

EPCOS Product Brief 2017

Power Factor Correction

Power Quality Solutions

PQS key components

PQS key components from EPCOS cover the entire range of products needed for successful power factor correction. All parts are carefully matched to each other. With this unique portfolio, EPCOS is more than a supplier of products: Power Quality Solutions is the strategy that has been developed to fulfill the demand of the market to offer solutions rather than single components. This product brief gives an overview of all PQS products for power factor correction. For detailed information, please refer to the PFC Product Profile and data sheets, available in the Internet at www.epcos.com/pfc, or contact our local sales office.

- PFC Capacitors
 - PhaseCap, PhaseCap Energy Heavy Duty, PhaseCap Super Heavy Duty, PhiCap Normal Duty, PhiCap Heavy Duty, Square Cap Capacitors & PoleCap Capacitors
- Power factor controllers
 - BR6000, BR5000 & BR4000
- Capacitor contactors
 - C240/N230 series
- Thyristor modules for dynamic PFC
 - TSM-LC
 - TSM-LC-N series
- Reactors
 - Antiresonance harmonic filter
- Active Harmonic Filter
 - PQ Sine Series



EPCOS India Private Limited



EPCOS India Private Limited (EIPL) is a Group company of TDK Corporation, Japan. EPCOS emerged in 1999 as a successor to the joint venture Siemens Matsushita Components and the former Siemens passive Components and Electron Tubes Group. The company has been selling electronic components in India since the early 60s. Today, all business activities in India come under the umbrella of EPCOS India Private Limited, having Registered head office at Kalyani Plant in West Bengal and regional offices in Mumbai, Delhi, Bengaluru and Kolkata. In mid-90s EPCOS significantly stepped up its commitment to India by opening new manufacturing facility at Kalyani in West Bengal and Nashik in Maharashtra.

EPCOS in India is involved in design, manufacturing and marketing of a broad range of top quality products such as AC-mfd capacitors, LV Power Factor Correction Capacitors (resin, inert gas and oil filled designs), Key Components required for PF correction system, PF correction systems (APFC Panels), MV Capacitors, MV Capacitor Switch, MV Reactive Power Compensation systems, Power Electronic Capacitors, DC Capacitors, MPP film and high performance ferrite cores. Nashik factory also houses the Global R&D for Film metallisation, AC and PFC Products and Systems while Kalyani is Centre of Excellence for soft ferrites. EPCOS India also services the demands of customers for a wide variety of components from global factories of TDK-EPC.

EPCOS India has a strong sales and marketing team spread over the country. Our strength in market is based on the technical competence and marketing experience of our sales force. It is backed up by a very efficient and dedicated Channel Partner network to cover entire India and some neighboring countries.

About TDK Corporation:

TDK is one of the leading electronic component manufacturers in the world. TDK Corporation was founded in 1935 in Japan to commercialize the world's first invented ferrite. The spirit of creating entirely new things of value by starting at the fundamental level of the material has defined TDK from the beginning, and it still is the trait that sets the company apart. With a forward-looking vision, TDK endeavors to protect the global environment and make innovation work for the betterment of mankind. The company is constantly striving to contribute to the industry and to society at large.

PhaseCap Super Heavy Duty

- Semi-dry Biodegradable Resin
- Wavy Cut
- 3-Ph Over pressure disconnecter
- Low losses

PhaseCap Energy Heavy Duty

- Dry-Inert Gas
- Wavy Cut
- 3-Ph Over pressure disconnecter
- Low losses

PhaseCap

- Dry-Inert Gas
- Wavy Cut
- 3-Ph Over pressure disconnecter
- Low losses



Technical Data	PhaseCap Super Heavy Duty	PhaseCap Energy Heavy Duty	PhaseCap
	 	 	
Series Type	B25675L	B25674L	B25667L
Technology	MKK	MKK	MKK
Winding	Stacked	Stacked	Concentric
Power KVA	1...33.1KVA	5...33.1KVA	5...30KVA
Rated Voltage	415...690V	415...690V	230...525V
Frequency	50Hz	50Hz	50Hz
Transient peak current (Maximum permissible)	$\leq 500 I_R$ (A)	$\leq 400 I_R$ (A)	$\leq 300 I_R$ (A)
Temperature Category	-40°C to 60°C	-40° C to + 55°C	-40° C to + 55°C
Dielectric Losses	0.2 W / KVA	0.2 W / KVA	0.2 W / KVA
Losses(Without discharge Resistor)	≤ 0.45 W / KVA	≤ 0.45 W / KVA	≤ 0.5 W / KVA
Tolerance	-5 / +5%	-5 / +5%	-5 / +10%
Maximum Permissible Voltage	$V_R + 10\%$ (up to 8 h daily)/ $V_R + 15\%$ (up to 30 min daily)** $V_R + 20\%$ (up to 5 min daily)/ $V_R + 30\%$ (up to 1 min daily)***	$V_R + 10\%$ (up to 8 h daily)/ $V_R + 15\%$ (up to 30 min daily)** $V_R + 20\%$ (up to 5 min daily)/ $V_R + 30\%$ (up to 1 min daily)***	$V_R + 10\%$ (up to 8 h daily)/ $V_R + 15\%$ (up to 30 min daily)** $V_R + 20\%$ (up to 5 min daily)/ $V_R + 30\%$ (up to 1 min daily)***
Maximum Permissible Current	Up to 1.6... 2.0 I_R ***	Up to 1.6... 1.8 I_R ***	Up to 1.6 I_R ***
Safety	Self-healing, Three phase overpressure disconnecter	Self-healing, Three phase overpressure disconnecter	Self-healing, Three phase overpressure disconnecter
Impregnation	Non-PCB, semi-dry biodegradable resin	Non PCB, Dry, Inert Gas	Non PCB, Dry, Inert Gas
Life Expectancy	Up to 200,000 h for -40/D Up to 180, 000 h for -40/60	Up to 150,000 h for -40/D	Up to 1,30,000 h for -40/D Up to 180,000 h for -40/C
Cooling	Natural or forced	Natural or forced	Natural or forced
Case/Shape	Extruded round aluminium can with stud	Extruded round aluminium can with stud	Extruded round aluminium can with stud
Terminal	Sigut terminals for metal top - 5 to 33.1 kvar Fast on terminals for plastic top - 1 to 4 kvar	Optimized capacitor safety terminals	Optimized capacitor safety terminals
Mounting and Grounding	Threaded stud at bottom of can (max. torque for M8=4Nm & M12=10Nm)	Threaded stud at bottom of can (max. torque for M12=10Nm)	Threaded stud at bottom of can (max. torque for M12=10Nm)
Enclosure	IP20, indoor mounting	IP20, indoor mounting	IP20, indoor mounting
Discharge Resistor	Provided with discharge resistor	Provided with discharge resistor	Provided with discharge resistor
Connection	Delta	Delta	Delta
Dielectric	Polypropylene film (metallised)	Polypropylene film (metallised)	Polypropylene film (metallised)
No. of switching per annum	Max. 15 000 switching	Max. 12 500 switching	Max. 7500 switching
Reference Standard	IEC60831-1/2 and IS13340	IEC60831-1/2 and IS13340	IEC60831-1/2 and IS13340
Application	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC

** V_n rated voltage

*** I_R : RMS line current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note : for capacitors with different features/parameters than above, please check with our nearest sales office

Phicap Normal Duty

- Semi-dry Biodegradable Resin
- 3-Ph Over pressure disconnecter
- Low losses




Phicap Heavy Duty

- Semi-dry Biodegradable Resin
- 3-Ph Over pressure disconnecter
- Low losses

PoleCap

- Dry-Inert Gas
- Wavy Cut
- 3-Ph Over pressure disconnecter
- Low losses



Technical Data	Phicap Normal Duty	Phicap Heavy Duty	PoleCap
			
Series Type	B32343/B32344	B32447/B32448	B25671L
Technology	MKP	MKP	MKP/MKK
Winding	Stacked	Stacked	Concentric
Power KVA	0.5....33.1KVA	1....30KVA	1....30KVA
Rated Voltage	220....525V	415....480V	230....525V
Frequency	50Hz	50Hz	50Hz
Transient peak current (Maximum permissible)	200 I _R (A)	250 I _R (A)	200 I _R (A)
Temperature Category	-25°C to 55°C	-25°C to 55°C	-40°C to 55°C
Dielectric Losses	0.2 W / KVA	0.2 W / KVA	0.2 W / KVA
Losses(Without discharge Resistor)	≤ 0.5 W / KVA	≤ 0.5 W / KVA	≤ 0.5 W / KVA
Tolerance	-5 / +10%	-5 / +10%	-5 / +10%
Maximum Permissible Voltage	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***
Maximum Permissible Current	1.3....1.5 I _R ***	1.5....1.8 I _R ***	1.3 I _R ***
Safety	Self-healing, Three phase overpressure disconnecter	Self-healing, Three phase overpressure disconnecter	Self-healing, Three phase overpressure disconnecter, Dry Technology
Impregnation	Non-PCB, semi-dry biodegradable resin	Non-PCB, semi-dry biodegradable resin	Non-PCB, Dry, Inert Gas
Life Expectancy	Up to 1,00,000 h	Up to 115,000 h	Up to 100,000 h
Cooling	Natural or forced	Natural or forced	Natural or forced
Case/Shape	Extruded round aluminium can with stud	Extruded round aluminium can with stud	Extruded round aluminium can with stud
Terminal	Fast on terminal for plastic cap - 1 to 5KVA Screw terminal for metal top - 7.5KVA & above	Fast on terminal for plastic cap Sigut terminal for metal top	Optimized capacitor safety terminals
Mounting and Grounding	Threaded stud at bottom of can (Max Torque 4Nm for M8 & 10 Nm for M12)	Threaded stud at bottom of can (Max Torque 4Nm for M8 & 10 Nm for M12)	Threaded stud at bottom of can (Max Torque 10 Nm for M12)
Enclosure	IP20, indoor mounting	IP20, indoor mounting	IP54 with terminal cap
Discharge Resistor	Provided with discharge resistor	Provided with discharge resistor	Provided with discharge resistor
Connection	Delta	Delta	Delta
Dielectric	Polypropylene film (metallised)	Polypropylene film (metallised)	Polypropylene film (metallised)
No. of switching per annum	Max. 5000 switching	Max. 6000 switching	Max. 5000 switching
Reference Standard	IEC60831-1/2 and IS13340	IEC60831-1/2 and IS13340	IEC60831-1/2
Application	Automatic PFC equipment, capacitor banks	Automatic PFC equipment, capacitor banks	Pole mounted PFC i.e. outdoor application
	Individual fixed PFC (ex. motors, transformers, lighting)	Individual fixed PFC (ex. motors, transformers, lighting)	Individual fixed PFC
	Group fixed PFC	Group fixed PFC	

** V_R rated voltage




*** I_R : RMS line current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note : for capacitors with different features/parameters than above, please check with our nearest sales office

SquareCap PFC Capacitors

- Semi-dry biodegradable resin
- Modular construction
- Triple safety system



Technical Data	SquareCap-ENDC	SquareCap-EHDLL	SquareCap-ESHDC
			
Series Type	B32457L	B32459L	B32455L
Power KVA	1.....50KVA	1.....60KVA	1.....50KVA
Rated Voltage	415....440V	415....600V	415....600V
Frequency	50Hz	50Hz	50Hz
Transient peak current (Maximum permissible)	100 I _R (A)	250 I _R (A)	350 I _R (A)
Temperature Category	-10°C to 55°C	-10°C to 55°C	-10°C to 55°C
Losses(Without discharge Resistor)	≤0.5 W / KVA	≤0.5 W / KVA	≤0.5 W / KVA
Tolerance	0 / +10%	0 / +10%	0 / +10%
Maximum Permissible Voltage	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***	V _R +10%(up to 8 h daily)/ V _R +15% (up to 30 min daily)** V _R +20%(up to 5 min daily)/ V _R +30% (up to 1 min daily)***
Maximum Permissible Current	Up to 1.3 I _R ***	Up to 1.5 I _R ***	Up to 1.6 I _R ***
Safety	Self-healing,Three phase overpressure disconnecter	Self-healing,Three phase overpressure disconnecter	Self-healing,Three phase overpressure disconnecter
Impregnation	Non-PCB, semi-dry biodegradable resin	Non-PCB, semi-dry biodegradable resin	Non-PCB, semi-dry biodegradable resin
Life Expectancy	Up to 100,000 h	Up to 125,000 h	Up to 150,000 h
Cooling	Natural or forced	Natural or forced	Natural or forced
Case/Shape	Rectangular / powder coated grey colour	Rectangular / powder coated grey colour	Rectangular / powder coated grey colour
Terminal	Threaded stud terminals with ceramic bushing	Threaded stud terminals with ceramic bushing	Threaded stud terminals with ceramic bushing
Mounting and Grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding
Enclosure	IP20, indoor mounting	IP20, indoor mounting	IP20, indoor mounting
Discharge Resistor	Inbuilt	Inbuilt	Inbuilt
Connection	Delta	Delta	Delta
Dielectric	Polypropylene film (metallised)	Polypropylene film (metallised)	Polypropylene film (metallised)
No. of switching per annum	Max. 5000 switching	Max. 5000 switching	Max. 7500 switching
Reference Standard	IS:13340/41(ISI Mark available for 415/440V)	IS:13340/41(ISI Mark available for 415/440V)	IS:13340/41(ISI Mark available for 415/440V)
Application	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC	Automatic PFC equipment, capacitor banks Individual fixed PFC (ex. motors, transformers, lighting) Group fixed PFC Detuned capacitor banks Filter applications Dynamic PFC

** V_R rated voltage

*** I_R : RMS line current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note : for capacitors with different features/parameters than above, please check with our nearest sales office

PF Controllers BR6000 Series

- Intelligent
- Cost effective
- User friendly

PF Controllers BR5000 Series

- Intelligent
- Cost effective
- Compact
- User friendly



Features

- Multifunctional LCD Display
- Intelligent Control
- Menu Driven Handling (Plain Language)
- Self Optimizing control capability
- Recall function of recorded values
- Four Quadrant Operation
- Larger Measuring Voltage Range
- Powerful alarm output
- Dual target power factor setting



Features

- Multifunctional LCD Display
- Micro Controller logic for measurement
- Three CT Sensing for unbalanced loads
- RS 232 in front and RS 232 / 485 Switchable connection at rear
- EMI / EMC type tested
- Dual target power factor setting

Selection table for controllers

	BR6000 relay output	BR6000 transistor output	BR5000 relay output	BR5000 transistor output
Steps	6 STEP / 12 STEP	6 STEP / 12 STEP	8 STEP / 16 STEP	16 STEP
Switching	Contact	Thyristor	Contact	Thyristor
Ordering code	B44066R6006R230N1 B44066R6012R230N1	B44066R6106R230N1 B44066R6112R230N1	B44066R5908A415N1 B44066R5916A415N1	B44066R5716A415N1
Auxiliary supply	1-Phase, 2-Wire, 245 Vac (-20% to +20%)	1-Phase, 2-Wire, 245 Vac (-20% to +20%)	1Ph 415V (-30% to +20%)	1Ph 415V (-30% to +20%)
Measurement voltage	30-525 V AC (L-N) or (L-L)	30-525 V AC (L-N) or (L-L)	3P 3W 415V (-30% to +20%)	3P 3W 415V (-30% to +20%)
Load CT Input current	1 / 5 A	1 / 5 A	1 / 5 A	only 5 A CT secondary
No. of outputs	6 / 12	6 / 12	8 / 16	16
Alarm outputs	1 No.	1 No.	2 Nos	1 No.
Insufficient Compensation	Yes	Yes	Yes	Yes
Overcompensation	Yes	Yes	Yes	Yes
Over / under voltage	Yes	Yes	Yes	Yes
Overcurrent	Yes	Yes	Yes	Yes
Automatic Initialisation		Yes	No	No
Communication interface	No	Yes	RS 232 & RS 485	RS 232 & RS 485
Parameters displayed				
System voltage	Yes	Yes	Yes	Yes
Load current	Yes	Yes	Yes	Yes
Capacitor current	No	No	No	No
Active power	Yes	Yes	Yes	Yes
Reactive power	Yes	Yes	Yes	Yes
Apparent power	Yes	Yes	Yes	Yes
Frequency	Yes	Yes	Yes	Yes
Individual harmonics measurement upto	19	19	15	15
THD - V	Yes	Yes	Yes	Yes
THD - I	Yes	Yes	Yes	Yes
Monitoring of individual capacitor current	Yes - Health check	Yes - Health check	Yes - Health check	Yes - total panel capacitor current monitored
Apparent current	Yes	Yes	Yes	Yes
Overtemperature	Yes	Yes	Yes - (only INT Temp.)	
Real time cos	Yes	Yes	Yes	Yes
Target cos	Yes	Yes	Yes - (upper and lower target PF programmable)	Yes - (upper and lower target PF programmable)
KVAr value to target cos	Yes	Yes	Yes-displayed as System reactive power	Yes-displayed as System reactive power
Correction time	1 - 1200 sec	20 - 1000 msec	1 - 600 sec	20-5000 msec
Discharge time	1 - 1200 sec	20 - 1000 msec	1 - 600 sec	NA
Number of control series	20 + E series	20 + E series	Unequal, C-series (1-15), E-series	Binary, unequal C-series (1-15), E-series
Weight	1 Kg	1 Kg	2.5 Kg	2.5 Kg
Dimensions (L x D x H in mm)	144 x 55 x 144 mm	144 x 55 x 144 mm	144 x 125 x 144 mm	144 x 125 x 144 mm

BR4000ER

- Upgradable for steps
- Wide supply and measurement range
- Intelligent
- Recall recorded values



Features

- Multifunctional LCD Display
- Micro Controller logic for measurement
- Single CT Sensing for unbalanced loads
- Control Mode: Binary, Unequal, Preset & user defined
- User friendly operation
- Compact 96 x 96 front facia
- Suitable for Auto / Manual Operation



Selection table for controllers

BR4000ER

Series Type	B44066R4...R240
Steps	4,6 and 8 relay output
Supply Voltage	110...550V (L-N/L-L)
Measurement Voltage	30...550V (L-N/L-L)
Frequency (Selectable)	40 to 70 Hz
Switching	Contactors
Operating Temperature	-10°C to 60°C
Load CT input Current	1/5A
Parameter displayed	
Alarm Outputs	Yes
Out of Bank (Under Compensation)	Yes
Overcompensation	Yes
Under Voltage	Yes
Over Voltage	Yes
Undercurrent	Yes
Overcurrent	Yes
Over temperature	Yes
Under / Over Frequency	Yes
Excess Harmonics (V-THD / I-THD)	Yes
System voltage (V AC)	Yes
Reactive power (KVAR)	Yes
Active power (kW)	Yes
Apparent power (KVA)	Yes
Apparent current (A)	Yes
Temperature (°C)	Yes
Real-time cos ϕ	Yes
KVAR value to target cos ϕ	Yes
THD – V / THD - I in %	Yes
Individual Harmonics in % up to 31st for V and I	Yes
Energy kWh (Import/ Export)	Yes
Energy KVAh	Yes
Energy KVARh (Inductive / Capacitive)	Yes
Demand KVA /current	Yes
Run Hour – Number of hours load is connected	Yes
On Hour – hours for which power supply is On	Yes
No of interruption – Number of interruption for power supply	Yes
Recall recorded values	
Maximum / Minimum Voltage	Yes
Maximum / Minimum current	Yes
Maximum / Minimum Apparent power	Yes
Maximum / Minimum Reactive power	Yes
Maximum / Minimum temperature	Yes
Maximum / Minimum THD (V/I)	Yes
Switching count of Capacitor	Yes
Operation time of Capacitor	Yes
Correction Time	10 sec ...30 min
Discharge Time	60 sec ...30 min
Weight	0.35 Kg
Dimensions (L x D x H in mm)	96 × 96 × 51 mm

Switching Devices - Capacitor Duty Contactors

- Soft Switching of Capacitor
- Excellent Damping of Inrush

- Improved Power Quality
- UL Certified



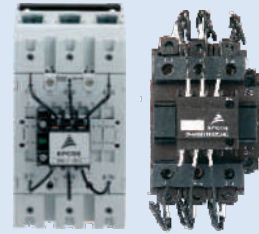
Features

- Excellent damping of inrush current
- Improved power quality (e.g. avoidance of voltage sags)
- Longer useful service life of main contacts of capacitor contactor
- Soft switching of capacitor and thus longer useful service life
- Enhanced mean life expectancy of PFC system

- Reduced ohmic losses
- Leading contacts with wiper function
- Tamper-proof and protected resistors
- Easy access for cable connection
- Voltage range: 400 / 690 V
- Output range: 12.5 to 100 KVAR
- Series J230 / C240 for all PFC systems
- AC6b utilization category

Applications

- Damping of inrush current in low-voltage PFC systems
- For PFC systems with and without reactors



Technical data : Capacitor duty contactors standard series

Type	B44066*****C240								
Main contacts		C1011	C1211	C1611	C2011	C2511	C3312	C4012	C6012
Rated insulation voltage V_i V_{is}	[V AC]	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾
Admissible frequency of operation	1/h	240	240	240	240	240	240	240	100
Contact life	million operations	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Cable cross section	[mm ²]	2.5	2.5	4	4	6	16	16	50
Flexible with cable end sleeve - 1 conductor	[mm ²]	1.5	1.5	2.5	4	4	6	6	25
Solid without cable end sleeve - 1 conductor	[mm ²]	4	4	6	10	16	25	25	50
Solid without cable end sleeve - 2 conductors	[mm ²]	4	4	6	6	10	16	16	35
Operating range of magnet coils in multiples of control voltage V_s		0.78-1.1	0.78-1.1	0.78-1.1	0.78-1.1	0.78-1.1	0.78-1.1	0.78-1.1	0.78-1.1
Auxiliary contacts¹⁾									
Rated insulation voltage V_i V_{is}	[V AC]	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾
Rated current I_{th} at ambient temperature: 40° C	I_{coth} [A]	10	10	10	10	10	10	10	10
60° C	I_{coth} [A]	8	8	8	8	8	8	8	8
Utilization category AC15									
220 ... 240 V	I_{coth} [A]	3	3	3	3	3	3	3	3
380 ... 440 V	I_{coth} [A]	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Short circuit protection									
Highest fuse size, slow, gL (gG)	I_{coth} [A]	10	10	10	10	10	10	10	10
Auxiliary contacts									
	NO	1	1	1	1	1	1	1	1
	NC	1	1	1	1	1	2	2	2

Technical data : Capacitor duty contactors premium series

Type	B44066*****J230								
Main contacts		S1811	S2411	S3211	S5011	S6211	S7411	S9011	S9911
Rated insulation voltage V_i V_{is}	[V AC]	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	1,000 ¹⁾	1,000 ¹⁾
Admissible frequency of operation	1/h	120	120	120	120	120	80	80	80
Contact life	million operations	0.25	0.15	0.15	0.15	0.15	0.12	0.12	0.12
Cable cross section	[mm ²]	1.56	2.525	2.525	450	450	450	0.595/10120	0.595/10120
Solid or standard									
Flexible	[mm ²]	1.54	2.516	2.516	1035	1035	1035	0.570/1095	0.570/1095
Flexible with multicore cable end	[mm ²]	1.54	2.516	2.516	635	635	635	0.570/1095	0.570/1095
Cables per clamp		2	1	1	1	1	1	2	2
Operating range of V_s magnet coils in multiples of control voltage		0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1	0.85-1.1
Auxiliary contacts¹⁾									
Rated insulation voltage V_i V_{is}	[V AC]	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾	690 ¹⁾
Rated current I_{th} at ambient temperature max. 40 °C	I_{coth} [A]	16	10	10	10	10	10	10	10
max. 60 °C	I_{coth} [A]	12	6	6	6	6	6	6	6
Utilization category AC15									
220 to 240 V	I_{coth} [A]	12	3	3	3	3	3	3	3
380 to 440 V	I_{coth} [A]	4	2	2	2	2	2	2	2
Short circuit protection									
Highest fuse rating	I_{coth} [A]	25	20	20	20	20	20	20	20
slow, gL (gG)									
Auxiliary contacts	NO/NC	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1

IEC 947-4-1, IEC 947-5-1, EN 60947-4-1, EN 60947-5-1, VDE 0660

1) Applies to networks with grounded star point, overvoltage category I to IV, pollution severity 3 (industrial standard), Vimp = 8 kV

Switching Devices - Thyristor Modules for Dynamic PFC

- Ultrafast Smooth Switching
- Natural Cooled

- Compact Design
- Enhanced Life of System



Features

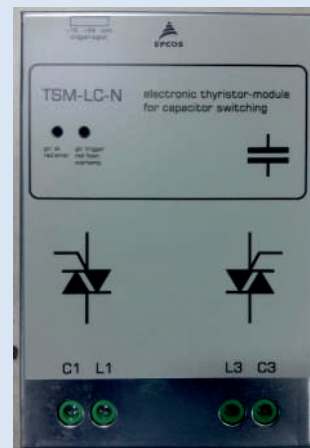
- Easy installation: it can be used similar to a contactor
- All the intelligence needed is offered within the thyristor module itself
- Reaction time: 5 milliseconds only
- Permanent self-controlling of: voltage parameter
phase sequence
capacitor output
- Display of operation
faults
activation
- Voltage range: 415 V and 440 V
Output range:
440 V: 10, 25 and 50 KVAR
- Rated PIV of 2.2 KV

Applications

- Main supply networks with high load fluctuations for dynamic PFC systems
- Presses
- Welding machines
- Elevators
- Cranes
- Wind turbines

Advantages

- Optimized switching behaviour by micro-processor controlled alignment to capacitor branches with or without detuning reactor.
- No wear-out parts (no fan)
- Monitoring of voltage, phase and temperature; status via LEDs
- Switching without delay
- No auxiliary voltage required
- Maintenance free
- Long service life



Selection table TSM series

	TSM-LC 10	TSM-LC-N 25	TSM-LC-N 50
Ordering code	B44066T0010R440	B44066T3025R442	B44066T3050R442
Rated voltage	380....440 V	380....440 V	380....440 V
Max. grid voltage: in conventional PFC systems(without reactors)	440 V	440 V	440 V
in detuned PFC system (7% detuning)	440 V (no upwards tolerance)	440 V (no upwards tolerance)	440 V (no upwards tolerance)
in detuned PFC system (14% detuning)	440 V	440 V	440 V
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Maximum power / at nominal voltage	10 KVAR	25 KVAR	50 KVAR
Power circuit	Direct connection 4 pole via terminal clamps	Direct Cable Connection	Direct Cable Connection
Neutral required	No*	No*	No*
Aux. supply voltage required	No	No	No
Connection	from bottom	from bottom	from bottom
Losses (PD in W)	2.0 x I (in A) typical; 35 W (thermal)	2.0 x I (in A) typical; 75 W (thermal)	2.0 x I (in A) typical; 150 W (thermal)
Recommended fuses superfast	3 x BS Type (AC 690 V) 40 A	3 x BS Type (AC 690 V) 80 A	3 x BS Type (AC 690 V) 160 A
Dimensions in mm (w x h x d)	163 x 150 x 75	157 x 200 x 180	157 x 200 x 180
Weight	1.75 kg	4.8 kg	4.8 kg
LED display per phase	2	2	2
Cascading	yes	yes	yes
Ambient temperature	-10 °C ... 55 °C	-10 °C ... 55 °C	-10 °C ... 55 °C
Discharge resistors EW-22 needed	1	1	1
Three phase current limitation reactor needed***	1	1	1

*For operation with three-phase capacitor or three single-phase capacitors. ***For PFC systems without detuning reactors mandatory.

Reactors - Antiresonance Harmonic Filter

- Linearity 173% *
- Class H Insulation
- Thermal Micro Switch
- Type Tested at CPRI



Features

- High harmonic loading capability
- Very low losses
- High linearity to avoid choke tilt
- Low noise
- Convenient mounting
- Long expected life time
- Temperature protection (NC contact)

Applications

- Avoidance of resonance conditions
- Tuned and detuned harmonic filters
- Reduction of harmonic distortion (network clearing)
- Reduction of power losses



Technical data and limit values

Filter reactors	
Standard	IEC 60076, IS 5553
Winding	Copper / Aluminium
Harmonics	$V_3 = 0.5\% V_R$ (duty cycle = 100%) $V_5 = 6.0\% V_R$ (duty cycle = 100%) $V_7 = 5.0\% V_R$ (duty cycle = 100%) $V_{11} = 3.5\% V_R$ (duty cycle = 100%) $V_{13} = 3.0\% V_R$ (duty cycle = 100%)
Effective current	$I_{rms} = \sqrt{(I_1^2 + I_3^2 + \dots + I_{13}^2)}$
Fundamental current	$I_1 = 1.06 \cdot I_R$ (50 Hz or 60 Hz current of capacitor)
Temperature protection	microswitch (NC)
Frequency	50 Hz or 60 Hz
Voltage	400, 415, 440**
Output	5....100 KVA
Detuning	5.67%, 7%, 14%
Cooling	natural
Ambient temperature	40 °C
Class of insulation	H
Enclosure	IP00

* 200% linearity is available on request

** Other voltages are available on request

Important Information: Some part of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products. We expressly point out that these statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. It is incumbent on the customer to check and decide whether a product is suitable for use in particular application. This publication is only a brief product survey which may be changed from time to time. Our products are described in detail in our data sheets.

Active Harmonic Filter and Power Quality Optimizer - PQSine Series



Features

- Compensation upto 50th Harmonic
- Flicker Compensation
- Ultra fast reactive power Compensation
- Load balance between phases
- Compact design
- User friendly menu operation
- High performance and reliability
- Simple installation

Safety Features

- Over load protection
- Internal short circuit protection
- Over heating protection
- Over / Under voltage protection
- Inverter bridge protection
- Resonance protection
- Fan fault protection

Applications

- Data centers
- UPS Systems
- Green Power Generation
- Industrial Production Machines
- Electrical Welding Systems
- Plastic Industry Machinery
- Office Building & Shopping Centre



Technical data

System input / No. of phases	3-wire: 3 phase 4-wire: 3 phase + neutral lead				
Inverter Technology	Three level NPC Topology, IGBT				
Rate of harmonic reduction	> 98%				
Phase compensation current	60 A	120 A	180 A	240 A	300 A
Neutral lead compensation current	180 A	360 A	540 A	720 A	900 A
Input voltage	3-wire: 200 V ... 480 V \pm 10% 4-wire: 200 V ... 400 V \pm 10%				
Frequency	50/60 Hz \pm 3 Hz				
Reaction time	21 μ s (immediate load change reaction)				
Steady state response time	< 300 μ s (steady state response time to full steady state compensation)				
Switching frequency	24 kHz				
Control frequency	48 kHz				
Harmonic compensation	Up to 50 th harmonic, 50 active harmonic orders simultaneous selectable				
Power factor correction	Fully inductive and capacitive current compensation from 0 ... 100%				
Weight single unit	59 kg 3P3W, 60 kg 3P4W				
Dimensions single unit	482 x 678 x 222 mm (w x d x h)				
Current transformer	Source or load side selectable, primary current range 100 A ... 10000 A, secondary current 1 A				
Overload current	150 A @cf2.5	300 A @cf2.5	450 A @cf2.5	600 A @cf2.5	750 A @cf2.5
Maximum power losses (W)	530	1100	1700	2000	2800
Cabinet mounting	Wall*	Wall*	Floor	Floor	Floor
Weight including cabinet	96 kg	160 kg	413 kg	474 kg	535 kg
Dimensions including cabinet	504 x 290 x 979	504 x 514 x 979	600 x 805 x 2095	600 x 805 x 2095	600 x 805 x 2095
Air flow rate	470 cfm	940 cfm	1410 cfm	1880 cfm	2350 cfm
Interface	Ethercat 100 Mbit/s, USB, Active sensor bus, display bus				
Ambient temperature	-10 ... +40 °C full performance, up to +55 °C derating 2%/K				
Humidity	95% non-condensing				
Self-protection	Yes				
Overheating protection	Yes				
Overvoltage and under-voltage protection	Yes				
Noise level	< 56 dB till < 60 dB (depending on the model)				
Altitude	Max. 4000 m (1% power de-rating for each additional 100 m, between 1500 m and 4000 m)				
Design/Standards	IEC 61000-4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-11, IEC 60146, EN 55011 Class A, EN 50091-1, EN 50178				
Compliance with standards	IEE 519, IEC 61000-3-6- ER G5/4				

*) Floor mounting on request

