









Main catalogue 2012/2013

Power Factor Correction / Power quality

## Power Quality Solutions

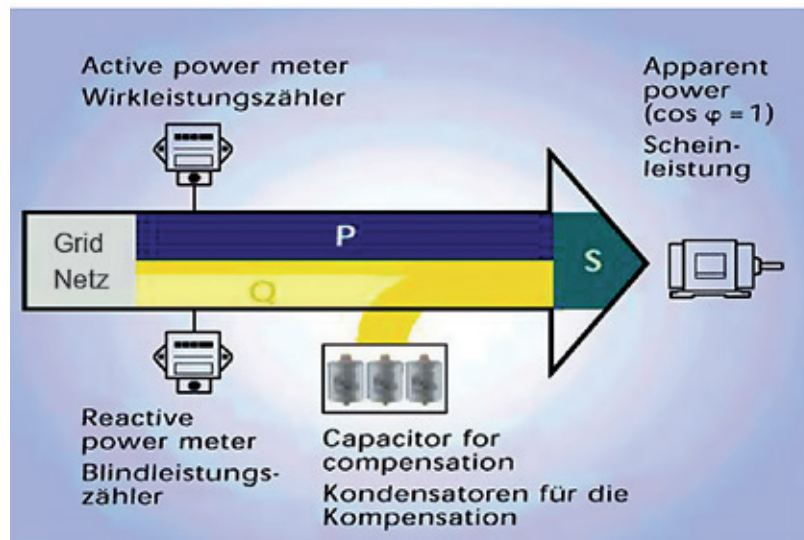
Power quality and supply reliability are extremely important in the modern world of business. Highly sensitive equipment and working processes are heavily dependant upon precisely defined power quality. On the other hand, the number of electrical and electronic consumers with system distortions is increasing which means that the networks are becoming more polluted. Janitza electronics® offers systems for the improvement of power quality and the necessary expertise for implementation. You, therefore, improve your power quality, save energy, stabilise your processes, avoid production interruptions and reduce maintenance costs.

- Electricity cost savings
- Reduction of reactive power consumption and penalties
- Saving of CO<sub>2</sub> emissions
- Reduction of voltage drops
- Reduce effect of transients
- Compensation of rapidly changing loads
- Filtering of harmonics

	<p><b>Prophi® power factor controller</b></p> <ul style="list-style-type: none"> <li>• Power factor controller for use in conventional and dynamic (fast switching) PFC systems</li> <li>• Hybrid switching (conventional and dynamic PFC are mixed)</li> <li>• Protocols: Profibus DP V0 + Modbus (RTU) slave</li> </ul>	<p><b>5</b></p>
	<p><b>PFC Monitoring and Protection</b></p> <ul style="list-style-type: none"> <li>• Capacitor protection relay</li> </ul>	<p><b>11</b></p>
	<p><b>PFC-Power capacitors</b></p> <ul style="list-style-type: none"> <li>• Can-type capacitors in aluminium housing</li> <li>• Square capacitors in steel housing</li> <li>• De-tuned power capacitors in steel cabinet</li> </ul>	<p><b>13</b></p>
	<p><b>Power factor correction (without reactors)</b></p> <p>For power factor correction (PFC) in low voltage networks with a low amount of non-linear loads, i.e. low harmonic distortion.</p>	<p><b>19</b></p>
	<p><b>De-tuned power factor correction, passive harmonic filters</b></p> <ul style="list-style-type: none"> <li>• Passive harmonic filters (de-tuned reactive power compensation, tuned filters)</li> </ul>	<p><b>27</b></p>
	<p><b>Dynamic (fast switching) power factor correction</b></p> <p>Switching times of approx. 20 - 30 milliseconds can be achieved with dynamic reactive power compensation systems. Reactive power compensation can be achieved in real time together with the highly dynamic power factor controller Prophi®-T.</p> <ul style="list-style-type: none"> <li>• Drawer modules for integration in existing switch boards</li> <li>• Dynamic power factor correction (without reactors)</li> <li>• De-tuned dynamic power factor correction (dynamic harmonic filter)</li> </ul>	<p><b>35</b></p>

# Introduction and customer benefits from PFC

In power factor correction systems the reactive current and the corresponding reactive power drawn by loads will be compensated by the means of PFC capacitors.



## What is reactive power?

Reactive power is needed to generate electromagnetic fields in motors, transformers etc. and is inductive reactive power. The magnitude of these fields vary continuously and inductive reactive power demand fluctuates, so power providers have to supply more reactive power as demand increases. Unfortunately, unlike active power, reactive power cannot be converted into another form of energy, so energy distribution and generation systems (generators, transformers etc.) have to be built to carry not only the active power but also the reactive power, which means they have to be larger than if designed for active power only.

The solution is to provide a method to reduce the inductive reactive power close to the consumer by using capacitive reactive power. This process is called compensation. During compensation the inductive reactive power in the local network is reduced by the reactive power of the power capacitor or PFC system. This reduces the load requirement on the energy generation and transmission supply system.

## What can be done to combat reactive power?

Energy supply companies charge penalties for poor power factor which is a measure of high inductive reactive power consumption. These penalties can be costly. Capacitor based reactive power compensation systems help to reduce or eliminate these penalties and offer the additional advantages:

- Reduced electricity invoices through lower reactive power costs
- Reduced  $I^2 R$  losses which means lower kWh consumption
- Discharge of transformers, cables and supply systems
- Increased lifespan of electrical distribution systems
- Active environment protection through the reduction of CO<sub>2</sub> emissions
- Improved utilization of networks i.e. additional loads (kWh) can be connected
- Voltage stabilization (reduced apparent current reduces the voltage drop across the network impedances)



## Power Factor Controller Prophi®

Optimised control for long lifespan

The Prophi® power factor controller has an optimised control mode. The implemented control algorithms reduce the number of switching cycles as well as the operating time per capacitor stage.

The aim is to have the same number of switching cycles and, if possible, the same operating time per capacitor stage. In addition, the number of switching cycles is reduced by up to 80 %.

The lifespan of the entire system can be significantly increased through even loading of all stages with an automatically regulated PFC system. This means that invested capital earns money for a longer time period and that new investments can be avoided.

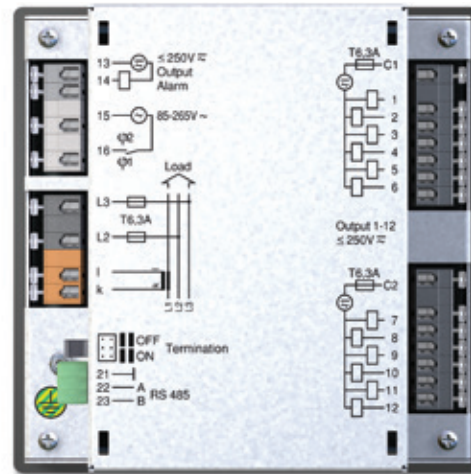
The hybrid switching (i.e. the combination of capacitor contactors and dynamic thyristor modules for contact-free rapid switching of capacitors) combines the advantages of rapid switching without network distortion with the cost advantages of common PFC systems.

# Power factor controller Prophi®

## Applications

PFC systems are used to discharge unnecessarily overloaded supply systems through inductive reactive power and to save reactive consumption costs. The reactive power controller is the main part of a PFC system and automatically switches capacitor steps on or off. The Prophi® power factor controller is suitable for use in conventional and dynamic PFC systems. A mixed operation (hybrid switching) is possible as well.

Illustration: Reverse of Prophi® 12RS



## Features

- Automatic or manual configuration
- Display of U, I, f, Q, P, S, cos-phi, uneven current and voltage harmonics, 1-19th
- Display of capacitor currents
- Display of switching cycles per capacitor step
- Display of capacitor step connection time
- Zero voltage release within 15 ms
- Detuning degree in % is programmable for each step from 0 - 20 %
- Setting of discharging time for all capacitor steps from 0 - 1200 secs
- Capacitor power can be individually programmed
- Temperature sensor for ventilator control
- Excess temperature shutdown can be programmed
- Control of external semiconductors (max. 50 switch actions per second)

- Current transformer input for ..1A and ..5A
- Password protection
- External target cos-phi changeover (except 6R / 6T)

### Alarm output is programmable for:

- Under-voltage recognition
- Over voltage recognition
- Under-compensation
- Measurement current exceeding
- Harmonic limit value
- Supply of effective power
- Excess temperature

## Functional principle

The single-phase electronic measuring system collects the reactive and effective current ratios of the network through the current and voltage measurement. Using the current from one phase and the voltage from the other two phases, the reactive power controller calculates the necessary reactive power to achieve the set target power factor. The capacitor steps are switched on or off

if any differences occur and the reactive power controller differentiates between the switching of capacitors through contactors or thyristors. The control through capacitor contactors is optimised; this means that the reactive power factor controller achieves the cos-phi target with a minimum of switching actions. The transistor outputs control the semiconductor switches for almost immediate compensation of any differences.

**Ventilator control**

Simple ventilator controls can be developed with the temperature sensor which is built into the Prophi® and a ventilator. A relay output or the alarm relay is used for controlling the ventilators. The upper/lower temperature limit can be programmed for this feature.

**Automatic configuration**

The "LEARN" function offers the opportunity to learn the connection configuration of the power factor controller and save it.

**LCD display**

The Prophi® power factor controller has a high-quality LCD display with high contrast. Extensive measurement parameters (approx. 100 measurement values) can be displayed via LCD.

**Display examples**



Display examples: voltage



reactive power



harmonics

**Excess temperature shutdown**

Connected capacitor steps can be disconnected with the excess temperature shutdown function in order to reduce the temperature inside the PFC-system cabinet and to protect the capacitors. The upper/lower limit temperature and pause time can be set by the user.



**Interface**

The Prophi® power factor controller is equipped with a RS485 interface depending upon the product variant. Via the RS485 interface Modbus RTU or Profibus DP V0 protocols are available, to integrate the Prophi® power factor controller to upstream systems such as PLC, BMS or energy management systems.

Communication speed: 9.6, 19.2, 38.4, 57.6, 115.2 kBit/s  
 Profibus: up to 1.5 MBit/s

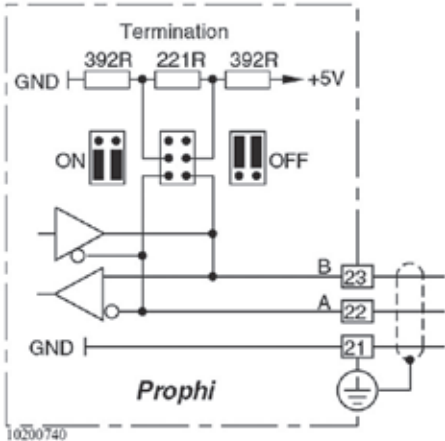


Illustration: RS485 interface terminal configuration

### Overview of product variants

Relay outputs (conventional)	Transistor outputs (dynamic)	Alarm output	Target cos-phi change over 1/2	Measurement and auxiliary voltage 400V AC (+10 %, -15 %) <sup>*1</sup>	RS485 interface <sup>*2</sup>	GridVis-Basic software	Type	Item number
6	-	•	-	•	-	-	<b>Prophi® 6R</b>	<b>52.08.002</b>
12	-	•	•	•	-	-	<b>Prophi® 12R</b>	<b>52.08.003</b>
-	6	•	-	•	-	-	<b>Prophi® 6T</b>	<b>52.08.005</b>
-	12	•	•	•	-	-	<b>Prophi® 12T</b>	<b>52.08.006</b>
6	6	•	•	•	-	-	<b>Prophi® 6T6R</b>	<b>52.08.007</b>
12	-	•	•	•	•	o	<b>Prophi® 12RS</b>	<b>52.08.008</b>
6	6	•	•	•	•	o	<b>Prophi® 6T6RS</b>	<b>52.08.009</b>
-	12	•	•	•	•	o	<b>Prophi® 12TS</b>	<b>52.08.091</b>

• = Included    - = Not possible    o = Option

<sup>\*1</sup> optional measurement and auxiliary voltage 100 V, 110 V, 200 V, 230 V, 440 V AC (+10 % - 15 %)

<sup>\*2</sup> not possible at 50 switching actions per second

<sup>\*3</sup> GridVis-Basic is included in delivery, GridVis-Professional / Enterprise / Service can be ordered optionally for an additional surcharge

### General technical data

Operating voltage L-L, L-N AC		Refer to product overview
Overvoltage category		CAT III
Quadrants		4
Sampling rate		3.2 kHz (at 50Hz)
Weight		1 kg
Dimensions		W = 144 mm x H = 144 mm x D = 49 mm
Mounting		Front panel installation
Working temperature range		-10...55 °C
Storage temperature range		-20...60 °C
Connectable conductors (U/I)	Single wire, multi-wire, fine-wire, pin cable lugs, ferrule	0.08 - 2.5 mm <sup>2</sup> 1.5 mm <sup>2</sup>
Protection class (front / reverse)	According to EN 60529	IP 50 / 20

### Measurement range

Voltage L-N, AC (without voltage transformer)		Refer to product overview
Voltage L-L, AC (without voltage transformer)		Refer to product overview
Current (transformer: x/1 and x/5 A)		0.01...6 A
Frequency of mains		45...65 Hz
Grid types		TN, TT, (IT)
Measurement in multi-phase networks		3ph



### Measurement values

Voltage	1 phase L-N or L-L	Accuracy: ± 0.5 %
Current	1 phase	Accuracy: ± 0.5 %
Effective, apparent and reactive power	Sum L1-L3	Accuracy: ± 1 %
cos phi	Sum L1-L3	Accuracy: ± 1 %
Frequency of mains		Accuracy: ± 0.5 %
Minimum and maximum values		yes

### Power quality

Harmonics 1st to 19 <sup>th</sup> , uneven	Current, voltage 1-phase	Accuracy: ± 2 %
Distortion factor THD-U in %	1-phase	yes
Distortion factor THD-I in %	1-phase	yes

### Features

Capacitor current		yes
Capacitor operation time		yes
No. of switching per step		yes
Zero voltage release		yes
Automatic configuration		yes
Password protection		yes

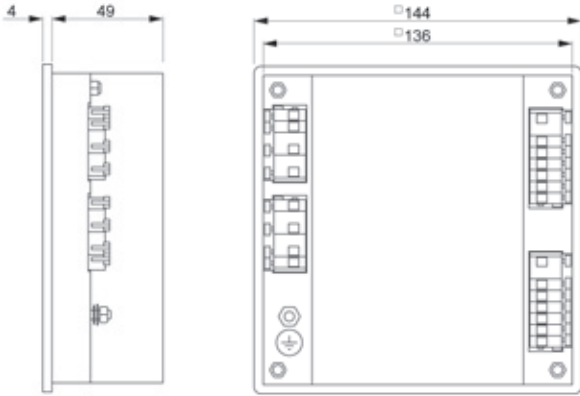
### Periphery

Relay outputs	As switch output	6 or 12, refer to product overview
Transistor outputs	As switch output	6 or 12, refer to product overview
Alarm output	As status output	1
Digital input	For tariff change over	1, refer to product overview
Temperature sensor	Internal	1
<b>Software GridVis-Basic</b>		yes

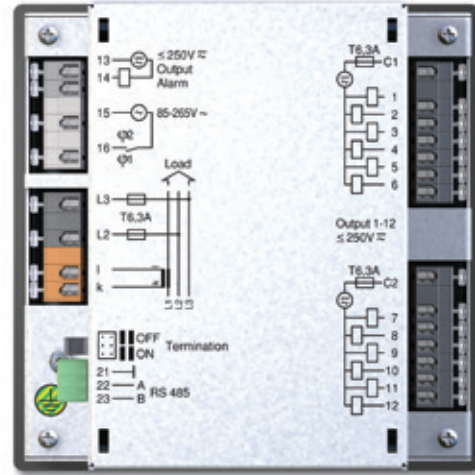
### Communication

Interfaces		
RS485	9.6; 19.2; 38.4; 57.6; 115.2 kbps	Yes, refer to product overview
Profibus DP V0	9.6 kbps to 1.5 Mbps	Yes, refer to product overview
Protocols		
Modbus RTU		Yes, refer to product overview
Profibus DP V0		Yes, refer to product overview

**Dimensional drawing**



**Connection illustration**



(all dimensions in mm)

Illustration: Prophi® 12RS, reverse side

**Typical connection**

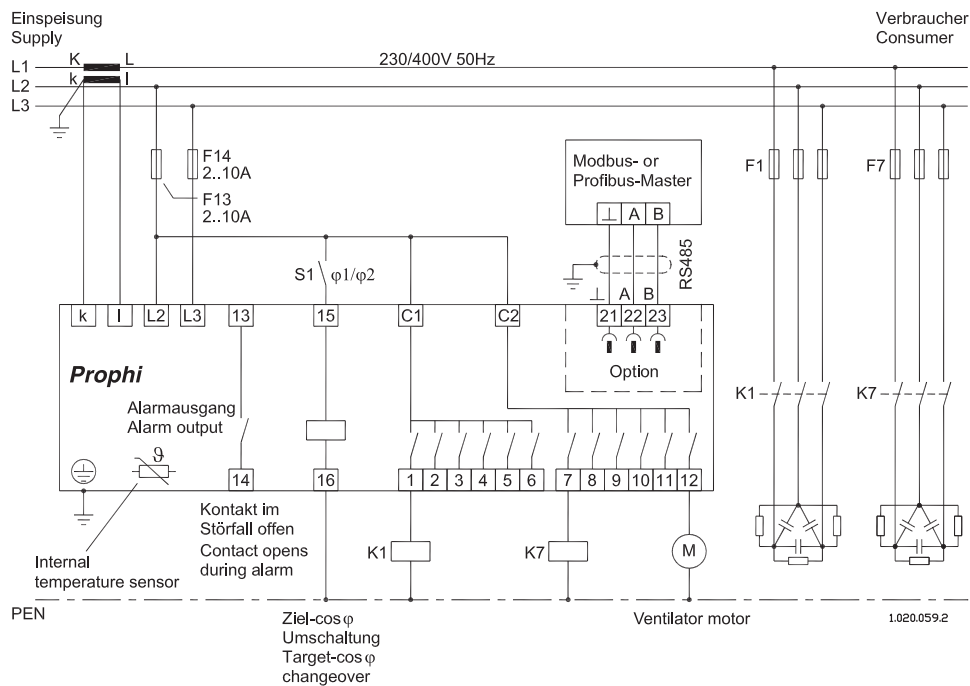


Illustration: connection example - Prophi® power factor controller 12RS (item no. 52.08.008) with L2-L3 voltage measurement, 12 relay outputs, target cos-phi changeover, alarm output and RS485 interface.



## PFC Monitoring and Protection

Surges and other overloads cause damage to self-healing power capacitors for power factor correction. Overloads give rise to an increased number of self-healing processes of the dielectric polypropylene film, which cause a reduction in the capacity and thus the service life of the capacitor. Under certain overload conditions, the capacitor winding may even collapse and physically destroy the power capacitor.

In order to increase the safety of power capacitors and PFC systems, Janitza electronics® has developed „capacitor monitoring“ in connection with the network analyser UMG 604E.

# Protection of capacitors and PFC devices

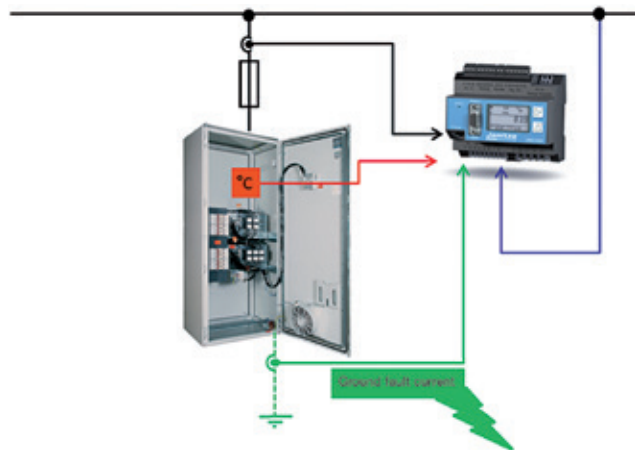
Type: BLKprotect / Item number: 52.16.300

Depending on the level of the overload as well as the amount of energy introduced and the other application conditions, an overload may cause a capacitor to collapse. If capacitor overloads of this nature occur, it cannot be assumed that the current, commonly-used protection mechanisms on the market are sufficiently effective.

Upstream HRC fuses or circuit breakers are primarily used for short-circuits. The capacitor overpressure disconnecter protects the capacitor against explosions in the event of constant internal overpressure. However, the capacitor overpressure disconnecter does not offer 100 % security in every fault or overload scenario. In the case of highly dynamic incidents such as a low-resistance short-circuit, the capacitor overpressure disconnecter acts too slowly and furthermore, when used with capacitors available on the market, will be rendered useless as soon as the active winding collapses.

In the event of an error, it may give rise to short-circuits with more or less energy transfer in the capacitor. The levels of energy introduced in the capacitor frequently exceed the specifications and in certain circumstances

may cause the capacitor casing to explode. In order to demonstrably increase the safety of power capacitors and PFC systems, unique „capacitor monitoring“ has been developed by Janitza electronics® to monitor all known overload scenarios.



## Characteristics

- Monitoring via UMG 604E network analyser
- Measurement, 3-phase, 3 current transformers in the supply line of the PFC system
- PFC-APP (Jasic monitoring software on UMG 604E)
- Monitoring of: earth faults, over-currents and under-currents, over-voltages, asymmetry, switching rate, temperature...
- Additional comprehensive network analyser functions
- Extensive options for analysis via the GridVis-Basic software
- Integration into networks possible with Ethernet or RS485 modbus RTU
- Flexible alarm system with monitoring of up to 32 measured values
- Menu-driven user interface in plain text on the UMG 604E homepage





## PFC - Power capacitors

Highest safety and long lifespan with dry technology

PFC-Power capacitors for power factor correction allow the configuration of fixed capacitors, automatic PFC systems and harmonic filters for all requirements.

Our capacitors are designed with dry technology due to safety reasons. All capacitors are designed according to the international valid standards EN 60831-1 and -2 and production is monitored in accordance with our quality management system.

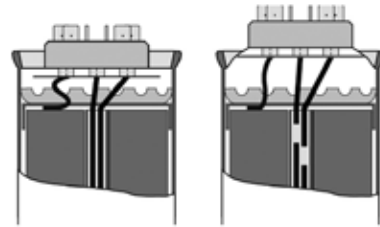
# Three-phase power capacitors

## The over pressure tear-off fuse: the main protection element

If voltage-related, thermal overloads or numerous break-downs at the end of the lifespan of the capacitor lead to increased self-healing processes with the corresponding development of gas, excess pressure builds up in the capacitor. The capacitors are generally equipped with an over pressure tear-off fuse to avoid the capacitor can bursting.

This protection feature consists of nominal break points in the internal connection wires. If there is excess pressure in the capacitor, the cylindrical capacitor casing expands and the electrical supply to the active capacitor elements is irreversibly interrupted at the nominal break point.

**This safety principle is only reliably effective within the defined (specified) load and overload limits.**



### Main features

The main requirements of power capacitors are a long lifespan and a high level of safety. A fivefold safety system for optimum protection:

- Selfhealing dielectric
- Dry impregnation (PCB free)
- Over pressure tear-off fuse
- Integrated discharge resistors
- Segmented metalization

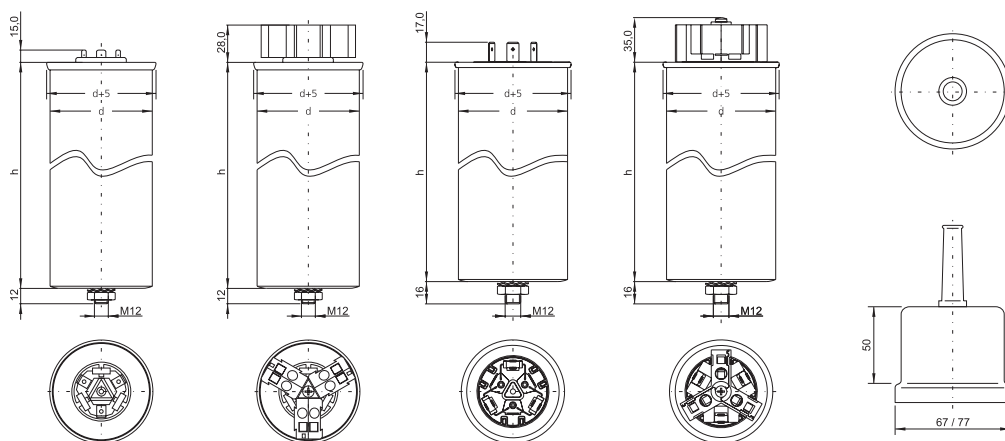
**This safety principle is only reliably effective within the defined (specified) load and overload limits**

Standards		IEC 60831-1+2, EN 60831-1+2
Overvoltage	$U_{max}$	$U_n + 10\%$ (up to 8 hours each day) / $U_n + 15\%$ (up to 30 mins each day) $U_n + 20\%$ (up to 5 mins each day) / $U_n + 30\%$ (up to 1 min each day)
Excess current	$I_{max}$	$2,2 \times I_n$ (at nominal voltage, 50 Hz) $2,7 \times I_n$ (at high-power capacitors)
Inrush current	IS	Up to $300 \times I_n$ Up to $450 \times I_n$ (at high-power capacitors)
Losses		Approx. 0.2 Watt per kvar
Nominal frequency	f	50 / 60 Hz
Capacity tolerance		$\pm 5\%$
Test voltage (terminal / terminal)	VTT	$2,15 \times U_n$ , AC, 2 s / $1,85 \times U_n$ , AC, 18 s
Test voltage (terminal / casing)	VTC	3900 V, 2 s
Average life expectancy	t LD(Co)	Up to 170 000 hours
Environmental temperature		-25/D; max temp 55 °C; max 24 hour average = 45 °C; max 1 year average = 35 °C; lowest temperature = -40 °C
Temperature class		-40 / +65 °C
Max. case temperature		75 °C
Air humidity	$H_{rel}$	Max. 95 %
Operation height		Max. 4,000m above sea level
Fixing and earth		M12 thread bolts on the housing bottom
Safety		Dry technology, over pressure tear-off fuse, selfhealing, maximum permitted fault current 10,000 A in accordance with UL810 standard
Discharge		Discharge resistors
Housing		Aluminium can and steel housing
Protection class		IP20, indoor (optional with terminal cover, IP54)
Dielectric		Polypropylene film
Impregnation		Dry
Number of switching cycles per year		Maximum 60,000 switching cycles in accordance with IEC 60831

**Three-phase power capacitors**

Nominal power in kvar at a nominal voltage of:					Type	Item no.	Capacity in $\mu\text{F} \pm 5\%$	Dimensions	kg
400 V	415 V	440 V	480 V	525 V					
2.4	2.6	2.9	3.5	4.17	JCP525/4,1-D	<b>19.02.275</b>	3x16.0	D= 60 mm x H= 225 mm	0.7
2.5	2.7	3.0	3.6	4.3	JCP480/3,6-D	<b>19.02.205</b>	3x16.6	D= 60 mm x H= 150 mm	0.5
4.8	5.2	5.8	7	8.33	JCP525/8,3-D	<b>19.02.249</b>	3x32.0	D= 70 mm x H= 225 mm	0.9
5	5.4	6	7.2	8.6	JCP480/7,2-D	<b>19.02.210</b>	3x33.2	D= 60 mm x H= 225 mm	0.8
5.8	6.3	7	8.33	10	JCS525/10,0-D	<b>19.02.150</b>	3x38.5	D= 70 mm x H= 225 mm	0.8
6.25	6.7	7.6	9.0	-	JCP440/7,6-D	<b>19.02.211</b>	3x41.7	D= 60 mm x H= 225 mm	0.7
7.2	7.8	8.7	10.5	12.5	JCS525/12,5-D	<b>19.02.180</b>	3x47.9	D= 70 mm x H= 225 mm	1.1
8.7	9.4	10.5	12.5	15	JCS525/15,0-D	<b>19.02.103</b>	3x57.7	D= 70 mm x H= 265 mm	1.2
7.5	8.1	9.1	10.8	-	JCP440/9,1-D	<b>19.02.215</b>	3x49.9	D= 60 mm x H= 225 mm	0.7
10	10.8	12.1	14.4	-	JCP440/12,1-D	<b>19.02.217</b>	3x66.3	D= 70 mm x H= 225 mm	1.1
10.8	11.6	13.1	15.5	-	JCS480/15,5-D	<b>19.02.116</b>	3x71.4	D= 70 mm x H= 225 mm	1.1
9.3	10	11.2	-	-	JCP400/9,3-D	<b>19.02.219</b>	3x61.4	D= 70 mm x H= 225 mm	1.1
10	10.8	12.1	-	-	JCP400/10,0-D	<b>19.02.220</b>	3x66.3	D= 70 mm x H= 225 mm	1.1
11.7	12.5	14.1	-	-	JCP400/11,7-D	<b>19.02.221</b>	3x77.3	D= 70 mm x H= 225 mm	1.1
12.5	13.4	15.1	-	-	JCS440/15,0-D	<b>19.02.125</b>	3x82.9	D= 70 mm x H= 225 mm	1.1
20	-	24.2	-	-	JCP400/20,0-D	<b>19.02.228</b>	3x132.6	D= 85 mm x H= 285 mm	2.4
23,3	25,1	28,2	-	-	JCS440/28,2-D	<b>19.02.126</b>	3x154.6	D= 85 mm x H= 320 mm	2.5
25	29,9	30,2	-	-	JCS440/30,0-D	<b>19.02.127</b>	3x165.5	D= 85 mm x H= 320 mm	2.6

Protection cap / Connection cap	Type	Item no.	
Protection cap with cable gland construction height + 77 mm	SK60	<b>19.02.620</b>	For power capacitors with a diameter of 60 mm
Protection cap with cable gland construction height + 75 mm	SK70	<b>19.02.621</b>	For power capacitors with a diameter of 70 mm
Connection cap for D 60/70 mm with spring force clamp 2x6 mm <sup>2</sup>	ASS 1	<b>19.02.610</b>	Height = 28 mm
Connection cap for D 85 mm with spring force clamp 16 mm <sup>2</sup>	ASS 2	<b>19.02.612</b>	Height = 30.5 mm



Capacitors with d = 60 / 70 mm  
For connection with flat plug 6.3 x 0.8 mm

Capacitors with connection cap ASS 1, d = 60 / 70 mm

Capacitors with d = 85 mm  
For connection with flat plug 9.5 x 1.2 mm

Capacitors with connection cap ASS 2, d = 85 mm

Protection cap SK60 / SK70 for capacitors with d = 60 / 70 mm  
Not available for capacitors with d = 85 mm

# Square capacitor in steel housing

## Application

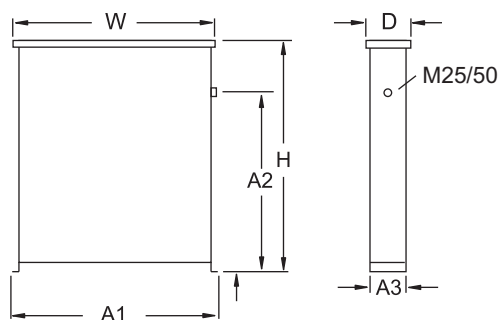
Mainly for fixed PFC, freestanding and for high mechanical protection, with discharge resistors – IP53 – network: 400 V/50 Hz – nominal capacitor voltage: 440 V



## LK-440V power capacitors

Nominal power in kvar	Type	Item no.	Dimensions	kg
2.5	JF440/2,5LK-3313	<b>50.61.000</b>	H341 x B306 x T136 mm	5
5	JF440/5LK-3313	<b>50.61.050</b>	H341 x B306 x T136 mm	5
10	JF440/10LK-3313	<b>50.61.150</b>	H341 x B306 x T136 mm	8
12.5	JF440/12,5LK-3313	<b>50.61.200</b>	H341 x B306 x T136 mm	8
15	JF440/15LK-3313	<b>50.61.250</b>	H341 x B306 x T136 mm	9
20	JF440/20LK-3313	<b>50.61.350</b>	H341 x B306 x T136 mm	10
25	JF440/25LK-3313	<b>50.61.400</b>	H341 x B306 x T136 mm	10
30	JF440/30LK-3313	<b>50.61.450</b>	H341 x B306 x T136 mm	15
40	JF440/40LK-5314	<b>50.61.650</b>	H470 x B545 x T135 mm	19
50	JF440/50LK-5314	<b>50.61.700</b>	H470 x B545 x T135 mm	19
60	JF440/60LK-5314	<b>50.61.750</b>	H470 x B545 x T135 mm	20
70	JF440/70LK-5314	<b>50.61.780</b>	H470 x B545 x T135 mm	20
75	JF440/75LK-5314	<b>50.61.820</b>	H470 x B545 x T135 mm	20
80	JF440/80LK-5314	<b>50.61.860</b>	H470 x B545 x T135 mm	21
90	JF440/90LK-5314	<b>50.61.900</b>	H470 x B545 x T135 mm	21
100	JF440/100LK-5314	<b>50.61.945</b>	H470 x B545 x T135 mm	21

## Dimensional drawing



### Dimensions (mm) 2.5 kvar - 30 kvar:

H = 341, W = 306, D = 136,  
A1 = 345, A2 = 240, A3 = 125

### Dimensions (mm) from 40 kvar:

H = 470, W = 545, D = 135,  
A1 = 525, A2 = 390, A3 = 125



## 7 % de-tuned power capacitors in steel cabinets

### Application

For fixed PFC in networks with a high proportion of non-linear loads or for filtering of harmonics.

Nominal voltage: 400 V, 3-phase, 50 Hz

Protection class: IP32

Cooling: Self convection – from 25 kvar with ventilators in the switchboard cabinet door

Filter frequency: 7 % = 189 Hz

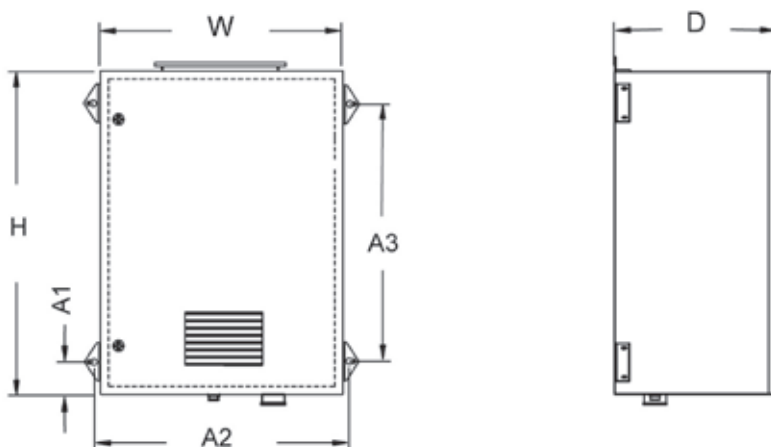
### LK-FK7 power capacitors – 7 % de-tuning (with reactors)

Nominal power in kvar	Type	Item no.	Dimensions	kg
5	JF440/5LK-KB4-FK7	50.24.050	H600 x B400 x T210 mm	23
10	JF440/10LK-KB4-FK7	50.24.100	H600 x B400 x T210 mm	28
12.5	JF440/12,5LK-KB4-FK7	50.24.130	H600 x B400 x T210 mm	29
20	JF440/20LK-KB4-FK7	50.24.170	H600 x B400 x T210 mm	36
25	JF440/25LK-KB8-FK7	50.24.220	H800 x B600 x T250 mm	38
30	JF440/30LK-KB8-FK7	50.24.280	H800 x B600 x T250 mm	40
40	JF440/40LK-KB8-FK7	50.24.350	H800 x B600 x T250 mm	49
50	JF440/50LK-KB8-FK7	50.24.450	H800 x B600 x T250 mm	82

Circuit breaker or capacitor contactors available upon request.

Other network voltages, powers, detuning and designs are available upon request.

### Dimensional drawing



#### KB4:

H = 600, W = 400, D = 210,  
A1 = 23, A2 = 430, A3 = 535

#### KB8:

H = 800, W = 600, D = 250,  
A1 = 23, A2 = 630, A3 = 735

All measurements in mm.



Cooling determines the lifespan of the capacitor

# 14 % de-tuned power capacitors in steel cabinets

## Application

For fixed PFC in networks with a high proportion of non-linear loads or for filtering of harmonics.

Nominal voltage: 400 V, 3-phase, 50 Hz

Protection class: IP32

Cooling: Self convection – from 25 kvar with ventilators in the switchboard cabinet door

Filter frequency: 14 % = 134 Hz



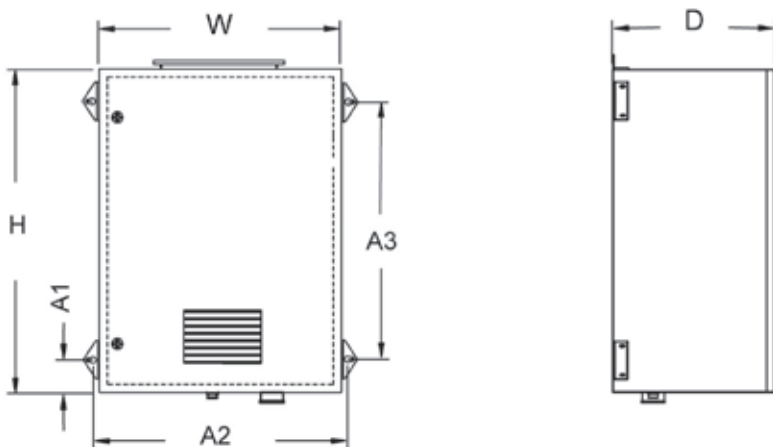
**Cooling determines the lifespan of the capacitor**

## LK-FK14 power capacitors – 14 % de-tuning (with reactors)

Nominal power in kvar	Type	Item no.	Dimensions	kg
5	JF525/5LK-KB4-FK14	<b>50.25.050</b>	H600 x B400 x T210 mm	24
10	JF525/10LK-KB4-FK14	<b>50.25.100</b>	H600 x B400 x T210 mm	29
12.5	JF525/12,5LK-KB4-FK14	<b>50.25.130</b>	H600 x B400 x T210 mm	30
20	JF525/20LK-KB8-FK14	<b>50.25.170</b>	H800 x B600 x T250 mm	37
25	JF525/25LK-KB8-FK14	<b>50.25.220</b>	H800 x B600 x T250 mm	39
30	JF525/30LK-KB8-FK14	<b>50.25.280</b>	H800 x B600 x T250 mm	51
40	JF525/40LK-KB8-FK14	<b>50.25.350</b>	H800 x B600 x T250 mm	63
50	JF525/50LK-KB8-FK14	<b>50.25.450</b>	H800 x B600 x T250 mm	83

Isolator or capacitor contactors available upon request.  
Other network voltages, powers, detuning and designs are available upon request.

## Dimensional drawing



**KB4:**  
H = 600, W = 400, D = 210,  
A1 = 23, A2 = 430, A3 = 535

**KB8:**  
H = 800, W = 600, D = 250,  
A1 = 23, A2 = 630, A3 = 735

All measurements in mm.



## Automatic PFC-Systems (without reactors)

Quality components for a long lifespan

Automatic PFC-systems for central compensation in low voltage distribution boards or group compensation of system parts. Due to exclusive use of quality components from leading manufacturers, the Prophi® power factor controller, as a central control unit, guarantees the best safety and a long lifespan thanks to the years of experience in the field of PFC- systems.

PFC-systems without reactors are considered for use in applications with a low proportion of non-linear loads i.e. low harmonic loads. There are four different designs customised to suit your individual application.

## PQS - Power Quality Solutions

### Technical data conventional and detuned automatic PFC-systems

#### Information

PFC-systems without reactors must not be used (refer to DIN EN 61921 and other norms) in the following situations:

- Converter power (non-linear loads) > 15 % of the connection power
- Overall harmonic distortion of THD-U > 3 %
- Networks with de-tuned capacitors
- Critical ripple control systems within a range of 270 - 425 Hz
- PFC output > 35 % of the transformer or connection power

#### Technical data

Standards	DIN, VDE 0660 part 500, EN 60439-1 and EN 60831-1/2			
Design in accordance with:	DIN EN 60439 part 1, partially type tested combination			
Construction form	Steel plate cabinet for KB and ES versions Mounting plate for MP version Module for MO version			
Power factor controller	Prophi® according to data sheet or selection table			
Nominal voltage	400 V, 50 Hz; other voltages upon request			
Control voltage	230 V, 50 Hz			
Capacitor voltage	440 V (without reactors) and 5.67 - 7 % (with reactors), 525 V at 14 % (with reactors)			
Voltage rating of the capacitor	at p = 5.67 - 7 %	440 V	at p = 14 %	525 V
	8 h each day	484 V		577 V
	30 min each day	506 V		604 V
	5 min	528 V		630 V
	1 min	572 V		682 V
Power losses	Capacitors <0.2 W/kvar, systems 4-7 W/kvar			

System design	Permitted harmonic currents		harmonic voltage	
	I 250 Hz	I 350 Hz	U 250 Hz	U 350 Hz
FK 5.67	0.565 IN	0.186 IN	5 %	5 %
FK 7	0.31 IN	0.134 IN	5 %	5 %
FK 14	0.086 IN	0.051 IN	5 %	5 %
Capacitor contactor switching cycles	Max 100,000 switching cycles			
Optional thyristor actuator	Unlimited switching cycles			
Current transformer connection	.. /1A, ../5A			
Nominal power / nominal current	Refer to option overview			
Switching ratio	Refer to option overview			
Discharging	With discharge resistors in accordance with EN 60831-1/2			
Installation height	Up to 2,000 m above sea level			
Environmental temperature	According to DIN EN 60439 part 1			
Protection class	KB, ES: IP32 and MP, MO: IP00			
Cooling	Self-ventilating or forced ventilation depending on type			
Colour	RAL 7035			
Noise emissions (FK)	< 60 dB at a distance of 1 m from the closed unit			
Connection cable diameters and fuses	Refer to option overview			

The following detuning can be applied in networks with ripple control systems:

Power utility ripple control frequency	Detuning factor	Series resonance frequency
< 168Hz	p = 14 %	fr = 134 Hz
168 - 183Hz	p = 14 / 5.67 %	fr = 134 / 210 Hz
> 228Hz	p = 7 %	fr = 189 Hz
> 350Hz	p = 5.67 %	fr = 210 Hz

## Compact design

### Applications

This is a space-saving design for smaller nominal power levels and wall mounting, for grids with low harmonic content.

Nominal voltage: 400 V, 3-phase, 50 Hz  
 Protection class: IP32  
 Cooling: Self convection – take care of sufficient convection  
 Controller: Prophi® 6R with AUTO configuration  
 Reactor: No reactor

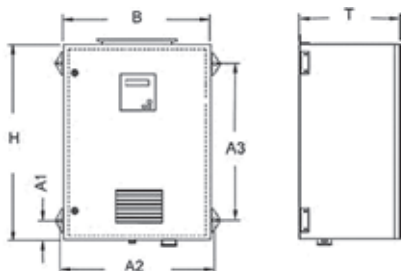


### Technical data

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Version	kg
7.5	2.5/5	1:2	JF440/7,5ER3KB4	50.39.005	KB4	25
10	2.5/2.5/5	1:1:2	JF440/10ER4KB4	50.39.015	KB4	25
12.5	2.5/5/5	1:2:2	JF440/12,5ER5KB4	50.39.030	KB4	25
15	5/10	1:2	JF440/15ER3KB4	50.39.045	KB4	26
17.5	2.5/5/10	1:2:4	JF440/17,5/ER7KB4	50.39.060	KB4	26
20	5/5/10	1:1:2	JF440/20ER4KB4	50.39.075	KB4	29
25	5/10/10	1:2:2	JF440/25ER5KB4	50.39.095	KB4	27
31	6.2/12.5/12.5	1:2:2	JF440/31ER5KB4	50.39.145	KB4	35
35	5/10/20	1:2:4	JF440/35ER7KB4	50.39.175	KB4	35
40	10/10/20	1:1:2	JF440/40ER4KB4	50.39.195	KB4	36
50	10/20/20	1:2:2	JF440/50ER5KB4	50.39.235	KB4	38
55	5/10/20/20	1:2:4:4	JF440/55ER11KB8	50.39.270	KB8	77
60	10/20/30	1:2:3	JF440/60ER6KB8	50.39.295	KB8	78
75	12.5/12.5/25/25	1:1:2:2	JF440/75ER6KB8	50.39.345	KB8	70
80	20/20/40	1:1:2	JF440/80ER4KB8	50.39.370	KB8	92
100	12.5/12.5/25/50	1:1:2:4	JF440/100ER8KB8	50.39.420	KB8	95
100	20/40/40	1:2:2	JF440/100ER5KB8	50.39.430	KB8	95
110	10/20/40/40	1:2:4:4	JF440/110ER11KB8	50.39.440	KB8	96
120	20/20/40/40	1:1:2:2	JF440/120ER6KB8	50.39.450	KB8	97

Other nominal voltages, frequencies, powers, mechanical designs or versions with circuit breaker are available upon request. Extension units, units in ISO housing and audio frequency blocking circuits are available upon request.

### Dimensional drawing



**KB4:** H = 600, W = 400, D = 210, A1 = 23, A2 = 421, A3 = 560  
**KB8:** H = 800, W = 600, D = 250, A1 = 23, A2 = 620, A3 = 756

All measurements in mm.

# Power factor correction systems in modular design (without reactors)

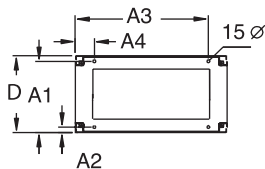
## Applications

These are automatically regulated PFC systems in steel cabinets in modular design. The output can be easily expanded inside the cabinet or with additional cabinets. For grids with low harmonic content.

Nominal voltage: 400 V, 3-phase, 50 Hz  
Protection class: IP32  
Cooling: Self convection – take care of sufficient convection  
Controller: Prophi® with AUTO configuration  
Reactor: No reactor



## Dimensional drawing



### ES8184:

H = 1820, W = 800, D = 400,  
A1 = 374, A2 = 25, A3 = 700, A4 = 100, A5 = 1480

All measurements in mm.

**PQS - Power Quality Solutions**  
Power factor correction systems in modular design (without reactors)

**Modular design ES8184** (B= as bellow x H= 1820 mm x T= 400 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
150	25/25/50/50	1:1:2:2	JF440/150ER6ES8184**	<b>50.81.400</b>	800 mm	208
150	12.5/12.5/25/50/50	1:1:2:4:4	JF440/150ER12ES8184**	<b>50.81.415</b>	800 mm	208
150	25/25/25...	1:1:1:1:1:1	JF440/150ER6ES8184**	<b>50.81.425</b>	800 mm	208
160	20/20/40...	1:1:2:2:2	JF440/160ER8ES8184**	<b>50.81.450</b>	800 mm	209
175	25/50/50/50	1:2:2:2	JF440/175ER7ES8184**	<b>50.81.475</b>	800 mm	210
175	12.5/12.5/25/25/50...	1:1:2:2:4:4	JF440/175ER14ES8184***	<b>50.81.490</b>	800 mm	210
180	20/40/40...	1:2:2:2:2	JF440/180ER9ES8184**	<b>50.81.515</b>	800 mm	211
200	50/50...	1:1:1:1	JF440/200ER4ES8184**	<b>50.81.540</b>	800 mm	212
200	25/25/50...	1:1:2:2:2	JF440/200ER8ES8184**	<b>50.81.550</b>	800 mm	212
200	12.5/12.5/25/50...	1:1:2:4:4...	JF440/200/ER16ES8184**	<b>50.81.560</b>	800 mm	212
200	20/20/40...	1:1:2:2:2:2	JF440/200ER10ES8184**	<b>50.81.570</b>	800 mm	212
240	20/20/40...	1:1:2:2...	JF440/240ER12ES8184***	<b>50.81.600</b>	800 mm	232
250	50...	1:1:1:1:1	JF440/250ER5ES8184**	<b>50.81.625</b>	800 mm	233
250	25/25/50...	1:1:2:2...	JF440/250ER10ES8184**	<b>50.81.635</b>	800 mm	233
250	12.5/12.5/25/50...	1:1:2:4:4...	JF440/250ER20ES8184***	<b>50.81.645</b>	800 mm	233
300	50/50...	1:1:1:1:1:1	JF440/300ER6ES8184**	<b>50.81.670</b>	800 mm	236
300	25/25/50...	1:1:2:2...	JF440/300ER12ES8184***	<b>50.81.680</b>	800 mm	236
300	12.5/12.5/25/50...	1:1:2:4:4...	JF440/300ER24ES8184***	<b>50.81.690</b>	800 mm	236
400	50/50/50...	1:1...	JF440/400ER8ES8184***	<b>50.81.693</b>	2 x 800 mm	475
500	50/50/50...	1:1...	JF440/500ER10ES8184***	<b>50.81.696</b>	2 x 800 mm	500
600	50/50/50...	1:1...	JF440/600ER12ES8184***	<b>50.81.900</b>	2 x 800 mm	525
<b>Accessories</b>						
Socket 100 mm high	SO 100 / 800 / 400			<b>29.03.317</b>		5
Socket 100 mm high	SO 200 / 800 / 400			<b>29.03.322</b>		10

\*\* With Prophi® 6R  
\*\*\* With Prophi® 12R

Other nominal voltages, frequencies, powers, mechanical designs or versions with circuit breakers are available upon request. Extension units, units in ISO housing and audio frequency blocks are available upon request.

# Power factor correction system on extractable module – M084 (without reactor)

## Application

This is a ready to install extractable PFC module for installation in existing switchboard cabinets or low voltage distribution boards. The module includes capacitors, contactors, 630 A bus bar system, HRC fuses and fuse sockets, discharge resistors...

Nominal voltage: 400 V, 3-phase, 50 Hz  
 Protection class: IP00  
 Cooling: Self convection – take care of sufficient convection  
 Controller: None  
 Reactor: No reactor



## PFC Module M084

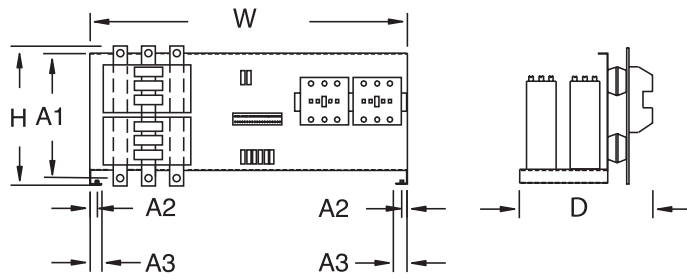
Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
50	50		JF440/50EK1M084	<b>50.80.700</b>	22
50	25/25	1:1	JF440/50/2EK2M084	<b>50.80.740</b>	22
50	10/20/20	1:2:2	JF440/50/3EK5M084	<b>50.80.770</b>	22
50	12.5/12.5/25	1:1:2	JF440/50/3/EK4M084	<b>50.80.774</b>	22
60	20/40	1:2	JF440/60/2EK3M084	<b>50.80.775</b>	23
60	10/10/20/20	1:1:2:2	JF440/60/4EK6M084	<b>50.80.776</b>	23
75	25/50	1:2	JF440/75/2EK3M084	<b>50.80.800</b>	24
75	25/25/25	1:1:1	JF440/75/3EK3M084	<b>50.80.810</b>	24
75	12.5/12.5/25/25	1:1:2:2	JF440/75/4EK6M084	<b>50.80.811</b>	24
80	40/40	1:1	JF440/80/2EK2M084	<b>50.80.835</b>	24
80	20/20/40	1:1:2	JF440/80/3EK4M084	<b>50.80.837</b>	24
100	50/50	1:1	JF440/100/2EK2M084	<b>50.80.875</b>	25
100	25/25/50	1:1:2	JF440/100/3EK4M084	<b>50.80.880</b>	25
100	25/25/25/25	1:1:1:1	JF440/100/4EK4M084	<b>50.80.900</b>	25
100	20/40/40	1:2:2	JF440/100/3EK5M084	<b>50.80.902</b>	25
100	12.5/12.5/25/50	1:1:2:4	JF440/100/4EK8M084	<b>50.80.903</b>	25
<b>Control module with Prophi® 6R controller,</b> Fuse separation switch, current transformer clamp and 2 m connection cable (mounted on the capacitor module)				<b>50.80.003</b>	
<b>Control module with Prophi® 12R controller,</b> Fuse separation switch, current transformer clamp and 2 m connection cable (mounted on the capacitor module)				<b>50.80.004</b>	
<b>Accessories</b> Set module fixing rail for Rittal cabinet left / right, with accessories (for Rittal cabinet M084)				<b>50.00.100</b>	



Other nominal voltages, frequencies, powers, mechanical designs or versions with circuit breakers are available upon request.



**Dimensional drawing**



**MO84:**

H = 330, W = 703, D = 333,  
A1 = 290, A2 = 14, A3 = 26.5

All measurements in mm.





## De-tuned power factor correction (with reactors)

### Harmonic filters for improved power quality

In electrical power networks, ranging from the industrial electricity network through to office buildings, system perturbation occur when operating electrical and electronic loads. We refer to network perturbation when the original “clean” sine wave of the voltage or current changes.

Network perturbation cause additional costs and should be limited. Janitza® offers various approaches to solutions which limit harmonic currents and therefore improve

power quality. The solutions range from passive harmonic filters e.g. de-tuned PFC systems through to customized tuned harmonic filters.

Investments in harmonic filters generally pay off within 6 - 24 months. This means that kWh losses are reduced, reactive power costs are decreased, the lifespan of electrical instruments is lengthened and production processes are stabilised.

## Harmonic filters

### Improvement of power quality, energy savings and stabilisation of the power supply

The permanently increasing number of non-linear loads in our electricity networks cause rising “network impurities”. We talk about network perturbations in a similar way to the way we talk about the environment with its water and air pollution. In an ideal situation, the generators in a power plant produce a pure sinusoidal-shaped current at the output terminals. This sinusoidal-shaped voltage form is regarded as the ideal form of alternating current and any deviation from this form is described as a network perturbation. More and more consumers take a non-sinusoidal-shaped current from the network. The FFT fast-Fourier transformation of these polluted currents results in a wide range of harmonic frequencies which are usually referred to as harmonics.

Harmonics are causing negative effects to electrical networks and can sometimes be dangerous. Connected loads can suffer in a way which is similar to the unhealthy effect impure water has on the human body. This results in overload, reduced lifespan and under some circumstances can even lead to premature failure of electrical and electronic components. Harmonics overloads are the main cause of invisible power quality problems with enormous maintenance costs and investments for the replacement of defective equipment. Excessive network perturbations and the resulting poor power quality can also lead to problems in production processes and can even result in production stoppages.

### What can you do to improve your power quality?

There are different solutions for the restriction of harmonic currents which are caused by non-linear consumers which can therefore contribute to the improvement of power quality.

### De-tuned PFC systems (passive, de-tuned filter)

Passive filters and de-tuned PFC systems are some of the traditional measures. In de-tuned PFC systems, power capacitors are switched to the network individually or in groups and are regulated according to the power factor. Low-pass filters with a de-tuning factor, which is more or less dependent upon a broadband filter effect (towards high frequencies), is generated through the filter circuit reactors which are connected to the capacitor in series. This means that the occurrence of resonance is avoided and some harmonics are reduced from the network.

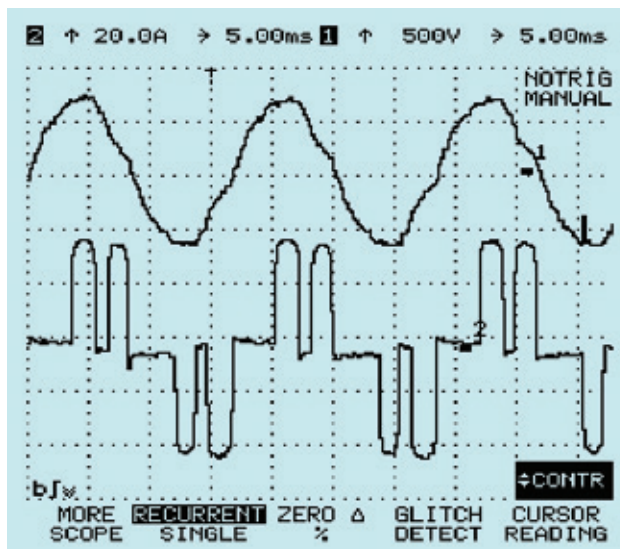


Illustration: network perturbation through a frequency converter  
(above: voltage; below: current)

### Advantages

Network optimisation with de-tuned PFC systems (harmonic filters) from Janitza® result in the following advantages:

- Reduction of electricity bills through the elimination of reactive power
- Reduction of electricity bills through reduced kWh losses (I<sup>2</sup>R losses)
- Avoidance of resonance problems and significant safety risks
- Improvement of the general power quality (reduction of THD-U)
- Saving of maintenance costs
- Delay or avoidance of new investments through improved utilization of energy distribution systems and equipment
- Stabilisation of production processes
- Stabilisation of supply voltage



## De-tuned power factor correction (with reactors)

### Passive harmonic filters

De-tuned automatically regulated PFC (passive harmonic filters) for central compensation in low voltage distribution boards or group compensation.

The exclusive use of quality components from leading manufacturers and the Prophi® power factor controller, as a central control unit, guarantees the best safety and a long lifespan also thanks to the years of experience in the

field of PFC systems. Reactors with high linearity and low power losses reduce electricity costs.

De-tuned PFC systems are suitable for use in applications with non-linear loads i.e. harmonic loads (refer to data sheet for maximum harmonic loads).

There are four different product families customised to suit your individual application.

# De-tuned power factor correction (with reactors) Compact design

## Applications

Small sized automatically regulated PFC systems for grids with harmonics.

Nominal voltage: 400 V, 3-phase, 50 Hz  
 Protection class: IP32  
 Cooling: With ventilator in cabinet door from 31 kvar and above  
 Controller: Prophi® 6R with AUTO configuration  
 Reactor: 5...14 %



### 7 % de-tuning with a filter frequency of 189 Hz

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Version	kg
15	5/10	1:2	JF440/15ER3KB6825FK7	<b>50.52.020</b>	KB6825	112
20	5/5/10	1:1:2	JF440/20ER4KB6825FK7	<b>50.52.040</b>	KB6825	113
25	5/10/10	1:2:2	JF440/25ER5KB6825FK7	<b>50.52.080</b>	KB6825	116
31	6.25/12.5/12.5	1:2:2	JF440/31/ER5KB6825FK7	<b>50.52.110</b>	KB6825	118
35	5/10/20	1:2:4	JF440/35ER7KB6825FK7	<b>50.52.150</b>	KB6825	122
43.75	6.25/12.5/25	1:2:4	JF440/43,75ER7KB6825FK7	<b>50.52.180</b>	KB6825	138
50	10/20/20	1:2:2	JF440/50ER5KB6825FK7	<b>50.52.210</b>	KB6825	142
60	10/20/30	1:2:3	JF440/60ER6KB6123FK7	<b>50.52.225</b>	KB6123	158
75	12.5/25/37.5	1:2:3	JF440/75ER6KB6123FK7	<b>50.52.240</b>	KB6123	167

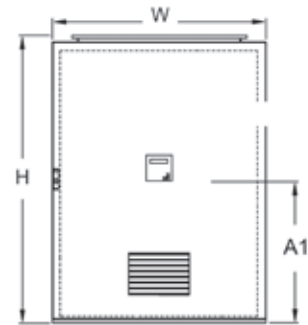
Other nominal voltages, frequencies, outputs, reactors, mechanical designs or versions with circuit breakers are available upon request.

### 14 % de-tuning with a filter frequency of 134 Hz

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Version	kg
15	5/10	1:2	JF525/15ER3KB6825FK14	<b>50.52.520</b>	KB6825	123
20	5/5/10	1:1:2	JF525/20ER4KB6825FK14	<b>50.52.540</b>	KB6825	124
25	5/10/10	1:2:2	JF525/25ER5KB6825FK14	<b>50.52.580</b>	KB6825	128
31	6.25/12.5/12.5	1:2:2	JF525/31/ER5KB6825FK14	<b>50.52.610</b>	KB6825	130
35	5/10/20	1:2:4	JF525/35ER7KB6825FK14	<b>50.52.650</b>	KB6825	134
43.75	6.25/12.5/25	1:2:4	JF525/43,75ER7KB6825FK14	<b>50.52.680</b>	KB6825	152
50	10/20/20	1:2:2	JF525/50ER5KB6825FK14	<b>50.52.710</b>	KB6825	173
60	10/20/30	1:2:3	JF525/60ER6KB6123FK14	<b>50.52.725</b>	KB6123	184
75	12.5/25/37.5	1:2:3	JF525/75ER6KB6123FK14	<b>50.52.729</b>	KB6123	195

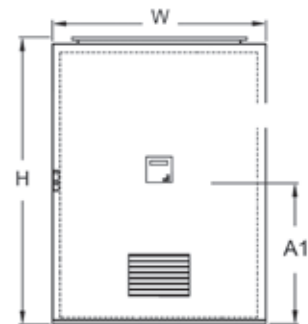
Other nominal voltages, frequencies, outputs, reactors, mechanical designs or versions with circuit breakers are available upon request. Refer to page 34 for accessories.

### Dimensional drawing



**KB6825:** W = 600, H = 800, D = 250, A1 = 410  
**KB6123:** W = 600, H = 1200, D = 300, A1 = 655  
 All measurements in mm.

### Dimensional drawing



**KB6825:** W = 600, H = 800, D = 250, A1 = 410  
**KB6123:** W = 600, H = 1200, D = 300, A1 = 655  
 All measurements in mm.

## 7 % de-tuned PFC (harmonic filters) in extractable design

### Application

These are automatically regulated PFC systems in steel cabinets constructed in extractable modular design. The output in the systems can be expanded as required. For grids with harmonics distortions.

Nominal voltage: 400 V, 3-phase, 50 Hz  
 Protection class: IP32  
 Cooling: With ventilator in cabinet door from 120 kvar and above  
 Controller: Prophi® with AUTO configuration  
 Reactor: 7 % (189 Hz filter)



### Extractable modular design ES206 FK7

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
60	10/20/30	1:2:3...	JF440/60ER6ES8206FK7**	50.89.040	800 mm	278
75	12.5/12.5/25	1:1:2:2	JF440/75ER6ES8206FK7**	50.89.080	800 mm	278
100	25/25/50	1:1:2	JF440/100ER4ES8206FK7**	50.89.120	800 mm	288
100	12.5/12.5/25/50	1:1:2:4	JF440/100ER8ES8206FK7**	50.89.200	800 mm	288
100	10/20/30/40	1:2:3:4	JF440/100ER10ES8206FK7**	50.89.250	800 mm	288
120	20/20/40/40	1:1:2:2	JF440/120ER6ES8206FK7**	50.89.320	800 mm	340
150	25/25/50/50	1:1:2:2	JF440/150ER6ES8206FK7**	50.89.400	800 mm	344
175	25/50/50/50	1:2:2:2	JF440/175ER7ES8206FK7**	50.89.440	800 mm	367
200	50...	1:1:1...	JF440/200ER4ES8206FK7**	50.89.480	800 mm	314
200	25/25/50...	1:1:2...	JF440/200ER8ES8206FK7**	50.89.520	800 mm	314
200	12.5/12.5/25/50...	1:1:2:4...	JF440/200ER16ES8206FK7**	50.89.560	800 mm	314
250	50...	1:1:1...	JF440/250/ER5ES8206FK7**	50.89.600	800 mm	437
250	25/25/50...	1:1:2...	JF440/250ER10ES8206FK7**	50.89.640	800 mm	437
300	50...	1:1:1...	JF440/300ER6ES8206FK7**	50.89.685	800 mm	487
300	25/25/50...	1:1:2...	JF440/300ER12ES8206FK7***	50.89.687	800 mm	498
350	50...	1:1:1...	JF440/350ER7ES8206FK7-1S***	50.89.720	800 mm	520
350	50...	1:1:1...	JF440/350ER7ES8206FK7***	50.89.722	1600 mm	352/347
400	50...	1:1:1...	JF440/400ER8ES8206FK7-1S***	50.89.744	800 mm	570
400	50...	1:1.1...	JF440/400ER8ES8206FK7***	50.89.740	1600 mm	2x370
450	50...	1:1:1...	JF440/450ER9ES8206FK7***	50.89.770	1600 mm	437/347
500	50...	1:1:1...	JF440/500ER10ES8206FK7***	50.89.800	1600 mm	479/359
550	50...	1:1:1...	JF440/550ER11ES8206FK7***	50.89.805	1600 mm	2x431
600	50...	1:1:1...	JF440/600ER12ES8206FK7***	50.89.820	1600 mm	2x481

Other nominal voltages, frequencies, outputs, reactors, mechanical designs or versions with circuit breakers are available upon request. Refer to page 34 for accessories.

\*\* with Prophi® 6R, \*\*\*with Prophi® 12R

# 14 % de-tuned PFC (harmonic filters) in extractable design

## Application

These are automatically regulated PFC systems in steel cabinets constructed in extractable modular design. The output in the systems can be expanded as required. For grids with harmonics distortions.

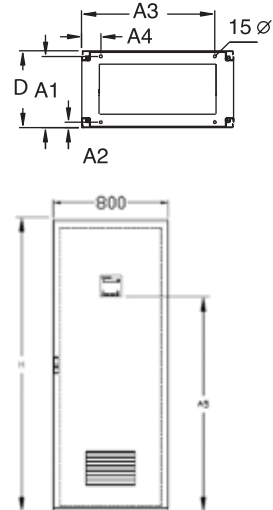
Nominal voltage: 400 V, 3-phase, 50 Hz  
Protection class: IP32  
Cooling: With ventilator in cabinet door from 120 kvar and above  
Controller: Prophi® with AUTO configuration  
Reactor: 14 % (134 Hz filter)



## Extractable modular design ES8206 FK14

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
60	10/20/30	1:2:3	JF525/60ER6ES8206FK14**	50.93.040	800 mm	317
75	12.5/12.5/25/25	1:1:2:2	JF525/75ER6ES8206FK14**	50.93.080	800 mm	318
100	25/25/50	1:1:2	JF525/100ER4ES8206FK14**	50.93.120	800 mm	368
100	12.5/12.5/25/50	1:1:2:4	JF525/100ER8ES8206FK14**	50.93.200	800 mm	380
100	10/20/30/40	1:2:3:4	JF525/100ER10ES8206FK14**	50.93.250	800 mm	387
120	20/20/40/40	1:1:2:2	JF525/120ER6ES8206FK14**	50.93.320	800 mm	379
150	25/25/50/50	1:1:2:2	JF525/150ER6ES8206FK14**	50.93.400	800 mm	375
175	25/50/50/50	1:2:2:2	JF525/175ER7ES8206FK14**	50.93.440	800 mm	407
200	50	1:1:1:1	JF525/200ER4ES8206FK14**	50.93.480	800 mm	420
200	25/25/50...	1:1:2...	JF525/200ER8ES8206FK14**	50.93.520	800 mm	421
200	12.5/12.5/25/50...	1:1:2:4...	JF525/200ER16ES8206FK14**	50.93.560	800 mm	371
250	50	1:1:1...	JF525/250/ER5ES8206FK14**	50.93.600	800 mm	478
250	25/25/50...	1:1:2...	JF525/250ER10ES8206FK14**	50.93.640	800 mm	490
300	50	1:1:1...	JF525/300ER6ES8206FK14**	50.93.685	800 mm	500
300	25/25/50...	1:1:2...	JF525/300ER12ES8206FK14***	50.93.690	800 mm	500
350	50...	1:1:1...	JF525/350ER7ES8206FK14-1S***	50.93.720	800 mm	550
350	50...	1:1:1...	JF525/350ER7ES8206FK14***	50.93.722	1600 mm	424/365
400	50...	1:1:1...	JF525/400ER8ES8206FK14-1S***	50.93.740	800 mm	600
400	50...	1:1:1...	JF525/400ER8ES8206FK14***	50.93.742	1600 mm	2x424
450	50...	1:1:1...	JF525/450ER9ES8206FK14***	50.93.770	1600 mm	2x478
500	50...	1:1:1...	JF525/500ER10ES8206FK14***	50.93.800	1600 mm	500/420
550	50...	1:1:1...	JF525/550ER11ES8206FK14***	50.93.805	1600 mm	500/478
600	50...	1:1:1...	JF525/600ER12ES8206FK14***	50.93.920	1600 mm	500/500

**Dimensional drawing  
ES8206 FK7 and  
ES8206 FK14**



**ES8206:**  
H = 2020, W = 800 or  
1600, D = 600,  
A1 = 537, A2 = 63, A3 = 737,  
A4 = 62, A5 = 1480

All measurements in mm.

Other nominal voltages, frequencies, outputs, reactors, mechanical designs or versions with circuit breakers are available upon request. Refer to page 34 for accessories.

\*\* with Prophi® 6R, \*\*\*with Prophi® 12R

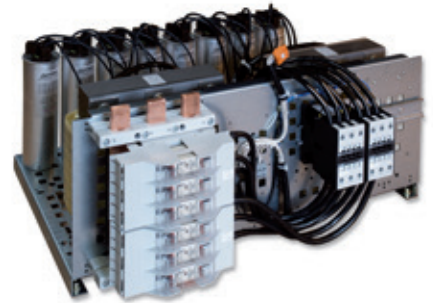


## De-tuned capacitor modules (harmonic filters)

### Application

These are automatically regulated PFC modules for installation in existing cabinets or low voltage distribution boards constructed in extractable modular design. The output can be expanded to 300 kvar (in series). Supply complete with set of copper bus bar links for connecting multiple modules.

Nominal voltage: 400 V, 3-phase, 50 Hz  
 Protection class: IP00  
 Cooling: Self convection – take care of sufficient convection  
 Controller: None  
 Reactor: 7 % and 14 %

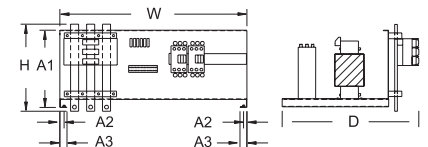


### 7 % de-tuned capacitor module (189Hz) (construction width 800 mm, depth 600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
10	10		JF440/10EK1MO86FK7	<b>50.88.650</b>	24
12.5	12.5		JF440/12,5EK1MO86FK7	<b>50.88.680</b>	26
20	20		JF440/20EK1MO86FK7	<b>50.88.710</b>	33
25	25		JF440/25/EK1MO86FK7	<b>50.88.740</b>	33
40	40		JF440/40EK1MO86FK7	<b>50.88.770</b>	43
50	50		JF440/50EK1MO86FK7	<b>50.88.800</b>	45
20/2	10	1:1	JF440/20/2EK2MO86FK7	<b>50.88.801</b>	36
25/2	12.5	1:1	JF440/25/2EK2MO86FK7	<b>50.88.830</b>	38
30/2	10/20	1:2	JF440/30/2EK2MO86FK7	<b>50.88.860</b>	42
40/2	20	1:1	JF440/40/2EK2MO86FK7	<b>50.88.890</b>	55
40/3	10/10/20	1:1:2	JF440/40/3EK2MO86FK7	<b>50.88.891</b>	55
50/2	25	1:1	JF440/50/2EK2MO86FK7	<b>50.88.930</b>	56
75/2	25/50	1:2	JF440/75/2EK2MO86FK7	<b>50.88.932</b>	72
80/2	40	1:1	JF440/80/2EK2MO86FK7	<b>50.88.933</b>	72
100/2	50	1:1	JF440/100/2EK2MO86FK7	<b>50.88.931</b>	86

Other nominal voltages, frequencies, outputs, reactors, mechanical designs (e.g. 500 mm cabinet depth) or versions with circuit breakers are available upon request.

### For cabinet depth 600 mm



H = 330, W = 703, D = 533,  
 A1 = 290, A2 = 14, A3 = 26.5

All measurements in mm.

**14 % de-tuned capacitor module (134 Hz)** (construction width 800 mm, depth 600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
10	10		JF525/10EK1MO86FK14	<b>50.92.650</b>	34
12.5	12.5		JF525/12,5EK1MO86FK14	<b>50.92.680</b>	35
20	20		JF525/20EK1MO86FK14	<b>50.92.710</b>	40
25	25		JF525/25EK1MO86FK14	<b>50.92.740</b>	40
40	40		JF525/40EK1MO86FK14	<b>50.92.770</b>	52
50	50		JF525/50EK1MO86FK14	<b>50.92.800</b>	54
20/2	10	1:1	JF525/20/2EK2MO86FK14	<b>50.92.803</b>	53
25/2	12.5	1:1	JF525/25/2EK2MO86FK14	<b>50.92.804</b>	60
30/2	10/20	1:2	JF525/30/2EK2MO86FK14	<b>50.92.849</b>	45
40/2	20	1:1	JF525/40/2EK2MO86FK14	<b>50.92.850</b>	67
40/3	10/10/20	1:1:2	JF525/40/3EK3MO86FK14	<b>50.92.851</b>	72
50/2	25	1:1	JF525/50/2EK2MO86FK14	<b>50.92.890</b>	69
75/2	25/50	1:2	JF525/75/2EK2MO86FK14	<b>50.92.893</b>	78
80/2	40	1:1	JF525/80/2EK2MO86FK14	<b>50.92.896</b>	78
100/2	50	1:1	JF525/100/2EK2MO86FK14	<b>50.92.892</b>	92

Other nominal voltages, frequencies, outputs, reactors, mechanical designs (e.g. 500 mm cabinet depth) or versions with circuit breakers are available upon request.

## Passive harmonic filter – Accessories

### Controller modules

Item	Item no.
<b>Controller module with Prophi® 6R controller, 6 steps (relay outputs), fuses, current transformer clamps and 2 m connection cable (mounted on the capacitor module)</b>	<b>50.80.003</b>
<b>Controller module with Prophi® 12R controller, 12 steps (relay outputs), fuses, current transformer clamps and 2 m connection cable (mounted on the capacitor module)</b>	<b>50.80.004</b>



### Fixing rails for extractable modules in Rittal cabinets

Item	Item no.
Set fixing rail (left, right) for MO84 Rittal cabinets	<b>50.00.100</b>
Set fixing rail (left, right) for MO86 Rittal cabinets	<b>50.00.101</b>

### Cabinet socket

Item	Item-no.	Item no.
Socket 100 mm high	SO 100/800/600	<b>50.00.150</b>
Socket 200 mm high	SO 200/800/600	<b>50.00.151</b>

### Harmonic analyser with Ethernet connection

Item	Item-no.	Item no.
UMG 508	With display in cabinet door	<b>52.21.001</b>
UMG 604E	Din rail mounting (inside the cabinet)	<b>52.16.002</b>

Refer to chapter 2, main catalog for other versions.



## Dynamic (fast switching) power factor correction

For use with rapid and high load changes

Dynamic PFC systems are particularly used in applications with rapid and high load changes. These are automatically regulated systems for central compensation in low voltage distribution boards or for group compensation of sub-systems.

De-tuned PFC systems for use in applications with non-linear loads i.e. harmonic loads. There are various designs customised to suit your individual application.

# Dynamic power factor correction

## Applications

Dynamic PFC systems are particularly used in applications with rapid and high load changes. In such cases, conventional PFC systems are not fast enough to follow the load changes which means, that these systems are either under- or overcompensated.

Electromechanical contactors are not suitable for these types of frequent switching cycles. If contactors or capacitor contactors are still used in such applications, the contactors are worn out very quickly and this can lead to significant safety risks for the whole system. Dynamic PFC systems avoid this problem with the help of semiconductors. Semiconductors gently connect the capacitors to the network i.e. without network perturbations and capacitor stresses.

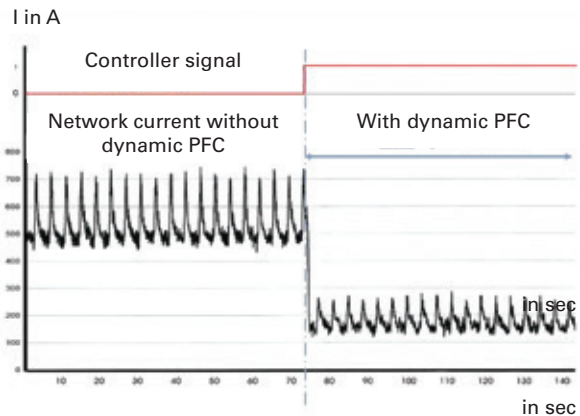


Illustration: current reduction through dynamic PFC

## This results in the following advantages:

- Improved power quality i.e. high inrush currents from power capacitors are avoided
- The lifespan of PFC systems is increased
- The safety of the full system is significantly increased (i.e. damages due to defective contactors and as a result of exploding capacitors are avoided)
- Extremely rapid regulation of the power factor and therefore consequential reduction of reactive power costs and kWh losses
- Voltage stabilisation (e.g. network support during the start-up phase for large motors)
- Improved utilization for energy distribution (transformers, cable, switch gear etc.) through the elimination of power peaks
- Process times can be shortened (e.g. welding)

## Typical applications

- Automobile industry (welding machines, presses...)
- Elevator systems and cranes
- Start-up compensation for larger motors
- Drilling rigs in oil production
- Wind power plants
- Welding
- Steel production
- Plastic injection moulding units
- Trawlers

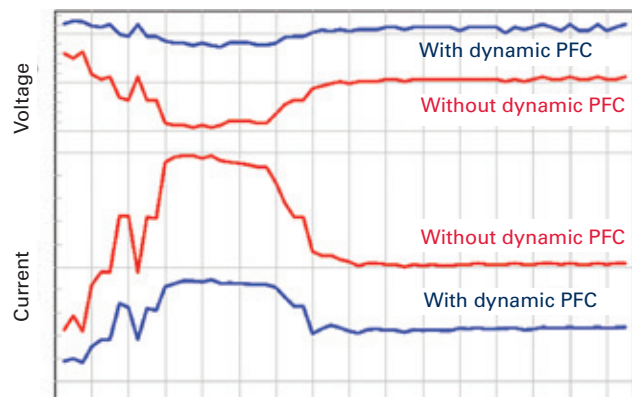


Illustration: comparison of current and voltage with and without dynamic PFC when starting up a large motor.

# De-tuned dynamic capacitor module in extractable modular design

## Application

Automatically regulated dynamic PFC modules in extractable design for applications with rapid and high load changes. This is an extractable module for use in existing cabinets or low-voltage main distribution systems.



Nominal voltage: 400 V, 3-phase, 50 Hz

Protection class: IP00

Reactor: 5 ... 14 %

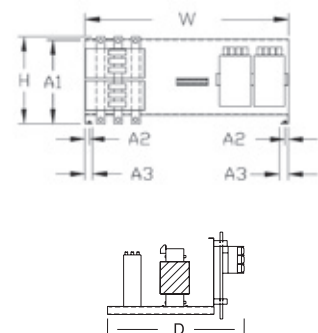
## 7 % reactor capacitor module M086FK7Th (construction width 800 mm, depth 600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
10	10		JF440/10EK1M086FK7Th	50.18.650	26
12.5	12.5		JF440/12,5EK1M086FK7Th	50.18.680	28
20	20		JF440/20EK1M086FK7Th	50.18.710	35
25	25		JF440/25/EK1M086FK7Th	50.18.740	35
40	40		JF440/40EK1M086FK7Th	50.18.770	45
50	50		JF440/50EK1M086FK7Th	50.18.800	47
20	10	1:1	JF440/20/2EK2M086FK7Th	50.18.801	40
25	12.5	1:1	JF440/25/2EK2M086FK7Th	50.18.830	42
30	15	1:1	JF440/30/2EK2M086FK7Th	50.18.860	46
40	20	1:1	JF440/40/2EK2M086FK7Th	50.18.890	57
50	25	1:1	JF440/50/2EK2M086FK7Th	50.18.930	58
75	25/50	1:2	JF440/75/2EK2M086FK7Th	50.18.932	76
80	40/40	1:1	JF440/80/2EK2M086FK7Th	50.18.933	77
100	50/50	1:1	JF440/100/2EK2M086FK7Th	50.18.931	90

## 14 % reactor capacitor module M086FK7Th (construction width 800 mm, depth 600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
10	10		JF525/10EK1M086FK14Th	50.12.650	36
12.5	12.5		JF525/12,5EK1M086FK14Th	50.12.680	37
20	20		JF525/20EK1M086FK14Th	50.12.710	42
25	25		JF525/25EK1M086FK14Th	50.12.740	43
40	40		JF525/40EK1M086FK14Th	50.12.770	54
50	50		JF525/50EK1M086FK14Th	50.12.800	56
20	10	1:1	JF525/20/2E2M086FK14Th	50.12.803	57
25	12.5	1:1	JF525/25/2EK2M086FK14Th	50.12.804	64
30	15	1:1	JF525/30/2EK2M086FK14Th	50.12.849	69
40	20	1:1	JF525/40/2EK2M086FK14Th	50.12.850	71
50	25	1:1	JF525/50/2EK2M086FK14Th	50.12.890	73
75	25/50	1:2	JF525/75/2EK2M086FK14Th	50.12.893	82
80	40/40	1:1	JF525/80/2EK2M086FK14Th	50.12.896	84
100	50/50	1:1	JF525/100/2EK2M086FK14Th	50.12.892	96

## Dimensional drawing



H = 330, W = 703, D = 550,  
A1 = 290, A2 = 14, A3 = 26.5

All measurements in mm.

Other nominal voltages, frequencies, outputs, reactors, mechanical designs or versions with circuit breakers are available upon request. Refer to page 42 for accessories.

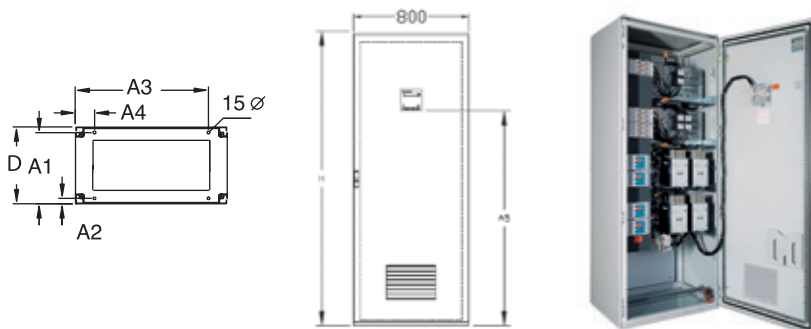
# Dynamic power factor correction in extractable module design

## Application

Automatically regulated PFC systems in extractable module design for applications with rapid and high load changes. The modules are built into steel cabinets constructed in extractable module design in which the output can be expanded as required.

Nominal voltage: 400 V, 3-phase, 50 Hz  
Protection class: IP32  
Cooling: Self convection – take care of sufficient convection  
Controller: Prophi® with AUTO configuration  
Reactor: None

## Dimensional drawing



**ES8184:**  
H = 1800, W = 800, D = 400, A1 = 537,  
A2 = 63, A3 = 737, A4 = 62, A5 = 1480

All measurements in mm.

## Extractable module design ES8184Th (W=800/1600 mm x H=1800 mm x D=400 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
100	12.5/12.5/25/50	1:1:2:4	JF440/100ER8ES8184Th**	<b>50.81.920</b>	800 mm	190
125	12.5/25/37.5/50	1:2:3:4	JF440/125ER10ES8184Th**	<b>50.81.921</b>	800 mm	195
150	12.5/12.5/25/50/50	1:1:2:4:4	JF440/150ER12ES8184Th**	<b>50.81.922</b>	800 mm	208
150	25/25/50/50	1:1:2:2	JF440/150ER6ES8184Th**	<b>50.81.923</b>	800 mm	208
175	12.5/25/37.5/50/50	1:2:3:4:4	JF440/175ERES8184Th**	<b>50.81.924</b>	800 mm	210
180	20/40/40/40/40	1:2:2:2:2	JF440/180ER9ES8184Th**	<b>50.81.925</b>	800 mm	211
200	50/50/50/50	1:1:1:1	JF440/200ER4ES8184Th**	<b>50.81.926</b>	800 mm	212
200	25/25/50/50/50	1:1:2:2:2	JF440/200ER8ES8184Th**	<b>50.81.927</b>	800 mm	212
200	12.5/12.5/25/50...	1:1:2:4...	JF440/200ER16ES8184Th**	<b>50.81.928</b>	800 mm	212
250	50/50/50/50/50	1:1:1:1:1	JF440/250ER5ES8184Th**	<b>50.81.929</b>	800 mm	233
250	25/25/50/50/50/50	1:1:2:2:2:2	JF440/250ER10ES8184Th**	<b>50.81.930</b>	800 mm	233
250	12.5/12.5/25/50...	1:1:2:4...	JF440/250ER20ES8184Th***	<b>50.81.931</b>	800 mm	233
300	50/50...	1:1...	JF440/300ER6ES8184Th**	<b>50.81.932</b>	800 mm	236
300	25/25/50...	1:1:2...	JF440/300ER12ES8184Th***	<b>50.81.933</b>	800 mm	236
400	50/50...	1:1...	JF440/400ER8ES8184Th***	<b>50.81.934</b>	1600 mm	380
500	50/50...	1:1...	JF440/500ER10ES8184Th***	<b>50.81.935</b>	1600 mm	460
600	50/50...	1:1...	JF440/600ER12ES8184Th***	<b>50.81.936</b>	1600 mm	540

Other nominal voltages, frequencies, outputs, mechanical designs or versions with circuit breakers are available upon request. Refer to page 42 for accessories. \*\* With Prophi® 6T \*\*\* With Prophi® 12T

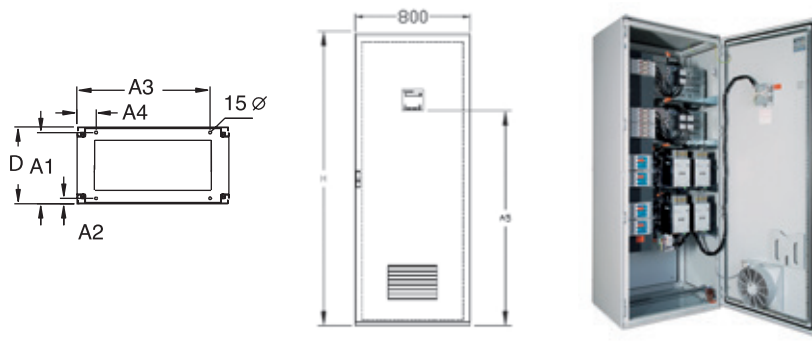
# 7 % de-tuned dynamic PFC in extractable module design

## Application

Automatically regulated PFC systems in extractable module design for applications with rapid and high load changes. The modules are built into steel cabinets constructed in extractable module design in which the power can be expanded as required. 7 % reactors for networks with predominantly 3-phase non-linear loads i.e. a lower proportion of 3rd harmonics.

Nominal voltage: 400 V, 3-phase, 50 Hz  
Protection class: IP32  
Cooling: With ventilator in cabinet door from 120 kvar and above  
Controller: Propfi® with AUTO configuration  
Reactor: 7 % (189 Hz filter)

## Dimensional drawing



### ES8206:

H = 2020, W = 800, D = 600, A1 = 537,  
A2 = 63, A3 = 737, A4 = 62, A5 = 1480

All measurements in mm.

## Extractable module design ES8206 FK7Th (W=800/1600 mm x H=2020 mm x D=600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
60	10/20/30	1:2:3	JF440/60ER6ES8206FK7Th**	50.19.040	800 mm	290
75	12.5/12.5/25/25	1:1:2:2	JF440/75ER6ES8206FK7Th**	50.19.080	800 mm	290
100	25/25/50	1:1:2	JF440/100ER4ES8206FK7Th**	50.19.120	800 mm	306
120	20/20/40/40	1:1:2:2	JF440/120/ER6ES8206FK7Th**	50.19.320	800 mm	306
100	12.5/12.5/25/50	1:1:2:4	JF440/100ER8ES8206FK7Th**	50.19.200	800 mm	380
125	12.5/25/37.5/50	1:2:3:4	JF440/125ER10ES8206FK7Th**	50.19.325	800 mm	390
150	12.5/12.5/25/50...	1:1:2:4...	JF440/150ER12ES8206FK7Th**	50.19.330	800 mm	410
150	25/25/50/50	1:1:2:2	JF440/150ER6ES8206FK7Th**	50.19.400	800 mm	410
175	12.5/25/37.5/50...	1:2:3:4...	JF440/175ERES8206FK7Th**	50.19.440	800 mm	420
200	50/50/50/50	1:1:1:1	JF440/200ER4ES8206FK7Th**	50.19.480	800 mm	430
200	25/25/50...	1:1:2...	JF440/200ER8ES8206FK7Th**	50.19.520	800 mm	430
200	12.5/12.5/25/50...	1:1:2:4...	JF440/200ER16ES8206FK7Th**	50.19.560	800 mm	435
250	50/50...	1:1...	JF440/250ER5ES8206FK7Th**	50.19.600	800 mm	478
250	25/25/50...	1:1:2...	JF440/250ER10ES8206FK7Th**	50.19.640	800 mm	490
250	12.5/12.5/25/50...	1:1:2:4...	JF440/250ER20ES8206FK7Th***	50.19.645	800 mm	495
300	50/50...	1:1...	JF440/300ER6ES8206FK7Th**	50.19.685	800 mm	500
300	25/25/50...	1:1:2...	JF440/300ER12ES8206FK7Th***	50.19.690	800 mm	500
400	50/50...	1:1...	JF440/400ER8ES8206FK7Th***	50.19.742	1600 mm	2 x 421
500	50/50...	1:1...	JF440/500ER10ES8206FK7Th***	50.19.800	1600 mm	500/421
600	50/50...	1:1...	JF440/600ER12ES8206FK7Th***	50.19.820	1600 mm	2 x 500

Other nominal voltages, frequencies, outputs, mechanical designs or versions with circuit breakers are available upon request. Refer to page 42 for accessories. \*\* With Propfi® 6T \*\*\* With Propfi® 12T

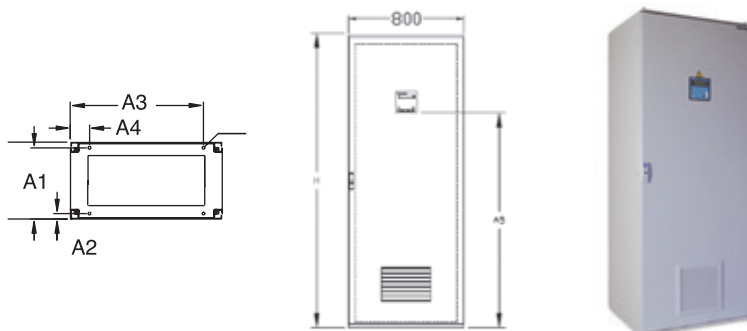
# 14 % de-tuned dynamic PFC in extractable module design

## Application

Automatically regulated PFC systems in extractable module design for applications with rapid and high load changes. The modules are built into steel cabinets constructed in extractable module design in which the power can be expanded as required. 14 % reactors for networks with a high proportion of 1-phase non-linear loads i.e. a high proportion of 3rd harmonics.

Nominal voltage: 400 V, 3-phase, 50 Hz  
Protection class: IP32  
Cooling: Ventilator in cabinet door  
Controller: Prophi® with AUTO configuration  
Reactor: 14 % (134 Hz filter)

## Dimensional drawing



### ES8206:

H = 2020, W = 800, D = 600, A1 = 537,  
A2 = 63, A3 = 737, A4 = 62, A5 = 1480

All measurements in mm.

## Extractable module design ES8206Th (W=800/1600 mm x H=2020 mm x D=600 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	Width	kg
60	10/20/30	1:2:3	JF525/60ER6ES8206FK14Th**	<b>50.98.040</b>	800 mm	290
75	12.5/12.5/25/25	1:1:2:2	JF525/75ER6ES8206FK14Th**	<b>50.98.080</b>	800 mm	290
100	25/25/50	1:1:2	JF525/100ER4ES8206FK14Th**	<b>50.98.120</b>	800 mm	306
120	20/20/40/40	1:1:2:2	JF525/120/ER6ES8206FK14Th**	<b>50.98.320</b>	800 mm	306
100	12.5/12.5/25/50	1:1:2:4	JF525/100ER8ES8206FK14Th**	<b>50.98.200</b>	800 mm	380
125	12.5/25/37.5/50	1:2:3:4	JF525/125ER10ES8206FK14Th**	<b>50.98.325</b>	800 mm	390
150	12.5/12.5/25/50...	1:1:2:4...	JF525/150ER12ES8206FK14Th**	<b>50.98.330</b>	800 mm	410
150	25/25/50/50	1:1:2:2	JF525/150ER6ES8206FK14Th**	<b>50.98.400</b>	800 mm	410
175	12.5/25/37.5/50...	1:2:3:4...	JF525/175ERES8206FK14Th**	<b>50.98.440</b>	800 mm	420
200	50/50/50/50	1:1:1:1	JF525/200ER4ES8206FK14Th**	<b>50.98.480</b>	800 mm	430
200	25/25/50...	1:1:2...	JF525/200ER8ES8206FK14Th**	<b>50.98.520</b>	800 mm	430
200	12.5/12.5/25/50...	1:1:2:4...	JF525/200ER16ES8206FK14Th**	<b>50.98.560</b>	800 mm	435
250	50/50...	1:1...	JF525/250ER5ES8206FK14Th**	<b>50.98.600</b>	800 mm	478
250	25/25/50...	1:1:2...	JF525/250ER10ES8206FK14Th**	<b>50.98.640</b>	800 mm	490
250	12.5/12.5/25/50...	1:1:2:4...	JF525/250ER20ES8206FK14Th***	<b>50.98.645</b>	800 mm	495
300	50/50...	1:1...	JF525/300ER6ES8206FK14Th**	<b>50.98.685</b>	800 mm	500
300	25/25/50...	1:1:2...	JF525/300ER12ES8206FK14Th***	<b>50.98.690</b>	800 mm	500
400	50/50...	1:1...	JF525/400ER8ES8206FK14Th***	<b>50.98.742</b>	1600 mm	2 x 421
500	50/50...	1:1...	JF525/500ER10ES8206FK14Th***	<b>50.98.800</b>	1600 mm	500/421
600	50/50...	1:1...	JF525/600ER12ES8206FK14Th***	<b>50.98.920</b>	1600 mm	2 x 500

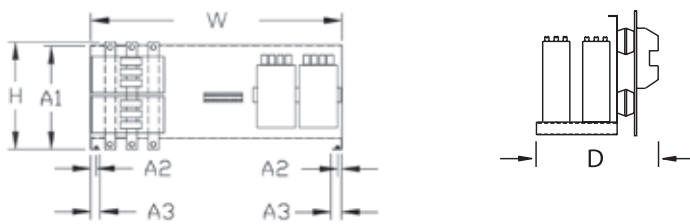
Other nominal voltages, frequencies, outputs, mechanical designs or versions with circuit breakers are available upon request. Refer to page 42 for accessories. \*\* With Prophi® 6T \*\*\* With Prophi® 12T



## Dynamic capacitor modules without reactors (thyristor switches)

Nominal voltage: 400 V, 50 Hz  
 Capacitor voltage: 440 V, 50 Hz  
 Protection class: IP00  
 Reactor: ohne

### Dimensional drawing



#### MO84:

H = 330, W = 703, D = 345,  
 A1 = 290, A2 = 14, A3 = 26.5

All measurements in mm.

### Capacitor module MO84Th (construction width 800 mm, depth 400 mm)

Nominal power kvar	Step power kvar	Switching ratio	Type	Item no.	kg
50	50		JF440/50EK1MO84Th	<b>50.81.700</b>	24
50/2	25	1:1	JF440/50/2EK2MO84Th	<b>50.81.740</b>	28
60/2	20/40	1:2	JF440/60/2EK3MO84Th	<b>50.80.775</b>	28
75/2	25/50	1:2	JF440/75/2EK3MO84Th	<b>50.80.800</b>	30
80/2	40	1:1	JF440/80/2EK2MO84Th	<b>50.80.835</b>	32
100/2	50	1:1	JF440/100/2EK2MO84Th	<b>50.80.875</b>	34

## Accessories



### Dynamic PFC accessories

Item	Type	Item no.	kg
100 mm high socket	SO 100/800/600	<b>50.00.150</b>	8
200 mm high socket	SO 200/800/600	<b>50.00.151</b>	15

### PFC controller module

Item	Item no.	kg
<b>Controller module with Prophi® 6T controller, 6 steps (relay outputs),</b> fuses, current transformer clamps and 2 m connection cable (mounted on the capacitor module)	<b>50.10.003</b>	3
<b>Controller module with Prophi® 12T controller, 12 steps (relay outputs),</b> fuses, current transformer clamps and 2 m connection cable (mounted on the capacitor module)	<b>50.10.004</b>	3

### Fixing rails

Item	Item no.	kg
Set fixing rail (left, right) for MO84 Rittal cabinets	<b>50.00.100</b>	1
Set fixing rail (left, right) for MO86 Rittal cabinets	<b>50.00.101</b>	1,5



Janitza electronics GmbH  
Vor dem Polstück 1  
D-35633 Lahnau  
Germany

Tel.: +49 6441 9642-0  
Fax: +49 6441 9642-30  
info@janitza.com  
www.janitza.com