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1 Introduction
The LiGO system provides control and integration of lighting DALI control. Each LiGO controller can interface to up to 8 DALI loops. Multiple LiGO controllers can be linked via IP to integrate into a single complete system, which can be configured, monitored and controlled from a browser over an internal network or over the internet.

2 System Topology
3 Control Elements
The control elements of the system consist of the LiGO controller, its power supply, the RS232/DALI interfaces and DALI power supplies. These should be installed in suitable enclosures (see example right), in an accessible position preferably adjacent to the lighting distribution board(s) feeding the luminaires to be controlled by the system.

Each panel should be fed from the 240V essential mains from supply via a 5A fused spur.

An internal RCD socket should be provided to allow the configuration laptop to be plugged in.

A typical schematic and layout are shown in annex A.

3.1 LiGO Controllers
The LiGO controller is the main element of the control system. One or more controllers should be mounted in an enclosure together with their power supply, the required interfaces and DALI bus power supplies.
3.2 IP Domain

LiGO controllers are connected together via an IP network. This can be a local private network, or part of another data network. An RJ45 data socket should be installed within 3m of each LiGO controller. An IP hub may be used to connect several LiGO controllers to an RJ45 network socket. For remote access and maintenance internet access should be provided to the LiGO network.

3.3 RS232/DALI interfaces

Each LiGO has 8 TTY (serial ports) comprising RJ45 sockets. Tridonic SCI2 interface units convert between the serial signals from the LiGO controller and the DALI bus. A bespoke DALI/Triconv 1.2M 9way to RJ45 cable is available from Open Technology.

3.4 DALI Power supplies

Each DALI bus requires a power supply. Tridonic PS DALI bus power supply may be used and should be installed in the control enclosure and connected at the interface end of the bus.
4 DALI

What is DALI?

Digital Addressable Lighting Interface is a lighting control method that allows for the remote switching and dimming of individual luminaires. Up to 64 fittings can be connected on a single DALI bus.

Control signals are passed along a bus cable connected from fitting to fitting.

Commands can be sent down the control cable to individual luminaries, or groups of luminaries, to switch them on or off and/or to dim them. DALI compliant luminaries are able to send status information (ECG errors/ lamp errors) back up to the next level control system (IP with LiGO).

A 2-core (1.5mm² max. 300m), polarity independent cable is connected from fitting to fitting using any topology (star, daisy-chain, etc).

The nominal voltage on the DALI line is 16V (SELV).

5 DALI Cabling

The electrical installation of lighting control systems with a DALI interface must be carried out by an authorised electrical engineer in accordance with the relevant power system regulations.

5.1 Topology

- DALI cabling can be wired in a free, radial topology (daisy chain, star, etc)
- Loops are NOT ALLOWED
- Live is permanent to all fittings (i.e unswitched)
- The same DALI pair may be connected to fittings that are on different phases
### 5.2 Conductors

- Can run alongside mains cables
- Minimum cross sectional area: 1.5mm²
- Can be single cores, busbar or modular wiring
- Red and White insulation / sheathing
- Source voltage (at LCS Panel): 16VDC
- All components to be disconnected before insulation resistance tests are undertaken
- 5 cores to each fitting (L,N,E & DALI pair) whether normal or emergency fitting.
- The polarity of the termination of the DALI pair at the light fitting is not important.

### 5.3 System Limits

- Maximum permissible cable length between any two DALI devices is 300m (with 1.5mm²) or 2V volt-drop. Example shows that the cable run distance from (X to Y) or (X to Z) or (Y to Z) or any point to the DALI/RS232 interface should not exceed 300m. Total loop resistance on longest run < 18 Ohms

- Addressing: Up to 64 DALI devices per DALI loop (e.g. Ballasts, EMPro inverters, sensors etc.)

- Current: Ballasts pull 2mA, and Sensors pull 6mA. Max current pulled by all devices on the loop is 200mA (Tridonic DALI PS).

- Select logical lighting circuits to group on to each DALI Loop.
6 Override Connection

Each LiGO controller provides a 25 pin DIN socket giving access to 21 programmable I/O lines. Each of pins 1 to 21 may be configured either as an input to accept switches or as outputs to interface to other systems or operate loads.

6.1 Inputs:

Switches and/or volt free contacts from other systems may be connected to any of pins 1 to 21 and these configured as inputs to provide override functions.

These inputs may be configured for special functions such as Fire Alarm or emergency test.

6.2 Outputs

Pins 1 to 21 may be configured as outputs to Drive 5v logic circuits or operate suitable loads.

The outputs can sink a maximum of 15mA in the low state.

TTL level relays may be connected to provide isolated interfaces.
Pin 23 provides a 5v Source supply

A suitable relay is the Crydom MPDCD3-B-MS11 which may be mounted in a DIN rail socket as shown below.
7 Pre Commissioning Checks

To enable the commissioning visit to site to be undertaken as requested the following points should be tested and documented during the final check of the installation:

All parts of the system must be powered, and all DALI luminaires checked to ensure that they operate correctly and that the DALI bus is fully operational.

1. All mains wiring associated with the control panel and the luminaires in the area has been tested and certified in accordance with the current IEE Wiring Regulations and all of the control panels, field devices and luminaires forming the zone are energised (230v), with all MCB’s and isolators on?

2. The DALI loop length is <300m (furthest distance device to device) and the loop resistance is <18 Ohms

3. The DALI loop has no short circuits (Red LED on SCI RS232/DALI interface on continuously if short circuit present)

4. The number of devices on each loop is within the required system limits (both addresses and current drawn).

5. All luminaires are on at full brightness (normal condition with power on and before commissioning)
   Any luminaires that are not lit should be rectified prior to commissioning.

6. Luminaires should have the lamps burnt in (operated at 100% for 200 hrs) before commissioning is undertaken.

The Pre-commissioning checklist (see later) should be completed, signed off and returned to the commissioning agent at least 5 working days before commissioning is required.
8 Annex A Typical Panel Schematic and Layout
To enable the commissioning visit to site as requested the following listed points must be completed, signed-off and issued to the commissioning office prior to the Engineer arriving on site. A completed copy of this form must be issued at least 5 working days before the scheduled visit date.

Please carry out the following pre-commissioning checks:

<table>
<thead>
<tr>
<th>Check</th>
<th>Tick when Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are all of the LiGO panels, field devices and items of equipment forming this control panel zone installed and complete and the device limits adhered to?</td>
<td></td>
</tr>
<tr>
<td>Has the mains wiring associated with the control panel in this area been tested and certified in accordance with the current IEE Wiring Regulations?</td>
<td></td>
</tr>
<tr>
<td>Are all of the control panels, field devices and luminaires forming this zone energised (230v), with all necessary MCB’s and isolators on?</td>
<td></td>
</tr>
<tr>
<td>Has all of the DALI bus wiring been installed and terminated and cable length limits adhered to?</td>
<td></td>
</tr>
<tr>
<td>Are all light fittings operating with working lamps?</td>
<td></td>
</tr>
<tr>
<td>When was the last of the 230v mains power to the lighting circuits energised? (with all lamps lit - 200 hour lamp burn-in required):</td>
<td></td>
</tr>
<tr>
<td>Date:</td>
<td>Time:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Is safe access available to all devices and components forming part of the system to be commissioned?</td>
<td></td>
</tr>
<tr>
<td>Will all ceiling tiles, access hatches, doors etc. be open or accessible for our works upon arrival to site?</td>
<td></td>
</tr>
<tr>
<td>Will the system and areas be ready and available for commissioning on the date indicated below?</td>
<td></td>
</tr>
<tr>
<td>Does Open Technology have your latest as fitted drawings?</td>
<td></td>
</tr>
<tr>
<td>Please give ref:</td>
<td></td>
</tr>
</tbody>
</table>

Commissioning is required to commence on: Date:________________________

Signed:_________________________ Date:________________________

Print Name:_________________________