



**Station Hill, Reading – Phase 2
One Station Hill**

L8147A

**LIGHTING CONTROLS SYSTEM
PERFORMANCE SPECIFICATION**

SHRN-DPA-BG-ZZ-SC-Y-0003

**Revision: T02
Status: D2**

24th September 2020

1.0 GENERAL

1.1 Introduction

The following pages set out the control requirements for the specialist lighting of **Station Hill, Reading, Phase 2, One Station Hill**, as designed by **dpa Lighting Consultants London (dpa)**.

It should be read in conjunction with all other relevant **dpa** project drawings and specifications.

The lighting shall be operated via an architectural Lighting Control System. It shall be designed and specified in accordance with the client/operators requirements.

The Lighting Control System will enable the selection of pre-programmed lighting scenes to provide differing atmospheres to exactly suit the client/operators requirements.

The lighting typically consists of luminaires which are dimmable or switched by various protocols.

1.2 Lighting Control Concept

The Lighting Control System shall be user friendly, intuitive to use, flexible and capable of accommodating future changes and expansion.

The following Project Areas will be operated by a Lighting Control System capable of providing numerous pre-set lighting scenes via a variety of control methods:

- a. Building Façade Lighting
- b. Colonnade
- c. Western Canopy
- d. LGF Garrard Street Entrance
- e. GF Reception Space
- f. GF Café/Bar
- g. Level 1 and Level 2 Co-Working Space
- h. Lift Lobbies
- i. 15th Floor Terrace

Each area shall be separated for lighting control purposes and will operate with its own scenes and independently from all other areas.

The Project Areas shall be controlled directly via:

Automatic Operation

- Photocell (Exterior)
- Daylight sensors (interior)
- Astronomic Time Clock
- Presence/Absence Detection

Manual Operation

- Lighting Scene Control Panels
- Portable Electronic Devices
- Head End Computer

The following notional automatic scenes will be required:

- Scene 01 Day
- Scene 02 Early Evening
- Scene 03 Late Evening
- Scene 04 Night
- Scene 05 Security
- Scene 06 Cleaning
- Off

The following areas will have the ability for manual operation via Lighting Control Panels (LCP) as follows:

- LGF Garrard Street Entrance
- GF Reception Space
- GF Café/Bar
- Level 1 and Level 2 Co-Working Space
- 15th Floor Terrace

The Lighting Control Panels required for the manual operation of the areas listed above are included within **dpa's** Lighting Scene Control Panel Schedule, within this document.

Each scene shall comprise any combination of control groups assigned an output between 0.1% and 100%, or 'on' / 'off', independent of any other control group within any individual scene.

Any group of luminaires/control channels shall be capable of being independently dimmed or switched without affecting any other channel within that scene.

Other specific event lighting is to be supplied by specialist Audio Visual/Events Company/Consultants and is not the responsibility of **dpa**. Any Event Lighting Control System must be capable of interfacing with the Architectural Lighting Control System.

2.0 OPERATION

2.1 Outline of Operation

The operation of the Lighting Control System shall be based around the concept of lighting scene control, where a lighting scene can comprise all or any of the independently controlled lighting groups set to provide stable, flicker free operation to any programmed output level between 0.1% and 100%, or 'on' and 'off' in a switched circuit.

Fade times can be attributed to each scene thus enabling gradual changes in lighting states to take place.

Appropriate control protocols, in combination with suitable control devices shall be specified to meet the following requirements:

Dimming:

- Dimming equipment, transformers/control gear/drivers are required to allow luminaires to dim to 0.1% of power without perceptible flicker.
- Dimming should follow a visually linear path.
- DALI dimming systems must offer dimming in a minimum of 254 power increments, allowing fine adjustment of output level.

Switching:

- Switching Equipment is required to switch on/off luminaires instantly without perceptible flicker.

The Lighting Control System shall accommodate any combination of the following protocols:

- Adaptive, Leading/Trailing Edge Phase Dimming
- Analogue 1-10 V
- Digital Serial Interface (DSI)
- Digital Addressable Lighting Interface (DALI)
- Digital Multiplex (DMX512)
- Relay/Switched control

The Lighting Control System shall be capable of providing a minimum of 64 different lighting scenes/per zone/area, which once programmed, can be selected by one or more of the following means:

- Astronomic Time Clock
- Photocell Light Sensor (external)
- Daylight sensors (interior)
- Touchscreens
- Lighting Scene Control Panels
- Head End Computer
- Portable Electronic Devices/Tablets
- PIR Sensors
- Audio Visual Integration
- DMX Input
- Internet Protocol Network Interface
- Building Management System

The operation and integration of these various devices is included within the Equipment Section.

2.2 Emergency Back-up System

The emergency back-up system shall provide a back-up lighting scene in the event of a failure in any of the central control elements.

The back-up scene shall not be dependent on any of the central control elements.

Upon restoration of normal operation, the Memory Scene Controller will automatically select the lighting state which would normally be prevailing at that time.

2.3 Emergency Lighting

The Lighting Control System must have the ability to facilitate emergency lighting operation and testing within the public areas.

2.4 System Integration

The Lighting Control System shall be able to interface with the Building Management System.

The manufacturer/supplier must be able to provide examples of previous successful integration with the Building Management System, and have the relevant proprietary software and hardware.

3.0 EQUIPMENT

3.1 General System Specifications

All items of equipment shall be fit for purpose, conform to all relevant International Electrical Safety and Construction Standards and other local regulations and standards applicable to the Region within which the Project site is located.



The manufacturer/supplier shall be responsible for ensuring that the dimming/switching modules used are suitable for controlling the loads as specified in **dpa's** Lighting Control Schedules.

The operational capacity of the system shall be capable of being expanded via the addition of hardware and software, enabling seamless operation and control of the expanded system, if so required.

The selected manufacturer/supplier must confirm all interconnecting cable requirements and suitability of cable routes with the Contractor.

The selected manufacturer/supplier must confirm that the cable routes and equipment locations chosen shall not result in any adverse interference, which shall affect the operation of the Lighting Control System or of any other equipment or cables in the vicinity.

The selected manufacturer/supplier shall fully commission the system after installation by the Electrical Contractor and demonstrate its correct and full operation, as defined in the commissioning and scene setting section of this document.

The location of all Lighting Control Equipment shall be agreed with the Client/Architect/MEP Consultant prior to any installation works, and be detailed in the contract documents. Equipment shall be located in clean, dry ventilated/conditioned environments to manufacturer/suppliers detail and specification.

The Lighting Control System shall be manufactured and installed in accordance with the latest edition of the IET Wiring Regulations and other local wiring regulations applicable to the region within which the project site is located.

All mains voltage equipment shall be suitable for operation on the local mains supply in the region within which the project site is located and shall be capable of operating normally on voltages in accordance with the manufacturer's recommendations.

All extra low voltage equipment will operate on a voltage as determined by the manufacturer in accordance with relevant protocols.

All necessary control modules, control panels and interfaces shall be provided to meet the control requirements of the specified lighting system as detailed within relevant **dpa** documents & drawings.

Compatibility of light sources, their associated control devices/drivers and the Lighting Control System is to be verified by the Electrical Consultant/Installing Contractor prior to installation.

Listed control channels should not be read as circuit design schematics. Electrical Consultant/Contractor to determine circuit breakdown based on electrical load.

The selected Lighting Control System manufacturer/supplier must identify a minimum of three recently completed installations in the Region within which the project site is located that are in accordance with this Lighting Control System Specification and if requested, show the Lighting Consultant/Design Team one completed installation that functions to the Lighting Consultant/Design Team's satisfaction.

3.2 Equipment Schedule

All items shall be supplied by a single manufacturer/supplier to form a complete, independent Lighting Control System. In addition, the manufacturer/supplier shall include any other items necessary in order to ensure the correct operation of the Lighting Control System in accordance with this specification.

KNX derived lighting control systems do not meet the requirements of this document and are NOT acceptable.

The Tenderer shall provide written confirmation of any deviation and non-compliance from the requirements of this Performance Specification.

3.3 Memory Scene Controller

The Control Modules specified shall be controlled by one or more microprocessor-based Memory Scene Controllers which shall provide all the following functions:

- The Lighting Control System shall be capable of processing multiple inputs and outputs concurrently.
- The Memory Scene Controller shall be capable of storing, and fade processing on command, a minimum of 64 independent lighting scenes per area, over the number of control channels specified.
- The Lighting Control System shall store all information relating to scenes, interfaces and operations within non-volatile memory. Memory shall be capable of retaining information for a minimum period of one month without system power, and shall not be corrupted on power-up or power-down of the system.

The assignment of levels for any or all control channels in each scene, and all other assignable parameters shall be by laptop P.C. or other mobile device.

Where the Lighting Control System interfaces with other systems, functionality for external interfaces will be defined by the M&E Consultant / Contractor/AV Consultant or Systems Integrator. In these instances the lighting control system must function without detriment to the lighting control requirements.

3.4 Control Modules

The Control Modules shall be able to accommodate the stated load types and functions (e.g. Switched, Dim 0-10v, DALI, DSI, DMX etc.) as identified within the associated **dpa** Lighting Control Schedule.

Modules may be split for various zones and may be located in a single electrical room, or separately in a number of different rooms as specified by the electrical engineer/architect.

Where multiple Control Modules are required, these modules shall be linked together with control cable (to the Lighting Control System supplier's specification) to enable complete operation of the whole system from any location.

Where a module is capable of outputting multiple protocols or phase dimming types the output or phase dim type shall be indicated within the system software.

All labelling must include reference to the Control Group numbers identified by **dpa** within their lighting control schedule(s).

All Control Modules used shall be suitable for controlling the loads as specified.

As indicated within the Lighting Control Schedule, a number of control channels/zones may require more than one control module to cater for the electrical load. The manufacturer/supplier shall provide a schedule clearly indicating the allocation of Control Modules for each control zone/area within the system software.

The Control Modules shall be supplied fully wired and suitably labelled by permanent means. Final load circuits shall be labelled in accordance with the final electrical load circuit designation as detailed in the contract documents.

The Control Modules shall be in the form of rack or wall mounted enclosures, with segregated termination areas for mains and extra low voltage control wiring.

Removable panels shall be provided to gain easy access to the termination areas for connection and servicing.

The Control Modules shall contain MCB protection with additional final circuit protection if required by the Electrical Engineering Consultant. The MCB's shall be readily accessible, to enable them to be changed or added to on site if conditions change. The type of MCB used shall be selected to prevent nuisance tripping due to surge currents, when a load is switched to full on, whilst at the same time providing adequate protection.

The Control Modules shall, at full rated loads, require no integrated cooling fans and shall maintain the equipment contained therein at a safe operating temperature, in ambient temperatures up to 50 degrees Centigrade.

Where more than one Control Module is required within the same location or across multiple locations, these Control Modules shall be linked together to enable operation of the whole system based on user inputs from any location, based on lighting control strategy and commissioning requirements.

3.4.1 Astronomic Time Clock

A programmable Astronomic Time Clock shall be the primary mode of control for the day to day operation of the lighting scenes within the Project Areas.

The Astronomic Time Clock shall enable any programmed time of day to be used as an input trigger.

The Astronomic Time Clock shall be capable of recalling programmed scenes based on the following:

- Time of day
- Day of the week
- Sunrise
- Sunset
- Timed commands relative to any of the above. (eg. Sunset + 1 hour)
- Specific calendar dates or ranges (eg. holidays/special events)

The Astronomic Time Clock must be able to identify, or manually input the Project's global latitude and longitude settings, enabling the variation of seasonal sunrise and sunset timings relative to the Project's location.

The Astronomic Time Clock shall include memory and be capable of sufficient commands to recall all scenes within a project independently from each other.

3.4.2 Photocell Light Sensor (exterior)

The Lighting Control System must be able to monitor external daylight levels via externally mounted photocells.

These daylight levels will permit the system to select pre-set lighting scenes in response to available daylight for optimum light levels and energy savings.

Light measurement shall be by means of a linear photodiode or equivalent. Light measurement by lower cost, lower performance devices e.g. Light Dependent Resistors, is not permitted.

It shall be possible to configure a single photocell sensor to control multiple lighting groups to different levels of illuminance.

The final location of Photocell Light Sensor is to be agreed with the Architect and Electrical Engineer.

3.4.3 Daylight Sensors (Interiors)

The Lighting Control System must be able to monitor external daylight levels via internally mounted photocells to provide the facility of daylight linking.

These daylight levels will permit the system to adjust the interior lighting automatically to compensate for the level of daylight illumination received in the space, for optimum light levels and energy savings.

Light measurement shall be by means of a linear photodiode or equivalent. Light measurement by lower cost, lower performance devices e.g. Light Dependent Resistors, is not permitted.

It shall be possible to configure a single photocell sensor to control multiple lighting groups to different levels of illuminance.

3.4.4 Touch Screens

These provide manual selection of assigned elements of the Lighting Control System operation in relation to their location via touch screen technology and interfaces.

The Touch Screen should be capable of displaying the Project building plans, or parts there-of, downloaded from CAD files provided by others.

The Touch Screen should be capable of showing graphic layouts of any of the Lighting Scene Control Panels if so assigned.

The Touch Screen should be capable of 'setting' the operation of Contact/Partition Switches and defining overall room configurations where these are applicable.

3.4.5 Lighting Scene Control Panels

These provide manual operation of assigned elements of the Lighting Control System operation in relation to their location by manual push button selection.

They shall interconnect with the Memory Scene Controller and allow selection of pre-assigned lighting scenes, raise & lower capability and on/off.

They shall comprise a number of push buttons as determined by **dpa**, and detailed within the Lighting Scene Control Panel Schedule as detailed below.

Lighting Scene Control Panels Schedule

Area	Control Panel Ref.	Control Panel Operation
All Areas	TS1	Touch Screen for master control of all areas
LGF Garrard Street Entrance	CP00.1	8 Scene, Raise / Lower and Off
GF Reception Space		
GF Café/Bar	CP00.2	8 Scene, Raise / Lower and Off
L1 Co-Working Space West	CP01.1	4 Scene, Raise / Lower and Off
L1 Meeting Room	CP01.2	8 Scene, Raise / Lower and Off
L2 Co-Working Space West	CP02.1	4 Scene, Raise / Lower and Off
L2 Co-Working Space Centre	CP02.2	4 Scene, Raise / Lower and Off
L2 Co-Working Space East	CP02.3	4 Scene, Raise / Lower and Off
15 th Floor Terrace	CP15.1	8 Scene, Raise / Lower and Off
Lift Lobby	PIR	Allowance for two number PIR sensors per lift lobby

The buttons shall be self-illuminated, or have LED indication, to clearly identify their operational status, including when scenes are triggered from other scene devices.

Custom labelling of the Lighting Scene Control Panels may be required. The process for agreeing labelling of the Lighting Scene Control Panels will be established with the Client, Architect and Lighting Consultant.

Samples of Lighting Scene Control Panel layouts and finishes should be available for selection and approval by the Client/Architect/Design Team.

3.4.6 Head End Computer

The lighting control system manufacturer/supplier is to allow for the supply and installation of their software on a suitable client computer.

The software will allow for the manual operation of the Lighting Control System and allow the selection of pre-assigned scenes, raise and lower capability and on/off.

The software will also allow for interrogation of the Lighting Control System to identify usage statistics, power consumption over time, etc. Where applicable (DALI systems, etc.) maintenance feedback reports will be possible to generate to assist the client with fault finding and ongoing maintenance of the systems.

Password protection is required to limit access to the software and advanced editable functions.

The lighting control system manufacturer/supplier is to identify any additional requirements required to interface between the lighting control system and client's identified head end computer (eg. Ethernet, firewall, ISP, minimum specification computer, operating system, etc. as required).

The lighting control system manufacturer/supplier will identify the capabilities of their proposed head end computer software to the client, engineer and **dpa** for review.

3.4.7 Portable Electronic Devices/Tablets

Password protection is required to limit access to advanced editable functions.

Any feature which permanently alters scene setting within a space must be password protected.

3.4.8 PIR Presence/Absence Detection

Presence/Absence Sensors should be capable of being integrated into the Lighting Control System.

Sensors should be capable of operating in either mode and have the capacity to trigger multiple events at specified time delays or when triggered.

An allowance is to be made for two number PIR sensors per lift lobby

3.4.9 AV Integration

Where integration with 3rd Party systems such as AV are required, the necessary triggers and commands are to be agreed prior to commissioning between the Lighting Control System supplier and appropriate third parties.

3.4.10 DMX Control

Where DMX control, or interfaces, are required the Lighting Control System supplier and third party DMX product supplier shall ensure that the necessary software & hardware is provided to enable seamless operation of the luminaires/devices without any interference to the normal operation of the Lighting Control System.

3.4.11 Internet Protocol Network

Where the Lighting Control System uses IP based protocol to communicate for all interfaces (including automatic/dynamically generated), all function and control groups must be clearly labelled and described. The descriptions of control groups and scene names are to be agreed with **dpa**.

Any access methods on computer devices must be password protected for each editable level to ensure protection of the system. All passwords must be advised to the appropriate client/operator representative(s) and to **dpa** for archive records.

3.4.12 Building Management System

The Lighting Control System shall be capable of interfacing with a maximum of 4 outputs from the BMS to facilitate essential over-ride provision when required. The methodology and protocol to achieve this will be determined and agreed by the Lighting Control System manufacturer/supplier as part of his Tendering Process.

3.5 Recommended Manufacturers

The selected Lighting Controls System Manufacturer/Supplier must identify a minimum of three completed installations that are generally in accordance with this Lighting Controls System Specification and if requested, show the Lighting Consultant/Design Team one complete installation that is to the Lighting Consultant/Design Team's satisfaction.

The Lighting Control System, as defined above, shall be provided from one of the following manufacturers/suppliers.

Manufacturer / Supplier	Contact Details
Eaton Lighting Systems	Contact: Paul Burgess Address: 20 Greenhill Crescent Watford Business Park Watford, Herts, WD18 8JA, UK Tel: +44 (0)1923 495 495 Mob: +44 (0)7721 521 900 Email: Paulburgess@eaton.com

4.0 INSTALLATION

4.1 General Installation

The Electrical Contractor shall install the Lighting Control System, make all connections, pre-test the installation and make it available to the Lighting Control System supplier for commissioning. The Contractor will then work with the Lighting Control System supplier through to project completion and the successful operation of the Lighting Control System as determined by **dpa** and the Client/Operator.

The Electrical Contractor shall ensure that the Lighting Control System is accurately installed against co-ordinated drawings with all critical information being properly recorded and provided to the Lighting Control System supplier for the purpose of system commissioning.

4.2 Commissioning & Scene Setting

This will be undertaken in two stages:

Stage 1: Commissioning (Manufacturer/Supplier and Electrical Contractor)

Prior to final scene setting the following steps shall be undertaken and completed to the satisfaction of **dpa**.

Verification that all luminaires are controlled correctly from 0.1% - 100% with no flicker, or on/off, via their specified protocols and within their prescribed control channels/groups as detailed in the relevant **dpa** drawings, specifications and control schedules.

Label all control channels/groups within commissioning software according to **dpa**'s drawings, specifications and schedules.

Demonstrate to **dpa** that all of the above have been successfully completed during a full commissioning visit following completion of the electrical installation, suitably verified, tested and fully operational.

Stage 2: Scene Setting (dpa, Client/Operator, Manufacturer/Supplier and Electrical Contractor)



The on-site scene setting is to be undertaken by **dpa** and the Lighting Control System commissioning engineers(s).

dpa, with the Lighting Control System commissioning engineers(s) in attendance, will provide a final demonstration to the Client/Operator for approval prior to final sign off.

It is expected that the Electrical Contractor will be present and available during the scene setting process.

Depending on the size of the Project and the Lighting Control System it may be necessary for a minimum of two competent Lighting Control System commissioning engineer(s) to be present and able to work in separate areas of the project site concurrently to facilitate the scene setting process.

During the scene setting process the Lighting Control System commissioning engineer(s) must be able to locate themselves within the area being commissioned, with a good view of the space and the installed lighting.

The on-site programming days shall include an allocation of time to train one or more of the Client's/Operator's staff in the operation of the system.

A sizeable proportion of the scene setting shall occur during the hours of darkness, outside of normal working hours. Allowance for this out-of-hours work shall be included within the Lighting Control System manufacturer/supplier's quotation.

The system will be fully commissioned and programmed by the manufacturer/supplier's own trained engineers.

The hardware and software for commissioning shall be made available to the Client and **dpa** at no extra cost.

The Lighting Control System must be controllable during both commissioning and scene setting stages, such that all luminaires/groups are controllable via mobile devices within the field of view of the consultants.

Remote or off site programming or commissioning protocols will not be accepted.

The Lighting Control System Manufacturer/Supplier is to retain copies and back-ups of all the programmed scenes set up during this Commissioning & Scene Setting Stage.

Consideration to cable connection or wireless access points should be given.

Lighting Control System and commissioning software/process must allow for access to all control groups within an area from a single access point in a simple and timely manner.

For spaces with natural light the scene setting process will occur throughout the day and night to ensure the correct balance of natural and artificial lighting. Allowance for site attendance outside of typical working hours is required.

Throughout the commissioning process it is expected that automatic back-ups of the system will be made at maximum 30 minute intervals, to facilitate a faster re-commissioning in the event of any error.

The Lighting Control System supplier shall provide **dpa** and the Client with a digital-copy of the system configuration and scene set-values.

This digital copy will allow the system to be easily reprogrammed should the system memory become corrupted or destroyed.

4.3 Manufacturer After Sales Service & Support

The Lighting Controls Manufacturer/supplier shall adopt a 'no quibbles' policy in relation to the on-site, short notice substitution or re-specification of control modules or any other parts/services required by the Installing Contractor/Lighting Consultant such that project completion and deadlines are achieved. Such parts or services shall be made available within 24hours of request.

All equipment provided by the manufacturer/supplier shall be guaranteed for a period of not less than 24 months from the completion of commissioning.

During the guarantee period, a repair and replacement service shall be provided for all items of equipment supplied, within a maximum of 24 hours from notification of a fault.

Telephone support shall be made available to the Client/Operator on an on-going basis.

5.0 REVISIONS

Revision / Status	Description	By	Date
00	First Issue	IC	15/05/2020
T01 / D2	Stage 4 Issue	IC	05/06/2020
T02 / D2	Stage 4 Update – L1 and L2 Coworking spaces added. Interior Daylight Sensors Added.	IC	24/09/2020