

## MULTIPHASE 420 MkIII Series of Lighting Control Units.

Models LEC420, 421, 422, 423 & 425.  
Remote Control Footswitch Model RCF425.

### Operating & Installation Instructions

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## 1. INTRODUCTION

Designed to meet the varied needs of today's entertainment lighting systems, the MKIII Multiphase 420 series of four channel lighting control units is the result of many years of careful research and development.

They provide the widest possible range of features to meet the requirements of any situation. All units are packaged in a robust extruded aluminium case with a replaceable output panel allowing any type of connector to be fitted.

All control units provide three modes of Sound to Light, Crossfade and All Flash effects, both of which may be sound activated. The crossfade may be varied from an almost imperceptibly slow colour change to a pulsating sequential effect. If sound activate is selected the lights race and stop in time with the music.

Red monitor LEDs indicate the channel output level and green the effects selected. A particular useful feature is that the effects LEDs operate in the preview mode allowing an effect to be set up before the master fader is raised.

The green LEDs blink, fade or flash to give a visual indication of the effect selected. If Sound Modulation is selected, a visual check is given on the presence of a suitable sound input signal.

To cater for the widest range of sound input signals two sockets are provided. A stereo line or loudspeaker input for electrical connection to a sound system and a Hi-Z microphone input for direct acoustic pick-up.

Individual channel faders controlling the background level and a set of sensitive push switches grouped together as a keyboard allow the operator to play the lights like a musical instrument.

All the models are fitted with a slave output, which provides four 0-10V dc control signals corresponding to the brightness of each channel. These can be used to drive slave dimmer packs when larger amounts of lighting are to be controlled. A 10V dc supply is provided on this socket as well as a remote input to disable the power outputs.

Models 421 & 423 include a digital effects unit that uses a memory chip for the storage of programmes. A total of sixteen different chase patterns may be selected which can then be modified using auto reverse or synchronised to the beat of the music. If autochange is selected the unit will sequence through each programme in turn providing an ever changing selection of lighting patterns.

The Model 425 portable stage lighting control unit is designed for use in theatre, club, and live music presentations, providing the widest possible range of features to meet the requirements of any venue.

In addition to the standard features, the 425 has a master dimmer with an autofade control for timed fade outs and a master blackout switch. A remote control footswitch (RCF425) is also available that allows a performing musician to control the main functions of the unit whilst on stage.

All units are provided with easily changeable fuses and when fitted with the recommended type the triacs will be protected against all but the worst overload conditions. The triacs are fitted in screw terminal blocks and in the rare event of failure can be replaced in minutes.

The internal design and construction is to a no compromise professional standard and allows servicing to be carried out, when necessary with the minimum of difficulty.

Designed primarily for portable use in mobile applications, Models 420 and 421 can handle a maximum load of 1kW/Ch, and Model 425 a maximum of 2kW/Ch. These units are normally fitted with twin Bulgin Multiway output sockets.

Models 422 and 423, which are intended for permanent installation, have a capacity of 2kW/Ch, and both mains input and outputs are to internal terminal blocks.

## **2. FRONT PANEL LAYOUT**

### ***2.1 All Models***

**CHANNEL DIMMERS:-** The four faders on the left hand side control the minimum output level of each channel and can be used for manual lighting control when the effects section is not in use.

**FLASH KEYS:-** When pressed they turn the channel full on, and override all other controls. As these switches have a very short travel they are ideal for 'playing' the lights in a manually synchronised light show.

**MIMIC INDICATORS:-** These red LEDs show the output level of each individual channel.

**EFFECTS MASTER:-** This fader controls the maximum brightness level of any effect, and can be used to fade effects on and off.

**SOUND TO LIGHT EFFECTS:-** These are selected by the left hand group of 3 buttons.

'Sound to Light':- 4 Band frequency selective with 2 stage AGC responding to bass, lower middle, upper middle and treble frequencies.

'Fast/Slow':- This determines whether the lamps fade ON and OFF or switch directly from OFF to full ON. The latter mode is best used with large lamps that have a slow response time such as Par Cans. This button also works with the Digital Effects Unit if fitted.

'Sound Modulation':- When used in conjunction with other effects, the brightness is modulated according to the loudness of the music, producing totally different sound to light effects. If the music stops, the output level returns to normal after a few seconds.

Above this group of 3 buttons is a green LED, which indicates when 'Sound to Light' is selected. If 'Sound Modulation' is selected the LED is driven from the sound input signal itself, and provides a useful check that there is sufficient sound input to operate the effects section.

**CROSSFADE RATE:-** This control adjusts the repetition rate of the Crossfade and All Flash effects.

**CROSSFADE effects:-** These are selected by the right hand group of 3 buttons.

'Crossfade':- Each channel fades up and down in turn crossing over at about half brightness. The rate of fade is variable from about 5 mins to 1/10 sec per cycle.

'Sound Activate':- The crossfader is driven from the crescendo's of the music so that it revs up when any beat occurs.

'All Flash':- All four channels flash ON together. The flash can be combined with crossfade to which it is synchronised. Sound activate will produce bursts of flashes in time with the beat.

Above this group of buttons is a green LED which fades or flashes indicating the effect selected. It can also be used to preview the particular effect prior to fading up the 'Effects Master' control.

## ***2.2 Models 421 and 423 only***

CHASE SPEED:- This sets the speed of the Digital Effects when running in the automatic mode.

DIGITAL EFFECTS:- There are 16 different chase patterns which can be selected by the group of 5 buttons. The effect selected is indicated by the numeric display to the left of the buttons.

'Chase On':- This turns on the digital effects unit and its green LED which blinks at each step of the pattern.

'Select':- This button is used to manually select the pattern required. If pressed once the programme advances to the next pattern, as indicated by the LED display. If the button is held in, the programme will advance in steps until the button is released.

'Auto Change':- This facility advances the programme automatically every 30 seconds to provide a continually changing light show.

'Auto Reverse':- The direction of a pattern can be reversed by pressing this button once and releasing. If the button is permanently latched, the direction will reverse automatically every 16 steps.

'Sound Sync':- Each step of the pattern is synchronised to the beat of the music. If the music stops, the pattern reverts to automatic operation after 5 seconds, under manual Speed control.

## ***2.3 Model 425 only.***

PRESET MASTER:- This fader controls the maximum level set by the preset channel faders..

AUTOFADE MASTER:- When switched on, this provides a slow fade up or down as the master fader is operated, with the fade time set by the rotary control.

BLACKOUT:- This switch will black out the channels, overriding all other controls on the unit except for the flash buttons.

## **3. REAR PANEL LAYOUT**

### **3.1 All Models**

Situated at the rear of all models are the following:-

**SOUND INPUTS:-** Two separate stereo jacks are provided, with sensitivities suitable for connection to microphone and loudspeaker level sources. The inputs are un-balanced, and correct polarity should be observed, particularly when connected to power amplifier outputs. For maximum sensitivity a stereo jack plug should be used. A mono plug will reduce the input sensitivity by 50% (6dB) due to the internal resistor network.

**FUSES:-** 4 output fuses and 1 equipment fuse are fitted in the removable fuse holders, (see separate section on fuses.)

**LIGHTING OUTPUTS:-** A replaceable output panel is fitted carrying the output connectors for the lighting circuits. A number of options are available including Bulgin Multiway, 3 pin and screw terminal types.

As normally supplied, Models 420, 421 & 425 are fitted with twin Bulgin Multiway sockets. Models 422 and 423 are supplied with internal terminal blocks, accessed via 20 mm knock outs. In all cases, however, the Output Panel can be changed after purchase by ordering the relevant spare. (See separate section for fitting instructions.)

**SLAVE OUTPUT:-** A low voltage DIN socket is fitted to allow the control unit to drive additional slave power packs or other 'add-on' units. As well as the four low voltage control signals, an auxiliary 10V supply is available to provide power for the 'add-on' unit. The power outputs can be ENABLED or DISABLED via pin 7, the function being determined by the position of an internal jumper link on the P.C.B.

### **3.2 Model 425 - Remote Control Facilities**

**REMOTE CONTROL INPUT:-** A locking 8 pin DIN socket is provided to allow connection of the Remote Control Footswitch, RCF425. This socket can also be used as a slave input using a 5 pin DIN lead to connect to any other 0-10V controllers.

To use the Multiphase 425 with the Remote Control Footswitch, RCF425, all Preset Faders and Master should be set to the minimum position and the Effects Master should be set to maximum. If Autofade is required, it should be switched on and the rate set. The blackout switch should be in the down position (inactive).

The footswitch has seven toe switches, each with an LED indicator, that operate the front panel controls as follows:

Channels 1-4:- Operate the preset faders, controlled by the Master.

Master:- Operates the Preset Master, if Autofade is on, the lights will fade on and off with this switch.

Effects:- Operates the Effects Master.

Blackout:- Operates the Blackout switch.

## 4. INSTALLATION

### 4.1 Physical & Electrical

Although these units are designed for 19" rack mounting, they can also be panel mounted through a cut out of 440 mm x 134 mm. The rear panel and side plates of the unit act as heat dissipators for the triacs, so adequate ventilation must be provided to these surfaces.

If handles are not required at the front of the unit, the side plates can be unscrewed, (one at a time), and replaced with the handles facing the rear.

Models 420 and 421:- The 1kW/Ch units are fitted with a flexible mains lead which should be connected to a supply of 13-16A, depending on the lighting load to be used.

Models 422, 423 & 425:- On the 2kW/Ch units the mains input is via the 20 mm gland to an internal terminal block.

To gain access to the mains input and output connections, remove the top cover by unscrewing the 6 screws holding it. The output panel has four 20 mm knock outs which should be removed as required, and glands or grommets fitted.

The mains input should be wired in 4 mm cable and the outputs in 1 mm. If a single neutral return is used from the four lighting circuits it must be connected to the terminal block on Channel 3.

### 4.2 Alternative Output Panels

As with all 420 series controllers, any unit can be fitted with a choice of alternative output connectors. The options are:

2 x Bulgin Multiway Sockets	-	REF:- OPM420
4 x 15A 3 pin Sockets	-	REF:- OPB420
4 x 16A Schuko Sockets	-	REF:- OPS420
4 x 3 way Terminal Blocks	-	REF:- OPT420
2 x Harting Multiway Sockets	-	REF:- OPH420

To change the output panel, first unscrew the six screws holding the panel to the rear of the chassis, and withdraw from the unit. Then disconnect all push-on terminals on wires leading from the output connectors to p.c.b.s, making note of the position of each terminal and its coloured wire. Fit the new output panel by reversing this procedure. Particular care must be taken to ensure that all the wires are re-connected to the correct terminals on the board.

### 4.3 Inductive Loads

All 420 series controllers are suitable for use with inductive loads.

#### a) TRANSFORMER COUPLED LOW VOLTAGE LIGHTING:-

Because of the extra losses and the reduced power factor associated with transformers, the maximum practical inductive load is normally about 80% of the maximum resistive load.

If the unit is used with the maximum load comprising lamps with a long thermal time constant, (i.e. Pin Spots), the initial current surges when the lamps are flashed rapidly, may cause premature fuse failure.

Under these circumstances it is permissible to fit a fuse with a slightly higher rating:

For 1kVA models - 6.3A  
For 2kVA models - 12A

The maximum loading must not be exceeded, nor should the fuse rating be increased by more than that specified above.

b) NEON:-

The 420 series controllers can also be used with many types of neon tube lighting. However the electrical characteristics of neon lighting installations are dependent on many factors, including the type and design of the high voltage neon transformer used. Specific advice should be sought from the suppliers of the neon as to its suitability for control by thyristor dimming equipment

It should be noted that due to the effect of the interference suppression circuitry there is always a small leakage current from the dimmers, even when their output is at zero. In some cases this may cause the neon to glow dimly. If this does occur the neon installer should be consulted.

c) FLUORESCENT:-

Fluorescent and U.V. tube lighting can be controlled, provided that suitable dimming ballasts are installed in the light fittings.

#### **4.4 Pre-Set Controls**

All Models:- The Sound to Light section (LEC420C) is fitted with four internal pre-set controls to adjust the relative sensitivity of the four audio filters. Channel 1 responds to bass, Channel 2 to lower mid, Channel 3 to upper mid, and Channel 4 to treble frequencies. Each dimmer channel (LEC420A) is fitted with 2 pre-set controls for PRE-HEAT and MAX LEVEL adjustment.

A jumper link on the effects master section (LEC420B) controls the action of the Remote Enable/Disable input. With this link in the EN position (as shipped), the power outputs are normally enabled and can be disabled by connecting the R/D pin of the Slave Output socket to 0V. With this link moved to the DIS position, the power outputs are normally disabled and will only operate when the R/D pin is connected to 10V.

Models 421 and 423:- The Digital Effects unit (LEC420G) is fitted with 2 pre-set controls, SOUND SYNC sensitivity adjusts the beat detector circuitry, and AUTO CHANGE time adjusts the time between changes of digital pattern.

Adjustments to these internal controls should only be carried out by a dealer or qualified service technician.

#### **4.5 Fuses**

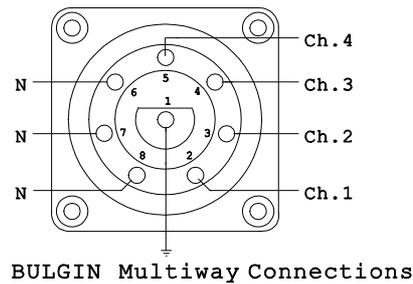
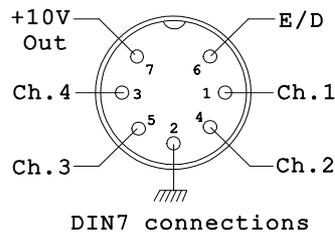
Each channel output is protected by a HI-SPEED ceramic HRC fuse.

Models 420 & 421:- 20mm x 5mm - 5A - Part No. FU910 012

Models 422, 423 & 425:- 20mm x 5mm - 10A - Part No. FU910 090

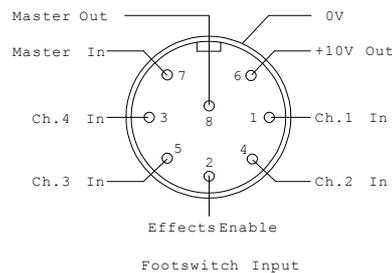
For complete protection of the triacs, the correct replacements must always be used. The power supply section is protected by a 20mm x 5mm 0.5A glass fuse.

## 5. OUTPUT CONNECTORS



## 6. REMOTE CONTROL CONNECTOR

Model 425 only.



## 7. TECHNICAL SPECIFICATION

Mains Supply:-	210 - 250V AC 50Hz (105-125V AC 60Hz by changing links)	
Supply Current:-	Models 420 & 421	- 16A max.
	Models 422 , 423 & 425	- 32A max.
Maximum Total Load:-	Models 420 & 421	- 4kVA
	Models 422 , 423 & 425	- 8kVA
Slave Output Signals:-	0-10V dc	
Auxiliary DC Output:-	10V dc @ 50mA	
Remote Enable/Disable:-	0-10V dc	
Slave Output Connector:-	7 pin DIN (270 degrees)	
Remote Control Connector:-	Model 425 only - 8 pin locking DIN	
Audio Input Signals:-	Mic:- 10mV-1V 50KOhm Unbalanced. Line:- 1V-100V 100KOhm Unbalanced.	
Audio Input Connectors:-	0.25" Stereo Jack	
Dimensions:-	482mm W x 133mm H x 275mm D (19"x3U)	
Weight:-	Models 420 & 421	- 5.5 kg
	Models 422, 423 & 425	- 6 kg

