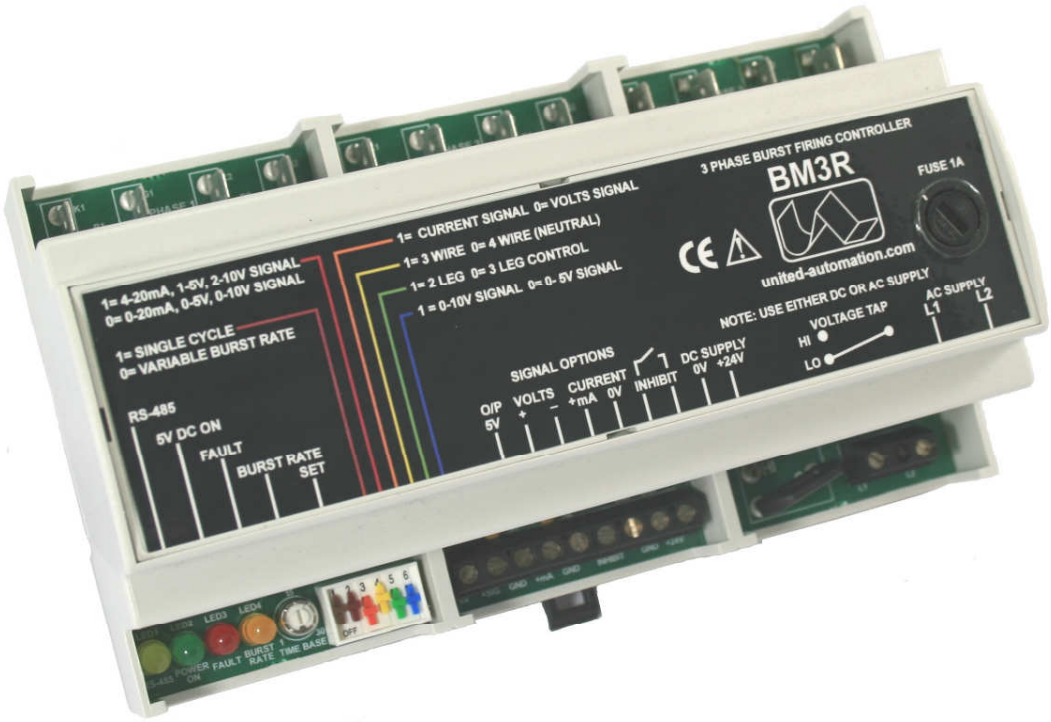
BM2R & BM3R
User Manual



KEY FEATURES

- Standard DIN Rail Mounting
- Selectable Single-Cycle/Dual-Cycle or adjustable Std Burst Firing
- On Board Indication of Power, Burst-Rates & Fault conditions
- Inhibit input
- Wide Range of Control Options (0-5V, 0-10V, 1-5V, 2-10V, 0-20mA, 4-20mA, Manual Potentiometer)
- On board protection fuse
- Isolated Pulse Transformer outputs

INTRODUCTION

The BM2R & BM3R driver modules have been designed to offer burst fire control of thyristor controllers driving Resistive loads. The Single-Cycle & Dual-Cycle options offer the fastest burst rates possible, providing very accurate control and minimising Harmonic distortion & Flicker within the system. In addition, the standard variable burst rate, adjustable from 1 to 30 seconds, is also available.

Designed to be used in conjunction with a thyristor assembly or supplied on one of our complete thyristor controllers, the BM2R & BM3R offer a highly versatile and cost effective solution in a wide variety of applications.

The BM3R is commonly used in three phase applications with both 3-Wire and 4-Wire load configurations (including Closed-Delta, Floating-Star & Star to Neutral), where all three limbs are controlled (fully controlled circuit).

The BM2R, operating in Burst-Fire mode, is also commonly used in three phase, 3-Wire load configurations (including Closed-Delta & Floating-Star), where only two limbs are controlled (2/3rds controlled circuit).

For ease of mounting & for protection purposes, the controller comes in a DIN Rail Enclosure.

TECHNICAL SPECIFICATION

Std Supply Voltage	420/460 VAC selectable via LINK J1 (other supply voltages available)
Supply Frequency	50/60 Hz
Auxiliary Supply Voltage	24V AC/DC (500mA minimum)
Power Consumption	7 VA
Internal Fusing	1Amp 32mm fuse
Protection Rating	IP20
Operating Temp Range	0-65℃
Input Signal Options	0-5VDC, 0-10VDC, 1-5VDC, 2-10VDC, 0-20mA, 4-20mA, Manual Potentiometer
Output Specification	Pulse transformer picket-fence 25kHz pulse output. Initial pulse 500mA & Sustaining pulses of 250mA
Output Isolation	3.5 KV
Std Burst-Fire Cycle Time	Minimum 1s to Maximum 30s variable. Selectable via switch SW1
Rapid Burst-Fire Cycle Time	Single-Cycle/Dual-Cycle variable time base, selectable via switch SW1 (see waveforms)
Yellow LED indicator	RS-485 comms indicator option (when fitted)
Green LED indicator	Power ON, indicating when 5 VDC is present
Red LED indicator	LED ON continuously indicates phase loss between K2 phase 1 & K2 phase 2 LED slow flashing indicates no current control signal (4-20mA) LED fast flashing indicates incompatible 2-Leg control & 4-Wire load selected
Orange LED indicator	Burst-Rate indicator, mimics the output burst-rate
Safety Standards	Complies with European Low Voltage Directive & major international standards

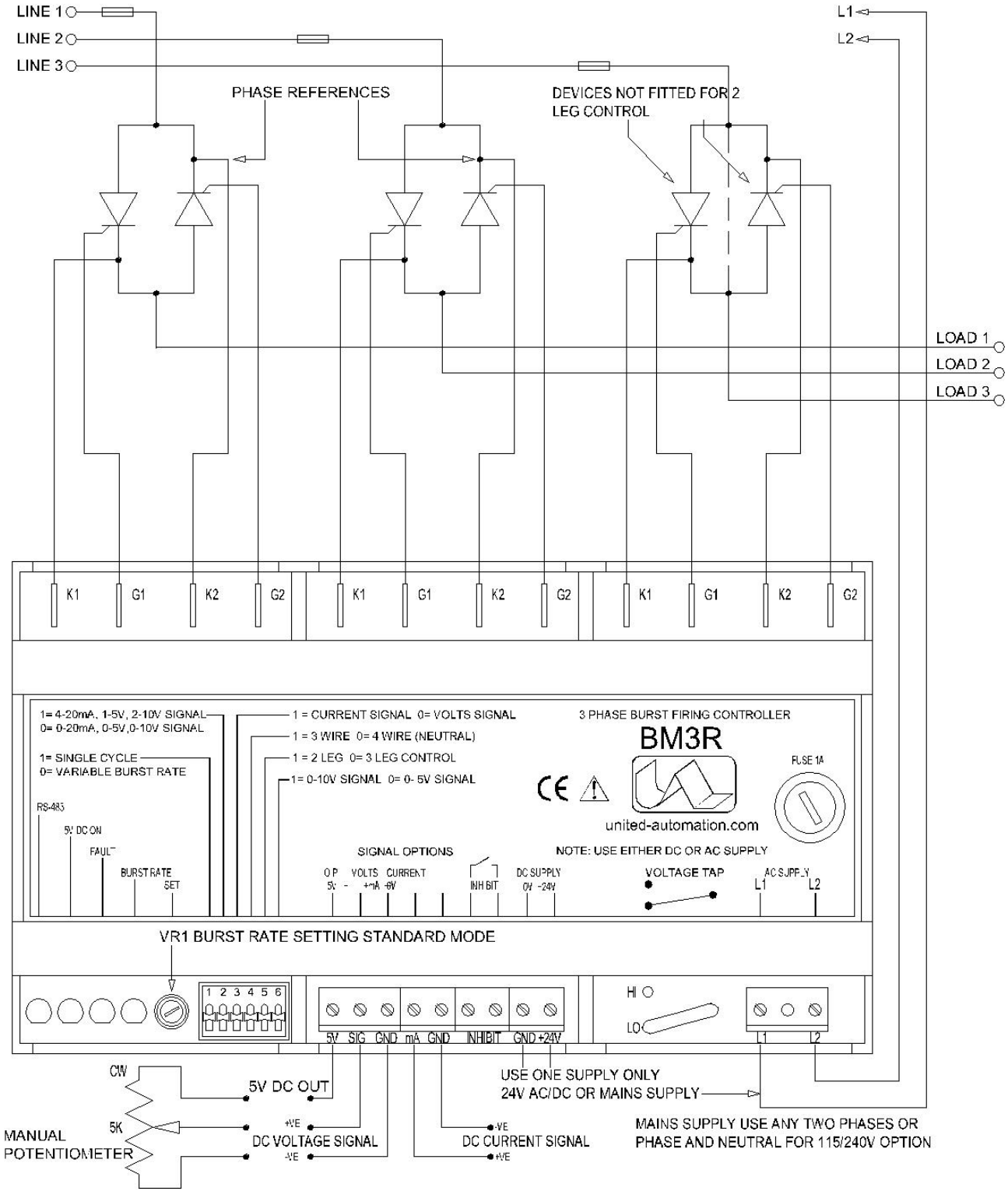
TERMINALS & CONNECTIONS

Terminal	Function	Notes
	9-way terminal block reading from Left-Right	
1	5V DC output (50mA max.)	This supply used to feed 5VDC to the clockwise end of the manual control potentiometer or auxiliary circuit.
2	+VE voltage control signal input	+ve control signal input from Temperature Controller or connect to wiper of a manual control potentiometer
3	Ground / 0V -VE voltage control signal input	-VE control signal input from Temperature Controller or connect to the counter clockwise end of the manual control potentiometer.
4	+VE Current signal input	+VE Current signal input, 0-20mA or 4-20mA
5	Ground / 0V	-VE Current signal input, 0-20mA or 4-20mA
6 7	INHIBIT INHIBIT	CLOSE Contacts to DISABLE (shut down) controller OPEN Contacts to ENABLE the controller
8	(Common 0V Line)	External -VE 24VDC supply only required if supply to L1 and L2 are not being used
9	+24V AC or DC input	External +VE 24VDC supply only required if supply to L1 and L2 are not being used
	Additional Connections	
HI/LO	High / Low Jumper Link	Select High or Low supply voltage range
L1 & L2	AC Supply input use any 2 phases or phase and Neutral.	AC supply only required if 24V DC supply to terminals 8 and 9 are not being used
G1 & K1 G2 & K2	Output connections to Thyristors	Timing reference inputs from K2 of Phase 1 and K2 of Phase 2 are taken from here

SWITCH SETTINGS

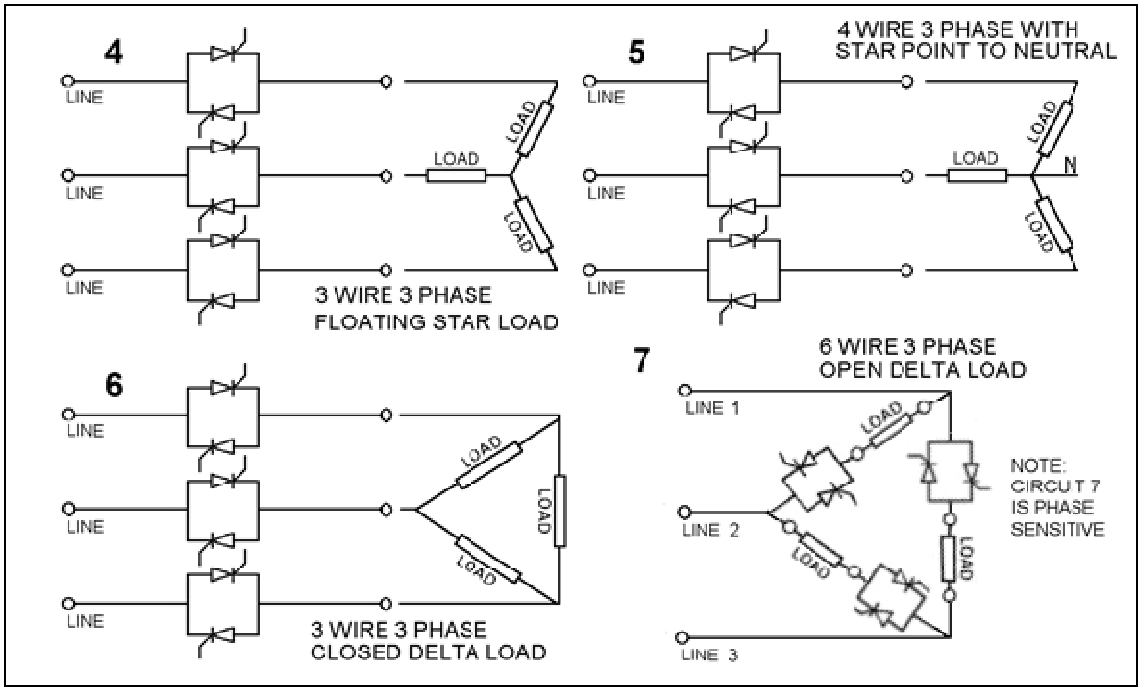
SW1 Settings ON=1 (UP) OFF=0 (DOWN)	**Notes**
SW1 6 way DIP switch	
Brown Switch ON Brown Switch OFF	VR1 Clockwise-Dual cycle VRI Anti clockwise-Single cycle Variable Burst Rate set by VR1 TIME BASE 1 to 30 seconds
Red Switch ON Red Switch OFF	When this switch is ON it sets an offset of 20%, this mode is used for control signals which do not start from 0, such as 1-5V 2-10V and 4-20mA. In this position there is no offset, this mode is used for control signals starting from 0, such as 0-5V, 0-10V and 0-20mA.
Orange Switch ON Orange Switch OFF	The controller reads a current control signal at the terminal marked +mA, this mode is used for control signals, such as 0-20mA and 4-20mA. The controller reads a voltage control signal at the terminal marked +SIG, this mode is used for voltage control signals, such as 0-5V and 0-10V and the manual Potentiometer
Yellow Switch ON Yellow Switch OFF	The controller is set for a floating star load no Neutral (3 wire) or closed delta configuration. The controller is set for a star load with a Neutral connected (4 wire) note in this position the Green switch must be switched OFF
Green Switch ON Green Switch OFF	The controller is set up to control 2 limbs L1 and L2 of a three phase load L3 is connected directly to the load, Neutral must not be connected in this configuration The controller is set up to control all 3 limbs of a three phase load the star point maybe floating or connected to Neutral
Blue Switch ON Blue Switch OFF	The controller is set for 0-10V DC control signals The controller is set for 0-5V DC control signals and manual control use a 5K Potentiometer

WIRING (THYRISTOR CONNECTIONS)

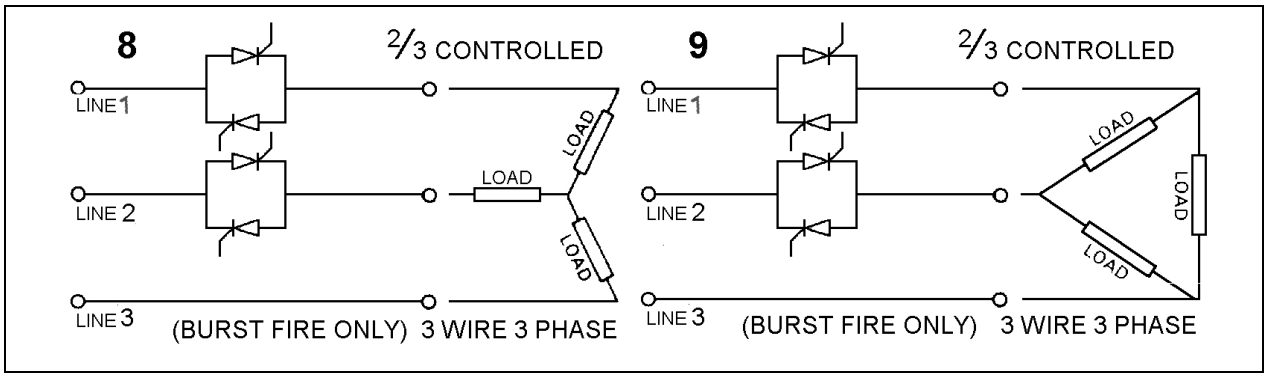


APPLICATION CIRCUITS

Typical 3-Phase, 3-Wire, 4-Wire & 6-Wire Load configurations (all three phases switched) using BM3R



Typical 3-Phase, 3-Wire Load configurations (only two of three phases switched) using BM2R (or BM3R)



TERMINAL CONNECTIONS

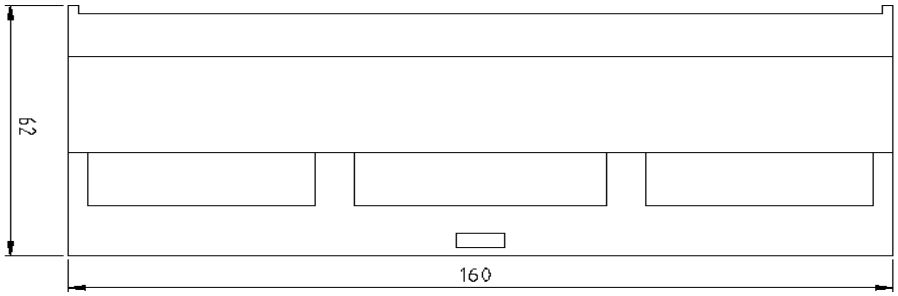
Connections are made to the above terminals which will accept wires up to 1.5mm^2 cross section. The use of screened cable is not usually necessary for control signal wiring within a panel.

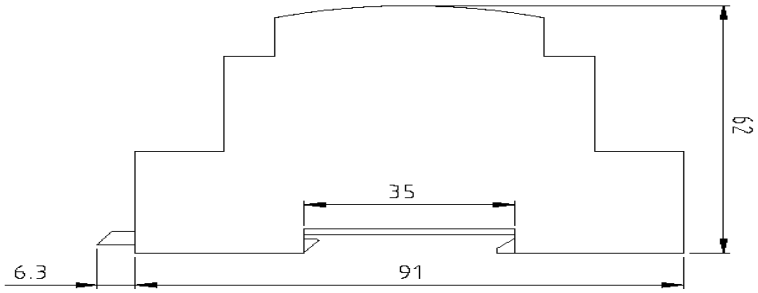
Normal precautions should be taken to keep signal wiring away from power cables, in particular avoid running signal cables parallel to power cables in the same trunking. See ITA datasheet for more information.

PHASE REFERENCE

The phase references, for the zero voltage detection circuit is taken from both of the K2 connections of PHASE 1 and PHASE 2, this phase reference is provided by the Cathode connections of the thyristor modules so the correct orientation of the thyristor modules is required see the schematic diagram. If the line supply to either of these phases is not present the Red LED will be on continuously and the output drive will be inhibited until the supply to these phases is reinstated.

DIMENSIONS





FIXING

Unit should be installed on TS35 DIN rail via DIN clip on base of control module

WEIGHT

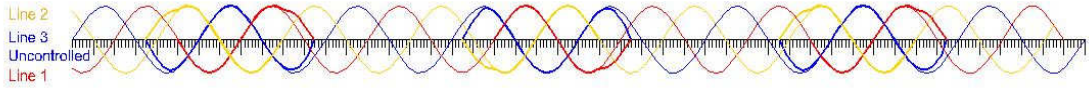
BM3R module <500g

WAVEFORMS (TYPICAL FOR SINGLE-CYCLE & DUAL CYCLE SWITCHING)

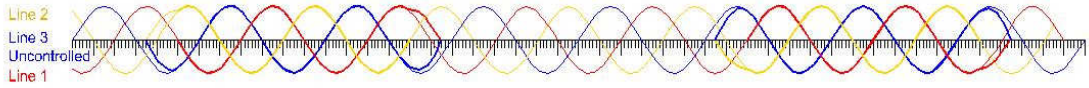
The following diagrams show representations of voltage waveforms for Burst-Fire (Single-Cycle & Dual-Cycle switching operation. The heavily outlined portion of the sinusoidal train indicates when the thyristors are switched on, and the lighter portion indicates when they are off. The waveforms show zero voltage (and thus current) switch on, and zero current switch off.

A more comprehensive set of waveforms and Harmonics information is available in a separate appendix document Ref : X10789

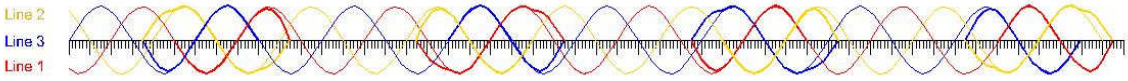
Single cycle fast burst 50% setting 2 leg control



Dual cycle fast burst 50% setting 2 leg control



Single cycle fast burst 50% setting 3 leg control 3 wire load



Single cycle fast burst 50% setting 3 leg control 4 wire load

EMC Standards Complies with the European EMC Directive for operation in an industrial environment

The following standards have been applied in whole or in part in the design of this controller; EN61010-1, EN61000-6-2, EN 50 081 part 2

ORDER CODES

Basic Instrument	Supply	UAL Order Code
BM3R	420/460VAC 50 Hz and 24V AC/DC	A32458
BM3R	480VAC 50Hz	A32462
BM3R	380/500VAC 24V AC/DC input	A32465
BM2R	420/460VAC 50 Hz and 24V AC/DC	A32459
BM2R	480VAC 50Hz	A32464
BM2R	380/500VAC 24V AC/DC input	A32466

RECOMMENDATION & SAFETY REQUIREMENTS

SUPPORTING DATASHEETS FOR PRODUCTS AND APPLICATIONS

Other documents, which may be appropriate for your applications, are available on request.

CODE	IDENTITY	DESCRIPTION
X10213	ITA	Interaction: Uses for phase angle and for burst fire control.
X10255	SRA	Safety requirements: Addressing the Low Voltage Directive (LVD) including, Thermal data/cooling, Live parts warning Earth requirements and Fusing recommendations.
X10322	APC	Application Circuits.
X10789	WAV	Single or Dual Cycle Waveforms & Harmonics Data.

NOTE:
It is recommended that installation and maintenance of this equipment should be carried out by suitably qualified personnel, with reference to the current edition of the I.E.E. Wiring Regulations BS7671. The regulations contain important requirements regarding the safety of electrical equipment.

Not for general waste

RoHS COMPLIANT

PRODUCT APPLICATION

The BM2R & BM3R offer Single-Cycle/Dual-Cycle (Rapid Burst Firing) control where minimum fluctuation in heater element temperature is required. This type of Rapid Burst Fire is useful if a system has a high impedance supply as a result of long power leads or if the system is powered by a generator set. Normally this can result in the supply being subject to mains dips, but this option minimises the 'Flicker' effect on the mains supply. Another benefit of using this type of control is that you avoid high 'Harmonic Distortion' normally associated with phase angle control, typically down to levels of below 4%.

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