### ELECTRICAL LIGHTING MANAGEMENT SYSTEMS

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<table>
<thead>
<tr>
<th><strong>Location Profile</strong></th>
<th><strong>Location Zone ID List</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pole Identifier</strong></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th><strong>OPERATING MODE</strong></th>
<th><strong>SwitchModeTime</strong></th>
<th><strong>SwitchMode</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>PHOTO CONTROL CONFIGURATION</strong></th>
<th><strong>Threshold</strong></th>
<th><strong>HoldInterval</strong></th>
<th><strong>LightHysteresis</strong></th>
<th><strong>DelayInterval</strong></th>
<th><strong>DimLevel</strong></th>
<th><strong>DimWarmUpInterval</strong></th>
<th><strong>StaggerInterval</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>CONTROL STATE AND CONDITIONS</strong></th>
<th><strong>TotalBurnTimeCounter</strong></th>
<th><strong>LampCond</strong></th>
<th><strong>BallastCond</strong></th>
<th><strong>SwitchState</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>SAFETY CONDITIONS</strong></th>
<th><strong>GroundFaultCond</strong></th>
<th><strong>ArcFaultCond</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>POWER MONITORING</strong></th>
<th><strong>Current</strong></th>
<th><strong>VoltageAB</strong></th>
<th><strong>VoltageBC</strong></th>
<th><strong>VoltageCA</strong></th>
<th><strong>VoltageAN</strong></th>
<th><strong>VoltageBN</strong></th>
<th><strong>VoltageCN</strong></th>
<th><strong>Power</strong></th>
<th><strong>PowerMeterCurrent</strong></th>
<th><strong>PowerMeterVoltageAB</strong></th>
<th><strong>PowerMeterVoltageBC</strong></th>
<th><strong>PowerMeterVoltageCA</strong></th>
<th><strong>PowerMeterVoltageAN</strong></th>
<th><strong>PowerMeterVoltageBN</strong></th>
<th><strong>PowerMeterVoltageCN</strong></th>
<th><strong>PowerMeterCond</strong></th>
<th><strong>PowerMeterSwitchState</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>ELEMENT STATES AND CONDITIONS</strong></th>
<th><strong>StarterStatus</strong></th>
<th><strong>LampBurntCond</strong></th>
<th><strong>PoleCond</strong></th>
<th><strong>Temp</strong></th>
<th><strong>MonthlyBurnTimeCounter</strong></th>
<th><strong>GroundFaultDetectorSwitchState</strong></th>
<th><strong>ArcFaultDetectorSwitchState</strong></th>
<th><strong>GroundFaultLeakageCurrent</strong></th>
<th><strong>PowerFactor</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>ELEMENT CONFIGURATION</strong></th>
<th><strong>PeriodicBurnTimeLogInterval</strong></th>
<th><strong>TempLogHysteresisLowerBound</strong></th>
<th><strong>TempLogHysteresisUpperBound</strong></th>
<th><strong>MonthlyExpectedBurnTime</strong></th>
<th><strong>GroundFaultLeakageCurrentThreshold</strong></th>
<th><strong>PowerMeterMeasLogInterval</strong></th>
<th><strong>GroundFaultMeasLogInterval</strong></th>
</tr>
</thead>
</table>

---

<table>
<thead>
<tr>
<th><strong>LUMINAIRE BRANCH ELECTRICAL SERVICE ZONE</strong></th>
<th><strong>ELMS Command Comparisons</strong></th>
</tr>
</thead>
</table>
ELMS
Electrical and Lighting Management System

PLC-Transportation is a founding member of the Electrical Lighting Management System (ELMS) expert group. Standard ITCIP 1213 version 2.20 is administered through the National Transportation Communication for ITS Protocols. The standard is published by major transportation industry stakeholders: NEMA, AASHTO and ITE. The ELMS standard was developed using the system engineering process of defining user needs, developing requirements, coding the standard, verification to requirements and validation of implementation.

The ELMS standard provides the interface between electrical and lighting devices with management computers to monitor and control lighting systems in a wide scale of applications. The system rolls up the discrete elements, such as a luminaire, to a branch circuit, electrical service and area wide zones. Each element is configured, operated and monitored through the standard.

Using ELMS Data in SCADA

Once the field data has been obtained by the management station, it can be stored for use in lighting management and operations. The task of storing the data can be accomplished on a workstation or a server. Supervisory Control and Data Acquisition (SCADA) systems can read the information; write back to the data logger. Real-time information is shown on overview displays. Configuration, operating status and condition of devices are shown in detail displays. Historical data can be shown as trends or accumulated into records for analysis or troubleshooting of the lighting system. Alarms are displayed, acknowledged and logged.

Communication

A Simple Network Management Protocol (SNMP) agent is the mechanism which remote management stations communicate with the ELMS data logging device. The data logger normally transmits its information to the management station over a transportation agency’s data infrastructure to the management station. Upon resumption of communication, after an outage, the data logger downloads the stored data to bring the management station up to date.

Data Logger

The primary ELMS device is the data logger, where all of ELMS information for a system is stored. The Non-ELMS physical hardware is interfaced through control devices, such as a programmable logic controller to the ELMS data logger. Values are read and stored in a Management Information Base, a large indexed database containing all of the configuration, control and monitored data. The data logger is configured to periodically poll and store information. PLC-Transportation’s data logger can store information for up to 30 days.

Application:

ELMS are used by the Washington State Department of Transportation on the approach to its new SR520 Bridge. Lighting in three short tunnels and connecting freeway use ELMS to communicate to the WSDOT operations center.

The major components of the system at each tunnel include:

- Luminance sensors to measure tunnel portal lighting.
- Tunnel Lighting Controller to apply setpoint and timing algorithm to sensor light, and execute control to load switching devices, read device status and calculate ELMS values.
- Lighting Controllers switch fixture groups.
- Current switch monitors circuit lighting load.
- Workstations run remote desktop sessions of SCADA program on the server.
- Data logger collects real-time data from and sends configuration to the tunnel lighting controller.
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