Infresco Cabinet Catalogue

We are industry leaders in power control solutions.

Off-the-shelf and bespoke solutions are available for your power control applications.
Do not hesitate to contact us for more information or a specialised quotation.

united automation

Infresco Cabinet Catalogue
Cabinet Products & Accessories Overview
Issue 1

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United Automation has been at the forefront of control for the infra-red heating market for the last 15 years with our large range of Infresco controllers. These controllers are used around the world for many different applications from heating outdoor areas to industrial processing. We have worked with our partners to provide a quality solution for people's requirements and now we are introducing the Infresco cabinets; a product range that is more akin to United Automation core business. As one of the leading manufacturers in the world of 3 phase controllers we are combining our 58 years of experience to offer a complete solution for larger installations.
In addition to this, we can still offer a bespoke solution if there are still unsatisfied requirements. At the back of the catalogue there is a 'Customer requirement Specification' Page (Section 4). If the standard range of solutions do not meet your requirements, please complete the sheet and email to enquiries@united-automation.com

1 Cabinet Products

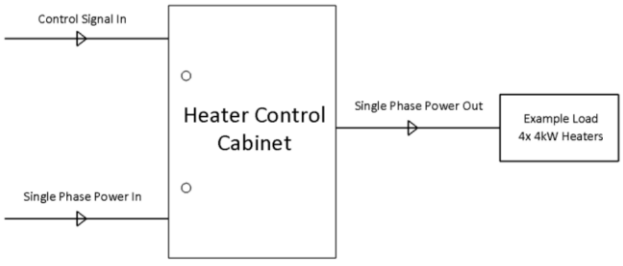
1.1 Single Zone – Single Phase

1.1.1 Technical Specifications

Max Line Voltage/V RMS	230 ±10%	
Max Load Power/kW	14/20	
Control Signal Input	Manual Pot, 0-5VDC, 0-10VDC, 0-20mA, 4-20mA, (Optional Extras: HMI, Thermostat, 24/7 Timer)	
Firing Method	Burst fire, Phase angle or combination of both	
Soft Start	Yes	
Load Type	Resistive	
Fuse	14kW	20kW
	80ET	100ET
RFI Filter	Yes	
Max. Ambient Temperature/°C	35	
Overall Dimensions/mm	450 x 802 x 380 (W x H x D) (Approx.)	
Data Sheet	Please contact us for more information	

Front Panel Interface			
LED Power Indicator	**LED Run Indicator**	**Start/Stop Button**	**ESTOP Switch**
✓	✓	✓	✓

1.1.2 Application



1.1.3 Order Codes & Pricing

Order Code	Voltage/V	Power Rating/kW	Max. Current/A
ACS1230-2YCN2B060	230	14	60
ACS1230-2YCN2B085	230	20	85

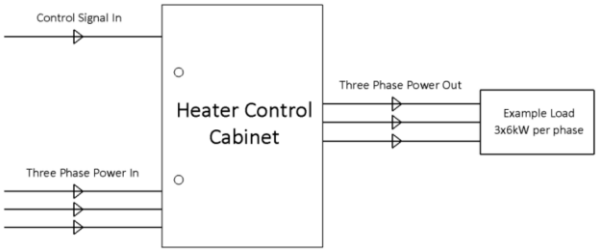
1.2 Single Zone – Three Phase

1.2.1 Technical Specifications

Max Line Voltage/V RMS	415 ±10%			
Max Load Power/kW	12/18/36/54			
Control Signal Input	Manual Pot, 0-5VDC, 0-10VDC, 0-20mA, 4-20mA, (Optional Extras: HMI, Thermostat, 24/7 Timer)			
Firing Method	Burst fire, Phase angle or combination of both			
Soft Start	Yes			
Load Type	Resistive			
Version	12kW	18kW	36kW	54kW
Fuse	25ET	35ET	63ET	100ET
RFI Filter	25A	30A	55A	75A
Max. Ambient Temperature/°C	35			
Overall Dimensions/mm	450 x 802 x 380 (W x H x D) (Approx.)			
Data Sheet	Please contact us for more information			

Front Panel Interface			
LED Power Indicator	**LED Run Indicator**	**Start/Stop Button**	**ESTOP Switch**
✓	✓	✓	✓

1.2.2 Applications



1.2.3 Order Codes & Pricing

Order Code	Voltage/V	Power Rating/kW	Max. Current/A
ACS3415-MYCN2B017	415	12	17
ACS3415-MYCN2B025	415	18	25
ACS3415-MYCN2B050	415	36	50
ACS3415-MYCN2B075	415	54	75

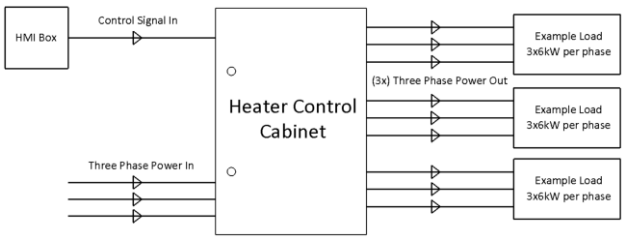
1.3 3 Zones – Three Phase

1.3.1 Technical Specifications

Max Line Voltage/V RMS	415 ±10%			
Max Load Power/kW	12/18/36/54			
Control Signal Input	Manual Pot, 0-5VDC, 0-10VDC, 0-20mA, 4-20mA, (Optional Extras: HMI, Thermostat, 24/7 Timer)			
Firing Method	Burst fire, Phase angle or combination of both			
Soft Start	Yes			
Load Type	Resistive			
Version	12kW	18kW	36kW	54kW
Fuse	25ET	35ET	63ET	100ET
RFI Filter	25A	30A	55A	75A
Max. Ambient Temperature/°C	35			
Overall Dimensions/mm	450 x 802 x 380 (W x H x D) (Approx.)			
Data Sheet	Please contact us for more information			

Front Panel Interface			
LED Power Indicator	**LED Run Indicator**	**Start/Stop Button**	**ESTOP Switch**
✓	✓	✓	✓

1.3.2 Applications



1.3.3 Order Codes & Pricing

Order Code	Voltage/V	Power Rating/kW	Max. Current/A
ACS3415-2YCN2B017	415	12	17
ACS3415-2YCN2B025	415	18	25
ACS3415-2YCN2B050	415	36	50
ACS3415-2YCN2B075	415	54	75

1.4 Bespoke Solutions

1.4.1 Technical Specifications

Max Line Voltage/V	Made to customer's specifications
Max Load Current/A	
Control Signal Input	
Firing Method	
Soft Start	
Load Type	
Fuse/A	
RFI Filter	
Max. Ambient Temperature/°C	
Overall Dimensions/mm	
Data Sheet	Provided based on customer's specifications

1.4.2 Applications

The sky is the limit when considering the applications of a bespoke unit. Please do not hesitate to contact us for a quotation based on your needs.

Some examples include:

- High current
- High voltage
- AC to DC rectification
- 12 pulse configurations
- Multi-leg/channel configurations
- Custom interfacing
- Custom package dimensions

2 Cabinet Accessories

Listed below are some accessories that can be purchased alongside the cabinet in order to further improve the user experience.

2.1 9-Channel HMI Controller

Data Sheet	X20105 – 9 Channel HMI

2.1.1 Order Codes & Pricing

Order Code	Description
A86357	Remote Handset
A402190	HMI Master Controller & Display
A402191	HMI Slave (1 required per 3 channels)

2.2 5KΩ Manual Potentiometer with Knob and Leads

Can be fitted into the front panel of a cabinet, upon request.

2.2.1 Order Codes & Pricing

Order Code	Description
A403001	5KΩ Potentiometer with Knob and 0.5m Leads for manual control

2.3 24-7 Timer/Thermostat

Picture for illustration purposes only, actual item may vary in design.

2.3.1 Order Codes & Pricing

Order Code	Description
Please enquire	Digital Thermostat/24-7 Timer for controlling the output of the cabinet

3 Product Application & FAQ

United Automation Limited was formed in 1964 and is now one of the UK's leading manufacturers of power control products. This position was achieved as a result of our technical strengths and dedication to the needs of our customers. The company serves international markets with sales to a wide variety of industry sectors and market segments including end users, distributors, contractors, and own equipment manufacturers.

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. A key differentiating factor is United Automations experienced design team, this enables us to react quickly to provide high quality design solutions, which leave our competitors standing.

Our production team employs leading edge manufacturing techniques to ensure continuous improvement both in customer service levels and cost reduction. All business processes are underpinned by the ISO 9001:2008 quality standard for which we achieved accreditation in 1995.

We believe that our customers will experience even greater benefits from working with United Automation Limited as a key supplier.

3.1 Product Application

3.1.1 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.

In order 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 then stay on until the load current through the thyristor drops to zero.

3.1.2 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 – 1Hz). The number of complete mains sine waves are varied in its on/off ratio (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.

3.1.3 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.

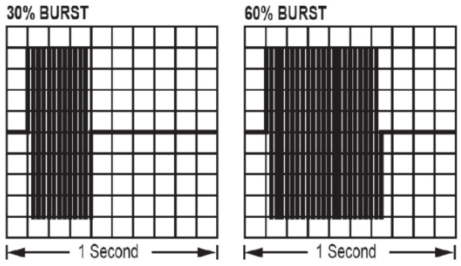
The addition of other filters or 'snubber networks' to this system may cause 'interaction' and therefore reduce the recommended filters performance.

3.1.4 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 (AC) and 24V (DC) with tolerances of +10% and -6%.

3.1.5 Burst Fire

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



3.1.6 Inhibition of RFI

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

3.1.7 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.

3.1.8 What is Dual Control?

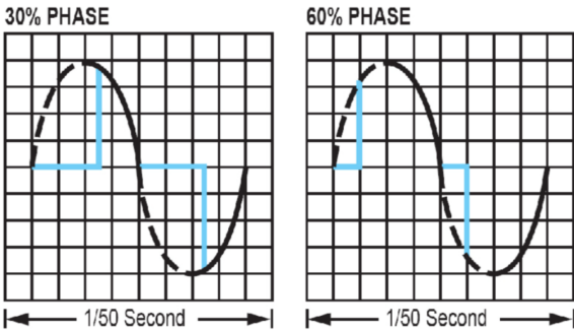
The dual control feature includes both phase angle and burst firing. Either can be selected separately or used for soft starting in phase angle mode and automatically switching over to burst firing mode when the control signal has reached a pre-set level. The control will remain in the burst fire state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

3.1.9 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. The step function of a current creates a wide range of radio frequencies and is the main source of RFI. Logic signals are usually between 0-24VDC or low voltage AC.

3.1.10 Phase Angle

The graphs, on the right, show the 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.



3.1.11 Generation of RFI

The step function of current creates a wide range of radio frequencies and is the main source of RFI.

3.2 Safety Considerations

3.2.1 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 website, 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 (HSW 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.

3.2.2 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.

3.3 Design Considerations

3.3.1 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 as the supply voltage is typically lower than 250VAC.

Snubber networks are also very useful at smoothing out spikes in the supply voltage and reducing the effects of RFI.

3.3.2 Cooling Requirements

The equipment's environment and its initial ambient temperature should be considered in the early stages of the product design process as this could have an adverse effect to the overall operating performance of the device.

UAL's products use a wide range of discrete power semiconductors which under load conditions may generate excessive heat. We therefore recommend some form of cooling or additional cooling for high power rated products.

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 air flow over an existing heatsink within the unit. The heatsink fins should be mounted in line with the forced and/or natural airflow.

3.3.3 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. Failure to address these requirements and use incorrectly selected fuses may cause the equipment to fail.

3.3.4 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.

3.4 Power Electronics Theory and Applications

3.4.1 Installations and Maintenance Considerations

Good working practices must be addressed to ensure appropriate electrical and mechanical installation. This would include the mechanical fixing of potentiometer bushes and electrical set screw and/or pillar connections. These electrical connections and mechanical fastenings must not be over tightened, a torque setting of 1Nm is recommended.

Electronic equipment has few mechanical moving parts and is therefore, inherently, very reliable. Before any servicing is carried out, reference should be made to appropriate installation instructions, drawings and labelling which may come with the equipment. Personnel should switch off the unit supply before accessing or removing a safety cover and be aware of 'hazardous live' parts.

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).

3.4.2 Phase Angle Controllers Used on Inductive Loads

3.4.2.1 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.

3.4.2.2 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 Power-block 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 rates of dV/dt.

The suppression of dV/dt is also quite important for inductive loads such as transformers. In non-inductive load applications, the voltage and current waveform both pass through zero at the same instant and at this point, one of the conducting thyristors within the pair of inverse parallel thyristors, will be commutated or turned 'off'. However, an inductive load causes the current waveform to lag the voltage waveform. In this case, when the current wave reaches zero, the voltage wave is not at zero and the subsequent voltage appears as a forward bias across the other SCR. The rate of change of this voltage (dV/dt) depends on the amount of inductance in the load circuit. An R-C snubber in parallel with the thyristor can reduce the dV/dt to within allowable limits.

4 Customer Requirements

Let us know the requirements of your application and we will advise on the best solution available at the best cost. Please select the appropriate option or fill in your specific requirement (if known). Please complete the sheet and email to enquiries@united-automation.com

Customer Requirement Specifications		
Load Capacity		Amperes/kW
Phase	[Single Phase] [3 Phase]	
Supply Voltage		V
Frequency	[50] [60] [50/60]	Hz
Load Type	[Inductive] [Resistive]	
Soft Start	[Yes] [No]	
Control Signal	[0-5V] [0-10V] [4-20mA] [Manual Pot.] [BMS] [other]	
Firing Method	[Burst Fire] [Phase Angle] [Combination]	
Max. Ambient Temp.		°C
Where is it being mounted/fitted to?		
Where will the product be installed and used?		

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