SmartNodes®
Smart management solution for light points

Use your street lighting infrastructure to create smart roads
Controlling investment and operating budgets

- Reducing energy expenditure with dynamic lighting and dimming scenarios based on detection (motion and speed).
- Capitalizing on the investments that have already been made in the installation of luminaires equipped with NEMA or Zhaga sockets.
- Optimizing installation costs thanks to automatic configuration of SLC connected nodes.
- Overcoming the constraints of the electricity network through radio communication.

Preparing the smart city

- Ensuring the interoperability of systems within the light point, based on the current standards in force (DALI2/D4i).
- Enabling the creation of a local communication network, using the nodes that are installed for other sensors in the smart city.

Ensuring the attractiveness of cities while reducing the environmental impact of lighting

- Ensuring safety in mobility, both soft and active, as lighting is adapted to the presence and speed of users.
- Ensuring the attractiveness of cities and territories by planning dimming scenarios to suit the different areas and events of the city.
- Reducing the environmental impact by only providing lighting when necessary.
SmartNodes: a smart management solution for light points

Control and management of light point groups

- Automatic geolocation of light points, using the nodes’ on-board GPS.
- Management of light points by group, as defined by the user on the remote management interface.
- On-board smart functions within the nodes, allowing the configuration recorded locally to be maintained in the event of a communication fault.

Synchronized astronomical clock
- On-board each connected node.
  - Configurable offset.

Clock at fixed hours

Override
- Real-time control.

Creation of dimming scenarios
- Up to 6 transitions.
- Unlimited number of scenarios.

Creation of light point groups

Dimming schedule
- Configurable calendars.
  - Scenarios applied to a group of light points.
  - Several possible scenarios per group of light points.

SLC NEMA
CONNECTED NODE

SLC NEMA
CONNECTED NODE

CONTROL

8 P.M. > 100% LIGHTING

1 A.M. > 20% LIGHTING

MANAGEMENT
2 Monitoring of the light point

- **Malfunctions**
  Identification of malfunctions in the light point (related to the driver and LED panel) and the SmartNodes equipment (communication between nodes, and with the APS).

- **Text & email notifications**
  If any faults are observed, text and email alerts can be configured and sent automatically.

3 Reporting and analysis of the consumption

- **Reading D4i driver information**
  - Active energy (kWh)
  - Active power (W)
  - Etc.

- **Active power measurement**
  Optional with SLC NEMA connected nodes.

More than **20,000 light points equipped with the SmartNodes solution since 2018**

Solutions already live in 10 European countries: Belgium, France, Netherlands, Germany, Switzerland, Romania, Finland, Denmark, Iceland, Norway.

**Accessible and configurable through the dedicated LACROIX web interface**

- User-friendly
- Easy to use
- Accessible 24/7
- Secure
- TALQv2 certified
SmartNodes: a solution that combines remote management and dynamic lighting locally

Thanks to its sensors (PIR and radar doppler) and embedded intelligence, the SLS adjusts the light level in real time, based on the presence and speed of pedestrians, cyclists and vehicles. That way, the lighting adapts to suit the needs of users, depending on the situation and their location.
SmartNodes makes it possible to form a scalable communication network that can be deployed on a large scale.

A mesh communication network that adapts to the surrounding environment, for greater reliability on a large scale:

**Self-forming**: the network is automatically created by itself by considering the spatial configuration of the nodes. Each node creates a communication route with multiple adjacent nodes, facilitating redundancy and reliability of information, while providing a solution that can be easily deployed at scale.

**Self-healing**: if a connected node is no longer accessible by the network, the network generates new communication routes with adjacent nodes to ensure optimal communication.

**Self-adaptable**: thanks to the 40 communication channels available, each node is able to choose the communications channel that is best suited to its local environment, thus avoiding any local disturbances that may be present and offering a high degree of reliability for the deployed network.

Automatic selection of the gateway (APS) to facilitate equipment configuration and commissioning.

Wirepas local mesh network
Secure cellular or Ethernet communication
The gateway regularly sends queries to all the connected nodes, in order to ensure the completeness of the mesh network, regardless of the number of units installed.

A secure, decentralized, local mesh network
- 2.4 GHz frequency;
- 128-bit AES encryption + OMAC1 authentication;
- 1 single point of connection to the cloud from which to access the web interface;
- Up to 150 nodes supported by the gateway;
- A cost of communication per light point with no recurrence.

A scalable network
- Remote firmware update (Over the Air Programming - OTAP) for new features or new uses;
- The network quickly and easily integrates any new connected node once it is switched on and connected, for rapid and large-scale deployment.

The SmartNodes solution

SLC: standardized connected node
SLC NEMA and Zhaga are standardized nodes, and are compatible with any luminaire which is equipped with the corresponding socket. They control, monitor and provide information on the energy consumption of the luminaire. They communicate with the other nodes and with the APS via the Wirepas mesh RF communication network.

SLS: connected node with detection
The SLS (Smart Lighting System) is a connected node enabling dynamic lighting using two sensors: motion (PIR) and speed (radar). It consists of an SLN (Smart Lighting Node) and an SLP (Smart Lighting Power Unit). It also communicates with the other nodes and with the APS via the Wirepas mesh RF communications network.

APS: gateway
The APS (‘Access Point System’, also called ‘Gateway’) connects the SLC and SLS nodes to the Internet, and to the LACROIX remote management web interface. Depending on the version, the APS communicates via cellular network (3G or 4G) or Ethernet in order to transmit and receive information remotely. Locally, the gateway uses the Wirepas mesh RF communication network to connect and communicate with the nodes.

LACROIX web interface: central management system
The web interface enables users to configure, control, monitor and analyze the consumption of their street lighting infrastructure. It provides a user interface that is ergonomic, secure, and adapted to suit street lighting management needs.
Technical details

<table>
<thead>
<tr>
<th>Connected node - SLC</th>
<th>Connected node with detection - SLS</th>
<th>Gateway - APS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLC NEMA</td>
<td>SLC Zhaga</td>
<td>External - GSM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In cabinet - GSM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In cabinet - Ethernet</td>
</tr>
</tbody>
</table>

### Mechanical characteristics

<table>
<thead>
<tr>
<th>Casing</th>
<th>PBT (base) and PC (dome)</th>
<th>PBT (base) and PC (dome)</th>
<th>Luran ASA</th>
<th>ABS - Flame retardant V0</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IP66</td>
<td>IP66</td>
<td>IP67</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IK09</td>
<td>IK09</td>
<td>IK08</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection type</th>
<th>NEMA 7-pin connector</th>
<th>Zhaga</th>
<th>Molex Micro - Fit 3.0 connector</th>
<th>Power supply cable 2 × 15</th>
<th>Power supply cable 2 × 15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 coaxial cable outputs for antenna</td>
<td>Ethernet output: 2 × 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of assembly</th>
<th>On NEMA pre-equipped luminaire</th>
<th>On Zhaga pre-equipped luminaire</th>
<th>On mast with screws and/or a clamp</th>
<th>On DIN rail in a box</th>
<th>On post, with screws or fasteners</th>
<th>In cabinet, on DIN rail</th>
</tr>
</thead>
</table>

| Weight          | 600 g                        | 75 g                           | 810 g                             | 105 g               | ~ 550 g                       |
|------------------|------------------------------|--------------------------------|-----------------------------------|---------------------|-------------------------------|----------------------|

### Electrical characteristics

<table>
<thead>
<tr>
<th>Power supply voltage</th>
<th>110 V - 240 Vc / 50-60 Hz</th>
<th>12 V - 24 Vc</th>
<th>110 V - 240 Vc / 50-60 Hz</th>
<th>110 V - 240 Vc / 50-60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum relay load</td>
<td>1.2 kVA @ 240V</td>
<td>-</td>
<td>240W @ 60°C</td>
<td></td>
</tr>
<tr>
<td>Max relay current</td>
<td>5 A</td>
<td>-</td>
<td>5 A</td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>-</td>
<td>25 - 80 mA</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.8 W</td>
<td>0.6 W</td>
<td>&lt; 3 W</td>
<td>&lt; 0.7 W</td>
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<tr>
<td>Electrical class</td>
<td>Class II</td>
<td>Class II</td>
<td>Class II</td>
<td>Class II</td>
</tr>
</tbody>
</table>

### Radio link and communication

<table>
<thead>
<tr>
<th>Mesh radio link network</th>
<th>Wirepas</th>
<th>Wirepas</th>
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</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>Rated power</td>
<td>8 dBi/m</td>
<td>8 dBi/m</td>
</tr>
<tr>
<td>Modulation</td>
<td>GFSK</td>
<td>GFSK</td>
</tr>
<tr>
<td>Inter-node range</td>
<td>775 m maximum, with an empty field</td>
<td>775 m maximum, with an empty field</td>
</tr>
<tr>
<td>Flow</td>
<td>1 Mbit/s</td>
<td>1 Mbit/s</td>
</tr>
<tr>
<td>Network security</td>
<td>128-bit AES encryption + OMAC1 authentication</td>
<td>128-bit AES encryption + OMAC1 authentication</td>
</tr>
<tr>
<td>Modem</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Sensors and other components

<table>
<thead>
<tr>
<th>Power measurement (optional)</th>
<th>Active power</th>
<th>-</th>
<th>-</th>
<th>Active power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geolocation</td>
<td>GPS</td>
<td>GPS</td>
<td>GPS</td>
<td>GPS</td>
</tr>
<tr>
<td>Motion</td>
<td>-</td>
<td>PIR (Passive InfraRed)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Speed</td>
<td>-</td>
<td>Doppler radar</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Ambient conditions

| Ambient temperature        | -30°C to + 70°C | -30°C to + 70°C | -30°C to + 70°C | -30°C to + 70°C | -30°C to + 70°C |
|                            |                |                |                |                | -30°C to + 52°C |
| Humidity                   | 0% - 100% RH   | 0% - 100% RH   | 0% - 100% RH   | 0% - 100% RH   | 0% - 100% RH    |
| Storage temperature        | -30°C to + 70°C | -40°C to + 80°C | -40°C to + 80°C | -40°C to + 80°C | -30°C to + 70°C |

### Certification and Standards

<table>
<thead>
<tr>
<th>Certifications</th>
<th>CE</th>
<th>CE</th>
<th>CE</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product standards</td>
<td>ENS5015; ENS5052; EN60000-3-2</td>
<td>ENS5015; ENS5052; ENS5052; EN 61000-3-2/3</td>
<td>ENS5015; ENS5052; ENS5052; EN 61000-3-2/3</td>
<td>ENS5015; ENS5052; ENS5052; EN 61000-3-2/3</td>
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<tr>
<td></td>
<td>EN61000-4-2/3/4/6/11; EN50082; EN501489; V3.11; EN501489-17 V3.11</td>
<td>EN61000-4-2/3/4/6/11; EN50082; EN501489; V3.11; EN501489-17 V3.11</td>
<td>EN60000-4-2/3/4/6/11; EN50082; EN501489; V3.11; EN501489-17 V3.11</td>
<td>EN60000-4-2/3/4/6/11; EN50082; EN501489; V3.11; EN501489-17 V3.11</td>
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<td></td>
<td>EN300328 V2.01; EN300330 V2.11</td>
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<tr>
<td></td>
<td>IEC 62368-1</td>
<td>IEC 62386</td>
<td>IEC 62386</td>
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</tbody>
</table>

### Dimensions in mm

<table>
<thead>
<tr>
<th>Height</th>
<th>98</th>
<th>38.5</th>
<th>63</th>
<th>-</th>
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</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>84</td>
<td>80</td>
<td>102</td>
<td>-</td>
</tr>
<tr>
<td>Length</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>178</td>
</tr>
<tr>
<td>Width</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>161</td>
</tr>
</tbody>
</table>

Dimensions in mm