

Attracting Tomorrow

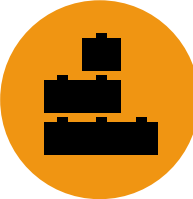


# Product presentation – ModCap MF

DCR Modular | New Modular Standard Series

TDK Electronics AG  
FILM ES PEC HP  
Málaga, Spain  
Sept 1st, 2022

# Introducing the New Modular Standard series Highlights



The most compact solution  
with highest energy density



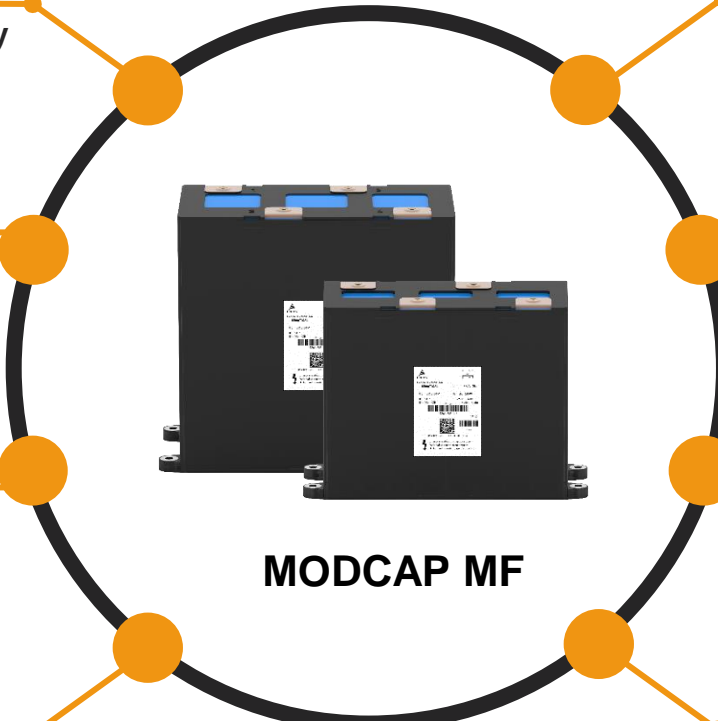
Reduce time to market  
& lead time



Cost saving solution

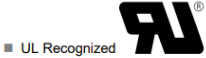


Reduce losses based on  
low ESR vs frequency

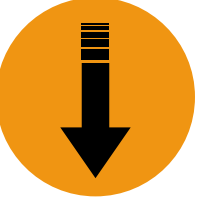


MODCAP MF

Product developed  
fire and smoke compliant



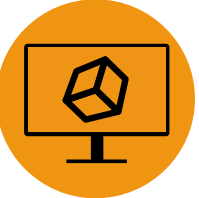
Low inductance (<14 nH)  
to avoid use of additional  
snubbers



Traction, industrial drives  
& renewable energies



Finite elements analysis



# ModCap series | B25645

~ AC FILTER

= DC-LINK / DC FILTER

MKK-HP

ModCap / MKK-DCR / MKK-DCi-R / MKK-DCi-H

# ModCap series | B25645

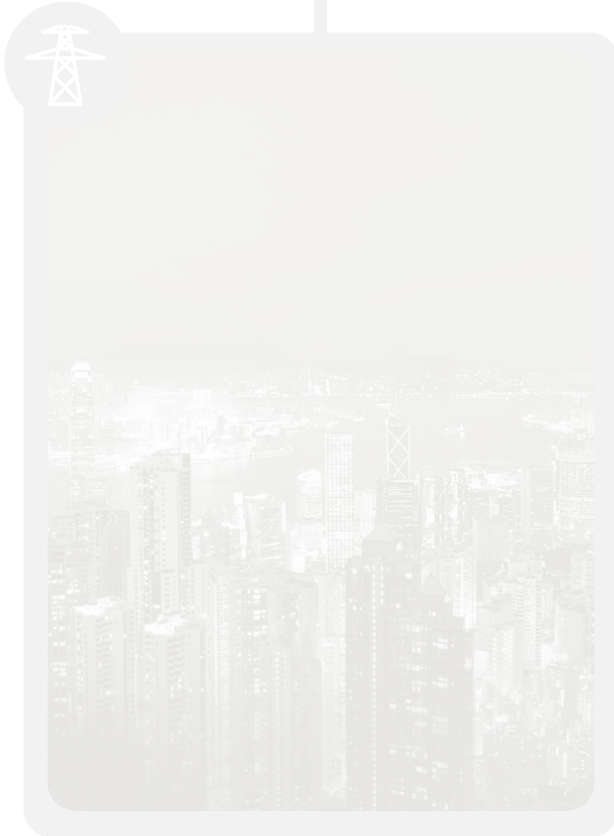
## DC-Link applications

Energy transmission

Renewable energies

Traction

Industry





# General overview

## B25645 series

=

ModCap (dry-modular)

NEW



Recommended applications

### Features

- Capacitance range from 335  $\mu\text{F}$  up to 3900  $\mu\text{F}$  and voltage from 900 V up to 2,300 V
- Low ESL <14 nH
- Temperature range up to 90 °C hotspot
- IEC 61071, IEC 61881-1, EN 45545-2 HL3 R23 (fire and smoke)
- Filled with polyurethane resin (dry technology)
- Plastic case (opened)
- Flat windings

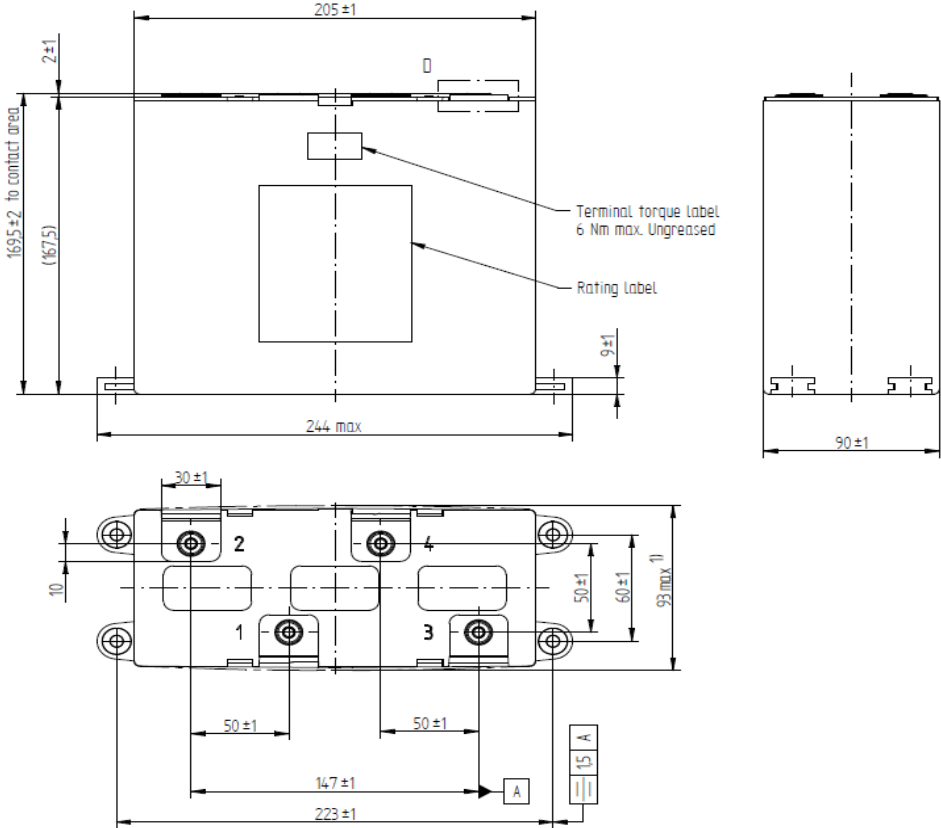
### Benefits

- High energy density, ultra compact solution
- Modular concept for parallelization
- Snubber avoidance / low voltage overshoot
- Lifetime up to 200,000 hours
- Finite elements analysis available for the whole series
- Cost oriented solution
- Reduced time to market & lead time

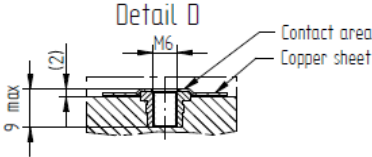
# Construction A

## Simplified drawing & 3-D

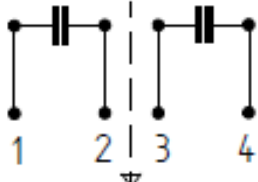
### Main dimensions: 243 x 169.5 x 90 mm



### Terminal



### Electric diagram



No active insulation between 1-3 and 2-4

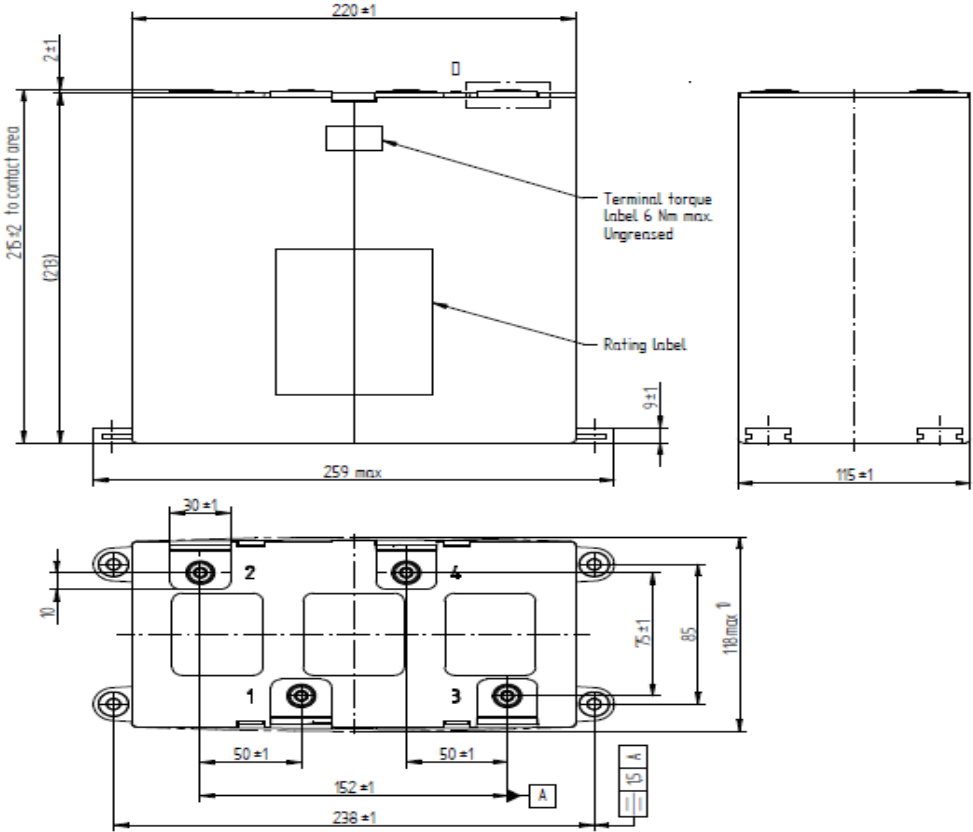
### 3D



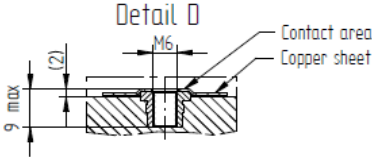
# Construction B

## Simplified drawing & 3-D

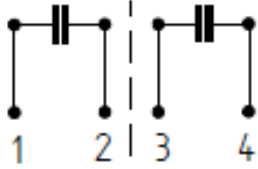
### Main dimensions: 258 x 215 x 115 mm



### Terminal



### Electric diagram



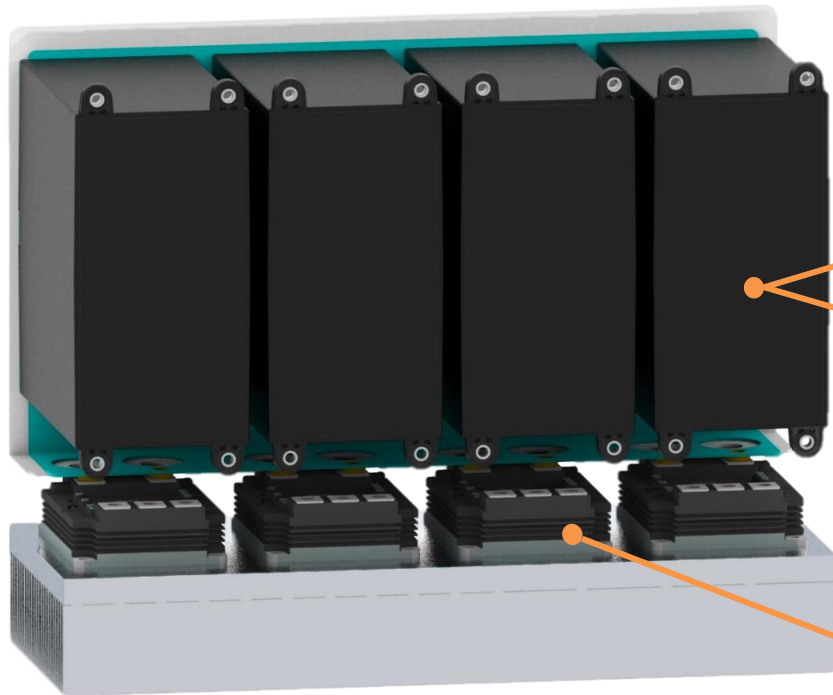
No active insulation between 1-3 and 2-4

### 3D

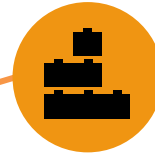


# Highlights: Compactness, low ESL & higher operation temperature

## Compact power unit



- Capacitors can be mounted very close to the power modules to reduce loop inductance.

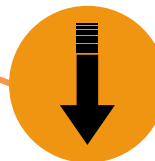


→ Ultra compact solution



→ **Less investment on cooling**

- Very short connection between capacitor and semi-conductor



→ Low inductance

→ **Possible snubber capacitors avoidance**



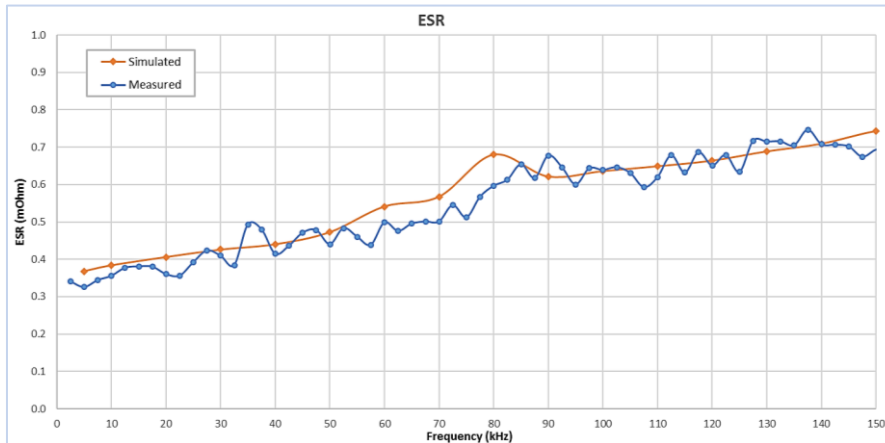
# Electromagnetic behavior of Modular Standard Series

## Electromagnetic: modelling

**Customer Input**  
Current-frequency spectrum

**TDK Input**  
Capacitor design

**Simulation**  
Capacitor electrical model: including ESL and ESR Vs Freq  
Total losses and its internal distribution (must for accurate thermal simulation)

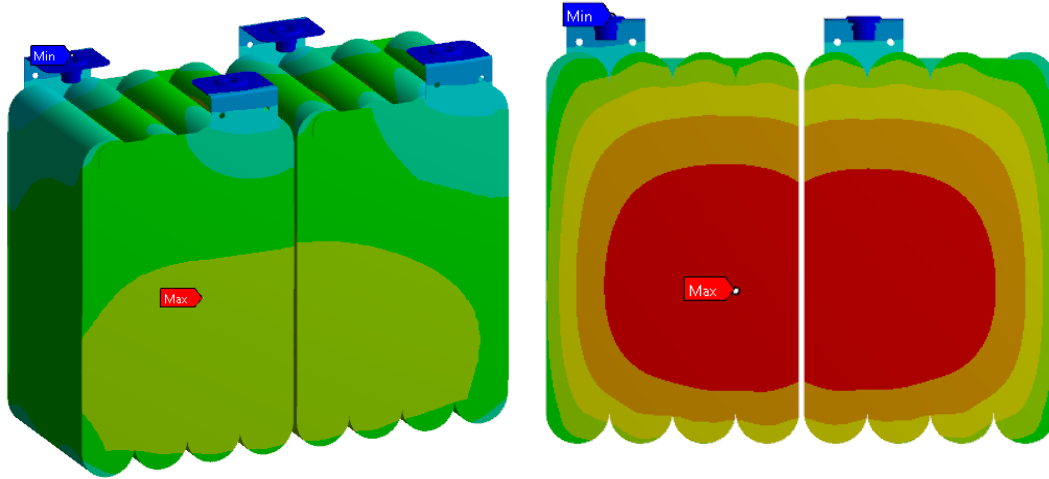
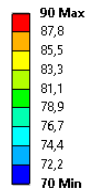


## Customer benefits

- Electromagnetic model available for specific simulation according to current-frequency spectrum defined by the customer.
- Capacitor electrical model available in time and frequency domain
- Losses at defined current-frequency spectrum and its internal distribution
- Graphs with simulated ESR fully available for further thermal calculations by calculating losses all along the complete range of frequency

## Thermal: hot spot & temperature mapping

B: 2kHz Spectrum  
Naked  
Type: Temperature  
Unit: °C  
Time: 1

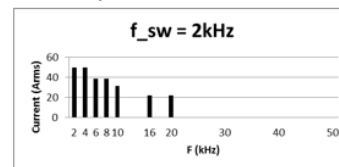


- Capacitance: 1 mF
- Current: 155 A
- Power losses: 11 W
- DeltaT = 15 K

Boundary conditions considered:

- Ambient temp: 70 °C
- Busbar temp: 80 °C
- Natural convection

Current spectrum considered



## Customer benefits

- Thermal model available for specific simulation according to spectrum and boundary conditions defined by the customer.
- Thermal simulations to be integrated as part of the type test report.
- Thermal Simulations may reduce the complexity and time of technical approvals, no further specific thermal stability test on lab.
- Detailed Temperature mapping allows customer to estimate in advance hot spot areas
- Thermal Simulation to be done as per specific customer requirements (customized current spectrum and thermal boundary conditions)
- Heating Transference from bus bar may be analyzed in advance

# ModCap Ordering Code System

Nominal voltage (V)	Capacitance ±10% (µF)	Nominal current (A)	Surge current (kA)	Repetitive peak current (kA)	Dimensions (LxWxH, mm)	Construction	Part Number
900	2075	200	225	5	205x90x170	A	<b>B25645A9218K003</b>
	3900	155	250	5	220x115x215	B	<b>B25645A9398K003</b>
1000	1705	190	220	5	205x90x170	A	<b>B25645A1178K003</b>
	3210	150	245	5	220x115x215	B	<b>B25645A1328K003</b>
1100	1330	180	215	5	243x169.5x90	A	<b>B25645A1138K003</b>
	2525	140	240	5	258x215x115	B	<b>B25645A1258K003</b>
1250	1045	170	210	5	243x169.5x90	A	<b>B25645A1118K003</b>
	1985	135	235	5	258x215x115	B	<b>B25645A1198K003</b>
1350	980	160	205	5	243x169.5x90	A	<b>B25645A1108K013</b>
	1865	130	230	5	258x215x115	B	<b>B25645A1188K003</b>
1600	710	150	200	5	243x169.5x90	A	<b>B25645A1757K003</b>
	1375	120	225	5	258x215x115	B	<b>B25645A1138K013</b>
1800	525	140	195	5	243x169.5x90	A	<b>B25645A1567K003</b>
	1025	115	220	5	258x215x115	B	<b>B25645A1108K003</b>
2000	415	130	185	5	243x169.5x90	A	<b>B25645A2447K003</b>
	820	110	210	5	258x215x115	B	<b>B25645A2827K003</b>
2300	335	120	175	5	243x169.5x90	A	<b>B25645A2367K003</b>
	670	105	200	5	258x215x115	B	<b>B25645A2677K003</b>

Get more info [here](#)



[www.tdk-electronics.tdk.com](http://www.tdk-electronics.tdk.com) - Get more info [here](#)