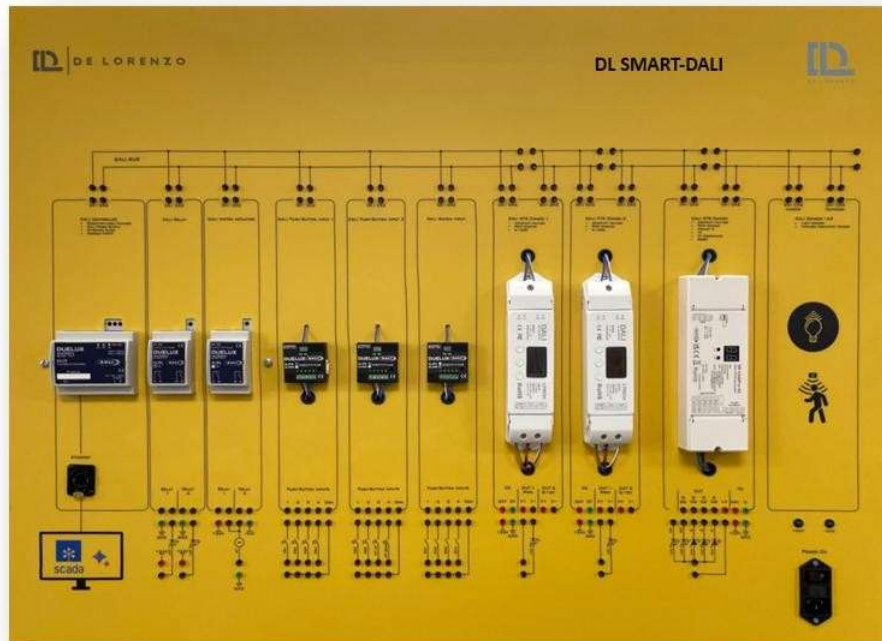




SMART BUILDING LABORATORY

DL SMART-DALI

“SMART LIGHTING TRAINER”



The picture is for reference only

INTRODUCTION

Smart building technology is revolutionizing the way we design, manage, and experience buildings. By integrating advanced systems, smart buildings offer enhanced efficiency, sustainability, and safety. The cutting-edge technologies enable seamless control of lighting, HVAC systems, fire safety, and security, while promoting energy optimization and user comfort.

The “smart building” concept refers to a structure that uses advanced technologies such as sensors, actuators, and automation systems to monitor and control building operations and the goal is to improve energy efficiency, comfort, safety, and overall building performance.

This specific lighting system is a cutting-edge training center dedicated to advancing lighting technology studies. It uses **DALI** (Digital Addressable Lighting Interface) technology as the protocol for digital lighting control. It is specialized in **DALI** fundamentals, installation and troubleshooting, control and automation, system monitoring and integration, and **AI**-driven lighting solutions. Its mission is to cultivate skilled engineers and technicians for the smart building industry's lighting sector.



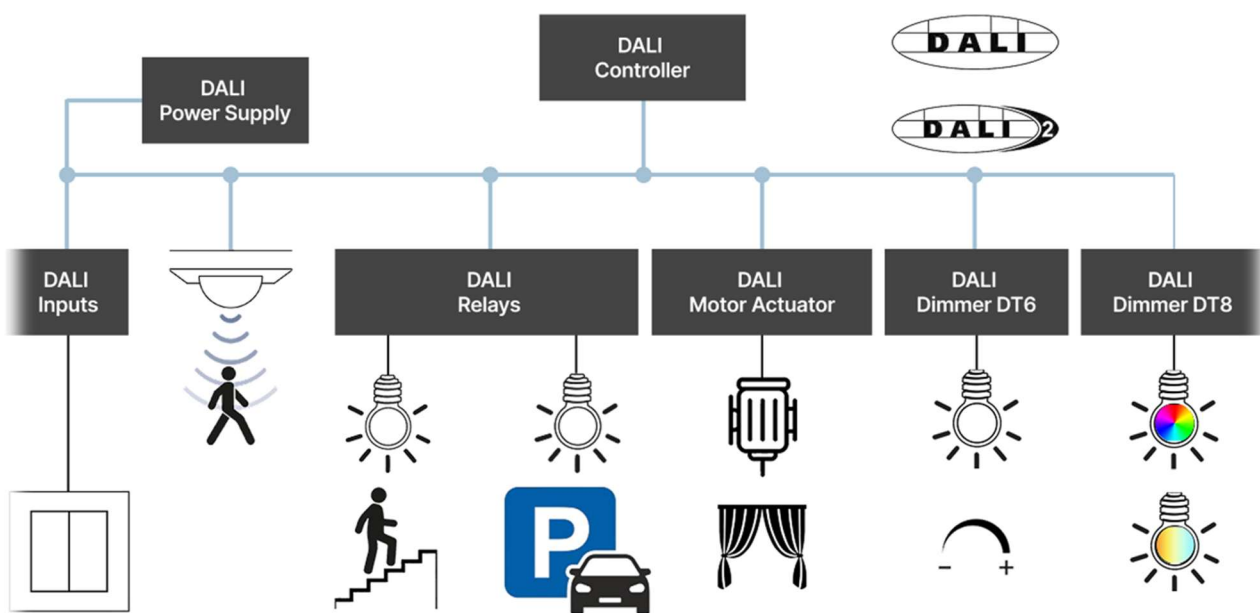
DALI is a standardized lighting control system that enables flexible, precise management and communication between lighting devices in smart building environments.

It allows for flexible, digital control of lighting systems, making it ideal for modern smart buildings such as:

- Office buildings with dynamic lighting needs,
- Smart homes with automated lighting scenes,
- Hospitals and schools for energy-efficient lighting control,
- Street lighting systems.

Regarding “**how it works**”, a DALI controller sends digital signals over the DALI bus, each DALI device listens for commands addressed to it, and the devices can respond with status information or execute commands like dimming, switching, or scene recall.

Here's a diagram illustrating a **basic DALI lighting setup**.



TRAINING OBJECTIVES

This trainer **DL SMART-DALI** is designed to equip users with comprehensive knowledge and hands-on skills in **DALI** lighting field. It is aimed at a wide audience, including non-experts, highly intuitive and simple to use through a user-friendly interface.

It is flexible enough to meet every need, from the simplest to the most complex, helping the user by simplifying and speeding up many of the most common everyday tasks.

It requires no special care and even in case of failure, it is able to provide the service for which it was designed, or a similar one in the case of reduced operation.



It can be fully configured quickly and intuitively using a software and the system can be accessible from any device connected to the same LAN.

By the end of the training, the users will be able to:

- Understand the Fundamentals of DALI Lighting.
- Master DALI System Installation and Troubleshooting.
- Develop Skills in DALI Control and Automation.
- Gain Proficiency in DALI System Monitoring and Integration.
- Apply AI in Lighting Control.

LABORATORY'S COMPOSITION

This trainer is composed of a main panel on which all DALI devices (sensors and control gear) are placed. Through this panel, the user will perform the DALI configuration, interfacing input devices with DALI devices, integrating luminaires into DALI control gear, and accessing the DALI system using the software.

On this front panel and where the manual settings are made during the installation phase, the users gain hands-on experience with real industrial equipment thanks to direct interaction with DALI devices.

In addition to the operation panel, the system offers a visualization space to better observe the automation performance. There is a showroom where the main parts of DALI sensors and luminaires are installed to simulate various environments, such as parking lots, outdoor areas, offices, meeting rooms, corridors among others.

Unlike conventional installations where all devices are placed on the same 2D panel, sensors and luminaires in the showroom are positioned in a more realistic setting. This enhances the natural occurrence of automation and makes its visualization more intuitive.

The input devices include DALI control panels such as an 8-key push-button panel and a DT8 touch panel to enhance the manual control experience. The sensors consist of motion sensors and illuminance sensors. The luminaires include single-color LEDs, CCT LEDs, and RGBW LEDs.

SCADA IN DALI LIGHTING

SCADA (Supervisory Control And Data Acquisition) is an industrial control system that monitors, gathers, and processes real-time data to manage and control equipment and processes across various industries.

In smart buildings, the **BMS** (Building Management System) manages and supervises all functional modules. When we focus on one functional module, such as the DALI Lighting system, we move to a lower level of management and supervision, dealing with critical statuses and decision-making controls of the DALI system.

In the process of using **SCADA**, smart building operations management specialists will gain an understanding of the key elements they need to monitor within the smart building and its various functional departments, enabling them to respond promptly in emergency situations.



THEORETICAL & EXPERIMENTAL TOPICS

The lab covers the following topics:

- DALI Fundamentals:
 - Introduction, Components, and Wiring.
 - Communication and Configuration.
- Installation and Troubleshooting:
 - System Installation & Pre-Commissioning Checks.
 - Device Addressing and Basic Commissioning.
 - Common DALI Faults.
- Control and Automation:
 - Manual Device & Group Control, Scene Configuration.
 - Color Temperature & Dynamic Color Control.
 - Automated Control, Scheduling & Event-Triggered Automation.
 - Smart Lighting & Circadian Lighting Design.
- DALI System Monitoring and Integration:
 - DALI Monitoring in SCADA & Smart Buildings.
- AI-driven Lighting Solutions:
 - AI-Based Analysis of User lighting Patterns for Predictive Control.



REAL APPLICATIONS INCLUDED IN *DL SMART-DALI*