

X10335 – PFC2 30Kvar and 50kVAR Range 2-Channel Power Factor Switch



Issue 6

1 Introduction

The PFC2 range of Capacitor switches provide optimised switching and control of three phase capacitive loads for Power Factor Correction, suitable for a three phase supply using the two-leg control technique. Signal control is by a DC signal.

They incorporate an automatic resetting temperature trip fitted to the heatsink. They also have an integral semiconductor power fuses.

The two models in this series include the 30kVAR and 50kVAR, with the 50kVAR model being fan cooled.



Sample Photo - PFC2-30KVAR.



2 Applications

The PFC2 controllers are suitable for 3-wire, 3-phase floating-star or closed-delta configured capacitive loads for Power Factor Correction and can be used in capacitor banks with or without chokes fitted.

These power control stacks are designed to dramatically reduce the inrush current normally found with contactor based systems, They also allow for repetitive and rapid switching as there are no mechanical contacts to arc, and feature a controlled switch off to minimise flicker and eliminate RFI problems.

These power switches could be used in places where rapid changes in Power Factor could be seen such as welding plants, lifts, cranes and wind powered plants.

3 Function

3.1 Operation

These solid state capacitor switches are comprised of two anti-parallel thyristor diode modules with appropriate transient protection connected across them. These modules are mounted on a heat sink and are controlled by a microprocessor based trigger module which determines the precise time to trigger the thyristor so as to eliminate any high current switching transients.

The processor monitors the heat sink temperature of both the 30 and 50 kVAR models. On the 50kVAR model the cooling fan will switch on when the heat sink temperature reaches 55°C. Both models will turn off if the heat sink temperature rises above 90°C and it will reset again when the temperature drops below 85°C.

The switching of the controller is by a control signal from 8 to 24V DC, this can be from an external power supply (J2 EXT). These input signals can be either common positive or common negative.

You can also use the onboard internal DC power supply (J2 INT) which provides a +12V DC output, this can be fed back into the controller into the +VE SIGNAL input via 'volt free' contacts or semiconductor switches.

The maximum DC voltage present when the thyristors are not conducting can be 150% of the peak mains voltage, so any discharge resistors used should be rated accordingly. Discharge reactors should not be used because the continuous DC voltage that is present would destroy them. It is recommended that discharge resistors are used and that they are designed to meet the peak DC voltages which may be seen in a permanent installation.



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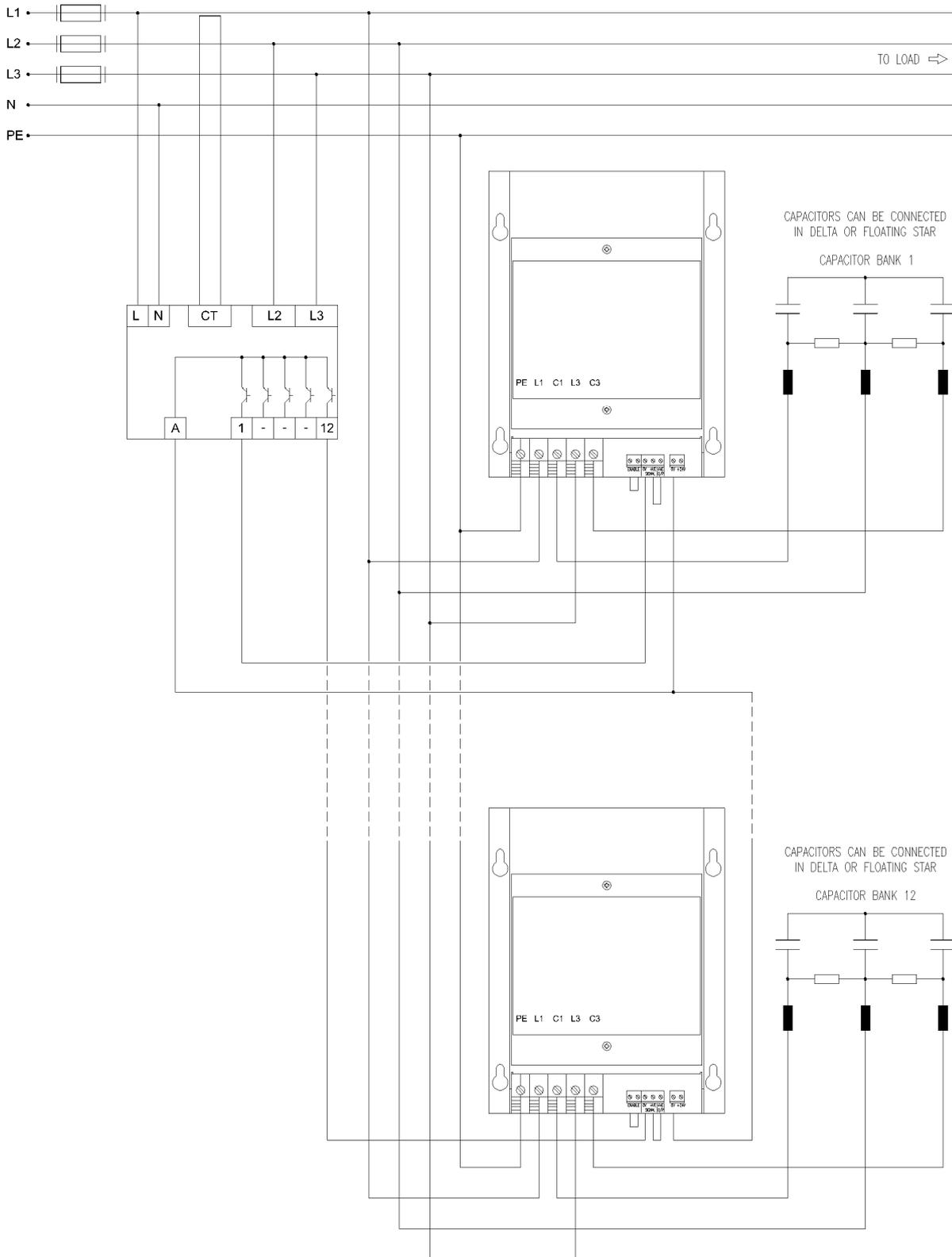
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3.2 Connection Diagram – Fig. 1

FOR SWITCHING A COMMON OV SIGNAL



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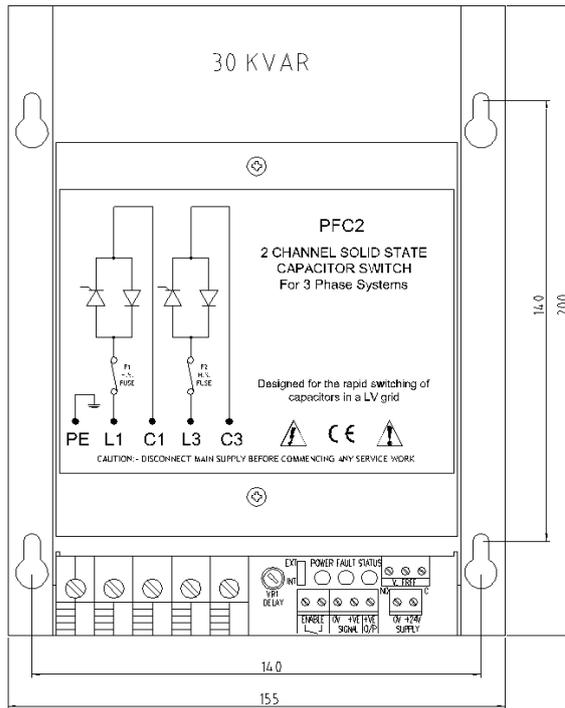


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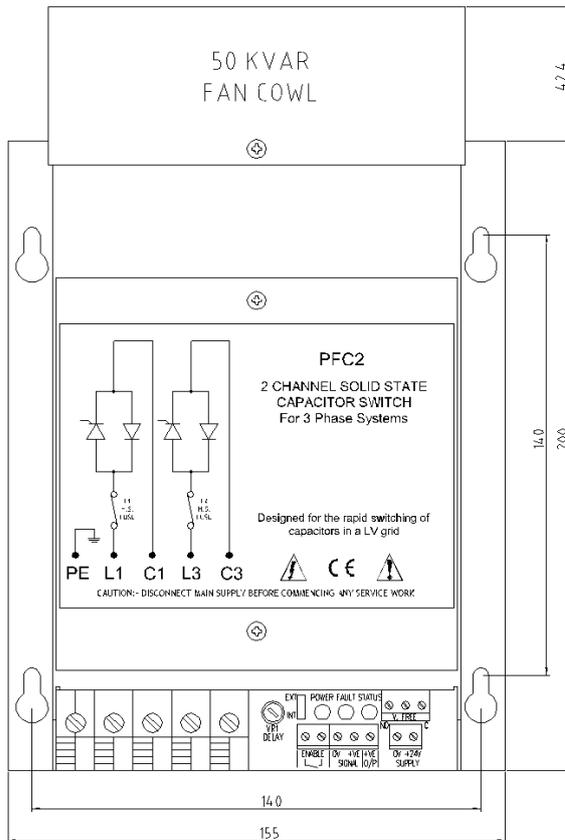
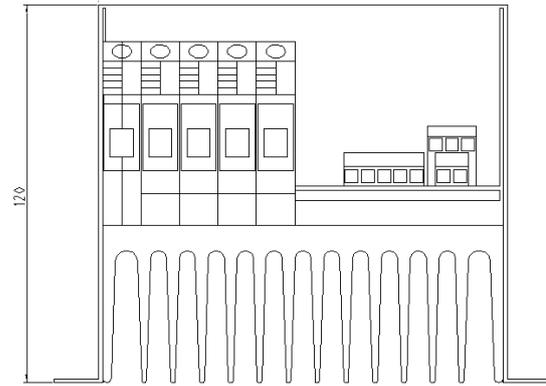
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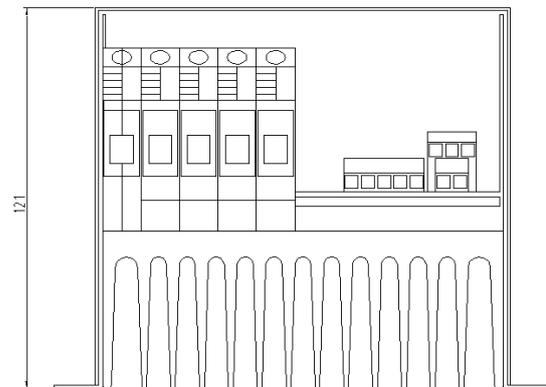
3.3 Mechanical Drawings Fig. 2



USE M5
FIXING
SCREWS



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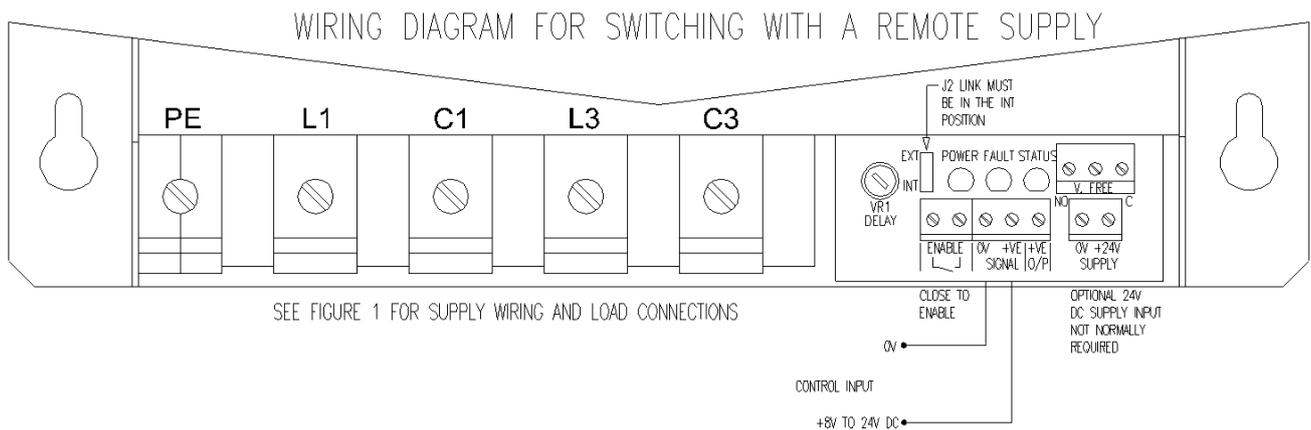
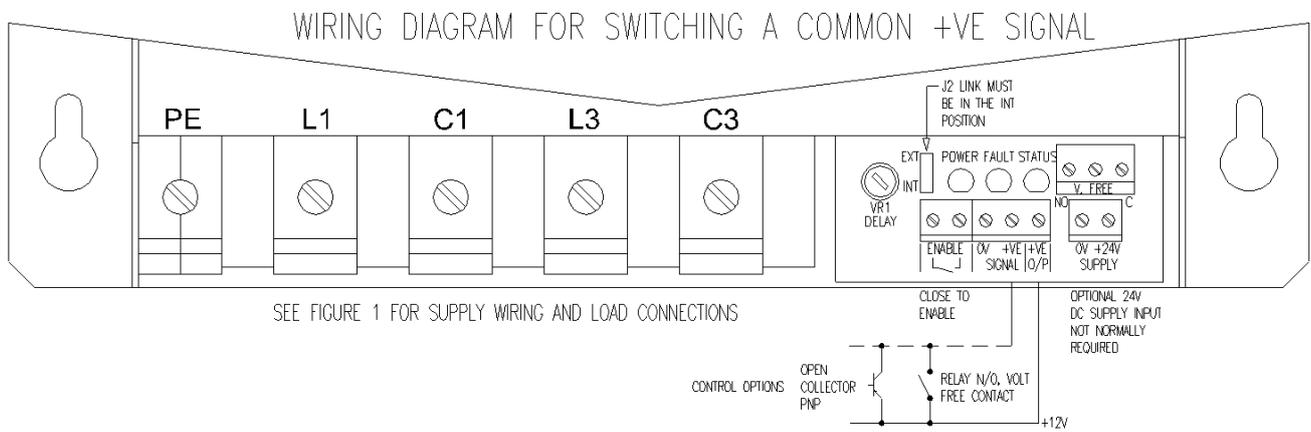
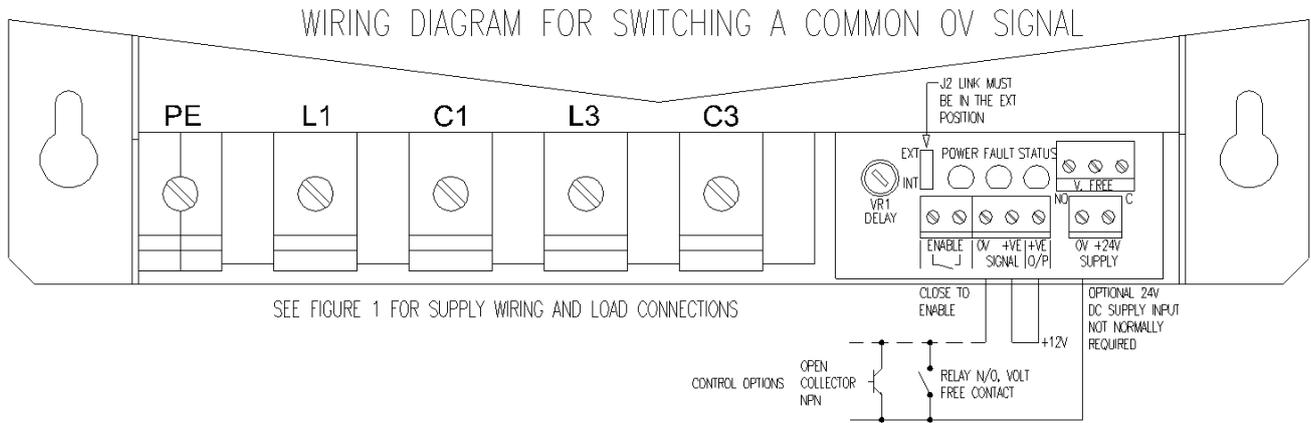
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3.4 Control Options – Fig. 3



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3.5 Fault delay timer VR1

This allows the power factor load capacitors to discharge before indicating a possible fault condition; the following table shows some recommended settings for various KVAR ratings.

POWER IN KVAR	DELAY TIME IN SECONDS	VRI SETTING
25	20	1
50	40	2

3.6 Fan activation 50 KVAR unit

When the temperature of the heat sink reaches 55°C the cooling fan is activated and it will remain on until the heat sink temperature drops below 50°C.

3.7 Over Temperature Alarm

If the temperature of the heat sink reaches 90°C the red fault LED will flash rapidly, the controller and the orange status LED will go off and the fault relay will energise. When the heat sink temperature drops below 85 °C the controller will reset, the status LED will come back on the red fault LED will turn off and the relay will de-energise.

3.8 Fuse Fail Alarm – (External DC Supply Needed)

If the supply or fuse fails in either L1 or L3 inputs the red fault LED and the orange status LED will flash alternately, if the control signal is turned on during this period the red fault LED and the relay will energise and remain latched on continuously until the firing card power supply is turned off. The controller must be powered down in order to allow the controller to reset.

3.9 Enable input

The contacts of the enable input must be closed for the controller to operate.

3.10 Maintenance

Generally thyristor switches are maintenance free but the following points should be observed;

The 50kVAR controller is equipped with a fan and it should be checked every two years, if it has become defective it should be replaced with a fan of the same type.

Generally the heat sinks should be checked regularly to ensure that the fins are not obstructed with dust or debris, it is worth checking that the thyristor terminals are also free from any pollution.

Continuous over temperature tripping will be indicated by the normally open contacts of the alarm relay closing, this may indicate that one of the above fault modes has occurred.

3.11 Cooling requirements

This robust stack assembly has an operational temperature of 65°C when naturally cooled and has a built in 90°C over temperature trip on the heatsink as a safety feature. The unit should be mounted vertically, with heatsink fins aligned top to bottom, and with sufficient surrounding air space to maximise natural convection cooling. If the unit is mounted in an enclosure or cabinet, adequate ventilation and/or forced air-cooling should be fitted. The 50kVAR controller has a fan which is normally off, but automatically turns on at high heatsink temperature (see SPECIFICATIONS – Fan switch-on and over temperature.)

4 Installation

If the PFC2 controllers are mounted in a control panel they should be mounted in a vertical position with the heat sink fins running top to bottom. Care must be taken to ensure that sufficient cooling is available for the PFC2 power switches; in continuous operation at maximum current the heat sink temperature can reach 90°C. Ensure that the heat sink fins are not obstructed by cables or ducting and that the controllers are not fixed directly above one another. Ensure the cabinet is cooled sufficiently to avoid the controllers tripping on over temperature, they will reset when the temperature drops below 85°C but they will be out of action for that period of time.

Maximum dissipated heat:-

1 x PFC2 controller 30KVAR at 400V AC, 2 x 44A is approximately 80W.

1 x PFC2 controller 100KVAR at 400V AC, 2 x 72A is approximately 130W.

4.1 Load Considerations

The PFC2 series of power controllers are designed for 3-wire, 3-phase floating-star or closed delta configured capacitive loads. For further information on configured loads, see our supporting datasheet - AC Power Control Specifications and Application Circuits (APC - ref. X10322).

4.2 Connections

This unit has clamp type connectors for all auxiliary-wiring requirements.

NOTE: The controller is factory set for an internal power supply. For alternative 'voltage free' alarm supply details see Functions section. Please contact our Technical support for further details.

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5 Specifications

Power/(current ratings):	30kVAR (50A); 50kVAR (75A) @ a typical supply of 415V RMS
Input voltage:	415V RMS +/- 10%
Frequency:	50/60Hz
External DC Supply:	24VDC (250mA) – Only when fuse failure monitoring is required
Control signal input:	8 to 24V DC, Common 0V or Common +VE, Open Collector or Volt Free Contact
Alarm relay functions:	The voltage free alarm relay is rated for 125V ac @ 2A
LED indicators:	Green = DC Power ON, Red = Fault, Orange = Signal enabled, Red/Orange = Capacitors discharging
Cooling fan:	24V DC (NOTE: Fan fitted on 50KVAR model only)
Fan 'switch-on':	50KVAR units typically 55 °C
Over Temperature:	Trip in temperature @ 90°C, +/- 1°C (Status LED indicator 'flashes' with ON/OFF rapid pulsing) Trip out temperature @ 85°C, +/- 1°C
Phase loss detection:	Phase loss or Fuse failure orange and red LEDs flash alternately
Status LED Fault condition:	Status LED indicator 'flashes' ON/OFF continuously at 1.5 second intervals
Sensor loss detection:	Status LED indicator 'flashes' ON/OFF continuously in equal intervals.
Power cable terminations:	Supply and Load 16mm ² rising clamp terminal block Earth 16mm ² rising clamp terminal block
Terminal torque settings:	2.5Nm (16mm ²) Power terminals only.
Signal cable terminations:	Remote supply Auxiliary alarm (relay) 2.5mm ² rising clamp terminal block Control signal 2.5mm ² rising clamp terminal block
Protection:	IP20
Fusing 30kVAR:	80ET (80A) High-Speed Semiconductor type fuse, or equivalent
50kVAR:	100ET (100A) High-Speed Semiconductor type fuse, or equivalent
Control circuit protection	F1A Control Circuit Protection fuse (On PCB next to Transformer)
Working temperature:	65°C (maximum operational)
Dimensions:	205mm (D) x 155mm (W) x 120mm (H) 30KVAR 250mm (D) x 155mm (W) x 120mm (H) 50KVAR
Fixing centres:	4 x 4.5mm-clear keyhole slots on fixing centres 140mm (W) x 140mm (D)
Weight:	(30KVAR) 3.0kg (50KVAR) 3.4kg

Note: SAFETY WARNING – Isolate supply before removing cover; Metal parts, in particular the case may get very hot when the unit is fully operational; DO NOT COVER enclosure ventilation slots.

6 Fusing

It is recommended that fast acting semiconductor type fuses (as supplied) be used for protection. See SRA Data sheet X10255 for further information. It is recommended that supply fuses are installed in the load supply.

7 CE Marking

This product family carries a CE marking. For information see recommendation section and contact our sales des. (see Declaration of Conformity).

8 Recommendations & Safety Requirements

Additional supporting documents, which may be appropriate for your application, are available on request. These include X10255: SRA – Safety Recommendations & Advice.

NOTE: It is recommended that installation and maintenance of this equipment should be done with reference to the current edition of the I.E.T. (formerly I.E.E.) regulations (BS7671) by suitably qualified/trained personnel. The regulations contain important requirements regarding installation and safety of electrical equipment. Specific installers should refer to local and national regulations.

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9 Order Code

When ordering directly, please use the following stock codes:-

Manufacturer Stock Code	Product Description	Rating
A418301	PFC2 30kVAR	3-phase, 30kVAR, 50A@ 415V, 2/3rds control
A418302	PFC2 50kVAR	3-phase, 50kVAR, 75A@ 415V, 2/3rds control

Available on request: Spare HS fuses 80ET (80A) or 100ET (100A) SCR-type



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