

# Slow ON/OFF DIMMER for modular light system

## K8029

### Features and specifications :

- Microprocessor controlled.
- Dual mode operation:
  - Mode 1 : Slow on / Slow off dimmer with two independent and programmable delays. Dimming direction changes with each keypress. Manual level control is possible. This mode also simulates a 'regular' dimmer.
  - Mode 2 : Light is turned on at full power for a programmable time, after which it slowly fades to zero, also during a programmable time.
- For use with the Velleman home modular light system K8006.
- Two programmable delays ranging from 1s to 1h.
- No memory loss in case of power failure.
- 'soft-start' function that prolong the life of the bulbs.
- AC power : 110-125 or 220-240VAC 50/60Hz.
- Max. load : 1,3A (150W/120V – 300W/230V).
- Dimensions : 67x57x25mm (2.7"x2.3"x1").

**Not suited for use with low voltage halogen lighting or electronic transformers.**


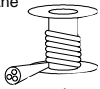
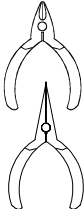
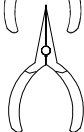


**VELLEMAN KIT NV**  
**Legen Heirweg 33**  
**9890 Gavere**  
**Belgium**  
**<http://www.velleman.be>**

### 1. Assembly (Skipping this can lead to troubles !)

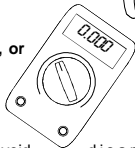
Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

#### 1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip. 
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin rosin-core solder. Do not use any flux or grease. 
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes. 
- Needle nose pliers, for bending leads, or to hold components in place. 
- Small blade and phillips screwdrivers. A basic range is fine.



**For some projects, a basic multi-meter is required, or might be handy**



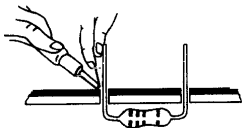
#### 1.2 Assembly Hints :

- ⇒ Make sure the skill level matches your experience, to avoid disappointments.
- ⇒ Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- ⇒ Perform the assembly in the correct order as stated in this manual
- ⇒ Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- ⇒ Values on the circuit diagram are subject to changes.
- ⇒ Values in this assembly guide are correct\*
- ⇒ Use the check-boxes to mark your progress.
- ⇒ Please read the included information on safety and customer service

\* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

### 1.3 Soldering Hints :

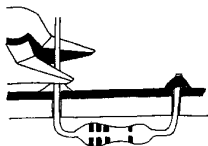
Mount the component against the PCB surface and carefully solder the leads



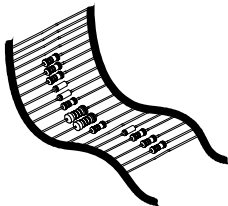
Make sure the solder joints are cone-shaped and shiny



Trim excess leads as close as possible to the solder joint

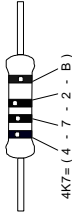


**AXIAL COMPONENTS ARE TAPED IN THE CORRECT MOUNTING SEQUENCE !**



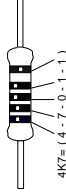
**REMOVE THEM FROM THE TAPE ONE AT A TIME !**

5%



4K7 = (4 - 7 - 2 - B.)

1%



4K7 = (4 - 7 - 0 - 1 - 1.)

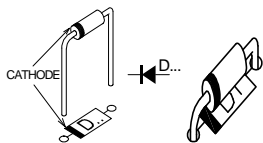
COLOR= 2...5



|         | I                | P                  | E                    | SF            | S              | DK             | N              | D            | GB             | F                                      | NL            |
|---------|------------------|--------------------|----------------------|---------------|----------------|----------------|----------------|--------------|----------------|--|---------------|
| C O D E | CODICE<br>COLORE | CODIGO<br>DE CORES | CODIGO<br>DE COLORES | VÄRI<br>KOODI | FÄRG<br>SCHEMA | FARVE-<br>KODE | FARGE-<br>KODE | FARB<br>KODE | COLOUR<br>CODE | CODIFI-<br>CATION<br>DES COU-<br>LEURS | KLEUR<br>KODE |
| 0       | Nero             | Preto              | Negro                | Musta         | Svart          | Sort           | Sort           | Schwarz      | Black          | Noir                                   | Zwart         |
| 1       | Marrone          | Castanho           | Marrón               | Ruskea        | Brun           | Brun           | Brun           | Braun        | Brown          | Brun                                   | Bruin         |
| 2       | Rosso            | Encarnado Rojo     |                      | Punainen      | Röd            | Röd            | Röd            | Rot          | Red            | Rouge                                  | Rood          |
| 3       | Aranciato        | Laranja            | Naranja              | Oranssi       | Orange         | Orange         | Orange         | Orange       | Orange         | Orange                                 | Oranje        |
| 4       | Giallo           | Amarelo            | Amarillo             | Keltainen     | Gul            | Gul            | Gul            | Gelb         | Yellow         | Jaune                                  | Geel          |
| 5       | Verde            | Verde              | Verde                | Vihreä        | Grön           | Grøn           | Grønn          | Grün         | Green          | Vert                                   | Groen         |
| 6       | Blu              | Azul               | Azul                 | Sininen       | Blå            | Blå            | Blå            | Blau         | Blue           | Blue                                   | Blauw         |
| 7       | Viola            | Violeta            | Morado               | Purppura      | Lila           | Violet         | Violet         | Violet       | Purple         | Violet                                 | Paars         |
| 8       | Grigio           | Cinzeno            | Gris                 | Harmaa        | Grå            | Grå            | Grå            | Grau         | Grey           | Gris                                   | Grijs         |
| 9       | Bianco           | Branco             | Bianco               | Valkoinen     | Vit            | Hvid           | Hvidt          | Weiss        | White          | Blanc                                  | Wit           |
| A       | Argento          | Prateado           | Plata                | Hopea         | Silver         | Sølv           | Sølv           | Silber       | Silver         | Argent                                 | Zilver        |
| B       | Oro              | Dourado            | Oro                  | Kulta         | Guld           | Guld           | Guldi          | Gold         | Gold           | Or                                     | Goud          |

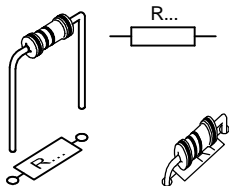
## 1. Diodes.

(Watch the polarity)



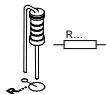
- D1 : 1N4148
- D2 : 1N4148
- D3 : 1N4007

## 2. Resistors.



- R1: 47K (4-7-3-B)
- R2: 470K (4-7-4-B)
- R3: 470K (4-7-4-B)
- R4: 4E7 (4-7-B-B)
- R5: 10K (1-0-3-B)
- R6: 10K (1-0-3-B)
- R7: 330 (3-3-1-B)

- R8: 220K (2-2-4-B-9)
- R9: 220K (2-2-4-B-9)
- R10: 220 (2-2-1-B-9)
- R11: 27K (2-7-3-B-9)
- R12: 27K (2-7-3-B-9)

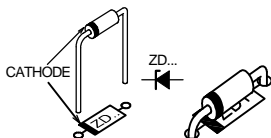


Mount  
R13  
Vertical !

- R13: 330 (3-3-1-B)

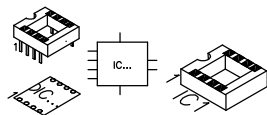
## 3. Zener diode.

(Watch the polarity)



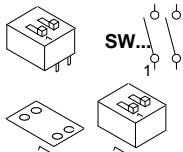
- ZD1 : 5V6 / 1.3W

## 4. IC socket.



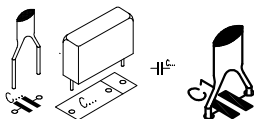
- IC1 : 8P

## 5. DIP switch.



- SW1 : DS-2

## 6. Capacitors.

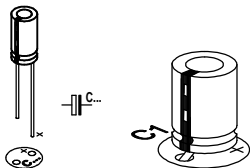


- C1 : 10nF (103)
- C2 : 100nF (104)
- C4 : 100nF/250V~

Check operating voltage

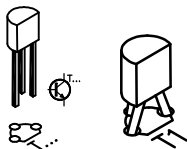
- For 220/240V~  
C5 : 470nF/630V
- For 110/125V~  
C5 : 1 $\mu$ F/250V

## 7. Electrolytic capacitor. (Watch the polarity)



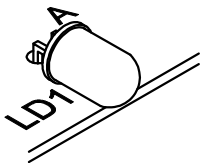
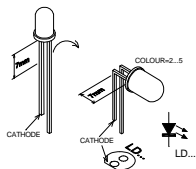
- C3 : 470 $\mu$ F

## 8. Transistor.



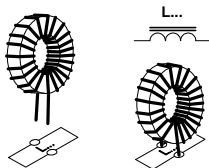
- T1 : BC547B

## 9. LED's.



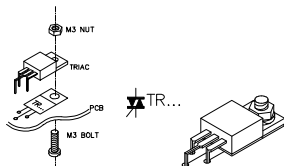
- LD1: 3mm Red (2)
- LD2: 3mm Yellow (4)

## 11. Coil.



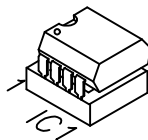
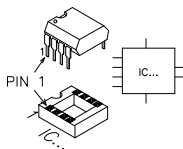
- L1 : 1mH

## 10. Triac.



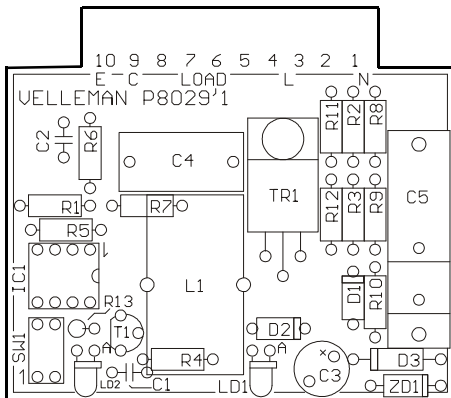
- TR1 : TIC206M or Eq.


## 12. IC (Check the position of the notch !).





- IC1 : VK8029  
= programmed  $\mu$ C:  
PIC12CE518 or Eq.


### 13. PCB layout & DIP switch setting.



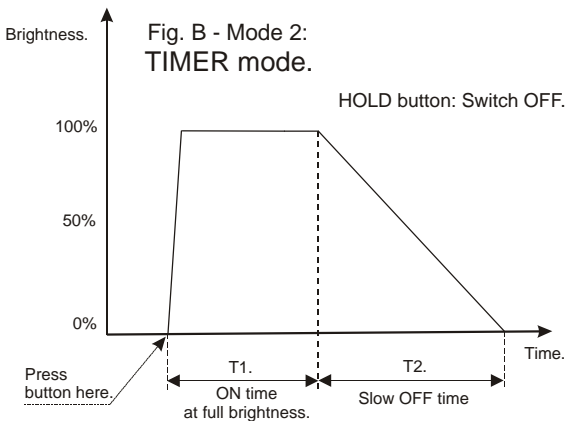
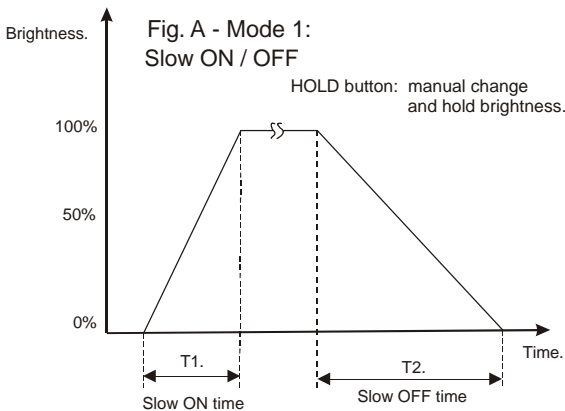
**SW1**  Slow-ON / Slow-OFF mode (1).

**SW1**  Timer mode (2).

**SW1**  Learn mode (3).

**SW1**  Restore factory defaults (4).

## 14. Use & programme this module.



**CONNECTION & TEST:** (\*x: See page 9)

**Always switch off the mains voltage from the K8006 bus card before:**

- **Plugging in or removing this module.**
- **Changing the operating mode. (If the K8029 is being used, changing the operating mode has no effect and is very dangerous!)**

- Insert the K8029 into a free slot of a K8006 bus card.
- Connect a light bulb to the relevant output of the bus card.
- Set both switches of the DIP switch SW1 to OFF (\*1).
- Now switch on the voltage of the K8006 bus card, LD2 (yellow) will light up to indicate the good operation of the microcontroller.
- The dimmer is now in the 'slowly on and off' state - the factory programmed delay times are 3 minutes each. The times can always be quickly restored, (see 'restoring factory settings').
- See also page 10 (Fig A & B) of the illustrated assembly plan for a graphic presentation of the operation.

**PROGRAMMING:**

The factory settings can be overwritten with your own delay-time settings, which will be called the 1<sup>st</sup> time and the 2<sup>nd</sup> time. Follow the procedure below for this:

*Programming the 1<sup>st</sup> time (t1): (The slow ON time / delay time in the step mode.)*

- 1) Place the kit in the programming state using the DIP switch SW1 (\*3).

- 2) Now switch the mains voltage on, the light and LD1 will now burn at 2/3 intensity.
- 3) Briefly press the pushbutton, LD2 (yellow) will now light up. The time registration starts now.
- 4) Wait until the desired time has been reached. (This can be from 1 second to approx. 70 min. The clock will stop automatically when the maximum registration time has been exceeded.)
- 5) Briefly press the pushbutton again. The registration clock will now stop.
  - LD2 (yellow) will flash for a maximum of 5 seconds. During this period, you have to press the pushbutton again in order to save the registered time to memory. When confirmed, LD1 (red) and LD2 (yellow) will flash on 2x as an indication. If the pushbutton is not pressed within the above 5 seconds, the time stored in the memory will NOT be overwritten. This can be done if only the 2<sup>nd</sup> time is to be adjusted.

*Programming the 2<sup>nd</sup> time (t2): (The slow OFF time.)*

- After programming the 1<sup>st</sup> time, the 2<sup>nd</sup> time automatically follows. The light will now come on at 1/3 intensity.
- Now follow the same procedure as with the 1<sup>st</sup> time, from point 3 onwards.

Both LED's go out at the end of the complete procedure. Now switch off the voltage and select the operating mode using DIP switch SW1 (slow ON/OFF or step mode).

**Only switch the voltage back on after that!**

Extra functions:

In the 2 different operating modes keeping the pushbutton pressed in (for more than 1 second) calls up an extra function:

-With MODE1: The light intensity can be manually changed here without difficulty. When the button is released the light intensity at that point in time will be preserved. This kit can thus be used as a normal hand operated dimmer. At the end of one dimming operation, the button has to be released to reverse the dimming sense (bright to dark or dark to bright), so that it is easy to turn the light off or on at maximum light intensity.

-With MODE2: Keep the pushbutton pressed in for more than 1 second during the time lapse or dimming cycle. The light will then go out immediately. Pressing it briefly restarts the entire cycle.

Restore factory settings:

The standard factory settings for the delay times can be restored by setting switch 1 & 2 of the DIP switch to 'ON' (\*4). If the voltage is switched on to the kit in this state then LD2 (yellow) will flash. After that keep the pushbutton pressed in until both LD1 and LD2 flash. The standard times of 3 minutes are now again stored in memory. Switch the voltage off and select an operating mode using DIP switch SW1 (slow ON/OFF or step mode).



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