

# ZCM-Z Lighting Control Module

PRELIMINARY

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*This User Guide provides information about the operation, installation and use of the AEG PS ZCM-Z series of Zigbee™ lighting control modules.*

# 1 NOTES

## TECHNICAL SUPPORT

If you experience difficulties using this product, or if you find any errors in this document, please contact your local AEG PS representative:

Tel:

Internet: [www.aegps.com](http://www.aegps.com)

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## ISSUE RECORD

Draft 1	July 23, 2013	First draft for ZCM_Z Based on input from ZCM
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## 2 INTRODUCTION

The ZCM-Z™ (ZigBee Communication Module) is an intelligent module designed to control lighting applications and reduce the operating costs. It allows management of LED drivers (or fluorescent ballasts) by controlling the dimming levels in response to sensor inputs, to reduce unnecessary energy consumption. The module supports effective energy management and reporting using intelligent wireless communication based on a ZigBee network. It offers a long life through the use of high reliability components, and is ideal for industrial or residential applications, street lighting, parking lots, tunnels, etc. It has class II isolation to simplify installation, with no ground connection required.

The module is programmable using Zigbee protocol, and offers a wide range of configurations to allow each individual luminaire to be optimized for its location, wherever it is installed. The ZCM-Z™ series has an auxiliary output that can be used to power motion sensors or other external devices. The module also includes an AC on-off function to minimize luminaire energy consumption in standby mode.

The module has been designed to meet European Directives and international standards concerning:

### EMC

- EN 55015, September 2007
- EN 61547
- FCC part 15

### Safety

- EN 61347-1-2-13
- EN 62384
- UL 60950-1 Second edition A1 rev date 2011-12-19 / UL 8750
- CAN/CSA C 22.2 N° 60950-1 rev date 2011-12-19

### Radio

- ETS 300 328 V1.8.1
- FCC part 15

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

## 3 RECEIPT OF EQUIPMENT

To use the ZCM-Z™ module correctly, please read and understand all the information in this User Guide. AEG assumes no liability for damage (if any) caused by misuse, negligence, equipment modification or use of items other than the original without written approval from the manufacturer.

Upon receipt of the equipment, check that the packaging is not damaged. Check that all items are present as described in the delivery slip. In case of loss or damage, file a claim immediately with the carrier and follow the necessary steps to protect your rights.

**IMPORTANT:** The original packaging must be used for any return.

If intended to be stored before use, place the material in its packaging in a dry, ventilated area away from rain, water or chemicals.

## 4 FEATURES

The ZCM-Z™ module is a complete, self-contained controller for LED drivers or ballasts.

Main functions:

- Wireless communication (ZigBee)
- Dimming output for 0-10V control (PWM option)
- Inputs for optional motion sensor and/or lumen sensor
- Internal AC power switch (relay): can switch on/off the LED driver
- RF antenna connector (ZigBee)
- Switchable auxiliary output: 5V/170mA , 12V / 65 mA, 24V/35mA (SELV)
- Switched AC output (same voltage as the input): max 500W
- All other input/outputs are SELV
- Class II isolation
- Temperature protection (optional external sensor)
- Long life
- Meets RoHS
- Test/reset button

### 4.1 DIMMING

The “Dim” output can be used with any driver or ballast that has a standard 0-10V control input. It is possible to control several drivers simultaneously, up to 5mA total.

As an option, the dimming output can provide a PWM signal instead of the 0-10V signal. (Refer to the ZCM-Z datasheet for more information.)

### 4.2 AC OUTPUT

The output “ACout” provides a switched AC equal to the input supply voltage. It allows you to connect any LED driver or ballast up to 500W maximum.

For special applications, this switched output can also be used to control power to any external device such as a fan, electric motor, etc up to 500W maximum.

### 4.3 PRESENCE/MOTION SENSOR

The module supports one motion/presence sensor which connect to the “Motion Sensor” input. This optional sensor may be mounted on the luminaire (or any other suitable location) to detect the presence of a user and allow illumination of one light, or a group of lights via the ZigBee network. The detector is a logic type, dry loop or open collector. An auxiliary output is available on the module for use with an integrated sensor such as the AEG Power Solutions type LX18440AB or similar (refer to paragraph 4.8).

Refer to paragraph 7.5 for wiring details.

### 4.4 LUMEN SENSOR

The ZCM-Z™ module supports a light level sensor which connects to the “Lumen sensor” input. The sensor may be mounted on the luminaire (or in any other suitable location) to measure ambient light level. The sensor is an analog type 0-10V.

**Caution:** disconnect AC power before connecting or disconnecting the sensor.

#### 4.5 PROTECTION/ CONTROL OF TEMPERATURE

An optional external temperature sensor can be connected to the “Temp” input to reduce the dimming level if the luminaire temperature becomes excessive (contact AEG for details). This function is based on the use of an LM335 device.

#### 4.6 MEASUREMENT

The following information is available through the ZigBee network:

- Energy consumption (W-hrs)
- Instantaneous power (W)
- Temperature (if a temperature sensor is connected)
- Ambient light level (if a lumen sensor is connected)

#### 4.7 RF ANTENNA

An RF antenna suitable for ZigBee use (2.4 GHz) is connected to the “RF out” coax connector, to allow communication with the network coordinator. The ZCM-Z has been FCC certified with a whip antenna reference LX18437AB vertically oriented.

LX18437AB specification :

- » Impedance: 50 ohms
- » Frequency: 2.4 GHz
- » Polarization: vertical
- » VSWR: 2: 1 Max
- » Connector: MMCX male 90°
- » Cable length: RG178 cable 250 mm
- » Housing: 70 ± 2 mm
- » Operating temperature: -30°C to +60°C
- » Protection rating: IP66
- » Gain: 2.2 dBi

#### 4.8 AUXILIARY OUTPUT

The auxiliary output allows powering an external device (such as a motion sensor or lumen sensor). The auxiliary output is independent of the programming and is always available whenever the AC input is present (within the ZCM-Z module input specification). The output voltage can be selected using the recessed switch above the output connector, to either 5V, 12V or 24V (respectively 170mA, 65mA, 35mA) as required. This output is internally protected and meets the requirements for SELV (safety extra low voltage).

#### 4.9 CLOCK BATTERY (OPTIONAL)

When the real-time clock option is installed, the timing is maintained by a battery (type CR2032 3V) inside the module. The battery has a life of more than 15 years under normal use, and is not designed for field replacement.

#### 4.10 ZCM-Z™ PROGRAMMING AND NETWORK MANAGEMENT

The ZCM-Z meets the requirements of the ZigBee Alliance for both profiles ZHA and ZBA.

## 4.11 TES / RESET

The ZCM-Z has a "Test / Reset" button, which allows:

- Reset network configuration (RESET)
- To carry out tests on the motion sensor and lumen sensor inputs and the dimming output (TEST)

This button is recessed in the top of the module, and requires a small screwdriver or thin rod (such as a paperclip) to operate.

### 4.11.1 TEST MODE

1. Power On the module
2. Press and hold the "Test/Reset" button for 4 seconds. The red LED  flashes during this time, then turns ON.
3. Release the "Test / Reset" button as soon as the LED is ON; the module is now in Test Mode.
4. **Dimming Output Test:** Red LED flashes once per second
  - The dimming level increases gradually for 3 seconds until it reaches 100%, and then drops to 0. This variation is repeated every 8 seconds
5. Briefly press the "Test / Reset" button to move to the next test.
6. **Motion sensor test:** Red LED flashes twice per second
  - The dimming is set to 0%
  - Activate the motion sensor (move in front of it)
  - When the motion signal is detected, the dimming level is gradually increased for 2 seconds up to 100%, then drops to 0.
7. Briefly press the "Test / Reset" button to move to the next test.
8. **Lumen sensor test:** Red LED flashes 3 times per second
  - Cover the lumen sensor momentarily so that it is dark
  - The dimming level should rise to 100% (full brightness of controlled lamps)
  - Uncover the lumen sensor so that it is illuminated
  - The dimming drops to 0%
  - Cover the lumen sensor again and the dimming level should return to 100%
9. Briefly press the "Test / Reset" button to exit the Test mode. The red LED should behave as follows:
  - Flash slowly (once per 2 seconds) if the module is associated to a network
  - Off if the module is not associated to a network

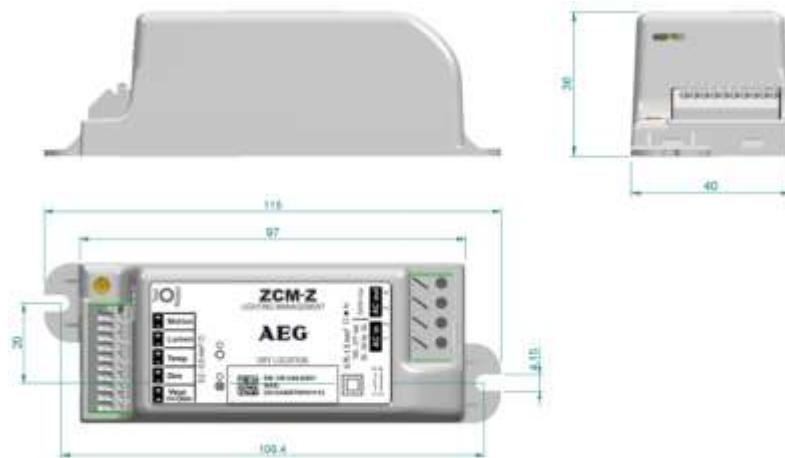
### 4.11.2 RESET MODE

To reset a ZCM-Z™ module (or disassociate from a network), press and hold the "Test / Reset" button for 6 seconds.

When the red LED  next to the power LED  goes off, the module is reset.

## 5 MECHANICAL SPECIFICATIONS

- Dimensions max 40mm X 115mm X 36mm
- Weight: < 80g



## 6 ELECTRICAL SPECIFICATIONS

### 6.1 INPUT SPECIFICATION

Nominal voltage	100V - 277 Vac
Voltage range	90 Vac - 305Vac
Frequency	50/60 Hz.
Frequency range	47 Hz - 63 Hz
Nominal current	5 A rms. max (500 W connected to the AC output)
Inrush current	≤ 9A
Power consumption	< 1W (dimming 0%, Aux output = 0 mA)

### 6.2 OUTPUT SPECIFICATION

Power from ACout	500 W max (@ unity power factor)
Dimming output	0-10V (5mA max)
Auxiliary output voltage	5Vdc / 12Vdc / 24V +/- 10%
Aux output current	170mA / 65mA / 65mA
Aux short circuit current	600mA / 400mA / 200mA
Ripple	≤ 2% (20 Mhz bandwidth)

### 6.3 OTHER SPECIFICATIONS

Maximum RF output	+3dBm
Battery (real-time clock)	CR2032 3V lithium (not field-replaceable)
Clock accuracy	+/- 20 PPM

### 6.4 DIELECTRIC STRENGTH

Isolation Primary (ACin & ACout) to secondary	3500 VAC
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### 6.5 ENVIRONMENT

Temperature :	
- storage	-40°C to +85°C
- operation	-30°C to + 60°C (including battery) -30°C to +75°C (without battery)
Relative humidity	
-storage	10 to 95% (no condensation)
-operation	20 to 95% (no condensation)

## 7 INSTALLATION AND CONNECTIONS

### 7.1 ELECTRICAL SAFETY

**For safety, the ZCM-Z™ must be installed in an enclosure that provides protection against electrical, mechanical and fire risks and which guarantees a dry environment.**

It is essential to use a fuse in the input supply for electrical safety.

Recommended fuse characteristics are as follows:

- Time delay
- High break capacity suitable for the AC input voltage (110, 240 or 277V)
- Current rating according to the AC load (6.3A maximum 440V, such as Littlefuse series 354)
- Compliant with UL, CEI127 or equivalent

The ZCM-Z™ module is Class II and does not require connection to protective earth. The ZCM-Z™ complies with international safety standards (IEC 61347-2-13 and UL 8750) and is CE certified.

**Caution:**

- input and output signals (Vaux, Dim, Sensor, Temp and antenna) are not isolated from each other and the user must take care accordingly.
- Changes or modifications not expressly approved by the AEG could void the user's authority to operate the equipment

### 7.2 ELECTROMAGNETIC COMPATIBILITY

The ZCM-Z™ module complies with emission standard EN55015 and immunity standard EN61547.

### 7.3 RADIO

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

This equipment complies with FCC's radiation exposure limits set forth for an uncontrolled environment under the following conditions :

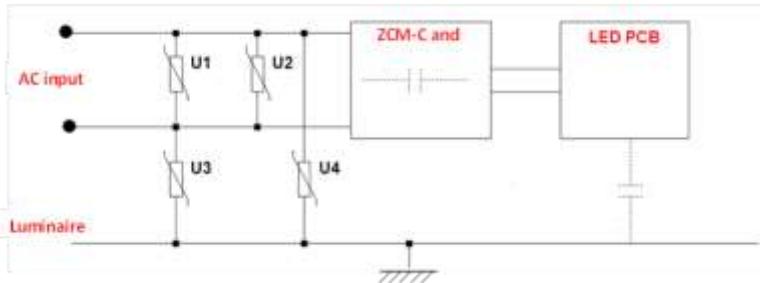
- This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## 7.4 ADDITIONAL PROTECTION AGAINST AC INPUT SURGE

The ZCM-Z™ module can withstand up to 4 kV between input line and neutral (differential-mode). However, in some applications such as street lighting it may be necessary to provide additional protection against voltage transients due to lightning and other AC surges. External protection may be added using varistor type surge limiter devices connected at the input terminals of the ZCM-Z.

Common-mode protection may also be necessary when the isolation between the outputs (particularly the LEDs) and the mechanical housing is less than 4kV, due to stray capacitance coupling of voltage surges as illustrated below.

Example of protection using varistors:



U1, U2 = differential-mode protection varistors (if required)

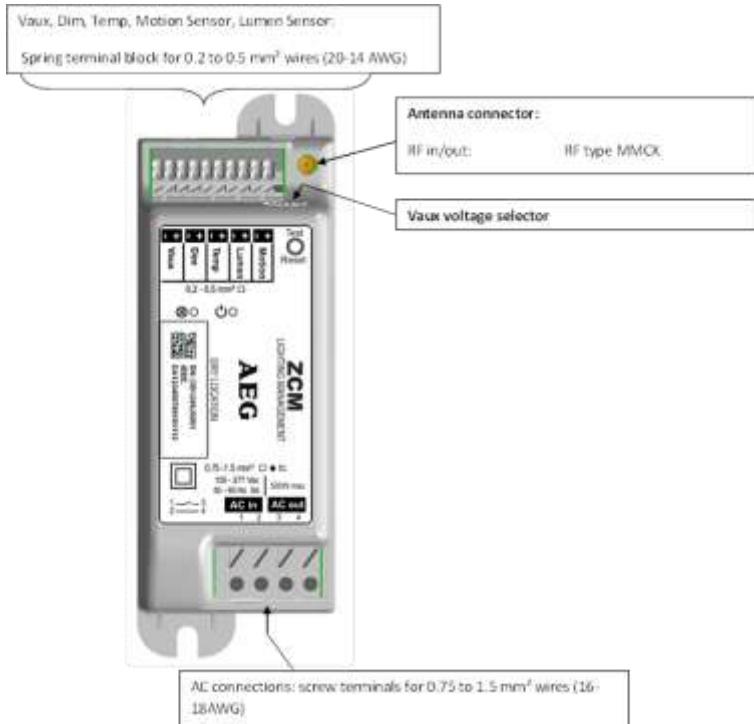
U3, U4 = common-mode protection varistors (if required)

Consult AEG Power Solutions for more information.

## 7.5 CONNECTIONS

**CAUTION: All work on the ZCM-Z™ must be carried out by qualified persons, knowledgeable about electrical hazards and able to take appropriate precautions for personal safety.**

**No unauthorized person shall handle live AC feeds.**



## 7.6 COOLING

The ZCM-Z™ module has negligible self-heating and requires no special cooling precautions. In the event of excessive temperature the module will shut down, and restart after it cools.

Maximum case temperature Tc is 95 °C for a product without RTC.

Maximum case temperature Tc is 80 °C for a product with RTC (limited by the battery).

Note: Installation in a moderate temperature will increase the lifetime, which depends directly on the ambient temperature.

Example of lifetime vs. ambient temperature (without battery)

Ambient (°C)	Predicted lifetime (hours)
70	40 000
60	80 000
50	160 000
40	320 000

## 7.7 POWERING UP

At power-up, some time is needed to establish the ZigBee network between devices. It may be necessary to wait up to 30 seconds or longer before the ZCM-Z™ network is fully operational.

## 8 MAINTENANCE & SUPPORT

### 8.1 TROUBLESHOOTING

This ZCM-Z™ requires no special maintenance and is not intended to be repaired on site. After the AC input is disconnected, dangerous voltages may persist for some time inside the unit. Do not open the module until you are sure no danger remains.

If you are experiencing difficulty with the ZCM-Z™, please consult the following chart showing symptoms and potential solutions.

Symptoms	Possible causes	Remedies
No auxiliary output or low voltage	<ul style="list-style-type: none"> <li>- Output overload or short circuit</li> <li>- Poor connection to the module</li> <li>- Input power failed</li> <li>- Over-temperature shutdown</li> </ul>	<ul style="list-style-type: none"> <li>-Check the load and the output wires.</li> <li>- Check the wires are not loose</li> <li>-Check the voltage on the AC input wires</li> <li>- Check that the temperature around the module does not exceed 75°C</li> </ul>
No dimming	<ul style="list-style-type: none"> <li>- Incorrect configuration</li> <li>- Wrong connection to driver</li> <li>- Radio communication not working</li> <li>- ZigBee interface failed</li> </ul>	<ul style="list-style-type: none"> <li>- Check the configuration</li> <li>- Check the wiring connections</li> <li>- Check antenna connections</li> <li>- Replace the module</li> </ul>
Module not joinable	<ul style="list-style-type: none"> <li>- Module is not on the right network</li> <li>- Module too far away from UBEE</li> <li>- Radio communication not working</li> </ul>	<ul style="list-style-type: none"> <li>-Reset the ZCM-Z, then carry out the operation to associate with the network</li> <li>- One module in network must be within 3m (10ft) of the UBEE</li> <li>- Check antenna connections</li> </ul>
AC output not working	<ul style="list-style-type: none"> <li>-Dimming set to 0%</li> <li>- Mains input failed</li> </ul>	<ul style="list-style-type: none"> <li>-Change the dimming setting</li> <li>- Check the voltage on the input wires</li> </ul>
Motion sensor not working	<ul style="list-style-type: none"> <li>- Incorrect configuration</li> <li>-Sensor failed or disconnected</li> </ul>	<ul style="list-style-type: none"> <li>- Check the configuration</li> <li>-Check the motion sensor is properly connected</li> </ul>
Lumen sensor not working	<ul style="list-style-type: none"> <li>- Incorrect configuration</li> <li>-Sensor failed or disconnected</li> </ul>	<ul style="list-style-type: none"> <li>- Check the configuration</li> <li>- Check the lumen sensor is properly connected</li> </ul>
Temperature sensor not working	<ul style="list-style-type: none"> <li>- Incorrect configuration</li> <li>-Sensor failed or</li> </ul>	<ul style="list-style-type: none"> <li>- Check the configuration</li> <li>- Check the temperature sensor is properly</li> </ul>

	disconnected	connected
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Note: To avoid possible damage in transport, the module must be well packed, and preferably should be returned in its original packaging.

## 8.2 CUSTOMER SERVICE

If the above suggestions do not resolve the problem, please contact our service department:

AEG PS (Lannion, France) Phone: +33 02 96 04 77 39

Fax: +33 02 96 04 71 66

Email: [aegps@aegps.com](mailto:aegps@aegps.com)

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22301 LANNION CEDEX  
FRANCE

## WARRANTY

TYPE: \_\_\_\_\_

PART NUMBER.: \_\_\_\_\_

DATE OF PURCHASE: \_\_\_\_\_

## DEALER STAMP / SIGNATURE

**AEGPS RESERVES THE RIGHT TO MAKE CHANGES WITHOUT NOTICE**

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