



# Street Lighting Controls

Technical Tool Guide



# Streets ahead for 60 years...

Lucy Zodion is a leader in the design and manufacture of street lighting equipment in the UK.

Our product range spans the on-street installation of lighting from electrical distribution to control.

Our leading position has been reached through constant innovation in both our products and service.

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**Lucy Zodion** is a leader in the design and manufacture of street lighting equipment in the UK, **with over 60 years' experience.**

**At Lucy Zodion products have been designed with durability in mind.**

On-street conditions can be harsh, and our products are a match for this environment and result from years of experience in electrical distribution and control.

The use of carefully selected high-quality materials ensures optimum life expectancy.

With our expert knowledge we can offer a wide range of skills and support routes.

We provide engineer-led custom based designs and have a knowledgebase of applications and solutions for nearly all requirements.

We pride ourselves on service and delivery and we can provide fast and efficient supply either from stock, or on short lead-times.

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**A brief history of Photocells**

**Photocells or PECUs (photo electric control units) are light operated switches that activate automatically to turn on at dusk and off at dawn.**

Photocells are stand-alone devices, used to switch lights individually, or with one photocell controlling multiple lights on one circuit.'

We often default to think about streetlights, but photocells are also used to control all manner of outdoor lighting, floodlights, pedestrian lights, illuminated road signs and even advertising hoardings.

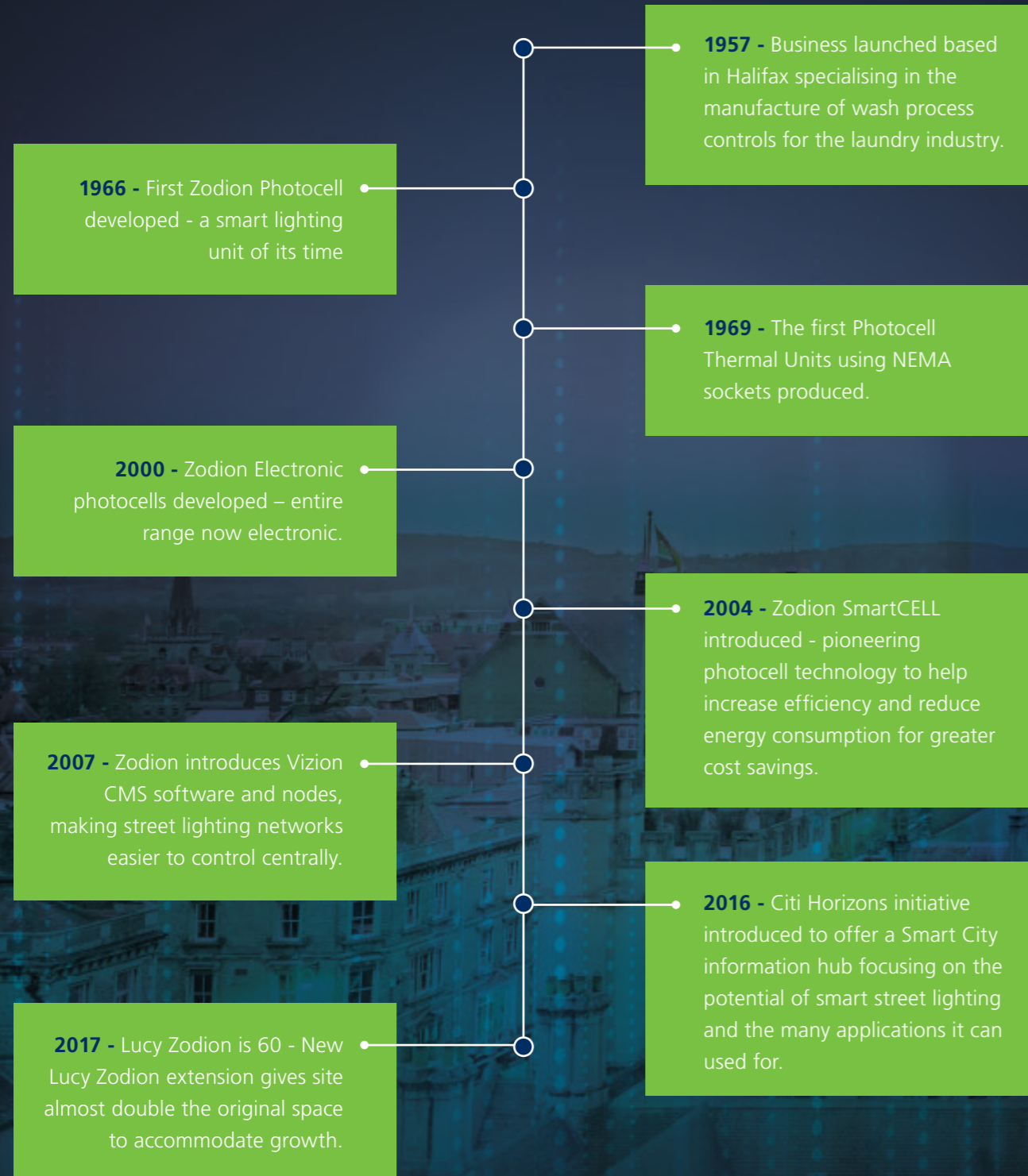
Anywhere you see lighting outdoors, a photocell won't be far away!

First developed in the 1960s, they were initially relatively crude in the way they worked but technological refinements down the years have brought about tremendous performance improvements.

Today's generation of photocells is extremely enviro-friendly, highly sensitive to light changes and exceptionally energy efficient, with many units using less than 100mW.



# Our History



# So, Why Photocells?

Did you know that here at Lucy Zodion we produce **over 700,000 photocells a year!**

## Contribute to Public Safety:

**Photocells contribute to public safety through:**

- Provide reliable switching at a consistent ambient light level
- Eliminating 'nuisance switching' - for example, making sure a car headlight does not switch the light off
- Ensure light is there when it is needed
- Fail safe
- A photocell on each streetlight ensures failure of one device cannot 'knock out' a full street

This is important from an environmental point of view, both carbon emissions and light pollution, and of course very important when you are looking to maximise energy savings.

Photocells have benefits over timeclocks as they turn the lights on when the light falls, ensuring that light is provided when there is poor visibility prior to dusk. Yet, on clear evenings they take full advantage of good light.

### Photocells affect energy use in 2 ways:

- The number of hours they cause the light to be lit
- The power consumption of the photocell itself

## Save Energy - maintenance / energy use:

**Choosing a quality, long life photocell has never been more important. LEDs save hugely not only on energy costs but also on maintenance, since there is no re-lamping needed.**

In the same way, it is important that the photocell life cycle is aligned with that of the luminaire - and the warranty too. Photocells also save energy.

The most efficient lighting is only switched on when needed and is no brighter than it needs to be when it is on.

## Ensure Futureproofing:

**Having a socket-type on each streetlight means the photocell can be upgraded to another type (e.g., part night), or a smart lighting control communicating device.**

Many 'Smart City' applications require uninterrupted 24/7 power, e.g., to maintain data communication, or to provide daytime power for additional applications such as Defibrillator or Electric Vehicle Charging.



# Ratios and Part Night

## Ratios:

Photocells switch the supply ON to a load when the light level falls beneath a given value (usually at dusk) and then switch the supply OFF when it rises above another level (usually at dawn). The ratio between the two light levels is known as the switching ratio.

**Positive Ratio:** When the ON level is lower than the OFF level (for example, where the light is switched ON at 70 Lux and switched OFF again at 105 Lux, the unit has a ratio of 1:1.5). Positive ratio units have significantly longer annual burning hours than negative ratio units but are simpler. They are often used where capital cost is of the primary importance.

**Unity Ratio:** When the ON and OFF levels are the same (1:1 ratio). For example, where the light is switch ON at 20 Lux and OFF again in the morning also at 20 Lux.

**Negative Ratio:** These units turn ON at a higher light level than they turn OFF. Typically, with a 1:0.5 ratio (for example, turning ON at 70 Lux and OFF at 35 Lux). These were often used on discharge lighting with significant warm-up time until the lamp achieves full brightness. This was typically several minutes. The negative ratio unit turned ON 'early' so that sufficient output was achieved when required.

## Part Night Photocells:

Using advanced functionality; Photocells can be designed to predict the time of day with sufficient accuracy to be useful for 'part night' operation of the attached light. They can, for instance turn OFF at midnight and back ON at 5:30am.

Use of such systems can dramatically reduce annual burning hours. An example of such a product is our **SS9**.



As the time is determined from cumulative light measurements at dusk and dawn over a couple of nights it is important that the Photocell remains continuously powered.

If the power is removed, it will take the Photocell some days to re-synchronise and re-establish the correct timing. Please note that the timing is not exact and only 'DLS' versions can compensate for changes in the time due to daylight saving (for example, GMT/BST change-over).

## Part Night Dimming Photocells:

A further variant is a part night dimming Photocell. The operation is like the above, with the capability to dim the light during the night instead of switching it off completely.

This balances energy saving against security considerations and are available with factory-programmed multi-step dimming profiles. Examples of part night dimming photocells are SS21 Miniature and Precision HALO Zhaga (for SR drivers).



## Part Night LED flashes:

**Two flashes in quick succession every few seconds:** the cell is operating in all-night mode (it has not yet established the midpoint of night). This operation occurs until the cell has operated dusk-down for one whole night.

**One flash every second:** the cell has calculated its night midpoint (and will therefore switch off its load at its programmed part-night time) but has not yet correctly established its programmed part-night early morning 'on' time. This operation occurs after the cell has operated dusk-down for one whole night.

The cell also operates in this mode at around the time of the changeover from Greenwich Mean Time to British Summer Time or vice-versa.

The preparation for the transition automatically commences approximately one week prior to the "changing of the clocks" (assuming that the cell has a clear, uninterrupted view of the sky - i.e., it is not situated under tree foliage, etc.) and continues for approximately one week afterwards. After this period, the timings should be following the same clock settings being observed in Britain.

**One flash every ten seconds** - the cell is fully calibrated for part-night operation and will switch off its load at the programmed part-night 'off' time, and back on (if required) at the programmed part-night 'on' time. This operation occurs after the cell has been operational for approximately ten days without any interruptions to the power supply, and when the photocell has not entered its GMT / BST transition period.



# Energy Consumption

Did you know bright sunlight is around 10,000 Lux, and **even the brightest mood light is under 0.5 Lux?**

## Ratios:

**Consumption:** Photocells consume energy. The amount varies according to the technology used. Generally, modern photocells consume less than 0.5W (approx. 4.4kWh/year) and several are less than 100mW (which equates to less than 1kWh/year).

**Burning Hours:** The total number of hours that a photocell operates the light each year is called the annual burning hours. Burning hours have the most dramatic effect on consumption.

A further 100hrs/year on a 100W load results in an additional 10kWh/year consumption. Switching level, switching accuracy, and switching ratio have most effect on burning hours. A major consideration is how accurately and consistently the load is controlled over a long period of time.

## Daylight and Photocells - what you need to know:

**Daylight contains much more than just visible light; however, our eyes are only sensitive to a specific band of wavelengths. The intensity of visible light, corrected for the eyes' varying sensitivity to colour is measured in Lux.**

Wavelengths of daylight that the eye is not sensitive to do not contribute to a measurement of Lux.

### Comparison of typical burning hours

Switching Level	Switching Ratio	Annual Burning Hours
70 Lux	1:5.5	4214
70 Lux	1:0.5	4150
55 Lux	1:0.5	4130
35 Lux	1:0.5	4103
20 Lux	1:1	4091
10 Lux	1:1	4072

The above tables show a TYPICAL example of the burning hours for Photocells with various switching ratios and switching levels. The actual number of hours will vary according to the weather profile of the year and the exact location of the installation (these figures are based on the Midlands).

The day-night cycle results from the earth's rotation. A consequence of this is a relatively quick decline of light at dusk (and rise at dawn).

The proportion of visible light to other wavelengths varies not only on a diurnal cycle, but also seasonally and is dependent on prevailing weather conditions. This means that only direct measurement of visible light level can accurately reflect the level of light that our eyes see due to daylight.

# Cost Savings

There are approximately 6.5 million lighting columns in public ownership in the UK. The **average cost of operating a light**, inclusive of energy cost and maintenance is between **£40 and £80 per year.**

## Cost savings – Modern Photocells:

- Photocells consume electricity 24/7, 365 days per year
- Older types drew around 0.5W - 1.0W
- Modern types of photocell draw <0.25W
- The latest designs for example, ZCELL consume less than 0.1W (100mW)
- Choice of the latest photocell type saves energy consumed by the photocells themselves

Electricity Cost	£0.17 per kWh
0.5W photocell =	£0.74 p.a.
0.1W photocell =	£0.15 pa.

**A saving of £0.59 per photocell, p.a.**

## Cost savings – Lux Level & Ratio

**Reducing the Lux level will reduce the number of burning hours per year.**

- 70 Lux On, 35 Lux off (1:0.5 ratio) photocell = 4,150 burning hours per annum
  - 35 Lux On, 18 Lux off (1:0.5 ratio) photocell = 4,103 burning hours per annum
  - 20 Lux On, 20 Lux off (1:1 ratio) photocell = 4,091 burning hours per annum
  - 10 Lux On, 10 Lux off (1:1 ratio) photocell = 4,072 burning hours per annum
- (Burning hours source: Elexon, typical figure for central UK location)

Electricity Cost	£0.17 per kWh
36W LED streetlight =	£0.00612 cost to run per hour

- 70/35 Lux @ 4,150 hours p.a. = £25.40 electricity cost per light, p.a.
- 20/20 Lux @ 4,092 hours p.a. = £25.04 electricity cost per light, p.a.

**A saving of £0.36 per light, p.a.**

Choice of a modern photocell and Lux level can save around £1 per streetlight, per year. Across 10,000 photocells this is an energy saving of £10,000 each year, every year!

Photocell Type

Lux Level





# Cost Savings

Did you know Part night photocells can almost **cut energy costs in half!**

## Cost savings – Long-life Photocells

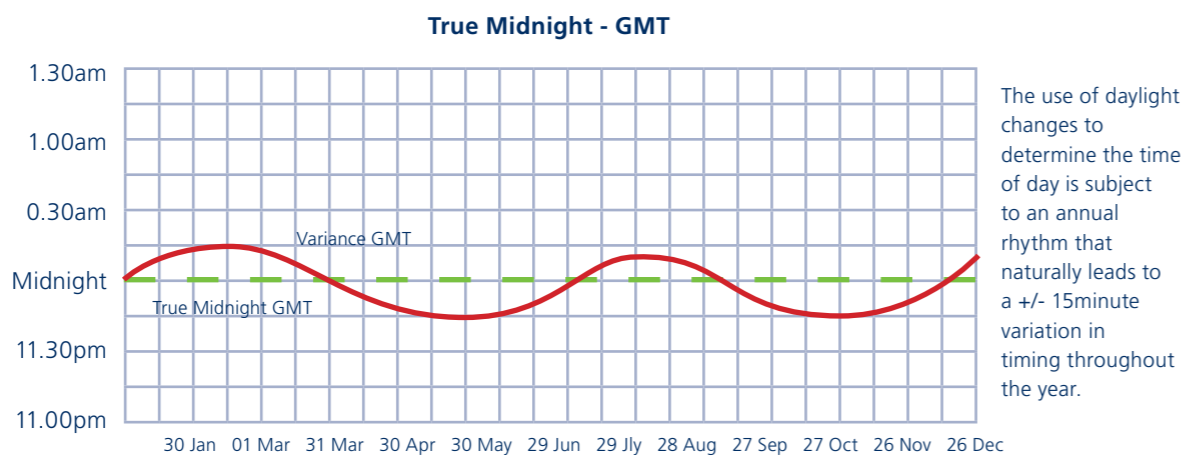
Long design life, long warranty photocells are aligned with LED service life and are maintenance-free

Remember that long design life, long warranty photocells save on Maintenance costs too.

Need more?

## Cost savings – Part Night

At the heart of a Lucy Zodion part-night photocell is a microcontroller which measures the time elapsed between selected symmetrical light levels in the evening and morning.



**Part Night** ↓

20 Lux On, 20 Lux off photocell  
= 4,091 burning hours per annum = £25.04 electricity cost per light, p.a.

20 Lux On, 20 Lux off Part Night Midnight - 5.30am OFF photocell  
= 2,203 burning hours per annum = £13.04 electricity cost per light, p.a.  
**A saving of £11.56 per light, p.a.**

# Sensors & Load Switches:

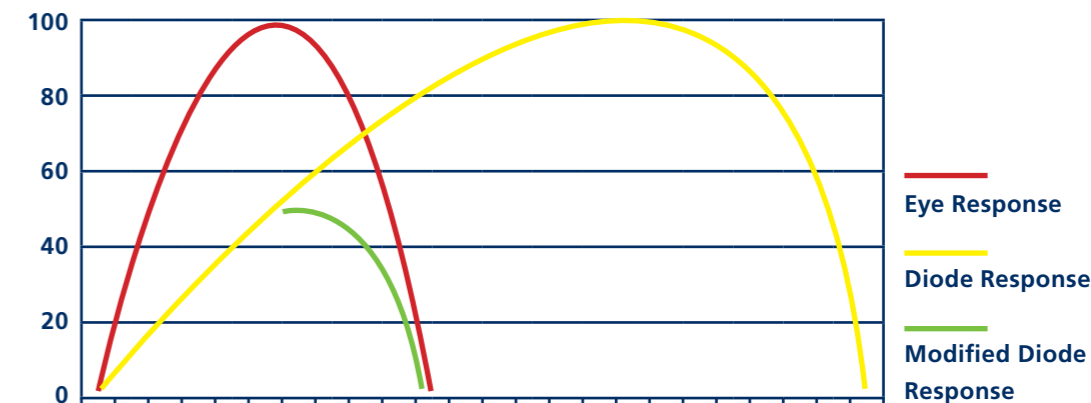
Did you know that here at Lucy Zodion we produce **over 700,000 photocells a year!**

## Sensors

The most critical part of any photocell is the light sensor. Spectral sensitivity and long-term stability play an important role in providing reliable daylight detection.

Photo ICs are **optical devices that combine a photosensitive section and a signal processing circuit into one package.**

		Drift	Dusk Dawn Switching Repeatability	Spectral Sensitivity vs Photopic response	Other
Photodiode	Unfiltered	Imperceptible	Moderate	Moderate	
	IR Filtered	Imperceptible	Poor	Very Poor	Insensitive to visible light
	Glass Filtered	Imperceptible	Excellent	Excellent	
Photo – IC	Filtered or Compensated	Imperceptible	Excellent	Excellent	Some versions provide digital outputs





## Load Switches

Photocells typically use one of two devices to switch the load:

- Electromagnetic relay (most common)
- Semiconductor (solid state)

**Electromagnetic relays** are small, capable of operation at low power and widely used in many applications. They are relatively poor at transferring high inrush loads (common to many

high-power discharge street lighting applications) however this can be mitigated by techniques such as predictive load transfer.

There are several **semiconductor** devices capable of switching street lighting loads. These devices are reliable, simple to control and are effective at transferring high inrush loads. It is relatively easy to implement zero-cross switching with semiconductor switches.

	Consumption	Load Switching Capacity	Load Holding Capacity	Size
Electromagnetic Relay	Moderate - Excellent	Moderate	Excellent	Moderate
Semiconductor	Excellent	High	High	Small - Moderate

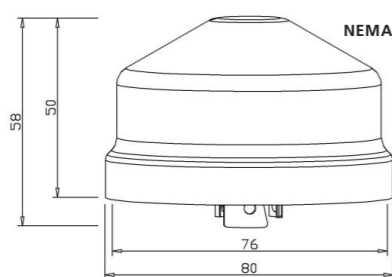




# Formats for Photocells

## Our Photocells:

Lucy Zodion photocells are available in several configurations, with dusk-dawn or Part Night operation, to meet the various needs of the street and amenity lighting market. We can break these into four different formats:



### NEMA:

This type mounts externally to the luminaire, fits and locks into a NEMA socket.

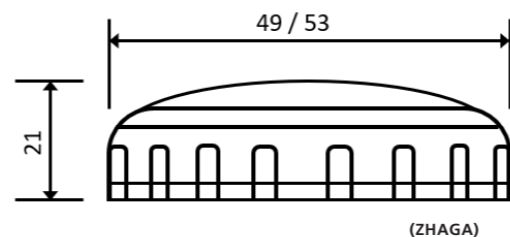
The sockets are defined under ANSI standards, there are 2 versions of the NEMA socket in use: 3-pin (ANSI C136.10) and 5/7 pin (ANSI C136.41).

It is common for streetlights to have a 7-pin socket, even when ON-OFF control with a conventional photocell is used. This is the first step of futureproofing.

### Miniature:

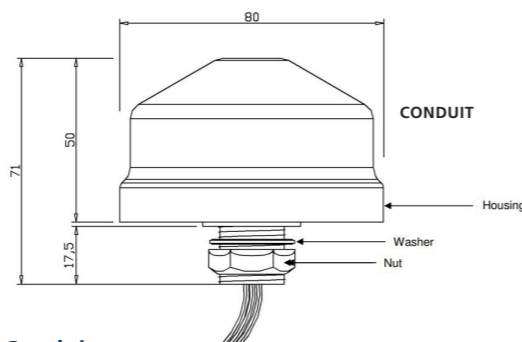
The Miniature will fit through a 20mm hole in the light fitting and usually supplied factor-fitted by the lighting manufacturer.

They can be useful for more intricate designs like the heritage light or sign light. There are versions with remote heads available and sub-miniature types which makes this option very flexible.



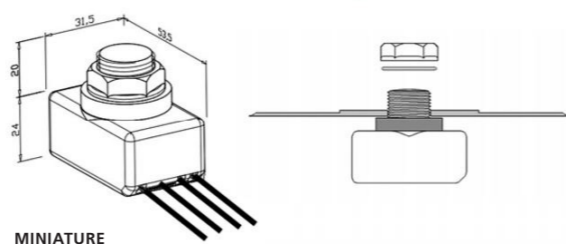
### (ZHAGA):

Compact, simple to install and upgrade, Zhaga Book 18 photocells work with approved components for improved efficiency, universal interoperability and are futureproof for smart city requirements.



### Conduit:

This allows for the direct mounting of a photocell into a Ø20mm clearance hole. Connection is made via wire leads. This arrangement is often used for 'special' photocells or where more than 3 connections are required.



MINIATURE

# Our Compliance & Standards

Did you know? There are **more than 30,000 British standards!**

Manufacturing standards are used to ensure that products are of a consistently high quality, comply with regulations and help to prevent product failures and recalls.

## Our Photocells:

	BS5972	BS EN IEC 55015	BS EN 55032	BS EN 60529	BS EN IEC 61000-3-2	BS EN 61000-3-3	BS EN IEC 61000-4-2	BS EN IEC 61000-4-3	BS EN 61000-4-4	BS EN 61000-4-5	BS EN 61000-4-6	BS EN IEC 61000-4-11	BS EN 61347-2-11	BS EN 61547
Micro MINI Pro	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS12C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SS12R	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS12SL	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS14	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS19	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS21	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Low Light Bollard	✓			✓										
SS9	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS4D	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS4ED	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
ZCELL	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Precizion Halo		✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
SS3	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SS5DR	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS6	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Super 6	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
SS12Xi	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓

## The details

**BS5972:** Requirement for photo-electric control units and associated sockets for operation on supply voltages not exceeding 250V and capable of switching a current not exceeding 10A. Includes requirements for electrical and photometric performances.

**BS EN IEC 55015:** Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.

**BS EN 55032:** This European standard covers the emission requirements of multimedia equipment, so the emissions don't interfere with radio services.



<< Continued

**BS EN 60529:** Degrees of protection provided by enclosures (IP code)

**BS EN IEC 61000-3-2:** This international standard sets limits on the harmonic current injected into the public low-voltage mains electricity supply system by electrical and electronic equipment.

**BS EN 61000-3-3:** This standard deals with limiting voltage fluctuations and flicker impressed on the public low-voltage system. It specifies the limits of voltage changes which may be produced by electrical and electronic equipment tested under specified conditions and gives guidance on methods of assessment.

**BS EN IEC 61000-4-2:** Establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment when subjected to electrostatic discharges. In addition, it includes electrostatic discharges which may occur from personnel to objects near vital equipment.

**BS EN IEC 61000-4-3:** looks at the testing and electrical measurement techniques to ensure protection against radio frequency electromagnetic fields from any source. The standard applies to all the immunity requirements of electronic equipment and components that are subjected to electromagnetic radiation.

**BS EN 61000-4-4:** cover the immunity of electrical and electronic equipment to repetitive electrical fast transients. It gives immunity requirements and test procedures related to electrical fast transients/bursts. It additionally defines ranges of test levels and establishes test procedures.

**BS EN 61000-4-5:** Electromagnetic compatibility (EMC). Testing and measurement techniques - surge immunity test.

**BS EN 61000-4-6:** defines test methods for measuring the effect that conducted disturbing signals, induced by electromagnetic radiation, have on the equipment concerned. The simulation and measurement of these conducted disturbances are not adequately exact for the quantitative determination of effects.

**BS EN IEC 61000-4-11:** defines the immunity test methods and range of preferred test levels for electrical and electronic equipment connected to low-voltage power supply networks for voltage dips, short interruptions, and voltage variations.

**BS EN 61347-2-11:** specifies general and safety requirements for miscellaneous electronic circuits used with luminaires for use on a.c. supplies up to 1 000V at 50Hz or 60Hz and/or d.c. supplies up to 250 1 000V. This part of IEC 61347 does not apply to circuits or devices for which specific IEC standards are published.

**BS EN 61547:** Equipment for general lighting purposes. EMC immunity requirements (British Standard)

	RoHS	CE	UKCA
MicroMINI Pro	✓	✓	✓
SS12C	✓	✓	✓
SS12R	✓	✓	✓
SS12SL	✓	✓	✓
SS14	✓	✓	✓
SS19	✓	✓	✓
SS21	✓	✓	✓
Low Light Bollard	✓	✓	✓
SS9	✓	✓	✓
SS4D	✓	✓	✓
SS4ED	✓	✓	✓
ZCELL	✓	✓	✓
Precision Halo	✓	✓	✓
SS3	✓	✓	✓
SS5DR	✓	✓	✓
SS6	✓	✓	✓
Super 6	✓	✓	✓

**RoHS:** means “Restriction of Certain Hazardous Substances” in the “Hazardous Substances Directive” in electrical and electronic equipment. If a product is RoHS-certified, this confirms that the proportion of hazardous, or difficult to dispose substances is limited to the maximum allowed.

**CE:** CE marking is where a manufacturer proves compliance with EU health, safety and environmental protection legislation and confirms a product’s compliance with relevant requirements.

**UKCA:** The UKCA (UK Conformity Assessed) marking is a new UK product marking that is used for goods being placed on the market in Great Britain (England, Wales and Scotland). It covers most goods which previously required the CE marking, known as ‘new approach’ goods.



# NEMA Range Overview



Type		ZCELL	SS6	Super6	SS3	SS5DR / SS5DRHD	
Sensor Type		Filtered Photodiode	Filtered Photodiode	Filtered Photodiode	Filtered Photodiode	Filtered Photodiode	
Switching Technology		Electronic EM Relay Load Switching	Electronic Solid State	Electronic Solid State	Electronic Solid State	Electronic EM Relay Load Switching	
On at dusk	Off at dawn	ZCELL	SS6	Super6	SS3	SS5DR / SS5DRHD	
70 Lux	35 Lux	Contact Sales	Yes	Yes	Yes	Yes	
55 Lux	28 Lux	Contact Sales	Yes	Yes	Yes	Yes	
35 Lux	18 Lux	Yes	Yes	Yes	Yes	Yes	
20 Lux	20 Lux	Yes	Yes	Yes	Yes	Yes	
10 Lux	10 Lux	Contact Sales	Contact Sales	Contact Sales	Contact Sales	Yes	
Switching Ratio		1:1 or 1:0.5	1:1 or 1:0.5	1:1 or 1:0.5	1:1 or 1:0.5	1:1 or 1:0.5	
Switching Delay		10 seconds	10 seconds	10 – 15 seconds	10 - 15 seconds	10 seconds	
		Max Load				SS5DR	SS5DRHD
LED lighting		400 Watts	600 Watts	600 Watts	400 Watts	250 Watts	1000 Watts
High Pressure Sodium		400 Watts	1200 Watts	1200 Watts	800 Watts	500 Watts	1200 Watts
Metal Halide		400 Watts	1200 Watts	1200 Watts	800 Watts	500 Watts	1200 Watts
GLS or incandescent		800 Watts	1200 Watts	1200 Watts	800 Watts	1200 Watts	2400 Watts
		Supply and Consumption					
Voltage		198-264	198-264	198-264	198-264	198-264	
Surge Suppression		38 Joules	20 Joules	20 Joules	20 Joules	38 Joules	
Frequency		50Hz	47-63Hz	47-63Hz	47-63Hz	47-63Hz	
Consumption in watts		100mW	<0.25	<0.25	<0.25	<0.25	
UMSUG charge code		94 0001 1000 100					
Min/Max operating ambient temp range		-20/+80°C	-20/+80°C	-20/+80°C	-20/+80°C	-20/+80°C	
IP Rating		IP67	IP65	IP66 or IP67	IP65	IP65	
Warranty		12 years	6 years	10 years	4 years	5 years	
Compliance Standards		See table (page 12)					
		Dimensions and Fixing					
Dimensions		50 x 80 mm	50 x 80 mm	50 x 80 mm	50 x 80 mm	50 x 80 mm	
Type		ZCELL	SS6	Super6	SS3	SS5DR/ SS5DRHD	
Weight		82g	79g	82g	77.5g	77.5g	
Fixing		3 pin or 5/7 NEMA base	3 pin or 5/7 NEMA base. Conduit version available.	3 pin or 5/7 NEMA base	3 pin or 5/7 NEMA base	3 pin or 5/7 NEMA base	
Control circuitry		Digital	Analogue	Analogue	Analogue	Digital	
Body Materials		UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	

# Part Night Range Overview



Type		SS9	SS19	SS21
Sensor Type		Photo IC	Photo IC	Photo IC
Switching Technology		Electronic EM Relay Load Switching	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching
		Lux Levels		
On at dusk	Off at dawn	SS9	SS19	SS21
70 Lux	35 Lux	Yes	Yes	Yes
55 Lux	28 Lux	Yes	Yes	Yes
35 Lux	18 Lux	Yes	Yes	Yes
20 Lux	20 Lux	Yes	Yes	Yes
10 Lux	10 Lux	Yes	Yes	Yes
Switching Ratio		1:1 or 1:0.5	1:1 or 1:0.5	1:1 or 1:0.5
Switching Delay		10 seconds	10 seconds	10 seconds
		Max Load		
LED lighting		250 Watts	250 Watts	Determined by lamp driver
High Pressure Sodium		500 Watts	500 Watts	
Metal Halide		500 Watts	500 Watts	
GLS or incandescent		1200 Watts	1200 Watts	
		Supply and Consumption		
Voltage		198-264	198-264	198-264
Surge Suppression		20 Joules	20 Joules	Protected
Frequency		50Hz	50Hz	47-63Hz
Consumption in watts		<0.25	<0.25	<0.25
UMSUG charge code		94 0001 1000 100		
Min/Max operating ambient temp range		-20/+80°C	-20/+75°C	-20/+80°C
IP Rating		IP65	IP65	IP65
Warranty		6 years	6 years	10 years
Compliance Standards		See table (page 12)		
		Dimensions and Fixing		
Dimensions		50 x 80 mm	44 x 31.5 mm	44 x 31.5 mm
Weight		77.5g	63g	50g
Fixing		3 pin or 5/7 NEMA base. Conduit version available.	20mm Hole Diameter	20mm Hole Diameter
Control circuitry		Digital	Digital	Digital
Body Materials		UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure



# Miniature Range Overview



Type	MicroMini Pro	SS14	SS14R
Sensor Type	Photo IC	Photodiode	Photodiode
Switching Technology	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching
Lux Levels			
On at dusk	Off at dawn	MicroMini Pro	SS14
70 Lux	35 Lux	Yes	Yes
70 Lux	105 Lux	N/A	N/A
55 Lux	28 Lux	Yes	Yes
35 Lux	18 Lux	Yes	Yes
20 Lux	20 Lux	N/A	N/A
Switching Ratio	1:0.5 Neg	1:1.5 POS	1:1.5 POS
Switching Delay	10 seconds	10 – 30 seconds	10 – 30 seconds
Max Load			
LED lighting	125 Watts	250 Watts	250 Watts
High Pressure Sodium	250 Watts	500 Watts	500 Watts
Metal Halide	250 Watts	500 Watts	500 Watts
GLS or incandescent	600 Watts	1200 Watts	1200 Watts
Supply and Consumption			
Voltage	198-264	198-264	198-264
Surge Suppression	20 Joules	20 Joules	20 Joules
Frequency	50Hz	47-63Hz	47-63Hz
Consumption in watts	<0.25	<0.5	<0.5
UMSUG charge code	94 0001 1000 100		
Min/Max operating ambient temp range	-20/+75°C	-20/+75°C	-20/+75°C
MicroMini Pro SS14 SS14R			
IP Rating	IP65	IP66	IP65
Warranty	6 years	3 years	3 years
Compliance Standards	See table (page 12)		
Dimensions and Fixing			
Dimensions	33 x 22 mm	44 x 31.5 mm	44 x 31.5 mm
Weight	60g	59g	61g
Fixing	10mm Hole Diameter	20mm Hole Diameter	20mm Hole Diameter
Control circuitry	Digital	Analogue	Analogue
Body Materials	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure

# Miniature Range Overview



Type	SS12C	SS12CHT	SS12A-R	SS12ASL	SS12Xii
Sensor Type	BG Glass Filtered Photodiode	BG Glass Filtered Photodiode	BG Glass Filtered Photodiode	Photodiode	BG Glass Filtered Photodiode
Switching Technology	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching
Lux Levels					
On at dusk	Off at dawn	SS12C	SS12CHT	SS12A-R	SS12ASL
70 Lux	35 Lux	Yes	Yes	Yes	Yes
55 Lux	28 Lux	Yes	Yes	Yes	Yes
35 Lux	18 Lux	Yes	Yes	Yes	N/A
20 Lux	20 Lux	Yes	Yes	N/A	N/A
10 Lux	10 Lux	N/A	N/A	N/A	N/A
Switching Ratio	1:1 20 Lux or 1:0.5 Neg	1:1 20 Lux or 1:0.5 Neg	1:0.5 Neg	1:0.5 Neg	1:1 20Lux or 1:0.5 Neg
Switching Delay	10 – 30 seconds	10 – 30 seconds	10 – 30 seconds	10 – 30 seconds	10 – 30 seconds
Max Load					
LED lighting	250 Watts	250 Watts	250 Watts	250 Watts	250 Watts
High Pressure Sodium	500 Watts	500 Watts	500 Watts	500 Watts	500 Watts
Metal Halide	500 Watts	500 Watts	500 Watts	500 Watts	500 Watts
GLS or incandescent	1200 Watts	1200 Watts	1200 Watts	1200 Watts	1200 Watts
Supply and Consumption					
Voltage	198-264	198-264	198-264	198-264	198-264
Surge Suppression	20 Joules	20 Joules	20 Joules	N/A	20 Joules
Frequency	47-63Hz	47-63Hz	47-63Hz	47-63Hz	47-63Hz
Consumption in watts	<0.25	<0.25	<0.25	<0.25	<0.25
UMSUG charge code	94 0001 1000 100				
Min/Max operating ambient temp range	-20/+80°C	-20/+80°C	-20/+80°C	-20/+80°C	-20/+80°C
IP Rating	IP67	IP65	IP66 or IP67	IP65	IP65
Warranty	12 years	6 years	10 years	4 years	5 years
Compliance Standards	See table (page 12)				
Min/Max operating ambient temp range	-20/+80°C	-20/+105	-20/+75°C	-20/+75°C	-20/+105
SS12C SS12CHT SS12A-R SS12ASL SS12Xii					
IP Rating	IP66	IP66	IP65	IP65	IP66
Warranty	6 years	6 years	6 years	6 years	12 years
Compliance Standards	See table (page 12)				
Dimensions and Fixing					
Dimensions	44 x 31.5 mm	44 x 31.5 mm	44 x 31.5 mm	44 x 31.5 mm	44 x 31.5 mm
Weight	58g	58g	67g	60g	58g
Fixing	20mm Hole Diameter	20mm Hole Diameter	20mm Hole Diameter	20mm Hole Diameter	20mm Hole Diameter
Control circuitry	Analogue	Analogue	Analogue	Analogue	Analogue
Body Materials	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure

# Zhaga Photocells



Type	Precision Halo (standard)	Precision Halo (Heavy-Duty)
Sensor Type	Photo IC	Photo IC
Switching Technology	SR	SR
Lux Levels		
On at dusk	Off at dawn	
35 Lux	18 Lux	Yes
20 Lux	20 Lux	Yes
10 Lux	10 Lux	Yes
Switching Ratio	1:1 or 1:0.5	1:1 or 1:0.5
Switching Delay	10 seconds	10 seconds
Max Load		
LED lighting	Dictated by SR driver	
Supply and Consumption		
Voltage	Via SR driver (typically 16V)	Via SR driver (typically 16V)
Surge Suppression	N/A	N/A
Frequency	N/A	N/A
Consumption in watts	SR lower tier	SR lower tier
UMSUG charge code	N/A	N/A
Operating Temperature		
Min/Max operating ambient temp range	-20/+80°C	-20/+80°C
Compliance and Approvals		
IP Rating	IP66	IP66
Warranty	10 years	10 years
Compliance Standards	See table (page 12)	
Dimensions and Fixing		
Dimensions	Ø49mm (with trim: 53mm)	Ø49mm (with trim: 53mm)
Weight	25g (29g with trim)	25g (29g with trim)
Fixing	Zhaga Book 18 socket	Zhaga Book 18 socket
Control circuitry	Digital	Digital
Lens Material	Polycarbonate KB18 (UV Stabilised)	Polycarbonate Siloxane Copolymer IK09 (UV Stabilised)
IK09 Impact Protection	No	Yes

Both are available with no trim, a light grey trim or a dark grey trim.

# Commercial Photocells



Type	SS4D	SS4ED
Sensor Type	Photodiode	Photodiode
Switching Technology	Electronic EM Relay Load Switching	Electronic EM Relay Load Switching
Lux Levels		
On at dusk	Off at dawn	
70 Lux	35 Lux	Yes
Switching Ratio	1:1.5 POS	1:1.5 POS
Switching Delay	20 seconds	20 seconds
Max Load		
LED lighting	250 Watts	250 Watts
High Pressure Sodium	500 Watts	500 watts
Metal Halide	500 Watts	500 watts
GLS or incandescent	1000 Watts	1000 Watts
Supply and Consumption		
Voltage	198-264	198-264
Surge Suppression	N/A	20 Joules
Frequency	50/60Hz	50/60Hz
Consumption in watts	<0.5	<0.5
UMSUG charge code	94 0001 1000 100	
Operating Temperature		
Min/Max operating ambient temp range	-20/+70°C	-20/+70°C
Compliance and Approvals		
IP Rating	IP65	IP65
Warranty	1 year	1 year
Compliance Standards	See table (page 12)	
Dimensions and Fixing		
Dimensions	50 x 80 mm	50 x 80 mm
Weight	77g	77g
Fixing	3 pin or 5/7 NEMA base	3 pin or 5/7 NEMA base
Control circuitry	Analogue	Analogue
Body Materials	UV stabilised Polycarbonate Enclosure	UV stabilised Polycarbonate Enclosure

Both the SS4D and SS4ED are available as a 'kit' (with socket & bracket) or a 'cell only'.



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