System Overview

Quantum is a facility management solution that creates a flexible, productive, and energy-efficient environment for an entire building or campus. A single system provides dimming, switching, motorized shade control, system integration and energy management. It is used to manage the electric and natural light in multiple spaces using both automatic and manual control options.

Features

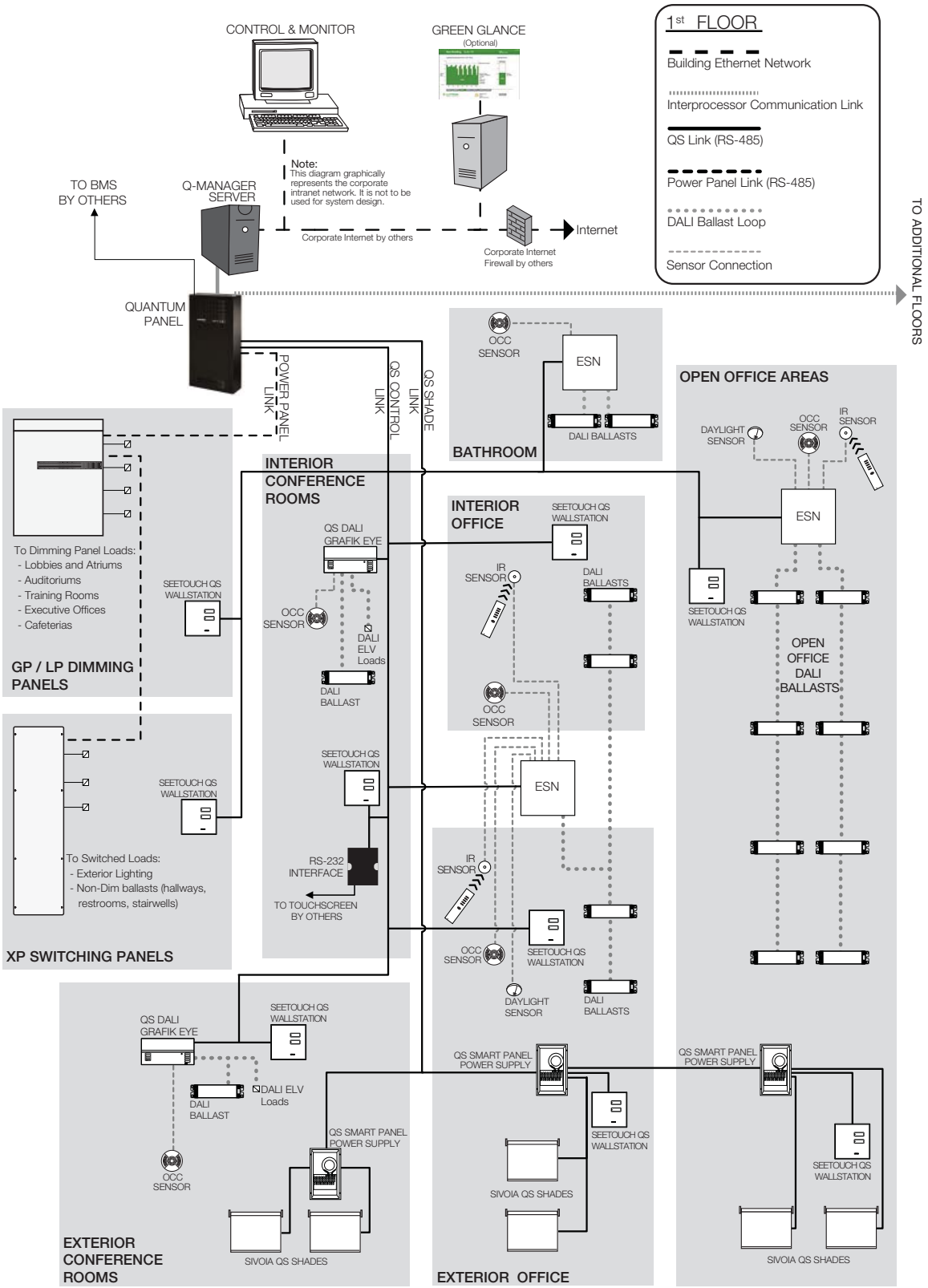
- Saves energy through occupancy/vacancy controls, daylighting, light level space tuning, shade control, and IntelliDemand load shedding.
- Increases productivity through maintaining optimal light level needed for tasks by daylighting, space tuning, and wallstation controls to activate desired preset scenes for the given activity.
- Centrally manage, monitor, and control DALI ballasts, GRAFIK Eye® dimming and switching panels, *Grafik Eye* QS scene controller, Energi Savr Node™ QS controller, and Sivoia® QS shades in a building or whole campus environment.
- Uses Lutron's Q-Admin™ Graphical User Interface for easy management of the system
- Built-in timeclock allows scheduling of events based on time of day and relative to local sunrise and sunset.
- Easily interfaces with audiovisual equipment, security systems, fire alarms, and building management systems.
- Partitioned space control combines/separates control station and occupancy control based on the status of movable walls.
- Controls can be programmed using recommended templates or on a button-by-button basis.
- Automatically adjusts Lutron *Sivoia* QS window shades based on the angle of the sun.

Architecture

Quantum is a tier of subsystems structured for phased startup and distributed processing. Although certain features (such as IntelliDemand peak energy response and energy reporting) may reach across the building, the majority of occupant features like occupancy, daylighting, and control station programming are local to a subsystem, typically a floor. Within a subsystem, DALI ballast loops are further segmented to allow for proper operation as a floor is being commissioned.

Job Name:	Model Numbers:	
Job Number:		

System Overview



Job Name:	Model Numbers:	
Job Number:		

System Components and Capacities

Light Management Hubs (LMH)

- 16 processors per sub-system. 8 to 16 LMHs per sub-system, depending on number of processors per hub.
- Up to 128 sub-systems, for a total of 2048 processors (1024 to 2048 LMH).
- Control links can be configured as QS control links or *GRAFIK Eye* power panel.
- Up to 3 control links per LMH.
- 5-port Ethernet device for connecting LMHs together and connection to the Q-Manager™ server.
- 3 configurable links can supply power for up to 32 keypad/control stations. For more controls on the QS link, additional power supplies are needed.

Energi Savr Node™ QS DALI Controller

The *Energi Savr Node* QS DALI Controller is a DALI bus supply. This supply powers 2 independent DALI loops with
up to 64 ballasts each.

- Provides power for either one or two DALI busses.
- Bus wires are polarity insensitive and topology free.
- Voltage input: 220-240 V~ 50/60 Hz
- Default configuration requires no commissioning.
- Advanced programming available via the Quantum Hand Held Device.
- 4 absense/presense sensors can control up to 32 areas.
- 4 photo sensors can control up to 32 areas with programmable gain settings.
- 4 IR sensors can control up to 32 areas.
- Includes communication link for seamless integration of lights, motorized window treatments, and control stations.
- Compatible with all Lutron QS system components.

DALI Loop Wiring Rules

- Up to 64 ballasts per DALI loop
- DALI wiring is not SELV.
- DALI wiring may be treated as mains voltage, and thus may be run within the same sheating.
- Using 2 different colors for DA/DA wire helps prevent miswires when using multiple busses within the same panel or conduit.
- Ensure that there is no greater than a 2 V drop between the *Energi Savr Node* QS DALI Controller and the end of the DALI loop.
- Consult all national and local electrical codes for separation requirements.

Wire Gauge	Bus Length (max)
4.0 mm^2 (12 AWG)	671 m (2200 ft)
2.5 mm^2 (14 AWG)	427 m (1400 ft)
1.5 mm^2 (16 AWG)	275 m (900 ft)
1.0 mm^2 (18 AWG)	175 m (570 ft)

Job Name:	Model Numbers:	
Job Number:		

QS Control Link

- Up to 99 QS controls per link
- Up to 512 switch legs or zones per link

QS Device Consumption Rules

The table below lists the devices available on the QS link. See below for each device's count toward the link maximums for zones, switch legs, and devices.

A *Quantum* QS link can have up to 512 switch legs (outputs), 99 devices, and 32 power draw units.

QS Device Description	Switch Leg Count	Device Count	Power Draw Units
3-zone GRAFIK Eye® QS	3	1	0
4-zone *GRAFIK Eye* QS	4	1	0
6-zone *GRAFIK Eye* QS	6	1	0
seeTouch® QS	0	1	1
Sivoia® QS Roller 64™	1	1	0
Sivoia QS Roller 100™	1	1	0
Sivoia QS Roller 225™	1	1	0
QS contact closure interface	up to 5	1	2
QS network interface	0	1	2
QS smart power panel	0	1	0
Digital Fluorescent Energi Savr Node™ QS Controls	up to 128	1	0

QS Wiring Rules

- Free wiring topology (daisy chain, T-tap, etc.).
- No link terminators needed.
- Total length of control link must not exceed 610 m (2000 ft).
- Up to 3 link repeaters each adding an additional 610 m (2000 ft).

Wire Gauge	Bus Length (max) (recommended GRX-CBL-46L)
4.0 mm^2 (12 AWG)	600 m (2000 ft)
1.5 mm^2 (16 AWG)	250 m (800 ft)
1.0 mm^2 (18 AWG)	150 m (500 ft)

DALI Ballasts

Manufacturer	Model	Power Factor	Dimming Range	# of Lamps	Power	Lamp Type	Line Voltage	Line Frequency
Philips	HF-R TD 1 14-35 TL5 EII 220-240 V 50/60 Hz	0.95	1-100%	1	14-35 W	TL5	220-240 V	50/60 Hz
Tridonic	PCA 1/14 T5 EXCEL one4all LP	0.97	1-100%	1	14 W	T5	220-240 V	50/60 Hz
	PCA 1/28 T5 EXCEL one4all LP	0.99	1-100%	1	28 W	T5	220-240 V	50/60 Hz
Osram	QTi DALI 1x14/24 220/240 V BALLAST	0.96	1-100%	1	14, 24 W	T5	220-240 V	50/60 Hz
	QTi DALI 1x28/54 220/240 V BALLAST	0.97, 0.98	1-100%	1	28, 54 W	T5	220-240 V	50/60 Hz

Sensors

Sensors	Description
EC-DIR-WH	Daylight sensor
EC-IR-WH	Infrared receiver
C-FLRC-WH	Personal IR transmitter
LOSI-CDT	Dual (IR and ultrasonic) ceiling-mount occupant sensor
LOSI-CIR	IR ceiling-mount occupant sensor

Job Name:

Job Number:

Model Numbers:

Power Panel Link

- Up to 32 power panels per link.
- Daisy chain wiring only.
- LT-1 link terminators needed on each end of the link.
- Power panel link connects the processor to the power panels, including: GP, LP, XP, CCP, JDP, JCP, DCI, and DP.
- PELV wiring link requires:
  - Two 2.5 mm^2 (12 AWG) conductors for control power.
  - One twisted, shielded pair of 1.0 mm^2 (18 AWG) for data link.
  - One 1.0 mm^2 (18 AWG) conductor for emergency (essential) sense line, from panel to panel.
  - Total length of control link may be no more than 600 m (2000 ft).
  - If MUX-RPTR interface and GRX-CBL-46L cable is used, length may be up to 1 200 m (4 000 ft).

GP 3-4 Mini Models - 230 V~ (CE) Power

Only standard panels listed. Consult Lutron for further options.

Number of Circuits	Feed Type	Maximum Feed	Panel Branch Ratings	
			Circuit Breakers[1]	Maximum Dimmed Hot Load[2]
3	1Ø 2 W	30 A	10 A[1]	2300 W/VA
3	3Ø 4 W	10 A	10 A[1]	2300 W/VA
4	Feed through	10 A	10 A[1,3]	2300 W/VA

1 10 A, 10 A continuous load rating.

2 Measured current will not exceed continuous load rating due to voltage drop in the dimmer.

3 Breakers located in distribution panels supplied by others.

GP 8-24 Standard-Size Models - 230 V~ (CE) Power

Only standard panels listed. Consult Lutron for further options.

Number of Circuits	Feed Type	Maximum Feed	Panel Branch Ratings	
			Circuit Breakers[1]	Maximum Dimmed Hot Load[2]
8	3Ø 4 W	125 A	10 A	2300 W/VA
12	3Ø 4 W	125 A	10 A	2300 W/VA
16	3Ø 4 W	125 A	10 A	2300 W/VA
20	3Ø 4 W	125 A	10 A	2300 W/VA
24	3Ø 4 W	125 A	10 A	2300 W/VA

1 10 A, 10 A continuous load rating.

2 Measured current will not exceed continuous load rating due to voltage drop in the dimmer.

Job Name:	Model Numbers:	
Job Number:		

LP 1-3 Mini Models

Only standard panels listed. Consult Lutron for further options.

230 V~ (CE) Power

Number of Dimming Modules	Number of Dimming Legs	Feed Type	Maximum Feed	Panel Branch Ratings
LP 1	4	1Ø, 2 W	13 A	13 A branch circuit breakers
LP 2	8	1Ø, 2 W	26 A	
LP 3	12	1Ø, 2 W	39 A	
		3Ø, 4 W	13 A	
LP4	16	3Ø, 4 W	125 A	
LP5	20	3Ø, 4 W	125 A	
LP6	24	3Ø, 4 W	125 A	
LP7	28	3Ø, 4 W	125 A	
LP8	32	3Ø, 4 W	125 A	

XP 4-16 Mini Feed-Through Models (without Branch Circuit Breakers)

Only standard panels listed. Consult Lutron for further options.

230 V~ (CE) Power

Number of Switch Legs	Feed Type	Maximum Feed
XP 4	Feed-through	230 V~ (CE): 16 A
XP 8		
XP 12		
XP 16		

XP 20-48 Standard-Size Feed-Through Models (without Branch Circuit Breakers)

Only standard panels listed. Consult Lutron for further options.

230 V~ (CE) Power

Number of Switch Legs	Feed Type	Maximum Feed
XP 20	Feed-through	230 V~ (CE): 16 A
XP 24		
XP 28		
XP 32		
XP 36		
XP 40		
XP 44		
XP 48		

Job Name:	Model Numbers:	
Job Number:		

XP 4-24 Standard-Size Models with Branch Circuit Breakers

Only standard panels listed. Consult Lutron for further options.

230 V~ (CE) Power

Number of Switch Legs	Feed Types and Wire Sizes	Maximum Feed	Branch Circuit Breakers[1]
XP 4	• 3Ø, 4 W • 125 A isolator switch • Isolator switch accepts 2.5 mm^2 to 35 mm^2 feed wiring	125 A	16 A
XP 8			
XP 12			
XP 16			
XP 20			
XP 24			

1 20/16 A, 15/12 A continuous load rating.

Q-Manager™ System Server

The *Q-Manager* server is used to collect and record data from the *Quantum* system components. It is also required for communicating to the Q-Admin™ client software and the Green Glance™ client display.

Q-Admin System Management Software

- *Q-Admin* is the *Quantum* software that allows facilities staff to manage their electric light and daylight for maximum energy efficiency, comfort, and productivity.
- Allows control of lights on an area basis for sending lights to a level, enabling and disabling of occupancy, and changing target light levels for areas that are daylighting.
- Monitors light status, occupancy status, and energy consumption.
- Real-time diagnostics of ballast lamp failures and equipment failures.

Green Glance™

- Displays lighting energy savings, real-time lighting power savings, and equivalent savings such as coal not burned or CO_2 not emitted. Data are organized into an easy-to-read format intended for public viewing.

Control Strategies

Scheduling

- Built-in timeclock allows scheduling of events based on time of day and relative to local sunrise and sunset.
- Create separate timeclocks for each related group of outputs, i.e., parking lots, common spaces, landscape lighting, etc.
- Each timeclock can contain different daily schedules.
- Astronomic events can be set up to 2 hours before or after sunrise or sunset.
- Daylight savings time can be defined according to any system used anywhere in the world.

Vacancy/Occupancy Detection

- Use occupant sensors to automatically turn the lights off in an area a fixed time after it becomes vacant.
- Use occupant sensors to automatically turn the lights on in an area when it becomes occupied and to automatically turn the lights off in an area a fixed time after it becomes vacant.
- Multiple areas may be grouped together to respond to vacancy/occupancy together.
- Each area's occupied level/scene and unoccupied level/scene can be programmed.
- Dependent occupancy groups allow you to keep an areas lights on when adjacent areas are occupied.

Daylighting

Automatically dim the electric lights in an area based on the amount of natural light entering through the windows.

Control Station Programming

- Select lighting scenes and/or shade presets in an area.
- Control individual lighting zones and/or shade groups using button-by-button programming.
- LED indicator displays the status of programmed lights.

Job Name:	Model Numbers:	
Job Number:		

Integration

Contact closures

- Simple integration with fire alarms systems, security systems, and audio/visual systems.

RS-232

- Advanced integration primarily used with audio/visual systems.

Telnet® via Ethernet

- Advanced integration primarily used with audio/visual systems.

BACnet® IP

- Integrate with the building management system.

Q-Admin™ Software

Control of Lights and Shades

Allows the building manager to control and monitor the lighting and shading system as follows:

Lights

- Area lights can be monitored for on/off status.
- All lights in an area can be turned on/off or sent to a specific level.
- For areas that have been zoned, these areas may be sent to a predefined lighting scene, and individual zones may be controlled.
- Area lighting scenes can be modified in real time, changing the levels zones go to when a scene is activated.

Shades

- Area shades can be monitored for current preset or position.
- Area shades can be opened/closed, sent to a preset, or sent to a specific position.
- Area shades can be automatically adjusted based on the angle of the sun.

Occupancy

Occupancy allows the building manager (or security guard) to monitor occupancy status and make occupancy-setting changes as follows:

- Area occupancy can be monitored.
- Area occupancy can be disabled to override occupancy control or in case of occupant sensor problems.
- Area occupancy settings, including level lights turn on to when area is occupied, and level lights turn off to when area is unoccupied, can be changed in real time.

Daylighting

Daylighting allows the building manager to control and monitor the daylighting settings as follows:

- Daylighting can be enabled/disabled. This can be used to override the control currently taking place in the space.
- Daylight target levels can be changed for each daylit area. This is particularly useful when new departments move into a space.

IntelliDemand Load Shedding

Load shedding allows the building manager to monitor whole-building lighting power usage and apply a load shed reduction to selected areas, thereby reducing a building's power usage.

Scheduling

Schedule time of day and astronomic timeclock events to automate functions for lights and shades.

Reporting

Reports allow the building manager to gather real-time and historical information about the system as follows:

- Energy Reports: Show a comparison of cumulative energy used over a period of time for one or more areas.
- Power Reports: Show power usage trend over a period of time for one or more areas.
- Activity Report: Shows what activity has taken place over a period of time for one or more areas. Activity includes occupancy activities (i.e., areas going occupied/unoccupied, wall controls being pressed), building manager operation (controlling/changing areas using the control and monitor tool), and device failures (keypads, ballasts, etc. not responding).
- Lamp Failure Report: Shows which areas are currently reporting lamp failures.

Diagnostics

Diagnostics allow the building manager to check on the status of all equipment in the lighting control system. Devices will be listed with a reporting status of OK, missing, or unknown.

Administration

The administration tab appears only for users who have been assigned the role "Admin" when their user account was created or last modified. The administration features are as follows:

- Users: Allows new user accounts to be created and existing user accounts to be edited.
- Publish Graphical Floor Plan: Allows admin user to publish new graphical floor plan files, allowing users to monitor the status of lights, occupancy of areas, and daylighting status.
- Back-up Project Database: Allows admin user to backup the project database. The project database holds all the configuration information for the system, including keypad programming, area scenes, daylighting, occupancy programming, emergency levels, night lights, and timeclock. The Control and Monitor tool can be used to adjust some of these settings, and thus it is important to back up the project database prior to changing settings in the Design and Setup tool.
- Publish Project Database: Allows the admin user to send a new project database to the server and download the new configuration to the system. The project database holds all the configuration information for the system, including keypad programming, area scenes, daylighting, occupancy programming, emergency levels, night lights, and timeclock.

Graphical Floor Plan Design Service

The Q-Admin™ system navigation and status reporting can be performed using customized CAD-based drawings of your building. Pan and zoom feature allows for easy navigation.

- Contact Lutron for hourly rate for graphics creation.
- Customer must supply vector-based (.dwg, .dxf, .wmf, etc.) drawings for each floor plan to be displayed.

Job Name:	Model Numbers:	
Job Number:		