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Commissioning time comparison
LITECOM and KNX system

Zumtobel Lighting GmbH, Dornbirn | AT
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1 Introduction

Lighting management systems have become an established part of contemporary lighting solutions, as they provide all prerequisites for user-centred premium lighting systems as well as for energy-efficient operation of a lighting system. When combined with daylight or ambient light sensors and presence detectors, highly convenient contemporary lighting solutions can be created. On the one hand, the task-specific focus may be placed on room ambience, as for instance in case of lighting scenes related to specific visual tasks, event-centred lighting scenes or daylight simulation. On the other hand, the focus may be on minimising energy consumption, for example in case of applications featuring daylight-based and presence-based control or constant lighting control systems.

Meanwhile, a wide range of lighting management and/or lighting control systems is available that are suitable for performing such tasks. Some of them have their origins in the "world of lighting", such as DALI-based solutions, while others come from the sphere of building management systems or building services control systems (KNX); hence the differences in procedure, i.e. the type of components, installation, commissioning, programming and configuration, but also operation. They differ not so much in terms of functions but with respect to handling. This factor has increasingly gained in importance over the past years, ensuring that attention is now being drawn to optimisation of both technical processes and user interfaces.

The question arising from this is which system and/or which philosophy is able to best possible support the user, i.e. the installer as well as the end user. Adequate findings can be obtained from a comparison of lighting control systems by analysing the individual steps and the time required to perform specific operations. Methods applying REFA standards deliver meaningful results.

Here, a comparison was made between Zumbtobel's LITECOM lighting management system, the design of which reflects the thinking of lighting solution experts, and a KNX system.

2   Background

KNX systems ensure intelligent networking of contemporary building management systems by controlling all building services such as heating, lighting, blinds, ventilation and security technology systems. Conceived as an advancement in conventional electrical engineering, this manufacturer-independent bus system has been continuously developed further since it was introduced in 1990 as a "European Installation Bus" (EIB). Thus, KNX is a sophisticated system optimised in terms of components and control units, installation, commissioning, configuration and operation. The "Engineering Tool Software" – currently version ETS 4 – is used for programming, this task being mainly performed by a system integrator trained in appropriate courses.

In contrast, the LITECOM lighting management system is considered a "newcomer". During its development, simplicity, i.e. intuitive user guidance, was a major priority, as regards installation, configuration and commissioning as well as in terms of operation.

The user interface runs on any computer or laptop with a Web browser installed, but of course also on mobile terminals. Directly linked to the Ethernet data network via a TCP/IP interface, all prerequisites for remote maintenance of the LITECOM lighting management system via Internet and Intranet are met.

The heart of the system is the compact LITECOM Controller featuring three DALI lines for 64 DALI ballasts each. In addition, the LM bus allows connection of up to 250 devices and/or actuators in total. Clicked into place on the DIN rail in the switch cabinet, the compact Controller (just 160 mm wide) needs extremely little space and can be installed easily and safely thanks to plug-in screw terminals.

A well-thought-out tool is the addressing wizard, which assists users in the commissioning procedure of the LITECOM lighting management system step by step. A well-structured input screen with clear symbols and unequivocal terms facilitates this procedure. Thus, electrical engineers or technical staff without any specialist skills – hence, no system integrator is required – can proceed in a target-oriented manner and successfully complete configuration and commissioning proce-dures within a short time.

The structure of the system can be defined in compliance with the situation on site and can very easily be extended or adjusted. The addressing wizard provides information on how to create or move rooms and lighting groups. Subsequently, the luminaires are allocated to individual rooms and/or groups. The advantage of the plain-text designations used is that every user can assign his or her own descrip-tive names.

LITEC⊙M

3   The way towards verification

During the development of LITECOM, the focus was on simplicity, a clear layout and speed. A time comparison test was made to find out whether the lighting management system meets these objectives, specifically when compared with a KNX system based on many years of experience.

REFA Consulting GmbH from Darmstadt was commissioned with performing the test, as the company is a specialist in this field that can look back on decades of experience. The consulting firm – being a member of the REFA German association for labour studies, industrial organisation and company development that dates back to the Reich committee for working time appraisal founded in 1924 – is able to perform easily reproducible time measurements using generally acknowledged methods and, as a result, develop custom solutions. For the purpose of this test, only the time required for commissioning – i.e. configuration and addressing – was measured.

The test specification was to create various lighting scenes in a fictitious office fitted with one continuous row system close to the window and one in the back of the room – each consisting of three DALI luminaires – as well as a window blind.

The range of tasks included:

– Switching the luminaire group on/off and dimming it using a
  momentary-action switch
– Switching and dimming the luminaire group in combination with
  the blind
– Daylight-based control
– Presence-based switching on/off
– Control according to specified times
  i.e. separately for weekdays and weekends

Fig. 1: Illustration of test scenario

4   Methods, details and implementation

An appropriate test scenario was set up at the training centre of Zumtobel Lighting GmbH, Dornbirn, to perform the time comparison test. This scenario included a desk with a laptop and wall panels with the luminaires, the blind and all other installation components preinstalled and wired. However, they had neither been assigned any addresses nor were they preconfigured.

In case of KNX, this constellation was supplemented by a USB bus interface, a DALI software tool by ABB for addressing the DALI/KNX gateway and the ETS software. All that was required specifically for LITECOM was a browser to call up the function for checking the installation and configuring a non-addressed system.

The test subject was Mirco Voss, who has gained comprehensive experience with KNX systems as an electrical installer and system integrator for Kirsch GmbH, Sonthofen. He is also familiar with Zumtobel's tried-and-tested LUXMATE lighting management system.

List of devices for KNX
ETS 4 design and configuration software and ABB DALI software tool incl. KNX USB interface installed on the electrician's computer;

ABB:
1 x voltage supply, 640 mA, SV/S 30.640.3.1
1 x DALI gateway, single, group control, DG/S 1.16.1
1 x blind/shutter actuator with manual control, quadruple,
     230 V AC, JRA/S 4.230.2.1
2 x control units, quadruple, 6127/01-84-500
1 x presence detector, constant light control, 6131/11-24-500
1 x radio-controlled timer, 8 channels, FW/S 8.2.1

Tridonic:
6 x DALI electronic ballasts PCA Excel one4all fitted with light
     sources

List of devices for LITECOM
Google Chrome browser installed on the electrician's computer;

Zumtobel:
1 x LITECOM CCD V1.2.1
1 x LM-4UAS
1 x LM-BV
1 x ED-SENS
1 x ED-EYE
1 x LM-SXED
1 x LM-4JAS

Tridonic:
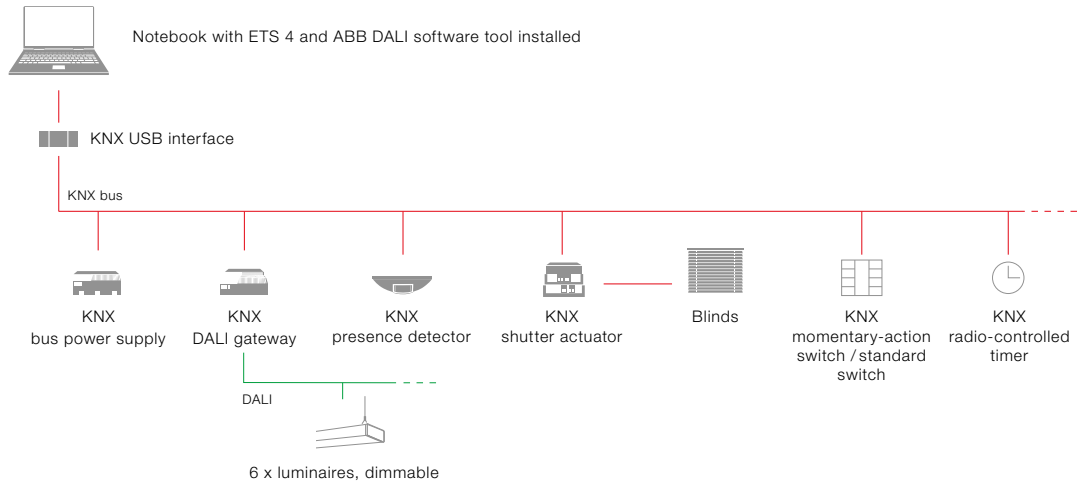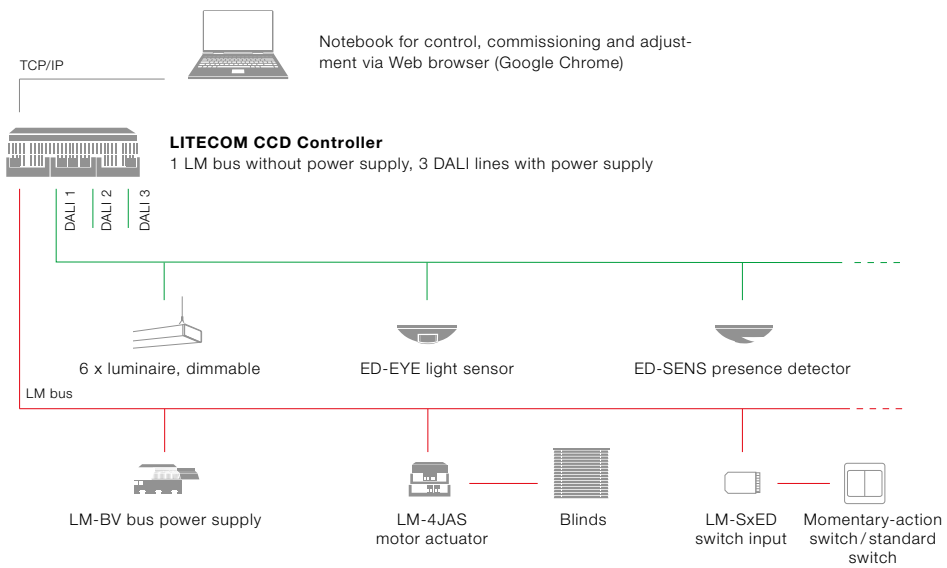6 x DALI electronic ballasts PCA Excel one4all fitted with light sources

Notebook with ETS 4 and ABB DALI software tool installed

KNX USB interface

KNX bus

KNX
bus power supply

KNX
DALI gateway

KNX
presence detector

KNX
shutter actuator

Blinds

KNX
momentary-action
switch / standard
switch

KNX
radio-controlled
timer

DALI

6 x luminaires, dimmable

Diagram 1: KNX wiring scheme

TCP/IP

Notebook for control, commissioning and adjust-
ment via Web browser (Google Chrome)

LITECOM CCD Controller
1 LM bus without power supply, 3 DALI lines with power supply

DALI 1 DALI 2 DALI 3

6 x luminaire, dimmable

ED-EYE light sensor

ED-SENS presence detector

LM bus

LM-BV bus power supply

LM-4JAS
motor actuator

Blinds

LM-SxED
switch input

Momentary-action
switch / standard
switch

Diagram 2: LITECOM wiring scheme

Before the test supervised by REFA consultant Dipl. Oec Doris Lau, Mirco Voss was given a 20-minute introduction to the LITECOM lighting management system with its specific features.

In order to be able to assess LITECOM and KNX in terms of programming and configuration efforts according to REFA criteria, the entire process was broken down to nine individual steps that were supposed to be as similar as possible. However, for reasons of system engineering, this was not possible in all instances.

Sequence of steps

	KNX	LITECOM
1	Create project	Create project
2	Create room and switch cabinet, add components	Create room and switch cabinet
3	Addressing and configuration	Address luminaires
4	Programme blind actuator, initialisation	Address blind
5	Programme modules 1 and 2 momentary-action switches	Address input devices
6	Make time entries	Make time entries
7	Perform function test	Perform function test
8	Enable constant light function with presence detector	Enable presence- and daylight-based control
9	Perform data backup	Perform data backup

The differences in execution times automatically resulting from the increasing level of practice were taken into account in compliance with REFA methodology by evaluating the level of performance. Thus, 100 % normal performance (= time baseline) was determined, to which 5 % of objective and personal allowance times were added, so that the test scenario reflected realistic surrounding conditions at the workplace.

Objective allowance times are the allocated times additionally required for performing a sequence as scheduled, for example official meetings, brief organisational or technical interruptions. Personal allowance times are for instance going to the bathroom, having a drink or providing food or drinks.

5 Results

The amounts of time determined by means of REFA methodology for commissioning the KNX lighting control system on the one hand and the LITECOM lighting management system on the other were astounding. For the difference was considerable – 49 minutes versus 13 minutes – in total, the sequence of steps could be completed almost four times faster with LITECOM.

KNX

LITECOM

49 min.

13 min.
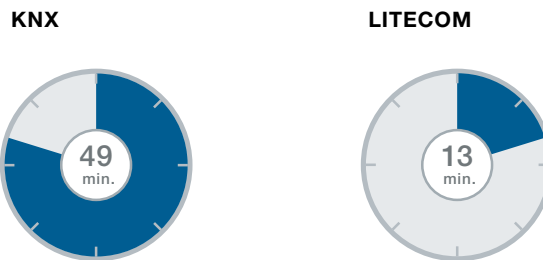
Time comparison	KNX Minutes	LITECOM Minutes
1 Create project	1.89	0.00
2 Create room and switch cabinet		0.84
Create room and switch cabinet, add components	5.61	
3 Address luminaires		1.51
Addressing and configuration	26.48	
4 Address blind		0.81
Programme blind actuator – initialisation	0.33	
5 Address input devices		2.17
Programme modules 1 and 2 momentary-action switches	1.58	
6 Make time entries	3.80	2.27
7 Perform function test	4.17	1.95
8 Enable presence- and daylight-based control		2.70
Enable constant light function with presence detector	4.93	
9 Perform data backup	0.00	0.66
Total amount	**48.79**	**12.90**

In addition, LITECOM does not require any special knowledge in programming or configuration, so that not only experts but also "regular" staff members of an electrical installation company can perform this task. During operation, too, it is not absolutely necessary to call an expert to change a scene or an address, for instance; this can also be done by the building service engineer.

The conclusion drawn by Mirco Voss was positive as well:

"In this practical application from the area of lighting and sunscreening, LITECOM is clearly in the lead. However, it must be taken into account that KNX allows implementation of a complete building management system involving all building services. The LITECOM lighting management system is easy to install and does not require any additional software or programming skills. The browser-optimised user interface provides clear menu guidance for commissioning the devices installed. Even complex applications such as time entries, presence detection or daylight-based control can be configured quickly and easily. A "jungle" of parameter settings as required for KNX is not necessary. I believe that even untrained users will be able to perform installation and commissioning procedures after a short briefing, which will save a lot of time. LITECOM offers a clearly structured user interface for end users, which allows them to adjust even luminaire groups, for instance in an open-plan office, to their individual needs, with no more than a little briefing."

Mirco Voss, being an electrical installer and system integrator for Elektro Kirsch GmbH, Sonthofen, has gained comprehensive experience with KNX building management systems. The family-run company with more than 40 employees was established in 1955 and handles projects in the areas of electrical engineering and building service installations. Since 2008, the range of services of Elektro Kirsch has also included KNX systems including programming, in addition to data, video, telephone or antenna technologies.

6 Partners and project team

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