



Film Capacitors – Power Factor Correction

PhaseCap Energy Capacitors - Resin-filled

Series/Type: MKK
Ordering code: B25675A*
Date: January 2021
Version: 1

Construction

- Dielectric: Polypropylene film
- Non PCB, Soft biodegradable resin
- Wave cut
- Extruded round aluminum can with stud
- Provided with ceramic discharge module or discharge module block
- Over pressure disconnecter for **all 3** phases

Features

- Three-phase, delta connected
- Self-healing technology
- Naturally air cooled (or forced air cooling)
- Indoor mounting

Typical applications

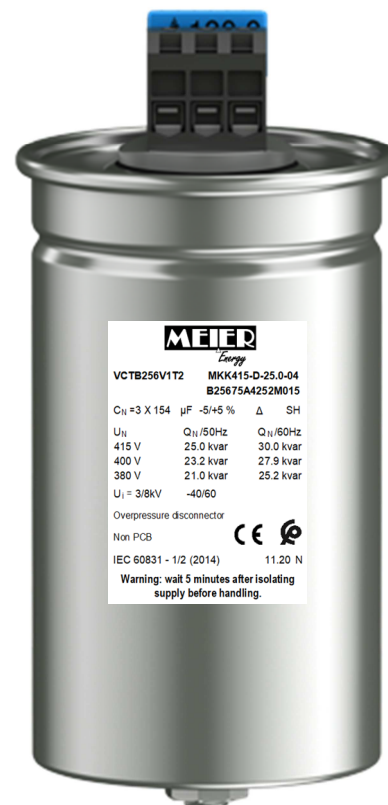
- For Power Factor Correction

Terminals

- Optimized capacitor safety terminals

Mounting

- Threaded stud at bottom of can
(max. torque for M12 = 10 Nm)



MEIER Energy			
VCTB256V1T2	MKK415-D-25.0-04	B25675A4252M015	
$C_N = 3 \times 154 \mu\text{F}$	-5/+5 %	Δ	SH
U_N	$Q_N/50\text{Hz}$	$Q_N/60\text{Hz}$	
415 V	25.0 kvar	30.0 kvar	
400 V	23.2 kvar	27.9 kvar	
380 V	21.0 kvar	25.2 kvar	
$U_I = 3/8\text{kV}$	-40/60		
Overpressure disconnecter			
Non PCB			
IEC 60831 - 1/2 (2014)		11.20 N	
Warning: wait 5 minutes after isolating supply before handling.			

Technical data and specifications

Characteristics	B25675A*	
Rated capacitance C_R	See table in page 7 to 10	
Tolerance	-5 / +5%	
Connection	D (Delta)	
Rated voltage V_R	Up to 690 V RMS (Details as per table in page 7 to 10)	
Rated frequency f_R	50 Hz	60 Hz
Output	Up to 33.1kvar (Details as per table in page 7 to 10)	
Rated current I_R	As per table in page 7 to 10	
Dimensions (d x h)	As per table in page 7 to 10	
Weight (approx.)	As per table in page 7 to 10	

Maximum ratings	
Maximum permissible voltage (V_{RMS})	VR +10% (up to 8 h daily) VR +15% (up to 30 min. daily) VR +20% (up to 5 min. daily) VR +30% (up to 1 min. daily)
Maximum permissible current (I_{max})	Up to $1.6 \dots 2.0 \cdot I_R$ (A) (including combined effects of harmonics, overvoltages and capacitance tolerance) depending on the individual type
Maximum inrush current (I_S)	$\leq 500 I_R$ (A) depending on the individual type Max. 15000 switching's per year
Test data	
Voltage test between terminals (V_{TT})	$2.15 \cdot V_R$ VAC / 50 Hz, 2s
Voltage test between terminals and container (V_{TC})	3600 V AC / 50 Hz, 2 s up to $V_R = 525$ V AC 6000 V AC / 50 Hz, 2 s above $V_R = 525$ V AC
Design data	
Dielectric losses	0.2 W / kvar
* Total losses	0.45 W / kvar
Impregnation	Non PCB, Soft biodegradable resin
* Without discharge resistor	
Climatic category	
\ominus Minimum	-40 °C
\ominus Maximum	+60 °C
Ambient temperature	Class -40/60: Max. short time: +60 °C, max. mean 24h: +45 °C; max mean 1 year: +35 °C; lowest temperature: -40 °C
Storage temperature	-40 °C +85 °C
$\Theta_{Hotspot}$ max.	+85 °C
Humidity	Average relative < 95%
Mean life expectancy	
t_{LD}	Up to 200 000 hours (temperature class -40/D) ; Up to 180 000 hours (temperature class -40/60) ; $\Theta_{HS} \leq 70$ °C (Max. mean ambient temperature per year = +35°C) Failure rate < 3%

Terminals

Protection degree	Isolated terminals, IP20, indoor mounting (optionally with terminal cap for IP54), VDE 0106 part 100	
Terminal type	Terminal type A & C	Terminal type B & D
Max. torque	1.2 Nm	2.0 Nm
Terminal cross section	16 mm ² (without cable and lug)	25 mm ² (without cable and lug)
Maximum terminal current	50 A	80 A
Creepage distance (min)	12.7 mm	
Clearance (min)	9.6 mm	






Mounting

Fixing	Threaded bolt M12
Max. torque (Al can stud)	10 Nm
Mounting position	Upright/Horizontal See "Maintenance and Installation Manual" for further details.
Maximum altitude	4000 m

Safety

Mechanical safety	Overpressure disconnecter
Max. short circuit current	(AFC: 10 kA)
Discharge resistor time	≤ 60 s to 50 V or less

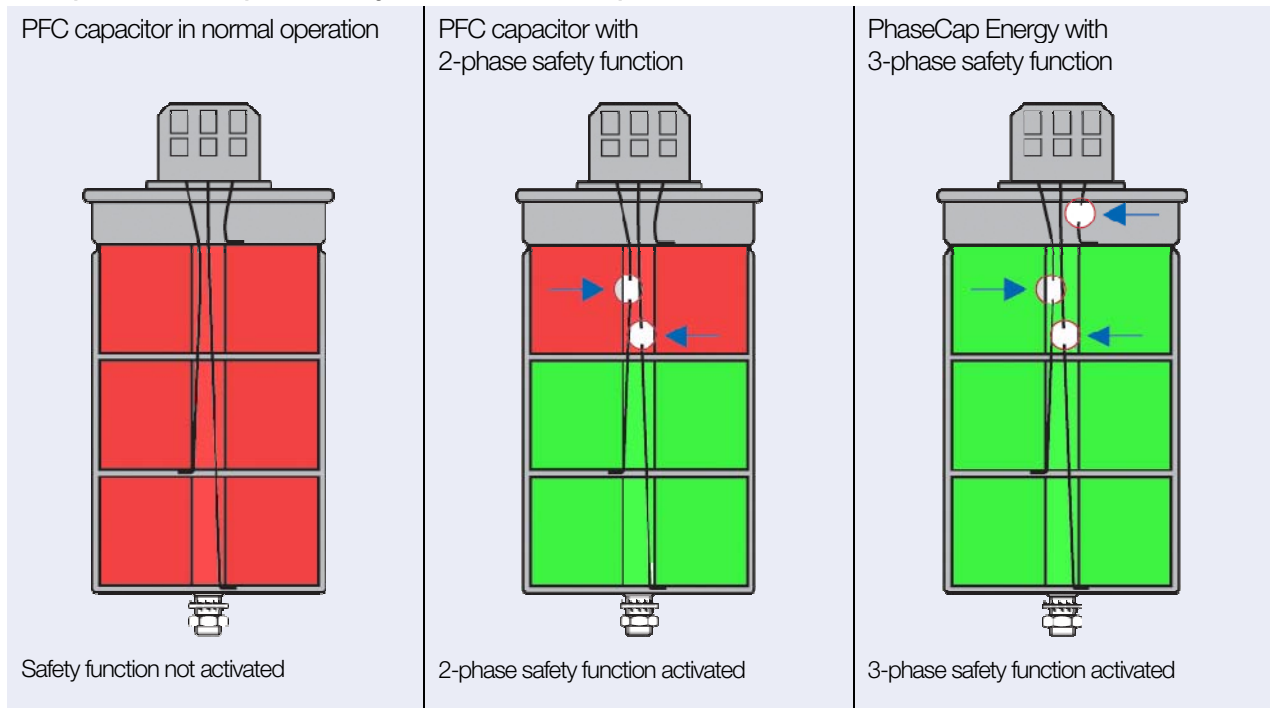
Approvals/Reference standards

Approval mark	Standard of reference	Certificate
	IEC 60831–1/2 Edition 3.0 (2014)	-
	UL 810-5th edition	Available from 230 to 660 V AC
IS: 13340  CM/L: AAAAAAA	IS 13340–1/2 (1993, 2012)	-
	IEC 60831–1/2 Edition 3.0 (2014)	In process
	IEC 60831–1/2 Edition 3.0 (2014)	

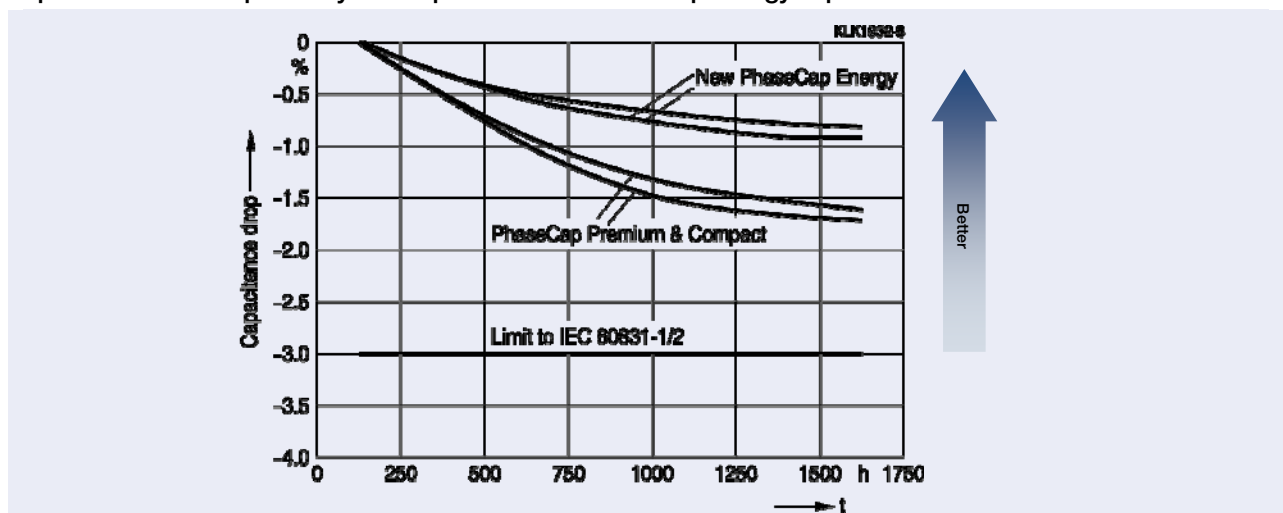
Overpressure disconnecter

The overpressure disconnecter will be activated in case of overpressure in the can or at end of useful service life. The wires of all three phases will be separated and the capacitor is completely disconnected from the line.

Principle of 2- and 3-phase safety functions of PFC capacitors

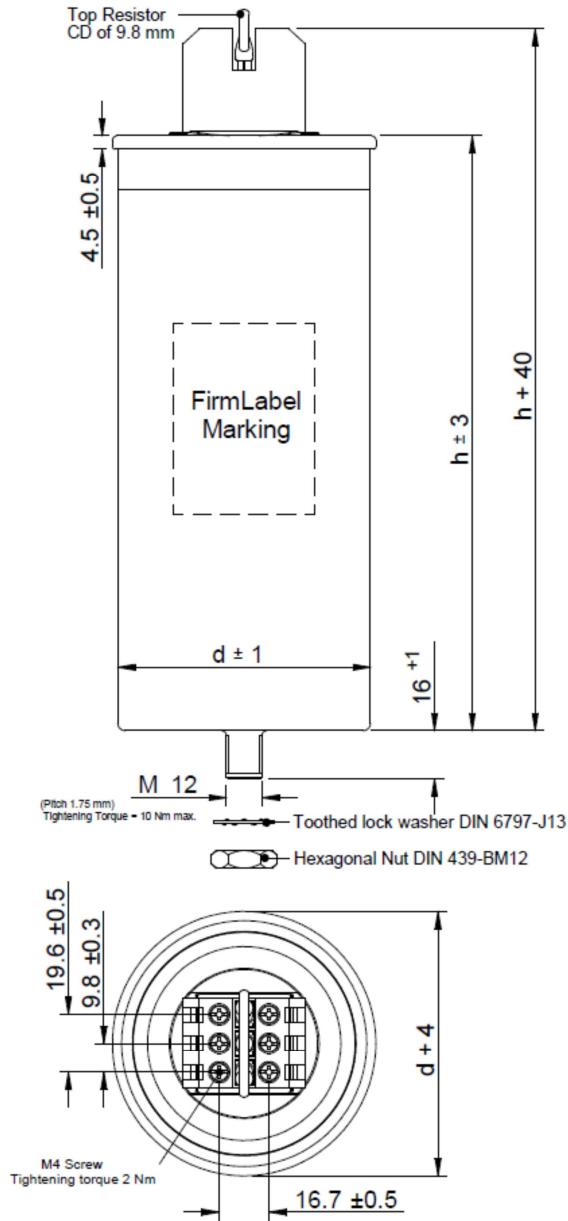


Improved life time expectancy and capacitance for PhaseCap Energy capacitors

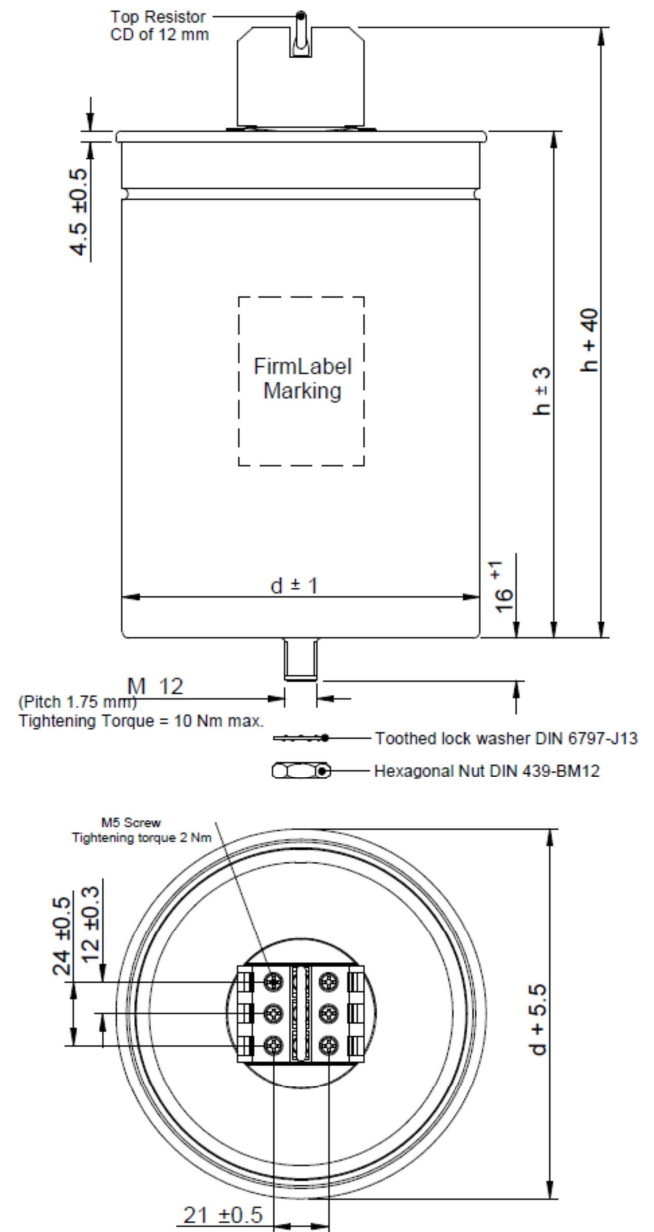


Dimensional drawings

Terminal type A



Terminal type B



Label design

MEIER
Energy

VCTB256V1T2 **MKK415-D-25.0-04**
B25675A4252M015

$C_N = 3 \times 154 \mu\text{F} \quad -5/+5 \% \quad \Delta \quad \text{SH}$

U_N	$Q_N / 50\text{Hz}$	$Q_N / 60\text{Hz}$
415 V	25.0 kvar	30.0 kvar
400 V	23.2 kvar	27.9 kvar
380 V	21.0 kvar	25.2 kvar


$U_i = 3/8\text{kV} \quad -40/60$

Overpressure disconnecter

Non PCB

IEC 60831 - 1/2 (2014) 11.20 N

**Warning: wait 5 minutes after isolating
supply before handling.**



Ordering codes

Ordering code	Series/type	Rated capacitance C_R μF	Rated voltage V_R V	Output & Rated current at 50 Hz, I_R		Output & Rated current at 60 Hz, I_R		Dimensions (d x h) mm	Weight approx. kg	Terminal type	PU* pcs
				kvar	A	kvar	A				
Rated voltage 415 V AC, delta connection											
B25675A4052M015	MKK415-D-5.0-04	3x 30.8	415	5.0	7.0	6.0	8.3	75 x 164	0.9	A	6
B25675A4062M315	MKK415-D-6.3-04	3x 38.8	415	6.3	8.8	7.6	10.6	75 x 164	0.9	A	6
B25675A4072M515	MKK415-D-7.5-04	3x 46.2	415	7.5	10.4	9.0	12.5	75 x 200	1.1	A	6
B25675A4082M315	MKK415-D-8.3-04	3x 51.1	415	8.3	11.5	10.0	13.9	75 x 200	1.1	A	6
B25675A4102M415	MKK415-D-10.4-04	3x 64.1	415	10.4	14.5	12.5	17.4	75 x 200	1.1	A	6
B25675A4122M515	MKK415-D-12.5-04	3x 77.0	415	12.5	17.4	15.0	20.9	85 x 200	1.3	A	9
B25675A4152M015	MKK415-D-15.0-04	3x 92.4	415	15.0	20.9	18.0	25.0	85 x 200	1.3	A	9
B25675A4162M715	MKK415-D-16.7-04	3x 102.9	415	16.7	23.2	20.0	27.8	100 x 207	1.9	B	6
B25675A4202M015	MKK415-D-20.0-04	3x 123.2	415	20.0	27.8	24.0	33.4	100 x 207	1.9	B	6
B25675A4252M015	MKK415-D-25.0-04	3x 154.0	415	25.0	34.8	30.0	41.7	116 x 192	2.4	B	4
B25675A4282M115	MKK415-D-28.1-04	3x 173.1	415	28.1	39.1	-	-	116 x 207	2.6	B	4
B25675A4302M015	MKK415-D-30.0-04	3x 184.8	415	30.0	41.7	-	-	116 x 207	2.6	B	4
B25675A4332M015	MKK415-D-33.0-04	3x 203.3	415	33.0	45.9	-	-	116 x 224	2.8	B	4

Rated voltage 480 V AC, delta connection

B25675A4052M080	MKK480-D-5.0-04	3x 23.0	480	5.0	6.0	6.0	7.2	75 x 164	0.9	A	6
B25675A4062M380	MKK480-D-6.3-04	3x 29.0	480	6.3	7.6	7.6	9.1	75 x 164	0.9	A	6
B25675A4072M580	MKK480-D-7.5-04	3x 34.5	480	7.5	9.0	9.0	10.8	75 x 200	1.1	A	6
B25675A4082M380	MKK480-D-8.3-04	3x 38.2	480	8.3	10.0	10.0	12.0	75 x 200	1.1	A	6
B25675A4102M480	MKK480-D-10.4-04	3x 47.9	480	10.4	12.5	12.5	15.0	75 x 200	1.1	A	6
B25675A4112M080	MKK480-D-11.0-04	3x 50.7	480	11.0	13.2	13.2	15.9	85 x 200	1.3	A	9
B25675A4122M580	MKK480-D-12.5-04	3x 57.6	480	12.5	15.0	15.0	18.0	85 x 200	1.3	A	9
B25675A4132M880	MKK480-D-13.8-04	3x 63.5	480	13.8	16.6	16.6	20.0	85 x 200	1.3	A	9
B25675A4152M080	MKK480-D-15.0-04	3x 69.1	480	15.0	18.0	18.0	21.7	100 x 207	1.9	B	6
B25675A4162M780	MKK480-D-16.7-04	3x 76.9	480	16.7	20.1	20.0	24.1	100 x 207	1.9	B	6
B25675A4202M080	MKK480-D-20.0-04	3x 92.1	480	20.0	24.1	24.0	28.9	100 x 207	1.9	B	6
B25675A4202M880	MKK480-D-20.8-04	3x 95.8	480	20.8	25.0	25.0	30.1	116 x 207	2.6	B	4
B25675A4222M080	MKK480-D-22.0-04	3x 101.3	480	22.0	26.5	26.4	31.8	116 x 207	2.6	B	4
B25675A4252M080	MKK480-D-25.0-04	3x 115.1	480	25.0	30.1	30.0	36.1	116 x 192	2.4	B	4
B25675A4282M180	MKK480-D-28.1-04	3x 129.4	480	28.1	33.8	-	-	116 x 207	2.6	B	4
B25675A4302M080	MKK480-D-30.0-04	3x 138.1	480	30.0	36.1	-	-	125 x 192	2.8	B	4
B25675A4312M080	MKK480-D-31.0-04	3x 142.7	480	31.0	37.3	-	-	125 x 192	2.8	B	4
B25675A4332M080	MKK480-D-33.0-04	3x 152.0	480	33.0	39.7	-	-	116 x 224	2.8	B	4

* Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

Film Capacitors – Power Factor Correction
B25675A*
PhaseCap Energy Capacitors - Resin-filled
MKK

Ordering code	Series/type	Rated capacitance C _R μF	Rated voltage V _R V	Output & Rated current at 50 Hz, I _R		Output & Rated current at 60 Hz, I _R		Dimensions (d x h) mm	Weight approx. kg	Terminal type	PU* pcs
				kvar	A	kvar	A				
Rated voltage 525 VAC, delta connection											
B25675A5052M025	MKK525-D-5.0-04	3x 19.2	525	5.0	5.5	6.0	6.6	75 x 164	0.9	A	6
B25675A5062M325	MKK525-D-6.3-04	3x 24.2	525	6.3	6.9	7.6	8.4	75 x 164	0.9	A	6
B25675A5072M525	MKK525-D-7.5-04	3x 28.9	525	7.5	8.2	9.0	9.9	75 x 185	1.0	A	6
B25675A5082M325	MKK525-D-8.3-04	3x 31.9	525	8.3	9.1	10.0	11.0	75 x 200	1.1	A	6
B25675A5102M425	MKK525-D-10.4-04	3x 40.0	525	10.4	11.4	12.5	13.7	85 x 185	1.2	A	9
B25675A5122M525	MKK525-D-12.5-04	3x 48.1	525	12.5	13.7	15.0	16.5	85 x 200	1.3	A	9
B25675A5132M225	MKK525-D-13.2-04	3x 50.8	525	13.2	14.5	15.8	17.4	85 x 200	1.3	A	9
B25675A5152M025	MKK525-D-15.0-04	3x 57.7	525	15.0	16.5	18.0	19.8	85 x 218	1.5	A	4
B25675A5162M725	MKK525-D-16.7-04	3x 64.3	525	16.7	18.4	20.0	22.0	100 x 207	1.9	B	6
B25675A5202M025	MKK525-D-20.0-04	3x 77.0	525	20.0	22.0	24.0	26.4	100 x 224	2.1	B	4
B25675A5202M825	MKK525-D-20.8-04	3x 80.1	525	20.8	22.9	25.0	27.5	100 x 224	2.1	B	4
B25675A5252M025	MKK525-D-25.0-04	3x 96.2	525	25.0	27.5	30.0	33.0	116 x 207	2.6	B	4
B25675A5262M525	MKK525-D-26.5-04	3x 102.0	525	26.5	29.1	31.8	35.0	116 x 207	2.6	B	4
B25675A5282M125	MKK525-D-28.1-04	3x 108.2	525	28.1	30.9	-	-	125 x 192	2.8	B	4
B25675A5302M025	MKK525-D-30.0-04	3x 115.5	525	30.0	33.0	-	-	125 x 207	3.0	B	4
B25675A5332M125	MKK525-D-33.1-04	3x 127.4	525	33.1	36.4	-	-	136 x 192	3.3	B	4
Rated voltage 690 V AC, delta connection											
B25675A6052M390	MKK690-D-5.3-04	3 x 11.8	690	5.3	4.4	6.4	5.4	75x185	1.0	C	6
B25675A6062M290	MKK690-D-6.2-04	3 x 13.8	690	6.2	5.2	7.4	6.2	75x200	1.1	C	6
B25675A6062M990	MKK690-D-6.9-04	3 x 15.4	690	6.9	5.8	8.3	6.9	75x200	1.1	C	6
B25675A6082M390	MKK690-D-8.3-04	3 x 18.5	690	8.3	6.9	10.0	8.4	75x200	1.1	C	6
B25675A6102M490	MKK690-D-10.4-04	3 x 23.2	690	10.4	8.7	12.5	10.5	75x200	1.1	C	6
B25675A6122M590	MKK690-D-12.5-04	3 x 27.9	690	12.5	10.5	15.0	12.6	85x200	1.3	C	9
B25675A6132M990	MKK690-D-13.9-04	3 x 31.0	690	13.9	11.6	16.7	14.0	85x200	1.3	C	9
B25675A6142M690	MKK690-D-14.6-04	3 x 32.5	690	14.6	12.2	17.5	14.6	100x207	1.9	D	6
B25675A6162M790	MKK690-D-16.7-04	3 x 37.2	690	16.7	14.0	20.0	16.7	100x192	1.8	D	6
B25675A6202M090	MKK690-D-20.0-04	3 x 44.6	690	20.0	16.7	24.0	20.1	100x207	1.9	D	6
B25675A6202M890	MKK690-D-20.8-04	3 x 46.3	690	20.8	17.4	25.0	20.9	100x224	2.1	D	4
B25675A6252M090	MKK690-D-25.0-04	3 x 55.7	690	25.0	20.9	30.0	25.1	116x192	2.4	D	4
B25675A6282M090	MKK690-D-28.0-04	3 x 62.4	690	28.0	23.4	-	-	116x207	2.6	D	4
B25675A6302M090	MKK690-D-30.0-04	3 x 66.8	690	30.0	25.1	-	-	125x192	2.8	D	4

* Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

Cautions and warnings

- In case of dents of more than 1 mm depth or any other mechanical damage, capacitors must not be used at all.
- This applies also in cases of oil leakages.
- To ensure the full functionality of the overpressure disconnecter, elastic elements must not be hindered and a minimum space of 12 mm has to be kept above each capacitor.
- Do not handle the capacitor before it is discharged.
- Resonance cases must be avoided by appropriate application design in any case.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- Protect the capacitor properly against over current and short circuit.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.

Discharging

Capacitors must be discharged to a maximum of 10% of rated voltage before they are switched in again. This prevents an electric impulse discharge in the application, influences the capacitor's service life and protects against electric shock. The capacitor must be discharged to 50 V or less within 1 minute. There must be not any switch, fuse or any other disconnecting device in the circuit between the power capacitor and the discharging device. PhaseCap Energy-capacitors have a pre-mounted ceramic discharge module; alternatively discharge reactors are available from MEIER ENERGY. Discharge and short circuit capacitor before handling!

Service life expectancy

Electrical components do not have an unlimited service life expectancy; this applies to self-healing capacitors too. The maximum service life expectancy may vary depending on the application the capacitor is used in.

Safety

Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from expulsion of oil or melted material due to mechanical disruption of the capacitor.

- Ensure good, effective grounding for capacitor enclosures.
- Provide means of disconnecting and insulating a faulty component/bank.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

Thermal load/over-temperature

After installation of the capacitor it is necessary to verify that maximum hot-spot temperature is not exceeded at extreme service conditions.

Overpressure disconnecter

To ensure full functionality of an overpressure disconnecter, the following must be observed:

1. The elastic elements must not be hindered, i.e.
 - Connecting lines must be flexible leads (cables).
 - There must be sufficient space (min. 12 mm) for expansion above the connections. This will enable a longitudinal extension of the can to secure the overpressure disconnecter work.
 - Folding beads must not be retained by clamps.
2. The maximum allowed fault current of 10000 A in accordance with UL 810 standard must be assured by the application.
3. Stress parameters of the capacitor must be within the IEC60831 specification.

Overcurrent and short circuit protection

- Use HRC fuses or MCCBs for short circuit protection. Short circuit protection and connecting cables should be selected so that 1.5 times the maximum total RMS capacitor current can be permanently handled.
- HRC fuses do not protect a capacitor against overload – they are only for short circuit protection.
- The HRC fuse rating should be 1.6 to 1.8 the maximum total RMS capacitor current.
- Do not use HRC fuses to switch capacitors (risk of arcing).
- Use thermal magnetic over current relays for overload protection.

Resonance cases

Resonance cases must be avoided by appropriate application design in any case. Maximum total RMS capacitor current (incl. fundamental harmonic current) specified in technical data must not be exceeded.

Re-switching vs. phase-opposition

In case of voltage interruption, a sufficient discharge time has to be ensured to avoid phase-opposition and resulting high inrush currents.

Vibration resistance

The resistance to vibration of capacitors corresponds to IEC 68, part 2–6.

Max. test conditions:

Test duration	6 h*
Frequency range 1	10 ... 55 Hz*
Displacement amplitude	0.75 mm*

*corresponding to max. 98.1 m/s or 10 g

These figures apply to the capacitor alone. Because the fixing and the terminals may influence the vibration properties, it is necessary to check stability when a capacitor is built in and exposed to vibration. Irrespective of this, you are advised not to locate capacitors where vibration amplitude reaches the maximum in strongly vibrating equipment.

Mechanical protection

The capacitor has to be installed in a way that mechanical damages and dents in the aluminum can are avoided.

Grounding

The threaded bottom stud of the capacitor has to be used for grounding. In case grounding is done via metal chassis that the capacitor is mounted to, the layer of varnish beneath the washer and nut should be removed. The maximum tightening torque is 10 Nm for M12 stud.

Maintenance

- Check tightness of the connections/terminals periodically.
- Take current reading twice a year and compare with nominal current. Use a harmonic analyser or true effective RMS-meter.
- In case of current above the nominal current check your application for modifications.
- If a significant increase in the amount of non-linear loads has been detected, then a consultant has to be called in for a harmonic study.
- In case of the presence of harmonics installation of a de-tuned capacitor bank (reactors) must be considered.
- Check the temperature of capacitors directly after operation for a longer period, but make sure that the capacitors have been switched off. In case of excessive temperature of individual capacitors, it is recommended to replace these capacitors, as this should be an indication for loss factor increase, which is a sign for reaching end of life.

Storage and operating conditions

Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In dusty environments regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground.

MEIER Energy

International Sales Office

Llull 321, Edificio CINC, 08019
Barcelona, SPAIN
Phone: +34 935 530 742
sales@meierenergy.com

meierenergy.com

Factory

14, Parc d'Activités Oukacha I
Boulevard Moulay Slimane
Roches Noires - Casablanca,
MOROCCO
Phone: +212 522 451 500
sav-ma@meierenergy.com