

Procont®

Power Energy Analyser & Logic Controller
Maximum Demand Load Shed Controller
2nd - 40th Voltage & Current Harmonic Analyser



- 4 Target Max. Demand (MD) Load Shed Controller
- Up to 64 loads may be shed to reach the target MD
- MODBUS RTU - PROFIBUS DP V0 available as standard
- Up to 96 switching outputs:
 - 64 for MD Control
 - 16 for Power Factor Correction
 - 16 for Time Block Control
- Up to 32 external switching modules
- Universal Power Measurement Display
- Bar graphs of kW Demand & U - I harmonics 2nd - 40th
- HP Printer port
- PC Prorem software for remote programming/analysis
- Front panel size of 288mm x 144mm x 69mm deep

PLEASE NOTE

The number of loads that can be switched is now 16 and not 64 and PROFIBUS is no longer available – only MODBUS RTU

Application

The PROCONT is a programmable controller, power analyser, Maximum Demand Controller and Harmonic Analyser all in one combined into one unique panel mounted instrument. The front panel size is 144 x 288 x 69 deep and there is an easy to read large size backlight LCD display. This display gives instantaneous readings of every required electrical value by depressing the appropriate key on the front panel. In addition, the PROCONT enables the user to evaluate and datalog Max, Min and Average values of any required value. With its own built in logic controller, commands are given by the PROCONT to operate externally mounted load shedding switch modules. In addition there are facilities for up to 32 input switching modules to enable external conditions such as temperature or pressure to be taken into account by the instrument, when making its load shed/restore decisions. Harmonic analysis is at the top of every Electrical Engineers agenda today and the PROCONT will analyse voltage and current harmonics up to the 40th. These can be shown instantly on the LCD display and printed in bargraph form. There is a printer port on the PROCONT - so it is not essential to download on to a PC first. Each individual harmonic value can be datalogged and printed out when required. Furthermore, a threshold limit for a switching function can be activated according to the harmonic condition.

The PROCONT is also designed to perform load shedding activities. Selected loads can be disconnected for pre-selected time periods and priorities. Target MD can be achieved often resulting in better use of distribution transformers and a consequent saving in capital.

The PROCONT has an integrated time controller enabling the connection/disconnection of selected loads according to time periods, especially useful for consumers on STOD Tariffs.

As if all these features were not enough, the PROCONT also incorporates a 16 step power factor controller for switching capacitor banks. Various switching programs are available.

The PROCONT has RS485, PROFIBUS DP V0 and MODBUS RTU outputs.

Output from the PROCONT can be fed into a PC for detailed load analysis and data logging utilising the PROREM software program.



-  **Measuring Device**
-  **Harmonics U - I**
-  **Maximum Demand controller**
-  **Time controller**
-  **Power factor controller**
-  **Logic**

PROCONT LOGIC

The function combinations are the connections between inputs and outputs and internal functions of the PROCONT Plc.

	Digital inputs (96 max)	
Power factor controller	_____	Tariff section power factor controller
Max. demand controller	_____	4 Separate Target MD settings
Time controller	_____	160 time block settings
Comparator	_____	1- 8 Time blocks
Auxiliary Input	_____	Keyboard event
Alarm output	_____	Backlight
	Digital inputs (96 max)	

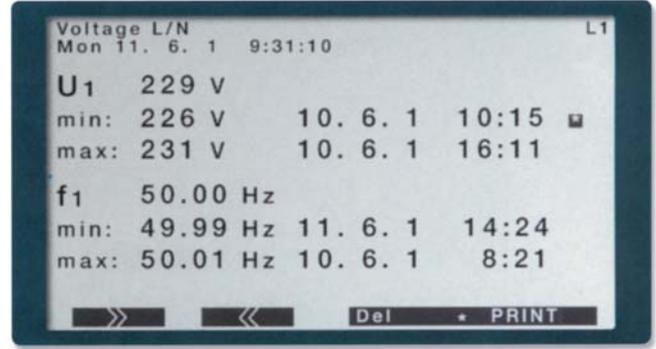
Input operands

Digital inputs 1 ... 96	Timer output 1 ... 8
Emax outputs 1 ... 64	Keyboard events 1
Time controller outputs 1 ... 16	Comparator outputs 1 ... 32
Alarm output 1	Power factor controller output 1 ...16
Flags 1 ... 128	Remote Flag 1 ... 32
Auxiliary input 1	

Output operands

Digital outputs 1 ... 96	Flags 1 ... 128
Request inputs 1 ... 64	Timer inputs 1 ... 8
Condition inputs 1 ... 64	Backlight 1
Operation input 1 ... 64	Reset of measuring period 1
Tariff inputs (Emax) 2 ... 4	Delete energy 1
Tariff inputs (power factor correction) 2 ... 4	Printer channels 1 ... 8

U I P W Measuring device



Quantity to be measured	Indication	Measuring range at scale factor 1	L1	L2	L3	Sum	Lowest value	Peak value	Date / time	Measuring accuracy
Current.../5A	0 ... 99, 100 ... 99999A	0.05 ... 5A	•	•	•		•	•	•	± 0.3% Mr + 0.3% Mv
Voltage L-N	0 ... 99, 100 ... 99999A	50 ... 250V	•	•	•		•	•	•	± 0.3% Mr + 0.3% Mv
Voltage L-L	0 ... 99, 100 ... 99999A	80 ... 440V	•	•	•		•	•	•	± 0.3% Mr + 0.3% Mv
Frequency (U)	45,000 ... 65,000Hz	45.00 ... 65.00HZ	•	•	•				•	± 0.1% Mr + 0.1% Mv
Real Power +/-	0 ... 9.99, 10 ... 99.99, 100 ... 99999kW	0 ... 1kW	•	•	•	•	•	•	•	± 0.5% Mr + 0.5% Mv
Apparent Power	0 ... 9.99, 10 ... 99.99, 100 ... 99999kWA	0 ... 1kWA	•	•	•	•	•	•	•	± 0.5% Mr + 0.5% Mv
Reactive Power	0 ... 9.99, 10 ... 99.99, 100 ... 99999kVAr	0 ... 1kVAr	•	•	•	•	cap.	ind.	•	± 0.5% Mr + 0.5% Mv
Power Factor	0.00 cap. ... 1.00 ... 0.00 ind	0.00 cap. ... 1.00 ... 0.00 ind	•	•	•	•	cap.	ind.	•	± 2 Digits + 1.0% Mv
Real Work +/-	0 ... 99.99, 100 ... 999.9	0 ... 99999999kWh				•				± 0.5% of measuring range & dependent upon accuracy of C.T.'s / external kWh pulse input device.
Reactive Work +/-	Reactive work +/- 1000 ... 99999999kWh	0 ... 99999999kWh				•				
Total Harmonic Distortion THD U - I	0.0 ... 99.9%	0.0 ... 99.9%	•	•	•			•	•	± 1.5% Mr + 1.5% Mv
Harmonic Distortion Factor HDF U 2-40	0.0 ... 999.9, 1000 ... 99999V	0.1 ... 250V	•	•	•			•	•	± 1.5% Mr + 1.5% Mv
Harmonic Distortion Factor HDF I 2-40	0.0 ... 999.9, 1000 ... 99999A	0.01 ... 5V	•	•	•			•	•	± 1.5% Mr + 1.5% Mv

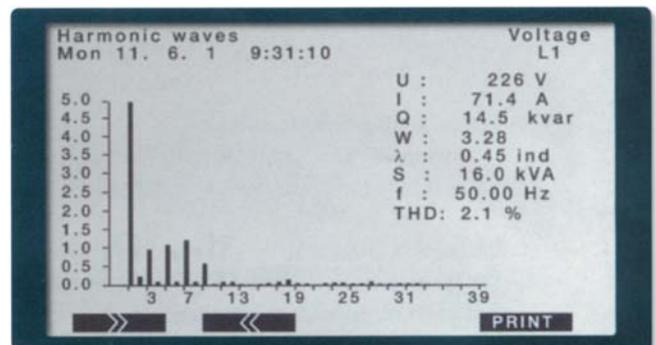
Mr: of measuring range, Mv: of measuring value, + consumption, - supply

2nd - 40th Harmonic

The 2nd to 40th harmonic are calculated from the scanned values of current and voltage by Fourier analysis. They can be displayed or printed in bar graphics or curves.

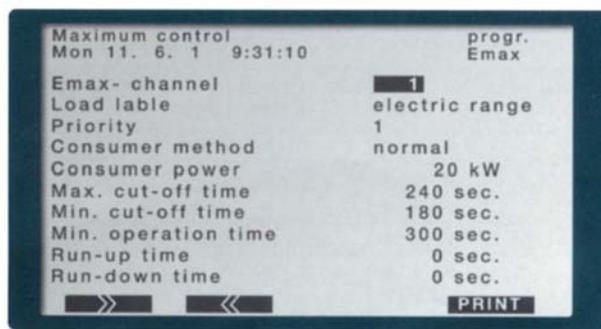
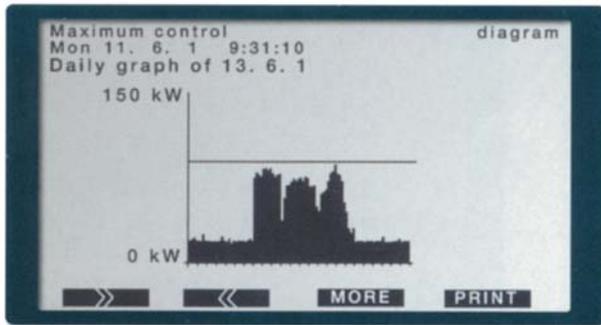
The bar graph contains the harmonic contents from the fundamental up to the 40th harmonic. The bars are displayed as a percentage of the fundamental. The curves and the bar graphics can be scaled. Within the graphics, some additional measured values are displayed.

The scaling of the bar graph can be adjusted to enable very small harmonic voltages or currents to be measured.





Maximum Demand Control for 64 Load Shed Outputs



The PROCONT can measure kW Max Demand in two ways:

- From an external kWh pulse input.
- Utilising the internal measurement functions of the PROCONT controller.

Accuracy of the measurement will depend upon the accuracy of the Current Transformers, if the PROCONT internal measurement system is used, or the accuracy of the pulse sender if an external kWh pulse is used.

The PROCONT will continuously monitor the forecast kW Maximum Demand (MD) in the next measurement period. In the UK this is normally 30 minutes but may be set as required. The PROCONT will continuously measure the actual MD., the forecast MD and the load value in kW (if any) to be disconnected in order to meet the Target MD value selected.

Having received the command to load shed, the PROCONT then decides which of up to 64 loads should be selected in order to provide as little disruption to users as possible. This is achieved by setting priorities with max/min disconnection times, time block and other parameters as shown in this display.

A kW Load bargraph is stored on the PROCONT for the last 100 days. This can be printed out directly from the PROCONT printer port if required.

There are 64 channels available for Maximum Demand Load Shed. Channels are connected or disconnected according to the following:

- Power values (target value, mean, actual, trend, correction and connected power)
- Priority and switching mode (normal, cycle, rotation)
- Time settings (min./max. disconnection time, min. connection time, make delay, break delay, switching pause)

Up to 4 different target values can be selected. These can be selected by external or internal commands. For example if power from the Supply Company is lost and an emergency or CHP generator is running then a new target value can be selected utilising an external input command.



Software

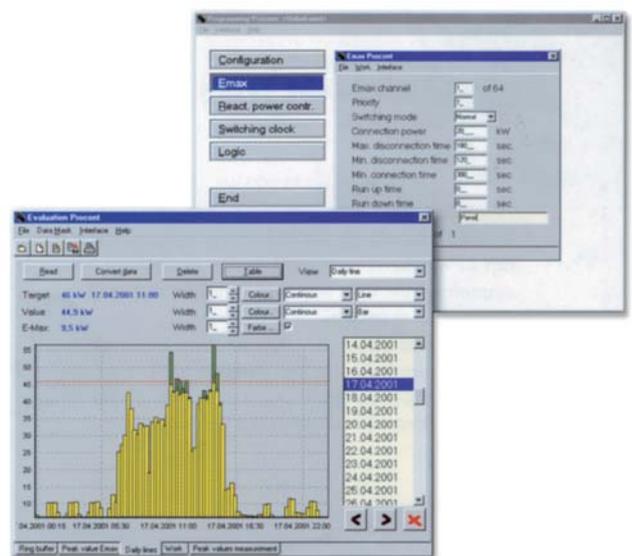
The software program Prorem can be used for programming, reading out and sampling of programmed, measured and event date.

Programming (send/retrieve):

Configuration data, maximum demand controller, power factor controller, time controller, logic

Evaluation (retrieve):

Event memory, peak values Max. Demand energy, daily graphs, peak values measurement.

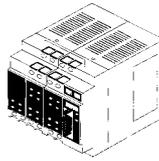


Function Modules - can be remotely located

Up to 32 I/O modules can be connected to the master interface of the PROCONT.

The following modules are available:

- MOD6I/6O - 6 inputs / 6 outputs,
- MOD12I - 12 inputs,
- MOD12O - 12 outputs,
- MOD24O - 24 outputs.

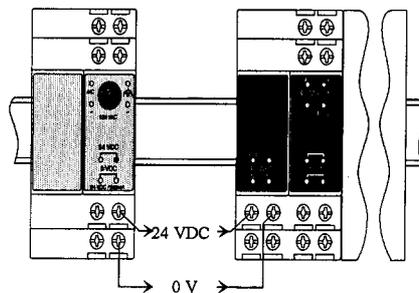


Switching Modules

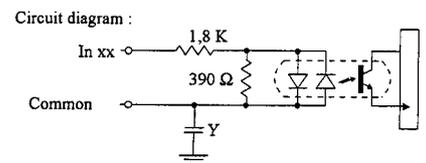
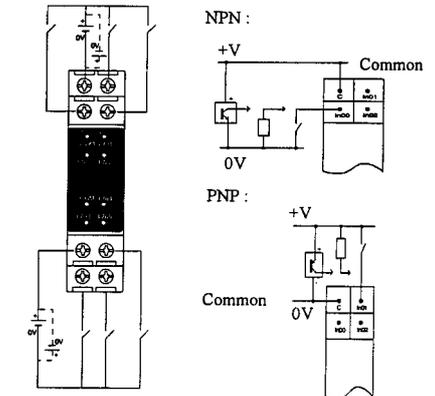
Commands from the PROCONT are given to output modules, and external commands are received via input modules. These commands are given via the master interface within the PROCONT.

Switching is performed by means of the DIN rail mounted input (I) and output (O) modules. The modules are powered by 24V DIN rail mounted power supply modules. Commands to the modules are given via the network connector. All modules are in compliance with IEC 1131-2. The I/O modules can be remotely wired from the PROCONT so as to perform switching functions close to the loads to be shed/restored.

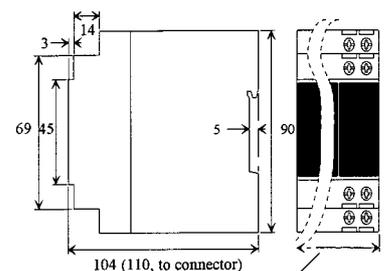
Function Modules



Nominal supply voltage: 24 VDC (-15% +20%)
 Max ripple: 5 %
 Internal protection fuse: yes
 Overvoltage protection: yes
 Reverse polarity protection: yes
 Immunity to power cuts: 10 ms max



Nominal input voltage: 24 VDC
 Level 0: 0 V to 5 VDC
 Level 1: 11 VDC to 30 VDC
 Current drawn: min: 7 mA
 nominal: 12 mA
 max: 17 mA
 Response time: T on : 10 ms T off : 30 ms
 Input frequency: 20 Hz
 Isolation: 2.5 KVDC
 Compatibility with 2 and 3 wire detectors : yes



- MOD I/O 2 slots : 90
- MOD I/O 4 slots : 135
- MOD I/O 6 slots : 180
- Supply, Extension : 45

Inputs/outputs

Input/output indicators

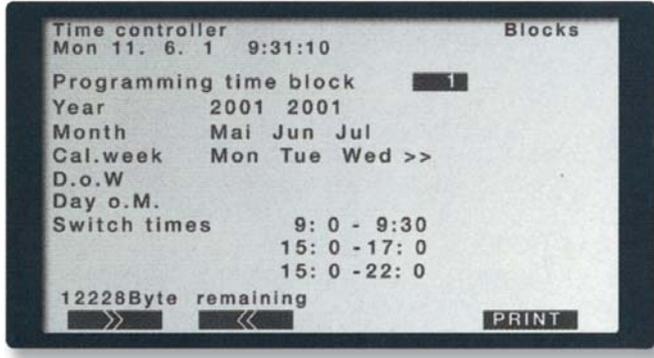
Supply

State indicators

Network connector



Time Controller

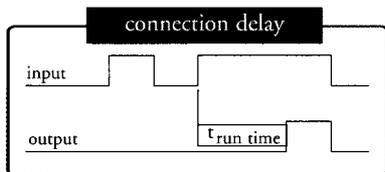


The time controller of the PROCONT Control System is equipped with numerous setting possibilities. With its 16 channels and 160 free programmable time blocks, it provides the possibility to realise time programs of daily repeated or one-off intervals within twenty years.

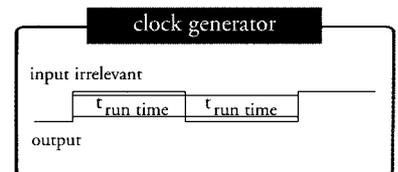
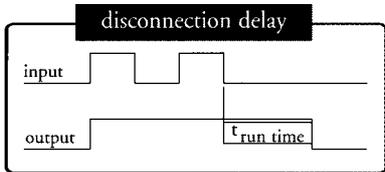
In addition to the load shedding functions, the time controller can also change over the target MD settings, according to tariff requirements. The PROCONT has a built in calendar to take account of leap years, holidays and special national holidays. The available memory space for additional time control operations is permanently displayed.



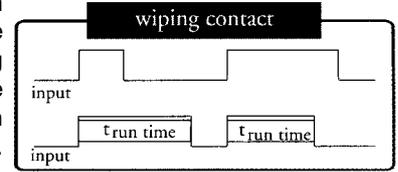
Timer



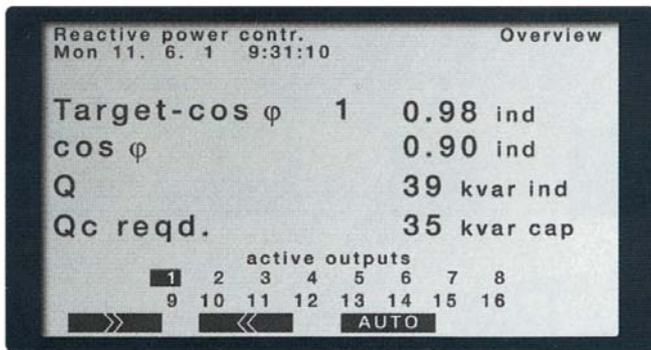
The system puts 8 timers at your disposal. Each timer can be used in different operating modes.



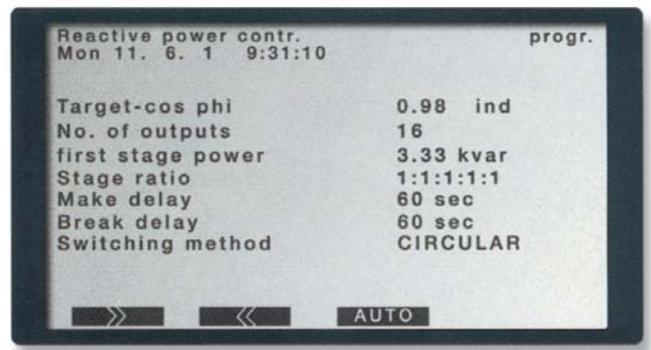
The course diagram can be seen on the right side. The running time of the timers can be set in steps between 0 and 99999 seconds.



Power factor controller 16 steps



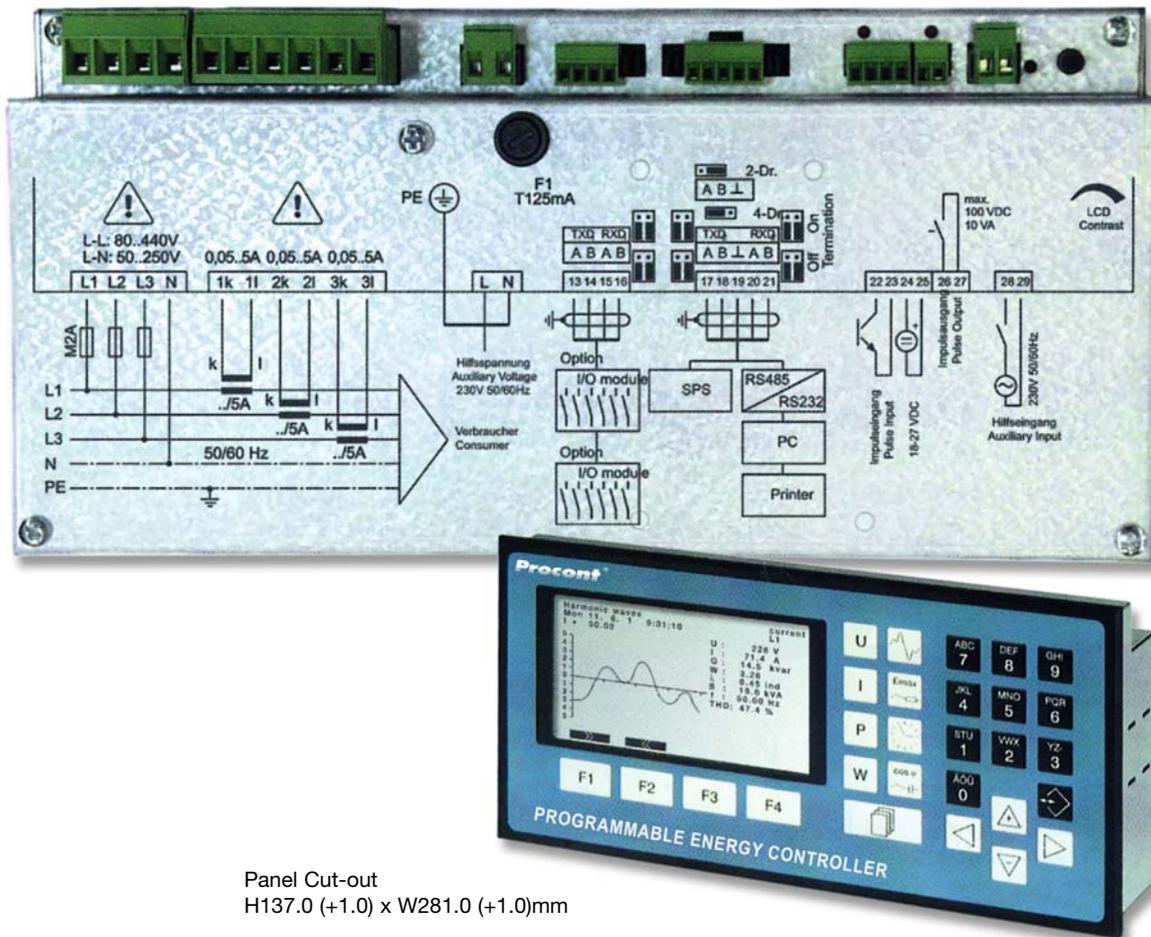
The power factor controller provides 16 outputs and works with up to 4 targets (0.8ind...1.0...0.8cap). The stage power of the first capacitor stage can be set in the range of 0.00 to 999.99kVAr.



The following stage ratios can be set: 1:1:1..., 1:1:2..., 1:2:2..., 1:2:3:6..., 1:2:4..., 1:2:4:8..., 1:1:2:4..., 1:2:3:4..., 1:2:3..., 1:1:2:2:4... The time after a connection or disconnection can be programmed between 20 and 999s. Rotation or linear switching is available.

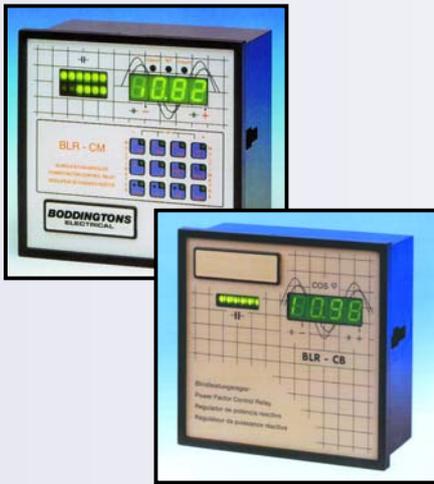
Technical Data

Technical data



Panel Cut-out
H137.0 (+1.0) x W281.0 (+1.0)mm

Auxiliary voltage:	230V (Option 110V)
Net frequency:	47 ... 63Hz
Power consumption	20VA
Measuring inputs:	
Current path:	5A (50mA ... 5.5A)
Option:	1A (10mA ... 1.1A)
Power consumption:	1.25VA at 5A
Rated current Long term:	In = 5A
Long term overcurrent:	1.2 * In
Short term overcurrent:	2.4*In (duration: 5s, pause with maximum In: 1h)
Voltage path:	
Signal frequency:	45 ... 65Hz for the fundamental
Voltage input:	60 ... 250V
Power consumption:	2.75VA at 230V
Auxiliary input:	230V 50/60Hz + active
Pulse output:	kWh pulse output
Max switching frequency:	4.75Hz
Max voltage of the contact:	100V DC, max. 1A
MD measurement periods:	10, 15, 30 or 60 minutes
Ambient temperature:	0°C ... +45°C
Storage temperature:	-20°C ... +60°C
Humidity class:	F according to DIN 40040 (15% up to 95% without dew)
Weight:	2.5kg
Protection class front/back side:	IP 50 / IP 20



Power Factor Control Relays

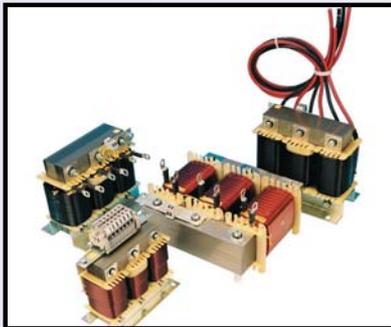
Our CA/CB range of PFC controllers are available with 3, 6, 12 and 14 steps and have options for High Harmonic Current and Low Power Factor alarm contacts.

Our CM relay is available with 6 or 12 steps and has RS232/RS485 output, CMWIN data logging software with an integrated multimeter for all electrical values. Unlike most instruments of this type the CM relay has an LED display and each value is displayed by its own tab key; an easy to use, accurate and reliable Power Factor Controller and multimeter combined.

All PFC controllers are guaranteed against faulty parts and labour for 5 years from date of despatch from our factory,

Panel Mounted Multimeter

Panel mounted multimeter measuring 96 x 96 x 81mm (deep inc. terminals) measures every electrical value and can be supplied with RS 485 output. The price is extremely attractive. The instrument shown has LED display and stores max/min values. A range of panel mounted multimeters is available with kW pulse output and multimedia card data logging facilities.



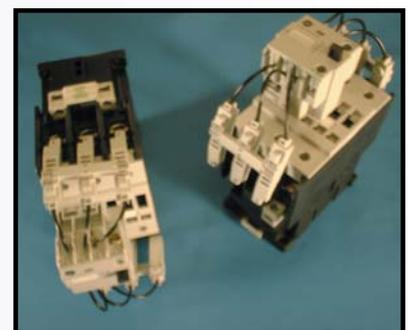
Harmonic Blocking and Tuning Reactors

Capacitor banks are subject to serious overload if there are excessive harmonics on the system. The range of PFC controllers (CA/CB/CM) all have THD harmonic overload indication and can be supplied with external switching contacts.

Reactors are compact and have an excellent name for quality. 50kAVr, 210Hz reactors with over temperature alarm contacts are normally ex-stock.

Capacitor Switching Contactor

The GE Power Controls capacitor switching contactors in stock. The inrush current is absorbed by current limiting resistors which are in circuit for one cycle - enough to absorb the inrush and enable price savings to be achieved. Contactors for 25, 50 & 100kVAR are kept in stock for the PFC Engineer.



Switchboard Rubber Matting

We supply switchboard matting for working voltages up to 17,000V. Rubber matting conforming to BS921 is in stock along with our range of other electrical safety products, such as insulated tools, gloves, cable preparation tools and insulating fibre glass ladders.