

# Grid Plus™ Intelligent Dimmer Switches

K4300 WHI LV and K4301 WHI LV

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Please leave this leaflet with the end user for future reference

43074PL Ed.2



## A. INTRODUCTION

The Dimmer Switches in this range conforming to the latest standards BS EN 60669-2-1 and BS EN 55015, are designed for 1 or 2 way operation and are suitable for controlling the light output of GLS Tungsten filament lamps. They are also suitable for controlling the light output of Low Voltage Tungsten Halogen Lamps, when used in conjunction with suitable Low Voltage Lighting (Electronic or Wirewound) Dimmable Transformers.

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## B. PRODUCT FEATURES

The dimmer switches in this range employ the latest technology, using micro-controller based circuitry to provide the following features.

### Soft Start

When the dimmer is switched on, the brightness of the lights will be gradually increased over a period of 1 to 3 seconds until a pre-selected level (set via the control knob) is attained. This feature alone will help to greatly extend the life expectancy of filament lamps being used in conjunction with these dimmers, by avoiding the initial power surge.

### Overload Protection

If any of the dimmer switches in this range is overloaded, the output to the load(s) will be automatically reduced to provide protection against damage to the dimmer and to the installation. These dimmer switches use an Intelligent Power Monitoring System (IPMS) to

provide protection from overload by reducing power levels to the load(s) in stages according to the severity of the overload, as shown in Table 1.

Normal operation will resume after the dimmer switch is switched off and turned back on, with the load adjusted to be within its minimum and maximum ratings.

**Note: For correct operation of the dimmer, it is very important that the total load on the dimmer must not be less than the Min. Power/Load rating and must not be greater than the Max. Power/Load Rating marked on the dimmer (see Table 2).**

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## B. PRODUCT FEATURES *continued*

Case	Approximate load on the Dimmer as a percentage of its maximum rating	Power output to load when dimmer control is set to maximum
1	Up to 125	Load will receive maximum power continuously.
2	>125 to 150	Output to load will be reduced to 50% of the maximum after a delay of approximately 20 seconds after switch on.
3	>150 to 200	Output to load will be reduced to the minimum setting of the dimmer after a delay of approximately 20 seconds after switch on.
4	>200	Output will be disabled (load will be switched off) almost instantaneously after switch on

Table 1

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### Compatibility with Low Voltage Lighting System

One form of Low Voltage Lighting System comprises a good quality **wire wound** step down transformer for Low Voltage Lighting loaded with suitable Low Voltage Tungsten Halogen lamp(s). Another form of Low Voltage Lighting System comprises a fully dimmable **Electronic Transformer**, designed for dimming using **phase delay (leading edge)** type of dimmer switch, loaded with suitable Low Voltage Tungsten Halogen lamp(s).

The dimmer switches in this range are designed to work with a large number of fully dimmable, good quality, Wire Wound as well as Electronic Low Voltage Lighting Transformers, which are recommended for use with **phase delay or leading edge (NOT phase cut, phase-cut-off or trailing edge)** type of dimmers.

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So as not to compromise system safety, MK recommend that transformers have built in thermal protection and have over-current protection on both primary and secondary circuits. The LV system must comply with the EMC directive and carry the CE marking. The total transformer load on the dimmer (obtained by adding together the load rating of each transformer) must be within the minimum and maximum load rating W/VA of the dimmer.

**In addition, transformers MUST be loaded correctly and they must provide correct loading to the dimmer, within its specified minimum and maximum Power/Load ratings.**

**The total lamp load on any transformer being used in conjunction with any of the dimmers in this range, must not be less than the minimum Power /Load Rating (W or VA) of the dimmer, or higher than the maximum Power/Load Rating (W or VA) specified for the transformer or the dimmer - see**

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## B. PRODUCT FEATURES *continued*

Table 2 and markings on the back of the dimmer. Also, check the information provided in the instruction leaflet for the transformer and any markings on it. For optimum performance of the dimmer switch, load each transformer with lamp(s) so that the total load on each transformer is between 75-100% of its rated load (e.g., load a transformer rated at 25 to 105W/VA with lamps, so that their total wattage adds up to 80 to 105 Watts).

The dimmer switches in this range are not suitable for use with **non-dimmable** Electronic Transformers.

**Note:** Some transformers for low voltage lighting have input circuits which, when used with phase delay type of dimmers, result in very high peak power pulses in the dimmer. To avoid overloading and possible malfunctioning of the Dimmer Switch, do not connect more than the maximum number of transformers, specified in Table 2, to any one dimmer.

The dimmer's micro-controller based circuitry monitors the essentially a.c. supply conditions

required for wire wound transformers and if a d.c. supply condition is detected due to some fault, which could overheat and damage the transformer, the dimmer automatically turns off the supply to the transformer after a short period.

### Compatibility with Mains Voltage Halogen Lamps

The **Soft Start** feature incorporated in this range of dimmers makes them ideally suited to drive mains voltage halogen lamps, which have inherently high inrush currents at switch on. By soft starting this type of load(s), not only is the dimmer switch protected against premature failure but the lamp(s) load also benefits from prolonging its life due to limiting of the life shortening high inrush currents at switch on.

**IF IN DOUBT AND FOR FURTHER INFORMATION, CONSULT MK ELECTRIC TECHNICAL SALES AND SERVICE DEPARTMENT (see section G).**

Failure to comply with the pre-requisites above, could compromise System Safety.

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## D. PRODUCT SPECIFICATION

Mains Supply Voltage (nominal): 230V a.c.

Mains Supply Voltage Range: 216 to 253V a.c.

Mains Supply Frequency: 50 ± 3Hz

Ambient Temperature Range: 0°C to 40°C

Load Rating: See markings at the back of the dimmer and Section C

**NOTE: Loads must be within the min. and max. ratings of the dimmer.**

Type of Loads: Fused GLS lamps conforming to BS161, rated at 230/240V. Wire Wound Low Voltage transformer(s) of good quality, laminated or toroidal. Fully dimmable Electronic Transformer(s) suitable for mains input voltage range specified above, used in conjunction with low voltage halogen lamp(s). Mains rated halogen lamps.

**NOTE: Transformers must be suitable for dimming, using phase delay (not phase cut) type of dimmers.**

**WARNING:** These dimmer switches are not suitable for use with Fluorescent Lamps or Energy Saving Lamps.

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## E. COMPLIANCE WITH STANDARDS & EC DIRECTIVES

The dimmers in this range comply with the following EC directives:

Low Voltage Directive (73/23/EEC)

Electromagnetic Compatibility Directive (89/336/EEC)

They also comply with the requirements of the following Standards: BS EN 60669-2-1  
BS EN 55015

**NOTE:** While the dimmer switches in this range conform to the EMC requirements in compliance with the EC Directives when used with Tungsten Filament Lamp Loads specified above, it is the responsibility of the installer to ensure that when using these dimmers with transformers in Low Voltage Lighting Systems, the complete installation complies with the Electromagnetic Compatibility Regulations (SI 1992/2372).

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## C. PRODUCT RANGE/RATINGS

List No.	Power/Load Ratings with Mains Tungsten GLS Lamps		Power/Load Ratings with Mains Tungsten Halogen Lamps and LV Transformers		Size of Front Plate	Max No of Transformers	Comments
	Min. W	Max. W	Min. W or VA	Max. W or VA			
K4500 WHILV	60	400	60	320	2M	5	Do not exceed the max. number of Transformers specified
K4501 WHILV	40	220	40	180	1M	3	

Table 2

### NOTES:

- Do not exceed the Max. Power/Load Rating (W or VA) of the dimmers when using with Low Voltage transformers, as shown in Table 2 above.
- The minimum load on the transformer should not be less than the Min. Power/Load Rating of the dimmer, even if the transformer has a lower Min. Power/Load Rating (eg. 20W or VA).

If the transformer is loaded with more than one lamp to achieve the minimum load in accordance with the Min. Power/Load Rating, then on failure of one or more of the lamps, the total load may fall below the Min. Power/Load Rating of the dimmer, which could result in the system not functioning correctly.

3. In addition to white plastic knobs, metal capped knobs for other finishes eg. POB, PBS, PCR, MCO and SAB are also available.

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## F. SAFETY INSTRUCTIONS

- To prevent the risk of electrocution, turn off the mains electricity supply before commencing work.
- Do not work on this product with electricity supply to it switched on.
- To ensure a safe installation;
  - This product must be installed by a competent person (e.g. a qualified electrician) in accordance with these instructions and the appropriate clauses of the current edition of the IEE Wiring Regulations (BS 7671).
  - Where the mounting box incorporates an earth terminal, it must be connected to the circuit protective (Earth) conductor.
  - NOTE:** All bare earth wires must be covered with appropriate green/yellow sleeving.

- It is essential that all connections are made as instructed, that the cables are not stressed and that the terminal screws are fully tightened.
- Dimmer switches must **NOT** be installed in bathrooms, washrooms or any location subject to splashes of water, condensation or excessively damp conditions.
  - Ensure that the product is mounted on an even surface in the vertical plane (see Note in section G, step 9).
  - To avoid damage to the Dimmer Switch do not operate it with higher than the maximum rated load of the Dimmer Switch. Also, do not use the Dimmer Switch with less than its minimum rated load.

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## F. SAFETY INSTRUCTIONS (continued)

- Do not use the Dimmer Switch in ambient temperatures higher than the maximum temperature specified for the dimmer.
- To avoid premature failure of the Dimmer Switch and lighting system do not use the Dimmer Switch with fluorescent lamps or Energy Saving Lamps.
- Do not attempt to open the Dimmer Switch as there are **NO user serviceable parts** inside.

**NOTE:** It is normal for the Dimmer Switch front face to become quite warm in use, the temperature reached being dependent upon the lamp load and the ambient temperature.

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## G. INSTALLATION

**IMPORTANT**  
Refer to **Product Features (B)**, and **Safety Instructions (F)**, before starting work.

- Remove Rotary Knob from the Shaft by gently pulling it away from the Dimmer (this is only necessary if using the Dimmer in Frontplates of more than 2 Modules width).
- Ensure that the Grid Mounting Frame is installed into the appropriate Mounting box in accordance with sections D1 to D5 of the Grid Plus System Instruction Leaflet.

Minimum internal – 40mm box depth

Suitable MK box – See MK catalogue list numbers

**NOTE:** The two module Dimmers can **ONLY** be fitted into two, four and six module **wide** Grid Mounting Frames, and therefore can only be used with 2, 4, 8, 12, 18 and 24 Gang Frontplates.

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- To avoid overheating when using more than one Dimmer in the same Grid Plus Enclosure it is recommended that the dimmers are preferentially mounted on the bottom row on 6, 8, 9, 12, 18 and 24 Gang Enclosures, before mounting on any other row(s). Also, each dimmer **MUST** be de-rated and its load adjusted in accordance with the information provided in Table 3.

The maximum Power/Load figures given in table 3 should not be exceeded, taking due care with different figures for normal GLS tungsten filament lamps compared with Mains Tungsten Halogen Lamps and Low Voltage Transformers.

Frontplate Size, Number of Gangs	2	3	4	6	8	9	12	18	24
Max. Power/Load <b>per Row</b> - Tungsten GLS Lamps - W	400	480	480	480	480	480	480	720	720
Max. Power/Load <b>per Row</b> - Mains Tungsten Halogen Lamps or Low Voltage Transformers - W or VA	320	380	380	380	380	380	380	580	580
Max. Power/Load for <b>Total Plate</b> - Tungsten GLS Lamps - W	400	480	480	740	740	940	940	1440	1800
Max. Power/Load for <b>Total Plate</b> - Mains Tungsten Halogen Lamps or Low Voltage Transformers - W or VA	320	380	380	600	600	750	750	1155	1440

Table 3

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## G. INSTALLATION (continued)

- Connecting the supply cables:
  - Strip back the outer cable sheath and trim the wires to the appropriate length to allow cable ends to reach the terminals.
  - Carefully strip Red and Black Insulation by 10mm (1/2"), and place a Red Sleeve over the Black Insulation.
  - Slide a length of green/yellow insulating sleeve on to the bare earth wire(s) and connect to the earth terminal in the mounting box and link to the Earth Terminal on the Grid Mounting Frame.

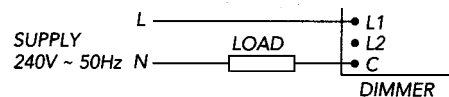
You must connect the wires to the correct terminals of the Dimmer.

**DO NOT** Connect Earth to the Dimmer Terminals.

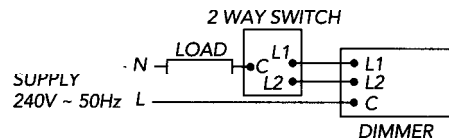
**Notes:** From the point of view of good thermal management leading to improved reliability:

- In Front Plates with more than one row, mount dimmers in the lower rows as much as possible, the lower the row the better it would be in allowing the dimmer to operate more reliably.
- Do not mount dimmers one above the other in adjacent rows or side by side in adjacent columns. Try to stagger the positions of the dimmers as much as possible.
- Avoid using more than one dimmer in any one column.
- Do not exceed the maximum Load Rating of any dimmer, printed on the back of the dimmer.

Consult the MK Technical Sales Services Department if other combinations are required.



One Way Switching



Two Way Switching (only 1 Dimmer can be used)

- When connecting to a Low Voltage Lighting System the Dimmer must **ONLY** be connected to the appropriate 240V Input Terminals (in accordance with the Manufacturers Instructions).
- If replacing a switch, take note of original wire and terminal positions to aid reconnection.
- Insert the bared ends of the wires fully into the relevant terminals and securely tighten the Terminal Screws.

- Carefully push the wired Dimmer into the Grid Mounting Frame, until the latches have fully engaged and the Module is secure (as shown in Fig. 1). Ensure cables are not trapped or pinched.
- The modules can be removed by placing the blade of a small flat bladed screwdriver in the top clip fit section and levering out. On the 2 Module Dimmers all four latches have to be unclipped before the Dimmer can be removed (see Fig. 2).

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## G. INSTALLATION (continued)

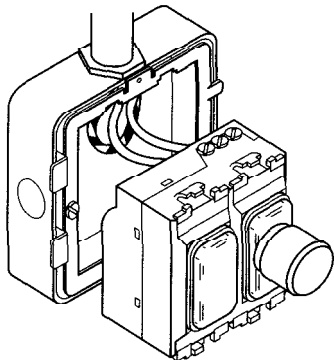


Fig. 1 Typical Mounting Arrangement

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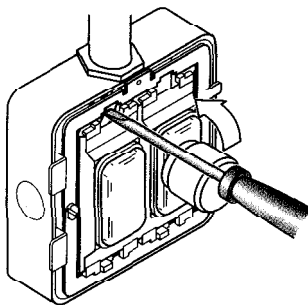


Fig. 2 Module Removal Procedure

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- When all the modules have been fitted, the Grid Mounting Frame can be adjusted to set the Frontplate square, by slightly loosening the Grid Mounting Frame screws, moving the frame by hand and re tightening the screws.
- Locate the Frontplate and fit the Frontplate fixing screws. Do not over-tighten the screws, to do so may damage the Frontplate or Grid Mounting Frame threads.
- Refit Rotary Knob onto the Shaft and gently push it into place.
- Retain these instructions, leave them with the end user for future reference.** Remaining Packaging can safely be disposed of via standard refuse facilities.
- Due to the many innovative protection features incorporated in these Dimmer Modules there are a

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number of instances when the operation of these safety features could be interpreted as the Dimmer having malfunctioned. Before returning a Dimmer as faulty please ensure that none of the protection features (see section B) have operated.

**The completed installation should be tested in accordance with the current IEE wiring regulations by a qualified electrician.**

**IMPORTANT: Disconnect the Dimmer Switch before performing the Insulation Resistance Test (i.e. Clause 713-04).**

If you are in any doubt regarding the application or installation of this product, please contact the MK Technical Sales Service Department.  
Telephone: 01268 563720 (national)  
+44 (0) 1268 563758 (International)

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## INSTALLATION NOTES

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## H. GUARANTEE

The Company undertakes to replace or repair, at its discretion, this product should it become defective within a period of 10 years after delivery, solely as a result of faulty materials and/or workmanship. Understandably, if the product has not been installed or maintained in accordance with the Company's instructions, has not been used appropriately, or if any attempt has been made to rectify, dismantle or alter the product in any way, the guarantee will be invalidated.

This Guarantee states the Company's entire liability. It does not extend to cover consequential loss or damage or installation costs arising from the defective product. This Guarantee does not restrict or infringe the normal statutory or other rights of the consumer.

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# **CAUTION**

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**When using this Dimmer Switch with  
MAINS VOLTAGE TUNGSTEN  
HALOGEN LAMPS**

**Please ensure that the lamps used are of the highest quality, incorporating internal fuses and manufactured by well known manufacturers of high repute. Also, please ensure while using such lamps, that they are recommended for use at very low dimmed levels of output, which can be obtained by the use of this dimmer switch .**

**USE OF LAMPS OF LOW QUALITY WITHOUT  
INTERNAL FUSES AND NOT RECOMMENDED  
FOR USE AT LOW DIMMED LEVELS OF LIGHT  
OUTPUT WOULD RESULT IN IRREPARABLE  
DAMAGE TO THIS DIMMER SWITCH**