Urms= 350 V Un<sub>AC</sub> = 510 V Un<sub>DC</sub> = 700 V Us= 1200 V</b> |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 100   | 50                      | 3.5                     | 8                      | 1.7   | 4.8                    | 180         | 65        | 164       | 640           | E1                    | 3256               | 16            | A           |
| 200   | 60                      | 5.0                     | 14                     | 1.0   | 5.6                    | 210         | 85        | 205       | 1150          | F2                    | 3497               | 6             | C           |
| 250   | 80                      | 5.5                     | 15                     | 1.0   | 3.2                    | 230         | 85        | 205       | 1300          | F2                    | 3557               | 6             | C           |
| 300   | 90                      | 6.0                     | 15                     | 0.9   | 2.8                    | 240         | 90        | 220       | 1450          | F3                    | 3687               | 6             | C           |
| 400   | 110                     | 8.0                     | 16                     | 0.7   | 2.4                    | 280         | 100       | 245       | 2150          | F3                    | 3857               | 6             | E           |
| 450   | 115                     | 9.0                     | 18                     | 0.6   | 2.6                    | 320         | 100       | 280       | 2350          | F3                    | 3957               | 6             | E           |
| 500   | 120                     | 10.0                    | 20                     | 0.6   | 2.4                    | 320         | 100       | 280       | 2400          | F3                    | 3987               | 6             | E           |
| <b>Urms= 450 V Un<sub>AC</sub> = 630 V Un<sub>DC</sub> = 850 V Us= 1600 V</b> |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 50  | 45                      | 2.0                     | 6                      | 2.1   | 4.8                    | 150         | 60        | 145       | 490           | D                     | 4185               | 18            | A           |
| 100   | 60                      | 3.0                     | 8                      | 1.3   | 4.3                    | 200         | 75        | 176       | 850           | F1                    | 4387               | 6             | B           |
| 150   | 75                      | 4.0                     | 10                     | 1.1   | 3.3                    | 210         | 90        | 176       | 1150          | F3                    | 4487               | 6             | B           |
| 200   | 95                      | 6.0                     | 12                     | 0.9   | 2.5                    | 240         | 90        | 220       | 1550          | F3                    | 4697               | 6             | C           |
| 250   | 100                     | 6.5                     | 14                     | 0.8   | 2.5                    | 310         | 90        | 280       | 1950          | F3                    | 4757               | 6             | D           |
| 300   | 110                     | 6.8                     | 15                     | 0.6   | 2.8                    | 320         | 90        | 280       | 2350          | F3                    | 4857               | 6             | E           |
| 400   | 120                     | 9.0                     | 20                     | 0.4   | 3.5                    | 400         | 100       | 360       | 3050          | F3                    | 4957               | 6             | F           |

(Cn) Standard values, other values on request.

Standard capacitance tolerance: ±10%. Other tolerance values on request

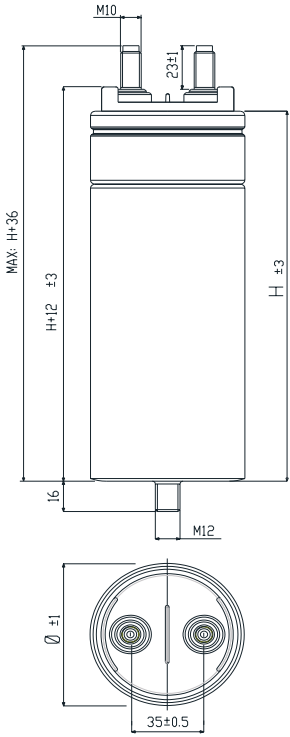
| Cn<br>[μF]  | I <sub>MAX</sub><br>[A] | I <sub>PK</sub><br>[kA] | I <sub>S</sub><br>[kA] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | R <sub>S</sub><br>[mΩ] | ESL<br>[nH] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Technical<br>solution | Code n.<br>416.84H | Pcs. /<br>box | Box<br>type |
|---|-------------------------|-------------------------|------------------------|---|------------------------|-------------|-----------|-----------|---------------|-----------------------|--------------------|---------------|-------------|
| <b>Urms= 550 V Un<sub>AC</sub> = 790 V Un<sub>DC</sub> = 940 V Us= 1800 V</b>   |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 30  | 35                      | 1.6                     | 5                      | 2.1   | 7.8                    | 150         | 60        | 145       | 490           | D                     | 5185               | 18            | A           |
| 50  | 45                      | 2.4                     | 7                      | 1.3   | 7.6                    | 200         | 75        | 176       | 870           | E2                    | 5256               | 6             | B           |
| 70  | 60                      | 3.2                     | 8                      | 1.1   | 5.1                    | 230         | 75        | 205       | 1050          | F1                    | 5277               | 6             | C           |
| 100   | 75                      | 4.0                     | 10                     | 1.0   | 3.6                    | 230         | 85        | 205       | 1300          | F2                    | 5387               | 6             | C           |
| 150   | 90                      | 5.0                     | 12                     | 0.8   | 3.1                    | 310         | 90        | 280       | 1950          | F3                    | 5487               | 6             | D           |
| 200   | 105                     | 6.4                     | 14                     | 0.6   | 3.1                    | 320         | 100       | 280       | 2350          | F3                    | 5567               | 6             | E           |
| 250   | 110                     | 8.2                     | 15                     | 0.4   | 4.2                    | 400         | 100       | 360       | 3050          | F3                    | 5747               | 6             | F           |
| 300   | 120                     | 10.0                    | 20                     | 0.4   | 3.5                    | 400         | 100       | 360       | 3100          | F3                    | 5897               | 6             | F           |
| <b>Urms= 730 V Un<sub>AC</sub> = 1050 V Un<sub>DC</sub> = 1450 V Us= 2600 V</b> |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 10  | 35                      | 0.8                     | 2.2                    | 2.1   | 7.8                    | 150         | 60        | 145       | 490           | D                     | 6045               | 18            | A           |
| 30  | 50                      | 1.5                     | 4                      | 1.3   | 6.2                    | 200         | 75        | 176       | 880           | E2                    | 6286               | 6             | B           |
| 50  | 70                      | 2.5                     | 8                      | 1.0   | 4.1                    | 230         | 85        | 205       | 1350          | F2                    | 6357               | 6             | B           |
| 70  | 90                      | 3.6                     | 10                     | 0.9   | 2.8                    | 250         | 90        | 245       | 1700          | F3                    | 6557               | 6             | C           |
| 100   | 100                     | 5.0                     | 12                     | 0.7   | 2.9                    | 300         | 100       | 280       | 2150          | F3                    | 6697               | 6             | E           |
| 120   | 110                     | 6.2                     | 12.6                   | 0.6   | 2.8                    | 320         | 100       | 280       | 2350          | F3                    | 6897               | 6             | E           |
| 150   | 120                     | 7.5                     | 18                     | 0.4   | 3.5                    | 400         | 100       | 360       | 3100          | F3                    | 6977               | 6             | F           |
| <b>Urms= 950 V Un<sub>AC</sub> = 1350 V Un<sub>DC</sub> = 1850 V Us= 3300 V</b> |                         |                         |                        |   |                        |             |           |           |               |                       |                    |               |             |
| 10  | 32                      | 0.8                     | 3.0                    | 1.8   | 10.9                   | 170         | 65        | 164       | 480           | E1                    | 9166               | 16            | A           |
| 20  | 45                      | 1.4                     | 3.0                    | 1.1   | 9.0                    | 230         | 75        | 205       | 1050          | F1                    | 9287               | 6             | B           |
| 30  | 55                      | 1.8                     | 5.0                    | 1.0   | 6.7                    | 230         | 85        | 205       | 1350          | F2                    | 9397               | 6             | B           |
| 50  | 80                      | 3.0                     | 7.0                    | 0.8   | 7.0                    | 310         | 90        | 280       | 1950          | F3                    | 9597               | 6             | E           |
| 65  | 80                      | 4.2                     | 10.0                   | 0.6   | 5.3                    | 320         | 100       | 280       | 2350          | F3                    | 9697               | 6             | E           |
| 80  | 90                      | 5.0                     | 12.0                   | 0.4   | 6.2                    | 400         | 100       | 360       | 3050          | F3                    | 9797               | 6             | F           |
| 90  | 110                     | 6.0                     | 15.0                   | 0.4   | 4.2                    | 400         | 100       | 360       | 3100          | F3                    | 9897               | 6             | F           |

(Cn) Standard values, other values on request.

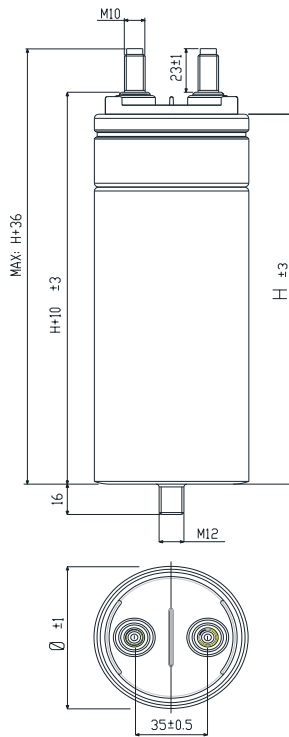
Standard capacitance tolerance: ±10%. Other tolerance values on request

| Box TYPE | Standard box dimensions |
|----------|-------------------------|
| A        | mm 190 x 250 x 386      |
| B        | mm 190 x 285 x 265      |
| C        | mm 190 x 285 x 325      |
| D        | mm 190 x 285 x 375      |
| E        | mm 220 x 335 x 375      |
| F        | mm 220 x 335 x 450      |

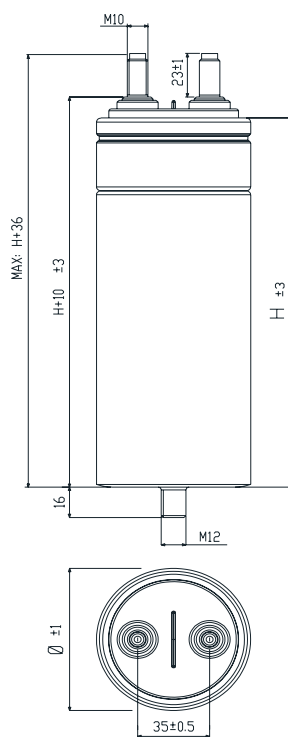
| TECHNICAL SOLUTION<br>(Terminal type) | D  | E1 | E2 | F1 | F2 | F3 |
|---------------------------------------|----|----|----|----|----|----|
| Min. Creepage distance (mm)           | 30 | 32 | 32 | 28 | 28 | 28 |
| Min. Clearance distance (mm)          | 14 | 21 | 21 | 20 | 20 | 20 |



**F1 SOLUTION**  
Ø75 M10



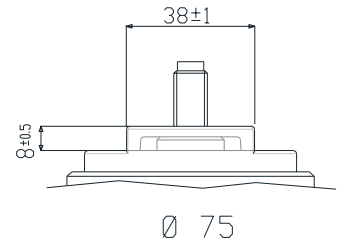
**F2 SOLUTION**  
Ø85 M10



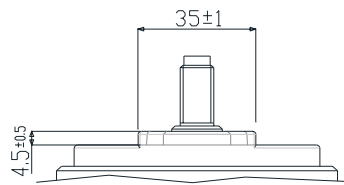
**F3 SOLUTION**  
Ø90 - 100 - (116)  
M10

**Overpressure safety device**

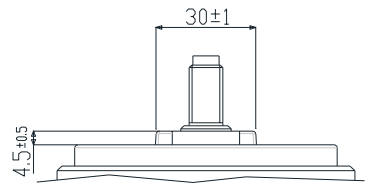
In order to ensure proper device operation, when the capacitor is installed, a clearance of at least the values given on drawing below must be left above terminals.



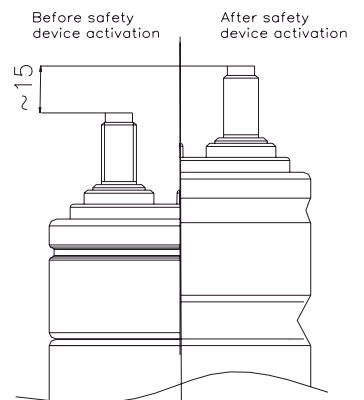
Ø 75



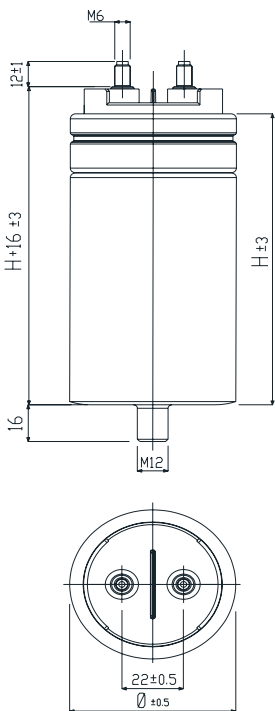
Ø 85



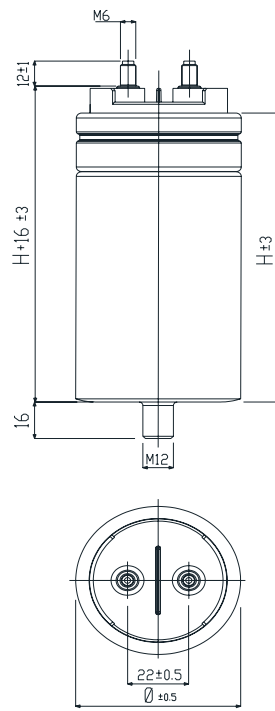
Ø 90 - 100



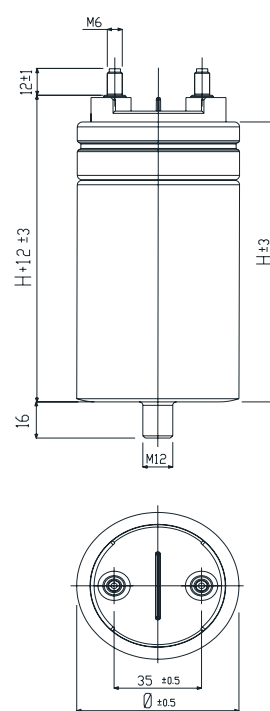
Dimension with overpressure device activated



**D SOLUTION**  
Ø60 M6



**E1 SOLUTION**  
Ø65 M6



**E2 SOLUTION**  
Ø75 M6

## GP 42 series

### Compact General Purpose Capacitors Cylindrical Aluminum Case

With its compact size and simple construction, GP42 is an efficient solution for AC Filtering applications requiring relatively low capacities and currents.

Main characteristics:

- Self-Healing Metallized Polypropylene Film
- Overpressure Safety Device
- Aluminum Case
- DRY Resin filling

Main applications:

- AC Filtering
- High-Performance PFC (high harmonics, voltage and RMS/surge current)
- UPS and Wind-Power Applications



#### General Characteristics

|   |  |
|---|--|
| RMS Voltage range                         | 250 ÷ 930 V  |
| Capacitance range                         | 0.1÷100 µF   |
| Capacitance tolerance                     | ±5% / ±10%   |
| Max. RMS current                          | 10 A / 16 A  |
| Maximum working frequency                 | 10 kHz   |
| Thermal resistance natural cooling (RTHc) | < 12 °C/W  |
| Series resistance (RS)                    | < 5 mΩ   |
| Terminals                                 | Single or double tag 6.3x0.8 mm  |
| Working temperature                       | -40 / +70 °C   |
| Storage temperature                       | -40 / +85 °C   |
| Test voltage                              | U <sub>tc</sub> = 3 kVac / 6 kVac @50 Hz 10 s<br>U <sub>tt</sub> = 1.5 x UnDC 10 s |
| Filling                                   | Dry polyurethane resin   |
| Dielectric                                | Metallized PPM film  |
| Cylindrical case                          | Aluminum   |
| Life expectancy                           | 80.000 h (*)   |
| Failure quota                             | 300/10E9   |
| Reference standards                       | IEC 61071-1/2 - UL 810   |
| Overpressure Safety Device                | Integrated   |
| M8 fixing bolt                            | Max 5 Nm   |
| M12 fixing bolt                           | Max 10 Nm  |

| Life expectancy         | 4.16.42.1xxx Series | 4.16.42.2xxx Series | 4.16.42.3xxx Series | 4.16.42.4xxx Series | 4.16.42.6xxx Series | 4.16.42.9xxx Series |
|-------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <b>80.000 h (rated)</b> | 250 V               | 330 V               | 450 V               | 550 V               | 690 V               | 930 V               |
| 40.000 h                | 275 V               | 360 V               | 500 V               | 575 V               | 760 V               | 1025 V              |
| 20.000 h                | 300 V               | 400 V               | 540 V               | 630 V               | 830 V               | 1120 V              |
| 10.000 h                | 330 V               | 450 V               | 600 V               | 690 V               | 930 V               | 1250 V              |

(\*) Life Derating at operating voltage (according to the chart on page 83).



| Cn<br>[μF]  | I <sub>MAX</sub><br>[A] | I <sub>PK</sub> C <sub>w</sub><br>[A] | I <sub>pk</sub> I <sub>w</sub><br>[kA] | dV/dTmax<br>[V/μs] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | Tan MAX<br>@50Hz [10-4] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Part n.<br>416.42. | Pcs. / box | Box type |
|---|-------------------------|---------------------------------------|--|--------------------|---|-------------------------|-----------|-----------|---------------|--------------------|------------|----------|
| <b>Urms= 250 V Un<sub>AC</sub>= 350 V Un<sub>DC</sub>= 490 V Us= 840 V</b>  |                         |                                       |  |                    |   |                         |           |           |               |                    |            |          |
| 2   | 5.0                     | 8                                     | 0.1                                    | 50                 | 11.7  | 3.5                     | 25        | 60        | 40            | 1.05.x             | 250        | 6        |
| 5   | 6.5                     | 10                                    | 0.3                                    | 50                 | 9.4   | 4.0                     | 30        | 60        | 50            | 1.23.x             | 200        | 6        |
| 10  | 7.5                     | 11                                    | 0.5                                    | 45                 | 6.8   | 4.5                     | 35        | 72        | 80            | 1.42.x             | 100        | 7        |
| 15  | 8.0                     | 12                                    | 0.7                                    | 45                 | 5.8   | 5.0                     | 40        | 72        | 100           | 1.55.x             | 100        | 6        |
| 20  | 8.5                     | 13                                    | 0.7                                    | 30                 | 4.5   | 5.5                     | 40        | 98        | 140           | 1.63.x             | 50         | 7        |
| 25  | 8.5                     | 13                                    | 0.8                                    | 30                 | 4.5   | 5.5                     | 40        | 98        | 150           | 1.68.x             | 50         | 7        |
| 30  | 9.0                     | 14                                    | 1.0                                    | 30                 | 3.9   | 5.5                     | 40        | 98        | 170           | 1.69.x             | 50         | 7        |
| 40  | 10.0                    | 15                                    | 0.9                                    | 20                 | 3.3   | 6.0                     | 45        | 122       | 220           | 1.82.x             | 25         | 7        |
| 50  | 10.0                    | 15                                    | 1.1                                    | 20                 | 3.3   | 6.0                     | 45        | 122       | 230           | 1.89.x             | 25         | 7        |
| 60  | 10.0                    | 15                                    | 1.3                                    | 20                 | 2.9   | 6.0                     | 50        | 122       | 270           | 1.92.x             | 25         | 7        |
| 70  | 10.0                    | 15                                    | 1.5                                    | 20                 | 2.6   | 6.5                     | 55        | 122       | 320           | 1.95.x             | 25         | 6        |
| 80  | 10.0                    | 15                                    | 1.5                                    | 20                 | 2.6   | 6.5                     | 55        | 132       | 330           | 1.97.x             | 25         | 6        |
| 100   | 10.0                    | 15                                    | 1.7                                    | 15                 | 2.1   | 7.0                     | 60        | 137       | 420           | 1.99.x             | 25         | 6        |
| <b>Urms= 330 V Un<sub>AC</sub>= 470 V Un<sub>DC</sub>= 600 V Us= 1120 V</b> |                         |                                       |  |                    |   |                         |           |           |               |                    |            |          |
| 1   | 5.0                     | 8                                     | 0.1                                    | 50                 | 11.7  | 3.5                     | 25        | 60        | 40            | 2.03.x             | 250        | 6        |
| 2   | 6.0                     | 9                                     | 0.2                                    | 70                 | 10.4  | 3.5                     | 30        | 53        | 50            | 2.12.x             | 200        | 7        |
| 5   | 7.0                     | 11                                    | 0.3                                    | 50                 | 7.8   | 4.5                     | 35        | 60        | 80            | 2.39.x             | 125        | 6        |
| 10  | 8.0                     | 12                                    | 0.5                                    | 45                 | 5.8   | 5.0                     | 40        | 72        | 100           | 2.49.x             | 100        | 6        |
| 15  | 8.5                     | 13                                    | 0.5                                    | 30                 | 4.5   | 5.5                     | 40        | 98        | 140           | 2.58.x             | 50         | 7        |
| 20  | 9.0                     | 14                                    | 0.7                                    | 30                 | 3.9   | 5.5                     | 45        | 98        | 180           | 2.68.x             | 50         | 6        |
| 25  | 10.0                    | 15                                    | 0.6                                    | 20                 | 3.3   | 6.0                     | 45        | 122       | 220           | 2.75.x             | 25         | 7        |
| 35  | 10.0                    | 15                                    | 0.8                                    | 20                 | 2.9   | 6.5                     | 50        | 122       | 270           | 2.88.x             | 25         | 7        |
| 50  | 10.0                    | 15                                    | 0.8                                    | 15                 | 2.4   | 6.5                     | 55        | 132       | 350           | 2.94.x             | 25         | 6        |
| 60  | 10.0                    | 15                                    | 1.0                                    | 15                 | 2.1   | 7.0                     | 60        | 137       | 430           | 2.98.x             | 25         | 6        |
| <b>Urms= 450 V Un<sub>AC</sub>= 640 V Un<sub>DC</sub>= 890 V Us= 1400 V</b> |                         |                                       |  |                    |   |                         |           |           |               |                    |            |          |
| 1   | 5.0                     | 8                                     | 0.1                                    | 50                 | 11.7  | 3.5                     | 25        | 60        | 40            | 3.08.x             | 250        | 6        |
| 2   | 6.5                     | 10                                    | 0.1                                    | 50                 | 9.4   | 4.0                     | 30        | 60        | 50            | 3.29.x             | 200        | 6        |
| 5   | 8.0                     | 12                                    | 0.2                                    | 45                 | 5.8   | 5.0                     | 40        | 72        | 100           | 3.47.x             | 100        | 6        |
| 10  | 8.5                     | 13                                    | 0.3                                    | 30                 | 4.5   | 5.5                     | 40        | 98        | 140           | 3.58.x             | 50         | 7        |
| 15  | 10.0                    | 15                                    | 0.3                                    | 20                 | 3.3   | 6.0                     | 45        | 122       | 220           | 3.77.x             | 25         | 7        |
| 20  | 10.0                    | 15                                    | 0.4                                    | 20                 | 2.9   | 6.5                     | 50        | 122       | 270           | 3.88.x             | 25         | 7        |
| 25  | 10.0                    | 15                                    | 0.4                                    | 15                 | 2.4   | 6.5                     | 55        | 132       | 350           | 3.92.x             | 25         | 6        |
| 30  | 10.0                    | 15                                    | 0.5                                    | 15                 | 2.4   | 6.5                     | 55        | 132       | 360           | 3.95.x             | 25         | 6        |
| 35  | 10.0                    | 15                                    | 0.6                                    | 15                 | 2.1   | 7.0                     | 60        | 137       | 430           | 3.97.x             | 25         | 6        |
| 40  | 10.0                    | 15                                    | 0.7                                    | 15                 | 2.1   | 7.0                     | 60        | 137       | 440           | 3.99.x             | 25         | 6        |





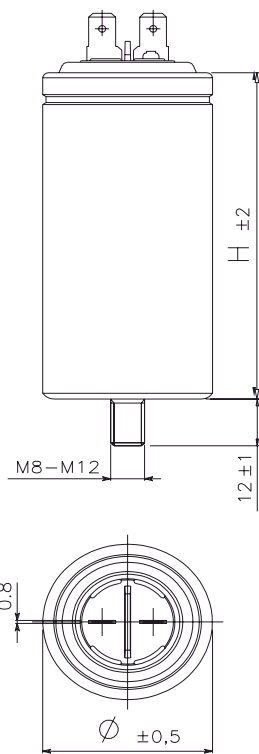
| Cn<br>[μF]  | I <sub>MAX</sub><br>[A] | I <sub>PK</sub> C <sub>w</sub><br>[A] | I <sub>pk</sub> I <sub>w</sub><br>[kA] | dV/dTmax<br>[V/μs] | R <sub>THC</sub><br>natural cooling<br>[°C/W] | Tan MAX<br>@50Hz [10 <sup>-4</sup> ] | Ø<br>[mm] | H<br>[mm] | Weight<br>[g] | Part n.<br>416.42. | Pcs. / box | Box type |
|---|-------------------------|---------------------------------------|--|--------------------|---|--------------------------------------|-----------|-----------|---------------|--------------------|------------|----------|
| <b>Urms= 550 V Un<sub>AC</sub>= 780 V Un<sub>DC</sub>= 940 V Us= 1680 V</b>   |                         |                                       |  |                    |   |                                      |           |           |               |                    |            |          |
| 1   | 7.0                     | 11                                    | 0.1                                    | 60                 | 6.3   | 3.0                                  | 30        | 98        | 70            | 4.10.x             | 125        | 6        |
| 2   | 7.0                     | 11                                    | 0.1                                    | 60                 | 5.2   | 3.0                                  | 30        | 98        | 80            | 4.15.x             | 125        | 6        |
| 5   | 8.5                     | 13                                    | 0.3                                    | 60                 | 4.5   | 3.5                                  | 40        | 98        | 140           | 4.33.x             | 50         | 7        |
| 10  | 9.5                     | 14                                    | 0.7                                    | 60                 | 3.5   | 4.0                                  | 50        | 98        | 220           | 4.58.x             | 25         | 7        |
| 15  | 10.0                    | 15                                    | 0.7                                    | 40                 | 2.4   | 4.5                                  | 55        | 132       | 360           | 4.63.x             | 25         | 6        |
| 20  | 10.0                    | 15                                    | 0.9                                    | 40                 | 2.4   | 4.5                                  | 55        | 132       | 370           | 4.68.x             | 25         | 6        |
| 25  | 10.0                    | 15                                    | 1.1                                    | 40                 | 2.1   | 5.0                                  | 60        | 137       | 420           | 4.78.x             | 25         | 6        |
| 35  | 10.0                    | 15                                    | 1.0                                    | 25                 | 1.7   | 5.5                                  | 60        | 181       | 560           | 4.88.x             | 18         | 6        |
| <b>Urms= 690 V Un<sub>AC</sub>= 990 V Un<sub>DC</sub>= 1350 V Us= 2240 V</b>  |                         |                                       |  |                    |   |                                      |           |           |               |                    |            |          |
| 0.68  | 7.0                     | 11                                    | 0.1                                    | 60                 | 6.3   | 3.0                                  | 30        | 98        | 80            | 6.12.x             | 125        | 6        |
| 1   | 7.0                     | 11                                    | 0.1                                    | 60                 | 6.3   | 3.0                                  | 30        | 98        | 90            | 6.15.x             | 125        | 6        |
| 2   | 8.0                     | 12                                    | 0.1                                    | 60                 | 5.2   | 3.0                                  | 35        | 98        | 110           | 6.23.x             | 50         | 7        |
| 5   | 9.5                     | 14                                    | 0.3                                    | 60                 | 3.5   | 4.0                                  | 50        | 98        | 220           | 6.51.x             | 25         | 7        |
| 8   | 10.0                    | 15                                    | 0.4                                    | 40                 | 2.4   | 4.5                                  | 55        | 132       | 360           | 6.62.x             | 25         | 6        |
| 10  | 10.0                    | 15                                    | 0.4                                    | 40                 | 2.4   | 4.5                                  | 55        | 132       | 370           | 6.68.x             | 25         | 6        |
| 12  | 10.0                    | 15                                    | 0.7                                    | 40                 | 2.1   | 5.0                                  | 60        | 137       | 420           | 6.74.x             | 25         | 6        |
| 20  | 10.0                    | 15                                    | 0.6                                    | 25                 | 1.7   | 5.5                                  | 60        | 181       | 560           | 6.88.x             | 18         | 6        |
| <b>Urms= 930 V Un<sub>AC</sub>= 1300 V Un<sub>DC</sub>= 1700 V Us= 2800 V</b> |                         |                                       |  |                    |   |                                      |           |           |               |                    |            |          |
| 0.68  | 8.5                     | 13                                    | 0.1                                    | 60                 | 3.9   | 3.0                                  | 40        | 115       | 160           | 9.10.4             | 50         | 7        |
| 1   | 8.5                     | 13                                    | 0.1                                    | 60                 | 3.9   | 3.0                                  | 40        | 115       | 170           | 9.14.4             | 50         | 7        |
| 2   | 8.5                     | 13                                    | 0.1                                    | 60                 | 3.9   | 3.0                                  | 40        | 115       | 190           | 9.18.4             | 50         | 7        |
| 5   | 10.5                    | 16                                    | 0.3                                    | 60                 | 2.7   | 4.0                                  | 55        | 115       | 300           | 9.49.4             | 25         | 6        |
| 8   | 12.0                    | 18                                    | 0.4                                    | 40                 | 2.0   | 4.5                                  | 60        | 150       | 470           | 9.61.4             | 25         | 6        |
| 10  | 14.0                    | 21                                    | 0.4                                    | 40                 | 1.8   | 5.0                                  | 65        | 150       | 550           | 9.75.4             | 20         | 6        |
| 12  | 16.0                    | 24                                    | 0.5                                    | 35                 | 1.7   | 5.5                                  | 65        | 165       | 600           | 9.85.4             | 15         | 6        |
| 14  | 16.0                    | 24                                    | 0.5                                    | 35                 | 1.7   | 5.5                                  | 65        | 165       | 620           | 9.89.4             | 15         | 6        |

(Cn) Standard values, other values on request.

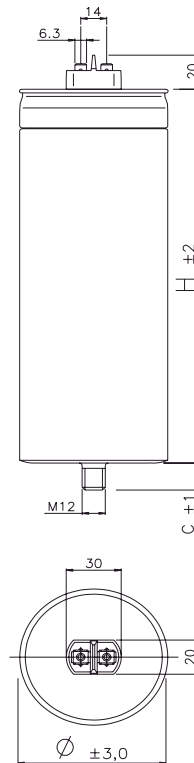
Code "x": according to the mechanical configuration, see figures at page 26 (only for A solution).

| Box TYPE | Standard box dimensions |
|----------|-------------------------|
| 6        | mm 195 x 390 x 250      |
| 7        | mm 195 x 390 x 200      |

| STUD | Capacitor diameter       |
|------|--------------------------|
| M8   | Ø 25 - 30 - 40 - 45 - 50 |
| M12  | Ø 55 - 60                |

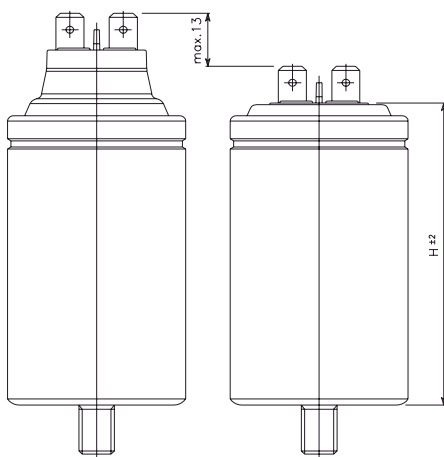


**Example of cover configuration - A solution** according as shown in "Table 1", the code "x" in this example cover configuration is equal to "3": 6,3x0,8 single tag terminals



**Cover configuration - B solution** for this type of solution, is set only x = 4 configuration: 6,3x0,8 double tag terminals

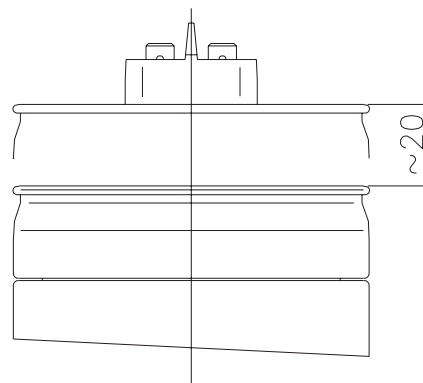
C is equal to 12 mm for diameter up to  $\varnothing 60$  mm. For higher diameter, C is equal to 16 mm.



### A SOLUTION

#### Overpressure safety device

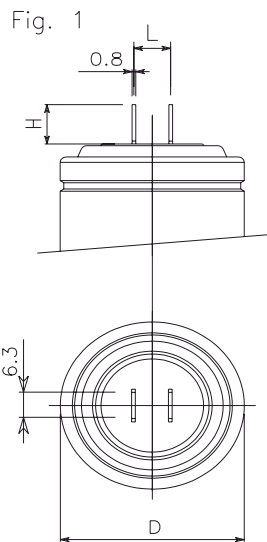
In order to ensure proper device operation, when the capacitor is installed, a clearance of at least 13mm must be left above terminals.



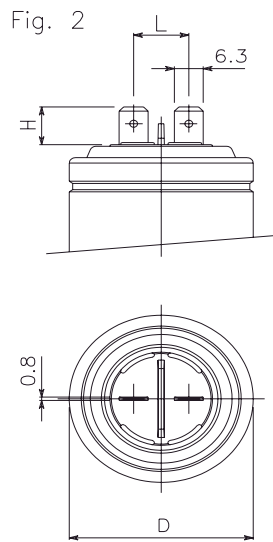
### B SOLUTION

#### Overpressure safety device

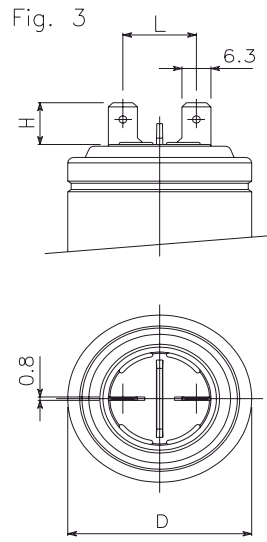
In order to ensure proper device operation, when the capacitor is installed, a clearance of at least 20mm must be left above terminals.



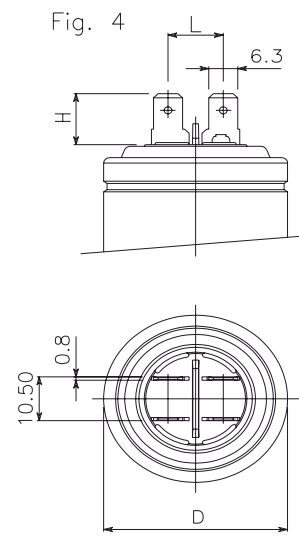
CODE .x. = 1



CODE .x. = 2



CODE .x. = 3



CODE .x. = 4

| D<br>(mm) | Fig 1     |           | Fig 2     |           | Fig 3     |           | Fig 4     |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|           | H<br>(mm) | L<br>(mm) | H<br>(mm) | L<br>(mm) | H<br>(mm) | L<br>(mm) | H<br>(mm) | L<br>(mm) |
| 25        | 10.9      | 8         |           |           |           |           |           |           |
| 30        | 10.9      | 8         | 9         | 12        |           |           |           |           |
| 35        |           |           | 9         | 12        |           |           | 12.2      | 12        |
| 40        |           |           | 9         | 12        | 10        | 16        | 12.2      | 12        |
| 45        |           |           | 9         | 12        | 10        | 16        | 12.2      | 12        |
| 50        |           |           | 9         | 12        | 10        | 16        | 12.2      | 12        |
| 55        |           |           | 9         | 12        | 10        | 16        | 12.2      | 12        |
| 60        |           |           | 8.9       | 15.5      |           |           | 12        | 20.5      |



## GP 81 series

### High Performance AC Filter Capacitor Small plastic Box Case

GP 81 Capacitors are the ideal solution as AC filter for power electronic applications requiring high current capability and small size designed for mounting on print circuit board. It provides to customers a modular solution on which to develop and scale their projects. In addition, the construction with internal wound element made with special metallized film, very low internal self-inductance and potted with resin in self-extinguish plastic case give a superior capacitor type with very high stability and reliability performance.

#### Main characteristics:

- Self-Healing Metallized Polypropylene Film
- Small size, very low ESL
- Self-extinguish Plastic Case
- DRY Self-extinguish Resin filling
- Modular shape

#### Main applications:

- AC Filtering
- UPS
- Wind and Solar Power Applications



#### General Characteristics

|   |  |
|---|--|
| Rated AC voltage (Urms) - effective                         | 200 - 550                                  |
| Capacitance tolerance                                       | ±10%                                       |
| Maximum effective current (Imax) - continuous               | 40 Arms                                    |
| Series resistance (RS)                                      | 1 – 3.5 mΩ                                 |
| Terminals   | Double flat tag 15x0.8mm with Ø6.2mm holes |
| Film Dielectric type  | Self-healing metallized polypropylene film |
| Box container   | Self-extinguish plastic                    |
| Mounting  | Any position - Indoor / On PCB             |
| Insulation distance CREEPAGE / CLEARANCE:                   | 38 / 38 mm                                 |
| Self Inductance (ESL)                                       | < 20 nH                                    |
| Working ambient temperature                                 | -25 .. +50 °C                              |
| Operating temperature MIN/ MAX (case)                       | -25 .. +70 °C                              |
| Maximum Hotspot temperature                                 | +85 °C                                     |
| Storage temperature   | -40 .. +85 °C                              |
| AC test voltage between terminals                           | 2x Un – 10s                                |
| AC test Voltage between terminals and container (to ground) | 2.5kVac 50Hz 10 s                          |
| Life expectancy (@Un / 60°C hot spot)                       | 70.000 h                                   |
| Failure quota   | 300 FIT                                    |
| Reference standards   | IEC 61071-1/2                              |

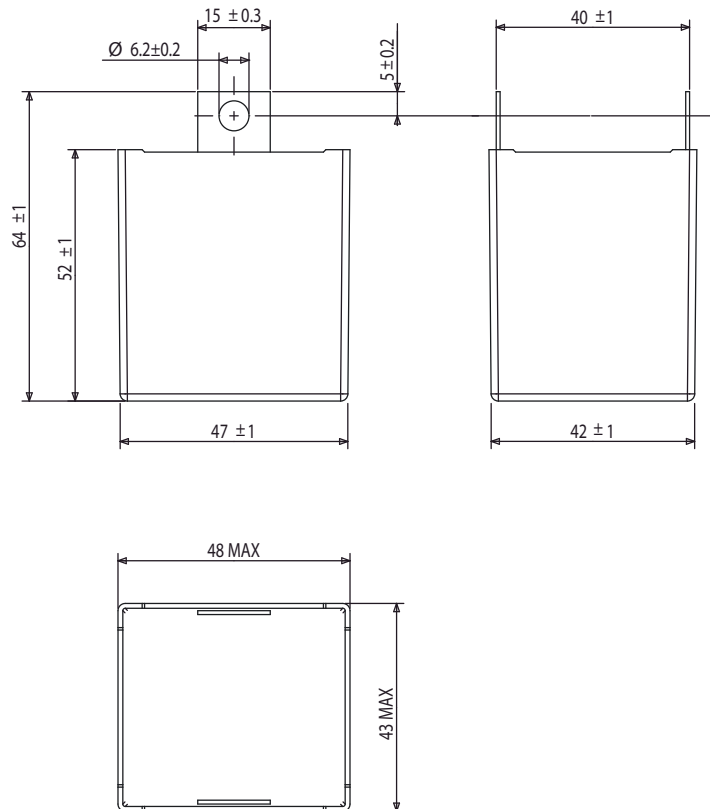


| Capacitance<br>Cn [μF] | AC RMS<br>Voltage<br>Urms [V] | Rated<br>AC Voltage<br>Un [V] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Rated<br>Current<br>@50Hz<br>In [A] | Repet.<br>Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Self-<br>inductance<br>ESL [nH] | Thermal<br>Resistance<br>R <sub>TH</sub> [°C/W] | Part number<br>416.81. |
|------------------------|-------------------------------|-------------------------------|-----------------------------|---|-------------------------------------|-------------------------------------|-----------------------------|---------------------------------|---------------------------------|---|------------------------|
| 50                     | 200                           | 300                           | 0,6                         | 37  | 3,1                                 | 1406                                | 3,0                         | 1,30                            | 15                              | 12,5  | 2090                   |
| 30                     | 250                           | 375                           | 0,8                         | 30  | 2,4                                 | 1140                                | 2,7                         | 1,60                            | 15                              | 12,5  | 2590                   |
| 20                     | 300                           | 450                           | 0,9                         | 25  | 1,9                                 | 950                                 | 2,3                         | 2,10                            | 15                              | 12,5  | 3090                   |
| 15                     | 350                           | 525                           | 1,1                         | 23  | 1,6                                 | 874                                 | 2,1                         | 2,25                            | 15                              | 12,5  | 3590                   |
| 12                     | 400                           | 600                           | 1,2                         | 20  | 1,5                                 | 760                                 | 1,9                         | 2,60                            | 15                              | 12,5  | 4090                   |
| 9                      | 450                           | 675                           | 1,4                         | 18  | 1,3                                 | 684                                 | 1,8                         | 2,90                            | 15                              | 12,5  | 4590                   |
| 8                      | 500                           | 750                           | 1,5                         | 16  | 1,2                                 | 608                                 | 1,7                         | 3,20                            | 15                              | 12,5  | 5090                   |
| 6                      | 550                           | 825                           | 1,7                         | 14  | 1,0                                 | 532                                 | 1,5                         | 3,40                            | 15                              | 12,5  | 5590                   |

**NOTES:**

- (Cn) Tolerance standard value: ±10%. Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Rs) Related at 1 KHz.
- (R<sub>THS</sub>) Thermal resistance with natural cooling.
- (Imax) Maximum RMS @ 50 °C ambient temperature and working frequency < 40KHz.

**Dimensions:**



| Pcs. per box | Box dimensions     |
|--------------|--------------------|
| 32           | mm 195 x 210 x 170 |





# CAPACITORS FOR DC AND PULSE APPLICATION





## DCH 85 C series

### Very High Density, Low Inductance DC-Link Capacitors Cylindrical Aluminum Case

Thanks to the exclusive Ducati Energia High Crystallinity Film DCH 85 C DC-link Capacitors provide leading Capacity Density without any de-rating or limitation, respective to standard makes.

The very high capacity density allows substantial cost reductions due to the reduction of capacitor size and/or number, as well as particularly low inductance values.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DCH 85 C operational life, while maximizing the current capability.

Main characteristics:



- Self-Healing Metallized Polypropylene Film
- UL-Approved
- Aluminum Case
- DRY Resin filling

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|  |   |
|--|---|
| DC Voltage range   | 700÷2100 V  |
| Maximum ripple voltage   | 1150 V  |
| Maximum ripple current   | 100 A   |
| Capacitance range  | up to 5600 µF   |
| Capacitance tolerance  | standard: ±10% on request ±5%   |
| Series resistance (RS)   | < 4.5 mΩ  |
| Maximum Voltage rate of rise (dV/dT)   | ≤ 40 V/µs   |
| Standard terminals (*)   | M6 internal threads<br>M8 screw types bolts   |
| Voltage test   | U <sub>tc</sub> = 3.5 kVac @50 Hz 10 s<br>U <sub>tt</sub> = 1.5 x U <sub>nDC</sub> 10 s |
| Working temperature (θ <sub>MIN</sub> - θ <sub>MAX</sub> )   | -25 / +85 °C  |
| Storage temperature  | -25 / +85 °C  |
| Filling  | Dry polyurethane resin  |
| New PP Dielectric  | Self healing. PPMdh film  |
| Cylindrical case   | Aluminum  |
| Failure quota  | 50/10E9   |
| Life expectancy  | 100.000 h(*)  |
| Maximum altitude   | 2000 m a.s.l.   |
| Reference standard   | IEC 61071-1/2 - IEC 61881 - UL 810  |
| Internal thread terminals  | Max 3 Nm  |
| M8 screw terminals   | Max 6 Nm  |
| M12 fixing bolt  | Max 12 Nm   |
| UL - CSA approved (  )                    | File n. E192559   |
| In according to fire protection standard  | EN 45545-2  |

(\*) For more details, for different solutions please refer to page 83.

**Safety system:** These capacitors are designed with a particular type of polypropylene metalized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.





| Capacitance<br>Cn [µF]   | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85.V. |
|--|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|----------------------|
| <b>Un<sub>DC</sub>= 700 V Ur= 320 V Up= 1050 V Us= 1470V</b>   |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 480  | 75                 | 105              | 25  | 1500                            | 5.0                         | 3.8                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 009.x                |
| 750  | 75                 | 140              | 30  | 2200                            | 6.5                         | 3.6                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 019.x                |
| 840  | 75                 | 155              | 35  | 2200                            | 7.0                         | 3.0                             | 4.6  | < 60                             | 0.9            | 6 - B                     | 029.x                |
| 980  | 85                 | 140              | 35  | 3000                            | 7.5                         | 2.9                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 039.x                |
| 1050   | 90                 | 140              | 40  | 3000                            | 8.0                         | 2.8                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 045.x                |
| 1100   | 85                 | 155              | 40  | 3000                            | 9.0                         | 2.7                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 049.x                |
| 1800   | 100                | 185              | 65  | 3700                            | 11.0                        | 1.6                             | 2.6  | < 60                             | 1.8            | 6 - C                     | 055.x                |
| 2500   | 116                | 185              | 70  | 4000                            | 12.0                        | 1.4                             | 2.3  | < 60                             | 2.3            | 4 - G                     | 059.x                |
| 2700   | 100                | 255              | 70  | 4200                            | 13.0                        | 1.2                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 069.x                |
| 3700   | 116                | 255              | 75  | 5800                            | 15.0                        | 1.0                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 079.x                |
| 4300   | 116                | 285              | 80  | 6700                            | 18.0                        | 0.8                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 089.x                |
| 5600   | 116                | 373              | 100   | 10000                           | 22.0                        | 0.7                             | 1.6  | < 90                             | 4.8            | 4 - G                     | 095.x                |
| <b>Un<sub>DC</sub>= 900 V Ur= 550 V Up= 1350 V Us= 1900 V</b>  |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 340  | 75                 | 105              | 28  | 2200                            | 6.6                         | 3.9                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 109.x                |
| 500  | 75                 | 140              | 30  | 2800                            | 8.4                         | 3.7                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 119.x                |
| 600  | 75                 | 155              | 35  | 3200                            | 9.6                         | 3.2                             | 4.6  | < 60                             | 0.9            | 6 - B                     | 129.x                |
| 680  | 85                 | 140              | 35  | 3300                            | 10.0                        | 3.1                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 135.x                |
| 780  | 90                 | 140              | 40  | 3500                            | 10.0                        | 3.0                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 139.x                |
| 800  | 85                 | 155              | 40  | 3800                            | 11.5                        | 2.9                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 149.x                |
| 1300   | 100                | 185              | 65  | 5400                            | 16.0                        | 1.8                             | 2.6  | < 60                             | 1.8            | 6 - C                     | 155.x                |
| 1850   | 116                | 185              | 70  | 6600                            | 20.0                        | 1.7                             | 2.3  | < 60                             | 2.3            | 4 - G                     | 159.x                |
| 2000   | 100                | 255              | 70  | 7000                            | 21.0                        | 1.6                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 169.x                |
| 2700   | 116                | 255              | 75  | 7100                            | 21.0                        | 1.3                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 179.x                |
| 3200   | 116                | 285              | 85  | 8200                            | 24.5                        | 1.2                             | 1.7  | < 80                             | 3.5            | 4 - G                     | 189.x                |
| 4500   | 116                | 373              | 100   | 10000                           | 28.0                        | 1.0                             | 1.6  | < 90                             | 4.6            | 4 - G                     | 195.x                |
| <b>Un<sub>DC</sub>= 1100 V Ur= 700 V Up= 1650 V Us= 2300 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 260  | 75                 | 105              | 30  | 2200                            | 6.7                         | 4.1                             | 5.4  | < 45                             | 0.7            | 12 - A                    | 219.x                |
| 400  | 75                 | 140              | 35  | 2400                            | 7.1                         | 3.8                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 239.x                |
| 520  | 85                 | 140              | 35  | 3400                            | 10.3                        | 3.6                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 249.x                |
| 600  | 90                 | 140              | 40  | 3600                            | 10.3                        | 3.5                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 259.x                |
| 680  | 90                 | 155              | 40  | 3900                            | 11.7                        | 3.5                             | 3.6  | < 60                             | 1.3            | 6 - B                     | 269.x                |
| 1000   | 100                | 185              | 65  | 5300                            | 15.8                        | 2.2                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 279.x                |
| 1400   | 116                | 185              | 70  | 7300                            | 21.8                        | 2.0                             | 2.3  | < 70                             | 2.3            | 4 - G                     | 285.x                |
| 1500   | 100                | 255              | 70  | 7800                            | 23.3                        | 1.9                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 289.x                |
| 1600   | 100                | 285              | 75  | 8100                            | 24.3                        | 1.8                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 291.x                |
| 2100   | 116                | 255              | 75  | 9900                            | 29.7                        | 1.4                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 293.x                |
| 2300   | 100                | 373              | 100   | 10500                           | 31.7                        | 1.2                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 295.x                |
| 2400   | 116                | 285              | 85  | 10000                           | 30.0                        | 1.5                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 297.x                |
| 3.200  | 116                | 373              | 100   | 11550                           | 30.0                        | 1.1                             | 1.6  | < 90                             | 4.7            | 4 - H                     | 299.x                |



| Capacitance<br>Cn [μF]  | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85.V. |
|---|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|----------------------|
| <b>Un<sub>DC</sub> = 1350 V Ur= 850 V Up= 2000 V Us= 2800V</b>  |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 170   | 75                 | 105              | 30  | 2160                            | 6.5                         | 4.2                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 319.x                |
| 250   | 75                 | 140              | 35  | 3240                            | 9.7                         | 3.9                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 329.x                |
| 340   | 85                 | 140              | 35  | 3960                            | 11.9                        | 3.7                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 339.x                |
| 380   | 85                 | 155              | 40  | 4200                            | 12.6                        | 3.6                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 350.x                |
| 500   | 90                 | 185              | 65  | 5200                            | 16.0                        | 3.1                             | 2.8  | < 70                             | 1.5            | 6 - C                     | 355.x                |
| 640   | 100                | 185              | 65  | 5850                            | 17.6                        | 2.3                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 360.x                |
| 880   | 116                | 185              | 70  | 8100                            | 24.3                        | 2.1                             | 2.3  | < 70                             | 2.4            | 4 - G                     | 365.x                |
| 960   | 100                | 255              | 70  | 8500                            | 25.5                        | 2.0                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 370.x                |
| 1100  | 100                | 285              | 75  | 9200                            | 27.6                        | 1.9                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 380.x                |
| 1350  | 116                | 255              | 75  | 11900                           | 30.0                        | 1.7                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 385.x                |
| 1450  | 100                | 373              | 100   | 13500                           | 32.0                        | 1.3                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 389.x                |
| 1550  | 116                | 285              | 85  | 12800                           | 32.0                        | 1.7                             | 1.7  | < 80                             | 3.5            | 4 - G                     | 393.x                |
| 2000  | 116                | 373              | 100   | 14400                           | 32.0                        | 1.3                             | 1.6  | < 90                             | 4.4            | 4 - H                     | 398.x                |
| <b>Un<sub>DC</sub> = 1600 V Ur= 990 V Up= 2400 V Us= 3100 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 120   | 75                 | 105              | 30  | 2160                            | 6.5                         | 4.3                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 419.x                |
| 180   | 75                 | 140              | 35  | 3240                            | 9.7                         | 4.0                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 420.x                |
| 230   | 85                 | 140              | 35  | 4000                            | 12.0                        | 3.9                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 430.x                |
| 260   | 85                 | 155              | 40  | 4200                            | 12.0                        | 3.8                             | 4.0  | < 50                             | 1.2            | 6 - B                     | 435.x                |
| 350   | 90                 | 185              | 40  | 4480                            | 13.5                        | 3.7                             | 3.6  | < 60                             | 1.5            | 6 - B                     | 440.x                |
| 450   | 100                | 185              | 65  | 7200                            | 21.6                        | 2.3                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 450.x                |
| 530   | 90                 | 255              | 70  | 8500                            | 25.0                        | 2.2                             | 2.4  | < 70                             | 2.3            | 6 - D                     | 453.x                |
| 620   | 116                | 185              | 70  | 9750                            | 29.5                        | 2.2                             | 2.3  | < 70                             | 2.4            | 4 - G                     | 455.x                |
| 680   | 100                | 255              | 70  | 9800                            | 30.0                        | 2.1                             | 2.3  | < 75                             | 2.5            | 6 - D                     | 460.x                |
| 780   | 100                | 285              | 75  | 11200                           | 32.0                        | 2.0                             | 2.2  | < 80                             | 2.7            | 6 - E                     | 470.x                |
| 930   | 116                | 255              | 75  | 12740                           | 32.0                        | 1.8                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 475.x                |
| 1000  | 100                | 373              | 100   | 12600                           | 32.0                        | 1.3                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 485.x                |
| 1100  | 116                | 285              | 85  | 13800                           | 32.0                        | 1.8                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 489.x                |
| 1400  | 116                | 373              | 100   | 14500                           | 32.0                        | 1.4                             | 1.6  | < 90                             | 4.7            | 4 - H                     | 495.x                |

| Capacitance<br>Cn [μF]  | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85.V. |
|---|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|----------------------|
| <b>Un<sub>DC</sub> = 1900 V Ur = 1150 V Up = 2700 V Us = 3100 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 85  | 75                 | 105              | 30  | 2250                            | 6.5                         | 4.4                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 519.x                |
| 130   | 75                 | 140              | 35  | 2940                            | 9.7                         | 4.1                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 520.x                |
| 170   | 85                 | 140              | 35  | 3600                            | 12.0                        | 4.0                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 530.x                |
| 200   | 85                 | 155              | 40  | 4200                            | 13.5                        | 3.8                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 540.x                |
| 230   | 90                 | 155              | 45  | 5000                            | 15.0                        | 3.4                             | 3.3  | < 60                             | 1.2            | 6 - B                     | 545.x                |
| 330   | 100                | 185              | 65  | 7000                            | 21.6                        | 2.3                             | 2.6  | < 70                             | 1.9            | 6 - C                     | 550.x                |
| 380   | 90                 | 255              | 70  | 7500                            | 25.0                        | 2.2                             | 2.4  | < 70                             | 2.1            | 6 - D                     | 557.x                |
| 450   | 116                | 185              | 70  | 8460                            | 29.5                        | 2.3                             | 2.3  | < 70                             | 2.4            | 4 - G                     | 555.x                |
| 500   | 100                | 255              | 70  | 9000                            | 30.0                        | 2.2                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 560.x                |
| 570   | 100                | 285              | 75  | 9600                            | 32.0                        | 2.0                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 570.x                |
| 680   | 116                | 255              | 75  | 11200                           | 32.0                        | 1.9                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 575.x                |
| 740   | 100                | 373              | 100   | 12000                           | 32.0                        | 1.4                             | 1.8  | < 90                             | 3.3            | 6 - F                     | 580.x                |
| 780   | 116                | 285              | 85  | 13120                           | 32.0                        | 1.9                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 585.x                |
| 1030  | 116                | 373              | 100   | 14700                           | 32.0                        | 1.4                             | 1.6  | < 90                             | 4.6            | 4 - H                     | 598.x                |
| <b>Un<sub>DC</sub> = 2100 V Ur = 1150 V Up = 2700 V Us = 3100 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                      |
| 60  | 75                 | 105              | 30  | 2100                            | 6.5                         | 4.5                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 610.x                |
| 90  | 75                 | 140              | 35  | 3000                            | 9.7                         | 4.2                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 620.x                |
| 125   | 85                 | 140              | 35  | 3375                            | 12.0                        | 4.1                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 630.x                |
| 145   | 85                 | 155              | 40  | 3450                            | 12.0                        | 3.9                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 640.x                |
| 160   | 90                 | 155              | 45  | 3900                            | 13.5                        | 3.4                             | 3.3  | < 60                             | 1.3            | 6 - B                     | 645.x                |
| 210   | 100                | 185              | 65  | 4800                            | 15.0                        | 2.3                             | 2.6  | < 70                             | 1.5            | 6 - C                     | 650.x                |
| 290   | 90                 | 255              | 70  | 6500                            | 21.6                        | 2.1                             | 2.4  | < 70                             | 2.2            | 6 - D                     | 653.x                |
| 320   | 116                | 185              | 70  | 6800                            | 25.0                        | 2.2                             | 2.3  | < 70                             | 2.4            | 4 - G                     | 655.x                |
| 360   | 100                | 255              | 70  | 7400                            | 29.5                        | 2.1                             | 2.3  | < 75                             | 2.3            | 6 - D                     | 660.x                |
| 420   | 100                | 285              | 75  | 9600                            | 30.0                        | 2.0                             | 2.2  | < 80                             | 2.7            | 6 - E                     | 670.x                |
| 510   | 116                | 255              | 75  | 10750                           | 32.0                        | 2.0                             | 2.1  | < 75                             | 3.3            | 4 - G                     | 675.x                |
| 540   | 100                | 373              | 100   | 11500                           | 32.0                        | 1.4                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 680.x                |
| 580   | 116                | 285              | 85  | 12500                           | 32.0                        | 1.9                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 685.x                |
| 760   | 116                | 373              | 100   | 14400                           | 32.0                        | 1.5                             | 1.6  | < 90                             | 4.7            | 4 - H                     | 698.x                |

**NOTES:**

(Cn) Tolerance standard value: ±10%. Other tolerance values on request.

(Cn) - (Un) Capacitance and rated voltage standard values, other values on request.

(Ur) Maximum peak to peak alternating voltage component on the DC working voltage.

(Rs) Related at 1 kHz.

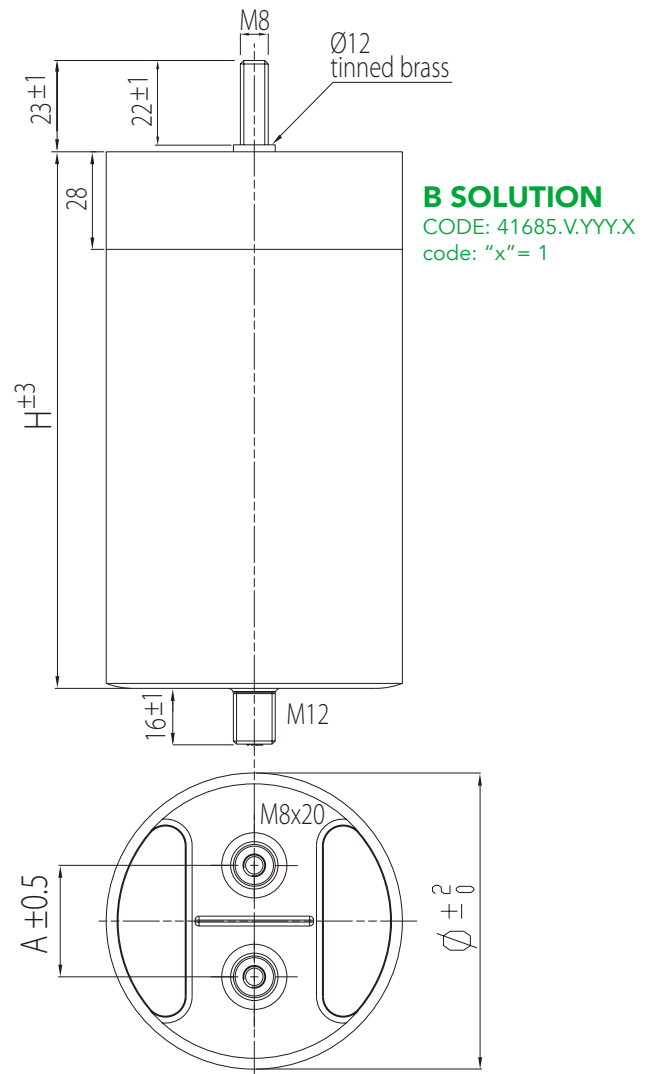
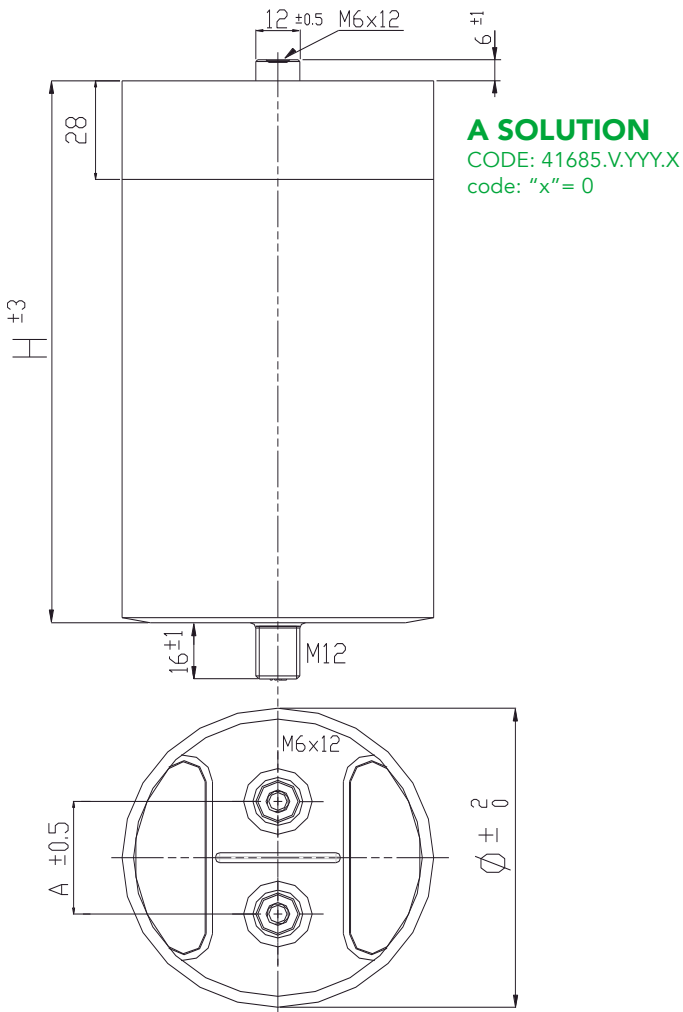
(R<sub>THC</sub>) Thermal resistance CASE TO AMBIENT in natural cooling environment.

(Imax) Maximum RMS current, referred to an ambient temperature of 50 °C (natural cooling) and working frequency of 1 KHz.

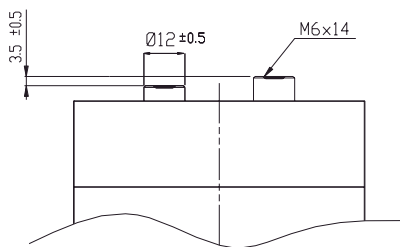
(x code) According to the terminal type: x=0--> A SOLUTION (internal thread M6) / x=1 B SOLUTION (M8 screw type bolts).



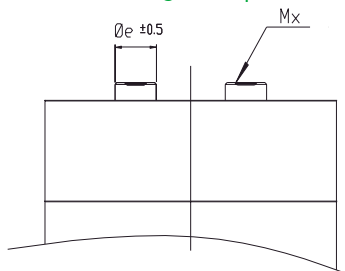
### Mechanical Standard configuration:



### Terminal options on request:



Two different terminals height for special BUS BAR coupling.



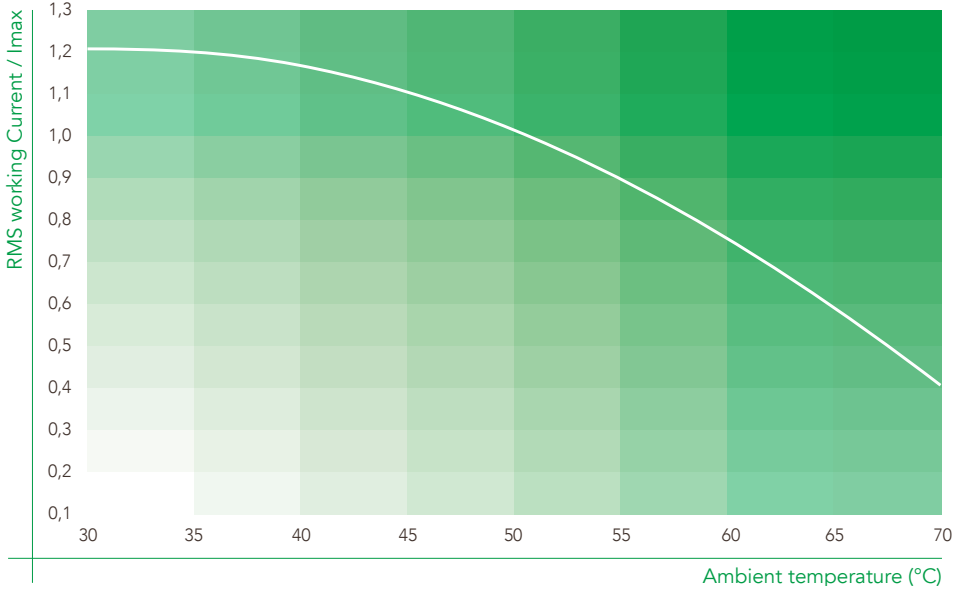
For Capacitor diameter Ø 116 and Ø 136 mm are available these different terminals type:  
- Øe : 12 - 14 - 16 mm  
- Mx : M6 - M8

| Diameter Ø (mm) | A spacing (mm) | Type of terminals        | Insulating spacing |          | Box TYPE | Standard box dimensions |
|-----------------|----------------|--------------------------|--------------------|----------|----------|-------------------------|
|                 |                |                          | Surface (mm)       | Air (mm) |          |                         |
| 75, 85, 100     | 32             | M6 female / M8 male      | 36                 | 20       | A        | mm 190 x 285 x 280      |
|                 |                |                          |                    |          | B        | mm 190 x 285 x 200      |
|                 |                |                          |                    |          | C        | mm 220 x 335 x 235      |
| 90              | 45 (*)         | M6 female / M8 male      | 49                 | 33       | D        | mm 220 x 335 x 265      |
|                 |                |                          |                    |          | E        | mm 220 x 335 x 375      |
| 116, 136        | 50 (**)        | M6 - M8 female / M8 male | 54                 | 38       | F        | mm 220 x 335 x 450      |
|                 |                |                          |                    |          | G        | mm 270 x 270 x 380      |
|                 |                |                          |                    |          | H        | mm 270 x 270 x 450      |

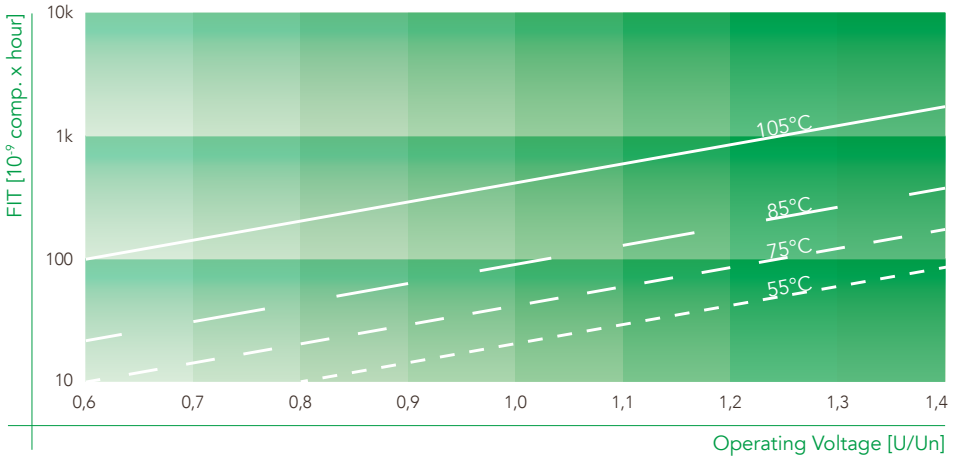
(\*) Available also in the dimensions: 32 - 50 mm



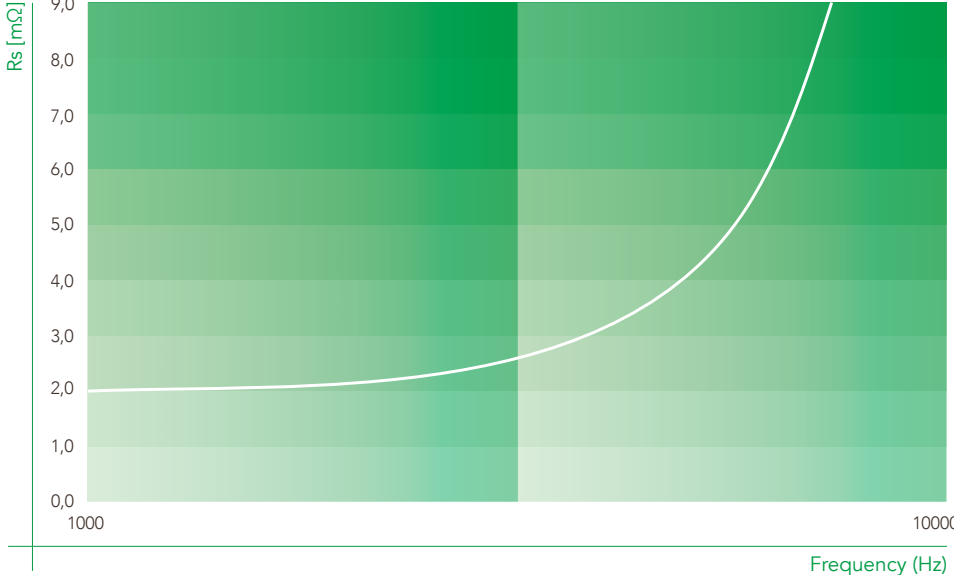
**RMS working current vs Ambient temperature**



**FIT vs Hot Spot Temperature**



**DCH 85C Un=900V**



Typical DCH85C Series Resistance at ambient temperature for a specific model. For the characterization of a different model, please contact R&D department.



## DC 85 C series

### High Density, Low Inductance DC-Link Capacitors Cylindrical Aluminium Case

Powered by the tried and proven Ducati Energia PPMh technology DC 85 C is a competitive and reliable solution to all common DC-Link applications. When coupled with the exclusive Ducati Energia High Crystallinity Film the DC 85 C construction provides superior temperature performance with 100khrs life at HotSpot temperature higher than 85°C or extended life of several hundred thousands hours @70°C HotSpot.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 85 C operational life, while maximizing the current capability.

Main characteristics:



- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- UL-Approved
- Aluminium Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|  |   |
|--|---|
| DC Voltage range   | 550÷1800 V  |
| Maximum ripple voltage   | 1150 V  |
| Maximum ripple current   | 100 A   |
| Capacitance range  | up to 4450 µF   |
| Capacitance tolerance  | standard: +0%/-15%; others on request   |
| Series resistance (RS)   | < 4.5 mΩ  |
| Maximum Voltage rate of rise (dV/dT)   | ≤ 40 V/µs   |
| Standard terminals (*)   | M6 internal threads<br>M8 screw types bolts   |
| Voltage test   | $U_{tc} = 3.5 \text{ kVac @50 Hz 10 s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Working temperature ( $\theta_{MIN} - \theta_{MAX}$ )  | -25 / +85 °C  |
| Storage temperature  | -25 / +85 °C  |
| Filling  | Dry polyurethane resin  |
| Dielectric   | Self healing PPMd film  |
| Cylindrical case   | Aluminum  |
| Failure quota  | 50 /10E9  |
| Life expectancy  | 100.000 h(*)  |
| Maximum altitude   | 2000 m a.s.l.   |
| Reference standard   | IEC 61071-1/2 - IEC 61881 - UL 810  |
| Internal thread terminals  | Max 5 Nm  |
| M8 screw terminals   | Max 6 Nm  |
| M12 fixing bolt  | Max 12 Nm   |
| UL - CSA approved (  )                    | File n. E192559   |
| In according to fire protection standard  | EN 45545-2  |

Safety system: These capacitors are designed with a particular type of polypropylene metallized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

(\*) For more details, for different solutions please refer to page 83.

| Capacitance<br>Cn [µF]  | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85 |
|---|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|-------------------|
| <b>Un [V]= 550 V<sub>DC</sub> Ur [V]= 230 V Up [V]= 850 V Us [V]= 1160 V</b>  |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 500   | 75                 | 105              | 25  | 1500                            | 5.0                         | 3.8                             | 5.4  | < 45                             | 0.6            | 12 - A                    | L09.x             |
| 760   | 75                 | 140              | 30  | 2200                            | 6.5                         | 3.6                             | 4.8  | < 50                             | 0.8            | 6 - B                     | L19.x             |
| 870   | 75                 | 155              | 35  | 2200                            | 7.0                         | 3.0                             | 4.6  | < 60                             | 0.9            | 6 - B                     | L29.x             |
| 1000  | 85                 | 140              | 35  | 3000                            | 7.5                         | 2.9                             | 4.2  | < 50                             | 1.0            | 6 - B                     | L39.x             |
| 1150  | 85                 | 155              | 40  | 3000                            | 9.0                         | 2.7                             | 3.6  | < 60                             | 1.1            | 6 - B                     | L49.x             |
| 1850  | 100                | 185              | 65  | 3700                            | 11.0                        | 1.6                             | 2.6  | < 60                             | 1.8            | 6 - C                     | L55.x             |
| 2550  | 116                | 185              | 70  | 4000                            | 12.0                        | 1.4                             | 2.3  | < 60                             | 2.3            | 4 - G                     | L59.X             |
| 2800  | 100                | 255              | 70  | 4200                            | 13.0                        | 1.2                             | 2.3  | < 75                             | 2.4            | 6 - D                     | L69.x             |
| 3900  | 116                | 255              | 75  | 5800                            | 15.0                        | 1.0                             | 2.1  | < 75                             | 3.2            | 4 - G                     | L79.x             |
| 4000  | 116                | 285              | 80  | 6700                            | 18.0                        | 0.8                             | 1.7  | < 80                             | 3.6            | 4 - G                     | L89.x             |
| <b>Un [V]= 700 V<sub>DC</sub> Ur [V]= 320 V Up [V]= 1050 V Us [V]= 1470 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 370   | 75                 | 105              | 28  | 2200                            | 6.6                         | 3.9                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 009.x             |
| 560   | 75                 | 140              | 30  | 2800                            | 8.4                         | 3.7                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 019.x             |
| 640   | 75                 | 155              | 35  | 3200                            | 9.6                         | 3.2                             | 4.6  | < 60                             | 0.9            | 6 - B                     | 029.x             |
| 740   | 85                 | 140              | 35  | 3300                            | 10.0                        | 3.1                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 039.x             |
| 830   | 90                 | 140              | 40  | 3500                            | 10.0                        | 3.0                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 039.x             |
| 850   | 85                 | 155              | 40  | 3800                            | 11.5                        | 2.9                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 049.x             |
| 1350  | 100                | 185              | 65  | 5400                            | 16.0                        | 1.8                             | 2.6  | < 60                             | 1.8            | 6 - C                     | 055.x             |
| 1900  | 116                | 185              | 70  | 6600                            | 20.0                        | 1.7                             | 2.3  | < 60                             | 2.3            | 4 - G                     | 059.x             |
| 2350  | 100                | 255              | 70  | 7000                            | 21.0                        | 1.6                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 069.x             |
| 2850  | 116                | 255              | 75  | 7100                            | 21.0                        | 1.3                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 079.x             |
| 3300  | 116                | 285              | 85  | 8200                            | 24.5                        | 1.2                             | 1.7  | < 80                             | 3.5            | 4 - G                     | 089.x             |
| <b>Un [V]= 900 V<sub>DC</sub> Ur [V]= 550 V Up [V]= 1350 V Us [V]= 1900 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 280   | 75                 | 105              | 30  | 2200                            | 6.7                         | 4.1                             | 5.4  | < 45                             | 0.7            | 12 - A                    | 119.x             |
| 430   | 75                 | 140              | 35  | 2400                            | 7.1                         | 3.8                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 139.x             |
| 570   | 85                 | 140              | 35  | 3400                            | 10.3                        | 3.6                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 149.x             |
| 620   | 90                 | 140              | 40  | 3600                            | 10.3                        | 3.5                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 159.x             |
| 650   | 85                 | 155              | 40  | 3900                            | 11.7                        | 3.5                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 169.x             |
| 1050  | 100                | 185              | 65  | 5300                            | 15.8                        | 2.2                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 179.x             |
| 1450  | 116                | 185              | 70  | 7300                            | 21.8                        | 2.0                             | 2.3  | < 70                             | 2.3            | 4 - G                     | 185.x             |
| 1550  | 100                | 255              | 70  | 7800                            | 23.3                        | 1.9                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 189.x             |
| 1800  | 100                | 285              | 75  | 8100                            | 24.3                        | 1.8                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 191.x             |
| 2200  | 116                | 255              | 75  | 9900                            | 29.7                        | 1.4                             | 2.1  | < 75                             | 3.1            | 4 - G                     | 193.x             |
| 2350  | 100                | 373              | 100   | 10500                           | 31.7                        | 1.2                             | 1.8  | < 90                             | 3.4            | 6 - F                     | 195.x             |
| 2500  | 116                | 285              | 85  | 10000                           | 30.0                        | 1.5                             | 1.7  | < 80                             | 3.5            | 4 - G                     | 197.x             |
| 3300  | 116                | 373              | 100   | 11550                           | 30.0                        | 1.1                             | 1.6  | < 90                             | 4.6            | 4 - H                     | 199.x             |



| Capacitance<br>Cn [µF]   | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85 |
|--|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|-------------------|
| <b>Un [V]= 1100 V<sub>DC</sub> Ur [V]= 700 V Up [V]= 1650 V Us [V]= 2300 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 180  | 75                 | 105              | 30  | 2160                            | 6.5                         | 4.2                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 219.x             |
| 270  | 75                 | 140              | 35  | 3240                            | 9.7                         | 3.9                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 229.x             |
| 370  | 85                 | 140              | 35  | 3960                            | 11.9                        | 3.7                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 239.x             |
| 420  | 85                 | 155              | 40  | 4200                            | 12.6                        | 3.6                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 250.x             |
| 510  | 90                 | 185              | 65  | 5200                            | 16.0                        | 3.1                             | 2.8  | < 70                             | 1.6            | 6 - C                     | 255.x             |
| 650  | 100                | 185              | 65  | 5850                            | 17.6                        | 2.3                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 260.x             |
| 900  | 116                | 185              | 70  | 8100                            | 24.3                        | 2.1                             | 2.3  | < 70                             | 2.3            | 4 - G                     | 265.X             |
| 1000   | 100                | 255              | 70  | 8500                            | 25.5                        | 2.0                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 270.x             |
| 1200   | 100                | 285              | 75  | 9200                            | 27.6                        | 1.9                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 280.x             |
| 1400   | 116                | 255              | 75  | 11900                           | 30.0                        | 1.7                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 285.x             |
| 1500   | 100                | 373              | 100   | 13500                           | 32.0                        | 1.3                             | 1.8  | < 90                             | 3.4            | 6 - F                     | 289.x             |
| 1600   | 116                | 285              | 85  | 12800                           | 32.0                        | 1.7                             | 1.7  | < 80                             | 3.5            | 4 - G                     | 293.x             |
| 2100   | 116                | 373              | 100   | 14400                           | 32.0                        | 1.3                             | 1.7  | < 90                             | 4.4            | 4 - H                     | 298.x             |
| <b>Un [V]= 1300 V<sub>DC</sub> Ur [V]= 850 V Up [V]= 1950 V Us [V]= 2700 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 120  | 75                 | 105              | 30  | 2160                            | 6.5                         | 4.3                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 319.x             |
| 180  | 75                 | 140              | 35  | 3240                            | 9.7                         | 4.0                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 320.x             |
| 250  | 85                 | 140              | 35  | 4000                            | 12.0                        | 3.9                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 330.x             |
| 270  | 90                 | 140              | 40  | 4200                            | 12.0                        | 3.8                             | 4.0  | < 50                             | 1.1            | 6 - B                     | 335.x             |
| 300  | 85                 | 155              | 40  | 4480                            | 13.5                        | 3.7                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 340.x             |
| 470  | 100                | 185              | 65  | 7200                            | 21.6                        | 2.3                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 350.x             |
| 550  | 90                 | 255              | 70  | 8500                            | 25.0                        | 2.2                             | 2.4  | < 70                             | 2.3            | 6 - D                     | 353.x             |
| 650  | 116                | 185              | 70  | 9750                            | 29.5                        | 2.2                             | 2.3  | < 70                             | 2.3            | 4 - G                     | 355.x             |
| 700  | 100                | 255              | 70  | 9800                            | 30.0                        | 2.1                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 360.x             |
| 800  | 100                | 285              | 75  | 11200                           | 32.0                        | 2.0                             | 2.2  | < 80                             | 3.1            | 6 - E                     | 370.x             |
| 980  | 116                | 255              | 75  | 12740                           | 32.0                        | 1.8                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 375.x             |
| 1000   | 100                | 373              | 100   | 12600                           | 32.0                        | 1.3                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 399.x             |
| 1150   | 116                | 285              | 85  | 13800                           | 32.0                        | 1.8                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 385.x             |
| 1450   | 116                | 373              | 100   | 14500                           | 32.0                        | 1.4                             | 1.6  | < 90                             | 4.6            | 4 - H                     | 388.x             |





| Capacitance<br>Cn [µF]  | Diameter<br>Ø [mm] | Height<br>H [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Pcs./box<br>- Box<br>type | Part n.<br>416.85 |
|---|--------------------|------------------|---|---------------------------------|-----------------------------|---------------------------------|--|----------------------------------|----------------|---------------------------|-------------------|
| <b>Un [V]= 1550 V<sub>DC</sub> Ur [V]= 990 V Up [V]= 2300 V Us [V]= 3000 V</b>      |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 90  | 75                 | 105              | 30  | 2250                            | 6.5                         | 4.4                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 419.x             |
| 140   | 75                 | 140              | 35  | 2940                            | 9.7                         | 4.1                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 420.x             |
| 180   | 85                 | 140              | 35  | 3600                            | 12.0                        | 4.0                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 430.x             |
| 200   | 85                 | 155              | 40  | 4200                            | 13.5                        | 3.8                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 440.x             |
| 250   | 90                 | 155              | 45  | 5000                            | 15.0                        | 3.4                             | 3.3  | < 60                             | 1.3            | 6 - B                     | 445.x             |
| 350   | 100                | 185              | 65  | 7000                            | 21.6                        | 2.3                             | 2.6  | < 70                             | 2.2            | 6 - C                     | 450.x             |
| 400   | 90                 | 255              | 70  | 7500                            | 25.0                        | 2.2                             | 2.4  | < 70                             | 2.3            | 6 - D                     | 457.x             |
| 470   | 116                | 185              | 70  | 8460                            | 29.5                        | 2.3                             | 2.3  | < 70                             | 2.3            | 4 - G                     | 455.x             |
| 500   | 100                | 255              | 70  | 9000                            | 30.0                        | 2.2                             | 2.3  | < 75                             | 2.4            | 6 - D                     | 460.x             |
| 600   | 100                | 285              | 75  | 9600                            | 32.0                        | 2.0                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 470.x             |
| 700   | 116                | 255              | 75  | 11200                           | 32.0                        | 1.9                             | 2.1  | < 75                             | 3.2            | 4 - G                     | 475.x             |
| 750   | 100                | 373              | 100   | 12000                           | 32.0                        | 1.4                             | 1.8  | < 90                             | 3.3            | 6 - F                     | 480.x             |
| 820   | 116                | 285              | 85  | 13120                           | 32.0                        | 1.9                             | 1.7  | < 80                             | 3.7            | 4 - G                     | 485.x             |
| 1050  | 116                | 373              | 100   | 14700                           | 32.0                        | 1.4                             | 1.6  | < 90                             | 4.6            | 4 - H                     | 498.x             |
| <b>Un [V] = 1800 V<sub>DC</sub> Ur [V] = 1150 V Up [V] = 2700 V Us [V] = 3800 V</b> |                    |                  |   |                                 |                             |                                 |  |                                  |                |                           |                   |
| 60  | 75                 | 105              | 30  | 2100                            | 6.5                         | 4.5                             | 5.4  | < 45                             | 0.6            | 12 - A                    | 510.x             |
| 100   | 75                 | 140              | 35  | 3000                            | 9.7                         | 4.2                             | 4.8  | < 50                             | 0.8            | 6 - B                     | 520.x             |
| 135   | 85                 | 140              | 35  | 3375                            | 12.0                        | 4.1                             | 4.2  | < 50                             | 1.0            | 6 - B                     | 530.x             |
| 150   | 85                 | 155              | 40  | 3450                            | 13.5                        | 3.9                             | 3.6  | < 60                             | 1.1            | 6 - B                     | 540.x             |
| 190   | 90                 | 155              | 45  | 3900                            | 15.0                        | 3.4                             | 3.3  | < 60                             | 1.3            | 6 - B                     | 545.x             |
| 240   | 100                | 185              | 65  | 4800                            | 21.6                        | 2.3                             | 2.6  | < 70                             | 1.8            | 6 - C                     | 550.x             |
| 310   | 90                 | 255              | 70  | 6500                            | 25.0                        | 2.1                             | 2.4  | < 70                             | 2.2            | 6 - D                     | 553.x             |
| 340   | 116                | 185              | 70  | 6800                            | 29.5                        | 2.2                             | 2.3  | < 70                             | 2.2            | 4 - G                     | 555.x             |
| 370   | 100                | 255              | 70  | 7400                            | 30.0                        | 2.1                             | 2.3  | < 75                             | 2.3            | 6 - D                     | 560.x             |
| 430   | 100                | 285              | 75  | 9600                            | 32.0                        | 2.0                             | 2.2  | < 80                             | 2.6            | 6 - E                     | 570.x             |
| 530   | 116                | 255              | 75  | 10750                           | 32.0                        | 2.0                             | 2.1  | < 75                             | 3.3            | 4 - G                     | 575.x             |
| 560   | 100                | 373              | 100   | 11500                           | 32.0                        | 1.4                             | 1.8  | < 90                             | 3.5            | 6 - F                     | 580.x             |
| 610   | 116                | 285              | 85  | 12500                           | 32.0                        | 1.9                             | 1.7  | < 80                             | 3.6            | 4 - G                     | 585.x             |
| 800   | 116                | 373              | 100   | 14400                           | 32.0                        | 1.5                             | 1.6  | < 90                             | 4.6            | 4 - H                     | 598.x             |

**NOTES:**

(Cn) Tolerance standard value: -15 ... +0%. Other tolerance values on request.

(Cn) - (Un) Capacitance and rated voltage standard values, other values on request.

(Ur) Maximum peak to peak alternating voltage component on the DC working voltage.

(Rs) Related at 1 KHz.

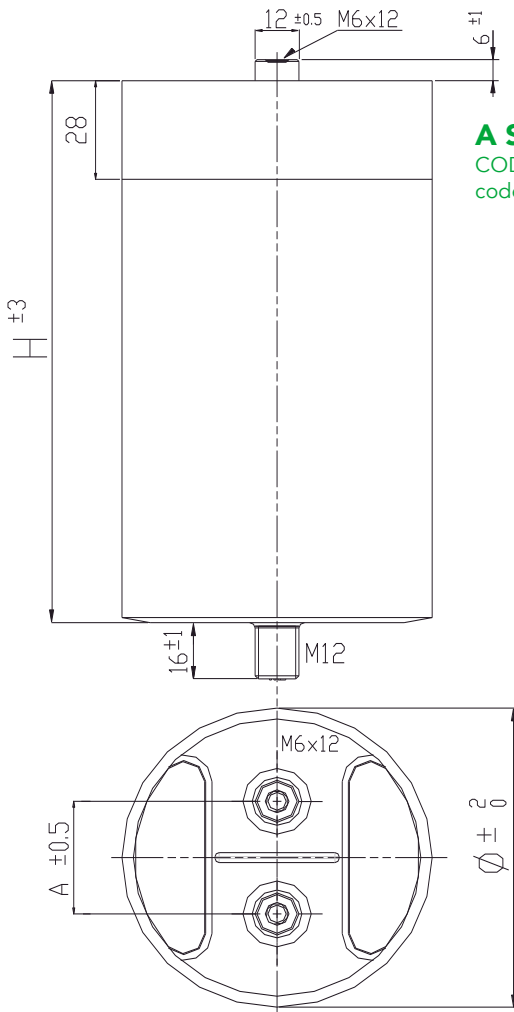
(R<sub>THC</sub>) Thermal resistance CASE TO AMBIENT in natural cooling environment.

(I<sub>MAX</sub>) Maximum RMS current, referred to an ambient temperature of 50 °C (natural cooling) and working frequency of 1 KHz.

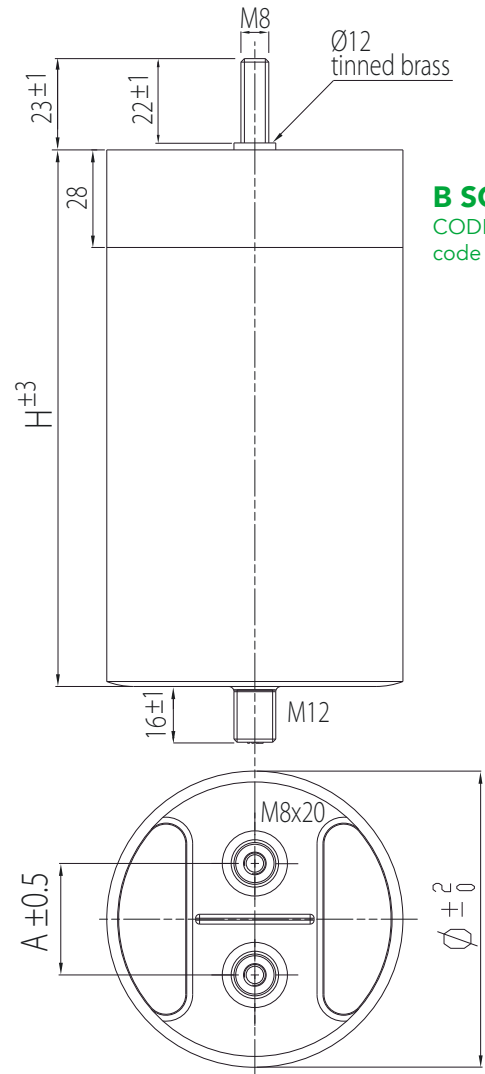
(x code) According to the terminal type: x=0--> A SOLUTION (internal thread M6) / x=1 B SOLUTION (M8 screw type bolts).



**Mechanical Standard configuration:**

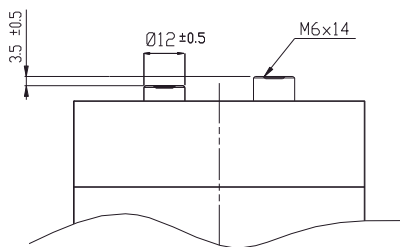


**A SOLUTION**  
CODE: 41685.yyy.x  
code "x" = 0

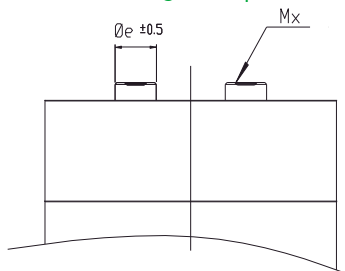


**B SOLUTION**  
CODE: 41685.yyy.x  
code "x" = 1

**Terminal options on request:**



Two different terminals height for special BUS BAR coupling.



For Capacitor diameter Ø 116 and Ø 136 mm are available these different terminals type:

- Øe : 12 - 14 - 16 mm
- Mx : M6 - M8

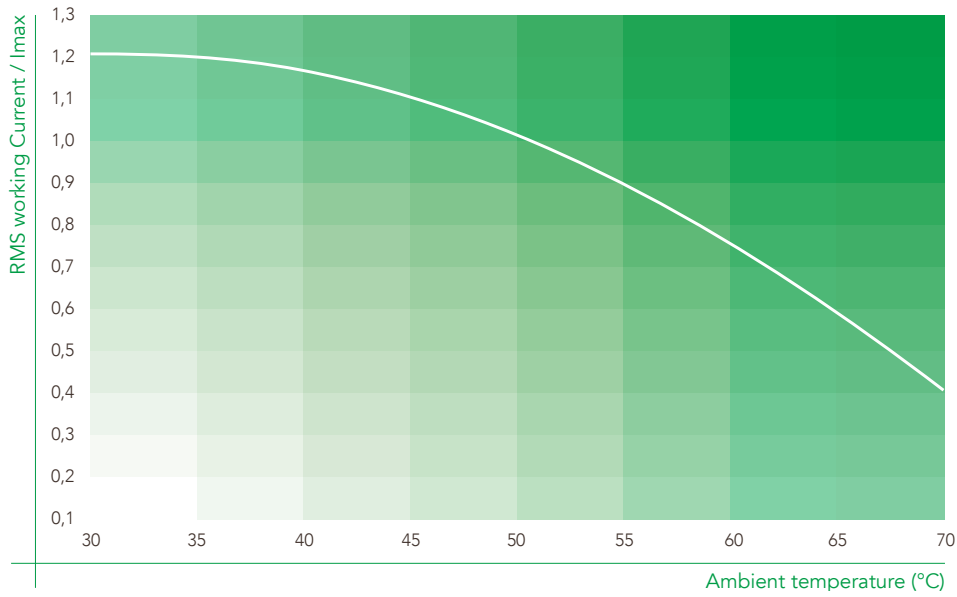
| Diameter Ø<br>(mm) | A spacing<br>(mm) | Type of terminals        | Insulating spacing |          |
|--------------------|-------------------|--------------------------|--------------------|----------|
|                    |                   |                          | Surface (mm)       | Air (mm) |
| 75, 85, 100        | 32                | M6 female / M8 male      | 36                 | 20       |
| 90                 | 45 (*)            | M6 female / M8 male      | 49                 | 33       |
| 116, 136           | 50 (**)           | M6 - M8 female / M8 male | 54                 | 38       |

(\*) Available also in the dimensions: 32 - 50 mm

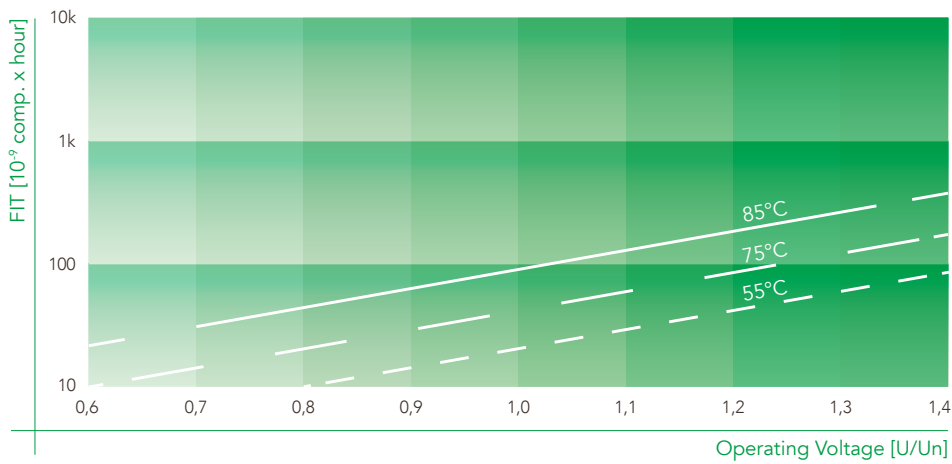
(\*\*) Available also in the dimensions: 32 - 45 mm



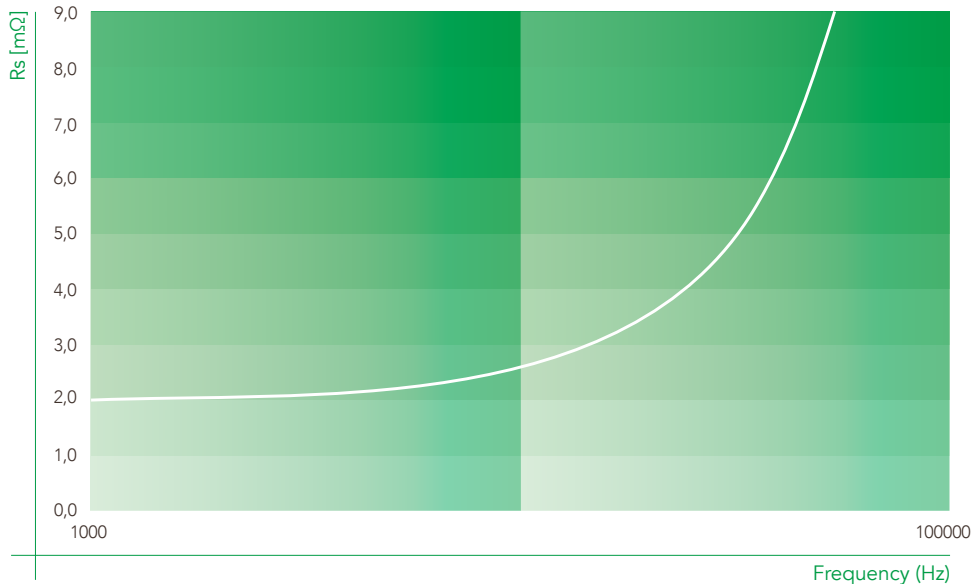
### RMS working current vs Ambient temperature



### FIT vs Hot Spot Temperature



### DC 85C Un=900V



Typical DC 85C Series Resistance at ambient temperature for a specific model. For the characterization of a different model, please contact R&D department.



## DC 89 HC series

*High Current, Very Low Inductance DC-link / Snubber Capacitors  
Cylindrical Plastic Case, optimised for heatsink mounting*

The special design of DC 89 HC provides very high RMS current capability and very low series inductance in a compact package. The exclusive metal bottom reduces thermal resistance for optimal heat-sink mounting. The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 89 HC operational life, while maximizing the current capability. A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:



- Very High Capacity Density
- Self-Healing Metallized Polypropylene Film
- UL-Approved Construction
- V0 Plastic Case
- DRY Resin filling
- Low ESL

Main applications:

- High Switching Frequency DC-Link



### General Characteristics

|   |   |
|---|---|
| DC Voltage range  | 500÷1450 V(*)   |
| Maximum ripple current  | 100 A   |
| Maximum working frequency   | 10 kHz  |
| Capacitance range   | up to 220 µF (*)  |
| Capacitance tolerance   | standard: ±10% / on request: ±5%  |
| Terminals   | M8 screw-type bolts or female M5  |
| Test voltage  | $U_{tc} = 3.0 \text{ kVac @} 50 \text{ Hz } 10 \text{ s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Working temperature<br>( $\theta_{MIN} - \theta_{MAX}$ )  | -25 / +85 °C  |
| Storage temperature   | -25 / +85 °C  |
| Filling   | Polyurethane resin  |
| Dielectric  | Self healing PPM film   |
| Container   | Self-extinguishing (UL94 V0)<br>plastic box   |
| Failure quota   | 50 /10E9  |
| Life expectancy   | 100.000 h (**)  |
| Maximum altitude  | 2000 m a.s.l.   |
| Reference standard  | IEC 61071-1/2 - IEC 61881 - UL 810  |
| Driving torque for M8<br>screw-type   | 5 Nm  |
| Driving torque for fixing holes<br>(MAX)  | 2.5 Nm  |
| Number pieces for box   | 16  |
| M8 screw terminals  | Max 5 Nm  |
| Fixing slots  | Max 2.5 Nm  |
| UL - CSA approved (  )                       | File n. E192559   |
| In according to fire<br>protection standard  | EN 45545-2  |

(\*) Other values on request

(\*\*) For details please refer to page 83.

| Capacitance<br>Cn [µF]                      | Height<br>H [mm] | Repet. Peak<br>Voltage<br>Up [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>R <sub>ESR</sub> [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Part number<br>416.89. |
|---|------------------|-----------------------------------|---|----------------------------------|-----------------------------|---|--|----------------------------------|----------------|------------------------|
| <b>Un<sub>DC</sub> = 500 V Us = 1.0 kV</b>  |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 70  | 40               | 0.75                              | 100   | 9000                             | 13.0                        | 0.55  | 4.8  | < 25                             | < 0.45         | 051x                   |
| 100   | 40               | 0.75                              | 100   | 8500                             | 12.7                        | 0.60  | 4.8  | < 25                             | < 0.45         | 052x                   |
| 130   | 51               | 0.75                              | 85  | 8000                             | 11.5                        | 0.70  | 5.7  | < 30                             | < 0.55         | 053x                   |
| 160   | 51               | 0.75                              | 85  | 7000                             | 10.5                        | 0.75  | 5.7  | < 30                             | < 0.55         | 055x                   |
| 190   | 64               | 0.75                              | 70  | 6500                             | 10.0                        | 0.78  | 7.8  | < 40                             | < 0.70         | 057x                   |
| 220   | 64               | 0.75                              | 70  | 6200                             | 9.3                         | 0.80  | 7.8  | < 40                             | < 0.65         | 059x                   |
| <b>Un<sub>DC</sub> = 700 V Us = 1.4 kV</b>  |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 60  | 40               | 1.05                              | 90  | 8000                             | 12.0                        | 0.70  | 4.8  | < 25                             | < 0.45         | 071x                   |
| 80  | 40               | 1.05                              | 90  | 7500                             | 11.3                        | 0.75  | 4.8  | < 25                             | < 0.45         | 072x                   |
| 100   | 51               | 1.05                              | 80  | 7400                             | 11.0                        | 0.80  | 5.7  | < 30                             | < 0.55         | 072x                   |
| 130   | 51               | 1.05                              | 80  | 7200                             | 10.8                        | 0.85  | 5.7  | < 30                             | < 0.55         | 075x                   |
| 150   | 64               | 1.05                              | 65  | 6400                             | 10.5                        | 0.87  | 7.8  | < 40                             | < 0.70         | 075x                   |
| 180   | 64               | 1.05                              | 65  | 6600                             | 9.9                         | 0.90  | 7.8  | < 40                             | < 0.65         | 079x                   |
| <b>Un<sub>DC</sub> = 900 V Us = 1.8 kV</b>  |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 45  | 40               | 1.35                              | 85  | 5300                             | 8.0                         | 0.80  | 4.8  | < 25                             | < 0.45         | 091x                   |
| 70  | 40               | 1.35                              | 85  | 5250                             | 7.8                         | 0.85  | 4.8  | < 25                             | < 0.45         | 092x                   |
| 100   | 51               | 1.35                              | 75  | 4700                             | 7.5                         | 0.95  | 5.7  | < 30                             | < 0.55         | 095x                   |
| 110   | 51               | 1.35                              | 75  | 4650                             | 7.3                         | 0.98  | 5.7  | < 30                             | < 0.55         | 096x                   |
| 125   | 64               | 1.35                              | 60  | 4600                             | 7.0                         | 1.00  | 7.8  | < 40                             | < 0.70         | 097x                   |
| 150   | 64               | 1.35                              | 60  | 4500                             | 6.8                         | 1.10  | 7.8  | < 40                             | < 0.65         | 099x                   |
| <b>Un<sub>DC</sub> = 1100 V Us = 2.2 kV</b> |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 30  | 40               | 1.65                              | 80  | 4800                             | 7.8                         | 0.90  | 4.8  | < 25                             | < 0.45         | 111x                   |
| 45  | 40               | 1.65                              | 80  | 4750                             | 7.2                         | 0.95  | 4.8  | < 25                             | < 0.45         | 112x                   |
| 70  | 51               | 1.65                              | 65  | 4600                             | 7.0                         | 1.00  | 5.7  | < 30                             | < 0.55         | 114x                   |
| 75  | 51               | 1.65                              | 65  | 4550                             | 6.8                         | 1.10  | 5.7  | < 30                             | < 0.55         | 115x                   |
| 100   | 64               | 1.65                              | 55  | 4500                             | 6.7                         | 1.20  | 7.8  | < 40                             | < 0.70         | 118x                   |
| 110   | 64               | 1.65                              | 55  | 4400                             | 6.6                         | 1.25  | 7.8  | < 40                             | < 0.65         | 119x                   |
| <b>Un<sub>DC</sub> = 1250 V Us = 2.5 kV</b> |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 20  | 40               | 1.90                              | 75  | 4500                             | 6.8                         | 1.15  | 4.8  | < 25                             | < 0.45         | 121x                   |
| 35  | 40               | 1.90                              | 75  | 4200                             | 6.6                         | 1.20  | 4.8  | < 25                             | < 0.45         | 122x                   |
| 45  | 51               | 1.90                              | 65  | 4200                             | 6.4                         | 1.25  | 5.7  | < 30                             | < 0.55         | 123x                   |
| 55  | 51               | 1.90                              | 65  | 4200                             | 6.2                         | 1.30  | 5.7  | < 30                             | < 0.55         | 125x                   |
| 70  | 64               | 1.90                              | 55  | 4000                             | 6.0                         | 1.35  | 7.8  | < 40                             | < 0.70         | 127x                   |
| 80  | 64               | 1.90                              | 55  | 4000                             | 6.0                         | 1.40  | 7.8  | < 40                             | < 0.65         | 129x                   |



| Capacitance<br>Cn [µF]                      | Height<br>H [mm] | Repet. Peak<br>Voltage<br>Up [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>R <sub>ESR</sub> [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Series<br>Inductance<br>ESL [nH] | Weight<br>[kg] | Part number<br>416.89. |
|---|------------------|-----------------------------------|---|----------------------------------|-----------------------------|---|--|----------------------------------|----------------|------------------------|
| <b>Un<sub>DC</sub> = 1450 V Us = 2.9 kV</b> |                  |                                   |   |                                  |                             |   |  |                                  |                |                        |
| 15  | 40               | 2.20                              | 70  | 3500                             | 5.2                         | 1.25  | 4.8  | < 25                             | < 0.45         | 141x                   |
| 25  | 40               | 2.20                              | 70  | 3380                             | 5.1                         | 1.30  | 4.8  | < 25                             | < 0.45         | 142x                   |
| 30  | 51               | 2.20                              | 60  | 3200                             | 4.8                         | 1.45  | 5.7  | < 30                             | < 0.55         | 143x                   |
| 40  | 51               | 2.20                              | 60  | 3200                             | 4.8                         | 1.45  | 5.7  | < 30                             | < 0.55         | 145x                   |
| 50  | 64               | 2.20                              | 50  | 3100                             | 4.6                         | 1.50  | 7.8  | < 40                             | < 0.70         | 147x                   |
| 55  | 64               | 2.20                              | 50  | 3050                             | 4.5                         | 1.55  | 7.8  | < 40                             | < 0.65         | 149x                   |

**NOTES:**

(Cn) Tolerance standard value: ±10%. Other tolerance values on request.

(Cn) - (Un) Capacitance and rated voltage standard values, other values on request.

(Rs) Related at 1 KHz.

(R<sub>THC</sub>) Thermal resistance CASE TO AMBIENT in natural cooling environment. In order to decrease the thermal resistance, install the capacitors on a heat-sink (with conductive past) through the optimised aluminum bottom.

(I<sub>MAX</sub>) Maximum RMS current, referred to an ambient temperature of 50 °C (natural cooling) and working frequency of 1 KHz.

(x code) According to mechanical solution: from Ø to 4 for M8 screw type bolt, from 5 to 8, for female M5 internal threads.

**Box TYPE**

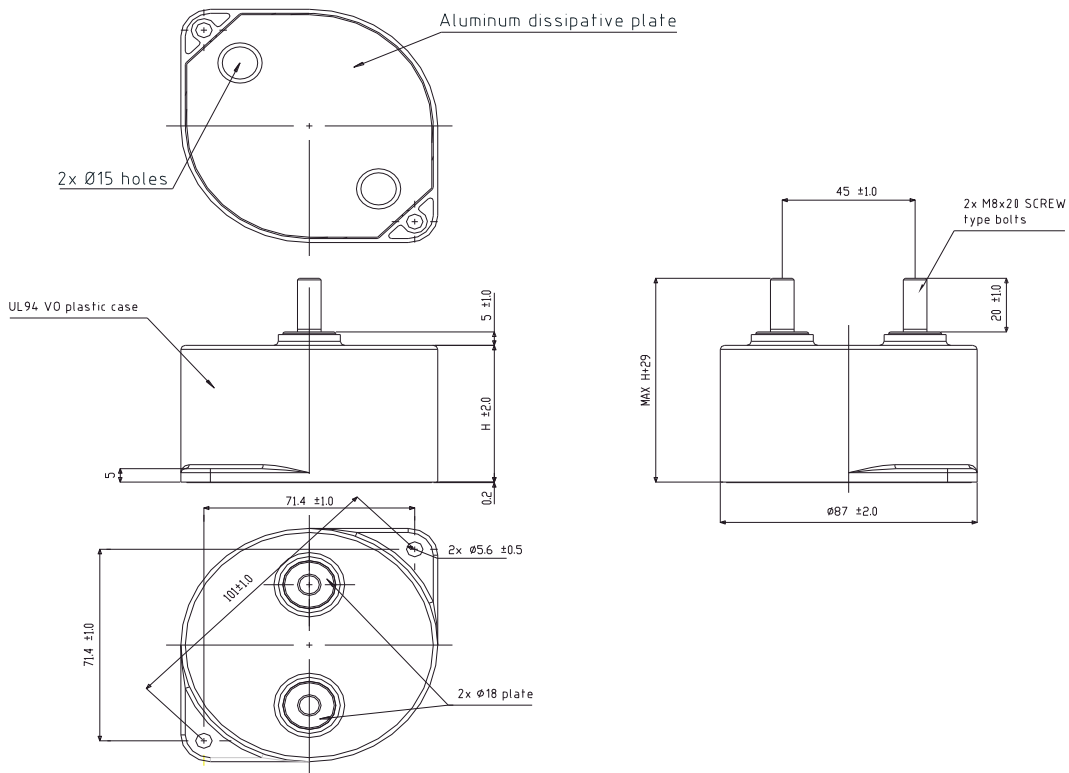
Standard box dimensions: mm 195 x 390 x 250

No. pieces per box: 16

**Insulation spacing**

Surface (mm) Air (mm)

37 27

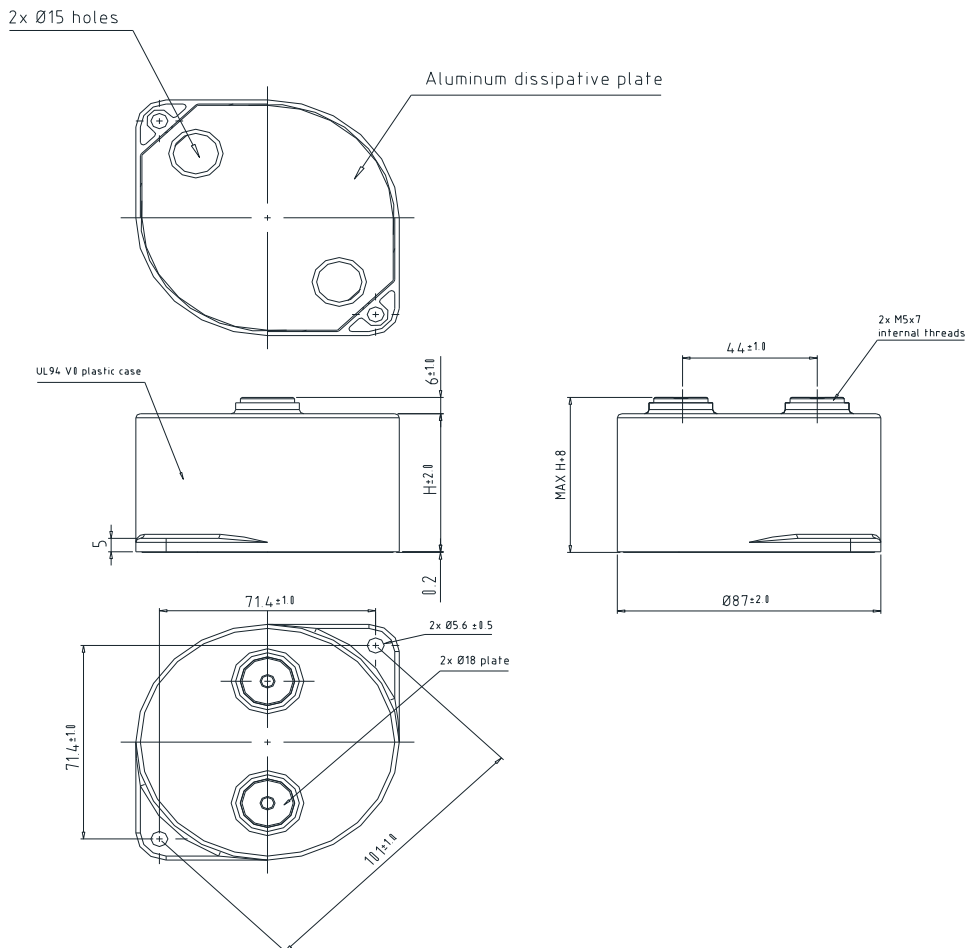


**A SOLUTION**

41689.YYY.X  
Male M8 screw type bolts  
(x) Code: from 0 to 4 for A solution

**(H) AVAILABLE DIMENSIONS:**

- H = 40 ± 2 mm
- H = 51 ± 2 mm
- H = 64 ± 2 mm



**B SOLUTION**

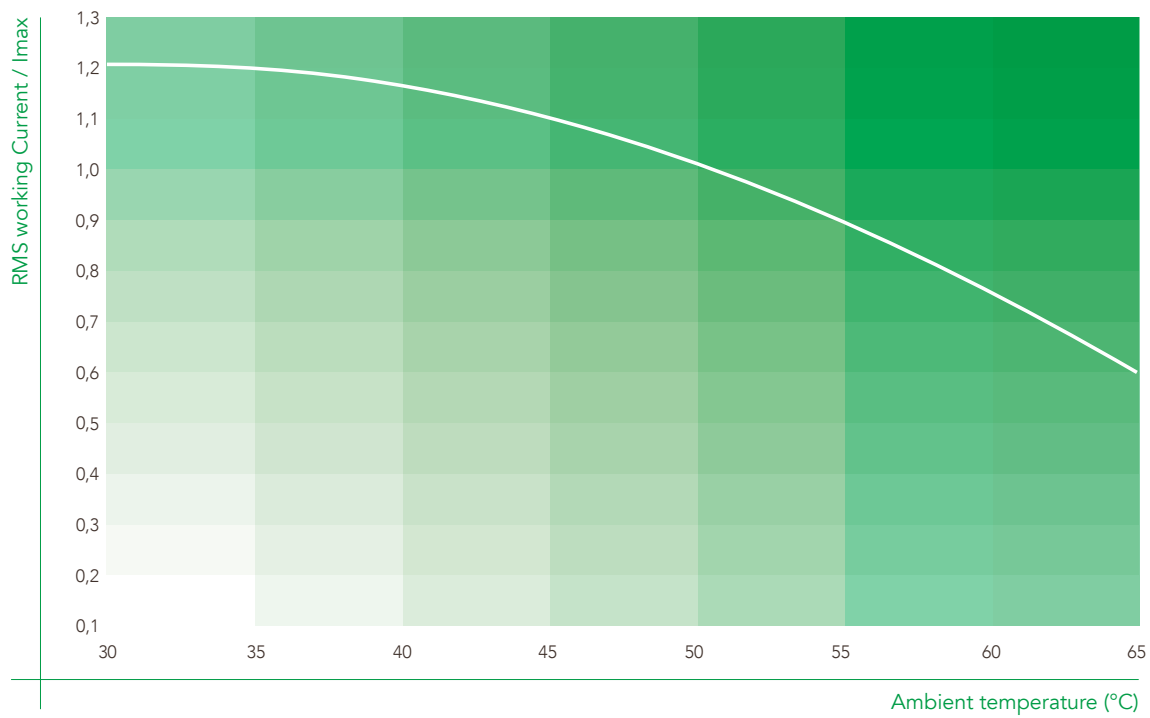
41689.YYY.X  
Female M5 internal threads  
(x) Code: : from 5 to 8 for B solution

**(H) AVAILABLE DIMENSIONS:**

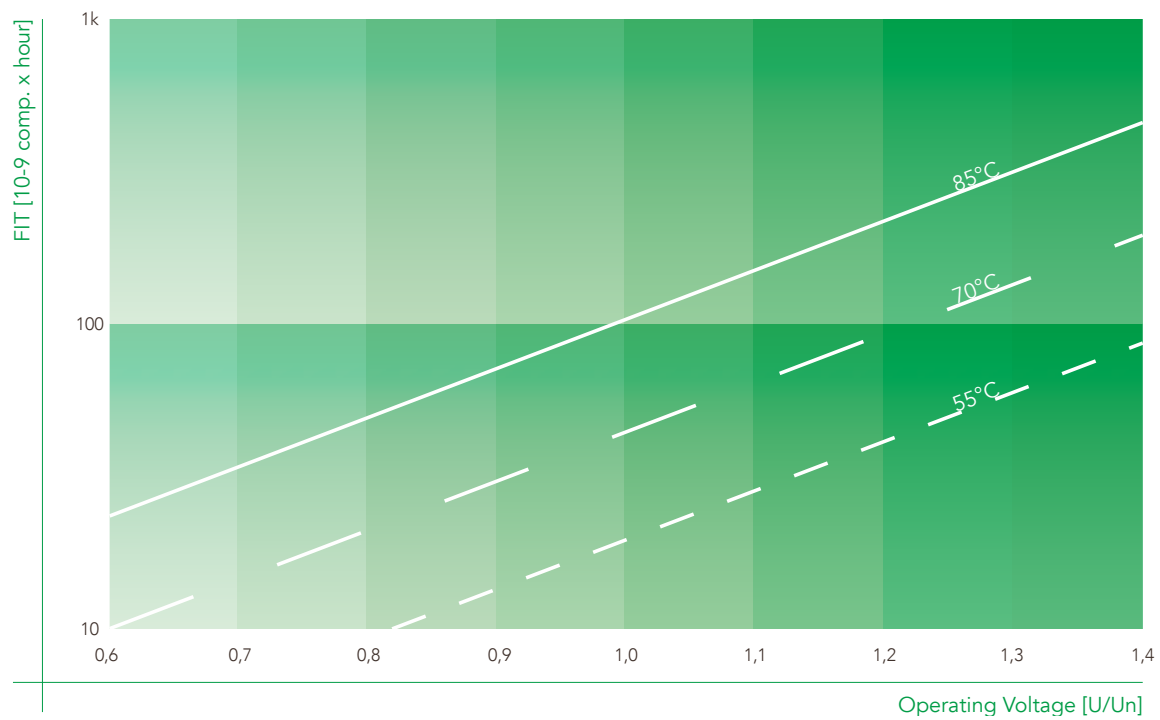
- H = 40 ± 2 mm
- H = 51 ± 2 mm
- H = 64 ± 2 mm



### RMS working current vs Ambient temperature

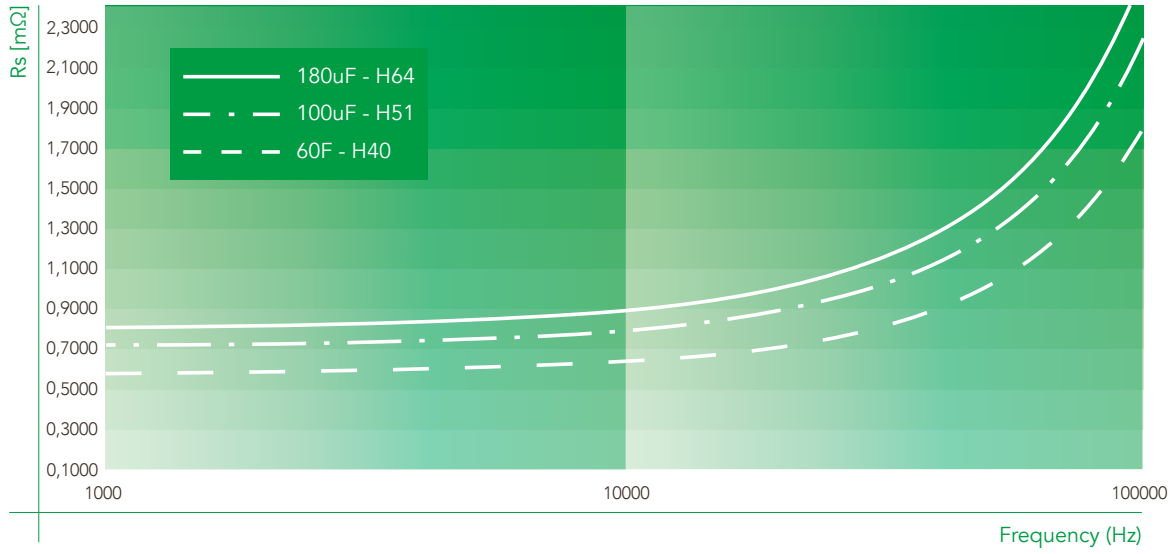


### FIT vs Hot Spot Temperature

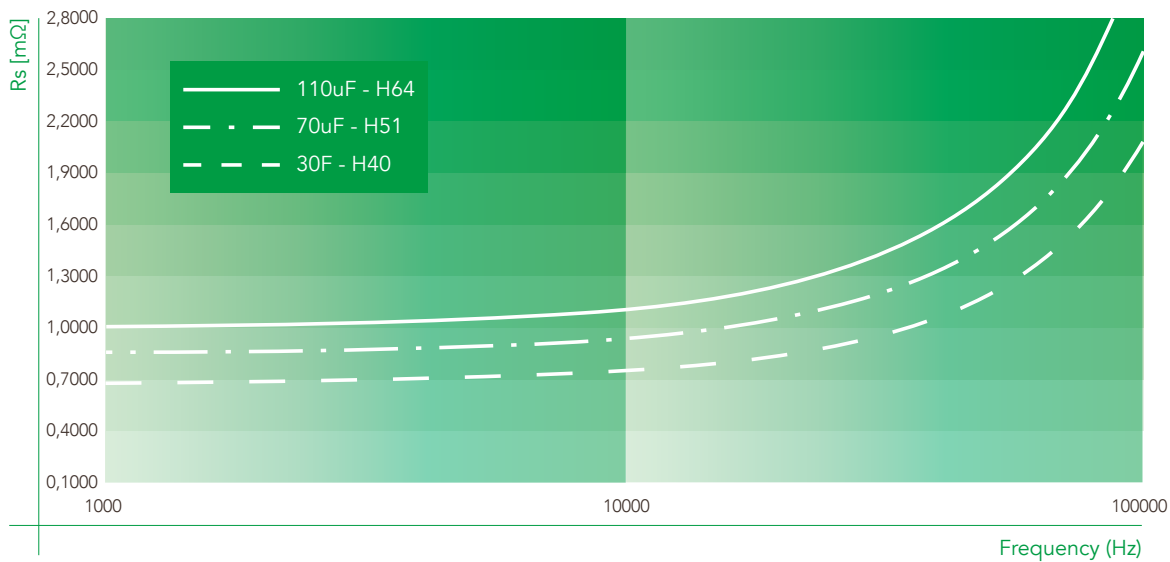




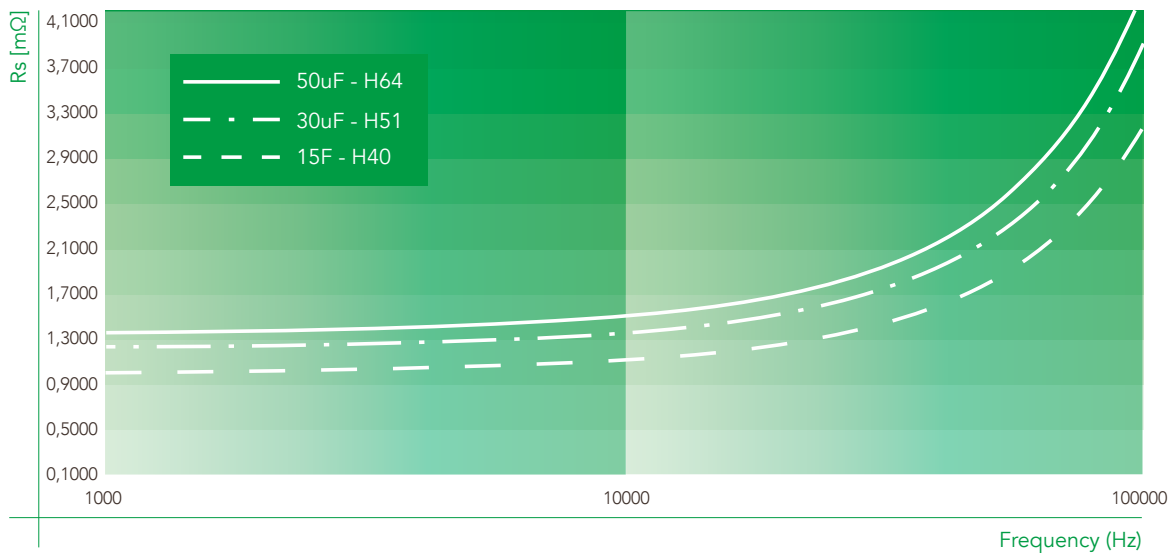
### Typical Series Resistance | $U_n = 700V$



### Typical Series Resistance | $U_n = 1100V$



### Typical Series Resistance | $U_n = 1450V$





## DC 81 series

### High Performance DC Filter Capacitor Small Plastic Box Case

DC 81 Capacitors are the ideal solution as DC filter for power electronic applications requiring high current capability and small size designed for mounting on print circuit board. It provides to customers a modular solution on which to develop and scale their projects. In addition, the construction with internal wound element made with special metallized film, very low internal self-inductance and potted with resin in self-extinguish plastic case give a superior capacitor type with very high stability and reliability performance.

Main characteristics:

- Self-Healing Metallized Polypropylene Film
- Small size, very low ESL
- Modular solution
- Self-extinguish Plastic Case
- DRY Self-extinguish Resin filling

Main applications:

- DC – Link Filtering
- Wind and Solar Power Applications



#### General Characteristics

|   |  |
|---|--|
| Rated DC voltage (Un)                                       | 700 - 1800                                 |
| Capacitance tolerance                                       | ±10%                                       |
| Maximum effective current (Imax) - continuous               | 40 Arms                                    |
| Series resistance (RS)                                      | 1 – 3.5 mΩ                                 |
| Terminals   | Double flat tag 15x0.8mm with Ø6.2mm holes |
| Film Dielectric type  | Self-healing metallized polypropylene film |
| Box container   | Self-extinguish plastic                    |
| Mounting  | Any position - Indoor / On PCB             |
| Insulation distance CREEPAGE / CLEARANCE:                   | 38 / 38 mm                                 |
| Self Inductance (ESL)                                       | < 20 nH                                    |
| Working ambient temperature                                 | -25 .. +50 °C                              |
| Operating temperature MIN/ MAX (case)                       | -25 .. +70 °C                              |
| Maximum Hotspot temperature                                 | +85 °C                                     |
| Storage temperature   | -40 .. +85 °C                              |
| DC test voltage between terminals                           | 1,5x Un – 10s                              |
| AC test Voltage between terminals and container (to ground) | 2.5kVac 50Hz 10 s                          |
| Life expectancy (@Un / 60°C hot spot)                       | 70.000 h                                   |
| Failure quota   | 300 FIT                                    |
| Reference standards   | IEC 61071-1/2                              |

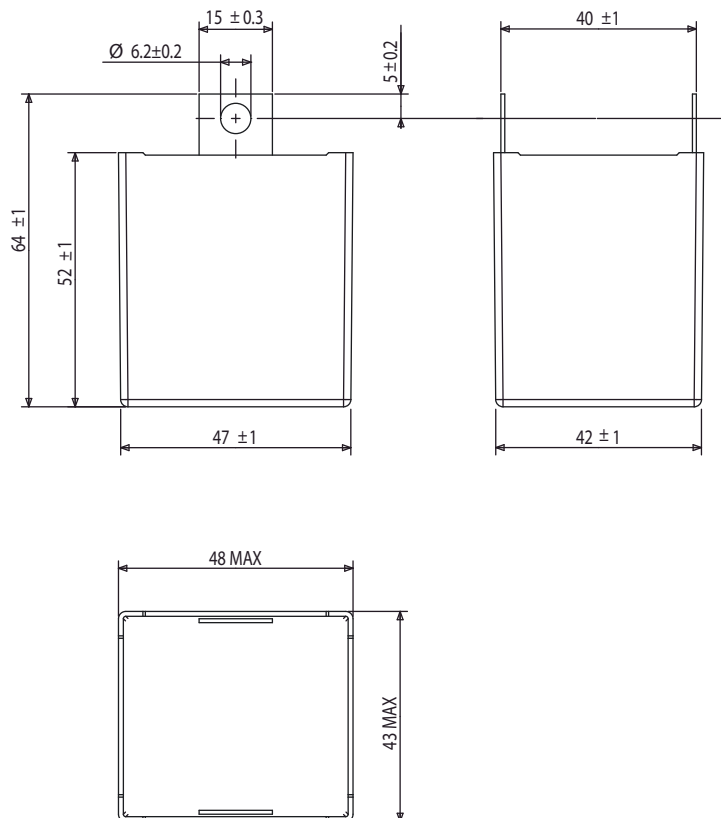


| Capacitance<br>Cn [ $\mu$ F] | DC Rated<br>Voltage<br>Un [V] | Repetitive<br>peak<br>Voltage<br>Up [V] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet.<br>Peak<br>Current<br>Ip [kA] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [m $\Omega$ ] | Self-<br>inductance<br>ESL [nH] | Thermal<br>Resistance<br>R <sub>TH</sub> [°C/W] | Part number<br>416.81. |
|------------------------------|-------------------------------|---|-----------------------------|---|--------------------------------------|-----------------------------|--|---------------------------------|---|------------------------|
| 50                           | 700                           | 1200                                    | 1,4                         | 40  | 2,5                                  | 3,5                         | 1,30                                     | 15                              | 12,5  | 2095                   |
| 30                           | 900                           | 1500                                    | 1,8                         | 38  | 1,5                                  | 2,5                         | 1,60                                     | 15                              | 12,5  | 2595                   |
| 25                           | 1000                          | 1650                                    | 2,0                         | 35  | 1,3                                  | 2,3                         | 2,10                                     | 15                              | 12,5  | 3095                   |
| 22                           | 1100                          | 1850                                    | 2,2                         | 35  | 1,3                                  | 2,3                         | 2,25                                     | 15                              | 12,5  | 3595                   |
| 16                           | 1250                          | 2100                                    | 2,5                         | 32  | 1,1                                  | 2,1                         | 2,60                                     | 15                              | 12,5  | 4095                   |
| 12                           | 1450                          | 2400                                    | 2,9                         | 28  | 1,0                                  | 2,0                         | 2,90                                     | 15                              | 12,5  | 4595                   |
| 9                            | 1600                          | 2650                                    | 3,2                         | 25  | 0,9                                  | 1,9                         | 3,20                                     | 15                              | 12,5  | 5095                   |
| 7,5                          | 1800                          | 3000                                    | 3,6                         | 25  | 0,8                                  | 1,8                         | 3,40                                     | 15                              | 12,5  | 5595                   |

**NOTES:**

- (Cn) Tolerance standard value:  $\pm 10\%$ . Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Rs) Related at 1 KHz.
- (R<sub>TH</sub>) Thermal resistance with natural cooling.
- (I<sub>max</sub>) Maximum RMS @ 50 °C ambient temperature and working frequency < 40KHz.

**Dimensions:**



| Pcs. per box | Box dimensions     |
|--------------|--------------------|
| 32           | mm 195 x 210 x 170 |



## DCH 86 PS series

### Very High Density, Very Low Inductance DC-Link Capacitors - Prismatic Plastic Case

Thanks to the exclusive Ducati Energia High Crystallinity Film DCH 86 PS Prismatic DC-link Capacitors provide leading Capacity Density without any de-rating or limitation, respective to standard makes.

The very high capacity density allows substantial cost reductions due to the reduction of capacitor size and/or number, as well as particularly low inductance values.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DCH 86 PS operational life, while maximizing the current capability.

A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:

- Very High Capacity Density
- Self-Healing Metallized Polypropylene Film
- UL-Approved Construction
- Aluminum Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|   |   |
|---|---|
| DC Voltage range                                      | 700÷2500 V  |
| Maximum ripple current                                | 165 A   |
| Capacitance range                                     | up to 2100 µF   |
| Capacitance tolerance                                 | ±10%  |
| Thermal resistance natural cooling (RTHc)             | 2.60 °C/W   |
| Equivalent series inductance (ESL)                    | < 30 nH   |
| Terminals   | M8 x 15 internal threads  |
| Test voltage  | $U_{tc} = 4.5 \text{ kVac @50 Hz 10 s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Climatic Ambient Temperature                          | -25 / +45 °C  |
| Working temperature ( $\theta_{MIN} - \theta_{MAX}$ ) | -25 / +85 °C  |
| Storage temperature                                   | -25 / +85 °C  |
| Filling   | Self-extinguishing (UL94 V0) polyurethane resin                                       |
| Container   | Self-extinguishing (UL94 V0) plastic box  |
| Failure quota   | 50/10E9   |
| Life expectancy                                       | 100.000 h   |
| Maximum altitude                                      | 100.000 h   |
| Maximum altitude                                      | 2000 m a.s.l.   |
| Reference standard                                    | IEC 61071-1/2 - IEC 61881 - UL 810  |
| M8 internal thread terminals                          | Max 4 Nm  |
| M8 screw terminals                                    | Max 6 Nm  |
| Fixing slots  | Max 10 Nm   |
| UL - CSA approved (  )                                | File n. E192559   |
| In according to fire protection standard              | EN 45545-2  |

**Safety system:** These capacitors are designed with a particular type of polypropylene metallized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

| Capacitance<br>Cn [μF] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THS</sub> [°C/W] | Weight<br>[kg] | Part number<br>416.86.V. |
|------------------------|-------------------------------|-----------------------------------|-----------------------------|---|----------------------------------|-----------------------------|---------------------------------|--|----------------|--------------------------|
| 2.100                  | 700                           | 1.1                               | 1.2                         | 165   | 15.000                           | 28.0                        | < 0.48                          | 2.60   | < 4.5          | 109x                     |
| 1.500                  | 850                           | 1.0                               | 1.5                         | 155   | 13.800                           | 26.0                        | < 0.50                          | 2.60   | < 4.5          | 159x                     |
| 1.150                  | 1100                          | 1.7                               | 2.3                         | 150   | 12.000                           | 25.0                        | < 0.55                          | 2.60   | < 4.5          | 209x                     |
| 750                    | 1250                          | 1.9                               | 2.625                       | 140   | 11.400                           | 23.0                        | < 0.59                          | 2.60   | < 4.5          | 259x                     |
| 600                    | 1400                          | 2.1                               | 2.9                         | 130   | 11.000                           | 21.5                        | < 0.66                          | 2.60   | < 4.5          | 309x                     |
| 500                    | 1600                          | 2.4                               | 3.36                        | 120   | 10.640                           | 20.5                        | < 0.73                          | 2.60   | < 4.5          | 359x                     |
| 380                    | 1800                          | 2.7                               | 3.8                         | 120   | 10.500                           | 19.0                        | < 0.85                          | 2.60   | < 4.5          | 409x                     |
| 300                    | 2100                          | 3.2                               | 4.5                         | 110   | 9.660                            | 18.5                        | < 0.89                          | 2.60   | < 4.5          | 459x                     |
| 230                    | 2500                          | 3.8                               | 4.5                         | 100   | 8.200                            | 14.5                        | < 0.98                          | 2.60   | < 4.5          | 509x                     |

**NOTES:**

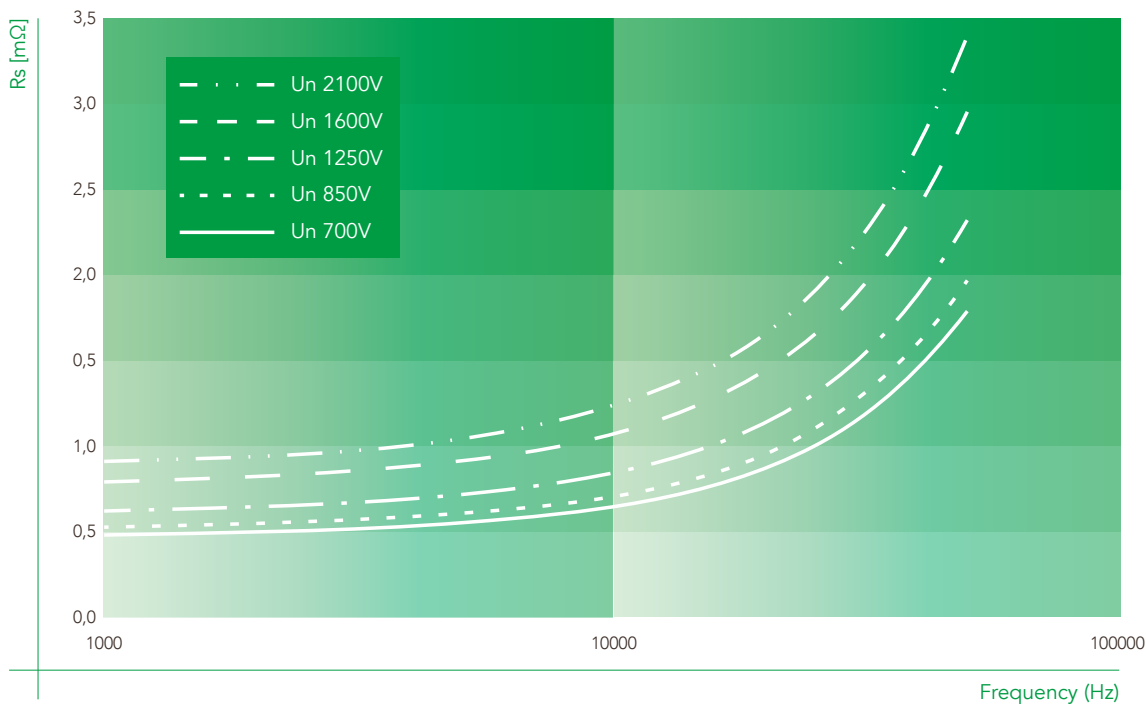
- (Cn) Tolerance standard value: ±10%. Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Ur) Maximum peak to peak alternating voltage component on the DC working voltage.
- (Rs) Related at 1 KHz.
- (R<sub>THS</sub>) Thermal resistance AMBIENT - HOT SPOT (air forced cooling system).
- (Imax) Maximum RMS @ 50 °C ambient temperature.
- (x code) According to mechanical solutions on next page.

| Insulation spacing |          |
|--------------------|----------|
| Surface (mm)       | Air (mm) |
| 37                 | 27       |

**Box TYPE**

Standard box dimensions: mm 195 x 390 x 250  
No. pieces per box: 16

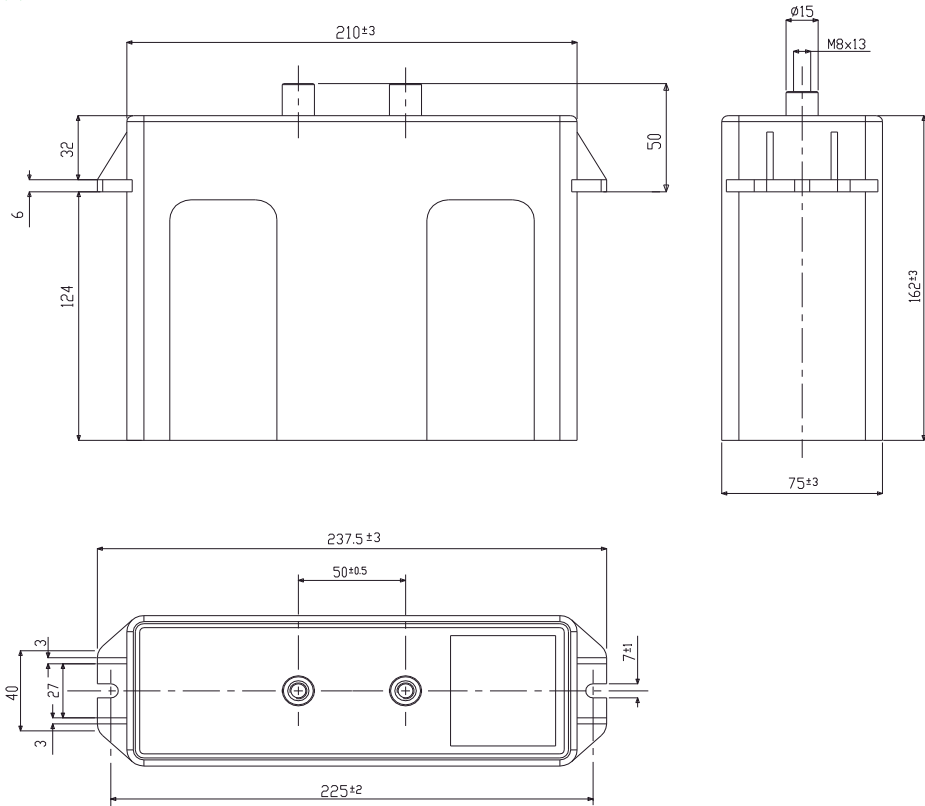
**Typical Series Resistance at 23 °C**





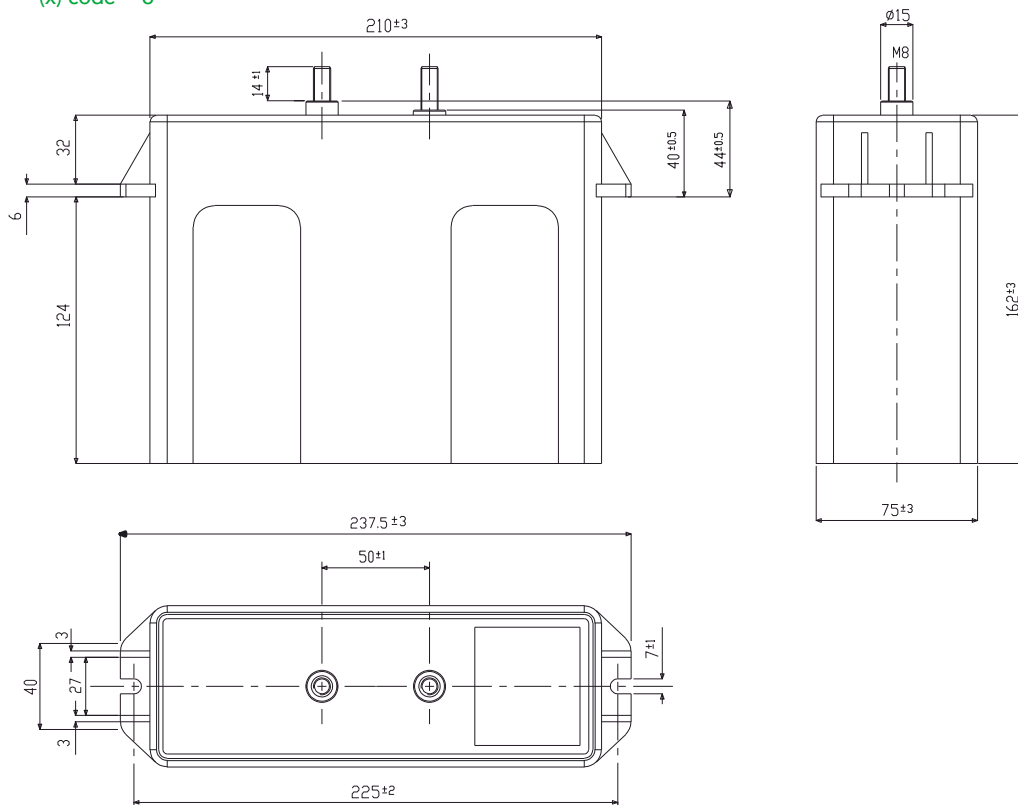
## A SOLUTION

M8 standard terminals solution:  
(x) code = 5



## B SOLUTION

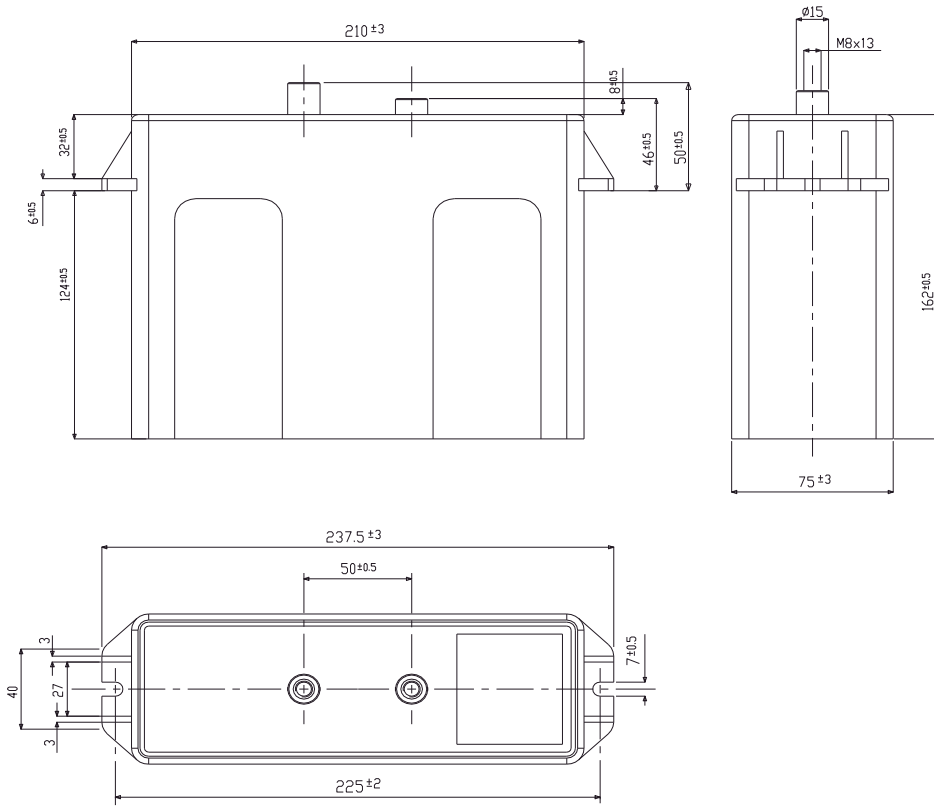
Available solution: M8 screw bolt terminals:  
(x) code = 6





## C SOLUTION

Available on request: M8 staggered terminals solution:  
(x) code  $\geq 7$





## DC 86 PS series

### High Density, Very Low Inductance DC-Link Capacitors Prismatic Plastic Case

This rectangular prism Box variant - DC86 PS - is powered by the tried and proven Ducati Energia PPMh technology making it a competitive and reliable solution to all common DC-Link applications.

When coupled with the exclusive Ducati Energia High Crystallinity Film the construction (DCH 86 PS series) provides superior temperature performance with 100khrs life @ HotSpot higher than 85°C. The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of operational life, while maximizing the current capability.

A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:



- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- UL-Approved Construction
- V0 Plastic Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|  |   |
|--|---|
| DC Voltage range   | 550÷2700 V  |
| Maximum ripple current   | 165 A   |
| Capacitance range  | up to 2100 µF   |
| Capacitance tolerance  | ±10%  |
| Thermal resistance natural cooling ( $R_{THC}$ )   | 2.60 °C/W   |
| Equivalent series inductance (ESL)   | < 30 nH   |
| Terminals  | M8 x 15 internal threads  |
| Test voltage   | $U_{tc} = 4.5 \text{ kVac @50 Hz 10 s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Working temperature ( $\theta_{MIN} - \theta_{MAX}$ )  | -25 / +85 °C  |
| Storage temperature  | -25 / +85 °C  |
| Filling  | Self-extinguishing (UL94 V0) polyurethane resin                                       |
| Dielectric   | Self healing PPMd film  |
| Container  | Self-extinguishing (UL94 V0) plastic box  |
| Failure quota  | 50 /10E9  |
| Life expectancy  | 100.000 h (*)   |
| Maximum altitude   | 2000 m a.s.l.   |
| Reference standard   | IEC 61071-1/2 - IEC 61881 - UL 810  |
| M6 internal thread terminals   | Max 4 Nm  |
| Fixing slots   | Max 10 Nm   |
| UL - CSA approved (  )                    | File n. E192559   |
| In according to fire protection standard  | EN 45545-2  |

**Safety system:** These capacitors are designed with a particular type of polypropylene metallized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

(\*) For details please refer to page 83.



| Capacitance<br>Cn [µF] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Weight<br>[kg] | Part number<br>416.86. |
|------------------------|-------------------------------|-----------------------------------|-----------------------------|---|----------------------------------|-----------------------------|---------------------------------|--|----------------|------------------------|
| 2100                   | 550                           | 0.8                               | 1.2                         | 165   | 16800                            | 29.5                        | < 0.48                          | 2.60   | < 4.5          | 009x                   |
| 1500                   | 700                           | 1.0                               | 1.5                         | 165   | 15000                            | 28.0                        | < 0.50                          | 2.60   | < 4.5          | 109x                   |
| 1150                   | 850                           | 1.3                               | 1.8                         | 155   | 13800                            | 26.0                        | < 0.55                          | 2.60   | < 4.5          | 159x                   |
| 750                    | 1100                          | 1.7                               | 2.3                         | 150   | 12000                            | 25.0                        | < 0.59                          | 2.60   | < 4.5          | 209x                   |
| 600                    | 1250                          | 1.9                               | 2.6                         | 140   | 11400                            | 23.0                        | < 0.66                          | 2.60   | < 4.5          | 259x                   |
| 500                    | 1400                          | 2.1                               | 2.9                         | 130   | 11000                            | 21.5                        | < 0.73                          | 2.60   | < 4.5          | 309x                   |
| 380                    | 1600                          | 2.4                               | 3.4                         | 120   | 10640                            | 20.5                        | < 0.85                          | 2.60   | < 4.5          | 359x                   |
| 300                    | 1800                          | 2.7                               | 3.8                         | 120   | 10500                            | 19.0                        | < 0.89                          | 2.60   | < 4.5          | 409x                   |
| 230                    | 2100                          | 3.2                               | 4.4                         | 110   | 9660                             | 18.5                        | < 0.98                          | 2.60   | < 4.5          | 459x                   |
| 120                    | 2700                          | 4.1                               | 5.7                         | 100   | 7800                             | 14.5                        | < 1.15                          | 2.60   | < 4.5          | 509x                   |

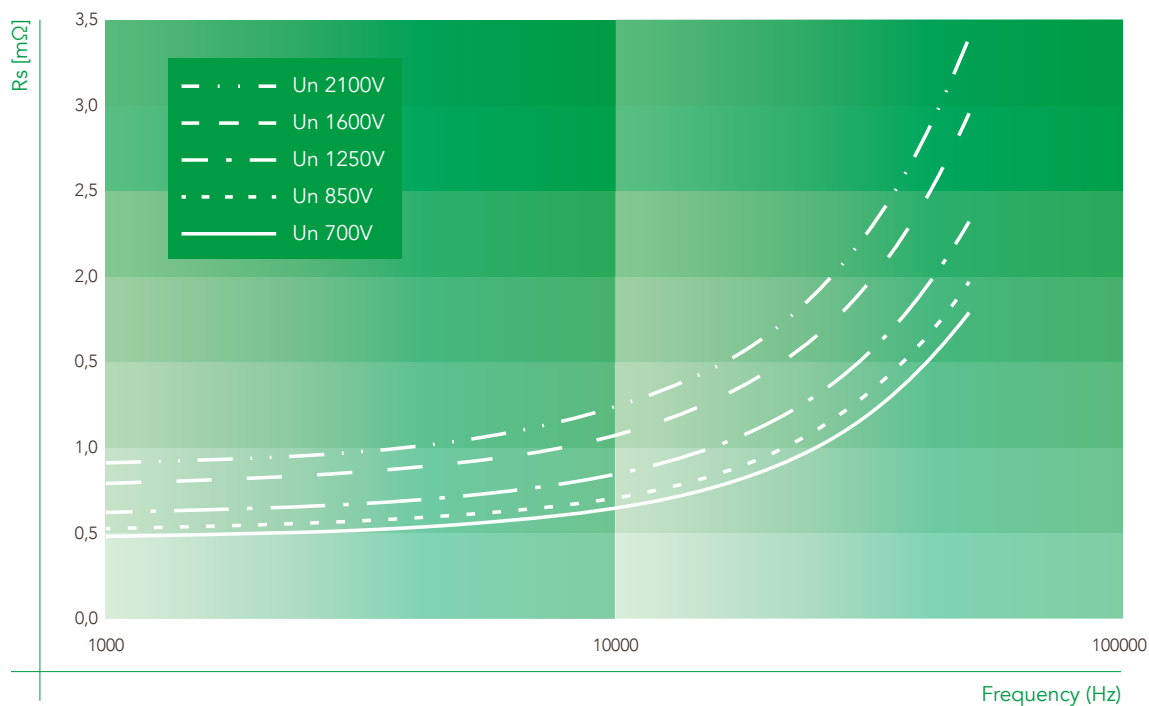
**NOTES:**

- (Cn) Tolerance standard value: ±10%. Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Rs) Related at 1 KHz.
- (R<sub>THC</sub>) Thermal resistance AMBIENT - HOT SPOT (air forced cooling system).
- (I<sub>MAX</sub>) Maximum RMS @ 50 °C ambient temperature.
- (x code) According to mechanical solutions on next page.

| Insulation spacing |          |
|--------------------|----------|
| Surface (mm)       | Air (mm) |
| 35                 | 35       |

| Box TYPE                 |                    |
|--------------------------|--------------------|
| Standard box dimensions: | mm 195 x 390 x 250 |
| No. pieces per box:      | 16                 |

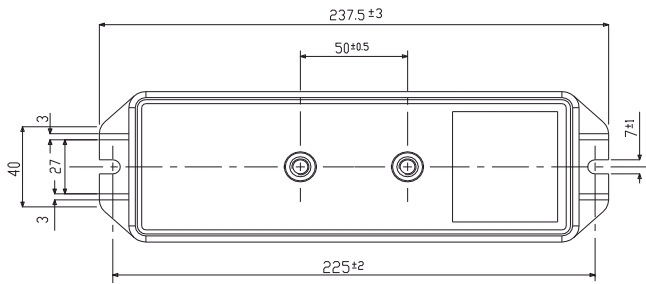
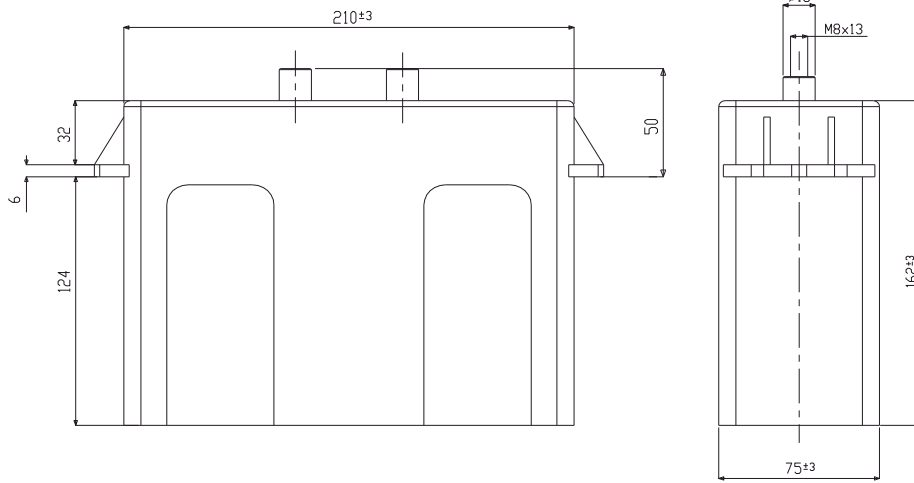
**Typical Series Resistance at 23 °C**





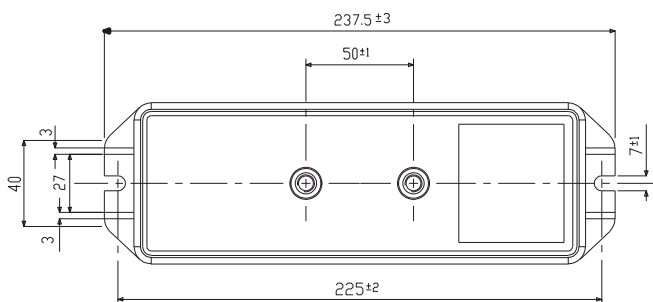
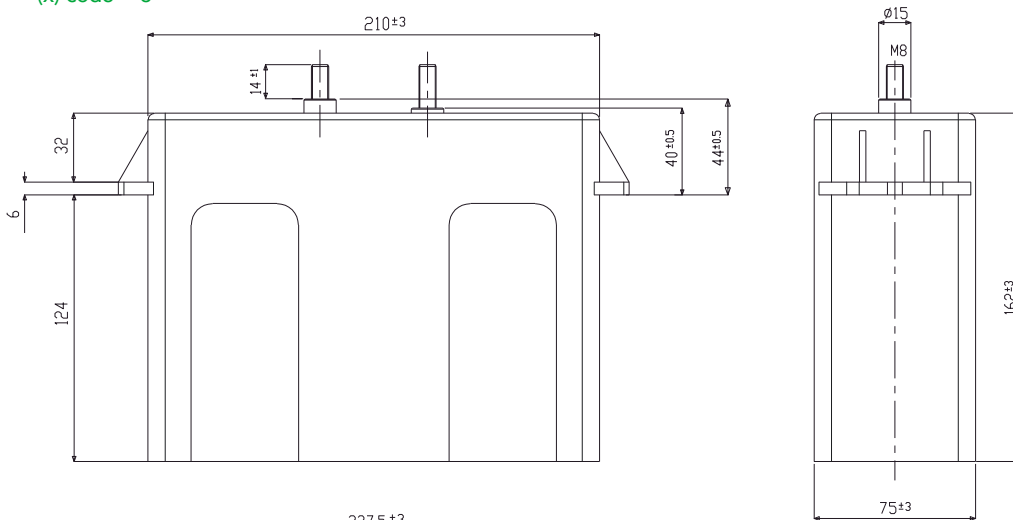
## A SOLUTION

M8 standard terminals solution:  
(x) code = 5



## B SOLUTION

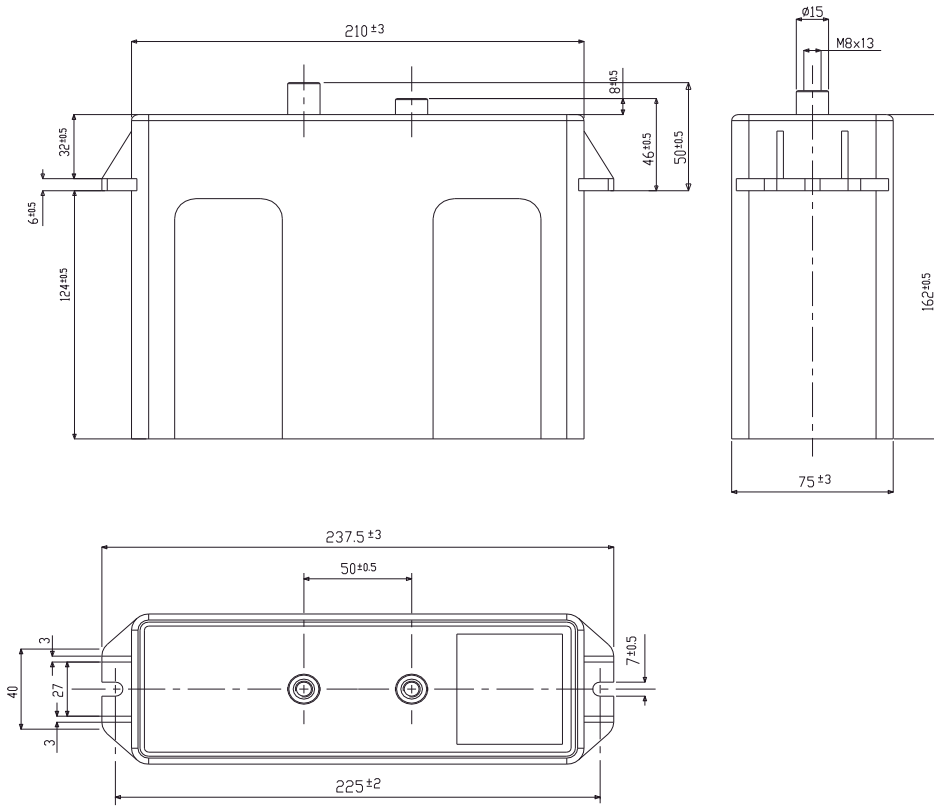
Available solution: M8 screw bolt terminals:  
(x) code = 6





## C SOLUTION

Available on request: M8 staggered terminals solution:  
(x) code  $\geq 7$





## DC 86 P series

### High Density, Low Inductance DC-Link Capacitors Prismatic Plastic Case

This very large Prismatic Box variant is particularly convenient for applications requiring very large capacity or high operating voltages; the tried and proven Ducati Energia PPMh technology provides competitive and reliable performances for all common DC-Link applications.

When coupled with the exclusive Ducati Energia High Crystallinity Film the DC 86 P construction provides superior temperature performance with 100khrs life at HotSpot temperature higher than 85 °C or extended life of several hundred thousand hours @70°C HotSpot.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 86 P operational life, while maximizing the current capability.

Main characteristics:


- Very High Capacity Density
- Self-Healing Metallized Polypropylene Film
- V0 Plastic Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|  |   |
|--|---|
| DC Voltage range   | 550÷6800 V  |
| Maximum ripple current   | 300 A   |
| Capacitance range  | up to 15000 µF  |
| Capacitance tolerance  | standard: +0%/-15%; others on request   |
| Thermal resistance natural cooling ( $R_{THC}$ )   | 0.52 °C/W   |
| Equivalent series inductance (ESL)   | < 45 nH   |
| Terminals  | 4 x M6 internal threads per pole or bus-bars  |
| Test voltage   | $U_{tc} = 6 \text{ kVac @50 Hz 10 s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Working temperature ( $\theta_{MIN} - \theta_{MAX}$ )  | -25 / +85 °C  |
| Storage temperature  | -25 / +85 °C  |
| Filling  | Self-extinguishing (UL94 V0) polyurethane resin                                     |
| Dielectric   | Self healing PPMd film  |
| Container  | Self-extinguishing (UL94 V0) plastic box  |
| Failure quota  | 50 /10E9  |
| Life expectancy  | 100.000 h (*)   |
| Maximum altitude   | 2000 m a.s.l.   |
| Reference standard   | IEC 61071-1/2 - IEC 61881 - UL 810  |
| M6 internal thread terminals   | Max 3 Nm  |
| Fixing slots   | Max 10 Nm   |
| In according to fire protection standard  | EN 45545-2  |

**Safety system:** These capacitors are designed with a particular type of polypropylene metalized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

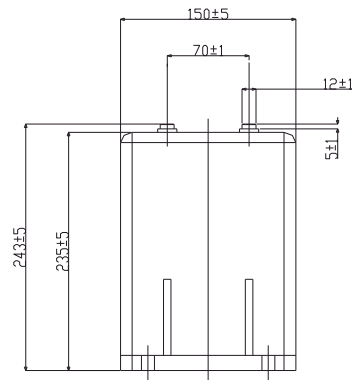
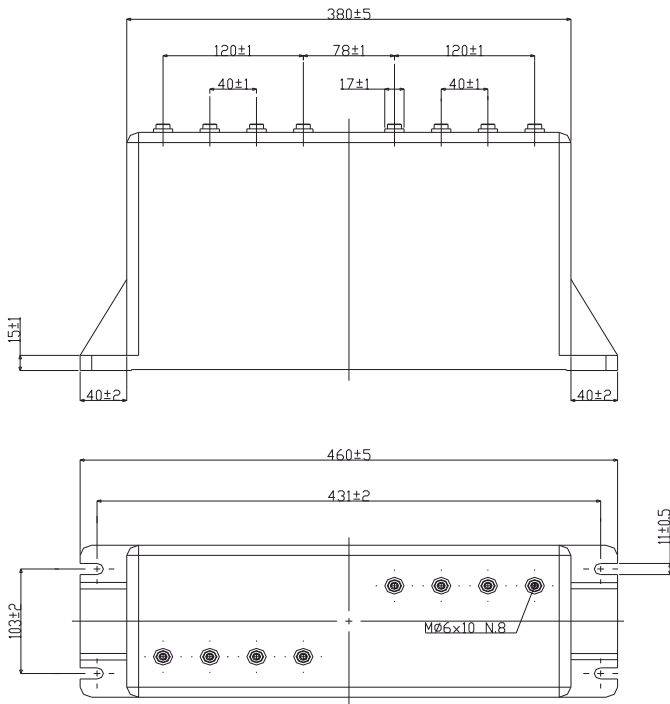
(\*) For details please refer to page 83.

| Capacitance<br>Cn [μF] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Weight<br>[kg] | Terminal<br>solution<br>A / B | Part n.<br>416.86. |
|------------------------|-------------------------------|-----------------------------------|-----------------------------|---|----------------------------------|-----------------------------|---------------------------------|--|----------------|-------------------------------|--------------------|
| 15000                  | 550                           | 0.8                               | 1.3                         | 300   | 34500                            | 45                          | < 0.30                          | 0.52   | < 19.0         | A / B                         | 009.x              |
| 11000                  | 650                           | 1.0                               | 1.5                         | 300   | 30800                            | 45                          | < 0.30                          | 0.52   | < 19.0         | A / B                         | 109.x              |
| 8500                   | 800                           | 1.2                               | 1.8                         | 300   | 28050                            | 45                          | < 0.30                          | 0.52   | < 19.0         | A / B                         | 159.x              |
| 5600                   | 1000                          | 1.5                               | 2.3                         | 250   | 26880                            | 40                          | < 0.45                          | 0.52   | < 19.0         | A / B                         | 209.x              |
| 3800                   | 1200                          | 1.8                               | 2.8                         | 250   | 22800                            | 40                          | < 0.50                          | 0.52   | < 19.0         | A / B                         | 259.x              |
| 2800                   | 1350                          | 2.0                               | 3.1                         | 250   | 22400                            | 40                          | < 0.50                          | 0.52   | < 19.0         | A / B                         | 309.x              |
| 2100                   | 1600                          | 2.4                               | 3.7                         | 200   | 21000                            | 40                          | < 0.65                          | 0.52   | < 19.0         | A / B                         | 359.x              |
| 1700                   | 1800                          | 2.7                               | 4.1                         | 200   | 20400                            | 40                          | < 0.70                          | 0.52   | < 19.0         | A / B                         | 409.x              |
| 1050                   | 2100                          | 3.1                               | 4.8                         | 200   | 19950                            | 40                          | < 0.70                          | 0.52   | < 19.0         | A / B                         | 459.x              |
| 650                    | 2700                          | 4.0                               | 6.2                         | 200   | 19500                            | 35                          | < 0.75                          | 0.52   | < 19.0         | A / B                         | 508.x              |
| 500                    | 3200                          | 4.8                               | 7.4                         | 200   | 17500                            | 35                          | < 0.75                          | 0.52   | < 19.0         | A / B                         | 559.x              |
| 300                    | 3800                          | 5.7                               | 8.7                         | 200   | 13500                            | 35                          | < 0.75                          | 0.52   | < 19.0         | A / B                         | 609.x              |
| 200                    | 4500                          | 6.7                               | 10.0                        | 150   | 13000                            | 30                          | < 1.20                          | 0.52   | < 19.0         | A                             | 659.0              |
| 160                    | 5200                          | 7.8                               | 10.0                        | 150   | 11200                            | 30                          | < 1.20                          | 0.52   | < 19.0         | A                             | 709.0              |
| 120                    | 6000                          | 9.0                               | 10.0                        | 150   | 10800                            | 25                          | < 1.40                          | 0.52   | < 19.0         | A                             | 759.0              |
| 80                     | 6800                          | 10.0                              | 10.0                        | 120   | 9600                             | 20                          | < 1.50                          | 0.52   | < 19.0         | A                             | 809.0              |

**NOTES:**

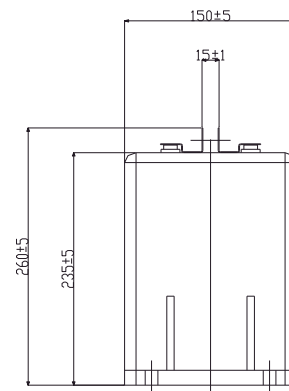
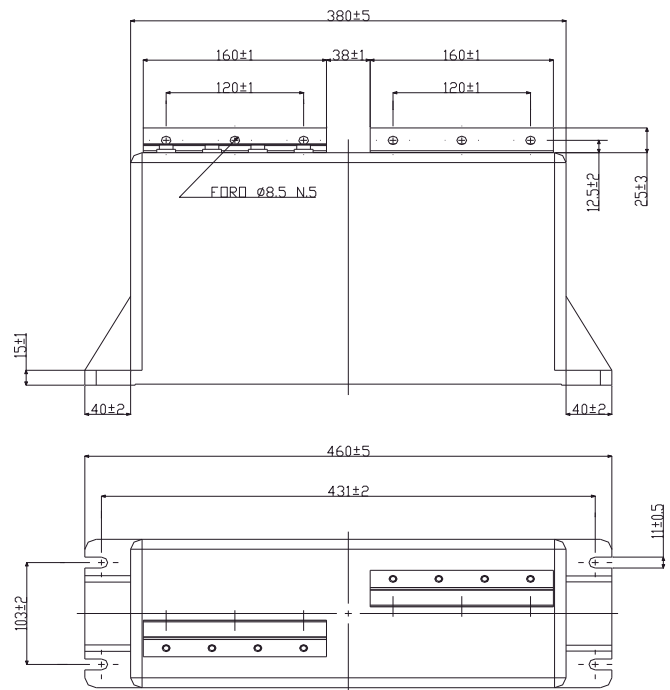
- (Cn) Tolerance standard value: -15 ... +0%. Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Ur) Maximum peak to peak alternating voltage component on the DC working voltage.
- (Rs) Related at 1 KHz.
- (R<sub>THC</sub>) Thermal resistance CASE TO AMBIENT in natural cooling environment.
- (A/B solut) Due to the clearance distance, B SOLUTION (X code= 1) is available only up to Un= 3800 V (Rated Voltage).
- (X code) According to terminal type. A SOLUTION X=0 / B SOLUTION X=1.

|                                |                    |
|--------------------------------|--------------------|
| <b>Box TYPE</b>                |                    |
| <b>Standard box dimensions</b> | mm 477 x 252 x 172 |
| No. pieces x box:              | 1                  |



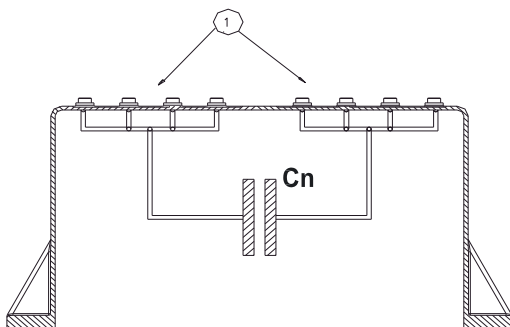
### A SOLUTION

41686.XXX.0  
M6 internal threads



### B SOLUTION

41686.XXX.1  
Bus bar terminals



### NOTES:

For A Solution: please, pay attention to connect all of the four M6 internal thread terminals for each polarity.

## DC 85 B series

### High Density, Low Inductance DC-Link Capacitors Cubic Plastic Case

This Cubic Box variant - DC 85 B - is powered by the tried and proven Ducati Energia PPMh technology making it a competitive and reliable solution to all common DC-Link applications.

When coupled with the exclusive Ducati Energia High Crystallinity Film the DC 85 B construction provides superior temperature performance with 100khrs life at HotSpot temperature higher than 85 °C or extended life of several hundred thousand hours @70°C HotSpot. The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 85 B operational life, while maximizing the current capability.

Main characteristics:


- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- V0 Plastic Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link
- Energy Storage / Pulse Generation



#### General Characteristics

|  |   |
|--|---|
| DC Voltage range   | 550÷6000 V                                      |
| Maximum ripple current   | 120 A   |
| Capacitance range  | up to 38000 µF                                  |
| Capacitance tolerance  | standard: +0%/-15%; others on request           |
| Series resistance (RS)   | < 5 mΩ  |
| Thermal resistance natural cooling (R <sub>THC</sub> )   | 2.0 °C/W  |
| Equivalent series inductance (ESL)   | < 30 nH   |
| Terminals  | M10 screw-type bolts                            |
| Test voltage   | U <sub>tt</sub> = 1.5 x U <sub>nDC</sub> 10 s   |
| Working temperature (θ <sub>MIN</sub> - θ <sub>MAX</sub> )   | -25 / +85 °C                                    |
| Storage temperature  | -25 / +85 °C                                    |
| Filling  | Self-extinguishing (UL94 V0) polyurethane resin |
| Dielectric   | Self healing PPMd film                          |
| Container  | Self-extinguishing (UL94 V0) plastic box        |
| Failure quota  | 50 /10E9  |
| Life expectancy  | 100.000 h (*)                                   |
| Maximum altitude   | 2000 m a.s.l.                                   |
| Reference standard   | IEC 61071-1/2 - IEC 61881 - UL 810              |
| M10 screw terminals  | Max 10 Nm                                       |
| Fixing slots   | Max 10 Nm                                       |
| In according to fire protection standard  | EN 45545-2                                      |

**Safety system:** These capacitors are designed with a particular type of polypropylene metallized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

(\*) For details please refer to page 83.



| Capacitance<br>Cn [ $\mu$ F] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [m $\Omega$ ] | Thermal<br>Resistance<br>R <sub>THC</sub> [ $^{\circ}$ C/W] | Weight<br>[kg] | Terminal<br>solution<br>A / B | Part n.<br>416.85. |
|------------------------------|-------------------------------|-----------------------------------|-----------------------------|---|----------------------------------|-----------------------------|--|---|----------------|-------------------------------|--------------------|
| 3800                         | 550                           | 0.8                               | 1.2                         | 120   | 9800                             | 25                          | < 0.80                                   | 1.65  | < 5.0          | A / B                         | 001.x              |
| 2800                         | 650                           | 1.0                               | 1.4                         | 120   | 9300                             | 25                          | < 0.80                                   | 1.65  | < 5.0          | A / B                         | 005.x              |
| 2250                         | 750                           | 1.1                               | 1.6                         | 120   | 9500                             | 25                          | < 0.80                                   | 1.65  | < 5.0          | A / B                         | 090.x              |
| 1500                         | 900                           | 1.4                               | 1.9                         | 120   | 9500                             | 25                          | < 0.80                                   | 1.65  | < 5.0          | A / B                         | 190.x              |
| 1200                         | 1100                          | 1.7                               | 2.3                         | 120   | 9600                             | 25                          | < 0.80                                   | 1.65  | < 5.0          | A / B                         | 290.x              |
| 1000                         | 1250                          | 1.9                               | 2.6                         | 120   | 9000                             | 20                          | < 0.85                                   | 1.65  | < 5.0          | A / B                         | 390.x              |
| 800                          | 1350                          | 2.0                               | 2.9                         | 100   | 8800                             | 20                          | < 1.20                                   | 1.65  | < 5.0          | A / B                         | 405.X              |
| 750                          | 1450                          | 2.2                               | 3.0                         | 100   | 8500                             | 20                          | < 1.20                                   | 1.65  | < 5.0          | A / B                         | 490.x              |
| 420                          | 1800                          | 2.7                               | 3.8                         | 100   | 8200                             | 15                          | < 1.20                                   | 1.65  | < 5.0          | A / B                         | 590.x              |
| 280                          | 2200                          | 3.3                               | 4.6                         | 80  | 7000                             | 15                          | < 1.80                                   | 1.65  | < 5.0          | A / B                         | 690.x              |
| 180                          | 2800                          | 4.2                               | 5.8                         | 80  | 6300                             | 15                          | < 1.90                                   | 1.65  | < 5.0          | A / B                         | 790.x              |
| 80                           | 4000                          | 6.0                               | 8.5                         | 60  | 4000                             | 10                          | < 3.20                                   | 1.65  | < 5.0          | A / B                         | 890.x              |
| 50                           | 5000                          | 7.5                               | 10.0                        | 50  | 3500                             | 10                          | < 4.60                                   | 1.65  | < 5.0          | A / B                         | 990.x              |
| 40                           | 5500                          | 8.3                               | 10.0                        | 40  | 3200                             | 8                           | < 7.50                                   | 1.65  | < 5.0          | A / B                         | A90.x              |
| 30                           | 6000                          | 9.0                               | 10.0                        | 35  | 2700                             | 8                           | < 8.20                                   | 1.65  | < 5.0          | A / B                         | B90.x              |

**NOTES:**

(Cn) Tolerance standard value: -15 ... +0%. Other tolerance values on request.

(Cn) - (Un) Capacitance and rated voltage standard values, other values on request.

(Ur) Maximum peak to peak alternating voltage component on the DC working voltage.

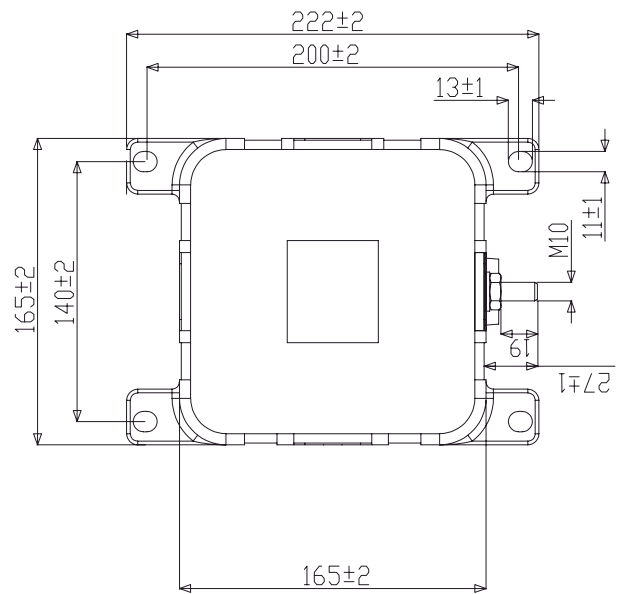
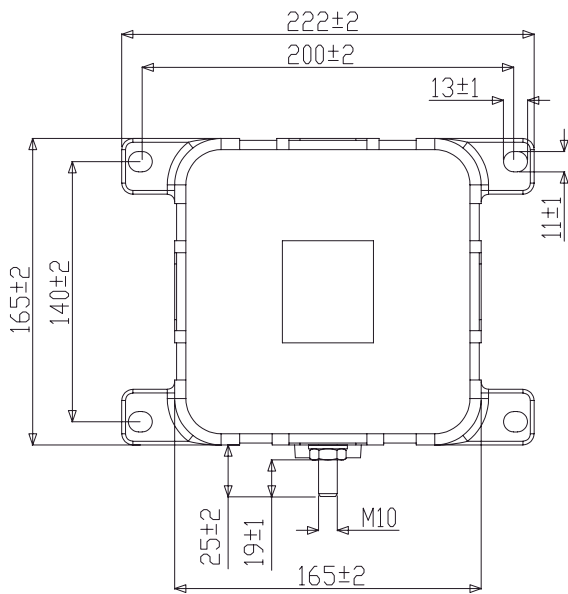
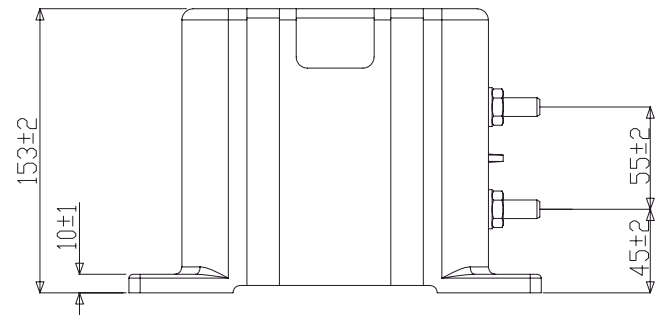
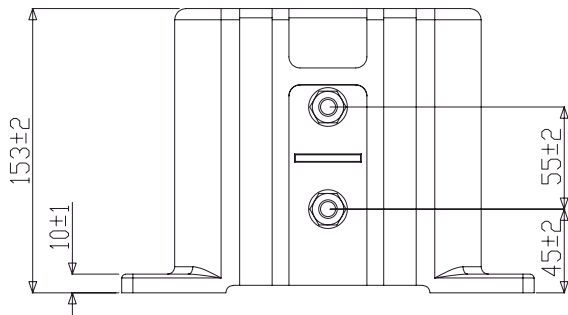
(Rs) Related at 1 KHz.

(R<sub>THC</sub>) Thermal resistance CASE TO AMBIENT in natural cooling environment.

(A/B solut) .X="5" for A SOLUTION (M10 terminals on surface without handles) / .x="6" for B SOLUTION (M10 terminals on handle surface).

|                                |                    |
|--------------------------------|--------------------|
| <b>Box TYPE</b>                |                    |
| <b>Standard box dimensions</b> | mm 450 x 470 x 220 |
| No. pieces x box:              | 4                  |



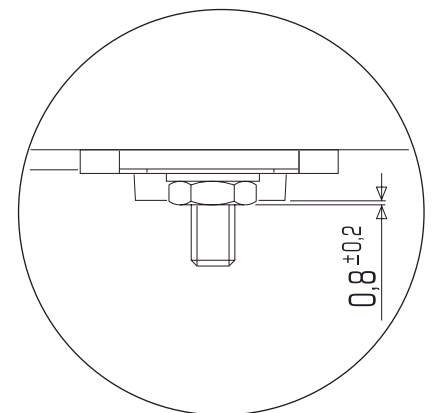
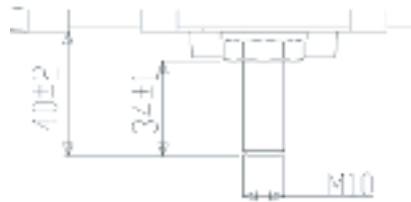


**A SOLUTION**

41685.xxx.5  
M10 terminals on handleless surface

**B SOLUTION**

41685.xxx.6  
M10 terminals on handle surface





## DC 83 P and DCH 83 P series

*DC-Link Capacitors, high density and low inductance,  
resin filled in box plastic case*

This rectangular prism Box variant - DC83 P - is powered by the tried and proven Ducati Energia PPMh technology making it a competitive and reliable solution to all common DC-Link applications.

When coupled with the exclusive Ducati Energia High Crystallinity Film the construction (DCH 83 P series) provides superior temperature performance with 100khrs life @ HotSpot higher than 85°C. The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of operational life, while maximizing the current capability.

A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:

- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- V0 Plastic Case
- DRY Resin filling
- Low ESL

Main applications:


- DC-Link
- Energy Storage / Pulse Generation



Crepage Distance (mm) 45

Clearance Distance (mm) 35

### General Characteristics

|   |  |
|---|--|
| DC Voltage range  | 550 - 2350 V   |
| Maximum ripple current (I <sub>max</sub> )              | 165 Arms   |
| Capacitance range                                       | 0,1 - 2,0 mF   |
| Equivalent series inductance (ESL) - typical            | 30 nH  |
| Tinned copper terminals                                 | M8x10 internal thread  |
| Container   | Self-extinguishing (UL94 V0) plastic box   |
| Filling   | Self-extinguishing (UL94 V0) Polyurethane resin  |
| Film Dielectric type                                    | PPMDh film (*)   |
| Maximum altitude  | 2000 m a.s.l.  |
| Mounting position                                       | Any position   |
| Maximum torque for fixing slots                         | 10Nm   |
| Maximum torque for M8 terminals                         | 4 Nm   |
| Working ambient temperature                             | -25 .. +50 °C  |
| Operating temperature MAX/ MIN (case)                   | -25 .. +85 °C  |
| Maximum Hotspot temperature                             | +85 °C   |
| Storage temperature                                     | -25 .. +85 °C  |
| Humidity category class (DIN 40040)                     | F  |
| Life expectancy (@Un / 70°C hot spot)                   | 100.000 h  |
| Failure quota   | 50FIT  |
| Reference standards                                     | IEC 61071-1/2<br>IEC 61881<br>UL810  |
| Material and insulation distance designed according to: | UL 810   |
| In according to fire protection standard                |  EN 45545-2 |

**Safety system:** These capacitors are designed with a particular type of polypropylene metalized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

## DC 83 P

| Capacitance<br>Cn [μF] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [kA] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THS</sub> [°C/W] | Weight<br>[kg] | Part n.<br>416.83. |
|------------------------|-------------------------------|-----------------------------------|-----------------------------|---|-----------------------------------|-----------------------------|---------------------------------|--|----------------|--------------------|
| 1850                   | 550                           | 0.8                               | 1.2                         | 165   | 14.8                              | 24                          | < 0.36                          | 3,60   | < 3            | 1900               |
| 1500                   | 700                           | 1.0                               | 1.5                         | 165   | 16.5                              | 25                          | < 0.38                          | 3,60   | < 3            | 2900               |
| 1050                   | 900                           | 1.3                               | 1.9                         | 155   | 14.7                              | 23                          | < 0.43                          | 3,60   | < 3            | 3900               |
| 700                    | 1100                          | 1.5                               | 2.3                         | 150   | 14.0                              | 22                          | < 0.45                          | 3,60   | < 3            | 4900               |
| 580                    | 1250                          | 1.8                               | 2.6                         | 145   | 14.5                              | 21.5                        | < 0.48                          | 3,60   | < 3            | 5900               |
| 460                    | 1400                          | 2.0                               | 2.9                         | 140   | 12.9                              | 20.5                        | < 0.52                          | 3,60   | < 3            | 6900               |
| 340                    | 1600                          | 2.2                               | 3.4                         | 135   | 11.9                              | 18                          | < 0.55                          | 3,60   | < 3            | 7900               |
| 240                    | 1800                          | 2.5                               | 3.8                         | 130   | 9.6                               | 15                          | < 0.62                          | 3,60   | < 3            | 8900               |
| 190                    | 2100                          | 2.9                               | 4.4                         | 120   | 8.0                               | 13                          | < 0.68                          | 3,60   | < 3            | 9900               |

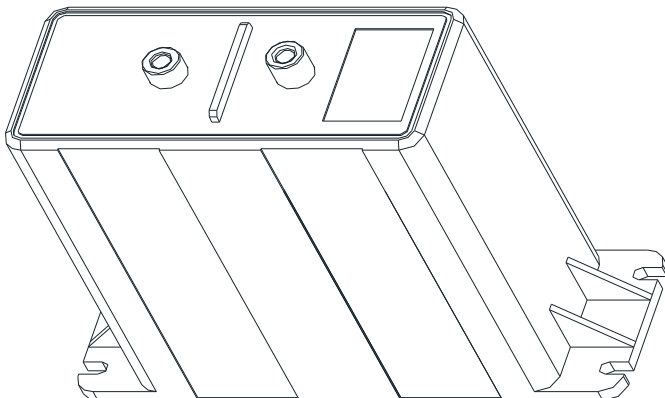
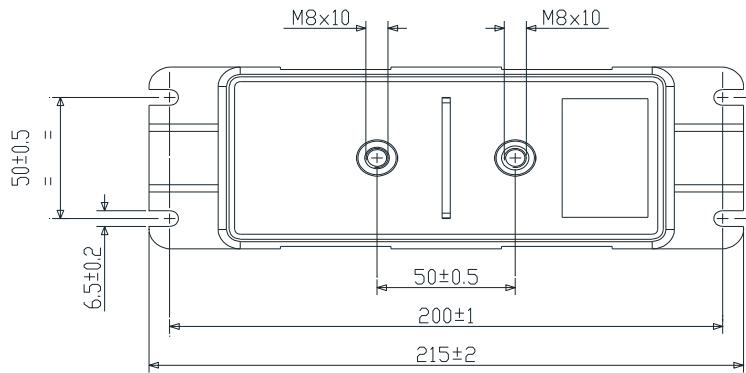
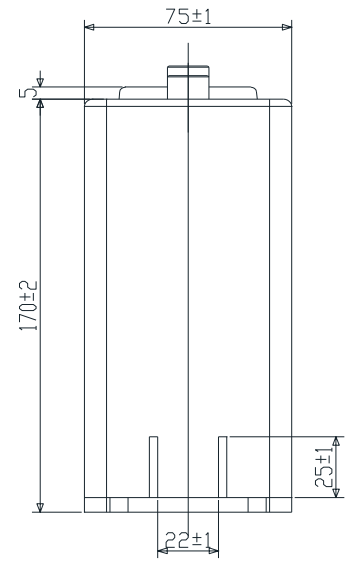
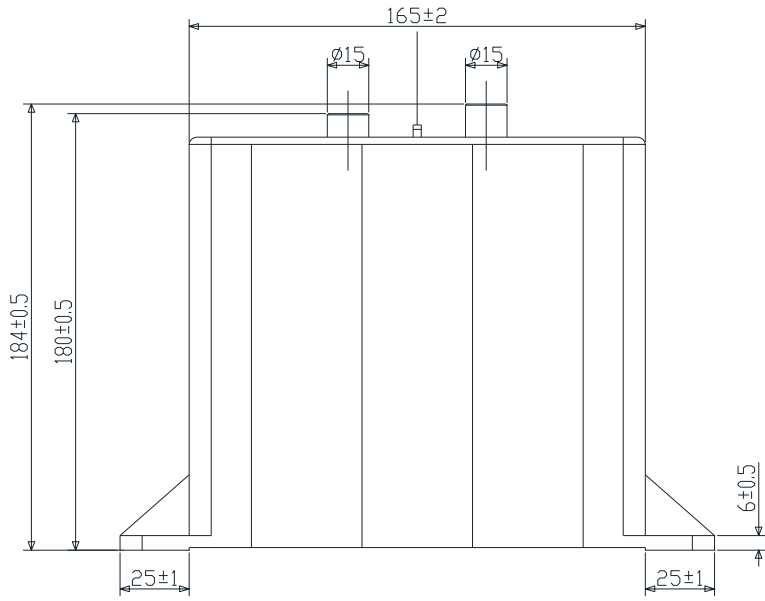
## DCH 83 P

| Capacitance<br>Cn [μF] | Rated DC<br>Voltage<br>Un [V] | Repet. Peak<br>Voltage<br>Up [kV] | Surge<br>Voltage<br>Us [kV] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [kA] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THS</sub> [°C/W] | Weight<br>[kg] | Part n.<br>416.83.V. |
|------------------------|-------------------------------|-----------------------------------|-----------------------------|---|-----------------------------------|-----------------------------|---------------------------------|--|----------------|----------------------|
| 1850                   | 650                           | 0.9                               | 1.4                         | 155   | 16.7                              | 25                          | < 0.41                          | 3,60   | < 3            | 1900                 |
| 1350                   | 850                           | 1.2                               | 1.8                         | 150   | 14.9                              | 25                          | < 0.43                          | 3,60   | < 3            | 2900                 |
| 1050                   | 1000                          | 1.4                               | 2.1                         | 150   | 13.7                              | 22                          | < 0.45                          | 3,60   | < 3            | 3900                 |
| 670                    | 1250                          | 1.8                               | 2.6                         | 145   | 12.1                              | 19.5                        | < 0.47                          | 3,60   | < 3            | 4900                 |
| 550                    | 1400                          | 2.0                               | 2.9                         | 140   | 11.0                              | 18                          | < 0.52                          | 3,60   | < 3            | 5900                 |
| 460                    | 1550                          | 2.2                               | 3.3                         | 135   | 10.6                              | 17                          | < 0.55                          | 3,60   | < 3            | 6900                 |
| 340                    | 1800                          | 2.5                               | 3.8                         | 125   | 9.5                               | 15                          | < 0.62                          | 3,60   | < 3            | 7900                 |
| 240                    | 2100                          | 2.9                               | 4.4                         | 120   | 8.4                               | 13                          | < 0.68                          | 3,60   | < 3            | 8900                 |
| 190                    | 2350                          | 3.3                               | 4.9                         | 115   | 7.6                               | 12                          | < 0.76                          | 3,60   | < 3            | 9900                 |

### NOTES:

- (Cn) Tolerance standard value: -15 ... +0%. Other tolerance values on request.
- (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.
- (Rs) Related at 1 KHz.
- (R<sub>THS</sub>) Thermal resistance AMBIENT - HOT SPOT (air forced cooling system).
- (I<sub>MAX</sub>) Maximum RMS Current @ 50°C ambient temperature.

|                                |                    |
|--------------------------------|--------------------|
| <b>Box TYPE</b>                |                    |
| <b>Standard box dimensions</b> | mm 450 x 470 x 220 |
| No. pieces x box:              | 8                  |





# METALLIC BOX



## DC 88 M series

### High Density, Very Low Inductance DC-Link Capacitors - Prismatic Stainless Steel Case (non magnetic)

The metallic case and open resin casting allows high flexibility of construction: painted / stainless steel or aluminum cases with standard screw terminals or IGBT-specific busbar terminals. DC 88 M is powered by the tried and proven Ducati Energia PPMh technology making it a competitive and reliable solution to all common DC-Link applications.

When coupled with the exclusive Ducati Energia High Crystallinity Film the DC 88 M construction provides superior temperature performance with 100khrs life at HotSpot temperature higher than 85°C or extended life of several hundred thousands hours @70°C HotSpot.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 88 M operational life, while maximizing the current capability.

A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:

- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- Steel, Stainless Steel or Aluminium Case
- DRY Resin filling
- Low ESL

Main applications:

- DC-Link for Large Drives
- Energy Storage / Pulse Generation

#### General Characteristics

|   |   |
|---|---|
| DC Voltage range                                      | 550÷1550 V(*)   |
| Maximum ripple current                                | 300 A   |
| Capacitance range                                     | up to 10500 µF  |
| Capacitance tolerance                                 | standard: ±10% / on request: ±5%  |
| Equivalent series inductance (ESL)                    | 35 nH to 50 nH  |
| Terminals   | 4x M10 screw type Its   |
| Test voltage  | $U_{tc} = 4.5 \text{ kVac @} 50 \text{ Hz } 60 \text{ s}$<br>$U_{tt} = 1.5 \times U_{nDC} 10 \text{ s}$ |
| Working temperature ( $\theta_{MIN} - \theta_{MAX}$ ) | -25 / +85 °C  |
| Storage temperature                                   | -25 / +85 °C  |
| Filling   | Polyurethane resin  |
| Dielectric  | Self healing PPMd film  |
| Container   | Non painted, stainless steel, not magnetic casing   |
| Failure quota   | 50 /10E9  |
| Life expectancy                                       | 100.000 h (**)  |
| Maximum altitude                                      | 2000 m a.s.l.   |
| Reference standard                                    | IEC 61071-1/2 - IEC 61881   |
| M10 internal thread                                   | Max 6 Nm  |
| Fixing slots  | Max 15 Nm   |



**Safety system:** These capacitors are designed with a particular type of polypropylene metallized film (PPMd film) that assures an open circuit at the end of life, if the operation is within the specification.

(\*) Other values on request

(\*\*) For details please refer to page 83.

## DC 88 M series

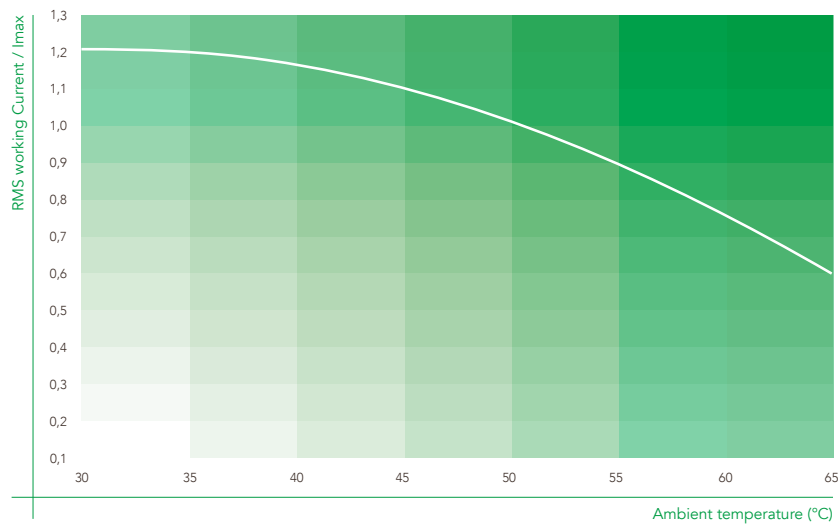
High Density, Very Low Inductance DC-Link Capacitors -  
 Prismatic Stainless Steel Case (non magnetic)

| Capacitance<br>Cn [μF]  | Height<br>H [mm] | Width<br>w [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Inductance<br>ESL [nH] | Typical<br>Weight<br>[kg] | Part number<br>416.88. |
|---|------------------|-----------------|---|----------------------------------|-----------------------------|---------------------------------|--|------------------------|---------------------------|------------------------|
| <b>Un<sub>DC</sub> = 550 V    Up = 8.5 kV    Us = 1.3 kV</b>  |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 3200  | 170              | 95              | 180   | 22.4                             | 36                          | < 0.80                          | 1.25   | 35                     | < 10.5                    | 1091                   |
| 5000  | 240              | 95              | 300   | 25.0                             | 40                          | < 0.40                          | 0.85   | 45                     | < 13.0                    | 1192                   |
| 5500  | 170              | 145             | 170   | 24.8                             | 40                          | < 0.85                          | 1.35   | 40                     | < 14.5                    | 1293                   |
| 8500  | 240              | 145             | 230   | 25.5                             | 41                          | < 0.50                          | 1.15   | 50                     | < 18.5                    | 1394                   |
| 6650  | 170              | 170             | 150   | 21.3                             | 34                          | < 1.05                          | 1.35   | 45                     | < 16.0                    | 1495                   |
| 10500   | 240              | 170             | 230   | 26.3                             | 42                          | < 0.65                          | 0.95   | 50                     | < 21.5                    | 1596                   |
| <b>Un<sub>DC</sub> = 700 V    Up = 1.05 kV    Us = 1.6 kV</b> |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 2400  | 170              | 95              | 180   | 19.2                             | 31                          | < 0.85                          | 1.25   | 35                     | < 10.5                    | 2091                   |
| 3800  | 240              | 95              | 300   | 22.8                             | 36                          | < 0.45                          | 0.85   | 45                     | < 13.0                    | 2192                   |
| 4250  | 170              | 145             | 170   | 23.4                             | 37                          | < 0.85                          | 1.35   | 40                     | < 14.5                    | 2293                   |
| 6500  | 240              | 145             | 220   | 22.8                             | 36                          | < 0.60                          | 1.15   | 50                     | < 18.5                    | 2394                   |
| 5000  | 170              | 170             | 150   | 20.5                             | 33                          | < 1.10                          | 1.35   | 45                     | < 16.0                    | 2495                   |
| 8000  | 240              | 170             | 230   | 24.8                             | 40                          | < 0.65                          | 0.95   | 50                     | < 21.5                    | 2596                   |
| <b>Un<sub>DC</sub> = 1000 V    Up = 1.4 kV    Us = 2.3 kV</b> |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 1600  | 170              | 95              | 180   | 19.2                             | 31                          | < 0.85                          | 1.25   | 35                     | < 10.5                    | 3091                   |
| 2530  | 240              | 95              | 300   | 20.2                             | 32                          | < 0.45                          | 0.85   | 45                     | < 13.0                    | 3192                   |
| 2650  | 170              | 145             | 170   | 18.6                             | 30                          | < 0.85                          | 1.35   | 40                     | < 14.5                    | 3293                   |
| 4300  | 240              | 145             | 220   | 21.5                             | 34                          | < 0.60                          | 1.15   | 50                     | < 18.5                    | 3394                   |
| 3250  | 170              | 170             | 150   | 16.3                             | 26                          | < 1.10                          | 1.35   | 45                     | < 16.0                    | 3495                   |
| 5060  | 240              | 170             | 230   | 20.2                             | 32                          | < 0.65                          | 0.95   | 50                     | < 21.5                    | 3596                   |
| <b>Un<sub>DC</sub> = 1200 V    Up = 1.7 kV    Us = 2.4 kV</b> |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 1100  | 170              | 95              | 170   | 22.0                             | 35                          | < 0.90                          | 1.25   | 35                     | < 10.5                    | 4091                   |
| 1750  | 240              | 95              | 280   | 19.3                             | 31                          | < 0.50                          | 0.85   | 45                     | < 13.0                    | 4192                   |
| 1900  | 170              | 145             | 160   | 19.0                             | 30                          | < 1.00                          | 1.35   | 40                     | < 14.5                    | 4293                   |
| 3000  | 240              | 145             | 250   | 21.0                             | 34                          | < 0.55                          | 1.15   | 50                     | < 18.5                    | 4394                   |
| 2250  | 170              | 170             | 140   | 19.1                             | 31                          | < 1.25                          | 1.35   | 45                     | < 16.0                    | 4495                   |
| 3700  | 240              | 170             | 240   | 20.4                             | 33                          | < 0.65                          | 0.95   | 50                     | < 21.5                    | 4596                   |
| <b>Un<sub>DC</sub> = 1350 V    Up = 1.9 kV    Us = 2.4 kV</b> |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 750   | 170              | 95              | 160   | 21.0                             | 34                          | < 1.10                          | 1.25   | 35                     | < 10.5                    | 5091                   |
| 1300  | 240              | 95              | 270   | 18.2                             | 29                          | < 0.55                          | 0.85   | 45                     | < 13.0                    | 5192                   |
| 1350  | 170              | 145             | 150   | 20.3                             | 32                          | < 1.15                          | 1.35   | 40                     | < 14.5                    | 5293                   |
| 2200  | 240              | 145             | 250   | 22.0                             | 35                          | < 0.55                          | 1.15   | 50                     | < 18.5                    | 5394                   |
| 1650  | 170              | 170             | 130   | 19.8                             | 32                          | < 1.45                          | 1.35   | 45                     | < 16.0                    | 5495                   |
| 2700  | 240              | 170             | 230   | 21.6                             | 35                          | < 0.70                          | 0.95   | 50                     | < 21.5                    | 5596                   |

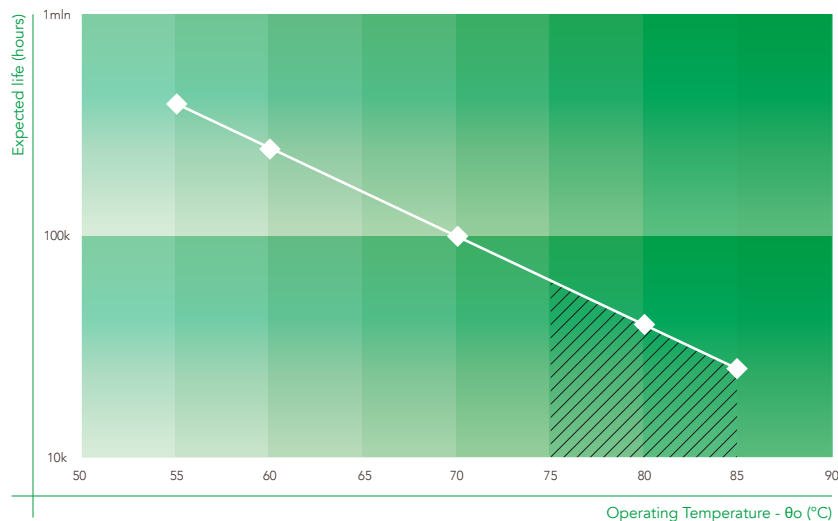
| Capacitance<br>Cn [μF]                                  | Height<br>H [mm] | Width<br>w [mm] | Max. RMS<br>Current<br>I <sub>MAX</sub> [A] | Repet. Peak<br>Current<br>Ip [A] | Surge<br>Current<br>Is [kA] | Series<br>Resistance<br>Rs [mΩ] | Thermal<br>Resistance<br>R <sub>THC</sub> [°C/W] | Inductance<br>ESL [nH] | Typical<br>Weight<br>[kg] | Part number<br>416.88. |
|---|------------------|-----------------|---|----------------------------------|-----------------------------|---------------------------------|--|------------------------|---------------------------|------------------------|
| Un <sub>DC</sub> = 1550 V    Up = 2.1 kV    Us = 2.4 kV |                  |                 |   |                                  |                             |                                 |  |                        |                           |                        |
| 550   | 170              | 95              | 150   | 18.7                             | 30                          | < 1.15                          | 1.25   | 35                     | < 10.5                    | 6091                   |
| 900   | 240              | 95              | 240   | 18.0                             | 29                          | < 0.65                          | 0.85   | 45                     | < 13.0                    | 6192                   |
| 1000  | 170              | 145             | 140   | 22.0                             | 35                          | < 1.20                          | 1.35   | 40                     | < 14.5                    | 6293                   |
| 1600  | 240              | 145             | 230   | 19.2                             | 31                          | < 0.60                          | 1.15   | 50                     | < 18.5                    | 6394                   |
| 1200  | 170              | 170             | 120   | 21.6                             | 35                          | < 1.60                          | 1.35   | 45                     | < 16.0                    | 6495                   |
| 2000  | 240              | 170             | 220   | 20.0                             | 32                          | < 0.75                          | 0.95   | 50                     | < 21.5                    | 6596                   |

**NOTES:**  
 (Cn) Tolerance standard value: ±10%. Other tolerance values on request.  
 (Cn) - (Un) Capacitance and rated voltage standard values, other values on request.  
 (Rs) Related at 1 KHz.  
 (R<sub>THC</sub>) Thermal resistance AMBIENT - CASE.  
 (I<sub>MAX</sub>) Maximum RMS @ 45 °C ambient temperature.  
 (ESL) Standard stray inductance. On request very low stray inductance models.

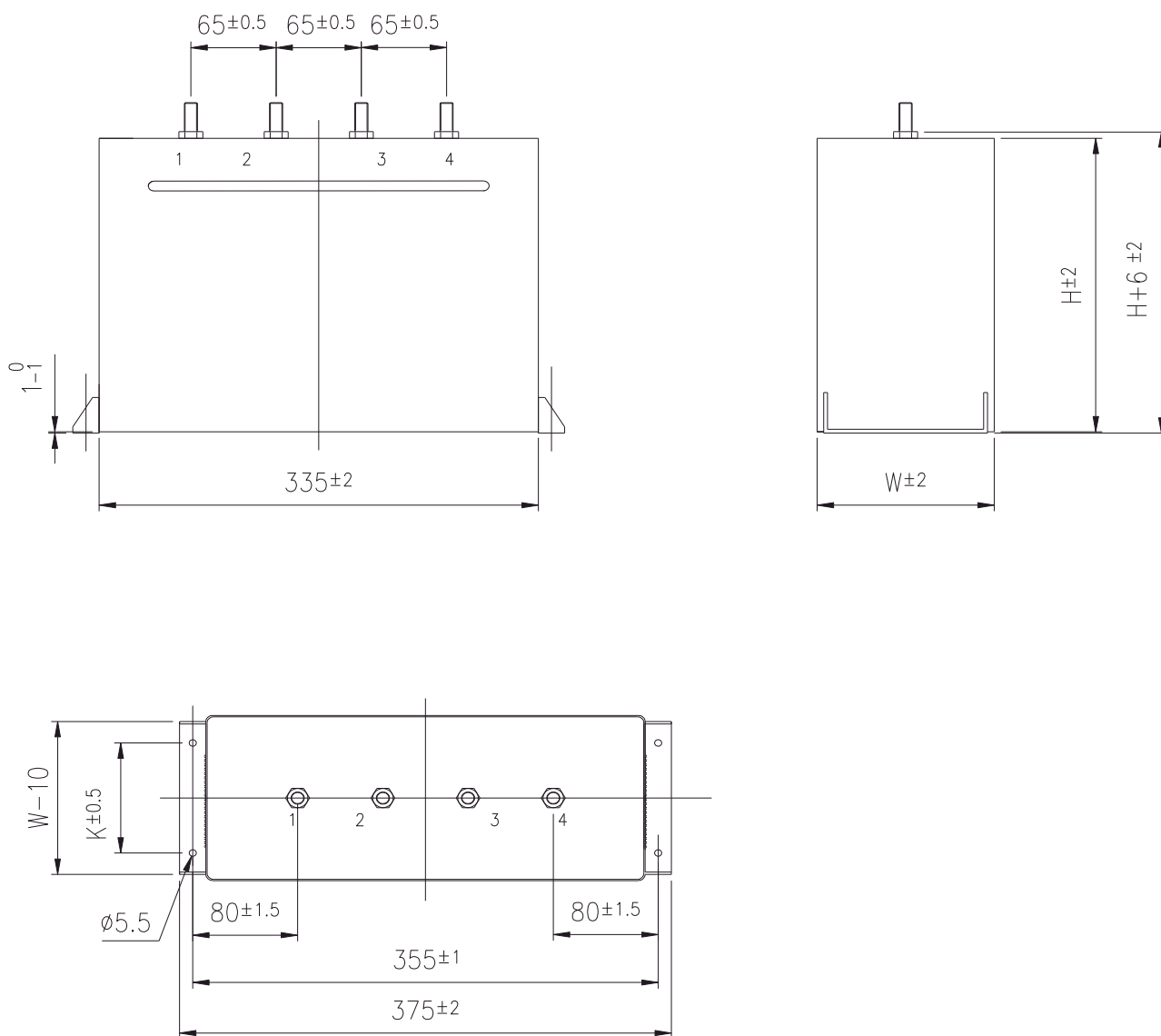
**RMS working current vs Ambient temperature**



**Expected life vs Temperature (on surface case, at 3/4 of height)**







**Safety system:** These capacitors are designed with a particular type of polypropylene metalized film (PPM-D film) that assure an open circuit at the end of life, if the service is within the specification.

| W (mm) | K (mm) |
|--------|--------|
| 95     | 50     |
| 145    | 100    |
| 170    | 100    |

## DC 45 series

*High Density, Low Inductance, Vacuum Silicone Oil impregnated DC-Link Capacitors - Prismatic Metal Case (steel, stainless steel or aluminum)*

Designed for High-Voltage - High-Capacity applications, DC 45 can be made either with steel, stainless steel or aluminum cases and are vacuum impregnated with silicon oil.

The exclusive Ducati Energia metallization profiles guarantee high capacity stability and a controlled, open-circuit condition at the end of DC 45 operational life, while maximizing the current capability.

A special internal construction allows the minimization of field effects, thus guaranteeing low ESL.

Main characteristics:


- High Capacity Density
- Self-Healing Metallized Polypropylene Film
- Steel, Stainless Steel or Aluminium Case
- Vacuum Silicone Oil Impregnation
- Low ESL

Main applications:

- DC-Link for Large Drives (Marine/Railway Propulsion; Mining Equipment, etc)
- Energy Storage / Pulse Generation



### General Characteristics

|  |  |
|--|--|
| DC Voltage range                         | 800+5000V (*)  |
| Capacitance range                        | 100+5000 $\mu$ F (*)   |
| Capacitance tolerance                    | $\pm$ 5% / $\pm$ 10%   |
| Test voltage between terminals           | 1.5 Un 10 s  |
| Test voltage between terminals and case  | 2 Un 50 Hz 60 s  |
| Terminals                                | Bushings   |
| Ambient operating temperature            | -25 / +55 °C   |
| Protection degree                        | -25 / +45 °C   |
| Filling                                  | Silicone Oil   |
| Dielectric                               | Metallized polypropylene   |
| Case                                     | Steel  |
| Life expectancy                          | 100.000 h (**)   |
| Installation                             | Vertical / horizontal  |
| Reference standard                       | IEC 61071-1/2 - IEC 61881 - UL 810   |
| In according to fire protection standard |  EN 45545-2 |

(\*) Standard values. Other values on request.

(\*\*) For details please refer to page 83.

| H 360 mm         |                            |                            |                            |
|------------------|----------------------------|----------------------------|----------------------------|
| Rated DC Voltage | Capacitance Cn [μF]        | Capacitance Cn [μF]        | Capacitance Cn [μF]        |
| Un [V]           | Base: (W) 125 x (L) 340 mm | Base: (W) 140 x (L) 340 mm | Base: (W) 165 x (L) 480 mm |
| 800              | 12000                      | 14000                      | 26000                      |
| 1200             | 6000                       | 7000                       | 13000                      |
| 1800             | 2600                       | 3000                       | 5600                       |
| 2400             | 1400                       | 1650                       | 2400                       |
| 3000             | 850                        | 950                        | 1700                       |
| 3600             | 400                        | 480                        | 850                        |
| 4200             | 300                        | 480                        | 850                        |
| 4800             | 300                        | 360                        | 650                        |

| H 700 mm         |                            |                            |                            |
|------------------|----------------------------|----------------------------|----------------------------|
| Rated DC Voltage | Capacitance Cn [μF]        | Capacitance Cn [μF]        | Capacitance Cn [μF]        |
| Un [V]           | Base: (W) 125 x (L) 340 mm | Base: (W) 140 x (L) 340 mm | Base: (W) 165 x (L) 480 mm |
| 800              | 26000                      | 29500                      | 53000                      |
| 1200             | 12000                      | 14500                      | 25000                      |
| 1800             | 5500                       | 6250                       | 11500                      |
| 2400             | 3000                       | 3500                       | 6500                       |
| 3000             | 1750                       | 3050                       | 3650                       |
| 3600             | 1150                       | 1350                       | 2450                       |
| 4200             | 880                        | 980                        | 1500                       |
| 4800             | 630                        | 720                        | 1100                       |

| H 515 mm         |                            |                            |                            |
|------------------|----------------------------|----------------------------|----------------------------|
| Rated DC Voltage | Capacitance Cn [μF]        | Capacitance Cn [μF]        | Capacitance Cn [μF]        |
| Un [V]           | Base: (W) 125 x (L) 340 mm | Base: (W) 140 x (L) 340 mm | Base: (W) 165 x (L) 480 mm |
| 800              | 18000                      | 20500                      | 36500                      |
| 1200             | 8500                       | 10000                      | 18000                      |
| 1800             | 3750                       | 4250                       | 8000                       |
| 2400             | 2100                       | 2500                       | 4400                       |
| 3000             | 1300                       | 1500                       | 2600                       |
| 3600             | 850                        | 1000                       | 1700                       |
| 4200             | 580                        | 700                        | 1250                       |
| 4800             | 430                        | 500                        | 950                        |

| H 815 mm         |                            |                            |                            |
|------------------|----------------------------|----------------------------|----------------------------|
| Rated DC Voltage | Capacitance Cn [μF]        | Capacitance Cn [μF]        | Capacitance Cn [μF]        |
| Un [V]           | Base: (W) 125 x (L) 340 mm | Base: (W) 140 x (L) 340 mm | Base: (W) 165 x (L) 480 mm |
| 800              | 32000                      | 36500                      | 62000                      |
| 1200             | 15500                      | 18000                      | 32000                      |
| 1800             | 7000                       | 8000                       | 14500                      |
| 2400             | 3850                       | 4500                       | 7650                       |
| 3000             | 2150                       | 2450                       | 4500                       |
| 3600             | 1400                       | 1650                       | 3000                       |
| 4200             | 1050                       | 1200                       | 2300                       |
| 4800             | 760                        | 900                        | 1650                       |

**Overvoltage conditions, Peak / Surge Voltage**

| Rated DC Voltage Un [V] | Max. Working Voltage Umax [V] | Repet. Peak Voltage Up [KV] | Surge Voltage Us [KV] |
|-------------------------|-------------------------------|-----------------------------|-----------------------|
| 800                     | 1040                          | 1.3                         | 1.7                   |
| 1200                    | 1560                          | 2.0                         | 2.5                   |
| 1800                    | 2340                          | 3.0                         | 3.8                   |
| 2400                    | 3120                          | 4.0                         | 5.0                   |
| 3000                    | 3900                          | 5.0                         | 6.3                   |
| 3600                    | 4680                          | 5.9                         | 7.6                   |
| 4200                    | 5460                          | 6.9                         | 8.8                   |
| 4800                    | 6240                          | 7.9                         | 10.1                  |

**NOTES:**

(Umax) Working DC Voltage for a limited period of time, typically 4 hours/day maximum.

(Up) Maximum Peak Voltage - repetitive condition. Pulse duration < 500μs

(Us) Surge Voltage, occasionally during the lifetime: < 100 times/life.

### Equivalent serie inductance (ESL)

The values on this table are the maximum ESL referred to the case dimension of the capacitor. According to the number of terminals (2 or 4 - internal layout construction) and also the type of terminals (male or female, bushing height, ect...), ESL could change.

| Height | Base: 125 x 340 [mm] |             | Base: 140 x 340 [mm] |             | Base: 165 x 480 [mm] |             |
|--------|----------------------|-------------|----------------------|-------------|----------------------|-------------|
|        | 2 terminals          | 4 terminals | 2 terminals          | 4 terminals | 2 terminals          | 4 terminals |
| H [mm] |                      |             |                      |             |                      |             |
| 360    | <130                 | <80         | <135                 | <85         | <145                 | <95         |
| 515    | <145                 | <90         | <150                 | <100        | <165                 | <110        |
| 700    | <160                 | <100        | <170                 | <110        | <185                 | <125        |
| 815    | <180                 | <110        | <200                 | <120        | <220                 | <140        |

ESL (nH) - Measured according to IEC 61071, annex C

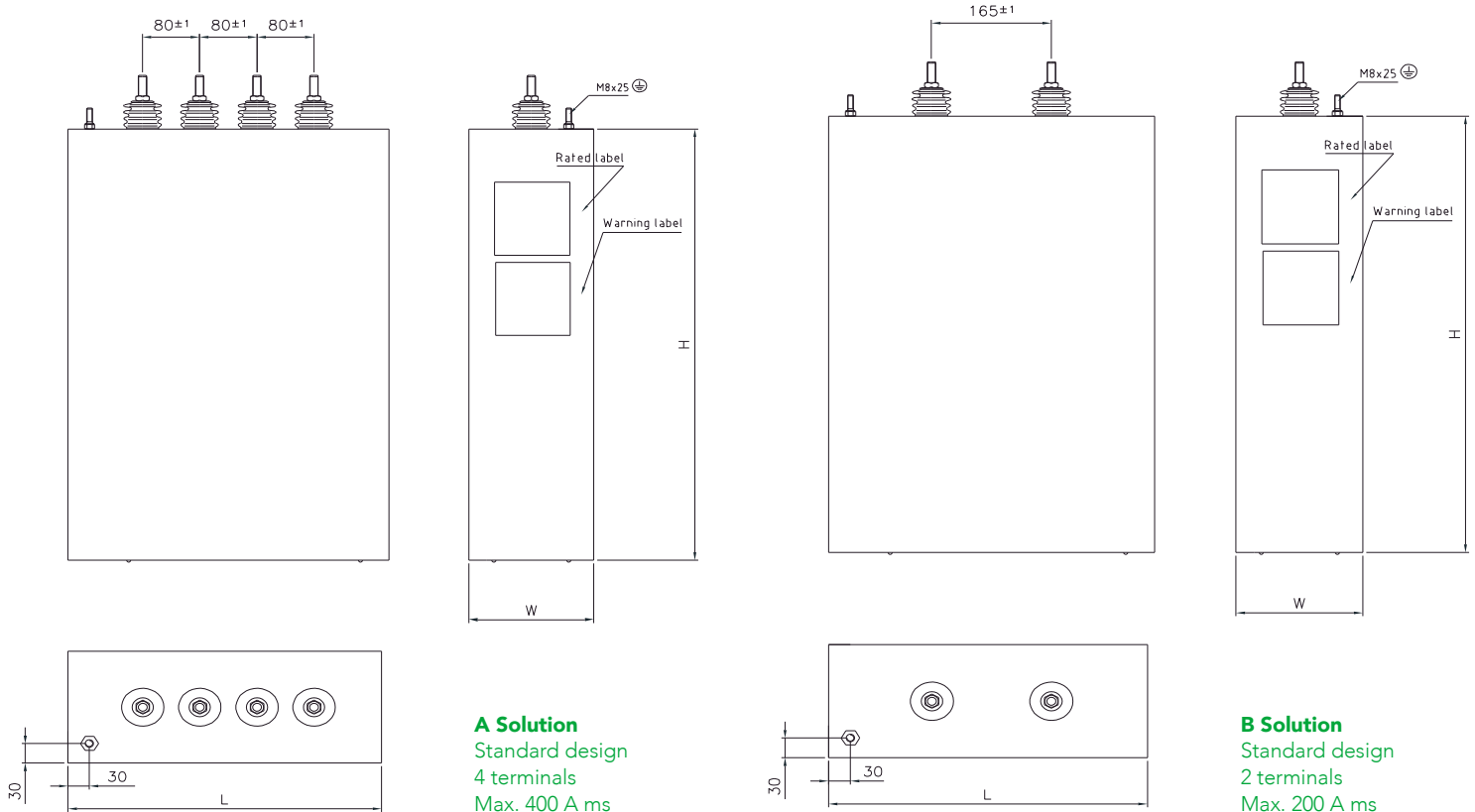
### Thermal resistance ( $R_{TH}$ )

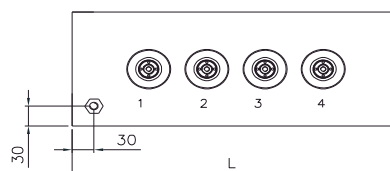
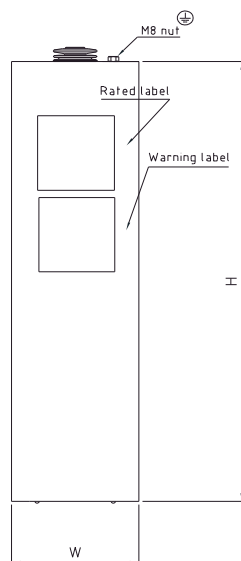
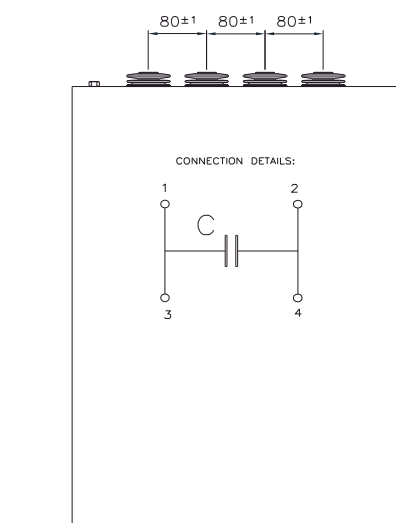
$R_{TH}$  (°C/W) Typical thermal resistance between case to ambient air, at thermal equilibrium.

| Height | Base dimension<br>Natural convection |              |              | Base dimension<br>Forced air (>2m/s) |             |              |
|--------|--------------------------------------|--------------|--------------|--------------------------------------|-------------|--------------|
|        | 125x340 [mm]                         | 140x340 [mm] | 165x480 [mm] | 25x340 [mm]                          | 140x340[mm] | 165x480 [mm] |
| H [mm] |                                      |              |              |                                      |             |              |
| 360    | 0.25                                 | 0.22         | 0.20         | 0.12                                 | 0.11        | 0.10         |
| 515    | 0.18                                 | 0.17         | 0.14         | 0.09                                 | 0.08        | 0.07         |
| 700    | 0.13                                 | 0.12         | 0.11         | 0.08                                 | 0.07        | 0.06         |
| 815    | 0.11                                 | 0.10         | 0.09         | 0.07                                 | 0.06        | 0.05         |

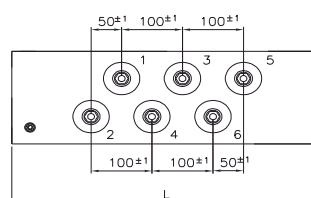
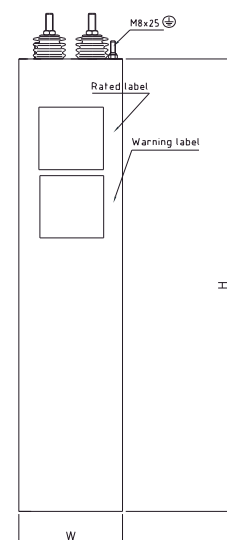
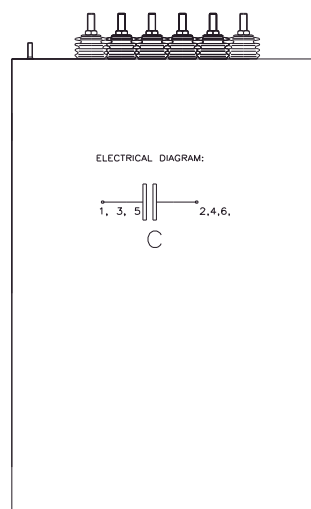
### Mechanical Design

No magnetic metal case: Stainless steel case, no magnetic / Aluminum case / Steel case





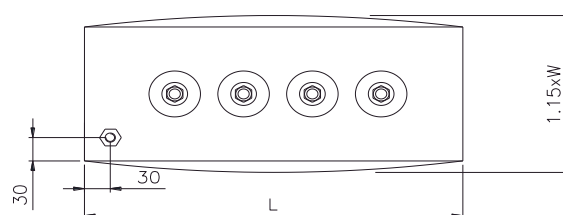
**C Solution**  
Low inductance design  
Female internal thread (on request also screw type solution) Max. 400 A rms



**D Solution**  
Special design for High current - Low inductance solution  
Max. 600 A rms

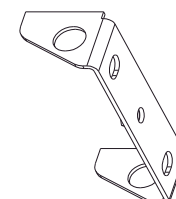
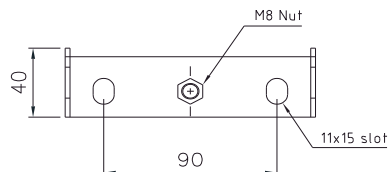
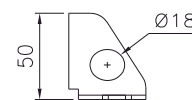
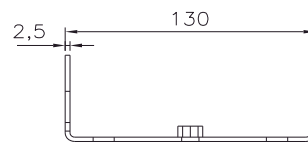
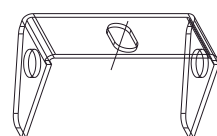
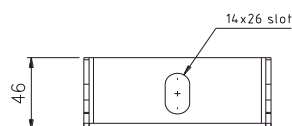
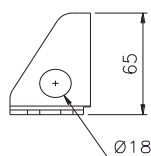
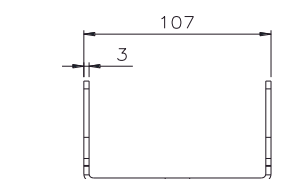
These are some examples of standard mechanical solutions.  
According to customer specification, other mechanical design and dimensions, terminals position and quantity are available on request.

**NOTES:**  
In case of two or more units connected as a battery, please take also into consideration the maximum deformation of W (width of the case):  
at the end of life, this dimension may be grow up to 15% greater.



**Mounting brackets (suggested)**

For H < 500 mm, use only one mounting bracket for each side.  
Take also into consideration the type of fixing frame (vertical / horizontal, resting or cantilevered): it may be necessary to use two mounting brackets on each side.  
In case of doubts, please contact DUCATI technical department to choose the right solution.

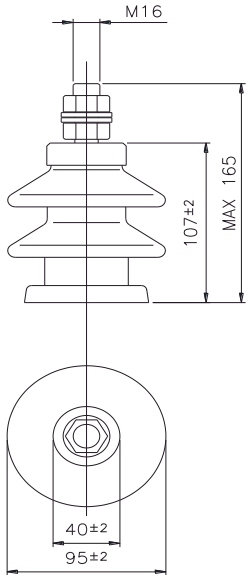


**MB1 solution**  
Suggested for cabinet with dimension W : 125 and 140 mm  
Code: 315104102

**MB2 solution**  
Suggested for cabinet with dimension W : 140 and 165 mm  
Code: 315104138

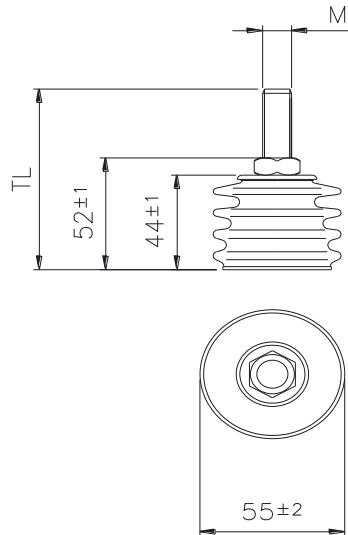
**Terminals and Connections**

Screw type solution  
Material: tinned copper



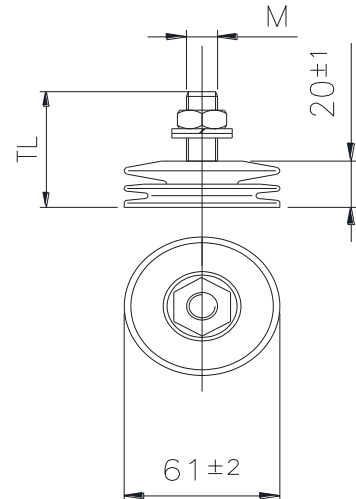
**TYPE TC1**

Bushing:  
- Ceramic - brown colour  
Connector  
- type: M12 / M16  
- length: LT on request



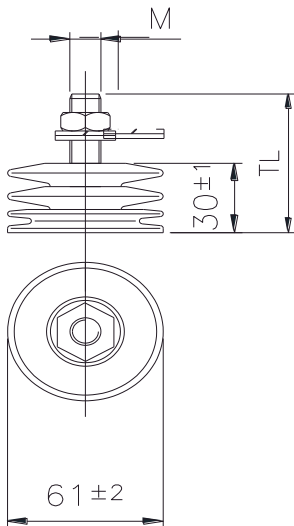
**TYPE TC2**

Bushing:  
- Ceramic - brown colour  
Connector  
- type: M12 / M16  
- length: LT on request  
Creepage distance: 85mm  
Air distance: 50mm



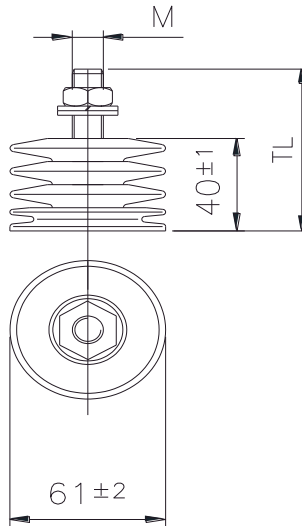
**TYPE TCP1**

Bushing:  
- Plastic - grey / black colour  
- Height: 20mm  
Connector  
- type: M12 / M16  
- length: LT on request  
Creepage distance: 42mm  
Air distance: 30mm



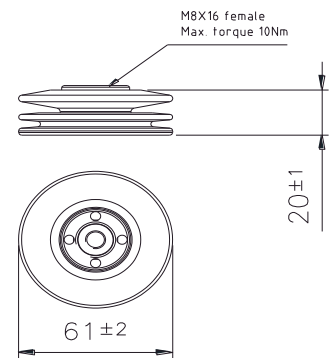
**TYPE TCP2**

Bushing:  
- Plastic - grey / black colour  
- Height: 30mm  
Connector  
- type: M12 / M16  
- length: LT on request  
Creepage distance: 64mm  
Air distance: 40mm



**TYPE TCP3**

Bushing:  
- Plastic - grey / black colour  
- Height: 40mm  
Connector  
- type: M12 / M16  
- length: LT on request  
Creepage distance: 85mm  
Air distance: 50mm



**TYPE TCP4**

Bushing:  
- Plastic grey / black colour  
- Height: 20mm (available also 30 / 40 mm)  
Connector  
- type: female M8 (available also M12 / M16)  
Creepage distance: 42mm  
Air distance: 30mm



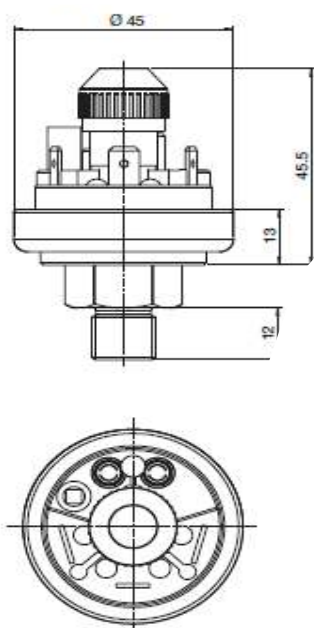
### Terminals and Connections

Female internal thread  
Material: tinned copper

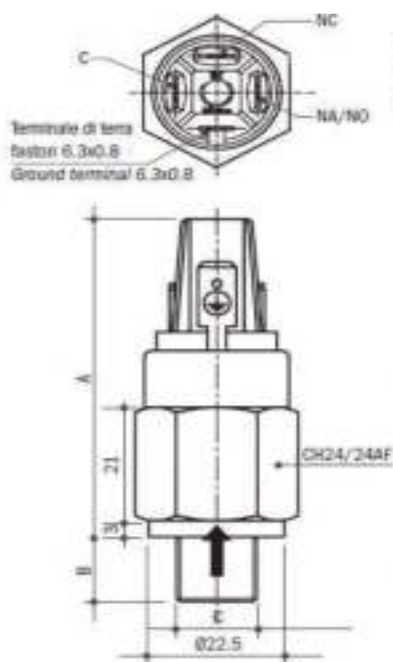
### Pressure Switch

Adjustable pressure switch with SPD contacts - Normally closed  
IP54 cover - Switch rating: 6A / 250Vac  
Available on two different solution, according to the maximum dimension accepted:

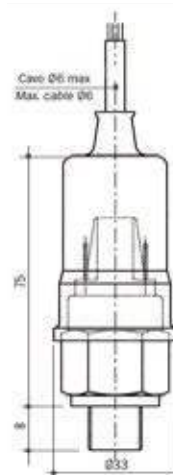
#### Standard solution:



#### On request, solution with reduced dimension:



IP 54 Cover



## APPENDIX

### TECHNOLOGIES

**PPM / MKP technology** Metallized polypropylene technology (PPM – MKP) utilizes a vacuum evaporation technique to deposit an extremely thin layer of metal on one side of the polypropylene film. The capacitor elements built using this technology are obtained by winding two polypropylene films. The capacitor plates consist in the metallized surface of the two films and the dielectric is the propylene film itself. The main advantage of capacitors with metallized plates is their self-healing capacity. This means that they are capable of restoring their electrical properties following the occurrence of a short circuit between the plates. Due to the reduced thickness of the plates, the short circuit current generated in the area of a fault is capable of vaporizing the metal coating; the short circuit is thereby automatically extinguished without an appreciable reduction in capacitance or expenditure of energy.

**PPMh and PPMd technology** The continuous research conducted in Ducati Energia laboratories has led to the development of a polypropylene film with a special metallization, whose purpose is to increase gradient of voltage without decreasing lifetime. Thanks to this innovative metallization treatment, the capacitor has a significantly dimension reduction and maintains its dielectric properties and performance in terms of both current and voltage:

- PPMh is film designed for AC voltage, can support also DC applications, agree with technical data;
- PPMd is designed for DC voltage, with high superimposed ripple.

**PPMdH high density / high temperature technology** The latest development of Ducati Energia research is a particularly crystalline film with a special metallization type. The result is a superior capability in terms of voltage gradient and temperature stability. PPMdH therefore provides:

- Up to +25% capacity in the same volume
- Up to +20°C Operating Temperatures, without current or lifetime derating

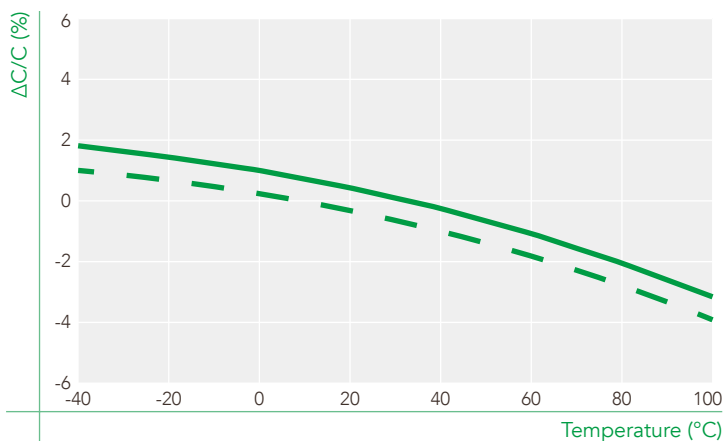
### TERMS AND DEFINITION

(According to IEC 61071)

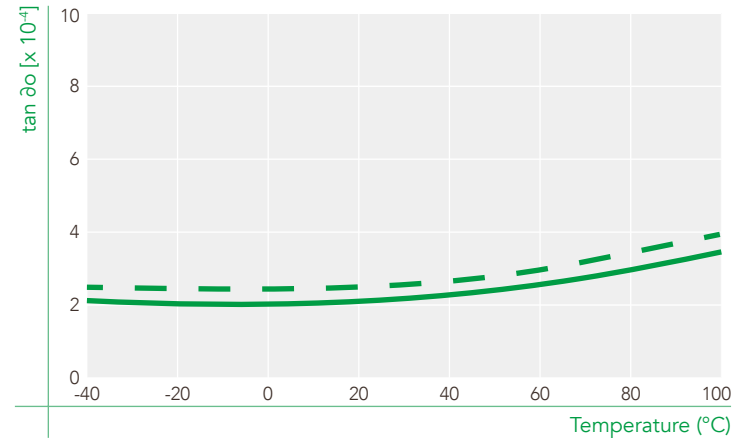
#### Rated capacitance (Cn)

Capacitance value rated at ambient temperature (20 ±5°C) and at the rated voltage. For capacitors made with metallized polypropylene dielectric film, the capacitance and dissipation factor change versus temperature. Typical graphs of these deviations are shown in the below diagrams.

#### Capacitance change with temperature (general guide)



#### Dielectric Dissipation factor change with temperature f=1KHz - (general guide)



#### Tolerance on capacitance

The maximum admitted deviation from the rated value of capacitance, measured at ambient temperature (20 ±5°C) and at the rated voltage.

#### Rated AC Voltage (Un AC)

The maximum operating peak recurrent voltage of either polarity of a reversing type wave form, for which the capacitor has been designed.

#### Rated DC Voltage (Un DC)

The maximum operating peak voltage of either polarity but of a non-reversing type wave form, for which the capacitor has been designed.

#### Rated Rms voltage (Urms)

Root mean square of the maximum permissible value of A.C. voltage, in continuous operation. In case of sinusoidal wave form voltage, the following relationship could be considered:

$$U_N = U_{RMS} \cdot \sqrt{2}$$

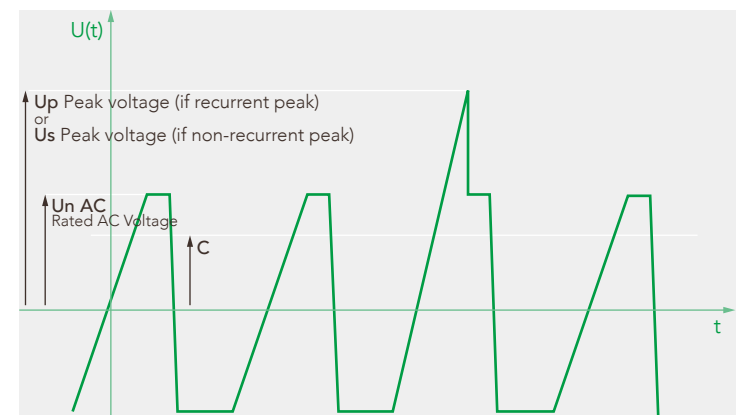
#### Non-recurrent surge voltage (Us)

A peak voltage inducted by switching or any other faults or disturbance of the system, which is allowed for a maximum of 500 times and for a durations shorter than 100 msec.

#### Ripple voltage (Ur)

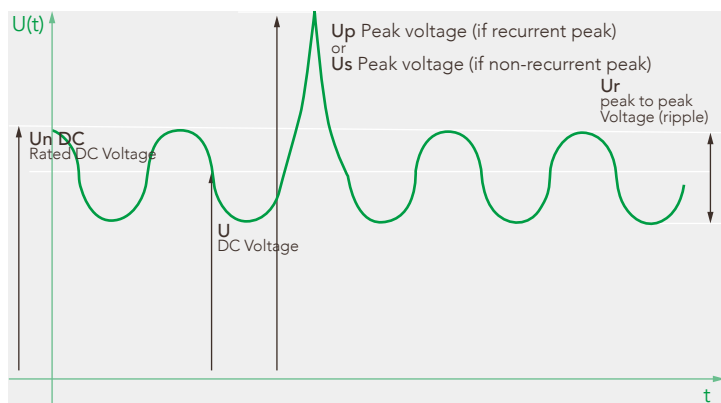
The peak-to-peak alternating component of the unidirectional voltage.

#### Illustrative Voltage Curve for terms and definitions of AC application





**Illustrative Voltage Curve for terms and definitions of DC application**



**Maximum current (Imax)**

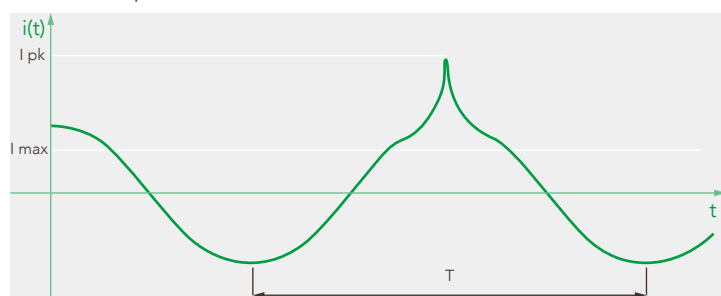
The maximum rms value of permissible current in continuous operation. This value is related to the maximum power dissipation at the highest permitted temperature of the case ( $\varnothing_{max}$ ) at which the capacitor may be operated. Operating at the maximum r.m.s current (IMAX), the capacitor produces a case temperature rise of about 10 – 15 °C over the ambient, according to the capacitor type (please see RTHC for each models) and the application.

To avoid thermal instability on the capacitor the case temperature of the capacitor must not exceed the maximum operating temperature ( $\varnothing_{max}$ ), so it could be necessary to reduce the ambient temperature with a cooling air system or to reduce the Imax current.

**Maximum peak current (Ipk)**

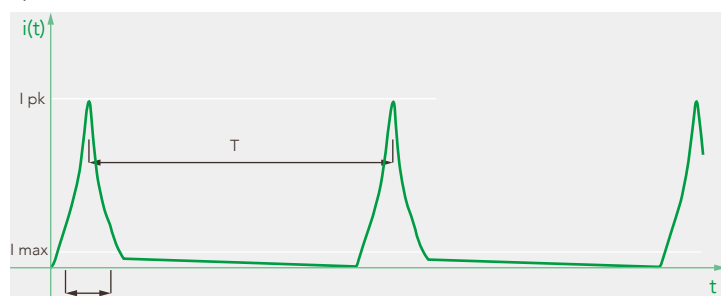
The maximum current amplitude which occurs instantaneously during continuous operation. For some capacitors series and according to the typical application (high or low distortion), it's possible to describe two different maximum peak current:

**Ipk Cw (continuous waveform):** for linear or low distortion current waveform - picture 1



**Ipk Iw (Impulsive waveform):**

for high distortion current waveform, typical when the  $t_0/T < 0,1\%$  - picture 2



**Rate of voltage rise (du/dt)**

Maximum permitted repetitive rate of voltage rise of the operational voltage

**Peak surge current (Is)**

The admissible peak current induced by switching or any other

faults or disturbance of the system, which is allowed for a maximum of 500 times and for a durations shorter than 100 msec.

**Equivalent series resistance (RESR)**

An effective resistance which, if connected in series with an ideal capacitor with the same value capacitance, would have a power loss equal to the active power dissipated in the capacitor under specified operating conditions. Normally, for frequency lower than the resonating one, the following relationship could be considered:

$$R_{ESR} = R_s + (\tan\delta_0 / 2\pi f C)$$

**Series resistance (Rs)**

It is the resistance produced by the current heat losses  $I_{RMS}^2 \cdot R_s$  in the capacitor.

**Equivalent series inductance (LESR)**

The value of equivalent inductance that the capacitors has due to the internal connections, terminals, winding characteristics and physical dimensions.

**Thermal resistance (RTHC)**

It is the thermal resistance (°C/W) between the hottest point on the case of the capacitor in thermal equilibrium and the natural cooling environment, with the temperature measured approximately at 0,1 meter away from the capacitor container and at two-third of the height from its base. The following relationship could be considered:

$$P_{MAX} = 1/R_{THC} (\varnothing_C - \varnothing_{MAX})$$

**Maximum dissipation factor (tanδ max)**

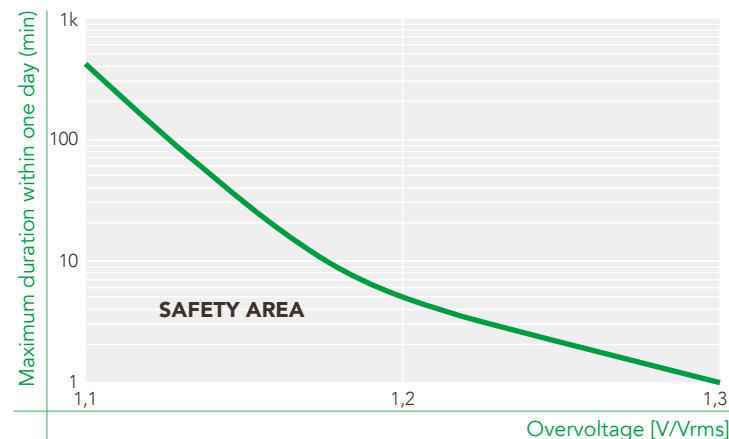
Maximum tangent of the loss angle, expressed as the ratio between the equivalent series resistance and the capacitive reactance of the capacitor at 50Hz sinusoidal frequency. The nominal value (tan) is calculated as follows:

$$\tan\delta = 2\pi f C R_{ESR} = \tan\delta_0 + 2\pi f C R_s$$

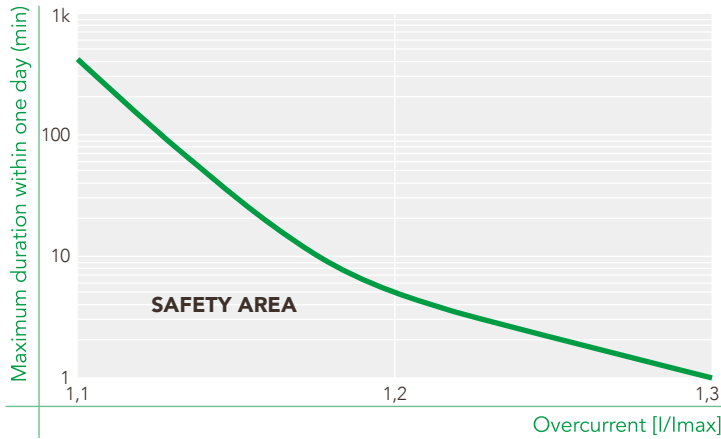
**Safety area**

The following charts shown the maximum permissible voltage or current in case of an overload operation. The amplitude of overvoltages or overcurrents may be tolerated without significant reduction in the life time of capacitor, if the case temperature of the capacitor is within the operating temperature.

**Safety area for overload Voltage**



**Safety area for overload Current**



**Voltage test between terminals (Utt)**

Routine test of all capacitors conducted at room temperature, prior to delivery. The capacitor shall be subjected for 10 s to a test voltage applied between the terminals. During the test, neither puncture nor flashover shall occur, self-healing breakdowns are permitted. For more details regarding the value of test voltage, please see the data sheet for each single capacitor model.

**Voltage test between terminals and case (Utc)**

Routine test of all capacitors conducted at room temperature, prior to delivery. The capacitor having all terminals insulated from the container shall be subjected for 10 s to a AC test voltage applied between terminals (joined together) and the container. During the test, neither puncture nor flashover shall occur. For more details regarding the value of test voltage, please see the data sheet for each single capacitor model.

**Lowest operating temperature (Ø min)**

Lowest permissible case temperature, in thermal equilibrium, at which the capacitor may be used.

**Maximum operating temperature (Ø max)**

Highest permissible case temperature, in thermal equilibrium, at which the capacitor may be used.

**Climatic categories**

F class:  
 - maximum relative humidity 75% - annual means,- permitted maximum 95% for 30 days/year,- condensation not permitted.

**Cooling-air temperature (Øamb)**

Temperature of the cooling air measured at the hottest position of the capacitor, under steady state conditions, midway between two units. If there is only one unit involved, it is the temperature measured at a point approximately 0,1 m away from the capacitor container and two-thirds of the height from its base.

**Hotspot temperature (HS)**

The highest temperature present inside the capacitor dielectric.

Since RTH the thermal resistance between internal dielectric hotspot and the hottest position of the capacitor case, the HS value (°C) can be calculated with the following formula:

$$HS = \varnothing_{amb} + P_{MAX} R_{TH}$$

**SAFETY**

**Capacitor Protection:**

**- Against accidental contact**

In accordance with IEC 61071, all capacitors are checked by 100% routine test (voltage test between terminations and case). Accessible capacitors must be earthed at the bottom stud or with an additional earthing clamp.

**- Overload and failure at the end of service life**

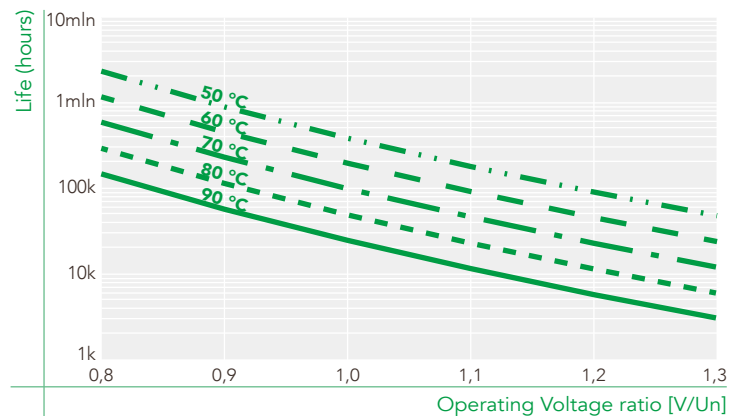
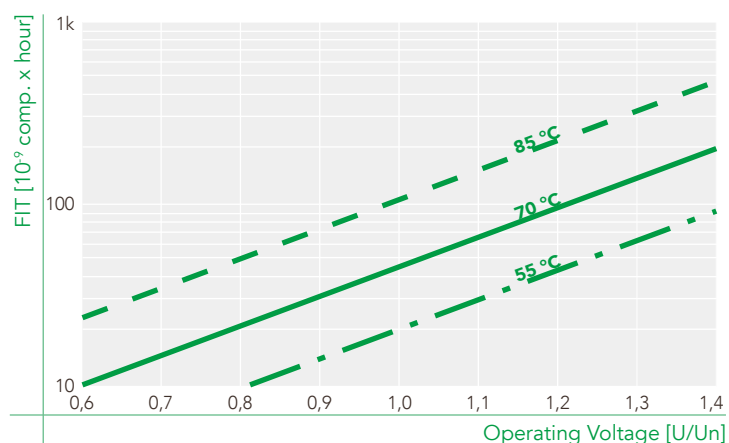
All described capacitors are "self-healing": in the event of a voltage breakdown the metal layers around the breakdown channel are evaporated by the temperature of the electric arc between the electrodes, and create small overpressure. An insulation area is formed which is reliably resistive and voltage proof for all operating requirements of the capacitor. The capacitor remains fully functional during and after the breakdown. In the event of overvoltage or at the end capacitor service life, an increasing number of selfhealing breakdowns may cause rising pressure inside the capacitor and brake the can. To prevent it, the capacitor is fitted with an obligatory "overpressure mechanism". This safety mechanism is based on an attenuated spot at one of the connecting wires inside the capacitor. When the rising pressure, the casing begins to expand, and disconnects the attenuated spot wire 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. The capacitors in rectangular case are provided with an overpressure switch that would signalize a rising pressure inside the case. A corresponding external safety circuit which disconnects the capacitor immediately in such event has to be provided by the user.

**- Overvoltages and Short Circuits**

As shown above, the capacitors are self-healing and regenerate themselves after breakdowns of the dielectric. For voltages within the permitted testing and operating maximum the capacitors are overvoltage-proof. They are also proof against external short circuits as far as the resulting surge discharges do not exceed the specified current limits (IS).

**Operating life**

The capacitors have been designed for an average service life of 100,000 hrs (with 50 fit permitted). Above all, the operating life of the capacitors depends on the temperature inside during operation, and the field strength in its dielectric. The following diagram demonstrates the correlation between service life, hot spot temperature, and operating voltage.

**Life vs Operating Voltage and Hot Spot Temperature (general guide)****FIT vs Hot Spot Temperature (general guide)****GENERAL SAFETY INSTRUCTIONS****Connection**

Connection at threaded studs have to be made between two nuts. It is not recommended to solder cables to the terminals. Permitted torque for screw connections. See individual data sheets for each range.

**Capacitors overpressure device:**

All the AC capacitors with overpressure device shall be connected with sufficiently flexible leads to permit the functioning of the mechanism, and sufficient space for expansion of the capacitor case must be left above the terminals. Depending on the specific dimensions of the capacitors the case could expand between 15 mm and 30 mm.

**Mounting Location**

As mentioned, the useful life of a capacitor may be reduced dramatically if exposed to excessive heat. To avoid overheating the capacitors must be allowed to emit their heat losses unhindered and shall be shielded from external heat sources. If attenuating circumstances give cause for doubt, special tests should be conducted to ensure that the permitted maximum temperature of the capacitor is not exceeded even under the most critical ambient circumstances. It should be noted that the internal heat balance of large capacitors is only reached after a couple of hours.

**Mounting position**

Capacitors with liquid or viscous filling shall be installed upright with terminals facing upwards. Please consult our technical department if different mounting position is required. Capacitors with hard resin filling can be mounted in any position without restrictions.

**Earthing**

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

**Discharge**

If there is no discharge of the capacitors provided by external circuits, the capacitors should be provided with discharge resistors. In any event, the poles of the capacitors must be short-circuited before being touched. Note that capacitors with nominal voltages above 750 V in particular may regenerate new voltage at their terminals after having been short-circuited just for short periods. This condition results from the internal series connection of the capacitor elements and will be avoided by storing them permanently short-circuited.

**DISPOSAL**

Our capacitors do not contain PCB, solvents, or any other toxic or banned materials. The impregnants and filling materials contain vegetable oil or polyurethane mixtures. The capacitors are not rated as hazardous goods in transit and 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"). We recommend disposing of the capacitors through professional recycling centres for electric/electronic waste. The capacitors can be disposed of as follows:

- Capacitors: acc. to European Waste Catalogue (EWC) No. 160216 ("Components taken from discarded equipment")
- Liquid filling materials: acc. to EWC No. 080402 ("Waste adhesives and sealants free of halogenated solvents")
- Hardened filling materials: acc. to EWC No. 080404 ("Hardened adhesives and sealants").

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! Capacitors are hermetic sealed, to maintain a long operating life and for the correct functioning of the break action mechanism, please pay special attention not to damage any parts of the can, cover or isolators.

**NOTE:**

Capacitors of the DC series are not provided with an internal safety mechanism which would separate them in a controlled and reliable manner from the energy supply in case of malfunctioning. These capacitors consist mainly of polypropylene (up to 90%), i.e. their energy content is comparably high. Capacitors may rupture and ignite as a result of internal faults or external overload (e.g. temperature, overvoltage, harmonic distortion). It must therefore be ensured by proper measures that they not perform any hazard for their environment in the event of failure. Energy content in case of fire: approx. 40 MJ/kg.

## MOUNTING AND OPERATING INSTRUCTIONS

### I. SCOPE

These safety recommendations and requirements apply to the following power electronics capacitors and standards. Their purpose is to describe the state of technology which must as a rule be adhered to in all relevant contracts for goods and services.

- 1) Capacitors for power IEC / DIN EN 61071 electronics (PEC).
- 2) Capacitors for railway IEC / DIN EN 61881 applications (PEC).

### II. GENERAL SAFETY RULES

Since power capacitors are electrical energy storage devices, they must always be handled with caution. Even after being turned off for a relatively long period of time, they can still be charged with potentially lethal high voltages.

### III. GENERAL CONDITIONS FOR STORAGE AND USE

- 1) The manufacturer's installation, application and maintenance instructions and the relevant standards must always be complied with.
- 2) Capacitors must never be stored or used outside the specified temperature ranges.
- 3) Capacitors may not be stored or operated in corrosive atmospheres, particularly not when chlorides, sulfides, acids, alkalis, salts, organic solvents or similar substances are present.
- 4) The maximum temperatures (including inherent heat) voltages, currents, power, reactive power, thermal resistances, frequencies, discharge times and switching frequencies specified in the data sheet must be adhered to.
- 5) A means of sufficient dissipation of heat loss (fan, cooling) or escaping gases in case of malfunction must be provided. Required minimum distances (e.g. to sources of heat) must be maintained.
- 6) Specified torques for electrical connections and fasteners must be adhered to.
- 7) Mechanically or electrically damaged, leaky or otherwise damaged capacitors may not be used or continue to be used.
- 8) Existing protective devices of the capacitors may not be manipulated, removed or impaired in their function.

### IV. INTERNAL PROTECTIVE DEVICES

- 1) Internal protective devices offer basic protection against certain internal faults, aging and overload.
- 2) Internal protective devices alone are not sufficient to prevent all conceivable dangers in case of malfunction. The so-called self-healing capability is not the same as failsafe system stability.
- 3) Depending on their protective mechanism, internal protective devices are subject to technical and functional limits which when exceeded will definitely cause malfunctions. Such violations can be excess temperature, overvoltage-age, wrong application, wrong installation, faulty maintenance, mechanical damage, or operation outside the technical limits of the specification.
- 4) Most internal protective devices can interrupt the voltage only within the capacitor. They are not fuses in the classical sense such as cable or device fuses which interrupt the voltage upstream from the faulty system component.

### V. RISK FACTORS FOR THE CAPACITOR

The most frequent risk factors which cause capacitor damage and possibly also the failure of the internal protective devices are:

- 1) Exceeding the permissible temperature on the capacitor surface (a continuous increase temperature of 7 K cuts life expectancy in half).
- 2) Over voltages, over currents and high inrush currents even if they only occur briefly or cyclically (a continuous increase in the operating voltage of the capacitor of 8% cuts life expectancy in half).
- 3) Network harmonics, resonances created by harmonics or flicker even when they occur only briefly or cyclically.
- 4) Aging of the lighting equipment and consequential excess temperature or high UV stress.
- 5) Failure of other components in a common circuit and consequential over voltages or over currents.
- 6) Interaction with other reactive power components, and also parasitic capacitances (cable) or inductivities in common circuits.
- 7) Even if the test based on the capacitor standard is passed, this does not ensure comprehensive protection against all possible overloading.
- 8) During the operation of thyristor-switched capacitor system, high DC voltages can occur continuously on the capacitors of compensation systems which are not switched on. These DC voltages must be considered when designing the capacitors and the discharge devices.

### VI. RISKS WHEN A FAULT OCCURS

- 1) Power capacitors can be a significant risk in the case of failure due to their stored energy and/or their properties during operation in networks with high short-circuit power.
- 2) Power capacitors can actively fail when internal or external protective devices are missing, incorrectly designed or have failed. They can burst, burn or, in extreme cases, explode.

### VII. RISK MINIMIZATION

- 1) The capacitor manufacturer cannot predict all possible stresses which a power capacitor can be subjected to and which must be taken into account in the design. This means that the user bears crucial co-responsibility here. For this reason alone, safety and quality should be the top priorities when a capacitor is selected. This is why we urgently recommend the use of capacitors with appropriate internal protective devices.
- 2) Before designing the application, capacitors must be checked for their suitability for this particular application. All influences (parameters) must be considered. Unexamined use in an application may have serious consequences. Particularly with sensitive applications, the internal protective devices of the capacitors should be supplemented by the user with suitable external protective measures. External protective measures are even mandatory when capacitors are used without internal protective devices.
- 3) When power capacitors are used, suitable measures must always be taken to eliminate possible danger to humans, animals and property both during operations and when a failure occurs. This applies to capacitors both without and with protective devices.





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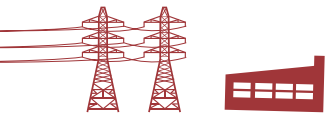
Product range



Instruments and systems  
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**Motor capacitors**





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## **DUCATI energia S.p.A.**

Via M.E.Lepido, 182  
40132 Bologna, Italy

 +39 051-6411511

 +39 051-402040

 [info@ducatienergia.com](mailto:info@ducatienergia.com)

**[www.ducatienergia.it](http://www.ducatienergia.it)**

CAT\_PEC\_rev\_12-2022



amelec Electronic GmbH  
Brunnwiesenstrasse 6A  
CH-8157 Dielsdorf



Tel.: +41 44 862 00 62  
Fax: +41 44 862 00 63



[info@amelec.ch](mailto:info@amelec.ch)  
[www.amelec.ch](http://www.amelec.ch)  
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