



# Power Factor Correction

## Power Quality Solutions

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. Consequently, PQS is not based on “hardware” alone: the bundled know-how of PQS partners worldwide form the second pillar of a customer-oriented strategy.

This product brief gives an overview of all PQS products for power factor correction and harmonic filtering. For detailed information, please refer to the PFC Product Profile and data sheets, available in the Internet at [www.epcos.com/pfc](http://www.epcos.com/pfc) or contact your local sales office.

### **PQS key components**

#### **PFC capacitors**

- PhaseCap® Premium
- PhaseCap® Compact
- PhaseCap® HD
- PhiCap
- PoleCap
- MKV capacitors

#### **Power factor controllers**

- BR604
- BR6000

#### **Multi measuring interface**

- MMI6000

#### **Capacitor contactors**


- J230 series
- N230 series

#### **Thyristor modules for dynamic PFC**


- TSM-LC series
- TSM-HV series

#### **Reactors – Antiresonance harmonic filter**




# Power Factor Correction: Capacitors

Technical data				
				
Series	PhaseCap Premium	PhaseCap Compact	PhaseCap HD	
	Premium power capacitors for low-voltage power factor correction	Power capacitors for low-voltage power factor correction	High-density power capacitors for low-voltage power factor correction	
Features				
Technology	MKK	MKK	MKK	
Inrush current	High pulse current withstandability up to $200 \cdot I_R$ for B25667 series; up to $300 \cdot I_R$ for B25668 series	High pulse current withstandability up to $300 \cdot I_R$	High pulse current withstandability up to $200 \cdot I_R$	
Discharge module	Pre-mounted	Pre-mounted	Included in the delivery	
Safety system	Triple: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> <li>• Dry technology</li> </ul>	Dual: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> </ul>	Triple: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> <li>• Dry technology</li> </ul>	
Impregnation	Inert gas, Nitrogen (N <sub>2</sub> )	Soft Polyurethane resin	Inert gas, Nitrogen (N <sub>2</sub> )	
Rated voltage	V <sub>R</sub> 230 ... 800	230 ... 525	400, 440, 525	V AC
Power	Q <sub>R</sub> 5 ... 36	5 ... 33	40 ... 60	kvar
Rated frequency	f <sub>R</sub> 50/60	50/60	50/60	Hz
Winding	Concentric	Concentric	Stacked	
Mounting position	Upright/horizontal	Upright/horizontal	Upright	
Ordering code	B25667B* B25668A*	B25673A*	B25669*	
Applications				
	<ul style="list-style-type: none"> <li>• Automatic PFC equipment</li> <li>• Individual fixed PFC</li> <li>• Fixed PFC</li> <li>• Tuned and detuned capacitor banks</li> <li>• 690 V and 800 V series for usage in harsh application conditions such as wind turbine and industrial applications with heavy harmonic loads</li> </ul>	<ul style="list-style-type: none"> <li>• Automatic PFC equipment</li> <li>• Individual fixed PFC</li> <li>• Fixed PFC</li> <li>• Tuned and detuned capacitor banks</li> <li>• All kinds of PFC</li> </ul>	<ul style="list-style-type: none"> <li>• Automatic PFC equipment</li> <li>• Individual fixed PFC</li> <li>• Fixed PFC</li> <li>• Detuned capacitor banks</li> </ul>	



# Power Factor Correction: Capacitors

Technical data				
				
Series	PhiCap	PoleCap	MKV	
	Power capacitors for low-voltage power factor correction	Power capacitors for outdoor applications or harsh environmental conditions	Power capacitors for high ambient temperatures and especially demanding loads	
Features				
Technology	MKP	MKP/MKK	MKV	
Inrush current	High pulse current with-standability up to $200 \cdot I_R$	High pulse current with-standability up to $200 \cdot I_R$	High pulse current with-standability up to $500 \cdot I_R$	
Discharge module	Pre-mounted for B32334D series; discharge resistors included in delivery	Pre-mounted	Included	
Safety system	Dual: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> </ul>	Triple: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> <li>• Dry technology</li> </ul>	Dual: <ul style="list-style-type: none"> <li>• Self healing</li> <li>• Overpressure disconnecter</li> </ul>	
Impregnation	Resin	Inert gas	Oil (PCB free)	
Rated voltage	$V_R$ 230 ... 525	400, 440, 525	400 ... 800	V AC
Power	$Q_R$ 0.5 ... 30	0.5 ... 30	4.2 ... 30	kvar
Rated frequency	$f_R$ 50/60	50/60	50/60	Hz
Winding	Stacked	MKP stacked MKK concentric	Stacked	
Mounting position	Upright	Upright/horizontal	Upright/horizontal	
Ordering code	B32340C* (single phase, fast-on terminals) B32343C* (three phase, fast-on terminals) B32344D* (three phase, SIGUT terminals)	B25671A*	B25836B*	
Applications				
	<ul style="list-style-type: none"> <li>• Automatic capacitor banks</li> <li>• Fixed PFC</li> <li>• Detuned PFC systems</li> </ul>	<ul style="list-style-type: none"> <li>• Pole mounted PFC, i.e. outdoor applications</li> <li>• Fixed PFC inside or outside a cabinet in surroundings with high dust or moisture concentrations</li> <li>• Automatic PFC systems to reduce labor costs</li> </ul>	<ul style="list-style-type: none"> <li>• Applications with high thermal loading</li> <li>• AC applications in industrial electronics, e.g. high dv/dt</li> <li>• Tuned harmonic filters</li> <li>• Industrial applications with heavy harmonic loads</li> </ul>	


# Power Factor Correction: Key Components

Technical data			
			
<b>Series</b>	<b>Power Factor Controllers BR604 and BR6000</b>		<b>Multi Measuring Interface MMI6000</b>
Features			
	Large and multifunctional display (2 x 16 characters, backlight for BR6000 series)		Coupling with PF controller BR6000 via interface for determination of real capacitor current
	Menu driven handling (plain language)		Capacitor protection by step switch-off at current limit
	Self-optimizing control capability		Fast trigger for dynamic PFC
	Recall function of recorded values		Independent switching of a single capacitor step
	Automatic initialization possible for BR6000 Option: interface RS485 for BR6000		Stand-alone measuring device with interface for read-out Measurement of V, I, P, Q, S, cos φ, f, W, T (read out via RS485)
Technical data			
	<ul style="list-style-type: none"> <li>Supply voltage: 230 V AC, 50/60 Hz</li> <li>Measurement voltage range: 30 ... 300 V AC phase to neutral, 50 ... 525 V AC phase to phase for BR6000 V5</li> <li>Sensitivity: 40 mA/10 mA</li> <li>Measuring current: X:5/X:1A</li> </ul>		<ul style="list-style-type: none"> <li>Operating and measuring voltage: 230 V AC, 50/60 Hz</li> <li>Measuring current: X:5/X:1A</li> <li>Sensitivity: 40 mA</li> <li>Graphic LCD-Display (2 · 16 characters); alphanumeric</li> </ul>
Versions and ordering codes			
	BR604 (4 steps)	B44066R6004E230	MMI6000-R (standard version with relay output) B44066M6000E230 MMI6000-T (dynamic version with transistor output) B44066M6100E230
	BR6000-R6 (6 steps)	B44066R6006E230	
	BR6000-R12 (12 steps)	B44066R6012E230	
	BR6000-R12/F (12 steps) (2nd auxiliary relay)	B44066R6212E230	
	BR6000-R12/S485 (12 steps with RS485 interface)	B44066R6412E230	
	BR6000-T6 (6 steps for dynamic PFC)	B44066R6106E230	
	BR6000-T12 (12 steps for dynamic PFC)	B44066R6112E230	
	BR6000-T12/S485 (12 steps for dynamic PFC, interface RS485)	B44066E6412E231	
	BR6000-T6R6 6 relay outputs, 6 transistor outputs for mixed compensation (standard/dynamic)	B44066E6066E230	
	BR6000-T6R6/S485 6 relay outputs, 6 transistor outputs for mixed compensation (standard/dynamic) with interface RS485	B44066E6466E230	

# Power Factor Correction: Key Components

Technical data				
				
<b>Series</b>	<b>Capacitor Contactors J230/N230</b>	<b>Thyristor Modules for Dynamic PFC</b>		
Features				
Standards	Excellent damping of inrush current	Easy installation: usage similar to a contactor		
	Soft switching of capacitors to increase the life expectancy of PFC systems	Ultra-short reaction time, almost no inrush current		
	Reduced ohmic losses	Permanent self controlling of various parameters: • voltage • phase sequence • capacitor output		
	High safety standards	Display of: • operation • faults • activation		
	Reduction of voltage sags and transients	• Maintenance-free • Long service life • No switching noise		
	Extension of life time of PFC system, contactors as well as of capacitors			
	Series J230: with pre-charge resistors for conventional PFC systems without reactors Series N230: without pre-charge resistors for detuned PFC systems			
Technical data				
	<ul style="list-style-type: none"> <li>• Voltage range: 400 ... 690 V</li> <li>• Output range: 12.5 ... 100 kvar</li> <li>• Auxiliary contacts: included (normally open)</li> <li>• Mounting: integrated DIN-rail</li> <li>• Approval: cUL</li> </ul>	<ul style="list-style-type: none"> <li>• Output at 400 V: 10, 25, 50, 100, 200 kvar</li> <li>• Output at 690 V: 50 and 200 kvar</li> <li>• Switching time: approx. 5 ms</li> </ul>		
Versions and ordering codes				
	J230 series	B44066S****J230	TSM-LC (400 V):	B44066T0***E402
	N230 series	B44066S****N230	TSM-HV (690 V):	B44066T0050E690 B44066T0200E690

# Power Factor Correction: Key Components

Technical data	
	
<b>Series</b>	<b>Reactors – Antiresonance Harmonic Filter</b>
<b>Features</b>	
	High harmonic loading capability, very low losses
	High linearity to avoid choke tilt, low noise emission
<b>Technical data</b>	
	Voltage range: 400 V, 440 V, 690 V
	Measurement output range: 10 ... 100 kvar
	Frequency: 50 or 60 Hz
	Temperature protection: microswitch (NC)
	Detuning factor: 5.67%, 7%, 14%
<b>Ordering codes</b>	
	B44066D****S*** / B44066D****M***
<b>General information</b>	
	<p>We constantly strive to improve our products. Consequently, <b>the products described in this publication may change from time to time.</b> The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.</p> <p>We also <b>reserve the right to discontinue production and delivery of products.</b> Consequently, we cannot guarantee that all products named in this publication will always be available.</p>

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