

Product Information

Power Capacitors Limited is "Power Factor Correction" having specialised in all aspects of power quality since 1973. Power Capacitors Ltd supplies capacitors for Power Factor Correction, Harmonic Filters, and Power Electronics applications to Industrialists, Equipment Manufacturers, Electricity Supply Companies and Contractors alike. Comprehensive stocks of capacitors and associated equipment enable quality products to be produced at *competitive prices* and to meet the *shortest delivery periods*.

Quality - Second to None

Working within the policies of BS EN ISO9001:2008 approval, all equipment is manufactured and tested to all appropriate standards.

Power Factor Correction - Multiple Benefits

Power Factor Correction, when correctly specified, completely removes the compulsory charges levied on consumers with a poor power factor. The savings achieved can amount to many thousands of pounds a year, depending on consumption. The reduction in loading on electrical distribution equipment increases supply capacity, reduces losses and also reduces CO² emissions, which are all crucial to today's commercially and environmentally aware society.



The PowerCab Plus - Blueline



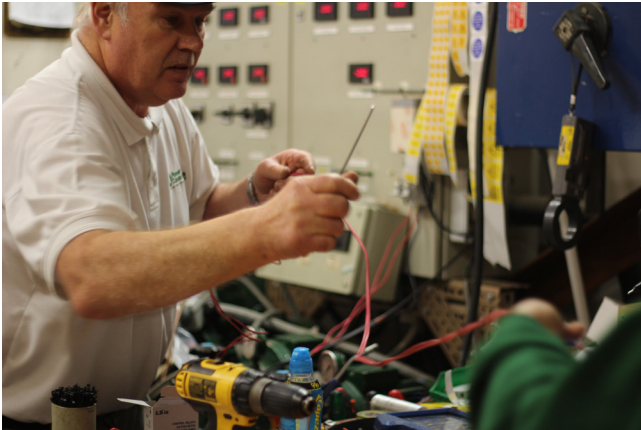
Formula 50 Chassis & The PowerCan

Capacitor Products - Total Capability

The comprehensive range of capacitor products available enables almost every requirement for power factor correction to be satisfied by a standard product. Where a solution does not already exist, our specialist engineers are able to offer a custom solution, designed specially around a particular set of requirements.

Capacitor Elements - The PowerCan

In cylindrical aluminium casings, from 0.25kVAr to 35kVAr, these are perfectly suited to the individual correction of motors in a motor control centre. Their compact dimensions and minimum IP2X rating are unmatched in this application. The market-leading design and optimum temperature rating result in increased reliability, greater lifetime, and improved savings than other, less well specified types.



Capacitor Chassis - The Formula Ranges

The Formula 50 and Formula 150 both comprise capacitors, contactors, main and control fusegear on a backplate mounting assembly, intended for use as the building blocks of an automatic system, housed within a switchboard or MCC. The Formula 50 range has a maximum rating of 50kVAR, the Formula 150 range can be fitted with up to 150kVAR. Both types are available for standard or detuned systems, according to the particular requirements of a system. The efficient utilisation of space and temperature rating exceed the capabilities of any major competitor.

Automatic Systems

To meet the diverse needs of ALL industries and application, Power Capacitors Ltd has developed three distinct ranges of automatic PFC systems:

PowerCabBlueLine

Designed with unparalleled performance and reliability in mind, the BlueLine range offers the most robust solution bar none for the most demanding applications, with the emphasis on Performance and Extended Lifetime.

PowerCabGreenLine

Intended for the 'Standard Industrial' application, the GreenLine range provides the simplest solution to whatever Power Factor Correction scheme is required. With standard ratings available to over 500kVAR in a single cubicle, the compact dimensions enable us to meet constraints our competitors cannot.

EnviroCab

With electricity bills now including penalty charges for poor power factor for the smaller consumers, the EnviroCab range offers a technically compliant and cost-effective solution to smaller equipment requirements. Ratings from 10kVAR to 75kVAR meet the most costsensitive requirements in ways our competitors can't match.

RealTime Switching - PowerCabFast

By using semiconductor switches and the latest in microprocessor based controllers, almost instantaneous switching can be achieved. All PowerCabFast systems are detuned, and include the optimised smaller stages of the BlueLine range.

Better Components = Lower Losses

By using better specified components across the whole range of designs, Power Capacitors Ltd is able to offer equipment with lower losses than its competitors. This reduction in losses can amount to a significant financial saving, for example, a 300kVAR detuned system from one of the 'market leading' PFC companies would cost over £350 per annum more to operate than our BlueLine system.



PowerCabBlueLine



PowerCabGreenLine

Capacitor Maintenance - Total Service

Power Factor Correction equipment is a piece of capital equipment, and regular maintenance is essential. Regular servicing ensures that the rated output is maintained, maximising the financial and technical benefits. Unlike our competitors, Power Capacitors Ltd is able to service and repair every LV capacitor installation regardless of manufacturer. Our team of fully qualified and experienced specialist Capacitor Engineers perform these services across the whole of the UK.

Technical Support & Site Services

The services performed by the company's specialist engineers include:

- Power Factor Surveys, performed free of charge on the UK mainland
- Load Profiling, with report & recommendations
- Harmonic Surveys, with full technical report & recommendations
- Installation of Capacitor Equipment
- Specialist Product Design Service
- Installation of Capacitor Equipment
- Specialist Product Design Service

General

Under normal operating conditions certain electrical loads draw not only active power from the supply (kilowatts kW) but also reactive power (reactive kVA, kVAR). This reactive power has no useful function, but is necessary for the equipment to operate correctly. Loads such as induction motors, welding equipment, arc furnaces and fluorescent lighting would fall into this category.

Correction

Opposing reactive power resulting from the connection of a correctly sized capacitor can compensate for the reactive power required by the load. This ensures that only a small amount of reactive power is drawn from the supply.

Purpose

An apparent reduction in the total current drawn from the supply can be achieved as a result of connecting a capacitor to an inductive load.



Definition

The Power Factor of a load is defined as being the ratio of active power to total demand, that is to say kW + kVA. The uncorrected power factor of a load is $\cos\theta_1$ (where θ_1 is the phase angle between the uncorrected load and unity), and the corrected power factor is $\cos\theta_2$ (where θ_2 is the phase angle between the corrected load and unity). The nearer the ratio $\text{kW} + \text{kVA} = \cos\theta$ is to unity, the less reactive power is drawn from the supply.

Reactive Power Penalty Charges

The Reactive Power charge is the means by which consumers with a poor power factor pay more for their electricity than consumers with a good power factor. Since April 2010, a common charging method is in force across all UK Electricity Supply Companies. This applies to ALL half-hourly metered consumers. By installing power factor correction equipment and ensuring that the average power factor is better than 0.95 lagging under ALL load conditions, no 'excess' reactive power is consumed. Smaller capacitor stages ensure that these charges are avoided under almost all load conditions. This means that ALL excess Reactive Power charges can be avoided. Contact our team of sales engineers to discuss existing or imminent Reactive Power charges, and how to avoid them.

**Technical Benefits**

The connection of a capacitor capable of "correcting" half of the reactive power of a load leads to a reduction in the demand on the supply of approximately 15%. This results in the following:

1. The load on the cables and switches is reduced
2. The supply is now able to support additional load
3. The charges made by the electricity supply company are likely to be reduced

By reducing the load on cables and switches, power loss is reduced and life is extended. The facility to connect additional load is always useful to an expanding company.

An example: A fully loaded 1000kVA transformer supplying a load with a power factor of 0.80 can only supply 800kW of "useful" load. By correcting the power factor to 0.96, an additional 160kW of load may be connected, increasing the "useful" load capacity to 960kW.

Commercial Benefits

By maintaining the power factor at or above 0.95 lagging under all load conditions:

- Any charges for excess reactive power are avoided
- System losses are reduced
- Distribution equipment runs cooler and lasts longer

Lower system losses means reduced electricity consumption, typically in the region of 2% of the total consumption. These additional, hidden savings can amount to many thousands of pounds over the course of a year.

Environmental Benefits

In addition to the benefits already listed, every kVAR of Power Factor Correction supplied by Power Capacitors Ltd reduces CO² emissions by 146kg per annum. Any responsible company having or seeking ISO14001 approval is wise to take advantage of this.

Harmonic Distortion

The relentless developments in semiconductor technology have led to constant increases in the proportion of harmonic generating loads connected to the mains. These converters have adverse effects on the incoming AC supply system, and the levels of distortion on the supply network should be limited to prevent equipment going into overtemperature, malfunction or even premature failure. The comprehensive range of equipment available means that Power Capacitors Ltd is almost uniquely able to offer PFC systems detuned to either 189Hz (where maximum harmonic blocking is required), or 210Hz (where absorption of the harmonic currents by the PFC system is required).

Capacitor Sizing

To obtain capacitor sizes (in kVA) for a given power factor, multiply the kW load by the number shown at the axis between existing and required power factors.

Existing Power Factor	Required Power Factor								
	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99
0.60	0.877	0.907	0.937	0.970	1.004	1.041	1.082	1.130	1.190
0.61	0.844	0.873	0.904	0.936	0.971	1.008	1.049	1.096	1.157
0.62	0.810	0.840	0.870	0.902	0.937	0.974	1.015	1.063	1.123
0.63	0.777	0.807	0.837	0.870	0.904	0.941	0.982	1.030	1.090
0.64	0.745	0.775	0.805	0.838	0.872	0.909	0.950	0.998	1.068
0.65	0.713	0.743	0.774	0.806	0.840	0.877	0.919	0.968	1.027
0.66	0.683	0.712	0.743	0.775	0.810	0.847	0.888	0.935	0.998
0.67	0.652	0.682	0.713	0.745	0.799	0.816	0.857	0.905	0.996
0.68	0.622	0.652	0.683	0.715	0.749	0.786	0.827	0.857	0.935
0.69	0.592	0.623	0.654	0.685	0.720	0.757	0.798	0.845	0.907
0.70	0.564	0.594	0.625	0.657	0.692	0.728	0.769	0.817	0.878
0.71	0.535	0.566	0.597	0.629	0.663	0.700	0.741	0.789	0.849
0.72	0.508	0.538	0.569	0.601	0.635	0.672	0.713	0.761	0.822
0.73	0.481	0.510	0.541	0.573	0.608	0.645	0.686	0.733	0.794
0.74	0.453	0.483	0.514	0.546	0.580	0.617	0.658	0.706	0.767
0.75	0.426	0.456	0.487	0.519	0.553	0.590	0.632	0.679	0.740
0.76	0.399	0.429	0.460	0.492	0.526	0.563	0.605	0.652	0.713
0.77	0.373	0.403	0.433	0.465	0.500	0.537	0.578	0.625	0.686
0.78	0.346	0.376	0.407	0.439	0.473	0.510	0.552	0.599	0.660
0.79	0.320	0.350	0.381	0.413	0.447	0.484	0.526	0.573	0.634
0.80	0.294	0.324	0.355	0.387	0.421	0.458	0.499	0.547	0.608
0.81	0.265	0.296	0.329	0.361	0.395	0.432	0.473	0.521	0.582
0.82	0.242	0.272	0.303	0.335	0.369	0.406	0.447	0.495	0.556
0.83	0.216	0.246	0.277	0.309	0.343	0.380	0.421	0.469	0.530
0.84	0.190	0.220	0.251	0.283	0.317	0.354	0.396	0.443	0.504
0.85	0.164	0.194	0.224	0.257	0.291	0.328	0.369	0.417	0.477
0.86	0.138	0.165	0.198	0.230	0.265	0.302	0.343	0.391	0.451
0.87	0.111	0.141	0.171	0.204	0.238	0.275	0.316	0.364	0.424
0.88	0.084	0.114	0.144	0.177	0.211	0.248	0.289	0.337	0.397
0.89	0.057	0.087	0.117	0.150	0.184	0.221	0.262	0.310	0.370
0.90	0.029	0.058	0.088	0.122	0.156	0.193	0.234	0.282	0.342
0.91	-	0.030	0.060	0.093	0.127	0.164	0.205	0.253	0.313
0.92	-	-	0.031	0.063	0.097	0.134	0.175	0.223	0.284
0.93	-	-	-	0.032	0.086	0.103	0.145	0.192	0.253
0.94	-	-	-	-	0.034	0.071	0.112	0.160	0.221
0.95	-	-	-	-	-	0.037	0.078	0.125	0.186
0.96	-	-	-	-	-	-	0.041	0.089	0.149
0.97	-	-	-	-	-	-	-	0.048	0.108
0.98	-	-	-	-	-	-	-	-	0.061
0.99	-	-	-	-	-	-	-	-	-

Typical distorted mains are matched by the GreenLine range of cubicles, whilst the Blue Line range is suitable for operation on the most heavily distorted of networks.

Where harmonic levels are especially severe, an Active Harmonic Filter is usually required, In this case, on-site measurements and detailed calculation are required: please contact us for details.

Maintenance & Service

Most Power Factor Correction equipment works invisibly in the background, but as capacitors deteriorate it easily goes unnoticed until long after the higher bills arrive. Responsible companies acknowledge the cost effectiveness of avoiding unnecessary downtime and maintenance. Power Capacitors has a team of skilled and experienced engineers available throughout the UK providing regular servicing and maintenance to ALL makes of power factor correction equipment, regardless of manufacturer. This ensures that the rated output is maintained, maximising the financial and technical benefits.

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