

# SMART SYSTEM

2018

Build your Smart City



SMART  
CONNECTED  
LIGHTING

Build the city of the future





BUILDING THE

# CITY OF THE FUTURE

SMART AND **CONNECTED** LIGHTING

WITH

## AEC SMART SYSTEM

**THE CITY BECOMES  
SMART AND CONNECTED**

Cities around the world are growing and it is increasingly difficult to manage mobility, ensure security and meet the increasing needs of citizens. Cities must evolve quickly, becoming interconnected and able to combine savings, safety and livability.



# AEC SOLUTIONS

AEC ILLUMINAZIONE has been a leader in the world of outdoor public lighting since 1957. For over 60 years, the company has been designing lighting systems able to fully meet the stringent demands of the sector, ensuring energy savings, road safety and environmental sustainability.

Today, AEC engages in the research and development of Smart connected systems that allow activating countless intelligent services to create real Smart Cities for the benefit of citizens and public administrations.

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# BUILDING THE CITY OF THE FUTURE

Cities around the world are growing and it is increasingly difficult to manage mobility, ensure security and meet the increasing needs of citizens. Cities must evolve quickly, becoming **interconnected** and able to combine **savings, safety and livability**.



## For citizens and administrations

AEC Smart System allows creating a communication network that makes possible to activate Smart scenarios for the benefit of citizens and their administrations.



## For energy savings

AEC solutions, designed with the best LED technology on the market and integrated with the AEC Smart System control system, allow very high energy savings.



## For an intelligent investment

The communication network created by the public lighting connected to the AEC Smart System becomes an economic opportunity for the operator, who in addition to obtaining a high energy saving, can also offer the use of the network and the information gathered there, also to third parties.

The AEC Smart System control system manages an efficient lighting network and creates an open communication infrastructure, extensively covering the city, which allows integration with other services (such as Smart Parking, Smart Metering, variable message panels, management irrigation, Wi-Fi network, etc.) for the benefit of both citizens and public administration.

LED fixtures, equipped with the latest technology for energy saving, can interact with motion sensors, traffic, weather and provide lighting "on demand", i.e. regulating lighting as necessary, significantly reducing costs and eliminating waste.

AEC Smart System represents a forward-looking investment. New Smart services can be activated without the need to create a new communication network, as they use the same infrastructure used for the control of public lighting. Furthermore, by making data easily accessible, in a shared and open platform, the costs of interfacing with third-party services are minimize.



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# SMART LIGHTING

## Lighting management

AEC Smart System allows regulating lighting in a flexible way and according to the most varied needs of the Smart City. From simple regulation to a customizable calendar up to the single day of the year, to the management of occasional events (concert, event, etc.), AEC Smart System easily guarantees a perfect regulation of systems from single lighting point to group management.

## Adaptive lighting

Specific sensors can communicate in real time to the system the road conditions and the state of the road surface (ex. dry or wet conditions), monitoring the progress of vehicles and regulating lighting in real time, maximizing energy savings and at the same time keeping traffic safe.

## Motion sensors

Thanks to the integration of motion sensors it is possible to adjust the light intensity, adapting it to the passage of people. In the case of completely empty roads, it is possible, for example, to program until the fixtures are turned off in order to minimize waste. Furthermore, the lighting of a cycle path can be regulated dynamically according to the movement of people.

## Detecting anomalies and consumption

AEC Smart System is also very useful for the remote monitoring of the single fixture for maintenance purposes. The system provides a complete recording of the operating status of each fixture, from the count of the hours of start-up, to energy consumption, to the precise diagnosis of power supplies. It is also possible to instantly detect abnormal consumption or faults in the network or individual lighting point, without requiring on-site preventive inspections.



# SMART PARKING

## Parking occupancy detection

The AEC Smart System is able to verify, through specific sensors connected to the lighting network, the presence of free parking spaces. This information can be used by the citizen, through applications (web or app) that reduce the time to look for a parking space.



# SMART TRACKING

## Car/bike sharing geolocation

AEC Smart System allows finding the exact location of rental vehicles available in the city. Citizens are no longer bound to leave vehicles in special parking areas but can leave bikes and cars, in every place covered by the AEC lighting network. Specific sensors, integrated in the means of transport, transmit the position to the system that allows it to provide this information to the user through specific applications.

## People geolocation

AEC Smart System is also very useful in locating people. Small, easily wearable sensors (*tags*), make it possible to identify the exact position of the subject under the coverage of the public lighting network. For example, children and the elderly can be reached in the place where they are, thanks to the signal that is constantly sent by the sensor to the lighting fixtures in the vicinity. The information, stored in the system database, can be made available by specific applications.

## Bus tracking

Installation of simple sensors on public transport allows real-time monitoring of their position thanks to triangulation algorithms of the signal received from the lighting fixtures installed along the path. The information can be used to inform users of the effective arrival or delay of the next bus.

# SMART ENVIRONMENT

## Integration of environmental sensors

The AEC Smart System provides for the integration of sensors of various kinds in the communication network created by the public lighting system. Sensors for monitoring air quality or noise pollution can provide detailed information based on which to plan operational decisions regarding the city and its resources.

## Integration of weather sensors

Specific sensors can provide information related to weather conditions: temperature, humidity, wind speed and direction, rainwater level. This data can be used to support decision making for a more efficient use of the resources of the smart city.

# SMART METERING

## Gas and Water metering

AEC Smart System allows remote metering of smart gas and water meters installed near the public lighting systems. This way, it is possible to reduce metering costs for which, done automatically and more frequently by the system, no longer requires the expensive intervention of an on-site operator.





# SMART INFORMATION

## Variable message panels

The data processed by the AEC Smart System can be converted into real-time information on panels with variable message in order to inform citizens about weather forecasts, air quality, vacancies at public car parks, traffic information, etc. In addition to public utility information, these panels can also be used for advertising purposes.

## Proximity tourist information

Through the lighting network it is possible to provide proximity information services to citizens or tourists when they are close to a cultural landmark. The node installed inside the fixtures can transmit information directly to the smartphones of passers-by.

# SMART IRRIGATION

## Irrigation system management

The technology of AEC Smart System allows better management of water resources in public irrigation systems by being able to remotely control the opening and closing of public sprinklers. It is possible to automatically activate diversified irrigation scenarios by adjusting irrigation systems based on time or even based on weather sensor information. In case of rain, for example, the system blocks the activation of irrigation systems to avoid unnecessary waste.

# SMART WASTE MANAGEMENT

## Checking waste level

Thanks to AEC Smart System, the bins located in the city, equipped with special sensors, can communicate to the central system their level of filling. Data sent to the central server via the communication network can be processed to plan efficient and targeted collection paths.



# BROADBAND SERVICES

## Wi-Fi access point

The AEC Smart System provides the possibility to activate the public Wi-Fi coverage through installation of the AEC MOD 2.0 TOWER (complete modular system for lighting and activation of smart services). It is possible to create connectivity in avenues, parks and squares by providing next-generation Wi-Fi coverage.

## Video surveillance

In addition to being more efficient, the city can also be safer, integrating video surveillance cameras in the environment, present in the modular system AEC MOD 2.0 TOWER. In fact, the camera module offers a compact and efficient solution even in night and low visibility conditions. Remote viewing can be accessed via the geo-referenced maps of the AEC Smart System platform.

## Audio diffusion

The diffusion of audio or music messages can be managed remotely through a specific module of the AEC MOD 2.0 TOWER. Audio diffusion allows creating a particular atmosphere of the city environment or, if necessary, it can be used for notices and announcements of public utility or to manage emergency situations.



# SYSTEM ARCHITECTURE

## AEC SMART SYSTEM

AEC Smart System is a management platform that combines the advantages of a modern remote control system of individual lighting points with the possibility of integrating Smart services.

Lighting fixtures equipped with **AEC Smart Node** create a distributed communication network called the **Wireless Sensor Network (WSN)**. The capillarity of the lighting system allows almost total coverage over the entire urban area.

The information conveyed by the fixtures passes through the WSN network to the **GTW Gateways** located in the territory and can be used directly to activate different Smart Lighting scenarios in real time. The gateways, mounted inside the electrical panels or in positions more conducive to communication, send the data to the central **server City SmartWay**.

The City SmartWay management platform stores Big Data from the territory. Information can thus also be processed by third-party applications to enable the activation and management of smart services for the benefit of citizens.

### SMART NODE

Radio node for communication and control of sensors and lighting points.



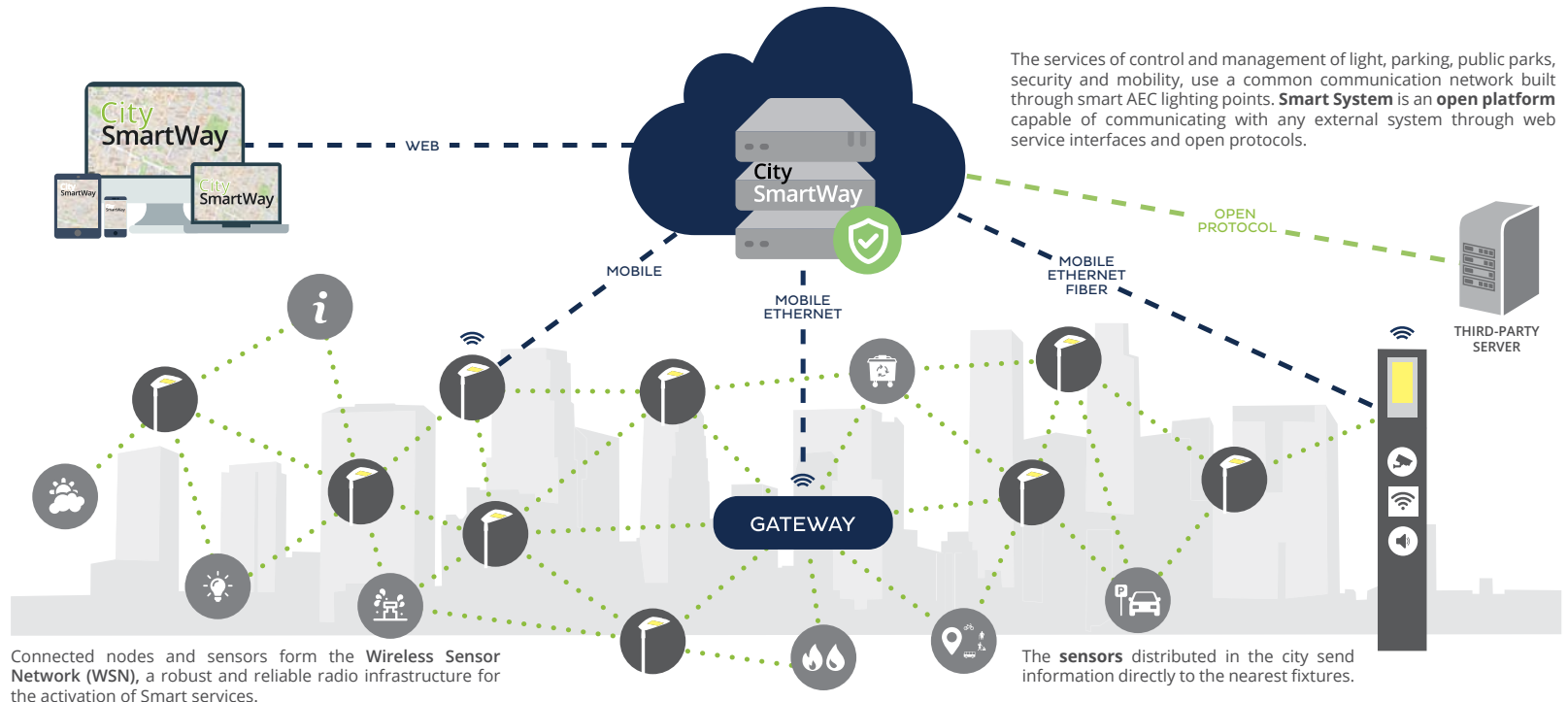
### GATEWAY GTW

Device for panel control and communication with nodes.



### CITY SMARTWAY

Remote control platform, monitoring and management of smart services.



The services of control and management of light, parking, public parks, security and mobility, use a common communication network built through smart AEC lighting points. **Smart System** is an **open platform** capable of communicating with any external system through web service interfaces and open protocols.

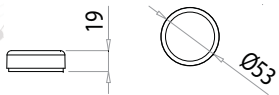
Connected nodes and sensors form the **Wireless Sensor Network (WSN)**, a robust and reliable radio infrastructure for the activation of Smart services.

The **sensors** distributed in the city send information directly to the nearest fixtures.

# SYSTEM COMPONENTS

## AEC SMART SYSTEM

The AEC radio tele-management node is typically installed **inside the fixtures** and is equipped with a transmission antenna installed on the external frame without affecting the protection level of the fixtures.



The antenna, particularly compact and contained in terms of dimensions, allows minimizing the aesthetic impact of the radio technology on the fixtures.



**AEC Smart Node** integrated in the fixture.

### WIRELESS SENSOR NETWORK

The radio nodes realize a self-installing MESH Wireless Sensor Network (WSN) at the frequency of 2.4GHz according to IEEE802.15.4 standard. Every node in the network is a signal repeater for all the others. The network is designed for the transport of dimensionally limited data (Narrow Band), but virtually coming from thousands of devices placed in every part of the city. Every point of the network can be reached thanks to multi-jump connections between the fixtures.

### H24 OPERATION

The AEC node allows the fixtures to be completely switched off during daylight hours, maintaining active 24-hour communication to guarantee the operation of Smart services.

### AUTOMATIC DIMMING

The node has an integrated clock that allows performing dimming profiles autonomously in case of loss of communication with the control software.

### INTEGRATED SENSORS

AEC Smart Node is complete with temperature sensors and accelerometer/inclinometer able to signal any anomalous installation or operating conditions. The node can also be integrated with a luminance sensor.

### DALI/1-10 INTERFACE

Inside the fixture, the node regulates the luminous flux through the DALI or 1-10 interface and allows monitoring the consumption of the fixture and the operation of the LED module and the power supply, signalling alarms in case of any anomalies.

### INTERFACE FOR EXTERNAL SENSORS

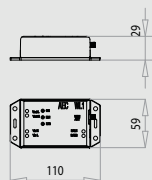
AEC Smart Node is available with an RS-485 interface or input contacts for integration with third-party sensors.

### REMOTE UPGRADE

The AEC node can be remotely updated with the possibility of downgrading (restoration of a previous version) without the need for on-site intervention.

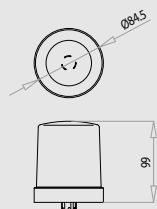


# AVAILABLE VERSIONS OF AEC SMART NODE



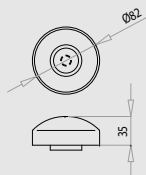
## INTEGRATED NODE

Version of AEC Smart Node perfectly integrated in the fixture. Solution that combines functionality, reliability and design.



## NEMA 7 PIN NODE

AEC Smart Node is also available in a 7-pin NEMA ANSI C136.41 socket version. All the functions included in the internal node are also available in this version.



## ZHAGA NODE

The AEC Smart Node technology is also available in a version compatible with the Zhaga connection specifications (Book 18).

AEC Smart Node allows direct connection to other radio communication infrastructures or third-party systems, by **integrating additional modules that coexist with the 2.4GHz communication module.**

This way, the existing MESH network can be combined with other types of network (star, long range, etc.) to meet the multiple needs of Smart Cities.

## 3G GATEWAY

This version allows direct connection to the AEC City SmartWay platform without the need for a GTW Gateway. The specific "gateway" function at the single node level is designed for isolated systems with a limited number of lighting points, for example in rural areas, suburban roads etc. where a panel connection will not be provided.

## LoRa

The AEC Illuminazione fixtures can be integrated into an existing LoRa network with LoRaWAN protocol using this dedicated version.

## Bluetooth

AEC Smart Node is also available with an additional Bluetooth communication module that allows direct connection from the most common personal mobile devices.

## SMART METERING

Remote metering of water and gas meters can be integrated into AEC Smart System using this type of node that combines the 2.4GHz radio with the 169MHz radio with the WMBus protocol. With this solution, smart metering can be easily activated in a capillary way in every part of the city.

## NB-IoT

With this version, the fixture can be integrated into future 5G networks with NB-IoT protocol.

## GPS

AEC Smart Node can be integrated with GPS module for automatic geolocation of the lighting point without the need for additional operations during the installation phase.

# AEC SMART NODE INTEGRATED AND CERTIFIED TECHNOLOGY

The fixtures of AEC Illuminazione with integrated radio node, are tested in certified company laboratories, fully meeting all the regulatory requirements.



The use of radio technology involves the use of additional electronic modules normally not provided for in lighting products; however, it is necessary that the fixture including the remote control module continues to fully satisfy all the requirements laid down by **EU directives and product standards for CE marking.**



AEC fixtures equipped with AEC Smart Node are also covered by **third-party ENEC certifications.**

## ELECTRICAL SAFETY



The electrical safety of the fixtures is verified by means of the tests required by the EN 60598 standard. In particular, thermal, insulation, leakage current, protection against the entry of liquid or solid bodies (IP test) and impact resistance tests (IK test) are carried out.



The nodes of the wireless sensor network transmit up to a distance of 100 meters, the best compromise between transmission reliability and low power communication, limiting electromagnetic pollution.

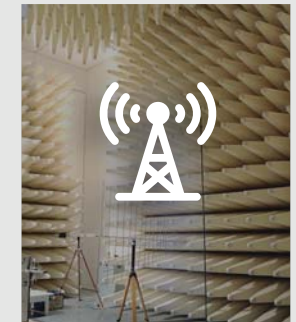


## ELECTROMAGNETIC COMPATIBILITY



Within the electromagnetic compatibility laboratory, AEC fixtures are tested to verify the absence of interference and the protection against interference from other electronic fixtures. Of particular importance is overvoltage protection, which is generally a critical parameter in the case of fixtures with integrated remote control systems.

## RADIO DEVICES



Fixtures with remote control module are tested according to the **RED directive** requirements to guarantee no interference in other communication bands. Of particular importance is the verification in **the TETRA band** used mainly by the public security forces (police, firefighters). This band must not be subjected to interference that could affect security communications or emergency messages. Under the RED directive, AEC fixtures are also checked for compliance with the limits set for **human exposure to electromagnetic fields (EMF).**



# SYSTEM COMPONENTS

## GATEWAY GTW

The extreme compactness and modularity of the components of AEC Smart System, such as the Gateway GTW, allow fully exploiting the existing space in the electrical panel, without requiring a complete redesign.



The GTW gateway is the device that allows the transmission of signals and commands between the control software and the nodes of the network. At the same time, it allows controlling and monitoring the fixtures typically installed in the electrical panel.

It has digital inputs for monitoring external contacts (for example: opening the panel port, general switch tripping) and relay outputs for controlling power switches (system ON/OFF).

It allows interfacing other fixtures, such as power meters, network analyzers, leakage current meters through the RS-485 port with ModBUS protocol.

The gateway is integrated with a communication module complete with an external antenna for connection to the Wireless Sensor Network. To connect to the control software, there is an integrated 2G/3G modem or alternatively a LAN port for Ethernet cable connection.

A Web Service interface or with ModBUS TCP/IP protocol is available for panel-level interoperability with third-party systems.

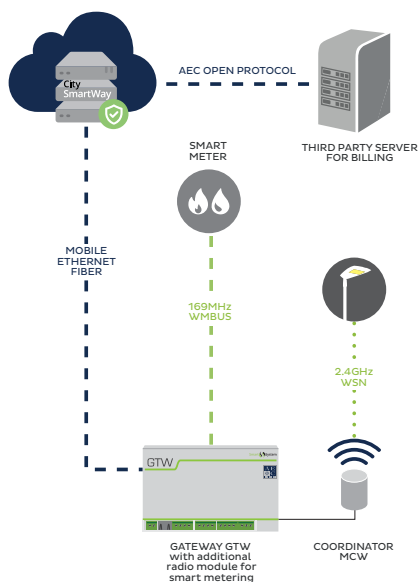
# ADVANTAGES OF THE GTW GATEWAY

## Integration with other networks for Smart Metering

The AEC GTW gateway can be equipped with a radio module dedicated to remote metering of the various utilities such as gas and water. In this configuration, up to three radio systems can coexist in the GTW gateway: 3G modem for connection to the control system, 2.4GHz module for the sensor network and 169MHz module for remote metering of the gas meters. The three radio systems share the same communication channel to the control system.

The single GTW gateway, thus equipped, can manage up to 8000 meters. Communication with these fixtures is via WMBUS protocol.

The data collected on the server can also be made available to specific management and billing software through the open interface of the AEC system.



## Reliable communication with the Wireless Sensor Network

Each gateway manages a subnet of fixtures and in the event of a fault, these can be managed automatically by another gateway. The Wireless Sensor Network thus continues to operate even in the event of communication anomalies or maintenance conditions of a single gateway.

## Optimization of the communication channel

The Wireless Sensor Network uses the 16 channels according to the IEEE 802.15.4 standard with the possibility of selecting the best communication channel to optimize data transmission.

This way, the system can be adapted to the many contexts of modern Smart Cities where different communication systems must coexist.

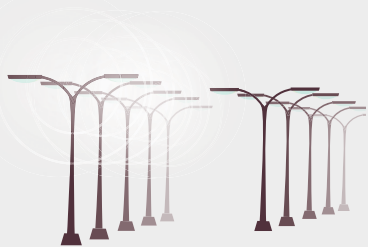




# MANAGEMENT AND CONTROL PLATFORM

## AEC CITY SMARTWAY

### DIMMING GROUPS AND PROFILES



Lighting fixtures can be assigned to groups according to their application. Fixtures on the main road may have a different dimming profile than those on secondary roads. Profiles can be programmed on a daily, weekly, monthly, annual or even personalized basis. For example, in case of occasional event, the regulation levels can be quickly changed according to the current need. The start-up of the system can follow the logic of the astronomical clock integrated into the system or an external sensor or command.

### ALARMS AND MAINTENANCE



The system allows managing the maintenance of the fixtures, scheduling periodic interventions or opening repair activities following the reporting of anomalies. Alarms can be sent by e-mail to specific recipients. An interactive calendar also allows organizing the activities of several maintenance teams at the same time and maintaining a history of the interventions performed by means of reports.

## City SmartWay

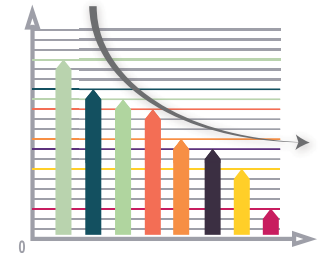
### SYSTEM INFORMATION MANAGEMENT

The software allows storing specific information and documents for each managed resource of the system, from the product features, to the technical manuals, to the wiring diagrams, to the certificates of conformity, etc.



### ANALYSES OF DATA AND REPORTS

All data stored by the software can be analyzed on multiple levels, with time-based or geo-localized filters. The selected data can be viewed graphically or exported in Excel or PDF format for different uses.



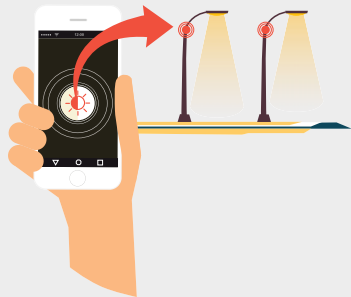
### H24 ONLINE SYSTEM

The continuous connection of the software with the fixtures installed allows constant updating of the operating status of the system. For example, any traffic or movement sensors can thus communicate the information necessary to activate certain lighting scenarios instantly. Parking sensors, exploiting the continuous connection, can promptly report the occupation of the parking space. Information panels of public transport can effectively communicate the arrival of the bus at the stop.



# City SmartWay

## MANAGEMENT AND CONTROL PLATFORM AEC CITY SMARTWAY



### REAL-TIME INTERACTIVITY

The software allows using interactive and geo-referenced maps that allow monitoring in real time the resources available. For example, it is possible to control an entire group of fixtures by a single action on the graphic interface, or immediately check the operation of the fixture and detect any anomalies in progress.



### DATA SECURITY

The transmission of data between the Wireless Sensor Network and the AEC City SmartWay control software is protected at multiple levels of communication by means of message encryption systems and the establishment of protected virtual networks. In the case of cloud installation, data is regularly saved through incremental backup copies according to customer needs.

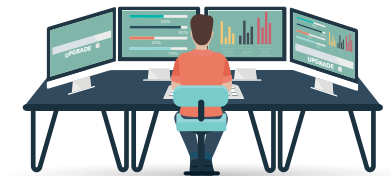
### WEB RESPONSIVE INTERFACE

The AEC City SmartWay software is based on a Web interface and can be used by any type of fixture: from the office desktop PC to the simple installer smartphone, to the most complete control room. Access to the platform is password protected with the possibility of different levels of authorization depending on the user.



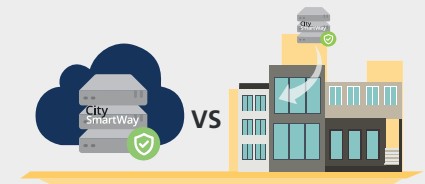
### REMOTE UPDATE

The AEC City SmartWay software allows updating the fixtures installed in the field, conveniently remotely also with the possibility of a possible downgrade, if necessary. Nodes and gateways can be upgraded with additional functions without the need for on-site interventions or expensive maintenance.



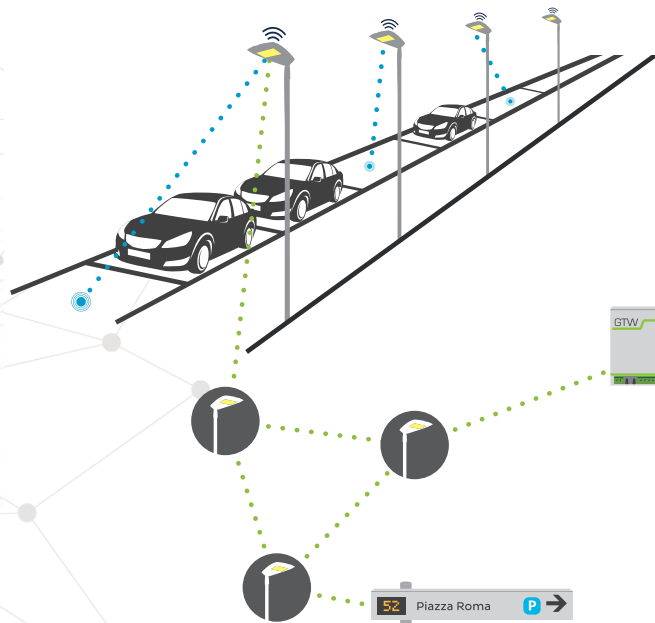
### INSTALLATION ON CLOUD OR SERVER

The AEC City SmartWay software is available in two options: cloud or server. With **cloud installation**, the customer connects to an external server without requiring special initial investments. This version requires an annual fee for maintaining the service. Instead, **installation on the client's server** allows keeping all the data inside the company database. This option does not require annual maintenance fees.





# SYSTEM INTEROPERABILITY



## SMART NODE FOR THIRD-PARTY DEVICES

With the AEC Smart Node, third-party sensors such as weather, air quality, noise, flooding sensors etc. can also be integrated into the system or also devices to command solenoid valves, variable message panels, remote switches. Systems that are not normally connected and cannot be managed remotely can thus be controlled directly by AEC Smart System.

## GRAPHIC INTERFACE

The operator can monitor the resources integrated into the system through the graphic interface of City SmartWay.



## PROTOCOLS FOR SMART CITY

The system implements the main communication protocols used for the management of lighting systems. Communication with these protocols can occur both at the server and at the gateway level. These protocols are based on exchanges of JSON/XML messages (ex. ALIS, TALQ, OSC).

## CITY SMARTWAY

The central server allows storing and analyzing Big Data coming from the sensor network and the public lighting system.



## AEC OPEN PROTOCOL

Interoperability between the AEC system and third-party systems is guaranteed by an open web service interface based on XML/JSON messages with which it is possible to interact completely with the system. It is possible to configure dimming profiles, retrieve information from lighting points, sensors and devices and control in real time any other device connected to the AEC Smart System network. AEC Open Protocol is also available for direct connection to the Gateway GTW.

## OTHER PROTOCOLS

The flexibility of the system allows implementing on request other protocols commonly used for the exchange of information to other systems.

- MQTT
- SAP
- FIWARE
- EMAIL
- HTTP
- FTP
- JMS
- JMX
- ...



# SMART LIGHTING MANAGING DIMMING GROUPS

AEC Smart System allows regulating lighting at different levels, for perfect management of the systems.



The system sends the dimming commands to groups of fixtures, so as to allow different lighting scenarios, depending on the environment considered (main road, secondary, underpass, square, etc.)



It is possible to control and monitor every single lighting point. In the event of an alarm, simple diagnostics or maintenance can be performed remotely.

# REGULATION WITH CALENDAR

## ASTRONOMIC CLOCK



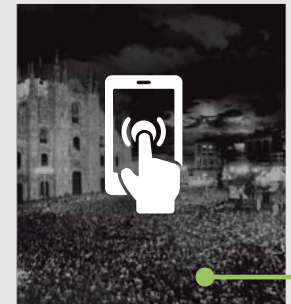
AEC City SmartWay implements an astronomical clock that can precisely calculate sunrise and sunset times on each day of the year based on geographical location. Thanks to this, it is possible to regulate system power on and off dynamically during the seasons, avoiding waste of unwanted energy. Also inside the fixtures there is an astronomical clock that activates autonomously in case of communication failure with the control software, ensuring power off of the systems during the day and energy saving at night.

## RECURRING EVENTS



AEC City SmartWay is equipped with a dimmer profile management engine based on a completely customizable calendar. Dimming profiles can be applied on a daily, weekly, monthly and yearly basis. Furthermore, it is possible to associate additional dimming profiles with different implementation priorities to a same group of fixtures, in order to simplify planning even in the presence of complex scenarios (recurring parties, particular periods of the year, etc.).

## SPOT EVENTS



The flexibility of the system makes it possible to activate lighting even in the case of sporadic events (such as concerts, events, etc.) and to intervene in real time for lighting regulation, by acting on a simple and immediate interface. The lighting scenarios are therefore at your fingertips, without requiring expensive intervention in the field.



# SMART LIGHTING REGULATION WITH SENSORS

AEC Smart System allows regulating lighting even with the help of information from sensors throughout the city.



## TRAFFIC ADAPTIVE INSTALLATION (TAI)

With AEC City SmartWay, it is possible to regulate lighting according to the actual traffic conditions. Traffic data comes from sensors or advanced cameras located in the territory. The software processes the information and sends the dimming commands to the fixtures concerned in real time. With this type of adaptive regulation, the system meets the requirements of the PR/EN 13201-1 standard.

## FULL ADAPTIVE INSTALLATION (FAI)

In addition to traffic sensors, the system can integrate luminance, lighting and weather condition sensors. This way, the real lighting conditions of the road surface are monitored and a further reduction of the luminous flux can be activated, so as to obtain the maximum energy saving required by current regulations.

## MOTION SENSORS

The system allows regulating in real time the light flux of the fixtures according to the passage of people or vehicles. For example, the lighting of a cycle path can be kept at minimum levels in the absence of people and progressively increased along the path of passers-by, optimizing energy savings.

## EXTERNAL COMMANDS

The system makes it possible to activate particular lighting scenarios also based on sensors or external commands directly connected to the gateway.

# SMART LIGHTING ADAPTIVE LIGHTING

Since AEC Smart System can manage signals from appropriate traffic, weather, luminance and lighting sensors, it allows implementing lighting regulation in an adaptive way, i.e. according to the real road operating conditions or the use of the illuminated environments.



The EN 13201-1 standard introduces regulatory appendix D, dedicated to adaptive lighting and proposes two possible solutions for the optimization of consumption and extension of the life of systems.



## ADAPTIVE SYSTEMS BASED ON TRAFFIC FLOWS TAI (Traffic Adaptive Installation)

The variation in the operating lighting category is no longer carried out on an hourly basis, but through the actual sampling of the traffic flow. Sampling takes place every 10 minutes and the lighting is regulated from one lighting category to the higher one in the event of an increase in traffic and the lower one in the opposite case. Regardless of the time, a level of lighting that is more suitable for road safety needs and greater energy savings is guaranteed.



## ADAPTIVE SYSTEMS BASED ON LUMINANCE/ LIGHTING AND WEATHER TRAFFIC FAI (Full Adaptive Installation)

The variation in the operating lighting category is based on the joint assessment of traffic conditions, measurement of luminance or illumination of the road surface and the specific meteorological conditions of the area. In this case, traffic is monitored more precisely by the TAI regulation: the updating of the real conditions takes place progressively and continuously between one lighting category and the other. Furthermore, the real measurement of luminance or illumination allows further regulation of the luminous flux, which also takes into account the actual aging of the sources, the level of accumulated dirt and the actual state of the illuminated surfaces. This way, energy savings are maximized.



# BROADBAND SERVICES

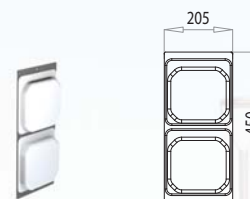
## MOD 2.0 TOWER

AEC Smart System provides smart broadband solutions such as video surveillance, Wi-Fi coverage and sound diffusion thanks to MOD 2.0 Tower: the modular and flexible solution for Smart cities.

**MOD 2.0 TOWER** is a multifunctional fixture, completely customizable. It can be equipped by choosing from among several optical modules and Smart modules including Wi-Fi access point, video surveillance camera, audio module and motion sensor.

Other specific modules available for lighting on request.  
For further information, visit [www.aecilluminazione.com](http://www.aecilluminazione.com) or consult the general catalogue.

# SMART MODULES



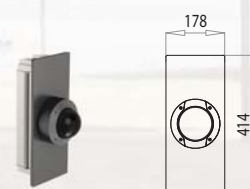
### WI-FI ACCESS POINTS

Public Internet connectivity can be extended thanks to the Wi-Fi module complete with integrated 2.4GHz and 5GHz antennas. It is possible to provide from the simplest stand-alone solution with 3G/4G connectivity to real access point infrastructures for more complete city coverage.



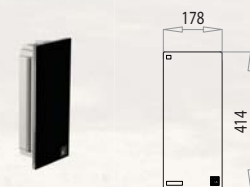
### MOTION SENSOR

Complete motion sensor module for pedestrian traffic detection. Lighting is regulated according to the presence of people in motion.



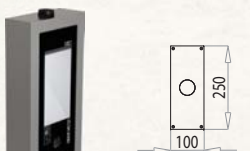
### VIDEO SURVEILLANCE CAMERA

The module can be integrated with various types of high definition cameras and infrared illuminators for video surveillance services.



### AUDIO SPEAKER

MOD 2.0 Tower can be equipped with a special audio module based on EXPD (EXCited Planar Dispersion) technology which, by vibrating the module surface, transforms it into a real loudspeaker.



### AEC SMART NODE

Integrated radio-frequency remote control node complete with transmission antenna.



# QUICK4LIGHT SOLUTION FOR SPORTS FACILITIES AND LARGE AREAS

The power and flexibility of the AEC Smart System can also be used in small lighting systems. In these cases, in addition to automatic regulation of lighting, it is possible to manage the luminous flux according to the specific needs of the moment by means of real-time control of the system.



// **Quick4Light:** the simplicity of managing an Indoor system in an outdoor lighting system. //

All the necessary operations for **remote** and **real-time control of the system** take place through a simple and intuitive interface, also accessible from smartphones, without the use of external dedicated servers.



## Intuitive interface

A graphic interface, with keys and graphic objects that are easy to use, allows regulation of the lighting level with a simple gesture. The interface is accessible via the web from any mobile device.



## Real-time control

The fixtures are controlled directly from the panel installed near the system. All the typical control functions are guaranteed and the commands are sent to the fixtures in real time.



## Integrated web server

The control software is resident in the panel. It is not necessary to install an external dedicated server. Start-up of the system can be carried out without the intervention of qualified personnel.



# ELECTRICAL PANEL COMPONENTS

## QUICK4LIGHT KIT

The QUICK4LIGHT KIT allows control of the fixtures connected via a web interface resident in the panel. Through Smart PLC, a component specially designed by AEC, it is possible to control system power on and off or read information from the installed devices.

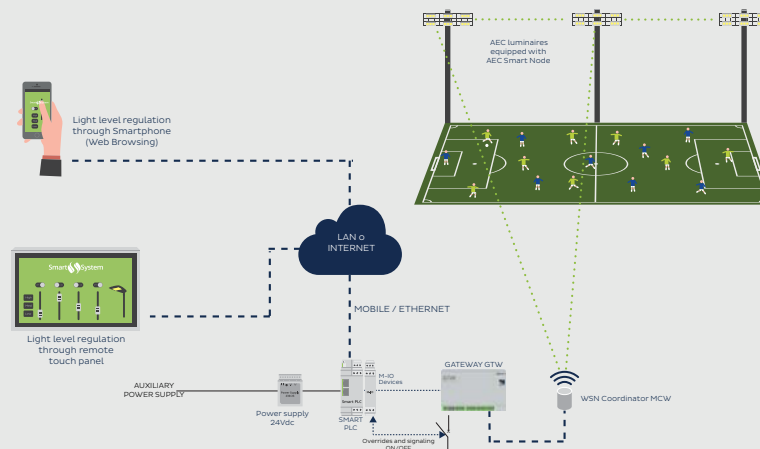
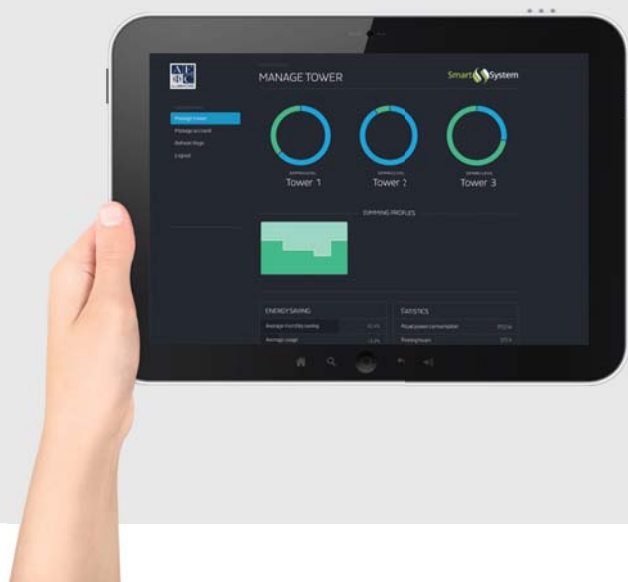
The remote connection to this panel, which is typically from smartphones and tablets, is possible in two ways: with a 2G/3G or Ethernet connection.

### 2G/3G MOBILE VERSION

The panel is connected via M2M 3G to the Internet and the smartphone connects via the 3G network to the panel.

### ETHERNET VERSION

The panel is connected via Ethernet cable to a local network, the smartphone connects via Wi-Fi to the local network and then to the panel.



# QUICK4LIGHT KIT

## KIT COMPONENTS

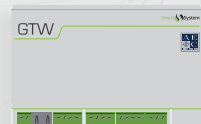
### SMART PLC

Industrial PLC with integrated web server for remote control of the fixtures. Complete with RS-485 ModBUS communication interface for controlling external devices. The device is available in a version with an integrated M2M 3G modem or Ethernet connection.



### GTW GATEWAY

Device responsible for communication between sensors, nodes and servers. Includes 2G/3G modem, RJ-45 Ethernet port, two input contacts, two relay outputs (125VAC - 0.5A/24VDC-1A), RS-485 port for connection to the MCW module, RS-485 port ModBUS master for connection to external devices. 12-48VDC power supply also via PoE. Real-time clock with integrated buffer battery. Overall dimensions 160x90x32mm. DIN rail mounting (9 modules).



### MCW COORDINATOR MODULE

Radio connection device with the 2.4GHz WSN network. Includes a connecting cable for RS-485 port. Can also be installed at a distance from the GTW gateway (not more than 800m). IP67 rating.



### M-IO 6IN 2OUT

Device for remote command and signalling with 6 input contacts and 2 output relays. DIN rail mounting.



### 24Vdc POWER SUPPLY

230Vac-24Vdc 50/60Hz. Also available in version with battery charger and buffer battery. DIN rail mounting.



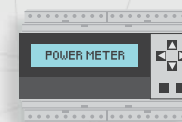
### 2G/3G ANTENNA

Omnidirectional antenna, with magnetic base, including connecting cable and connector. Also available in version for mounting on metal cabinets.

## OPTIONAL COMPONENTS

### POWER METER WITH TA

Three-phase electrical quantities meter: RMS voltage, RMS current, active power, reactive, apparent, frequency, power factor, energy. RS-485 port ModBUS slave. 2x16 backlit LCD display, ESD protection up to 4kV, insulation of 4kV power circuits, isolation of other 1.5kV circuits. Accuracy class 0.2%. Complete with current transformers. Overall dimensions 105x89x60mm. DIN rail mounting.

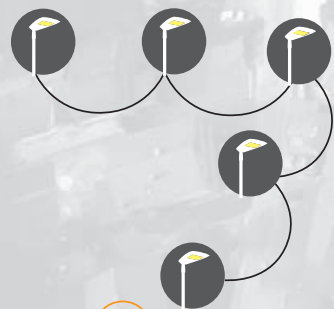




# OPTIMIZATION OF SYSTEM COSTS

The AEC Smart System allows avoiding the installation of a SMART KIT for each single panel. With the BASIC KIT, WSN extensions can be implemented or simple panel controls with a view to minimizing initial installation costs.

The **SMART KIT** connects the control system to the network of sensors and lighting points equipped with AEC Smart Node. The Wireless Sensor Network is created with this kit.



With the **3G/LAN BASIC KIT** it is possible to perform a simple panel control where it is not necessary to create a Smart control network.



The **WSN H24 BASIC KIT** allows extending the control to secondary systems without the need to install a SMART KIT. The KIT connects to the Wireless Sensor Network ensuring the functionality of the network and the panel.

The scalability of AEC Smart System allows extending the coverage of smart services and light control even to small isolated systems without requiring the use of the SMART KIT. It is sufficient to equip one of the fixtures with the **AEC Smart Node** in the **NEMA 7 PIN** version with additional **3G Gateway** module.

# ELECTRICAL PANEL COMPONENTS

## SMART KIT

SMART KIT allows realizing the communication infrastructure with lighting points equipped with Smart Node and activating Smart services.

It allows complete control of system power on and off and connection with the AEC City SmartWay control software.



### Activation of Smart Services

This kit allows creating a communication network that makes it possible to activate Smart services for the benefit of citizens and their administrations



### Smart Lighting

The SMART KIT allows the management of individual lighting points of the system, the creation of groups and the activation of multiple dimming profiles. Furthermore, dynamic scenarios based on adaptive lighting can be implemented.

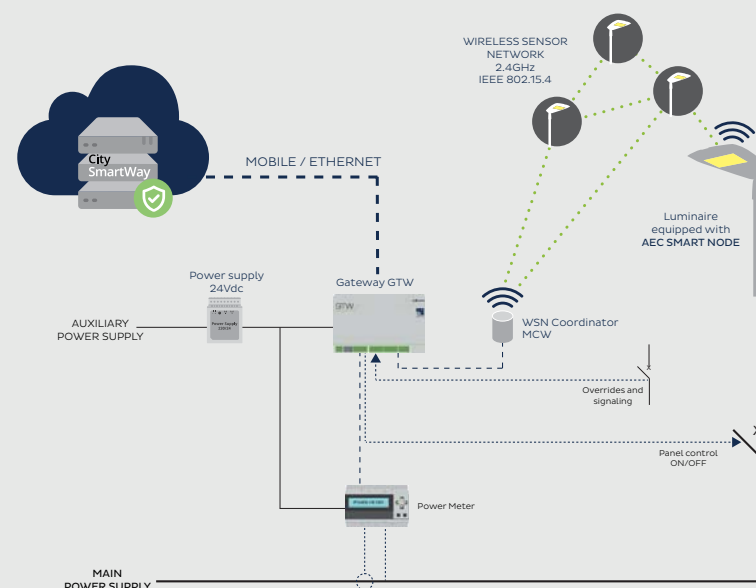


### Panel control

The SMART KIT allows complete control of system power on and off and connection with the AEC City SmartWay control software. Options are available for metering electrical consumption and signalling from external devices, for example, tripping of the main switch or opening of the panel port.

Remote connectivity to this panel is available in two versions: mobile (2G/3G) or Ethernet.

The Gateway GTW includes both types of connection without requiring additional devices. To activate mobile connectivity, just add a simple communication antenna.

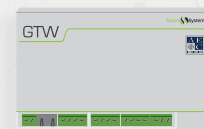


# SMART KIT

## KIT COMPONENTS

### GTW GATEWAY

Device responsible for communication between sensors, nodes and servers. Includes 2G/3G modem, RJ-45 Ethernet port, two input contacts, two relay outputs (125VAC - 0.5A/24VDC-1A), RS-485 port for connection to the MCW module, RS-485 port ModBUS master for connection to external devices. 12-48VDC power supply also via PoE. Real-time clock with integrated buffer battery. Overall dimensions 160x90x32mm. DIN rail mounting (9 modules).



### MCW COORDINATOR MODULE

Radio connection device with the 2.4GHz WSN network. Includes a connecting cable for RS-485 port. Can also be installed at a distance from the GTW gateway (not more than 800m). IP67 rating.



### 24Vdc POWER SUPPLY

230Vac-24Vdc 50/60Hz. Also available in version with battery charger and buffer battery. DIN rail mounting.



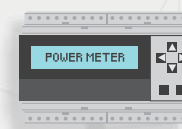
### 2G/3G ANTENNA

Omnidirectional antenna, with magnetic base, including connecting cable and connector. Also available in version for mounting on metal cabinets.

## OPTIONAL COMPONENTS

### POWER METER WITH TA

Three-phase electrical quantities meter: RMS voltage, RMS current, active power, reactive, apparent, frequency, power factor, energy. RS-485 port ModBUS slave. 2x16 backlit LCD display, ESD protection up to 4kV, insulation of 4kV power circuits, isolation of other 1.5kV circuits. Accuracy class 0.2%. Complete with current transformers. Overall dimensions 105x89x60mm. DIN rail mounting.



### M-IO DEVICES

Additional devices for remote signals or commands, available in the version with 5 output relays (M-IO 5OUT) or 8 input contacts (M-IO 8IN) or with 4 input contacts and 3 output relays (M-IO 3OUT 4IN). Combinable also in multiple combination. DIN rail mounting.



### LIGHT SENSOR

An external light sensor can be installed in order to measure the lighting levels of the environment in the site of installation. With this accessory it's possible to implement the switching-on/off of the installation, based on the real time weather conditions.



# ELECTRICAL PANEL COMPONENTS

## BASIC KIT

The BASIC KIT allows control of system power on and off remotely. Options are available for electrical consumption metering of the system and signals from external devices.



### Panel control

The BASIC KIT allows complete control of system power on and off and connection with the AEC City SmartWay control software. Options are available for metering electrical consumption and signalling from external devices, for example, tripping of the main switch or opening of the panel port.



### System optimization

The BASIC KIT is the ideal solution to complete system capillarity without requiring the installation of additional SMART KIT. The BASIC KIT can simply command system power on but also extend the WSN from a primary road (served by SMART KIT) to a secondary road.



### Compact solution

The BASIC KIT is realized with simple communication and control panel modules with contained dimensions that allow installation in existing panels without requiring a complete redesign.

The BASIC KIT is available in three versions depending on the connectivity required to the Server.

### 2G/3G MOBILE VERSION

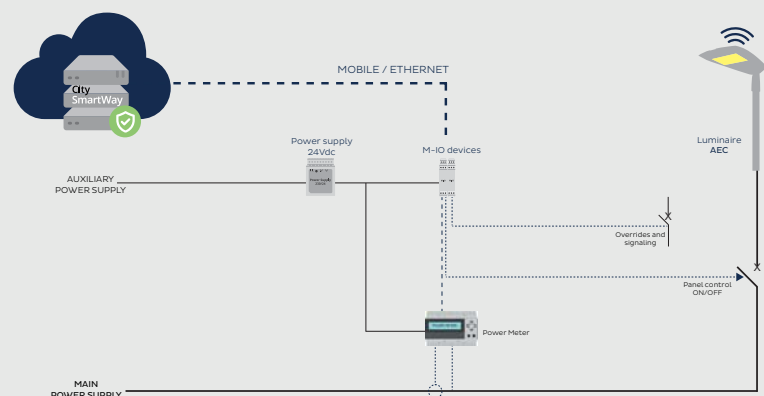
Connectivity to the control software is via an integrated M2G 2G/3G modem . This configuration allows monitoring of the status of the panel and remote consumption metering, in situations where the control of individual fixtures is not required.

### ETHERNET VERSION

Connectivity to the control software is via an integrated Ethernet connection. This configuration allows monitoring of the status of the panel and remote consumption metering, in situations where the control of individual fixtures is not required.

### WSN H24 VERSION

In this version, the panel can be reached via the 2.4 GHz network of sensors and fixtures equipped with AEC Smart Node. This configuration is typical in situations where fixtures are also powered during the day for the operation of Smart services. The BASIC KIT acts as an extension of an existing WSN, without requiring the installation of an additional SMART KIT.



# BASIC KIT

## KIT COMPONENTS

### M-IO WSN

Connection device that allows remote control of I/O devices via the 2.4 GHz WSN network. This device also acts as a repeater of the WSN to the secondary system. It has an RS-485 ModBUS Master port for connection to the Power Meter or other external devices. DIN rail mounting.



### M-IO 2G/3G

Connection device with M2M 2G/3G modem that allows remote control of I/O modules. It has an RS-485 ModBUS Master port for connection to the Power Meter or other external devices. DIN rail mounting.



### M-LAN

Ethernet connection device complete with MODBUS RS-485 Master interface for connection to external devices such as power meters or command and signalling modules. DIN rail mounting.



### M-IO 485

SLAVE 485 connection device for remote control of I/O devices. It has an RS-485 ModBUS Master port for connection to the Power Meter or other external devices. DIN rail mounting.



### M-IO 4IN 3OUT

Device for remote command and signalling with 4 input contacts and 3 output relays. DIN rail mounting.

### 24Vdc POWER SUPPLY

230Vac-24Vdc 50/60Hz. Also available in version with battery charger and buffer battery. DIN rail mounting.

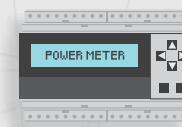
### 2G/3G ANTENNA

Omnidirectional antenna, with magnetic base, including connecting cable and connector. Also available in version for mounting on metal cabinets.

## OPTIONAL COMPONENTS

### POWER METER WITH TA

Three-phase electrical quantities meter: RMS voltage, RMS current, active power, reactive, apparent, frequency, power factor, energy. RS-485 port ModBUS slave. 2x16 backlit LCD display, ESD protection up to 4kV, insulation of 4kV power circuits, isolation of other 1.5kV circuits. Accuracy class 0.2%. Complete with current transformers. Overall dimensions 105x89x60mm. DIN rail mounting.



### M-IO DEVICES

Additional devices for remote signals or commands, available in the version with 5 output relays (M-IO 5OUT) or 8 input contacts (M-IO 8IN) or with 4 input contacts and 3 output relays (M-IO 3OUT 4IN). Combinable also in multiple combination.



# AEC SMART SYSTEM START-UP

With AEC Smart System, the installation and start-up of lighting points is extremely simple and fast.



Each AEC lighting luminaire is identified by a unique code, in the form of a QR code.



AEC provides a smartphone application dedicated to the registration of lighting luminaires. Once installed, the installer detects the QR code.



The application on the smartphone, scanning the QR code, associates the exact GPS coordinates of the installation point to the fixture.



With a simple click, the list of installed fixtures is sent to the central server and is ready to be displayed on the map. All the configurations of smart lighting and smart services can now be easily performed remotely.

# ASSISTANCE H24 7/7

A professional and technically prepared call center is always available to meet every maintenance and configuration request of the AEC Smart System.





# CERTIFICATIONS OF AEC SMART SYSTEM

ISO 9001



ISO 14001



ISO 18001



ELECTROMAGNETIC  
COMPATIBILITY



ELECTRICAL SAFETY



AEC fixtures are designed in compliance with the European Low Voltage Directive (LVD), Electromagnetic Compatibility (EMC), WEEE, Rohs, Ecodesign, Radio devices (RED former RTTE) and in particular according to the following standards:

**Fixtures and LED modules electrical safety**  
EN 60598-1, EN 60598-2-3, EN 60598-2-5, EN 62031

**Photobiological safety**  
EN 62471, IEC/TR 62778

**Human exposures to electromagnetic fields**  
EN 62493

**Electromagnetic compatibility**  
EN 55015 (CISPR 15), EN 61547, EN 61000-3-2, EN 61000-3-3

**Vibration resistance**  
IEC 60068-2-6

**Radio devices**  
ETSI EN 301-489-1, ETSI EN 301-489-17, ETSI EN 300-328





ART DIRECTION  
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