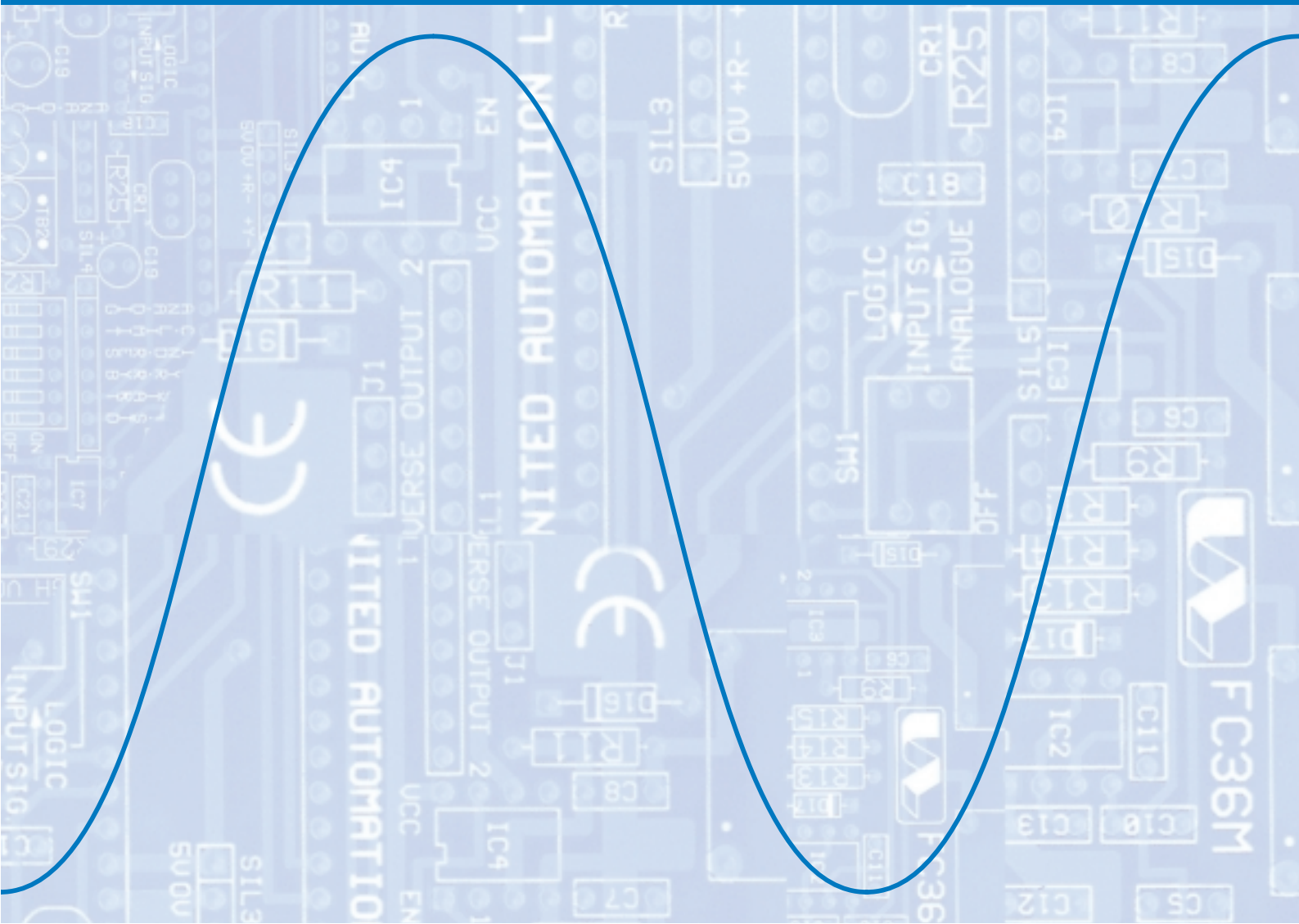


united automation limited

first in power electronics





united automation limited

INTRODUCTION

Power Control from United Automation

UAL is one of the UK's leading manufacturers of power control products. This position was achieved as a result of the technical strengths and dedication to its customers.

The company was formed in 1964 since then; the business has expanded continuously relocating to a new purpose building facility in 1999.

The company's markets are international. Products are sold into a wide variety of industry sectors and market segments including; end users, distributors, contractors and OEMs.

Our standard product range covers the majority of power control applications, however, where the customer has a requirement which cannot be met by a standard product, we provide specific design solutions. This is a key differentiating factor for UAL as the size of the company and the expertise in our design team means that we can react quickly to provide high quality design solutions, which leave our competitors standing.



Picture courtesy of Promart



Our production team employ leading edge business techniques to ensure a continuous improvement both in customer service levels and cost reduction. All business processes are underpinned by the ISO9002 quality system for which we achieved accreditation in 1995.

We now have a very secure base from which to develop the company and have recently set out a very challenging strategy for sales growth, which will be achieved through a focus on five key areas:

- Understanding and delivering exceptional value for our customers
- Developing our employees
- Expanding our market coverage
- Introducing new products
- Implementing e-business practices.



Picture courtesy of Royal Navy

With these initiatives we believe that our customers will experience even greater benefits from working with United Automation as a key supplier.



CONTENTS

INTRODUCTION

| | |
|-----------------------------------------------|-----|
| Product Application and Safety Considerations | 2 |
| Power Electronics Theory and Application | 3 |
| Application Table | 4-5 |

COMPACT PHASE ANGLE REGULATORS

| | |
|-------------|---|
| CSR Chips | 6 |
| CSR B and E | 6 |
| PSR-25 | 7 |
| TPSR-25 | 7 |

PHASE ANGLE REGULATORS

| | |
|--------------|----|
| QVR & QVR/S | 8 |
| QVR/RFI-TB | 8 |
| QVR/S-RFI-TB | 8 |
| QLC | 9 |
| QLC/RFI-TB | 9 |
| AVR-25 | 10 |

BURST FIRING REGULATORS

| | |
|----------------|----|
| BVR-25 | 10 |
| ZVS-16DV | 11 |
| ZVT-1, ZVT-2 | 11 |
| ZVT-25 | 12 |
| ZVT 'E' Sensor | 12 |

PHASE ANGLE FIRING CIRCUITS & POWER MODULES

| | |
|----------|----|
| AFM-11 | 13 |
| FC11AL | 13 |
| FC11AL/2 | 14 |
| PAC2 | 14 |
| MAT | 15 |

BURST FIRING CIRCUITS & POWER MODULES

| | |
|------------------|----|
| BM-1, BM-2, BM-3 | 16 |
| FC11BL | 16 |
| FC11BL2 | 17 |
| BMT3A | 17 |

DUAL MODE FIRING CIRCUITS & POWER MODULES

| | |
|------------|----|
| STOM-1 | 18 |
| STOM-2 | 18 |
| FC36M | 19 |
| HFM36A | 19 |
| FC36MV PDM | 20 |
| FC36MV | 21 |

SINGLE & THREE-PHASE POWER CONTROL ASSEMBLIES

| | |
|------------------------------------|-------|
| Assembly Application Circuit Chart | 22-23 |
| PR1 | 24 |
| EVR | 24 |
| LAC | 25 |
| SAC | 26 |
| HAC | 27 |
| DCR Rectifier Assemblies | 28 |

SPECIALISED POWER PRODUCTS

| | |
|----------------|----|
| SSC-25 | 29 |
| DCM-24 | 29 |
| LTMZ-2, LTMZ-4 | 30 |
| SSR-LN | 31 |
| RMS/DC-FB | 31 |

SPARES

| | |
|----------------------------------------|----|
| Semiconductor Fuses | 32 |
| Miniature Circuit Breakers (Z Type) | 32 |
| Diode Modules (DD Type) | 32 |
| Thyristor Modules (TT Type) | 32 |
| Triacs (Bi-directional Semiconductors) | 33 |
| Single-phase Filters (F Type) | 33 |
| Three-phase Filters (S Series) | 33 |
| DIN Rail Heat Sinks | 33 |



INTRODUCTION

These notes detail essential considerations relating to the design, installation, maintenance and safety aspects of United Automations products. Further information relating to individual products is available from the technical data sheets, which can be accessed on the UAL web site, or may be obtained by contacting a member of the UAL technical support team directly.

In the design and use of thyristor controllers considerations should be given to the requirements of the Health and Safety at Work Act 1974 (HASW 1974) and the EC "Provision and Use of Work Equipment Regulations 1992" (PUWER), both available from the Health and Safety Executive (HSE) publications, within the UK.

CE Directives

These regulations affect the equipment emissions and immunity to Radio Frequency Interference (RFI) and various elements of safety for electrical equipment.

The European Community (EC) 'CE' Directives that mainly affect UAL's products are the Low Voltage Directive (LVD) and the Electromagnetic Compliance Directive (EMC). With further reference to appropriate European Harmonised Standards, the company has opted for the self certification method of assessment to address the wide range and variety of products supplied by United Automation Limited (UAL). A Declaration of Conformity may be issued with the product or supplied on request.

DESIGN CONSIDERATIONS

Transients

The transient voltages in thyristor circuits can be generated due to a power line disturbance, interrupting or energizing of transformer circuits and inductive or capacitive load switching etc. The elimination or reduction of these voltage transients requires slowing down the rate of dissipation of stored energy across the device by providing additional energy storage or dissipation means in the circuit. One of the most effective methods of doing this is to use Voltage Dependent Resistors (VDR).

A VDR fitted in parallel across the inductive load and/or across the supply power controller with short leads will help clamp voltage spikes generated by the inductive loads. The selected VDR's should have a maximum continuous voltage rating, higher than the supply voltage and have good energy absorption e.g. a VDR type Z250G, manufactured by Bowthorpe Thermometrics would typically be selected for any range of mains supplied single phase power controllers.

Cooling Requirements

The equipment's environment and its potential ambient temperature should be considered in the early stages of the product design process as this could have an adverse effect on the overall operating performance of the device. All UAL power control products are designed to work in the recommended industry MAXIMUM ambient temperature of 40°C

UALs products use a wide range of discrete power semiconductors, which under load conditions may generate excessive heat. When additional heatsinks are not supplied as an integral part of the units, we recommend some form of cooling should be fitted to keep the units MAXIMUM operating temperature to 65°C.

The use of an additional heatsink (this could be a conductive panel) suitably attached or mounted with the unit will help to dissipate heat away from the device(s). An alternative or additional method would be forced air-cooling (using a fan), helping the natural convection of airflow over an existing heatsink within the units. Water cooled heatsinks can be used for very high current applications.

Fusing

Semiconductor (fast acting to BS88 [IEC 269]) type fuses or circuit breakers (Semiconductor - MCB) should be used for unit and/or device protection.

The appropriate maximum load current should be known to select the required SCR fuse or MCB, but must not exceed the equipment rating. The $I^2 t$ ($A^2 s$) rating of the selected fuse, must be less than that of the equipment so as to protect the equipment's discrete device. Further appropriate fusing may be required for protection of the unit supply using standard fuse links and holders.

Earthing

The protective conductor terminal of the equipment must be utilised at all times and bonded to a good earth. The earth bonding leads of any combined equipment should be as short as possible and be substantial i.e. at least rated higher than the equipment's load. For further information refer to BS7671. Following these simple guidelines will ensure optimum use of any appropriate filter circuits, which may be required.

INSTALLATION AND MAINTENANCE CONSIDERATIONS

We recommend that installation and maintenance of all UAL equipment should be done with reference to the current edition of the I.E.E. wiring regulations (BS7671), by suitably qualified/trained personnel. The regulations contain important requirements regarding safety of electrical equipment within the UK (For International Standards refer to I.E.C Directive IEC 950).

PHASE ANGLE CONTROLLERS USED ON INDUCTIVE LOADS

High Surge Inrush

When a phase angle thyristor power controller is operated using loads where high inrush current surges can occur it is desirable to utilise a 'soft start' type of circuit. This type of circuit gradually increases the output of the thyristor controller so that there is no immediate application of full voltage to the load, which might cause damaging surge current. A typical load, which exhibits this type of characteristic, is a transformer primary. The magnitude of inrush current of the transformer depends on the design of the particular unit and the basic magnetic construction of the transformer. If the transformer saturates, it causes high inrush currents, which may damage the thyristor or blow the main SCR fuses of the thyristor power stack.

Thus, in soft start operation, if there is an input signal when the thyristor unit is energised, there will be no output of the thyristor unit. The output will initially be zero and then gradually increase to maximum output, as the soft start action takes place over a period of seconds. During normal operation of the thyristor, the soft start feature has no effect on the response speed of the thyristor.

Semiconductor Forward Voltages - dV/dt

A thyristor may be switched into the "ON" condition by a high rate of rise of forward voltage. This switching action can result without the presence of the normal firing pulse and is called ' dV/dt '. The false firing of thyristors in this manner can cause control problems. To prevent this condition occurring, RC and/or C networks are fitted directly across each thyristor or pair of inverse parallel thyristors (A typical SCR/SCR Powerblock Module).

The dV/dt parameter is of particular importance when thyristor power controllers are used in applications where the load has fast 'rise' times, or the unit is subject to high frequency transient voltages. Power contactor and circuit breaker closures on industrial power feeder circuits, are possible sources of high dV/dt .

The dV/dt capability of the thyristor is also temperature dependent, as its ability to withstand dV/dt decreases as the junction temperature increases. Operation at lower temperatures thus allows the thyristor to withstand higher dV/dt .

The suppression of dV/dt is also quite important for inductive loads such as transformers, because the inductance of the load can cause the current waveform to lag behind the voltage waveform.

An R-C snubber in parallel with the thyristor can reduce the dV/dt to within allowable limits.



What is a Thyristor?

A thyristor is a semiconductor device, which acts as an electronic gate. When switched on the gate will only allow the current to pass in one direction.

To switch alternating current, 2 devices are normally connected in inverse parallel. Each device is turned on by a trigger pulse applied to the gate and, will stay on until the load current through the thyristor drops to zero.

What is Burst Firing?

Using zero voltage switching (ZVS), burst firing gives power control with minimal interference.

This circuit inhibits radio frequency interference (RFI) by switching on or off at zero volts mains crossover, in repeating time periods (typically one second). The number of complete mains sine waves are varied in its on/off ratio, or duty cycle, linearly by the control signal level.

The burst firing circuit provides trigger pulses coincident with mains zero polarity changeover, ensuring only complete half cycles are passed through resistive loads. This prevents step changes in load current, and thus virtually no RFI is produced.

Filtering

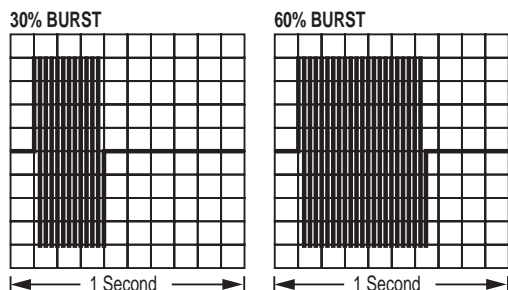
Any phase angle controller that does not incorporate its own RFI filter must be installed with an additional remote filter. The cable connections (including earth) to this filter must be kept as short as possible, to limit 'RFI pick-up'. To work effectively, the whole system must have bonded (common) earth connections.

The addition of other filters or 'snubber networks' to this system may cause 'interaction' and therefore reduce the recommended filters performance.

Supply Voltages

All of our products have been designed to operate at the voltages specified on the product data sheet.

These voltage tolerances are within the guidelines set out in the European directive BN EN 61010. Within the UK, these are 110v, 230v and 400v with tolerances of +10% and - 6%



Burst Fire

The above graphs show load voltage, using a variable time base switching down to half cycle increments at 30% and 60% throughput. Output is block bursts of complete sine waves, switched on and off at zero voltage mains crossover. More power is allowed through as on to off ratio is increased.

Inhibition of RFI

No step function as current is only switched on at zero voltage, therefore the RFI problem is eliminated.

What is Phase Angle Firing?

In each mains half cycle, the duration of thyristor conduction is determined by the firing instant, relative to mains polarity changeover. Once switched on the driven thyristor conducts power to the load until the end of each applied half cycle, resulting in a chopped sine wave output.

Increasing the DC signal to an isolated input of a firing circuit provides proportional control of power to the load with increasing conduction angle.

Advantages of phase angle firing include operation with all types of loads including inductive, soft start, current limit facility and stepless quick response.

What is Dual Control?

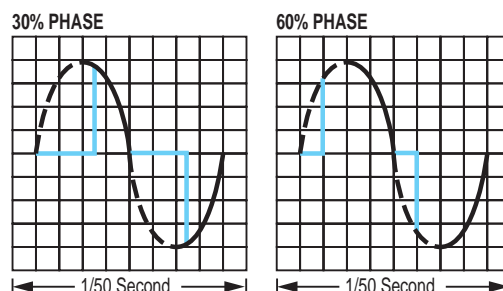
The dual control feature includes both phase angle and burst firing.

Either can be selected separately or used for soft starting in phase angle mode and automatically switch over to burst mode when the control signal has reached a pre-set level. The control will remain in the burst fire state even if the input signal drops below the pre-set level.

What is Logic Control?

Logic firing of a thyristor enables the unit to operate like a solid state relay or a contactor i.e. when the logic signal is low the thyristor is off and when high the thyristor is on.

To minimise RFI the thyristor unit switches on at the zero crossing of the mains voltage after the logic input goes high and when the logic input goes low the unit switches off at the next zero crossing point.



Phase Angle

The above graphs show load voltage against time on 1/50 second repeating time base at 30% and 60% throughput. Output is a chopped sine wave, allowing more power through as the conduction angle is increased.

Generation of RFI

In phase angle control, the step function of current creates a wide range of radio frequencies and it's the main source of radio frequency interference (RFI).



| Application | Compact Phase Angle Regulators | Phase Angle Regulators | Burst Firing Regulators | Phase Angle Firing Circuits & Power Modules |
|---------------------------|--------------------------------|------------------------|-------------------------|---------------------------------------------|
| Page No. | 6 - 7 | 8 - 10 | 10 - 12 | 13 - 16 |
| HEATING | | | | |
| Air Conditioning | | ✓ | ✓ | ✓ |
| Air Curtains | | ✓ | ✓ | ✓ |
| Annealing | | | | ✓ |
| Boilers | | | ✓ | ✓ |
| Dryers | ✓ | ✓ | ✓ | ✓ |
| Extruders | | | | ✓ |
| Heaters | ✓ | ✓ | ✓ | |
| Heater Mats | ✓ | ✓ | ✓ | |
| Heating Tape | ✓ | ✓ | ✓ | |
| Hot Plates | ✓ | ✓ | ✓ | |
| Hot Wires | ✓ | ✓ | ✓ | |
| Immersion Heaters | ✓ | ✓ | ✓ | |
| Induction Heaters | | | | ✓ |
| Industrial Furnaces | | | | ✓ |
| Infra-Red Heaters | ✓ | ✓ | | ✓ |
| Ovens | ✓ | ✓ | ✓ | ✓ |
| Smelting | | | | ✓ |
| Soldering Pots | ✓ | ✓ | ✓ | |
| Space Heating | | | ✓ | ✓ |
| Stress Relieving | | | | ✓ |
| Trace Heating | ✓ | ✓ | ✓ | ✓ |
| Ultraviolet Heaters | | | | ✓ |
| Under floor Heaters | | | ✓ | ✓ |
| Heating & Ventilation | ✓ | ✓ | ✓ | ✓ |
| LIGHTING | | | | |
| Energy Saving | ✓ | ✓ | | ✓ |
| Halogen Lamps | ✓ | ✓ | | ✓ |
| Industrial Dimmers | ✓ | ✓ | | ✓ |
| Quartz Lamps | ✓ | ✓ | | |
| Runway Lighting | | | | ✓ |
| Tungsten lamps | ✓ | ✓ | | |
| ELECTROCHEMICAL | | | | |
| Cathodic Protection | | | | ✓ |
| Chlorine Production | | | | ✓ |
| DC Reclamation | | | | ✓ |
| Electro plating | | | | ✓ |
| Water Purification | | | | ✓ |
| Battery Chargers | | | | ✓ |
| Hydrogen Production | | | | ✓ |
| VIBRATORS /SHAKERS | | | | |
| Bowl Feeders | ✓ | ✓ | | |
| Industrial Vibrators | | | | ✓ |
| Magnetic coil | | | | |
| Shakers (food) | | ✓ | | ✓ |
| Electromagnets | | | | |
| Transformers | ✓ | ✓ | | ✓ |
| MOTORS | | | | |
| Clean Room Extract | ✓ | ✓ | | |
| Exciters | ✓ | ✓ | | ✓ |
| Fan Motors (H & V) | ✓ | ✓ | | |
| Industrial Vacuum | ✓ | ✓ | | |
| Pumps | ✓ | ✓ | | |



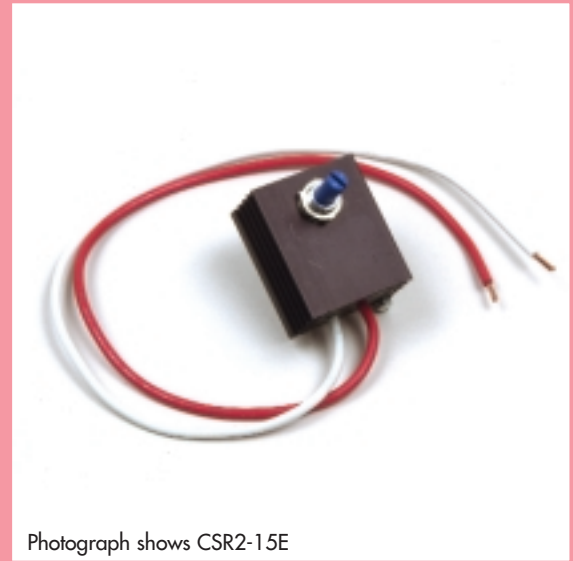
CSR Chips

The CSR chip is a combined thick film triac and phase angle firing circuit built into one package with an isolated tab heatsink. The two types available (A & B) are different sizes for mounting purposes.

Technical Specification

| | |
|----------------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power ratings (max. nominal): | 1.38kW, 2.30kW, 3.45kW |
| Control option (remote potentiometer): | 250kΩ 1W @ 230V & 100kΩ @ 110V |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see spares) |
| Dimensions 'A' body & tab: | L30 x W18 x H8mm (4mm dia. hole) |
| Dimensions 'B' body & tab: | L35 x W18 x H8mm (10mm dia. hole) |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| CSR604A | 6A | 230V | A01106 |
| CSR1004A | 10A | 230V | A01110 |
| CSR1504A | 15A | 230V | A01115 |
| CSR604B | 6A | 230V | A01206 |
| CSR1004B | 10A | 230V | A01210 |
| CSR1504B | 15A | 230V | A01215 |



Photograph shows CSR2-15E

CSR B and E

The CSR power regulator is a CSR chip with combined control potentiometer, available in two types (B & E).

- B type is open type construction.
- E type includes a heatsink & enclosure.
- Adhesive dial & hairline knobs are available as optional extras.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power ratings (max. nominal): | 1.38kW, 2.30kW, 3.45kW |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see spares) |
| Single hole fixing: | 10mm |
| Dimensions (E series body): | L44 x W36 x H23mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| CSR2-6E | 6A | 230V | A01406 |
| CSR2-10E | 10A | 230V | A01410 |
| CSR2-15E | 15A | 230V | A01415 |
| CSR2-6B | 6A | 230V | A01306 |
| CSR2-10B | 10A | 230V | A01310 |
| CSR2-15B | 15A | 230V | A01315 |
| CSR1-6E | 6A | 110V | A01496 |
| CSR1-10E | 10A | 110V | A01410 |
| CSR1-15E | 15A | 110V | A01495 |



PSR-25

The PSR is a full wave AC power control module with in built triac, snubber network and firing circuit.

Technical Specification

| | |
|----------------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 5.75kW |
| Control option (remote potentiometer): | 250kΩ 1W @ 230V & 100kΩ 1W @ 110V |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see spares) |
| Dimensions: | L56 x W43 x H26mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| PSR-25 | 25A | 230V | A01725 |



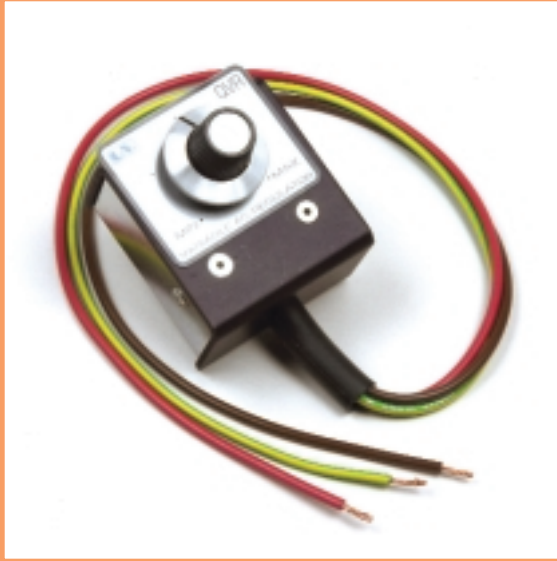
TPSR-25

The TPSR is a full wave AC power control module, capable of giving proportional control from a thermistor.

Technical Specification

| | |
|----------------------------------------|-------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60 Hz |
| Power rating (max. nominal): | 5.75kW |
| Control option (remote potentiometer): | 250kΩ 1W @ 230V & 100kΩ 1W @ 110V |
| Thermistor: | UQT 1090-B |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see spares) |
| Dimensions: | L56 x W43 x H26mm |

| Product name | Current(A) | Voltage | Order code |
|--------------------------|------------|---------|------------|
| TPSR-25 | 25A | 230V | A01825 |
| Thermistor: UQT 1090B | | | A84018 |



QVR & QVR/S

These fully adjustable, mains controlled variable regulators are designed to withstand four times full load current on switch on.

- QVR models have variable potentiometer.
- QVR/S models have a variable potentiometer with an 'off' position.
- Adhesive dial & hairline knobs are available as optional extras.

Technical specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 3.45kW |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series (see spares) |
| Dimensions (excluding wires): | L59 x W55 x H32mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| QVR-110V | 15A | 110V | A12112 |
| QVR-230V | 15A | 230V | A12201 |
| QVR/S-110V | 15A | 110V | A13113 |
| QVR/S-230V | 15A | 230V | A13202 |



QVR/TB-RFI & QVRS/TB-RFI

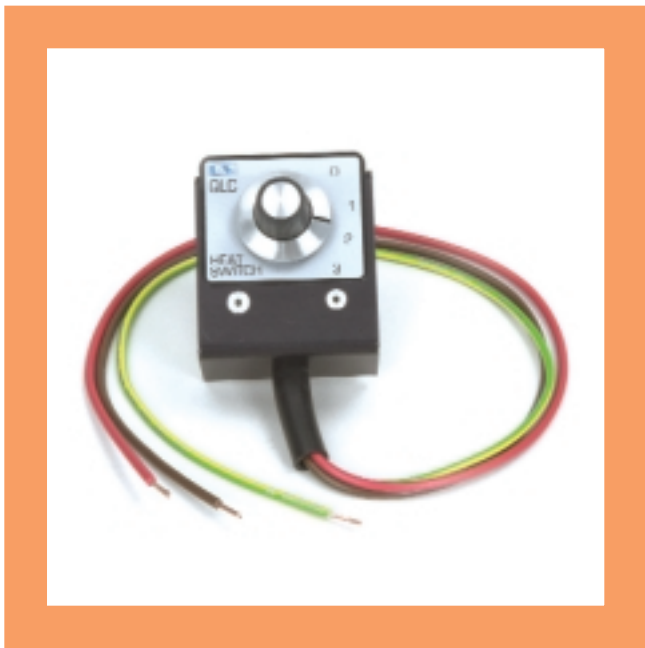
These mains controlled variable regulators are QVR's with a built in RFI suppression network, and have a plug in line and load terminal connection block.

- QVR/TB-RFI models have variable potentiometer.
- QVRS/TB-RFI models have a variable potentiometer with an off position.
- Adhesive dial & hairline knobs are available as optional extras.

Technical specification

| | |
|-----------------------------------|-----------------------------------|
| Line voltage: | 110V or 230V RMS +/-10% @ 50/60Hz |
| Power rating (max. nominal): | 3.45kW |
| Maximum operating temperature: | 65°C |
| EMC emission standards: | BS EN 55022 Class A |
| Dimensions (excluding terminals): | L78 x W65 x H41mm |

| Product name | Current(A) | Voltage | Order code |
|------------------|------------|---------|------------|
| QVR/TB-RFI 110V | 15A | 110V | A14118 |
| QVR/TB-RFI 230V | 15A | 230V | A14231 |
| QVRS/TB-RFI 110V | 15A | 110V | A14117 |
| QVRS/TB-RFI 230V | 15A | 230V | A14232 |



QLC

This power regulator is pre-set to give three positions of control (low, medium, and high) and an off position.

The QLC is designed to withstand four times full load current on switch on.

- Adhesive dial and hairline knobs are available as optional extras.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 3.45kW |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series (see spares) |
| Dimensions (excluding wires): | L59 x W55 x H32mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| QLC-110V | 15A | 110V | A11114 |
| QLC-230V | 15A | 230V | A11203 |



QLC/TB-RFI

This power regulator is a QLC with a built in RFI suppression network and plug in line and load terminal connection block.

- Adhesive dial and hairline knobs are available as optional extras.

Technical Specification

| | |
|-----------------------------------|-----------------------------------|
| Line voltage: | 110V or 230V RMS +/-10% @ 50/60Hz |
| Power rating (max. nominal): | 3.45kW |
| Maximum operating temperature: | 65°C |
| EMC emission standards: | BS EN 55022 Class A |
| Dimensions (including terminals): | L78 x W65 x H41mm |

| Product name | Current(A) | Voltage | Order code |
|-----------------|------------|---------|------------|
| QLC/TB-RFI 110V | 15A | 110V | A11101 |
| QLC/TB-RFI 230V | 15A | 230V | A11201 |



AVR-25

These are manually controlled variable AC power regulators with integral heatsink and internal semiconductor fusing.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 5.75kW |
| Maximum operating temperature: | 65°C |
| Integral high-speed fuse: | 30A SCR type |
| Recommended RFI suppression: | F-type series (see spares) |
| Dimensions: | L146 x W95 x H87mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| AVR 110V | 25A | 110V | A15101 |
| AVR 230V | 25A | 230V | A15201 |



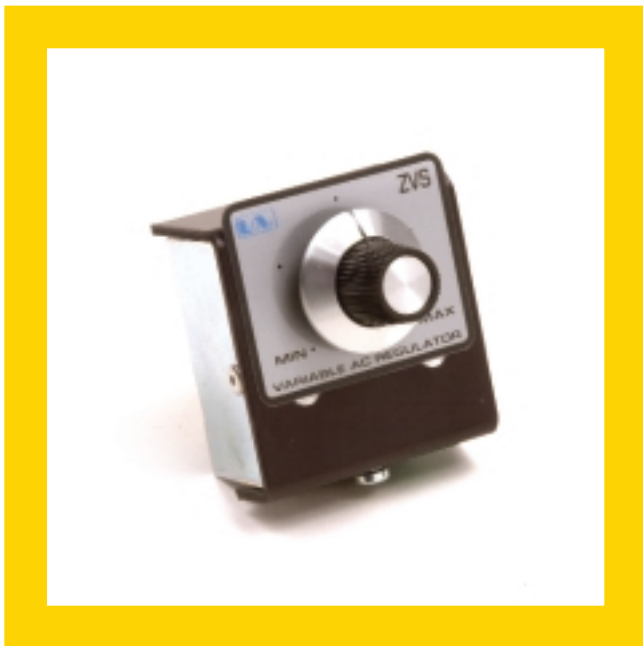
BVR-25

These manually controlled AC power regulators are suitable for most resistive heater loads, with integral heatsink and internal semiconductor fusing.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 5.75kW |
| Maximum operating temperature: | 65°C |
| Integral high-speed fuse: | 30A SCR type |
| Dimensions: | L146 x W95 x H87mm |

| Product name | Current(A) | Order code |
|--------------|------------|------------|
| BVR-25 | 25A | A28211 |



ZVS-16DV

This is a dual voltage manual controlled AC regulator for proportional control of resistive loads.

- Adhesive dial & hairline control knobs are available as optional extras.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 3.68kW |
| Maximum operating temperature: | 65°C |
| Dimensions: | L58 x W55 x H32mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|------------|------------|
| ZVS-16DV | 16A | 110 / 230V | A23212 |



ZVT-1 & 2

This manually controlled, energy saving temperature controller combines linear sensing with a power output.

- Two temperature ranges available.
- Micro processor based.
- Anti-flicker software.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 3.68kW |
| Temperature control range: | 0-40°C and 0-150°C |
| External temperature sensor: | RGT2-10K (see ZVT'E' sensor) |
| Maximum operating temperature: | 65°C |
| Dimensions : | L58 x W50 x H32mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| ZVT-1 110V | 16A | 110V | A26111 |
| ZVT-2 230V | 16A | 230V | A26212 |



ZVT-25

This is a high power version of the ZVT temperature controller complete with an integral heatsink and semiconductor fusing.

- Two temperature ranges available.
- Micro processor based.
- Anti-flicker software.

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 110V or 230V RMS +/- 10% @ 50/60Hz |
| Power rating (max. nominal): | 5.75kW |
| Temperature control range: | 0-40°C and 0-150°C |
| External temperature sensor: | RGT2-10K (see ZVT 'E' sensor) |
| Maximum operating temperature: | 65°C |
| Integral high-speed fuse: | 30A SCR type |
| Dimensions: | L146 x W95 x H87mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| ZVT-25 110V | 25A | 110V | A26117 |
| ZVT-25 230V | 25A | 230V | A26217 |



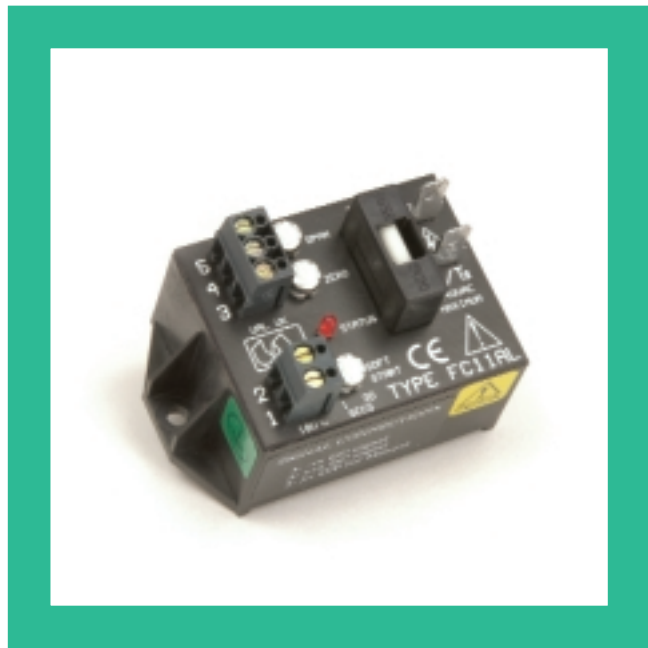
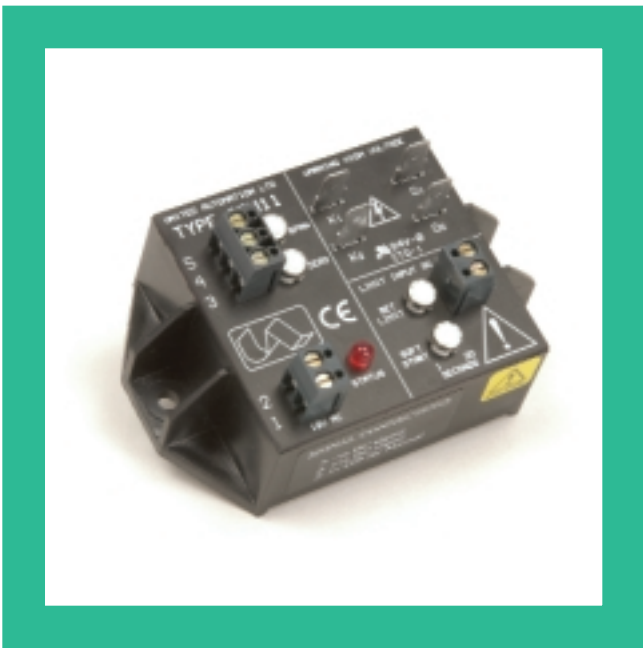
ZVT 'E' Sensor

This NTC sensor operates linearly over a 0 to 150°C temperature range. It is sealed in a robust stainless steel probe and has high temperature PTFE leads. The device is designed to compliment the ZVT range of temperature controllers.

Technical Specification

| | |
|--------------------------|------------|
| Temperature sensor type: | RGT2-10K |
| Resistance @ 250°C: | 10,000Ω |
| Liquid time constant: | 14 seconds |
| Dimensions: | 50 x 6.4mm |
| Lead length: | 1m |

| Product name | Order code |
|--------------|------------|
| ZVT-E Sensor | A26011 |



AFM-11

This universal firing module is designed to accept a wide range of common voltage or current control signals. It provides a powerful pulse-train output, which is ideal for driving semiconductor devices in both single-phase, and phase to phase applications.

The module is not restricted to 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 480v.

Features

- Output status LED
- Current limit input
- Adjustable soft start

Technical Specification

| | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 100V to 480V RMS @ 50/60 Hz |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 18V to 24V RMS @ 100mA |
| Maximum operating temperature: | 65°C |
| Soft start: | 0 to 20 seconds |
| Dimensions: | L92 x W62 x H44mm |

| Product name | Order code |
|--------------|------------|
| AFM-11 | A31411 |

FC11AL

This universal firing module is designed to accept a wide range of common voltage or current control signals, suitable for driving most semiconductor devices in both single and phase to phase applications.

The module is not restricted to 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

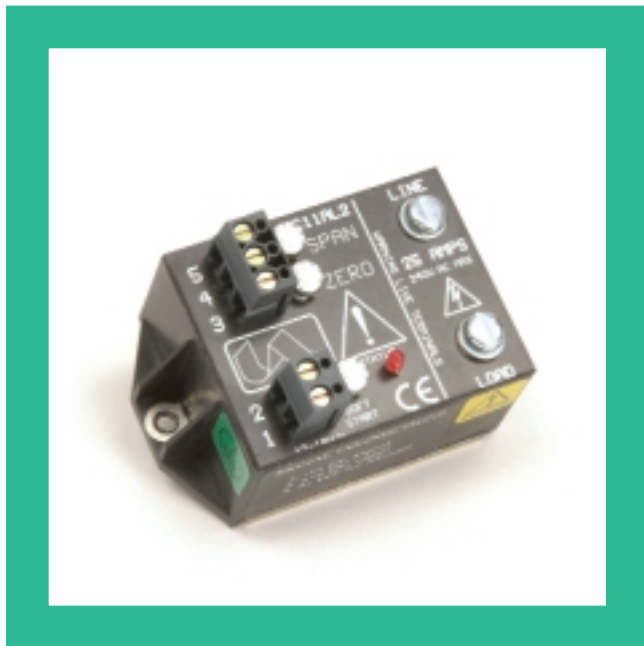
Features

- Output status LED
- Adjustable soft start
- MONO-LINK™ firing system

Technical Specification

| | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 110V to 400V RMS +/- 10% @ 50/60 Hz |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 12V to 18V RMS @ 65mA |
| Maximum operating temperature: | 65°C |
| Soft start: | 0 to 20 seconds |
| Dimensions: | L73 x W44 x H44mm |

| Product name | Order code |
|--------------|------------|
| FC11AL | A31214 |



FC11AL/2

This power module features an integral triac to enable control of resistive and inductive loads up to 25A, when fixed to a suitable heatsink.

The module can be used on line voltages from 25v to 230v, simply by selecting the type of auxiliary transformer used.

Features

- Output status LED
- Adjustable soft start

Technical Specification

| | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 25V to 250V RMS @ 50/60 Hz |
| Power rating (max. nominal): | 5.75kW |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 12V to 18V RMS @ 65mA |
| Maximum operating temperature: | 65°C |
| Soft start: | 0-20 seconds |
| Recommended RFI suppression: | F-type series filter (see Spares) |
| Dimensions: | L73 x W44 x H44mm |

| Product name | Current(A) | Order code |
|--------------|------------|------------|
| FC11AL/2 | 25A | A31217 |



PAC2

This compact power module is capable of controlling mains driven loads up to 25A, when mounted on a suitable heatsink.

Wiring is simplified by the use of only two power terminals, two auxiliary AC input terminals and a 3-way connection to a manual potentiometer or voltage signal input.

Technical Specification

| | |
|---------------------------------|----------------------------------------------------------------------|
| Line voltage: | 25V |
| Power rating (max. nominal): | 5.75kW |
| Control options: | Manual 5kΩ potentiometer Voltage signal input (typically 0-5V DC) |
| Auxiliary supply (transformer): | 10-15V AC @ 50mA |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see Spares) |
| Dimensions: | L56 x W43 x D26mm |

| Product name | Current(A) | Order code |
|--------------|------------|------------|
| PAC 2 | 25A | A72210 |



MAT

This compact manual driver is designed to trigger triacs in 110v to 230v applications.

The firing circuit is easily wired to a remote triac via a three way terminal block. The unit also has an integral cermet adjuster to set a minimum offset voltage level.

Technical Specification

| | |
|---------------------------------------------|-------------------------------------|
| Line voltage: | 110V to 230V RMS +/- 10% @ 50/60 Hz |
| Minimum offset: | 0 to 50% of line voltage |
| Maximum operating temperature: | 65°C |
| Dimensions (enclosure size): | L41 x W23 x H21mm |
| Overall pot shaft-terminal block dimension: | 53mm |

| Product name | Voltage(V) | Order code |
|--------------|------------|------------|
| MAT | 110 / 230V | A31414 |

Specialised Requirement?

If you have a specialised requirement that cannot be met by a standard product then UAL can help.

One phone call will put you in touch with our experienced team of design and development engineers.

After discussion of your particular application and operating environment we may be able to offer a custom design solution that meets your exact needs.

Tel: 01704 516500

Fax: 01704 516501

enquiry@united-automation.com



Photograph shows BM3

BM-1/2/3

The BM trigger modules are used in thyristor power assemblies for virtually all resistive heater loads.

- BM1 - Single or phase to phase applications.
- BM2 - 2/3 control of three phase applications.
- BM3 - Fully controlled three phase applications.

The firing circuit is designed to give a variable on/off output ratio, proportional to a wide range of common voltage or current control signals.

The module is not restricted for just 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

Features

- Output status LED
- MONO-LINK™ firing system

Technical Specification

| | |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 110V to 400V RMS +/- 10% @ 50/60 Hz |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply: | 18V to 24V AC/DC @ 65mA |
| Cycle time base (nominal): | 1 second |
| Maximum operating temperature: | 65°C |
| Dimensions: | L92 x W62 x H44mm |

| Product name | Order code |
|--------------|------------|
| BM-1 | A32411 |
| BM-2 | A32413 |
| BM-3 | A32414 |



FC11BL

This trigger module provides control of thyristors in virtually all single-phase or phase to phase resistive load applications.

The firing circuit is designed to give a variable on/off output ratio, proportional to a wide range of common voltage or current control signals.

The module is not restricted for just 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

Features

- Output status LED
- MONO-LINK™ firing system

Technical Specification

| | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 110V to 400V RMS +/- 10% @ 50/60 Hz |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 12V to 18V AC @ 65mA |
| Cycle time base (nominal): | 1 second |
| Maximum operating temperature: | 65°C |
| Dimensions: | L73 x W44 x H44mm |

| Product name | Order code |
|--------------|------------|
| FC11BL | A32410 |



FC11BL2

This power module features an integral triac to enable control of resistive loads up to 25A, when fitted to a suitable heatsink.

The controller is designed to give a variable on/off output ratio, proportional to a wide range of common voltage or current control signals.

The module can be used on line voltages from 110v to 230v simply by selecting the type of auxiliary transformer used.

Features

- Output status LED
- Soft start in phase angle mode

Technical Specification

| | |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 25V to 250V RMS @ 50/60 Hz |
| Power rating (max. nominal): | 5.75kW |
| Control options: | Manual potentiometer (typically 5k Ω) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Auxiliary supply: | 12V to 18V AC @ 65mA |
| Cycle time base (nominal): | 1 second |
| Maximum operating temperature: | 65°C |
| Dimensions: | L73 x W44 x H44mm |

| Product name | Current(A) | Order code |
|--------------|------------|------------|
| FC11BL2 | 25A | A32419 |



BMT3A

This microprocessor based temperature control module incorporates most of the characteristics of a three-phase firing circuit with the additional features of closed-loop temperature control. With three output stages, the module is suitable for driving thyristor pairs in single-phase, phase to phase, or 3-phase applications (2/3rds or full control).

The temperature, at which the system will regulate, is normally set with a 5k Ω manual potentiometer and graduated panel dial, although the module can also accept voltage, or current control signals.

The module is not restricted for just 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

Features

- Output status LED
- Switch selectable temperature ranges
- MONO-LINK™ firing system

Technical specification

| | |
|--------------------------------|-------------------------------------------------------|
| Line voltage: | 110V to 400V RMS +/-10% @ 50/60 Hz |
| Control options: | 5k Ω manual set pot voltage or current signals |
| Temperature range options: | 0 to 40°C and 0 to 150°C |
| Proportional band: | 1 to 15% |
| Thermistor type: | Betatherm 10K3A1 |
| Auxiliary supply: | 10V to 18V AC/DC @ 100mA |
| Cycle time base (nominal): | 1 second |
| Maximum operating temperature: | 65°C |
| Dimensions: | L92 x W62 x H44mm |

| Product name | Order code |
|--------------|------------|
| BMT3A | A33413 |



STOM-1

This microprocessor based power controller with integral power device, is capable of controlling loads up to 25A when fitted to a suitable heatsink.

A wide range of common voltage or current control signals is accepted by the module plus manual control via a potentiometer. An LED indicates the output status of the controller.

This module will operate in either phase-angle or burst-fire mode. It can be set up to soft-start in phase-angle mode, then switch over to burst-fire mode once the set point level is reached.

The unit is not restricted to 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

Features

- Output status LED
- Adjustable soft start

Technical Specification

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Line voltage: | 5V to 440V RMS @ 50/60 Hz |
| Power rating (max. nominal): | 5.75kW |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 10V to 18V AC @ 75mA |
| Maximum operating temperature: | 65°C |
| Recommended RFI suppression: | F-type series filter (see Spares) |
| Soft start: | 1 to 30 seconds |
| Dimensions: | L92 x W62 x H44mm |

| | |
|--------------|------------|
| Product name | Order code |
| STOM-1 | A34511 |



STOM-2

This microprocessor based trigger module is capable of driving most power thyristors and thyristor pairs.

A wide range of common voltage or current control signals is accepted by the module plus manual control via a potentiometer.

The module will operate in either phase-angle or burst-fire mode. It can be set up to soft-start in phase-angle mode, then switch over to burst-fire mode once a pre-set output level is reached.

The unit is not restricted to 230v or 400v applications as the auxiliary transformer can be selected to suit any line voltage up to 440v.

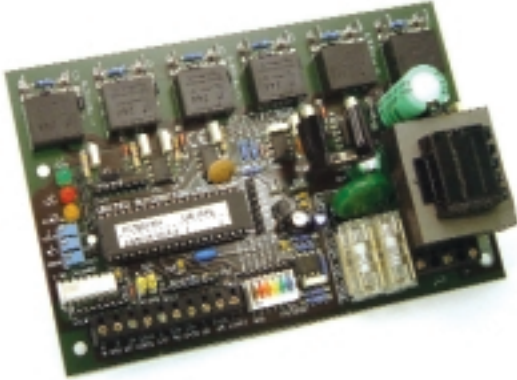
Features

- Output status LED
- MONO-LINK™ firing system
- Adjustable soft start

Technical Specification

| | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Line voltage: | 5V to 440V RMS @ 50/60 Hz |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V DC) Current signal (typically 4-20mA) |
| Auxiliary supply (transformer): | 10V to 18VAC @ 75mA |
| Maximum operating temperature: | 65°C |
| Soft start: | 1 to 30 seconds |
| Dimensions: | L92 x W62 x H44mm |

| | |
|--------------|------------|
| Product name | Order code |
| STOM- 2 | A34512 |



FC36M

This microprocessor based, three-phase firing circuit can operate in both phase-angle and burst-fire modes.

The firing circuit is designed to drive a wide range of thyristor types in different configurations but is commonly used to trigger three thyristor pairs in 3-phase thyristor control assembly applications. Each thyristor is individually driven by high-frequency voltage pulses, capable of driving high current devices.

Features

- Output status LED
- Phase rotation reversal
- Current limit input
- Over current latching
- Adjustable soft start

Technical Specification

| | |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Line voltage: | 110, 230 or 400V AC RMS +/- 10% @ 50/60 Hz |
| Control mode: | Phase-angle or Burst-firing |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V DC) Current signal (typically 4-20mA) |
| Adjustable ramp control: | 0 to 30 seconds |
| Current limit or Over current trip: | 0-100mV DC |
| Maximum operating temperature: | 65°C |
| Dimensions: | L162 x W108 x H36mm |

| Product name | Voltage | Order code |
|--------------|-------------|------------|
| FC36M | 110V | A34424 |
| FC36M | 230V | A34416 |
| FC36M | 415V / 440V | A34411 |



HFM36A

This is a fully enclosed, microprocessor based, 3-phase trigger module, that can be used in either phase-angle or burst-fire modes.

Commonly used to trigger three thyristor pairs in 3-phase thyristor power control assemblies, the module is suitable for control of most AC loads.

Features

- Output status LED
- Phase loss detection
- Phase rotation error indication
- Adjustable soft start
- MONO-LINK™ firing system

Technical Specification

| | |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 110, 230, 400V RMS +/- 10% @ 50/60 Hz |
| Control mode: | Phase-angle or Burst-firing |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (typically 0-5V or 0-10V DC) Current signal (typically 4-20mA) |
| Adjustable ramp control: | 0 to 30 seconds |
| Current limit input: | 0 to 5V DC |
| Maximum operating temperature: | 65°C |
| Dimensions: | L173 x W80 x H67mm |

| Product name | Voltage | Order code |
|--------------|---------|------------|
| HFM36A | 415V | A31432 |



Customer Solutions?

With many years of experience in the industry, we now have an excellent understanding of our customers' requirements.

Using United Automation as your potential or existing supplier, will enable us to deliver the following key benefits:-

Accredited quality system (ISO9001:2000) supporting:

- Customer satisfaction.
- Product reliability.

New product development supported by:

- Technical proposal.
- Turnkey designed solutions.

Product policy ensures:

- Leading edge technology.
- Agreed obsolescence.

You can help us to remain competitive by:

- Clearly defining your requirements.
- Identifying any constraints.
- Understanding end user requirements.

Tel: 01704 516500

Fax: 01704 516501

enquiry@united-automation.com



FC36MV PDM

The FC36MV-PDM is a remote programming and display module on which all the parameters of the FC36MV pcb may be viewed together with many additional display options and alarm capabilities.

Features

- Simple installation using:
 - TS35 DIN rail mounting
 - RJ45 1m long connection cable (supplied)
 - RJ45 FC36MV connection pcb (supplied)
- Powered from FC36MV pcb
- Compact and user-friendly controls
- Easily read - back-lit LCD display
- Alarm relay with sounder
- Interlock (tamper proof) and reset input
- Portable (plug/unplug) programmer

Technical Specification

Supply Voltage: 5V dc +/-10% (from FC36MV)

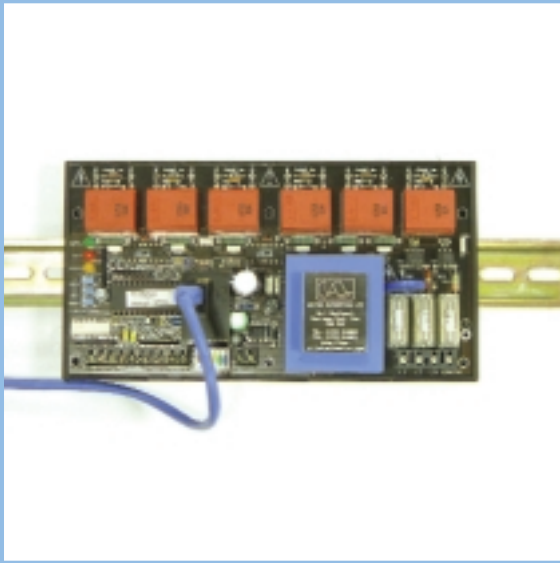
Control Options and status:

| | |
|---------------------------|-------------------------|
| Current limit set point | Phase rotation |
| Current trip set point | Phase frequency |
| Current limiting ON/OFF | Phase loss |
| Control set point | Ramp up/down time |
| Digital/Analogue mode | Soft/hard start & stop |
| Inductive /Resistive load | Standard/Delayed timing |

Operational temperature range: 0°C to + 65°C

Module dimensions (max.): L112 x W86 x H48mm

| | |
|--------------|------------|
| Product name | Order code |
| FC36MV-PDM | A31021 |



FC36MV

This microprocessor based, three-phase firing circuit is a higher specification version of the FC36M. It has various enhanced capabilities and integral features, which give improved performance in a wider range of applications.

Features

- High gate current drive
- Auto-phase correction
- Phase-loss detection
- Tracking of supply frequency from 40 to 70 Hz
- Compatible with remote programming display module (A31021)
- Optional RJ45 connection pcb
- Optional RJ45/RJ45 1M cable
- Optional DIN rail mounting enclosure

Technical Specification

| | |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Line voltage: | 230V, 415V or 440V RMS +/- 10% |
| Line frequency range | 40 to 70Hz |
| Control mode: | Burst-fire or phase-angle |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal (0 to 5V or 0 to 10V dc) Current signal (typically 4 to 20mA) |
| Input signal for current limit or over current trip: | 0 to 5V DC |
| Adjustable ramp control | 0-30 seconds |
| Operating temperature range: | 0°c to 65°c |
| Dimensions (pcb only): | L203 x W108 x H45mm |
| Fixings centres (pcb): | L75 x W193mm, |
| Fixings holes(pcb): | 4 x M3.5 clearance holes |

| Product name | Voltage | Order code |
|--------------|---------|------------|
| FC36MV | 230V | A34433 |
| FC36MV | 415V | A34428 |

Specialised Requirement?

If you have a specialised requirement that cannot be met by a standard product then UAL can help.

One phone call will put you in touch with our experienced team of design and development engineers.

After discussion of your particular application and operating environment we may be able to offer a custom design solution that meets your exact needs.

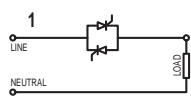
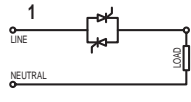
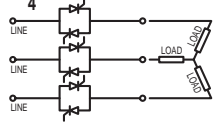
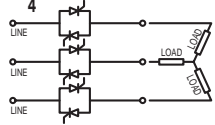
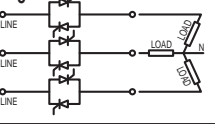
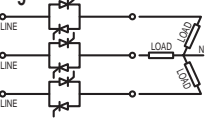
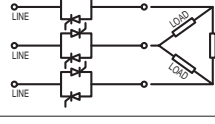
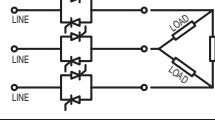
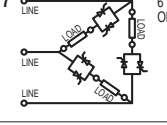
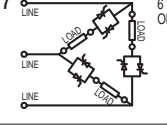
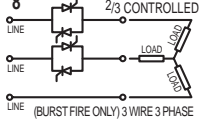
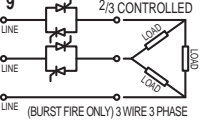
Tel: 01704 516500

Fax: 01704 516501

enquiry@united-automation.com



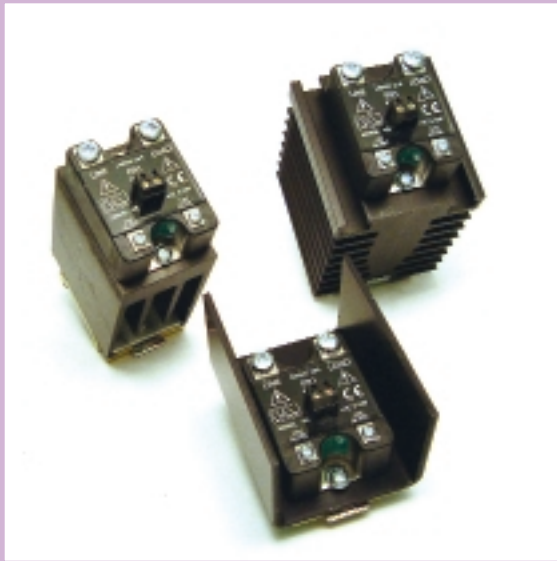
Single and Three-Phase Power

| Application Circuit | Max Current (Amps) | Max 240V Load (kW) | Max 415V Load (kW) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|
|  <p>1 2 WIRE PHASE TO PHASE AND PHASE TO NEUTRAL RESISTIVE</p> | 15 – 100 | 24 | 42 |
| | 100 – 250 | 58 | 104 |
|  <p>1 2 WIRE PHASE TO PHASE AND PHASE TO NEUTRAL INDUCTIVE</p> | 15 – 100 | 24 | 42 |
| | 100 – 250 | 58 | 104 |
|  <p>4 3 WIRE 3 PHASE FLOATING STAR LOAD RESISTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>4 3 WIRE 3 PHASE FLOATING STAR LOAD INDUCTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>5 4 WIRE 3 PHASE WITH STAR POINT TO NEUTRAL RESISTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>5 4 WIRE 3 PHASE WITH STAR POINT TO NEUTRAL INDUCTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>6 3 WIRE 3 PHASE CLOSED DELTA LOAD RESISTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>6 3 WIRE 3 PHASE CLOSED DELTA LOAD INDUCTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>7 6 WIRE 3 PHASE OPEN DELTA LOAD RESISTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>7 6 WIRE 3 PHASE OPEN DELTA LOAD INDUCTIVE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>8 RESISTIVE 2/3 CONTROLLED (BURST FIRE ONLY) 3 WIRE 3 PHASE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |
|  <p>9 RESISTIVE 2/3 CONTROLLED (BURST FIRE ONLY) 3 WIRE 3 PHASE</p> | 15 – 100 | 42 | 72 |
| | 100 – 250 | 104 | 180 |



Control Assembly Application Chart

| Burst Fire | Phase Angle | Dual | Logic | Model |
|------------|-------------|------|-------|-------------|
| ✓ | ✓ | ✓ | ✓ | PR1/EVR/LAC |
| ✓ | ✓ | ✓ | ✓ | HAC |
| | ✓ | | | LAC |
| | ✓ | | | HAC |
| ✓ | ✓ | ✓ | ✓ | SAC |
| ✓ | ✓ | ✓ | ✓ | HAC |
| | ✓ | | | SAC |
| | ✓ | | | HAC |
| ✓ | ✓ | ✓ | ✓ | SAC |
| ✓ | ✓ | ✓ | ✓ | HAC |
| | ✓ | | | SAC |
| | ✓ | | | HAC |
| ✓ | ✓ | ✓ | ✓ | SAC |
| ✓ | ✓ | ✓ | ✓ | HAC |
| | ✓ | | | SAC |
| | ✓ | | | HAC |
| ✓ | ✓ | ✓ | ✓ | SAC |
| ✓ | ✓ | ✓ | ✓ | HAC |
| | ✓ | | | SAC |
| | ✓ | | | HAC |
| ✓ | | | | SAC |
| ✓ | | | | HAC |



PR1

This range of single phase compact triac control assemblies are capable of controlling mains driven resistive loads, rated up to 5kW

Features

- Available in 1.5kW, 3kW & 5kW models
- Simple DIN rail mounting
- Solid-state control
- Output status LED indicator
- Over-temperature protection - auto-shutdown/reset
- AC or DC auxiliary power source input
- Proportional control DC signal
- Optional remote transformer (T30201 not supplied)

Technical Specification

| | | | |
|-------------------------------|----------------------------|--------------------|--|
| Line voltage: | 230V RMS +/-10% @ 50/60 Hz | | |
| Power ratings (max. nominal): | 1.38kW to 4.6kW (RMS) | | |
| Control mode: | Burst-fire | | |
| Control options: | 0 to 10V DC | | |
| Fixing: | TS35 DIN Rail | | |
| Auxiliary supply | 12-24V AC or DC @ 3VA | | |
| Fusing: | SCR type or Z-type MCB | | |
| Operating temperature range: | 0°C to 65°C | | |
| Overall dimensions: | PR1-1.5 | L80 x W60 x H65mm | |
| | PR1-3 | L80 x W45 x H130mm | |
| | PR1-5 | L75 x W70 x H135mm | |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| PR1-1.5 | 6A | 230V | A407249F |
| PR1-3 | 12A | 230V | A407250F |
| PR1-5 | 20A | 230V | A407251F |



EVR

These compact triac control assemblies are capable of driving mains driven loads, up to 6kW, without the need for an additional heatsink.

Features

- Single cable entry
- Available as burst fire or phase angle control
- Integral semiconductor ferrule fusing
- Manual (potentiometer) and signal control options
- Totally enclosed with integral heatsink
- Adjustable soft-start facility
- Output status led indicator

Technical Specification

| | | | |
|------------------------------|------------------------------------------------------------------------------------------------------------|--|--|
| Line voltage: | 230V RMS +10% @ 50/60Hz | | |
| Power rating (max. nominal): | 5.75kW (RMS) | | |
| Control mode: | Burst-fire or phase-angle | | |
| Control options: | Manual potentiometer (typically 5kΩ) Voltage signal range 0-24V DC Current signal (typically 4-20mA) | | |
| Isolation voltage (RMS): | 2500V | | |
| Soft-start time constant: | 0-20 seconds | | |
| Integral high speed fuse: | 30A SCR type (38L x 10mm ø) | | |
| Operating temperature range: | 0°C to 65°C | | |
| Dimensions: | L146 x W95 x H87mm | | |
| Fixing centres: | L119 x W75, M4 clearance holes | | |

| Product name | Current(A) | Voltage | Order code |
|--------------------|------------|---------|------------|
| EVR-25 Phase-Angle | 25A | 230V | A407222A |
| EVR-25 Burst-Fire | 25A | 230V | A407222B |



Photograph shows 400V version

LAC

Features

- Control option (see LAC power control assembly order code chart)
- 4kW – 24kW single phase.
- 15 to 100A single phase or phase to phase.
- Supply voltage range (RMS) 110 - 480V AC.
- Phase angle, burst firing logic control or dual control.
- Semiconductor fuses fitted.
- Naturally cooled.
- Dimensions: 240mm(W) x 150mm(H) x 100mm(D)

How to select the correct order code

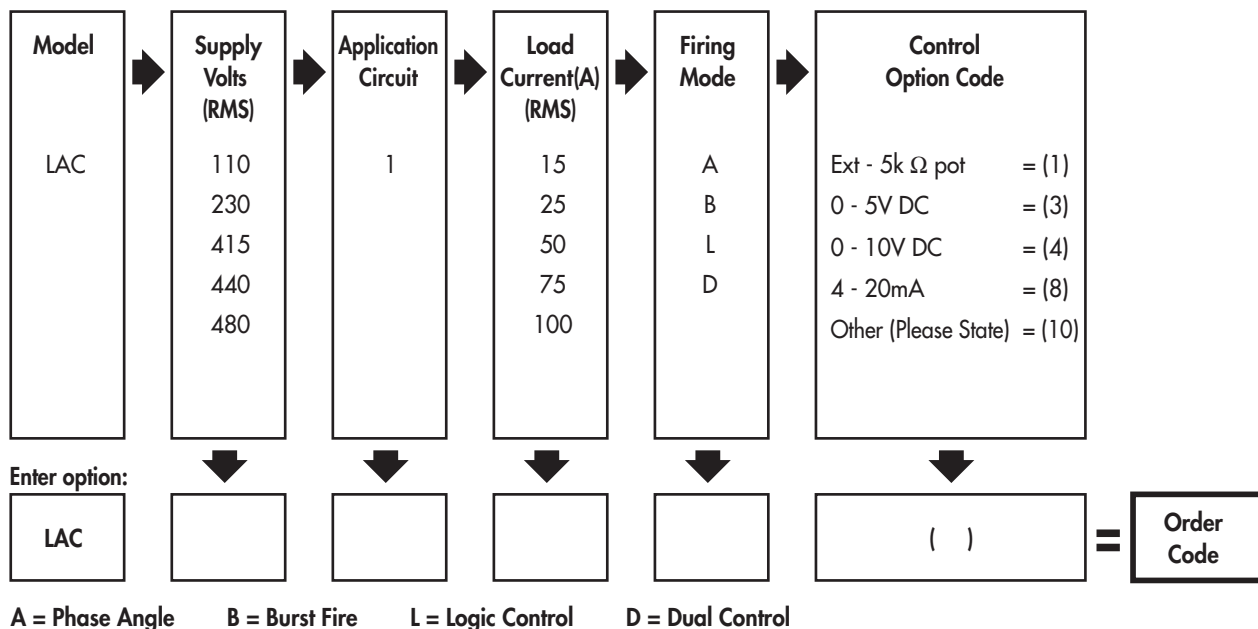
Referring to the single and three-phase power control assembly application chart:

- 1 Verify model
- 2 Select supply voltage
- 3 Select Application circuit (see pages 20-21)
- 4 Select load current
- 5 Select firing mode
- 6 Select control option and code

Example: A 21kW (50 Amp) resistive load, connected to a 415V phase to phase, could be controlled in burst-firing mode, via a 4-20mA signal.

The applicable stack code would be **LAC - 415 - 1 - 50 - B (8)**

LAC Power Control Assembly Order Code Chart





Photograph shows 100A version

SAC

Features

- Control option (see SAC power control assembly order code chart)
- 11kW – 72kW three phase.
- 15 to 100A, 3 phase or two thirds controlled.
- Supply voltage range (RMS) 220 – 480V AC
- Phase angle, burst firing logic control or dual control.
- Semiconductor fuses fitted.
- Naturally cooled.
- Dimensions: 340mm(W) x 230mm(H) x 120mm(D)

How to select the correct order code

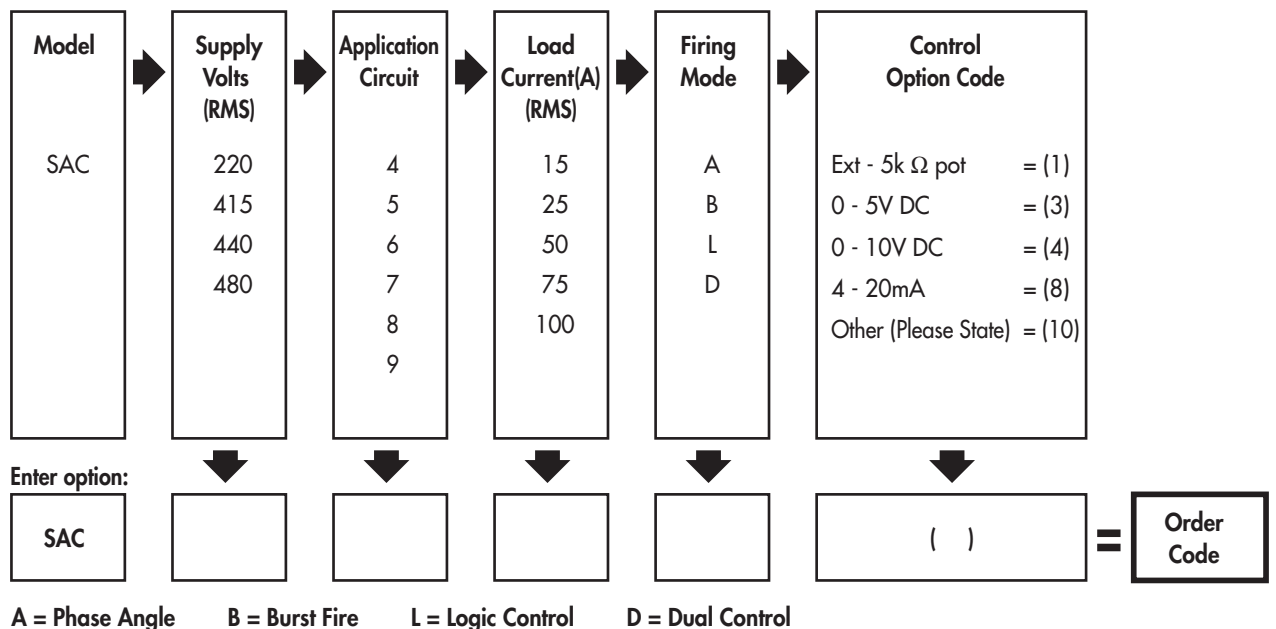
Referring to the single and three-phase power control assembly application chart:

- 1 Verify model
- 2 Select supply voltage
- 3 Select Application circuit (see pages 20-21)
- 4 Select load current
- 5 Select firing mode
- 6 Select control option and code

Example: A 36kW (50A) inductive delta transformer load, connected to a 400V, 3 phase supply, could be controlled in phase-angle firing mode, via a 0-5V signal.

The applicable stack code would be **SAC - 415 - 6 - 50A (3)**

SAC Power Control Assembly Order Code Chart





HAC

Features

- Control option (see HAC power control assembly order code chart)
- 108kW – 180kW three phase.
- 150 to 250A, single, three phase or two thirds controlled.
- Supply voltage range (RMS) 220 – 480V AC
- Phase angle, burst firing logic control or dual control.
- Fan cooled.
- Thermal cut-out.
- Dimensions: 180mm(W) x 240mm(H) x 180mm(D)

How to select the correct order code

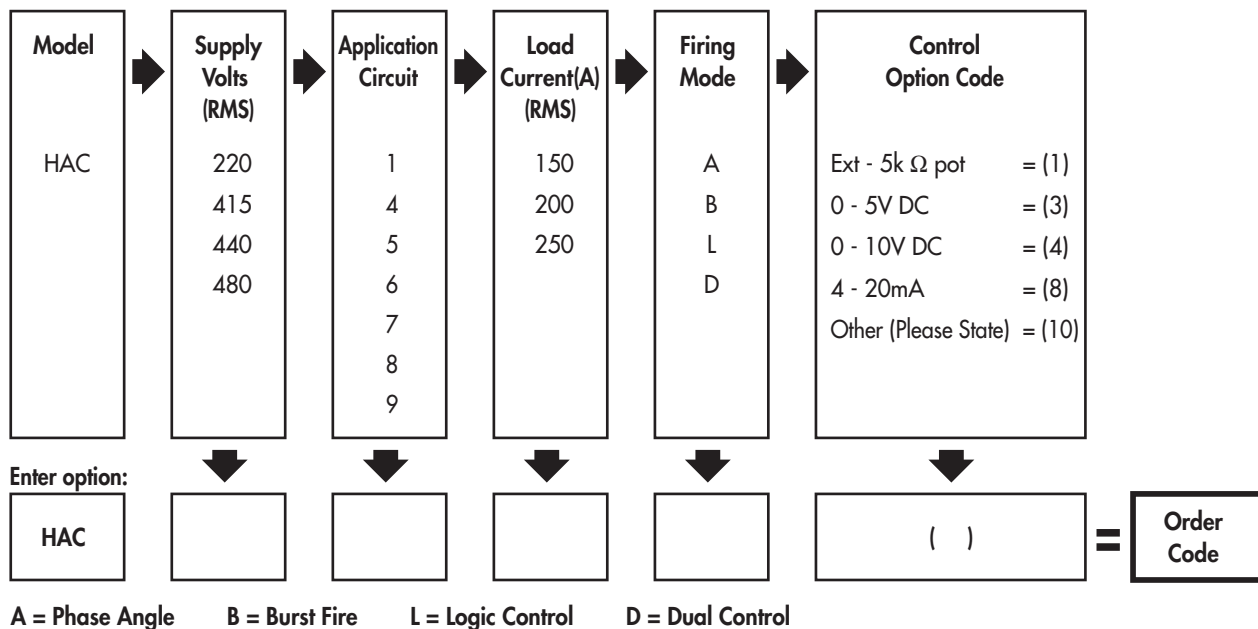
Referring to the single and three-phase power control assembly application chart:

- 1 Verify model
- 2 Select supply voltage
- 3 Select Application circuit (see pages 20-21)
- 4 Select load current
- 5 Select firing mode
- 6 Select control option and code

Example: A 108kW (150A) resistive load, in 2/3rds controlled star configuration, connected to a 400V supply, could be controlled in burst-firing mode, via a 0-10V signal.

The applicable stack code would be **HAC - 415 - 8 - 150 - B (4)**

HAC Power Control Assembly Order Code Chart





united automation limited

SINGLE & THREE-PHASE POWER CONTROL ASSEMBLIES



RECTIFIER ASSEMBLIES

DCR

United Automation manufacture a range of controlled or uncontrolled single and three phase DC rectifier assemblies. The standard ranges are from 15 to 300A per phase. All assemblies are built on integral earthed heatsink, and assemblies above 100A are forced air cooled, with thermal trip fitted.

Features

- 15 – 300A single and three phase.
- Isolated modules on standard range.
- Fan cooled over 100A.
- Other ratings available.

Specialised Requirement?

If you have a specialised requirement that cannot be met by a standard product then UAL can help.

One phone call will put you in touch with our experienced team of design and development engineers.

After discussion of your particular application and operating environment we may be able to offer a custom design solution that meets your exact needs.

Tel: 01704 516500

Fax: 01704 516501

enquiry@united-automation.com



SSC-25

This compact module is ideal for soft starting resistive and inductive loads up to 25 Amps, when fitted on a suitable heatsink.

Features

- Adjustable ramp time
- Adjustable pedestal voltage
- Available with fixed options

Technical Specification

| | |
|--------------------------------|------------------------------------|
| Line voltage: | 105V to 230V RMS +/-10% @ 50/60 Hz |
| Power rating (max. nominal): | 5.75kW |
| Maximum operating temperature: | 65°C |
| Ramp time: | 0 to 60 seconds |
| Pedestal voltage: | 10 to 50% of line voltage |
| Dimensions: | L56 x W46 x H26mm |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| SSC-25 | 25A | 230V | A403036 |



DCM-24

The DCM operates over a wide voltage range, up to 24V DC and a maximum current of 40 Amps, when fitted to a suitable heatsink.

Features

There are three main modes of control:

- Motor control - achieved by using the high-frequency setting.
- Lighting or Heating control - achieved by using the low-frequency setting
- Temperature control, over the 5 to 130°C range, achieved by connecting a thermistor.
- Output status LED

Technical Specification

| | |
|----------------------------------------|-------------------|
| Supply voltage: | 6V to 24V DC |
| Power rating (max. nominal): | 960W |
| Control signal voltage: | 0 to 5V DC |
| Control option (remote potentiometer): | 5KΩ |
| High-frequency level: | 350 Hz |
| Medium-frequency level: | 180 Hz |
| Thermistor type: | Betatherm 10K3A1 |
| Maximum operating temperature: | 65°C |
| Dimensions: | L56 x W43 x H26mm |

| Product name | Current(A) | Order code |
|--------------|------------|------------|
| DCM-24 | 40A | A75204 |



LTMZ-2 & LTMZ-4

These two logic trigger modules provide opto-isolated control of triacs or thyristor pairs. They can accept a wide range of logic control signals from TTL, CMOS devices, processor or fast-cycling instrument sources.

Features

- MONO-LINK™ firing system

Technical Specification

| | |
|--------------------------------|----------------------------|
| Line voltage – LTMZ-2: | 24V to 280V RMS @ 50/60 Hz |
| Line voltage – LTMZ-4: | 48V to 480V RMS @ 50/60 Hz |
| Control input voltage range: | 3V to 32V DC |
| Control input current @ 5V DC: | 10mA |
| Maximum operating temperature: | 65°C |
| Dimensions: | L56 x W43 x H26mm |

| Product Name | Voltage | Order code |
|--------------|---------|------------|
| LTM-Z2 | 230V | A33214 |
| LTM-Z4 | 415V | A33414 |

Specialised Requirement?

If you have a specialised requirement that cannot be met by a standard product then UAL can help.

One phone call will put you in touch with our experienced team of design and development engineers.

After discussion of your particular application and operating environment we may be able to offer a custom design solution that meets your exact needs.

Tel: 01704 516500

Fax: 01704 516501

enquiry@united-automation.com



SSR-LN

The SSR-LN series of low noise solid state relays are designed to provide near instantaneous switching of high current loads without the need of a remote filter.

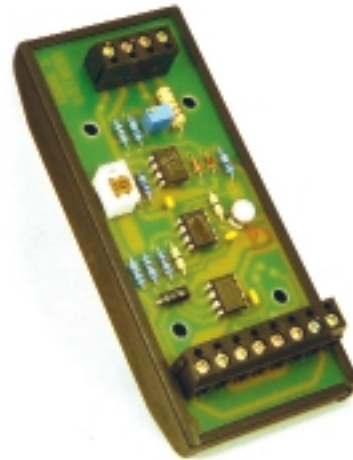
Features

- Industry standard module package
- True 'zero voltage' crossover at ON and OFF switching points
- EMC compliant to BS EN 50081-1, EN50082-2 and EN61000-3-2 (no remote filtering required)
- Optional heatsink range covers full current range (see page 33)
- Selection of two voltage and three current options
- Simple to install

Technical Specification

| | | | |
|--------------------------------|---------------------------------------|--------------|--|
| Line voltage: | 230V or 400V RMS +/-10% @ 50/60Hz | | |
| Power ratings (max. nominal): | 15.25kW (230V) RMS 30kW (400V) RMS | | |
| Control options: | Control voltage: | 3V to 32V dc | |
| | Must turn on voltage: | 3V dc | |
| | Must turn off voltage: | 1V dc | |
| | Impedance (nominal): | 1,500 Ohms | |
| Operational temperature range: | 0°C to + 65°C | | |
| Connection terminals: | M5 (Load) M3 (signal) | | |
| Dimensions (max.): | L57 x W44 x H28mm | | |
| Fixing centres: | 2 @ M4 clearance holes 48mm pitch | | |

| Product name | Current(A) | Voltage | Order code |
|--------------|------------|---------|------------|
| SSR2-LN-25 | 25A | 230V | A32251 |
| SSR2-LN-50 | 50A | 230V | A32252 |
| SSR2-LN-75 | 75A | 230V | A32253 |
| SSR4-LN-25 | 25A | 400V | A32451 |
| SSR4-LN-50 | 50A | 400V | A32452 |
| SSR4-LN-50 | 75A | 400V | A32453 |



RMS/DC-FB

The RMS to DC converter board is a microprocessor based closed loop controller which can be used with any phase angle controller having a 0-5v input signal. Its uses therefore extend to many voltage and current limiting applications incorporating current transformers or shunts.

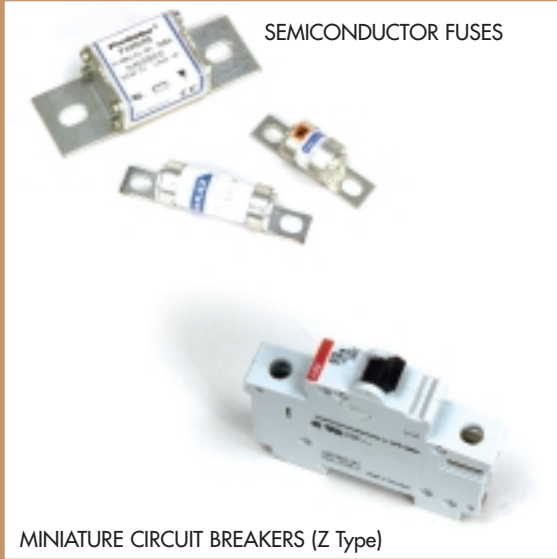
Features

- Constant voltage or current regulation
- Variable gain control
- High speed feedback response
- Selectable average or true RMS readings
- Supports FC36M and other firing circuits
- Optional DIN rail mounting enclosure

Technical Specification

| | | | |
|--------------------------------|----------------------------|---------------------|--|
| Supply Voltage: | 5V DC +/-10% | | |
| Power consumption: | Less than 20mA | | |
| Control options: | Shunts: | From 60mV to 500mV | |
| | Low voltage settings: | Up to 25V ac or dc | |
| | High voltage settings: | Up to 100V ac or dc | |
| Operational temperature range: | 0°C to + 65°C | | |
| Fixing centres pcb: | L55 x W28mm | | |
| Fixing holes: | 4 x M3.5mm clearance holes | | |
| Dimensions – pcb (max.): | L108 x W43 x H18mm | | |

| Product name | Order code |
|--------------|------------|
| RMS/DC-FB | A402072 |



SEMICONDUCTOR FUSES

- High rupturing capacity (HRC) fuse links with bolted connections for use in industrial and commercial installations.
- Ultra fast acting fuse links are designed to provide short circuit protection of semiconductors.

Available in 6A–720A, 250V–660V ratings (RMS).

MINIATURE CIRCUIT BREAKERS (Z Type)

- These items can replace conventional semiconductor fuses and are available as single and double pole models.
- They offer all the protection of a fuse but have the added advantages of being re-settable. They provide protection against earth faults and dangerous body currents in the case of high touch voltage due to installation faults.
- High short-circuit switching capacity.

Available in 6A – 25A current ratings (RMS).



DIODE MODULES (DD Type)

- Diode modules comprising a pair of series connected diodes featuring an isolated metal base to permit direct mounting to either a metal chassis or a heat sink.
- The modules can be used with encapsulated thyristor modules to construct half-controlled bridge configurations.

Available in 25A–250A, 1200V ratings (RMS).

THYRISTOR MODULES (TT Type)

- Thyristor modules comprising of a pair of inverse parallel connected thyristors. Featuring an isolated metal base to permit direct mounting to a heat sink.
- The modules can be used with the encapsulated diode modules to construct half-controlled single-phase and three-phase bridges.

Available in 25A–250A, 1200V ratings (RMS).



TRIACS (Bi-directional Semiconductors)

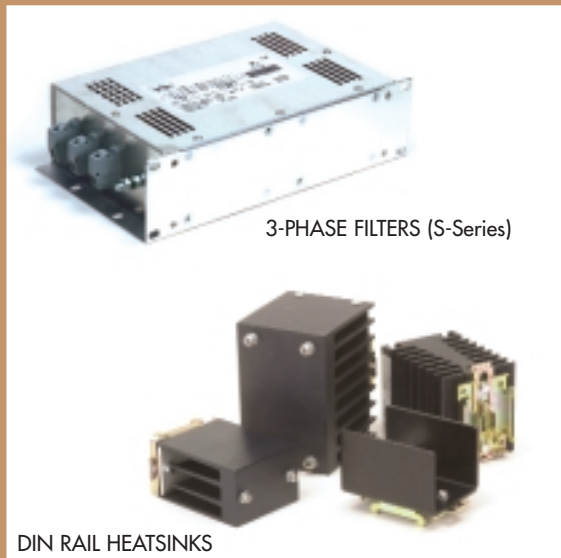
- Available in various electrically isolated packages.
- Voltage capacity – up to 800V
- Surge capacity – up to 400A

Available in 1-40A current ratings (RMS).

SINGLE-PHASE FILTERS (F Type)

- Designed to compliment the UAL mains phase-angle power controller range
- Simple two hole mounting lugs for simple installation
- Fully encapsulated & naturally cooled
- Simple push-on terminals for models up to 10A
- Robust threaded stud terminals on models above 10A
- To EMC emission standard BS EN 55022 Class A

Available in 3, 6, 10, 15 & 25A current ratings (RMS).



THREE-PHASE FILTERS (S Series)

- Designed to compliment the UAL phase-angle 3Ø thyristor control assemblies
- Universal mounting for simple installation
- Naturally cooled, light-weight construction
- Robust, high-current terminal block connections, for simple wiring
- Helps meet emission standard BS EN 55022 Class A

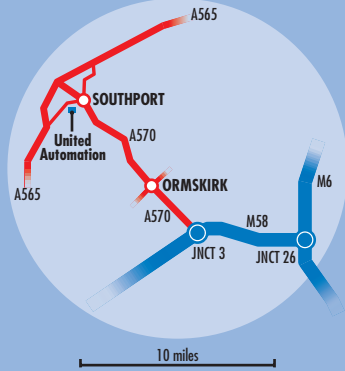
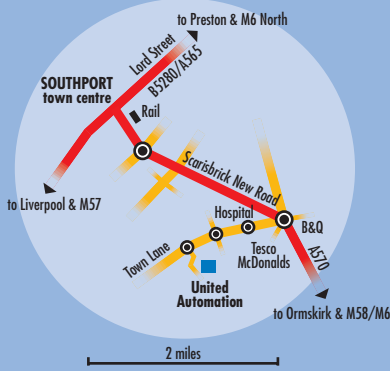
Available in 10, 25, 50, 100, 180A current ratings (RMS)
(higher ratings available upon request).

DIN RAIL HEATSINKS

- A wide range of heatsinks to compliment many of the UAL power controller range and other applications
- Ready for mounting on standard DIN rails
- Suitable for many single-phase applications for loads of up to 40 Amps

Available in various sizes (please contact our technical sales)

How to find United Automation



La Grand E.V.O

Opzoomerstraat 21b
 3023 SE Rotterdam
 tel. 010-2449966
 fax. 010-2449967
 lagrand-evo@planet.nl
 www.lagrand-evo.nl
 www.vermogensregeling.nl



united automation limited

1 Southport Business Park Kew Southport PR8 4HQ
 Tel: 01704 516500 Fax: 01704 516501
www.united-automation.com
enquiry@united-automation.com

Publication No. X10510 Issue 2

