

RELIANCE Approach Flash System

Elevated and Inset

User Manual

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ADB SAFEGATE

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The equipment listed as CE certified means that the product complies with the essential requirements concerning safety and hygiene. The European directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

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Note

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Note

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Replaced or repaired equipment under warranty falls into the warranty of the original delivery. No new warranty period is started for these replaced or repaired products.

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WARNING

Use of the equipment in ways other than described in the catalog leaflet and the manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in the manual.

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Unintended uses, includes the following actions:

- Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ADB SAFEGATE replacement parts or accessories.
- Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards if not in contradiction with the general rules.
- Using materials or auxiliary equipment that are inappropriate or incompatible with your ADB SAFEGATE equipment.
- Allowing unskilled personnel to perform any task on or with the equipment.

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1.0 Safety instructions

- Work on these systems, particularly when they have been opened up, may be carried out only by qualified electricians or persons trained in electrical engineering, in due compliance with occupational safety regulations!
- If you are not familiar with the occupational safety regulations and the general safety rules involved, please get in touch with your responsible manager!
- If the flash lighting system is switched off via the remote control system or the service control system, the power supply to the chain may remain activated. The chain can be safely de-energized only by using the main switch (miniature circuit-breaker) of the control unit!
- The LEDs of the flashing lights generate a light flash of very high brightness! The utmost care must be taken to avoid viewing this without eye protection from a short distance away from the LED light sources!
- Switching off, or making a change to the system that restricts its actual function, may be carried out only in consultation with the responsible traffic control!

1.1 Safety

Introduction to Safety

This section contains general safety instructions for installing and using ADB SAFEGATE equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.

1.2 Safety Messages

HAZARD Icons used in this manual

For all HAZARD symbols in use, see the Safety section. All symbols must comply with ISO and ANSI standards.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbols shown below.

	WARNING Failure to observe a warning may result in personal injury, death or equipment damage.
	DANGER – Risk of electrical shock or ARC FLASH Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage. ARC Flash may cause blindness, severe burns or death.
	WARNING – Wear personal protective equipment Failure to observe may result in serious injury.
	WARNING – Do not touch Failure to observe this warning may result in personal injury, death, or equipment damage.
	CAUTION Failure to observe a caution may result in equipment damage.
	ELECTROSTATIC SENSITIVE DEVICES This equipment may contain electrostatic devices.

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Qualified Personnel

Important Information

The term **qualified personnel** is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain and repair the equipment. It is the responsibility of the company operating this equipment to ensure that its personnel meet these requirements.

Always use required personal protective equipment (PPE) and follow safe electrical work practice.

1.2.1 Introduction to Safety



CAUTION

Unsafe Equipment Use

This equipment may contain electrostatic devices, hazardous voltages and sharp edges on components

- Read installation instructions in their entirety before starting installation.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Install all electrical connections to local code.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

Failure to follow these instructions can result in serious injury, death or equipment damage

Additional Reference Materials

Important Information

- IEC – International Standards and Conformity Assessment for all electrical, electronic and related technologies.
- IEC 60364 – Electrical Installations in Buildings.
- CSA – C22.2 No.180:13 (R2018), series isolating transformers for airport lighting.
- FAA Advisory: AC 150/5340-26 (current edition), Maintenance of Airport Visual Aid Facilities.
- Maintenance personnel must refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9.
- ANSI/NFPA 79, Electrical Standards for Metalworking Machine Tools.
- National and local electrical codes and standards.

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1.2.2 Intended Use

CAUTION

Use this equipment as intended by the manufacturer

This equipment is designed to perform a specific function. Do not use this equipment for other purposes

Failure to follow this instruction can result in serious injury, death and / or property and equipment damage

1.2.3 Material Handling Precautions: Storage



CAUTION

Improper Storage

Store this equipment properly

- If equipment is to be stored prior to installation, it must be protected from the weather elements and kept free of condensation and dust.

Failure to follow this instruction can result in equipment damage

1.2.4 Material Handling Precautions: Fasteners



DANGER

FOREIGN OBJECT DAMAGE - FOD

THIS EQUIPMENT MAY CONTAIN FASTENERS THAT CAN LOOSEN UNLESS TORQUED PROPERLY.

- ONLY USE FASTENERS OF THE SAME TYPE AS ORIGINALLY SUPPLIED WITH THE EQUIPMENT.
- USE OF INCORRECT COMBINATION OF GASKETS, BOLTS AND NUTS CAN CAUSE SEVERE DAMAGE TO THE PRODUCT AND CREATE MULTIPLE SAFETY RISKS .
- YOU NEED TO KNOW WHAT BASE THE LIGHT FIXTURE WILL BE INSTALLED IN, IN ORDER TO CHOOSE THE CORRECT GASKET, BOLTS AND NUTS.
- BOLT TYPE, LENGTH, AND TORQUE VALUE ARE DETERMINED BY TYPE OF BASE, HEIGHT OF SPACERS USED, AND CLAMP FORCE REQUIRED IN FAA ENGINEERING BRIEF NO 83 (LATEST REVISION).
- USE ONLY ANTI-VIBRATION WASHERS WITH THE FIXING BOLTS AS DEFINED IN FAA EB 83 (LATEST EDITION) TO AVOID THE RISK OF LOOSENING BOLTS . DO NOT USE OF ANY OTHER TYPE OF WASHER (SUCH AS SPLIT-LOCK WASHERS). FOR INSTALLATION OTHER THAN FAA, USE THE BASE CAN MANUFACTURER'S RECOMMENDATIONS.
- ALWAYS TIGHTEN THE FASTENERS TO THE RECOMMENDED TORQUE USING A CALIBRATED TORQUE WRENCH.
- APPLY THE RECOMMENDED TYPE OF ADHESIVE AND FOLLOW THE ADHESIVE INSTRUCTIONS CAREFULLY.

FAILURE TO FOLLOW THESE WARNINGS MAY CAUSE THE FASTENERS TO LOOSEN, POSSIBLY DAMAGING THE EQUIPMENT. THIS CAN LEAD TO THE HIGHLY DANGEROUS SITUATION OF FOD, WITH POTENTIALLY LETHAL CONSEQUENCES.

Note

To minimize the risk of errors, the ADB SAFEGATE Sales Representative will have information on which gasket goes with which base. This information is also provided in the product Data sheets, the User Manuals and the Spare Part Lists.

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1.2.5 Operation Safety



CAUTION

Improper Operation
Do Not Operate this equipment other than as specified by the manufacturer

- Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.
- Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.
- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks or locked-out electrical disconnects or pneumatic valves.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Never operate equipment with a known malfunction.
- Do not attempt to operate or service electrical equipment if standing water is present.
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Never touch exposed electrical connections on equipment while the power is ON.

Failure to follow these instructions can result in serious injury, death or equipment damage.

1.2.6 Maintenance Safety



DANGER

ELECTRIC SHOCK HAZARD
THIS EQUIPMENT MAY CONTAIN ELECTROSTATIC DEVICES

- DO NOT OPERATE A SYSTEM THAT CONTAINS MALFUNCTIONING COMPONENTS. IF A COMPONENT MALFUNCTIONS, TURN THE SYSTEM OFF IMMEDIATELY.
- DISCONNECT AND LOCK OUT ELECTRICAL POWER.
- ALLOW ONLY QUALIFIED PERSONNEL TO MAKE REPAIRS OR REPLACE MALFUNCTIONING COMPONENTS ACCORDING TO INSTRUCTIONS PROVIDED IN MANUAL.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH OR EQUIPMENT DAMAGE

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1.2.7 Material Handling Precautions, ESD



CAUTION

Electrostatic Sensitive Devices
This equipment may contain electrostatic devices

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet you shall bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

Failure to follow this instruction can result in equipment damage

1.2.8 Arc Flash and Electric Shock Hazard



DANGER

SERIES CIRCUITS HAVE HAZARDOUS VOLTAGES
THIS EQUIPMENT PRODUCES HIGH VOLTAGES TO MAINTAIN THE SPECIFIED CURRENT - DO NOT DISCONNECT WHILE ENERGIZED.

- ALLOW ONLY QUALIFIED PERSONNEL TO PERFORM MAINTENANCE, TROUBLESHOOTING, AND REPAIR TASKS.
- ONLY PERSONS WHO ARE PROPERLY TRAINED AND FAMILIAR WITH ADB SAFEGATE EQUIPMENT ARE PERMITTED TO SERVICE THIS EQUIPMENT.
- AN OPEN AIRFIELD CURRENT CIRCUIT IS CAPABLE OF GENERATING >5000 VAC AND MAY APPEAR OFF TO A METER.
- NEVER UNPLUG A DEVICE FROM A CONSTANT CURRENT CIRCUIT WHILE IT IS OPERATING; ARC FLASH MAY RESULT.
- DISCONNECT AND LOCK OUT ELECTRICAL POWER.
- ALWAYS USE SAFETY DEVICES WHEN WORKING ON THIS EQUIPMENT.
- FOLLOW THE RECOMMENDED MAINTENANCE PROCEDURES IN THE PRODUCT MANUALS.
- DO NOT SERVICE OR ADJUST ANY EQUIPMENT UNLESS ANOTHER PERSON TRAINED IN FIRST AID AND CPR IS PRESENT.
- CONNECT ALL DISCONNECTED EQUIPMENT GROUND CABLES AND WIRES AFTER SERVICING EQUIPMENT. GROUND ALL CONDUCTIVE EQUIPMENT.
- USE ONLY APPROVED ADB SAFEGATE REPLACEMENT PARTS. USING UNAPPROVED PARTS OR MAKING UNAPPROVED MODIFICATIONS TO EQUIPMENT MAY VOID AGENCY APPROVALS AND CREATE SAFETY HAZARDS.
- CHECK THE INTERLOCK SYSTEMS PERIODICALLY TO ENSURE THEIR EFFECTIVENESS.
- DO NOT ATTEMPT TO SERVICE ELECTRICAL EQUIPMENT IF STANDING WATER IS PRESENT. USE CAUTION WHEN SERVICING ELECTRICAL EQUIPMENT IN A HIGH-HUMIDITY ENVIRONMENT.
- USE TOOLS WITH INSULATED HANDLES WHEN WORKING WITH AIRFIELD ELECTRICAL EQUIPMENT.

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN DEATH OR EQUIPMENT DAMAGE

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2.0 Introduction

The RELIANCE Approach Flash System, referred to as SFL, serves as a sequential approach flash lighting system and threshold identification lighting system at airports. It meets all the requirements of ICAO Annex 14 and the requirements for military lighting systems in compliance with STANAG 3316 and the “Manual for Lighting Systems”.

No functional guarantee is given if the system is used for purposes other than its intended use or operated outside the specified limits.

2.1 Configurations of the System

The approach flash lighting system, referred to as SFL, consists of the main chain and a pair of threshold identification lights. The main chain (Lights 1 to 30) forms the extension of the runway centerline up to 900 m before the threshold. The flashing lights of the main chain, beginning with the light at Position 1, are lit one after the other in such a way that the approaching pilot has a continuous light signal guiding them to the runway.

In order to avoid dazzle effects, the main chain can be reduced by the final 300 m segment (22 to 30) before the threshold. In a fully equipped main chain, this segment can be switched off, if needed.

The runway threshold is marked by a pair of flashing lights (31 and 32) on the left and right next to the threshold lighting. These threshold identification lights (abbreviated below to TILs) are lit together after the sequence of the main chain. In order to avoid misleading the pilot, if one of the two threshold identification lights fails, the second one will be automatically switched off.

To distinguish between runways or as an additional signaling option, the sequence frequency can be switched over from the customary 2 sequences per second (2 Hz) to one sequence per second (1 Hz).

Three brightness steps enable the SFL system to be matched to the ongoing weather situation.

The individual-light monitoring capability of the SFL assures detailed technical remote control even in readiness mode.

The SFL system offers the following fixed or dynamic system configurations:

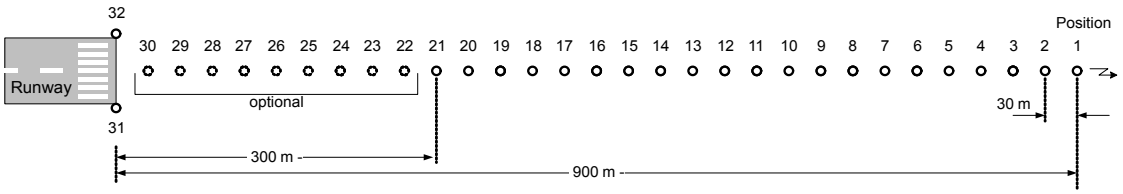
- Full main chain with TIL
- Reduced main chain with TIL
- TIL without main chain

Note

Configurations of a main chain can be implemented without TILs as a special function.

There is an option for having the SFL system externally synchronized: Here, the flash chain sequence is initiated once in each case by an external trigger signal. This enables the SFL system to be synchronized to be effected with upstream guide lights, for example.

Figure 1: SFL Approach System



2.2 System Architecture

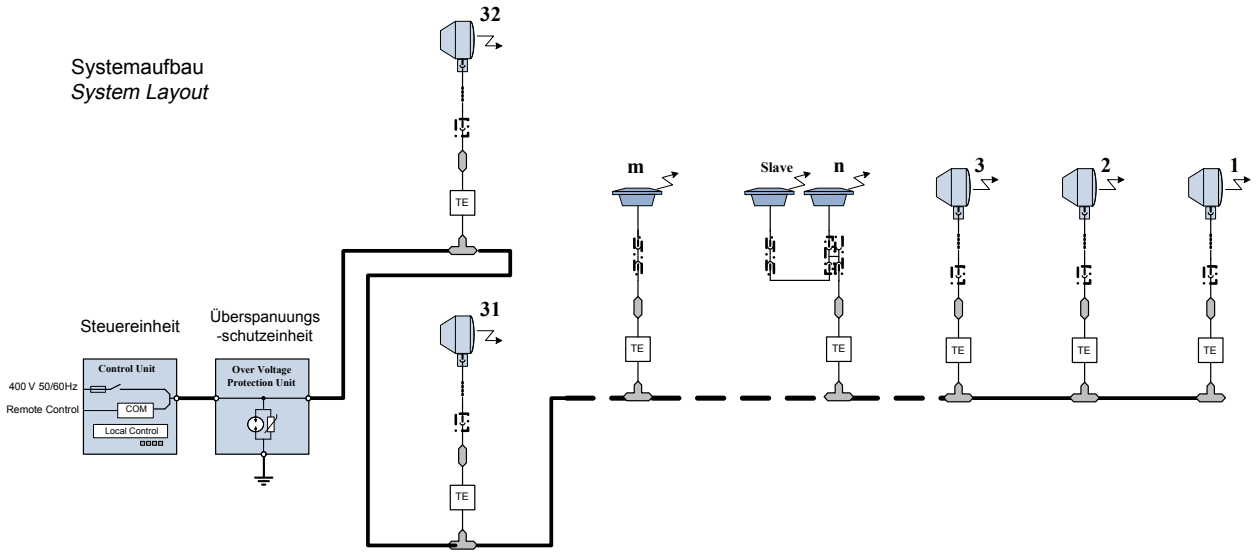
In the RELIANCE Approach Flash System, referred to as the SFL, instead of the traditional gaseous-discharge technology, lights with modern light-emitting diodes (LEDs) are used as the light source. The white high-performance LEDs generate the light flash using an extremely short light pulse with very high peak brightness. In contrast to gaseous discharge tubes, the LED technology does not require an internal high-voltage. This enables the lights to be designed for sturdiness, long lifetimes and safety.

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A single supply cable suffices for supplying, controlling and monitoring the flashing lights. An isolating unit decouples the supply voltage and the data transmission for each light from the supply cable route.

The output of the isolating unit meets the requirements for a safety extra-low voltage (SELV) and thus permits unrestricted, safe work on an active light. This personnel protection feature makes possible and also facilitates installation in public parts of the approach lighting system located outside the airport itself.

Figure 2: SFL System Layout



The low connected load of the flashing lights enables small cable cross-sectional areas to be used. Thanks to the safety extra-low voltage supply to the lights and the completely insulated construction of the primary cabling, the SFL system does not require a protective conductor to be incorporated.

If on the approach route a lightning protection system or equipotential bonding is installed, the arresters and equipotential connections must be routed independently and at a distance from the supply to the flash lighting system.

The LED light source is formed by a cluster of individual LEDs. A diffuser lens in front of each individual LED covers the entire range of diffusion required. The failure of an individual LED does not result in any change to the light distribution, but reduces the brightness of the light only by its proportion in the cluster. Thanks to this redundant construction of the light source, the SFL achieves an enormously long operational lifetime, which is many times longer than can be achieved using a single light source, e.g. gaseous discharge tubes.

Details of the elevated and inset flashing lights can be found in the separate data sheets.

2.3 Approach Flash System

Compliance with Standards

FAA	EB 67D
ICAO	Annex 14, Vol. I
IEC	TS 61827
NATO	STANAG 3316
EASA	CS-ADR-DSN
Canada	TP312
Australia	MOS139

Uses

Approach sequential flash and threshold identification for CAT I, II and III operations

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System Design

The RELIANCE™Approach Flash System, referred to as SFL, consists of a control unit, main chain (SFL - light 1..30), threshold identification (TIL - light 31..32) and power distribution units (1..32).

The RELIANCE SFL system enables following static (installation) or dynamic (configuration settings) system configurations:

- Full main chain with/without TIL (light 1..32)
- Reduced main chain with/without TIL (light 1..20 + 31..32)
- TIL without main chain (light 31..32)

Elevated, single inset or double inset lights available for installation.

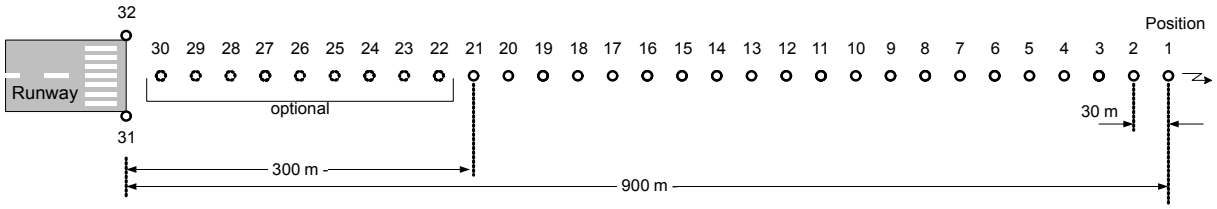
Note

The elevated flashing light is available in two versions:

1. RELIANCE elevated flashing light EL 817D-SFL/TIL, covered in this manual.
2. AXON elevated flashing light, covered in the AXON High-Intensity Elevated Lights user manual (UM-5078) and the ICAO Approach Flash and Runway Threshold Indicator Light datasheet (DS-5126).

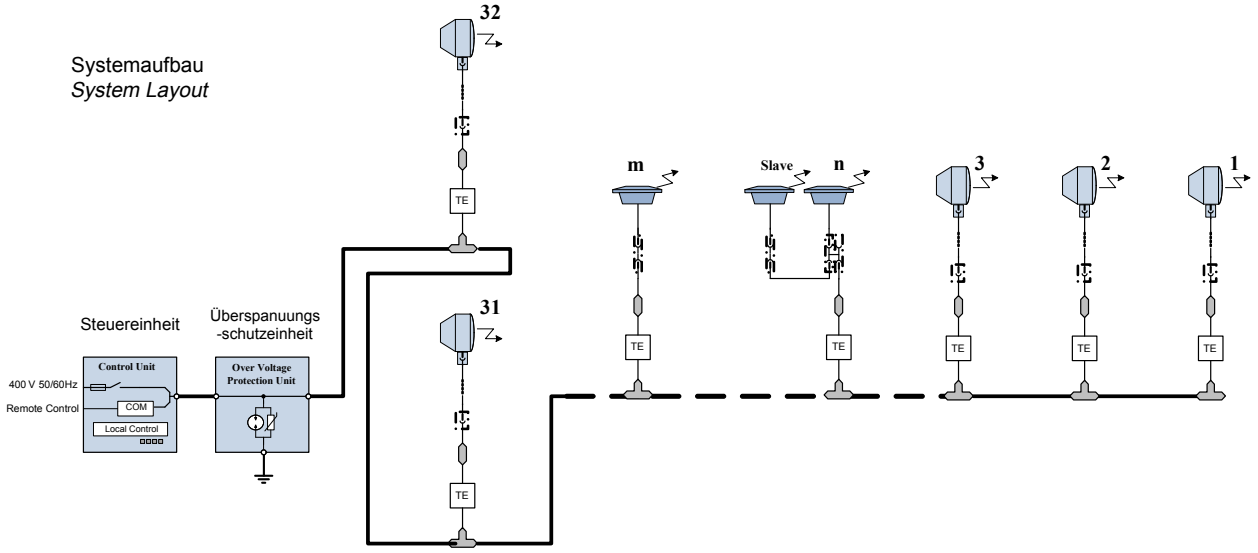
Features and Benefits

- Dynamic system configuration by parameter setting
- Single light monitoring even in standby mode
- Dynamic operation mode in 3 brightness steps (100%, 10% and 3%)
- Flash frequency switchable between 1 or 2 flashes per second
- Optional lights with high intensity
- Service local control at control unit possible
- Comfort control panel for service local control
- lucDMC Service Software
- Over voltage and lighting current protection of power and data lines
- Parallel remote control interface (default)
- 2× Serial remote control interface (redundant) with RS-485 MODBUS / RTU (optional)
- Optional remote control interface with Ethernet MODBUS/TCP or PROFIBUS DP (optional)
- Optional CANBUS interface (proprietary protocol for RELIANCE control system)
- SELV compliant lights
- EMI (Electro-Magnetic Interference) filter to harmonize power fluctuation

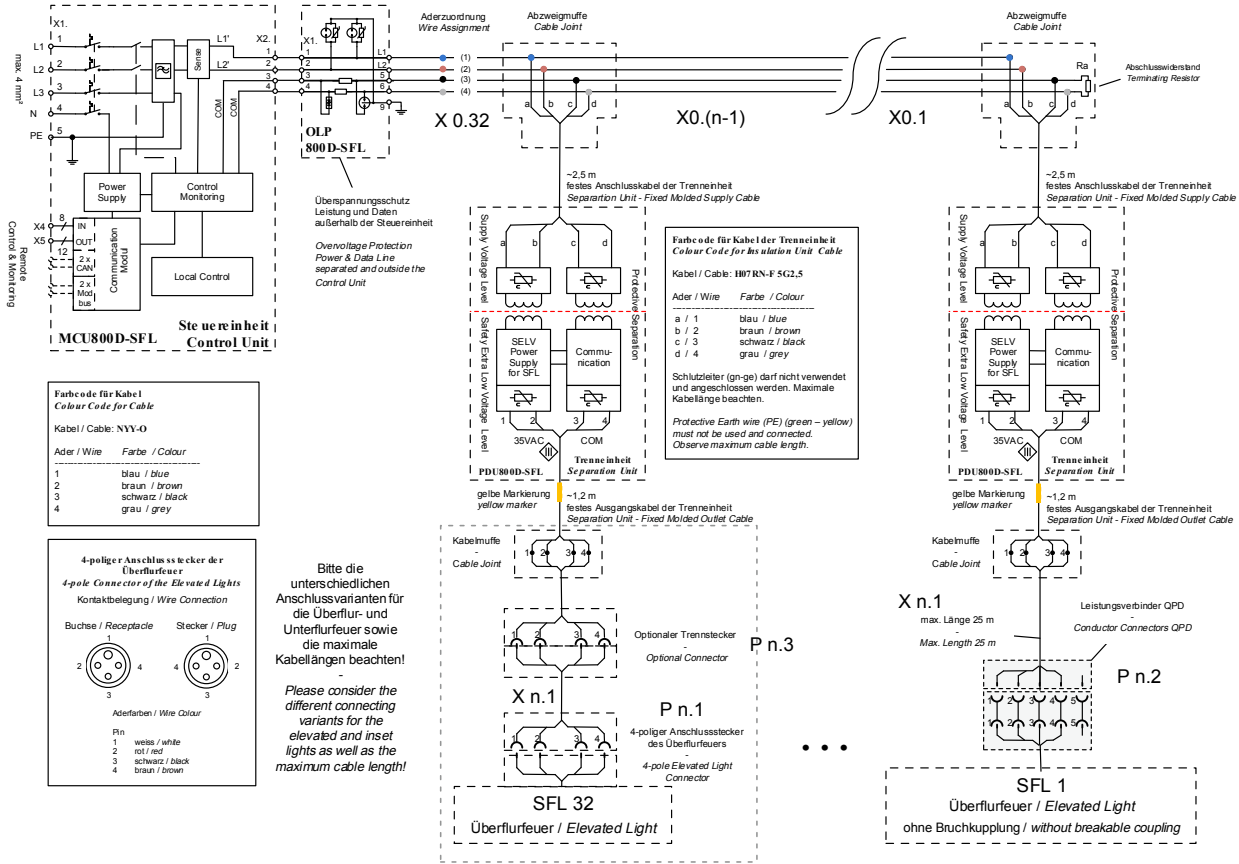


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SFL System Layout



SFL System Detail



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Control Unit (MCU800D-SFL)

Power supply	Power circuit: 400 VAC, 3 Ph., 50/60 Hz
Power consumption	~1.4 kVA, asymmetric load, main load at L1/L2
Fuse	Internal fuse automat 10A fuse characteristic K
Communication interface remote control	1× parallel remote control interface (default) 2× serial remote control interface (redundant) with RS-485 MODBUS / RTU (optional) Optional remote control interface with Ethernet MODBUS/TCP or PROFIBUS DP Optional CANBUS interface (proprietary protocol for RELIANCE control system)
Communication interface comfort local control	I2C
Communication interface service computer	USB
Communication interface flash lights	2-wire power line
Environmental temperature	-25 to +45 °C
Relative humidity, not condensed	10 to 90%
International Protection class	IP 43
Altitude over NN (operation)	-100 to +2,500 m
Housing	Metal housing wall mounted
Dimensions (B × H × D)	600 × 600 × 210 mm
Weight	~22 kg

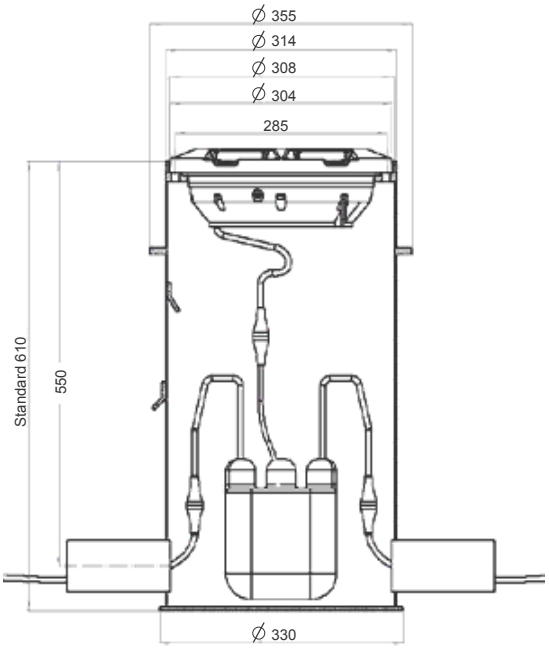
Power Distribution Unit (PDU800D-SFL)

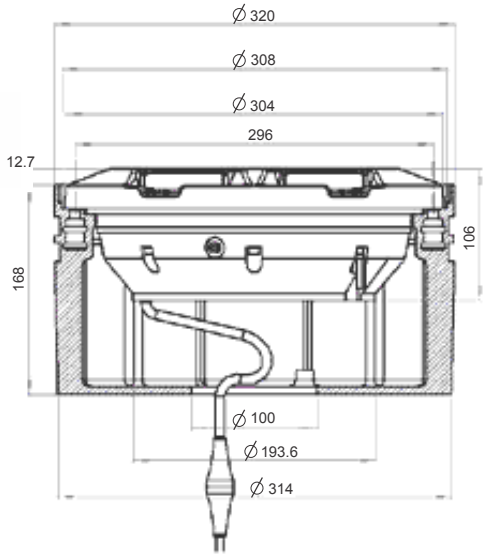
Power circuit	Primary circuit: 400 VAC, 50/60 Hz Primary circuit: 36 VAC (SELV)
Power supply	Control voltage 24 V from the cabinet
Data communication	Primary circuit: Powerline Primary circuit: Powerline (SELV)
Environmental temp.	-40 to +55 °C
Relative humidity, not condensed	10 to 100%
Protection class	IP 68, 1 m immersion depth
Altitude over NN (operation)	-100 to +2,500 m
Housing	Full potted PU housing
Dimensions (D × L)	142 × 192 mm, without cable
Weight	~6.5 kg

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In-Pavement Flashing Light

12″ shallow base and deep base can with transformer shown for complete view only but not part of the flash light. These articles can be ordered separately as accessories.





In-Pavement Flashing Light (SFL or RTIL)

Power supply	36 VAC, 50/60 Hz (SELV)
Max. power consumption	20 VA
Communication interface control unit	2-wire power line (SELV)
Environmental temp.	-25 to +85 °C
Relative humidity, not condensed	10 to 100%
Protection class	IP68
Altitude over NN (operation)	-100 to +2,500 m
Dimensions (W × H × D)	310 × 310 × 190 mm
Weight	6.9 kg
Intensity standard (dimmed)	6' 500 cd eff.
Intensity High	6' 500 cd eff. [1]
Nominal LED life	> 50.000 h

[1]For harmonization of the visual impression the use of double inset flash lights is recommended.

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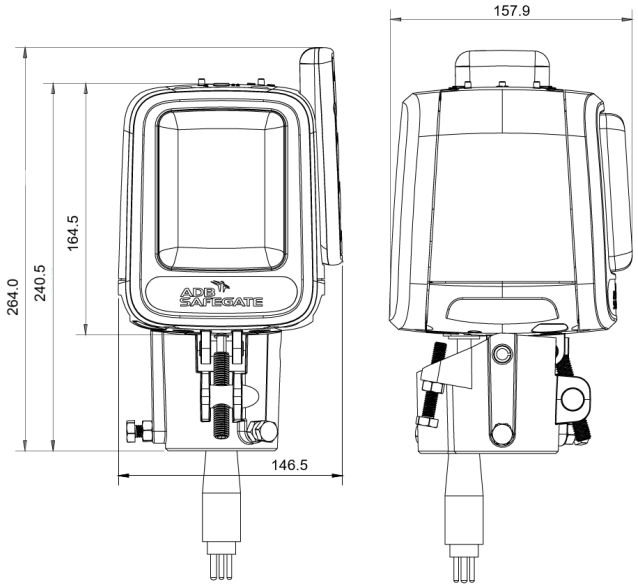
In-Pavement Flasher (IL868D) Ordering Information

Description	Part	Ordering code[1]
Single inset Cold/W+ 1x 2m FAA 5 pole cable	IL868D-SFL/TIL	868.211.1
Double inset Cold/W + 2x 2m 5 pole cable +1x H- Phoenix connector + 1x Phoenix connector	Double Set IL868D-SFL/TIL	868.212.1
Single inset Cold/W - FAA 5 pole plug	IL868D-SFL/TIL	868.200.1
Single inset Cold/W - Phoenix connector	IL868D-SFL/TIL	868.205.1

[1]Supply of required electric and installation parts (joint, T-joint, cabling) is not part of ADB SAFEGATE delivery but responsibility of the installer. For more details refer to manual.

AXON Elevated Flasher

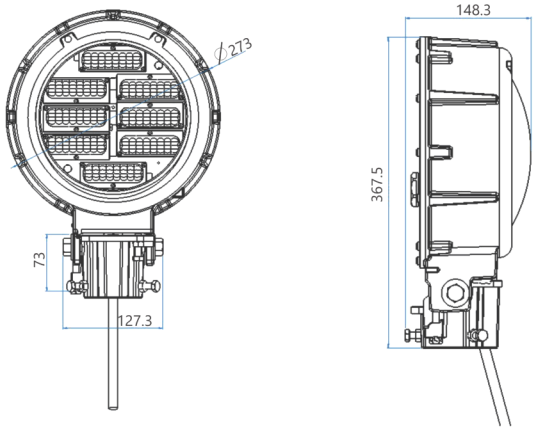
For AXON elevated flashing light information (technical data, ordering codes, installation, addressing, maintenance and spare parts), refer to the AXON High-Intensity Elevated Lights user manual (UM-5078) and the ICAO Approach Flash and Runway Threshold Indicator Light datasheet (DS-5126).



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Reliance Elevated Flasher

Base plate and frangible pedestal are not shown and are not part of the flash light. These articles can be ordered separately.



Reliance Elevated Flashing Light (SFL or RTIL) – Technical Specifications

Power supply	36 VAC, 50/60 Hz (SELV)
Max. Power consumption	20 VA
Communication interface control unit	2-wire power line (SELV)
Environmental temp.	-25 to +85 °C
Relative humidity, not condensed	10 to 100%
Protection class	IP68
Altitude over NN (operation)	-100 to +2,500 m
Dimensions (W × H × D)	300 × 300 × 190 mm
Weight	~7.5 kg
Intensity standard (dimmed)	12' 500 cd eff.
Intensity high	21' 000 cd eff. [1]
Nominal LED life	> 50.000 h

1. For harmonization of the visual impression the use of double inset flash lights is recommended.

Elevated Flashing Light (EL 817D) Ordering Information

Description	Part	Ordering code[1]	Spare part number
Elevated Cold/W - FAA connector + receptacle[2]	EL 817D-SFL/TIL	817.213.5	SP.817.213.5
Elevated Cold/W - Phoenix connector + receptacle	EL 817D-SFL/TIL	817.214.5	SP.817.214.5
Elevated Cold/W - Phoenix connector + receptacle + FAA-lead (connector + receptacle)	EL 817D-SFL/TIL	817.215.5	SP.817.215.5
Elevated Cold/W Sim flash (+ pole)	EL 817D-SFL/TIL	817.216.5	SP.817.216.5
Elevated Cold/W - Phoenix connector (no receptacle)	EL 817D-SFL/TIL	817.203.5	SP.817.203.5
Elevated Cold/W - FAA connector (no receptacle)	EL 817D-SFL/TIL	817.204.5	SP.817.204.5

[1]ADB SAFEGATE does not supply the required electrical components and installation materials, such as joints, T-joints, and cables. The installer is responsible for supplying these items. For more details, see section SFL System Components.

[2]A 300-ohm termination resistor for the data lines is supplied with the MCU. See section Terminating Resistor.

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Control Cabinet and Software Ordering Information

Description	Part	Ordering code
MCU with multiwire interface	MCU 800D-SFL	MCU800D-SFL-20
MCU with CAN bus interface	MCU 800D-SFL	MCU800D-SFL-21
MCU with Modbus interface	MCU 800D-SFL	MCU800D-SFL-22
MCU with single Profibus interface	MCU 800D-SFL	MCU800D-SFL-23
MCU with redundant Profibus interface	MCU 800D-SFL	MCU800D-SFL-24
MCU with single Ethernet interface	MCU 800D-SFL	MCU800D-SFL-25
MCU with redundant Ethernet interface	MCU 800D-SFL	MCU800D-SFL-26
lucDMC + 1 license dongle	lucDMC	P1299
lucDMC + 2 license dongles	lucDMC	P1300
lucDMC + 3 license dongles	lucDMC	P1301
lucDMC + 4 license dongles	lucDMC	P1302
lucDMC + 5 license dongles	lucDMC	P1303
Dongle for inset lights	PSD800D-SFL	P1030
Master PCB	LUC12711410	SP.A3446
COM gateway	LUC12711420	SP.A3447
Power supply unit	MINI-PS-100-240AC/24DC/2	A1608
Mains filter	LUC15710110	SP.A3913

Transformer, Connection, and Mounting Ordering Information

Description	Part	Ordering Code
PDU SELV Isolating Unit	PDU800D-SFL	P864
Optional Overvoltage Protection	OLP800D-SFL	P1006
Optional Remote Monitoring for Data Line Overvoltage Protection	OLP Accessory	A5326
T-Connection Junction Box	JBX800D-SFL	P1029
Phoenix Connector Plug (QPD Nut included)[1]	QPD Plug	300.241
Phoenix Connector Receptacle (QPD Nut included)[1]	QPD Receptacle	300.245
Phoenix Connector H (QPD Nuts not included), Use Nut or Receptacle	QPD H Connector	300.244
Phoenix Dustcap (to seal off unused connections)	QPD Dustcap	300.243
Phoenix Nut (for reusing a Phoenix plug or receptacle)[1]	QPD Nut	300.246
FAA 4 pole Cable Lead Plug - 440 mm	FAA 4 pole Cable Lead Plug	MCMP10CF4U16-0.44
FAA 4-Pole Cable with Style 8 Receptacle - 2000 mm	FAA 4 pole Cable Lead Receptacle	MCMR80CF4U16-2.00
FAA 5-Pole Cable Lead with FAA Style 1 Plug - 300 mm	FAA 5-pole Cable Plug	205.043
FAA 5-Pole Cable with Style 8 Receptacle - 2000 mm	FAA 5-pole Cable Receptacle	205.044
Base Plate, 2"-11.5 NPS	Base Plate	061.607
Frangible Coupling, 2"-11.5 NPS	Pedestal	061.186
Eurobase, Waterproof with O-Ring (O-Ring: 7080.90.650)	Shallow Base	211.319
Optional data line overvoltage protection remote monitoring accessory	Data Line OVP Monitoring	A5326

[1]The QPD Nut is considered a single-use nut and should be replaced when reusing a Phoenix connector.

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3.0 System Description

3.1 Power Supply

The control unit supplies 400 V AC at 50 Hz or 60 Hz to the flash-chain supply cable.

The isolating unit decreases the primary supply voltage to an isolated safety extra-low voltage (SELV) of approximately 36 V AC. The isolating unit protects the system from voltage spikes.

The SELV supply voltage goes directly to the flashing light or through an optional 4-pole connector. A power capacitor unit in the flashing light supplies the energy for each flash.

To prevent a high inrush current, an automatic time delay controls the initial charging of the flashing-light capacitors.

3.2 Light Intensity and Brightness Control

Set the nominal intensity of the elevated flashing lights in the general system configuration to meet flight-operation requirements.

At the default setting, an elevated light has an effective flash intensity of approximately 12,500 cd. This setting supports long service life and extended maintenance intervals. At the high setting, the effective flash intensity is more than 20,000 cd, with a peak intensity of 100,000 cd. The high setting can improve long-range visibility. Before selecting it, make sure it is permitted by airport regulations.

Each inset flashing light has an effective intensity of approximately 6,500 cd. Its smaller optical system cannot provide the same intensity as an elevated light. To achieve approximately the default intensity of an elevated light, install two inset lights in parallel at one light position.

The control system provides three brightness levels: 100%, 10%, and 3% of the selected nominal brightness. Select the desired level using the control system. Dimming reduces the effective brightness by shortening the light pulse while keeping peak brightness constant.

3.3 Control, Communication and Synchronization

The control unit controls and monitors the flashing lights via a half-duplex data link. The link uses a bus system and two reserved conductors in the supply cable. Isolating units decouple the data link from the power supply to the flashing lights, helping prevent faults in a secondary cable from disrupting bus communication.

The control unit uses the data link to configure the light chain, set the flash brightness, and synchronize the flashing sequence. It repeatedly transmits data to help maintain operation during brief communication interruptions. At the start of each sequence, the control unit sends a synchronization signal. If a signal is briefly interrupted, the lights' internal timers help maintain synchronization.

Each flashing light has an address corresponding to its position in the chain. The first light is address 1; the threshold lights are addresses 31 and 32. The control unit uses these addresses to trigger the lights in the specified sequence.

After each flash, the light reports its status to the control unit. The control unit evaluates and displays the status information, then forwards it to the remote control system.

A double-light configuration consists of two inset flashing lights. The first light acts as the master and connects to the power supply and communication bus through an isolating unit. It supplies power to the second light, which acts as the slave. The slave is triggered and monitored in synchronization with the master.

For reliable data transmission, connect the two data lines to a terminating resistor in the cable joint at the end of the cable at light position 1.

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4.0 Operating the Control Unit

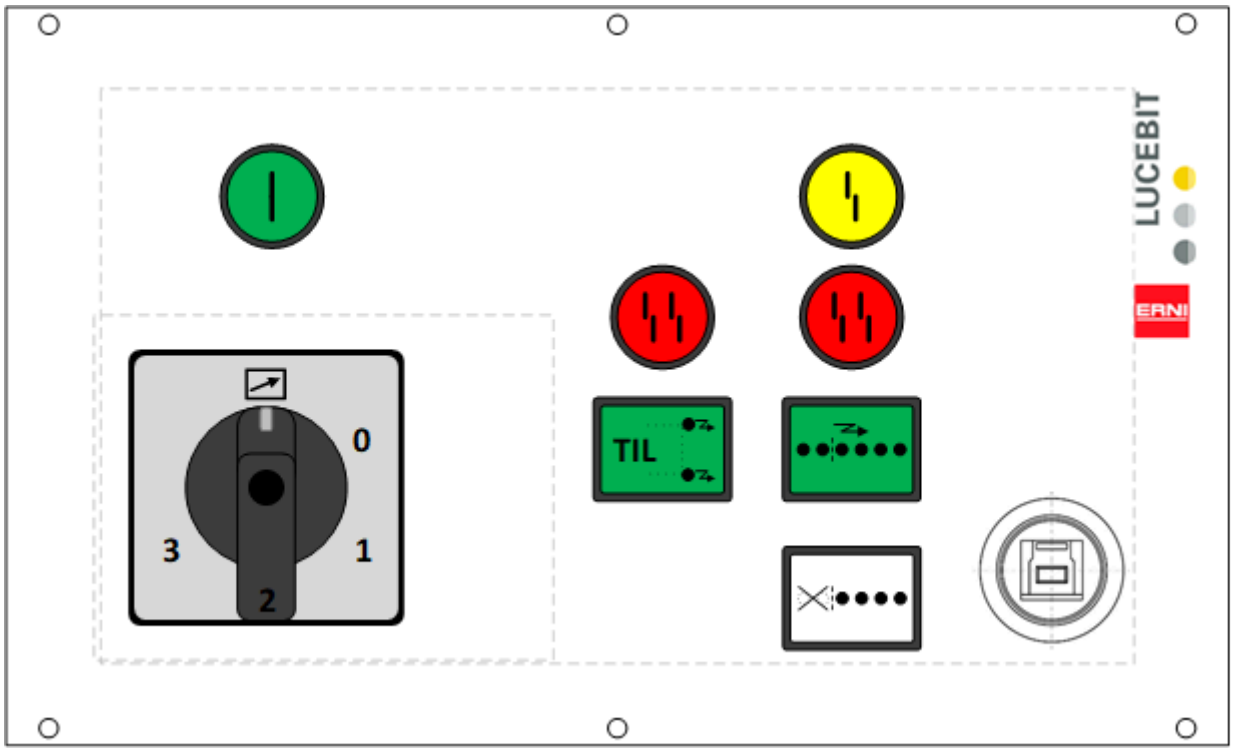
The control unit operates continuously with a remote control system (I&C) connected through a parallel or serial interface. It also includes controls for the system's basic functions.

The standard control unit provides three options for operating the flashing light system:

- Use the control panel in the cabinet door to operate and monitor the basic functions.
- Use an external service computer with the optional lucDMC service software to operate and configure the system.
- Trained maintenance personnel can use the local service control system in the control unit.

Additional or alternative operating options may be available for specific projects. Refer to the project documentation for operating instructions.

4.1 Local Control and Status Displays

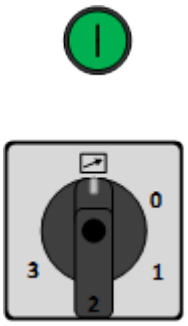
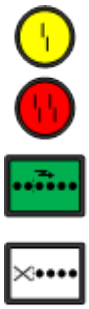


The control unit has a control panel on the front door. Use the panel to operate the basic functions of the flashing light system and view its operating status.

The device configuration may change some control panel functions to meet the requirements of a specific system. If so, refer to the project documentation for instructions. This manual describes the standard functions.

The control panel shown is an example. The layout and design of the controls and displays may vary.

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Elements	Functions
	The indicator light shows that the control unit is ready for operation. The rotary switch settings have the following functions: ▪ **Remote control:** The system follows control signals from the active control interface. ▪ **0:** Switches off the flashing light system. Depending on the system configuration, this setting may not disconnect the system from the power supply. ▪ **1:** Selects the lowest brightness level (3%) for local operation, at the configured flash sequence frequency. ▪ **2:** Selects the medium brightness level (10%) for local operation, at the configured flash sequence frequency. ▪ **3:** Selects the highest brightness level (100%) for local operation, at the configured flash sequence frequency. In settings 0 to 3, the system is disconnected from the remote control system.
	These controls and indicators are for the threshold identification lights. If these lights are not installed, the controls and indicators have no function. ▪ **Fault:** Indicates a fault that has caused the threshold identification lights to switch off automatically. Use lucDMC to identify the faulty light. ▪ **On/off button:** Switches the threshold identification lights on or off at the preselected brightness level.
	Button: The 300 m segment before the threshold has been deactivated/activated. If the segment has not been installed, the button has no function. These controls and indicators are for the flash chain. If the chain has no flashing lights, they have no function. ▪ **Partial fault:** Indicates that at least one flashing light in the chain has a fault. ▪ **Fault:** Indicates that the number of faulty flashing lights has reached or exceeded the preset signaling threshold, LF2. ▪ **On/off button:** Switches the chain on or off at the preselected brightness level. ▪ **300 m segment button:** Activates or deactivates the 300 m segment before the threshold. If this segment is not installed, the button has no function.
	The USB port connects a service computer running the lucDMC service software. Use the supplied adapter cable if required. The port does not support other devices or software. For a detailed description of the lucDMC functions, refer to the section lucDMC service software.

4.2 Internal Service Local Control and Status Displays

The control unit has buttons inside and outside the housing. Field users must use only the external buttons.

The service-mode local controls are on the control module inside the control unit. Only trained service personnel may use these controls. Before you start, read the Safety instructions chapter.



CAUTION

If you open the control unit, follow all applicable safety instructions.
The service-mode local control system isolates the flashing light system from the remote control system. Perform switching operations only after you consult the responsible traffic control authority.

- Do not use the controls inside the housing unless necessary. Use them only for emergency or maintenance work. For normal local control, use the local control panel in the front door or the optional operator control on the control unit.

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Figure 3: Control unit



See Figure 4. The control module has five buttons and one rotary switch for service-mode local control.

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To monitor the flash lighting system, the control module has nine LED displays under the transparent cover.

Figure 4: Service, operator control and display elements at the control module



4.2.1 Functions of the Configuration Buttons

The configuration buttons change the system configuration. Some functions are available only when dynamic configuration is enabled in the system configuration.

The rotary switch selects the configuration to activate. Changes made with the buttons take effect immediately, even while the flashing light system is operating. Before you operate the system, select at least the chain or the TILs.

Button	Function
TIL ON/OFF	Selects whether the TILs operate in the selected configuration.
CHAIN ON/OFF	Selects whether the flash chain installed before the threshold operates. The rotary switch sets the brightness of the lights.
Chain 21/30	Selects either the full chain of 30 flashing lights or the reduced chain of 21 flashing lights. In the 21-light configuration, the lights in the final 300 m before the threshold are switched off. **Note** This button has no function if lights 22 to 30 are not installed.
LED POWER	No function
SEQUENCE 1 Hz/2 Hz	Selects a sequence frequency of 1 or 2 sequences per second. On civil airfields, a sequence frequency of 2 Hz is the standard setting.

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4.2.2 Rotary Switch Positions

Position	Function
9 – REMOTE	Enables the remote control interface. The remote control system can operate the flashing light system.
0 – OFF	Disconnects the flash chain from remote control and switches it off. Depending on the system configuration, the flashing light system may remain energized and in standby. You can cancel a positive switch-off of the threshold identification lights (TILs) only in this position.
1 – STEP 1	Service local mode with 3% brightness.
2 – STEP 2	Service local mode with 10% brightness.
3 – STEP 3	Service local mode with 100% brightness.
4-8	No function. The last defined status is retained. Depending on the direction of rotation involved, this will be **REMOTE** or **STEP 3**. The flashing light system switches off if you connect the control unit supply voltage while the switch is in one of these positions,

4.2.3 LED Displays

Indicator	Color	Meaning
ON	Green	The supply voltage is connected and the system is ready.
ERROR ≥ 1 HEAD	Red	 A short flash indicates that at least one light in the main chain is defective (warning LF1).  A long flash indicates that the second configured failure threshold for the main chain has been reached, or that a fault has been detected in a threshold identification light (TIL).
LOCAL	Yellow	The flash lighting system is disconnected from the remote control.
TIL	Yellow	Steady: The TIL is operating. Flashing: The TIL is selected but not yet switched on (Brightness Step 0).
CHAIN	Yellow	Steady light: The main chain is in operation. Flashing light: The main chain is pre-selected but not operating because the brightness is at Step 0.
SHORT/LONG CHAIN	Yellow	The entire main chain, including the 300 m section before the threshold, is configured.
LED POWER (half / full)	Yellow	If this option is configured, elevated flashing lights can operate at increased brightness.
SEQUENCE	Yellow	Briefly flashes at the start of each sequence. The indicator flashes once or twice per second, according to the selected sequence frequency.

4.3 Optional Easy-to-Use Operator Control

You can connect an optional operator control to the control unit to provide more local control of the LED flashing light system.

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5.0 Installation

Install the RELIANCE Approach Flash System along the extended approach centerline in front of the runway. The system is usually 900 m long, with 30 m between lights. The project drawings specify the actual system length and light spacing.

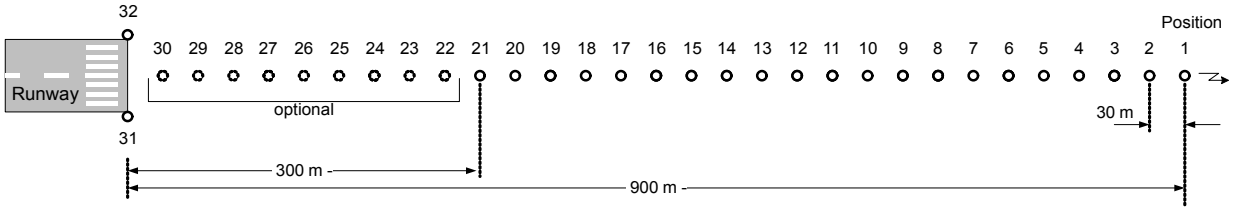
The approach centerline is already occupied by the standard approach lights. Install the flashing lights directly beside the approach lights. Do not offset lights within the main chain.

Install the two threshold identification lights (TILs, lights 31 and 32) outside the green threshold lights. To reduce glare, lights 22 to 30 are often omitted from the 300 m section before the threshold.

Fit elevated lights installed on the ground or on short masts within this 300 m section with mechanical and electrical frangible couplings. Refer to the project drawings for the installation details.

Supply power to the flashing light system from a lighting station through a supply cable. The cable is usually routed from the station, via the threshold, to the first light. You can select the positions of TILs 31 and 32. Their order may also depend on the cable route.

Figure 5: SFL system layout



5.1 SFL System Components

The quantities relate to a full chain with 32 flashing lights. The figure in brackets is for a reduced flash chain with 23 lights.

The material list does not contain any of the customary small installation material (e.g. self-bonding insulating tape for securing exposed plug-connectors). The cable joints must be selected to suit the cables being used and the installation options involved. The joints must be suitable for use outdoors.

Standard cables (see also system planning documents for details)

For cable lengths used and any cable types altered, please consult the project documents.

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Figure 6: SFL System Component Layout

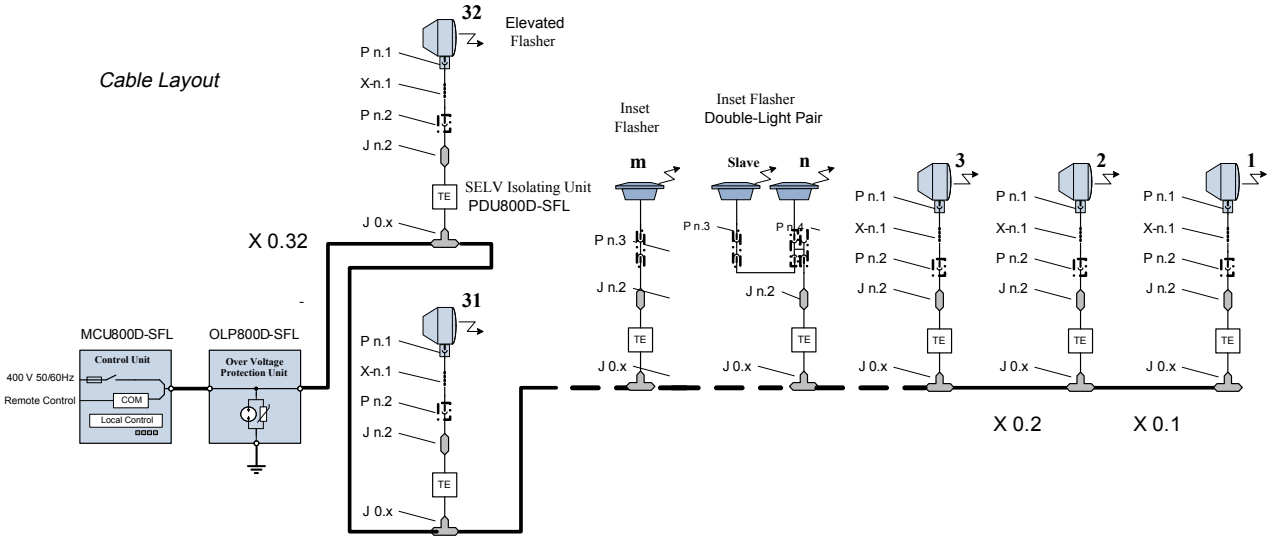


Table 1: System components

Position	Quantity	Designation	Type	Remarks
–	1	Control unit	MCU800D-SFL	Supplies and monitors the system.
TE	32 (23)	Isolating unit	PDU800D-SFL	Isolates the light and provides overvoltage protection.
OLP	1	Overvoltage protection unit	OLP800D-SFL	Provides overvoltage protection for power and data cables that enter the field.
J0.x	32 (23)	Branch joint		Matched to the supply cable used onto H07RN-F 5G2.5 branch
–	32 (23)	Straight joint		Suitable for H07RN-F 5G2.5.
Pn.1	1 to 32 (1 to 23)	Light connecting cable for elevated lights with a frangible coupling	04-95MR8J-x.x (x.x is the required length in meters)[1]	4-pole FAA Style 8 receptacle Thomas & Betts Limited 120 Nashdene Road Scarborough, ON Canada M1V 2W3
Pn.2		Cable connector for an elevated light without a frangible coupling	Cable connector QPD C 4PE2.5 2X9-16 BK – 1403836	Supplied with the light. Phoenix Contact
Pn.3	Optional Quantity as required	Intermediate plug connector in the light connecting cable. The connector consists of a plug connector and a receptacle.	Receptacle: 04-95MR7J-x.x Plug connector: 04-95MPJ-x.x (x.x is the required length in metres)[1] Cable sleeve, if required, corresponding to Jn.1 (see remark).	4-pole plug connector and receptacle Thomas & Betts Limited
	Or	Cable connector for an extended connection line	Cable connector QPD C 4PE2.5 2X9-16 BK – 1403836	

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Table 1: System components

Position	Quantity	Designation	Type	Remarks
Pn.4	As required	Coupling for an inset light	5-pole cast connector	Supplied with the inset flashing light.
Pn.5	As required	Cable connector for connecting a pair of inset lights as a double light	1 × H-distributor: QPD H 4PE2.5 4X9-16 BK – 1406369 1 × guard cap: QPD QSK BK 5X2.5 FS – 1404525	Supplied with the double inset flashing light set.

[1]The total cable length between the isolating unit and the light must not exceed 25 m. Include all cable sections in this length.

Table 2: Cable components

Cable segment	Section	Type	Remark
X 0.32	Station to threshold	NYY-O 4 x 4 RE	This cable has the minimum conductor cross-sectional area for a feed cable up to 1000 m long between the control unit and the threshold light. For longer cable runs, use a cable with a larger conductor cross-sectional area.
X 0.1 to X 0.n	Cable sections between lights	NYY-O 4 x 2.5 RE	This cable has the minimum conductor cross-sectional area for standard direct cable routing. For longer cable runs, use a cable with a larger conductor cross-sectional area.
X n.1	Connection between the isolating unit and the flashing light	H07RN-F 5G2.5	Protective conductor is not used! Do not exceed a maximum cable length of 25 m.
X n.2	Connection between the master and slave inset flashing lights	H07RN-F 7G1.5	Superfluous conductors and protective conductors are not used! Do not exceed a maximum cable length of 3 m.

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Figure 7: Cable Layout and System Detail – Elevated lights

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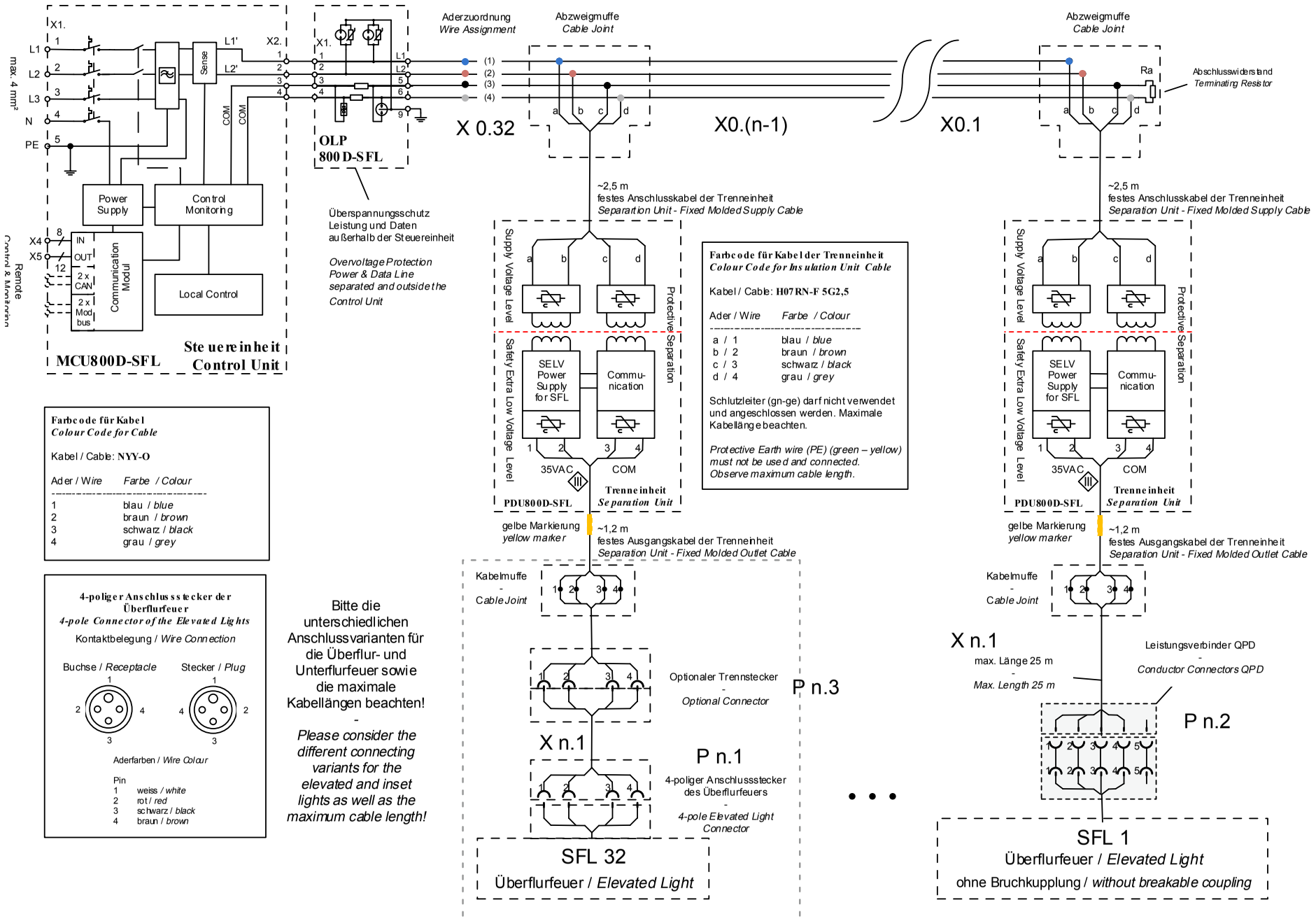
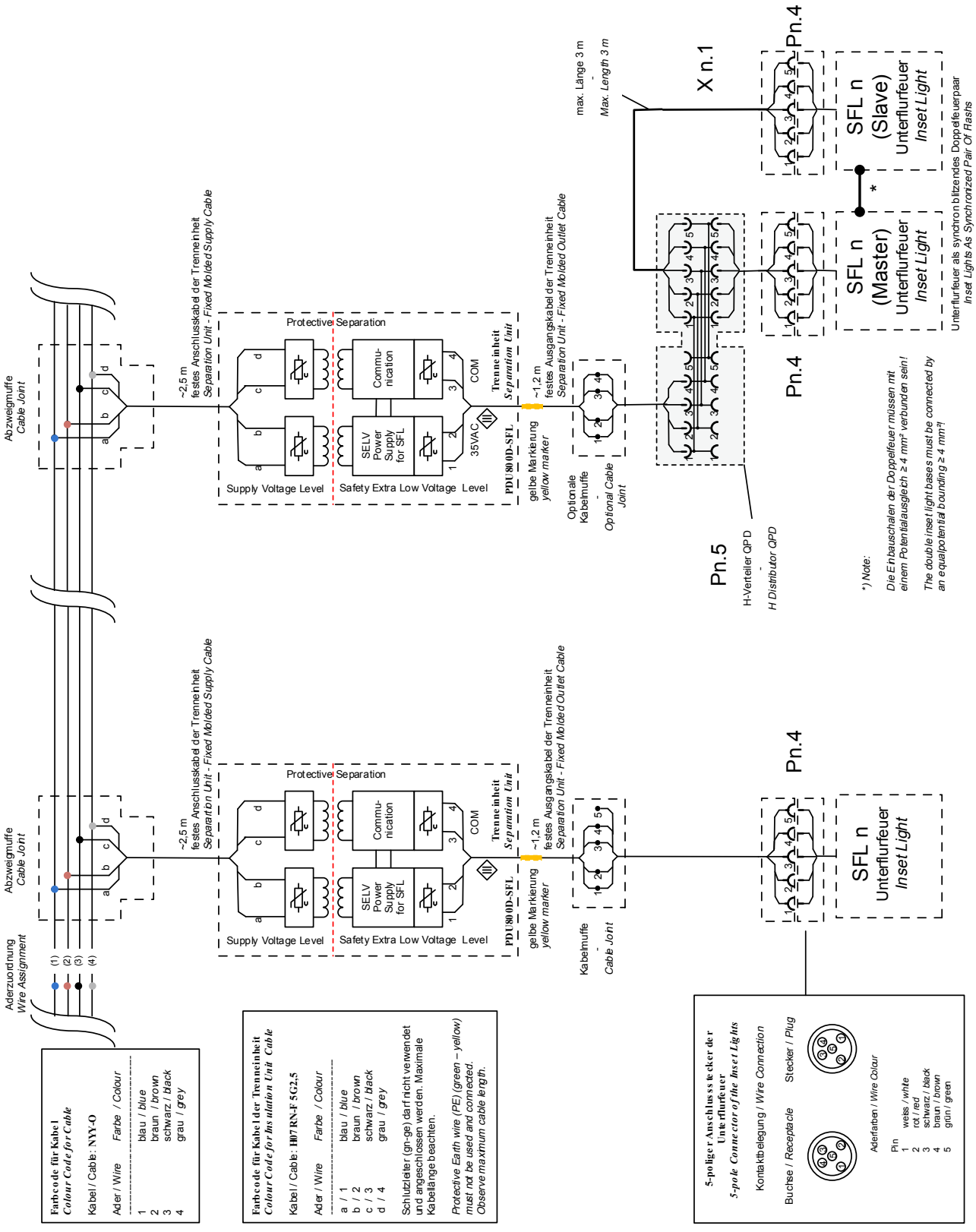


Figure 8: Cable Layout and System Detail – Inset Lights (Single and Double)



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5.2 Special Connecting Cables for Inset Flashing Lights

Inset flashing lights can be supplied with project-specific cables and plug connectors. Refer to the project documentation for the cable assignments and types.

You may need special programming adapters for these plug connectors. Use and operate the adapters as described in this manual.

5.3 Control Unit MCU800D-SFL

This section describes how to connect power to the control unit. For information about connecting the remote control system, see Remote control.

5.3.1 Power Supply

Terminal Block X1

Terminal	Conductor cross-sectional area	Signal	Signal level
1	1.5–4 mm²	Phase L1	400/230 V AC
2	1.5–4 mm²	Phase L2	400/230 V AC
3	1.5–4 mm²	Phase L3	400/230 V AC
4	1.5–4 mm²	Neutral (N)	—
5	1.5–4 mm²	Protective conductor	—

5.3.2 Power Supply to the Flashing Light Chain

Terminal Block X2

Terminal	Conductor cross-sectional area	Signal	Signal level	Supply cable number and color
1	2.5–6 mm²	Power L1′	400 V AC	1 / blue
2	2.5–6 mm²	Power L2′	400 V AC	2 / brown
3	2.5–6 mm²	Communication (COM)	Data level: ~ 2.5 V	3 / black
4	2.5–6 mm²	Communication (COM)	Data level: ~ 2.5 V	4 / grey

5.4 Overvoltage Protection Unit OLP800D-SF

To protect the system from external overvoltages, install surge arresters on the power and data cables. The OLP800D-SFL overvoltage protection unit includes surge protection for both cable types.

Install the OLP unit outside the control unit, as close as possible to the building cable inlet. Keep the grounding connection as short as possible. Connect it to the building ground point and route it away from the protected sections of the power and other cables.

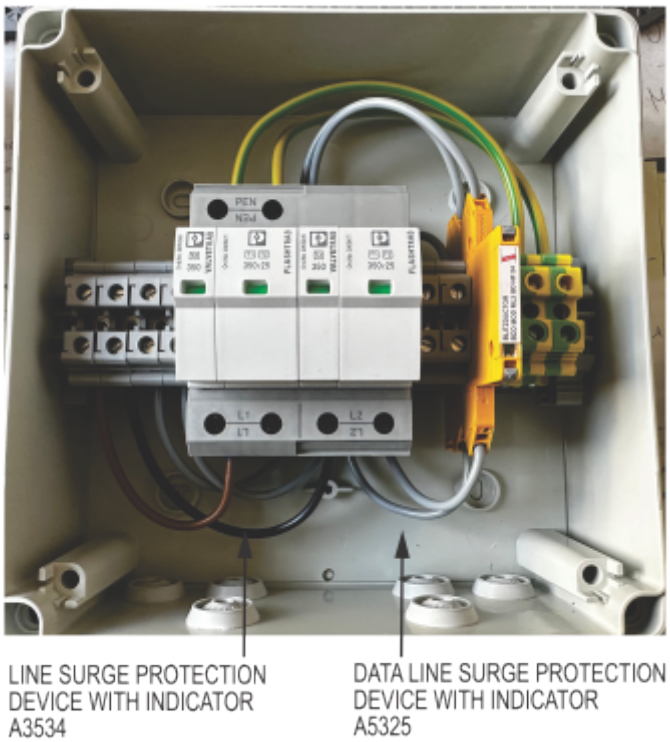
The installation location depends on the system. See the project drawings.

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Figure 9: OLP unit

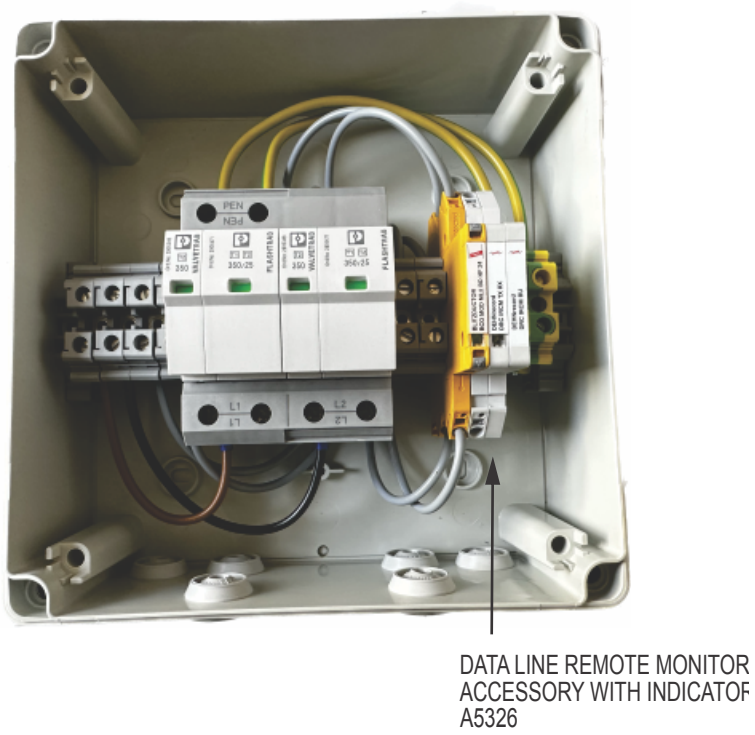


Figure 10: OLP unit surge protection devices



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Figure 11: OLP unit with optional data-line monitoring accessory



The supply cables (2.5 mm² to 10 mm²) are connected to the overvoltage protection unit as follows:

Terminal X1.	Input/output	Signal	Signal level	Wire number / Color of the supply cable
1	Input	Power Phase 1 from the control unit	400 V AC	1 / blue
2	Input	Power Phase 2 from the control unit	400 V AC	2 / brown
3	Input	Data cable from the control unit	~2.5 V AC	3 / black
4	Input	Data cable from the control unit	~2.5 V AC	4 / grey
L1	Output	Power Phase 1 supply output	400 V AC	1 / blue
L2	Output	Power Phase 2 supply output	400 V AC	2 / brown
5	Output	Data output to the field	~2.5 V AC	3 / black
6	Output	Data output to the field	~2.5 V AC	4 / grey
9 (Ground)		Discharge against building's ground potential (at least 10 mm²)	-	Separate cable

5.5 Terminating Resistor

A terminating resistor is included in the circuit for the two data lines. It prevents signal reflections at the end of the cable. The resistor is installed between the two data lines in the connection joint at the first light position, at the end of the cable.

Before the resistor is connected, its wires must be covered with insulating sleeves, and plug-in cable lugs must be fitted to the wire ends. A sufficient distance from the two supply lines must be maintained.

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Figure 12: Terminating resistor

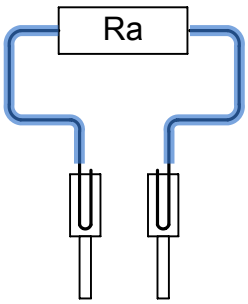


Table 3: Material for the terminating resistor

Quantity	Description	Type / size	Vendor
1	Carbon-film resistor	300 ohm, 0.5 W	**NOTICE** To prevent inductive effects, do not use metal-film or wire-wound resistors. The required resistance value depends on the cable type and may need to be adjusted. Follow the project drawings. See also the system planning documents.
2	Plug-in cable lugs	1.5 mm^2	
As required	Heat-shrink sleeve for the resistor connections		

5.6 Addressing of Flashing Lights

For operation, each flashing light must have a fixed address. The address corresponds to the light's position in the chain. Address 1 is assigned to the first light, and addresses 31 and 32 are assigned to the two threshold identification lights (TILs). The address determines the flash order in the sequence.

The two TILs are triggered simultaneously at the end of the sequence. They mark the runway threshold.

Because of site constraints, flashing lights may not be installed at some positions. The 300 m section before the threshold may also not be installed. Positions that are not installed must still be counted when addresses are assigned. This preserves the visual effect of the lights moving toward the runway.

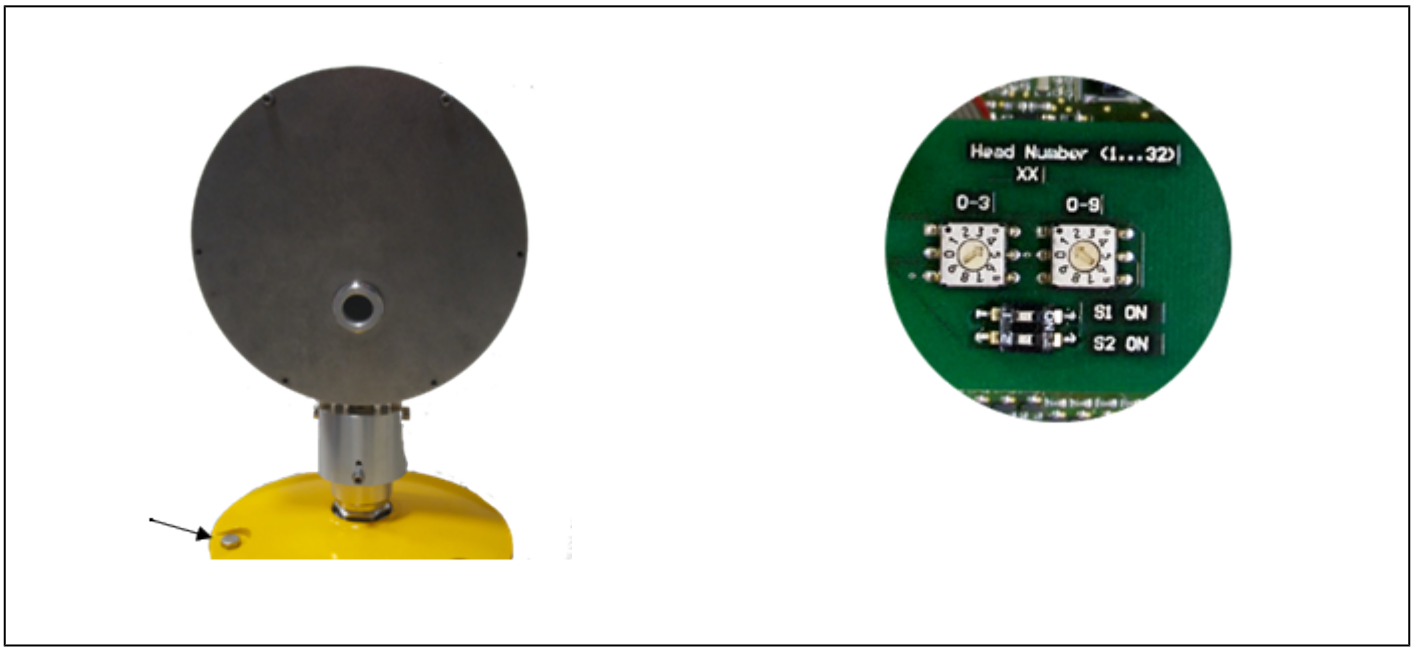
5.6.1 Addressing the RELIANCE EL 817D-SFL/TIL Elevated Flashing Lights

On an elevated flashing light, the address setting is behind a screw connection on the rear of the housing.

Note
The AXON elevated flashing light is addressed without opening the fixture by using the RFID AXON Flasher Programming Tool. The tool supports addresses 1 to 32. For instructions, see "RFID AXON Flasher Programming Tool" in the "Installation" chapter of UM-5078.

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Table 4: Rear view of an elevated flashing light showing the address switches



Set the position number (address) on rotary switches S1 and S2 as a two-digit decimal number (01 to 32). Addresses above 32 can activate the special functions listed below.

Table 5: S1 and S2 switches

Switch	Setting	Function
S1	**OFF**	The light electronics are configured for an elevated light. This is the standard setting.
	ON	Reserved for inset-light operation. Do not use this setting.
S2	**OFF**	The internal delayed synchronization briefly compensates for synchronization loss on the communication cable. This is the standard setting.
	ON	Synchronization loss is not compensated for. Use this setting when an external trigger input is used.

Table 6: Special addresses for test mode

Address	Function
33	No function
34	Test mode at 3 % standard brightness
35	Test mode at 10 % standard brightness
36	Test mode at 100 % standard brightness
37	Test mode at 3 % high brightness
38	Test mode at 10 % high brightness
39	Test mode at 100 % high brightness
40 to 99	No function

5.6.2 Addressing and Parameterization of Inset Lights

The light to be parameterized is connected directly to the parameterizing unit with the adapter cable (see Connection A below). The parameterizing unit supplies power to the light electronics for data transmission and parameter storage. Before the adapter cable is used for the first time, each inset light must be configured as a single flashing light, a master, or a slave. The factory setting is slave. A valid address must also be assigned to each single light and master.

If the inset flashing lights are installed as a double-light pair, the parameterizing unit can be used in the field to test the pair. Connect the parameterizing unit to the free connection on the H-connector with the appropriate adapter cable (see Connection B below). With this connection, the flash chain supplies power to the lights. A function test can be performed, some light parameters can be adjusted, and the communication status between the master and slave lights can be viewed.

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The parameterizing adapter is supplied with power through the USB interface or the 12–24 V DC auxiliary power socket. If project-specific light connecting cables are used, the supplied adapter cables must be selected to match. If different light connecting cables are used for a specific project, the adapter cables supplied must be used appropriately.

Table 7: Connecting an inset light to the parameterizing adapter

Connection A	Connection B
Basic parameterization of a de-energized inset flashing light	Functional test and limited parameterization of a pair of inset flashing lights connected to an active power line
Adapter cable connected directly to the inset light	Adapter cable connected to the H-connector of the inset-light pair

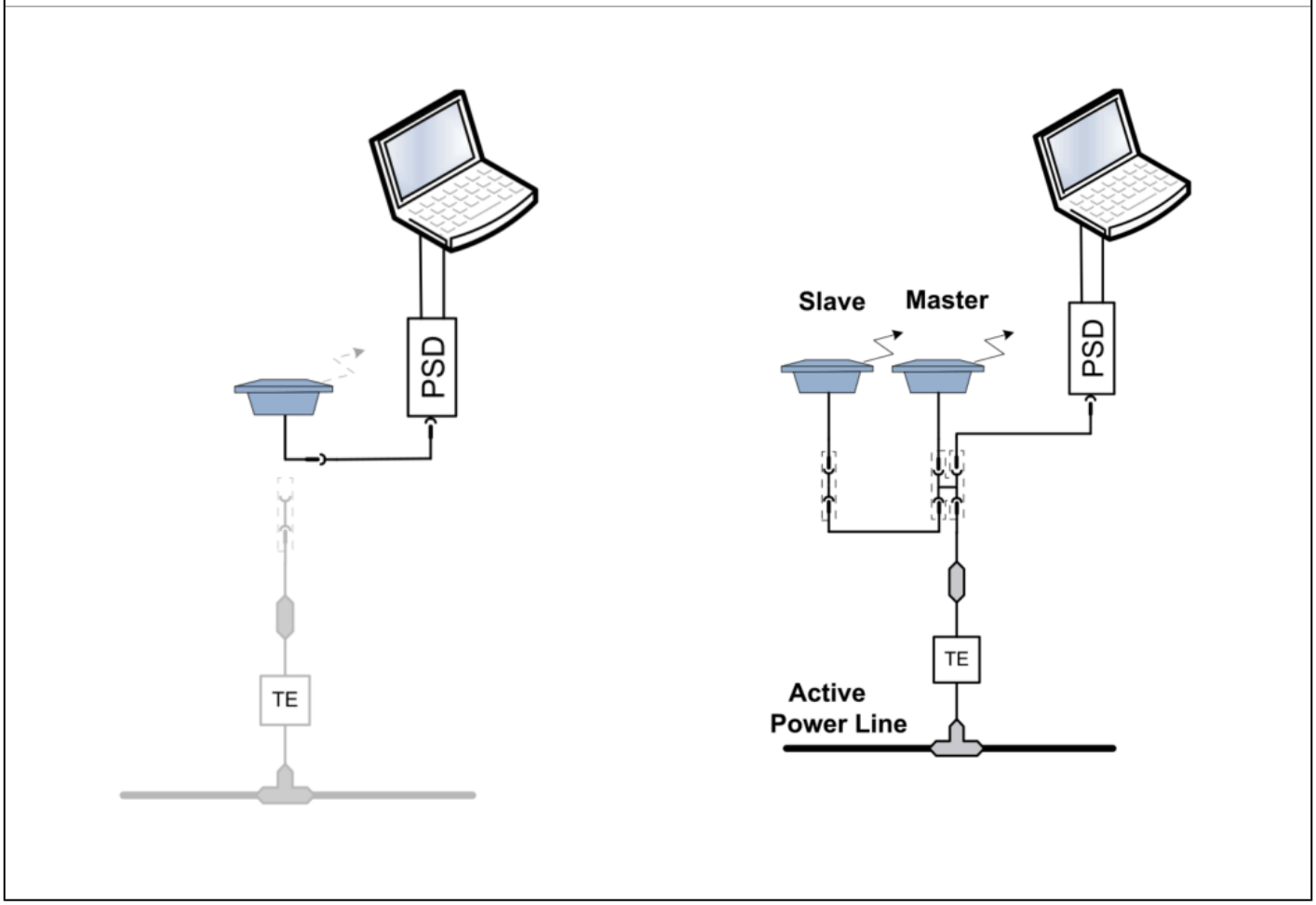


Figure 13: Parameterizing adapter for setting an inset flashing light



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Figure 14: Connections on the parameterizing adapter for the inset light, service computer, and optional auxiliary power supply via the USB interface or DC input socket

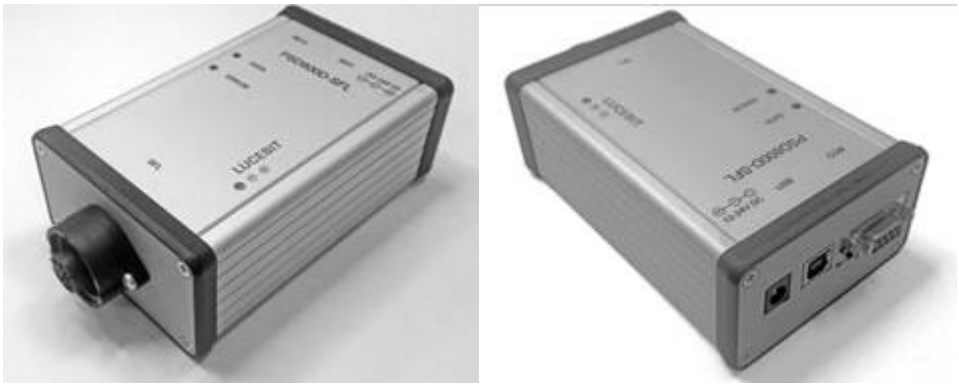
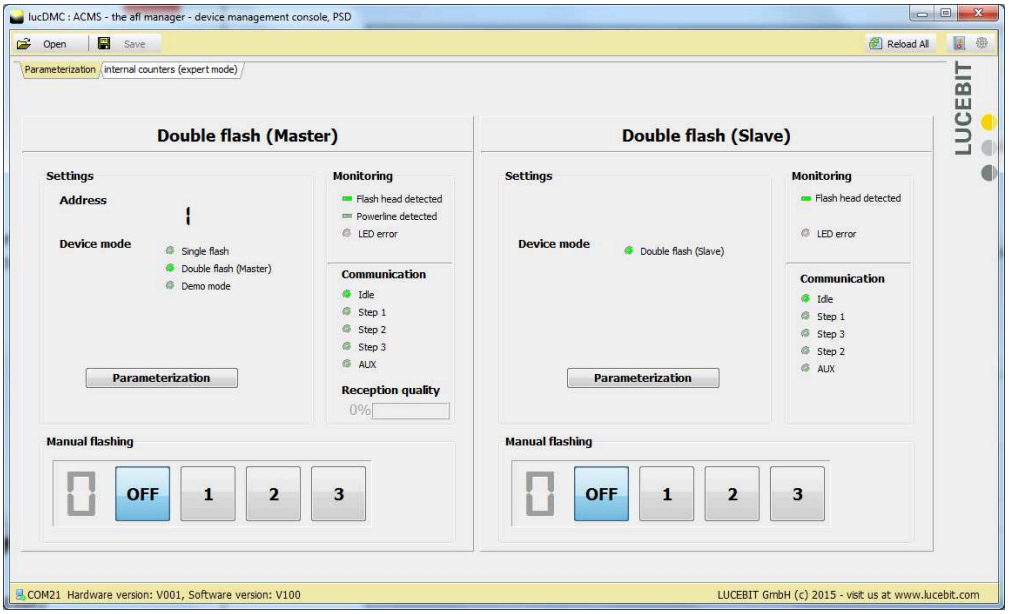


Figure 15: Adapter cable for a single light and a double light (via H-connector)



After the service computer is connected, the main menu for monitoring and parameterizing the flashing light is displayed automatically in the lucDMC service software.

Figure 16: Main menu of the light configuration display

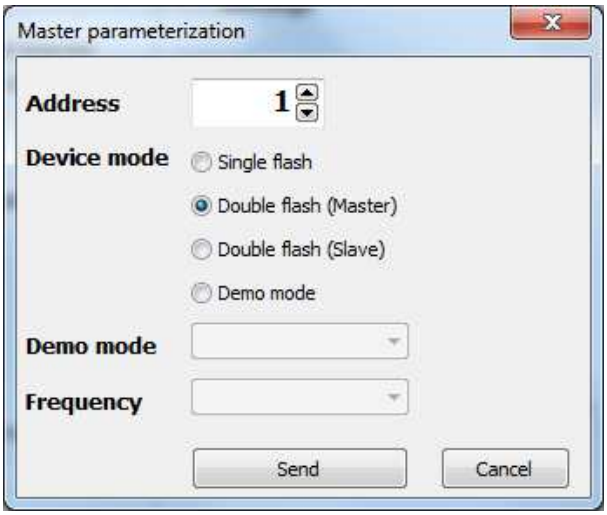


In the display, the ongoing operating parameters for the master light and the slave light are shown. The slave light is provided only in the case of a double-light inset light installation. When the light has been installed as a single light, the data will be displayed under **Master**.

For changes to the configuration, an entry window is opened using the Parameterization-switch.

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Figure 17: Window for setting the light's parameters



As with the elevated light, the address corresponds in the light's installation position in the chain.

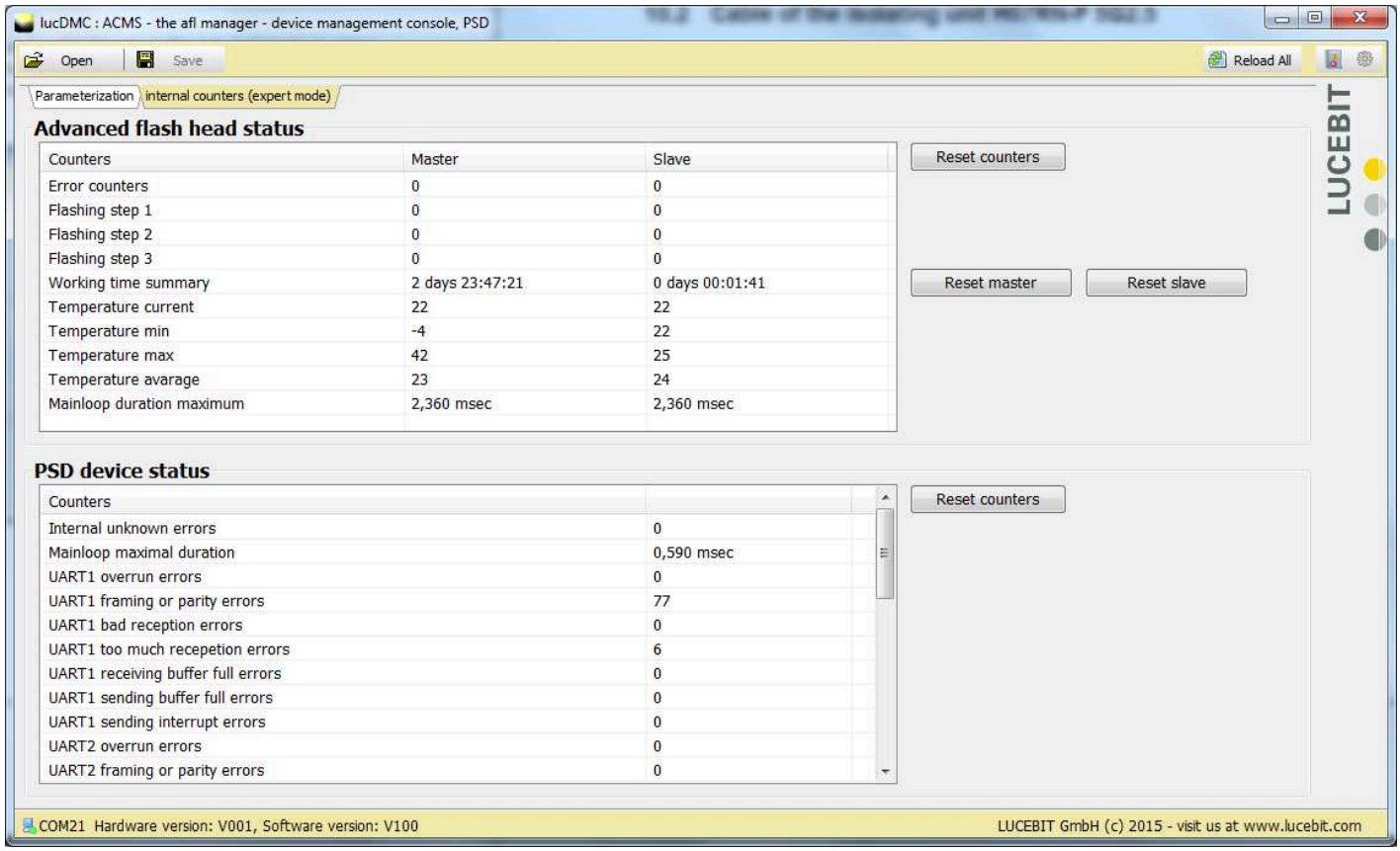
You can set the operating mode you want in the **Device mode** setting.

Mode	Function
Single flashing light	The inset light is operated as a single light at the defined address.
Double flashing light (master)	The inset light is operated as master of a double light pair at the defined address.
Double flashing light (slave)	The inset light is connected t a “master light” as a “slave” in a double light pair. The slave light does not need an address of its own: it automatically accepts the address of the master light.
Demo mode	This setting enables the light to be operated with the parameters set as a “self-running” system even without a control unit.
Send	The settings are transferred to the light.
Abort	The configuration routine is aborted.

For extended monitoring of the light, the internal counters can be displayed in the **Internal counters (expert mode)** tab. These data in *Expert mode* do not necessarily correspond to physical variables. They enable the service personnel to perform an extended analysis of the system and device functions.

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Figure 18: Menu – Internal counters (expert mode)



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6.0 Color coding of the cables and contact assignments of the light connecting cables

As an aid to installation, the standard conductor colors are listed with their assignments to the conductor numbers listed for the cables recommended.

6.1 Main supply cable NYY-O

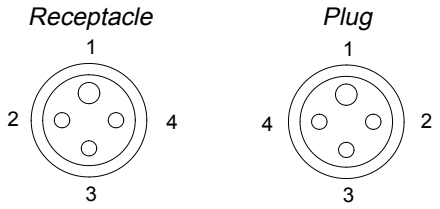
Wire	Color
1	blue
2	brown
3	black
4	gray

6.2 Cable of the isolating unit H07RN-F 5G2.5

Wire	Color
a / 1	blue
b / 2	brown
c / 3	black
d / 4	gray
PE *must not be used or connected*	green-yellow

6.3 4-Pole FAA Connector Pin Configuration for Elevated Light

Figure 19: 4-Pole FAA Connector Pin Configuration



Pin	Color
1	White
2	Red
3	Black
4	Brown

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7.0 Remote control

The SFL system has been designed to be operated with a remote control system and remote monitoring.

For simple link-up to any remote control system, a parallel interface is provided with 24 VDC inputs and outputs to the industrial standard. At the adapter terminal, the signal voltages and reference points are available for each input and output. The interface can accordingly be operated using potential-isolated contacts or equivalent digital interfaces without additional external voltage sources.

For integration of the flash lighting system into the ADB SAFEGATE remote control system, 2 redundant CAN-Bus interfaces are provided.

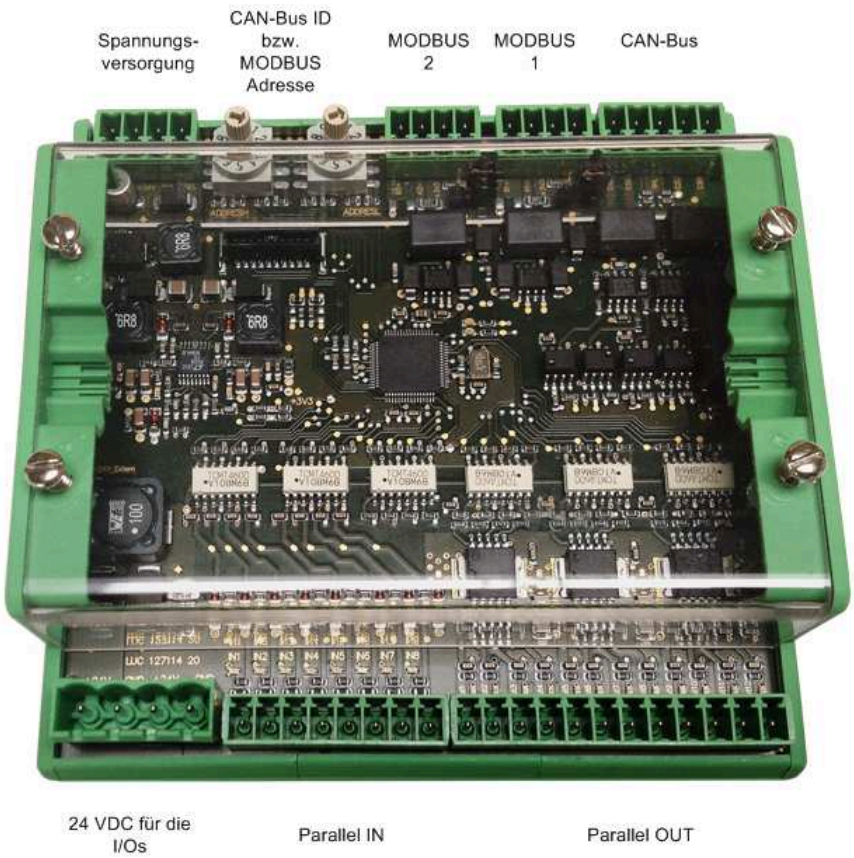
For serial integration of the SFL into a different remote control system, additional communication modules (GCI) are available as an optional extra, with the following redundant serial interfaces:

- RS-485 (EIA-485) MODBUS / RTU, RCOM, RCOMplus (default)
- ETHERNET MODBUS / TCP (optional)
- PROFIBUS DP (optional)
- CANBUS (optional)

The functions and terminal assignments of the communication modules optionally used are dealt with in a separate description.

The basic configuration of the flash lighting system, interface assignments and functions can be altered using the lucDMC service software package. The descriptions in this manual relate to the standard factory settings. If the configuration has been altered, the changes concerned have to be taken into due account. The ongoing configuration can be read out at any time with the aid of the service software package.

Figure 20: Communication module for parallel, CAN-Bus and RS485-MODBUS interfaces



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7.1 Parallel interface

7.1.1 Inputs of the parallel control interface

In the control unit, the inputs and outputs of the communication module are connected to two-tier terminals for linking up the parallel interface. The upper level (a) provides the control voltage for the lower input level. This means the control system can be implemented using potential-isolated contacts or equivalent digital interfaces without an external control voltage source.

Signal definition: ON = + 24 VDC; OFF = no signal

Terminal Block X4

Terminal (Level b)	Designation	Signal	Art
1	Step 1	Brightness preselection Step 1 (3%)	IN +24 V DC
2	Step 2	Brightness preselection Step 2 (10%)	IN +24 V DC
3	Step 3	Brightness preselection Step 3 (100%)	IN +24 V DC
4	TIL	Threshold identification lights switched on	IN +24 V DC
5	CHAIN	Flash chain switched on before the threshold. The basic configuration of the system determines whether the 300 m segment before the threshold is activated as well.	IN +24 V DC
6	Input AUX 1	Configurable control input. For the function assignments of this input, please note the configuration of the system and the project documents. When the external trigger is being used, this input is used as standard for enabling the trigger function. Enable for the external trigger. If the signal is active, the flash chain will wait for the external trigger signal before starting a one-off sequence. If the signal is switched off, the flashing light will run steadily without external synchronization.	IN +24 V DC
7	Input AUX 2	Configurable control input. For the function assignments of this input, please consult the system configuration and the project documents.	IN +24 V DC
8	EXECUTE	Validity signal for accepting the control signals. Acceptance with rising edge with a pulse duration of not less than 10 ms.	IN +24 V DC

7.1.2 Logic of the control system

Signals at the parallel input are not accepted until the rising edge of the EXECUTE signal arrives.

Without an acceptance signal, the most recent control commands remain saved internally. This likewise applies in the case of invalid control signal combinations, which also assures uninterrupted operation of the flash lighting system if the remote control system fails.

For fault-free control, the following signals are required:

- Brightness step (1 out of 3; in the case of multiple assignments, the highest step is valid)
- Preselection signal for the threshold identification lights (TILs), if stipulated
- Preselection signal for the flash chain before the threshold, if stipulated
- Acceptance signal after setting the control commands to at least 10 ms

Standby mode

As special functions, the flash chain incorporates a *standby mode* for monitoring communication and supply.

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The operating mode must be set in the system configuration, and is then set automatically instead of a system switch-off (no brightness step selected).

In standby mode, the system is in full operational readiness, and the power capacitors of the flashing lights are charged. Data communication runs as normal, and the lights provide periodic feedback of their operational readiness. No flash, however, is emitted via the LEDs.

Standby mode thus permits

- full function monitoring of the control system without impairing flight operations
- immediate functional readiness when switching over to active mode
  - no “ramp-up” of the control system
  - no loading time-delays for making current limitation
  - no charging time-delays for making current limitation
- In standby mode, the supply cable and the communication function remain activated in readiness mode even in the “switched-off” status of the flash chain.
- The flash lighting system cannot be safely de-energized via the service control system or via the remote control system!

7.1.3 Signal outputs of the parallel control interface

For connection to the parallel interface, two-tier terminals are provided in the control unit. The upper level (a) provides the ground reference for the status signals of the lower signal level.

Signal definition: ON = + 24 VDC; OFF = no signal;

Error messages (FAULT STATUS) are for safety reasons provided as closed-circuit-current signals (ON = no fault).

Maxi Maximum loading on the signal outputs

< 2 A per signal output

- < 2 A maximum total over all signal outputs

Table 8: Terminal block X5

Terminal	Designation	Signal	Art
1	Step 1	Brightness Step 1 (3%) is switched on.	Out +24 V DC
2	Step 2	Brightness Step 2 (10%) is switched on.	Out +24 V DC
3	Step 3	Brightness Step 3 (100%) is switched on.	Out +24 V DC
4	TIL	Threshold identification lights are switched on.	Out +24 V DC
5	CHAIN	Flash chain before the threshold is switched on.	Out +24 V DC
6	LOCAL	The flash lighting system has been disconnected from the remote control system by the service control system.	Out +24 V DC
7	TIL FAULT STATUS	ON: TIL is working faultlessly OFF: At least one of the threshold identification lights (TILs) has been detected as faulty and the threshold identification lights have been positively switched off.	Out +24 V DC
8	LF1 FAULT STATUS	ON: no lamp fault in the chain OFF: WARNING; a flashing light in the chain before the threshold has been detected as faulty.	Out +24 V DC
9	LF2 FAULT STATUS	ON: LF2 threshold not reached OFF: ALARM; the configured signaling threshold LF2 of the faulty flashing lights in the main chain has been reached.	Out +24 V DC
10	Output AUX 3	Configurable signal output For the functional assignments of this output, please note the configuration of the system and the project documents. If the external trigger is being used, this output is as standard used for signaling “The external trigger has been enabled”.	Out +24 V DC

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Table 8: Terminal block X5

Terminal	Designation	Signal	Art
11	Output AUX 4	Configurable signal output	Out +24 V DC
12	Operational readiness	Flash lighting system is ready for operation	Out +24 V DC

7.2 Optional CAN-Bus interface

The CAN-Bus is used only for connection to the ADB SAFEGATE remote control system. Consult the project drawings to see whether the interface has been activated and has been wired to the output terminal area of the control unit.

7.3 Optional serial RS485 interfaces

Two serial RS485 interfaces are available for connecting the remote control system. MODBUS / RTU, RCOM or RCOMplus are available as protocols.

As an option, the interfaces can be connected to an adapter terminal of the control unit.

A detailed description of the interfaces with data definitions is available on request.

1. Serial interface; RS-485 (EIA-485)
   For terminal block designation, see project drawing

Terminal	Designation	Signal	Art
1	B+	RX/TX Data +	Data
2	A-	RX/TX Data –	Data
3	GND	+ 3.3 V	Data
4	GND	Ground	Data

2. Serial interface; RS-485 (EIA-485) MODBUS/RTU
   For terminal block designation, see project drawing

Terminal	Designation	Signal	Art
1	B+	RX/TX Data +	Data
2	A-	RX/TX Data –	Data
3	GND	+ 3.3 V	Data
4	GND	Ground	Data

7.4 Optional MODBUS / TCP or PROFIBUS DP interface

There is also an option for providing a MODBUS/TCP or a PROFIBUS DP interface for controlling and monitoring the flash lighting system. For this purpose, the control unit is fitted with an additional communication unit (GCI).

Detailed descriptions of the optional interface are provided in a separate document and in the project documentation.

7.5 External trigger

The external trigger permits a flash sequence to be initiated by an external trigger signal. The trigger input is accommodated on the control module as an additional module.

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Figure 21: External trigger input on the control module



External trigger:

Terminal block designation A3-X1

Terminal	Designation	Signal	Type
1	GND	0 (+24 VDC)	IN 0 (+24 V DC)
2	External trigger signal	+24 VDC	IN +24 V DC (optically decoupled)

The trigger signal will be heeded only if the trigger signal has been enabled at Terminal X4.6 of the communication module or by serial control.

For the function of the trigger, the following conditions have to be met:

- The trigger pulse must lie inside the range between +12 and max. +60 VDC
- The length of the trigger pulse has to be at least 10 ms
- The trigger acts on the rising edge of the signal
- The minimum time interval between two trigger pulses must not be less than 450 ms
- The chain is triggered with the end of the entire network half-wave following the trigger pulse. The time-lag in the chain sequence thus lies between 10 and 20 ms.

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8.0 lucDMC Service Software

8.1 General remarks

The lucDMC service software is available as an accessory provided for configuring and analyzing the SFL800D flash lighting system. The software is universally suitable for all ADB SAFEGATE devices, and is accordingly required only once. A software update may be needed for operating the flash lighting system. If necessary, please get in touch with ADB SAFEGATE Service.

If you do not yet possess a service system, we recommend purchasing a complete unit, with a laptop, an adapter cable and the appropriate software. This is essential in order to ensure that all hardware and software requirements for the system are met.

8.2 Safety instructions

Alterations in the system should be carried out only by appropriately trained specialist personnel or by ADB SAFEGATE Service. Please comply with the following safety instructions.

- Changes to the system's parameters may be implemented immediately without any further requests for confirmation!
- Some functions of the service software will temporarily impair the functions of the flash lighting system. Use only functions and system parameters with which you are familiar!
- If system parameters of the flash lighting system have been altered, the system should be checked by a function test before it is started up again!

8.3 Help functions and expanded descriptions

The service software is intended for appropriately trained service personnel. This description contains a general overview of the basic functions and options provided by the service software. Since we continually endeavor to improve the software, and adapt it to include new functions, a current software version may deviate from this description. Please consult the explanations and help functions integrated into the software package.

Note

For training courses on how to work with the service software and the RELIANCE Flash Lighting System, please get in touch with ADB SAFEGATE Service.

8.4 Connection

For connecting up the service capability, the service computer is connected to the control module's service plug connector. The service software detects the type of device involved automatically, and after successful connection will display the service masks for the SFL system.

8.5 Header menu

At the top of the page, a menu will appear with the principal menu options provided by the software package. Besides general functions, the further pages of the software can be accessed here. The contents of the header menu will depend on the page currently being displayed. The current page is not listed.

Table 9: General functions available in the header menu

Load **Save**	Configuration and parameters for the behavior of the flash lighting system.
SFL operator control	Status displays and operator control of the flash lighting system.
SFL settings	Configuration and parameters for the behavior of the flash lighting system.
Update all parameters	The data displayed are replaced by the ongoing system values.

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Table 9: General functions available in the header menu

	Display of the protocols saved and the log files of the lucDMC service software package.
	General settings of the lucDMC software package.

8.6 Footer status line

The main status of the SFL system is displayed at the bottom edge of the screen.

SFL status	General operating status of the system. GREEN: switched on and fault-free operation YELLOW: Pre-warning LF1 RED: there is an LF2 fault message or TIL fault ongoing.
Software: --- **Hardware:---**	Displays the version statuses of the control module.

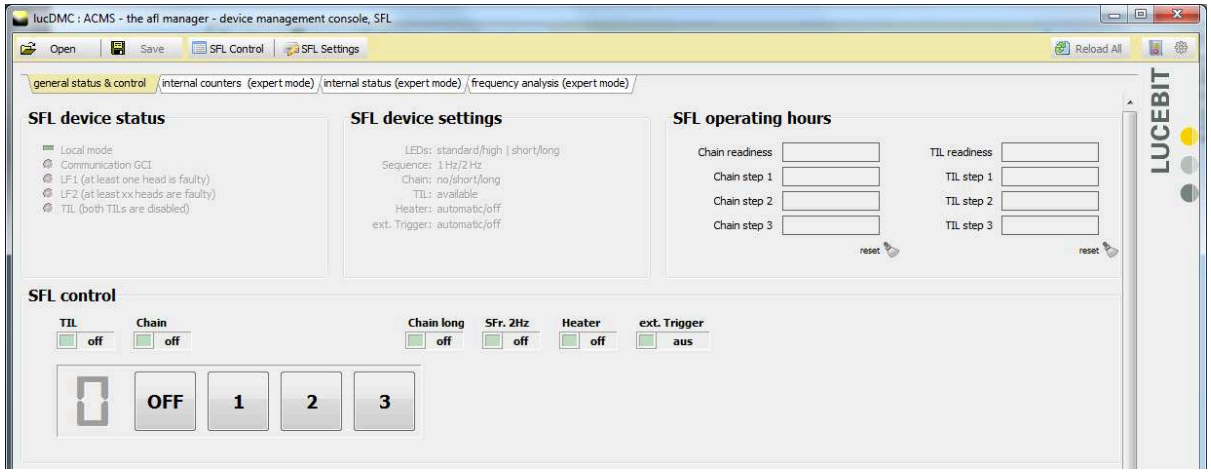
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8.7 SFL operator control

8.7.1 General status and control

In the top section of the window, you will find the status displays for the SFL system.

Figure 22: The basic display for SFL monitoring and control via the lucDMC



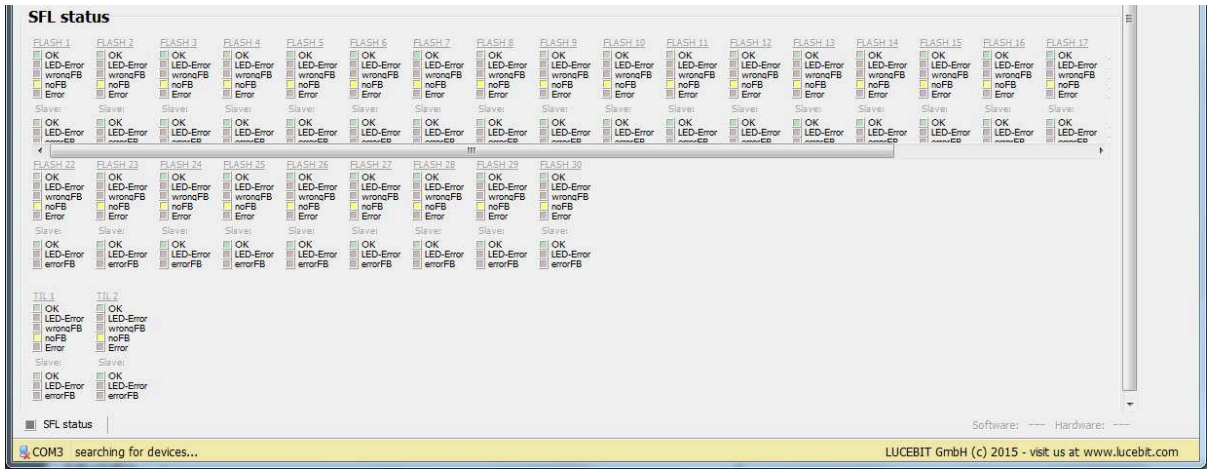


Table 10: SFL device status

○ **Local mode**	The system has been switched off using the service local control feature, or is now in local mode. The remote control has been de-activated.
○ **Communication GCI**	Status of the data link to the General Communication Interface (GCI)
○ **LF1**	Indicates that at least one flash head of the chain (excluding TILs) has failed
○ **LF2**	Indicates that the fault signaling threshold LF2 of the chain has been reached (excluding TILs)
○ **TIL**	A defective threshold identification light TIL, (Pos. 31 or 32) has been detected, and both threshold identification lights have been positively switched off.

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Table 11: SFL device settings

LED	Display of the internal light pulse configuration. **standard** the chain contains lights with the standard brightness or the optional high-performance lights are being operated at the standard brightness in order to extend their useful lifetime. **high** optional high-performance lights are operated at maximum brightness **long pulse** standard light pulse length **short pulse** shortened light pulse length with increased LED energization
Sequence frequency	Displays the sequence frequency: **1 Hz** or **2 Hz**
Chain length	Displays the configured or activated length of the flash chain. **none** no main chain **short** Flashing lights 1 to 21 **long** Flashing lights 1 to 30

Table 12: SFL operating hours

Here, the operating hours of the chain and the TILs are displayed, broken down by the different operating steps. They can also be reset here.

Table 13: SFL control

In this section, the flash lighting system can be switched directly by the service program. **For this purpose, the rotary switch of the control module must be in the OFF position (0). After the service program has been terminated, or after the service computer has been disconnected from the control module, the flash lighting system will be switched off.**	
□ **TIL**	Preselection of the threshold identification lights.
□ **Chain**	Preselection of the main chain.
□ **Chain long**	Chain configuration preselection (long / short). **ON** entire chain has been preselected (long) **OFF** reduced chain has been preselected (short) This function is available only if the change has been enabled for the remote control system. (see also SFL settings).
□ **DFr 2 Hz**	Preselection of the chain's sequence frequency. **ON** 2 Hz **OFF** 1 Hz *This function is available only if the change has been enabled for the remote control system. (see also SFL settings))*
□ **ext. trigger**	Activation of the trigger for external initiation of a sequence.
Numerical display	Display of the ongoing flashing light brightness 0, 1, 2 or 3 as indicated by the system feedback.
Taster „OFF“	Switches the flash lighting system to Brightness 0.
1, 2, 3	Switches the preselected segments of the flash lighting system to Brightness 1 (3%), 2 (10%) or 3 (100%).

Table 14: SFL status

In this section, you will see the detailed information for each individual flashing light. Flash 1 to Flash 30 stands here for the chain's flashing lights at Positions 1 to 30. **TIL1 and TIL2 refer to the threshold identification lights at Positions 31 and 32.**	
OK	The flashing light is in readiness mode.
LED error	A failure of one or more LED segments has been detected in the light. The light continues to be operated using the remaining LEDs with reduced brightness.

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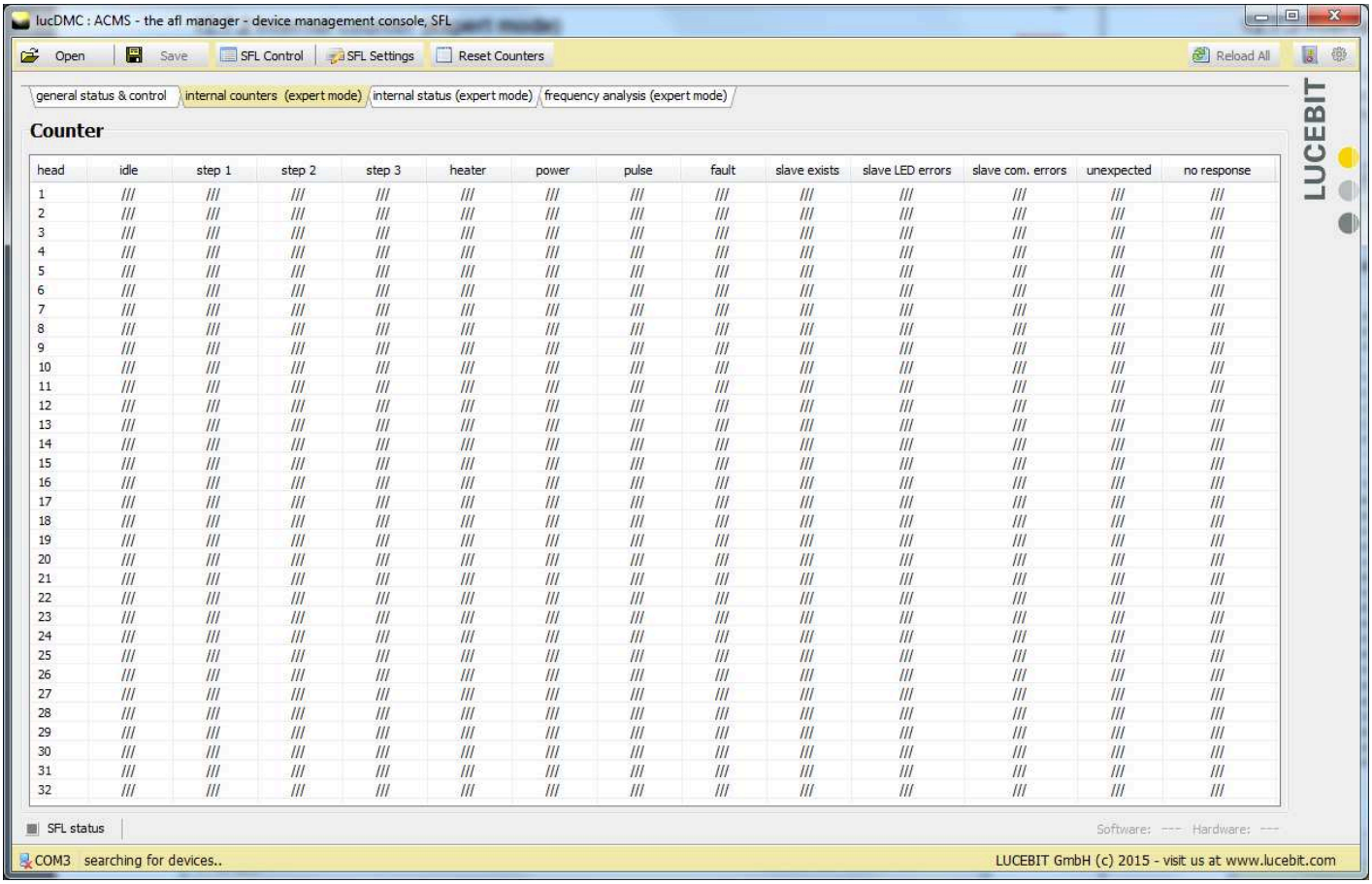
Table 14: SFL status

f.RM	Faulty feedback not compliant with the control instruction: Possible causes of the error: ▪ disturbed data transmission to the light, ▪ a general error in the light's electronics. No statement can be made on the ongoing status of the light.
k.RM	No (or no evaluable) signals are being received from the light.
Error	The flashing light is malfunctioning. One of the above-listed errors is ongoing.

8.7.2 Internal counter (expert mode)

On this page, the number of detailed signals from the lights is displayed. These data are used by ADB SAFEGATE Service to analyze the system.

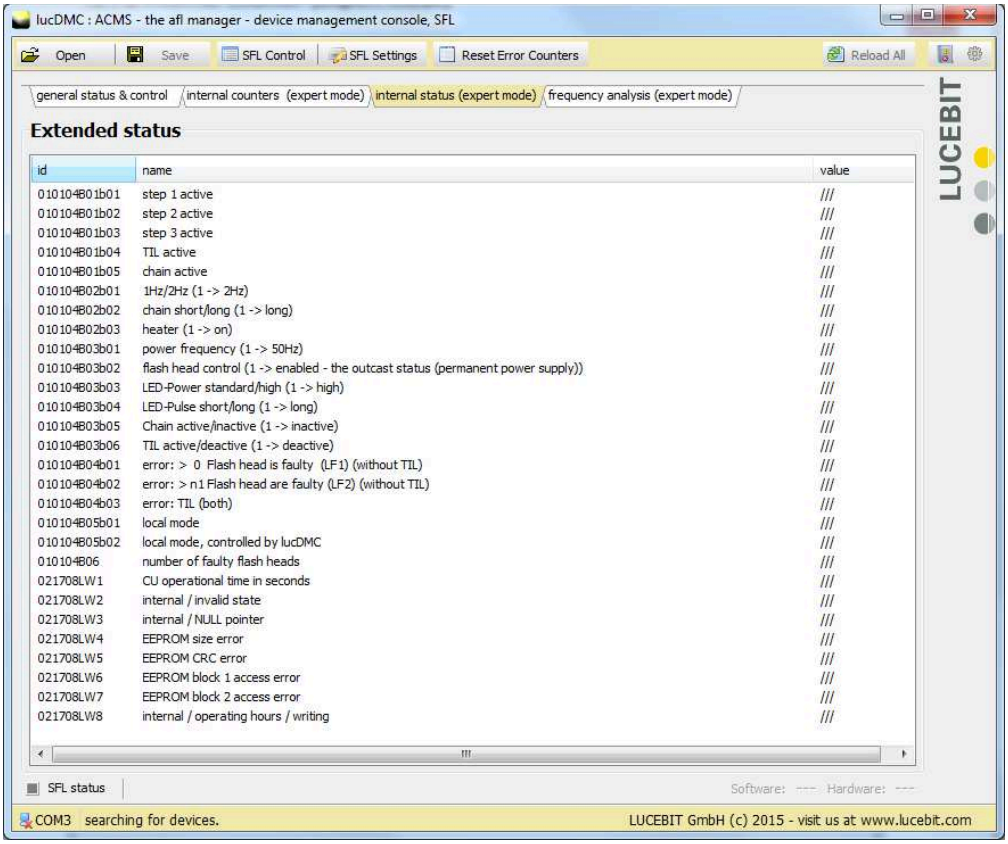
The counters can be set to zero by clicking the **Reset Counters** check-box.



8.7.3 Internal status (expert mode)

On this page, all control and monitoring messages and internal measured values are displayed. These data are used by ADB SAFEGATE Service for analyzing the system. Any values stated do not necessarily correspond to physical variables, but are internal scaled data intended for analyzing the system's behavior.

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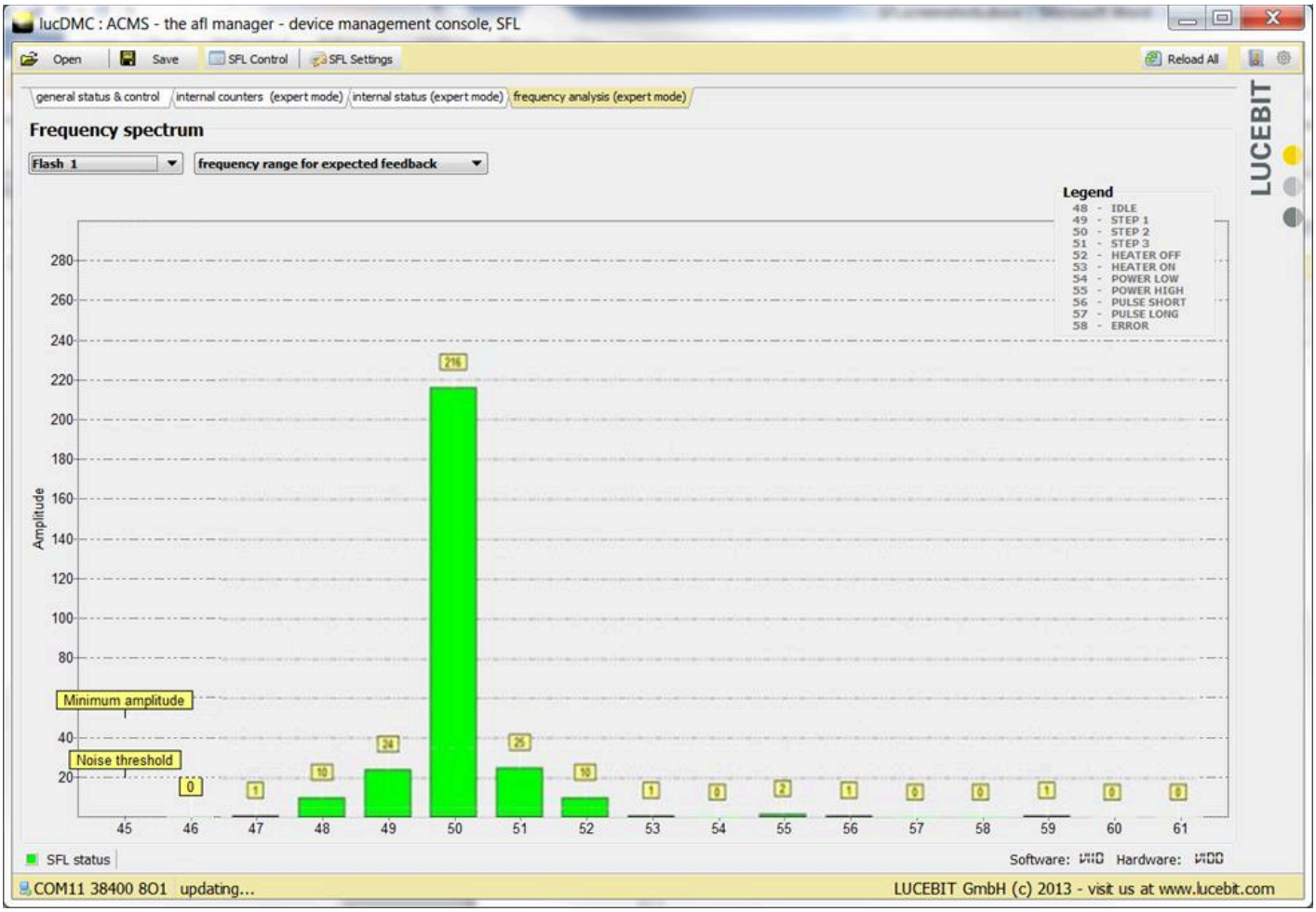


8.7.4 Frequency analysis (expert mode)

On this page, the activities and levels in the frequency bands of field communication can be monitored. The legend describes the meanings assigned to the frequency bands. For purposes of analysis, a flashing light and the frequency range to be examined must be selected.

These data are used by ADB SAFEGATE Service for analyzing the system. Any values stated do not necessarily correspond to physical variables, but are internal scaled data intended for analyzing the system's behavior.

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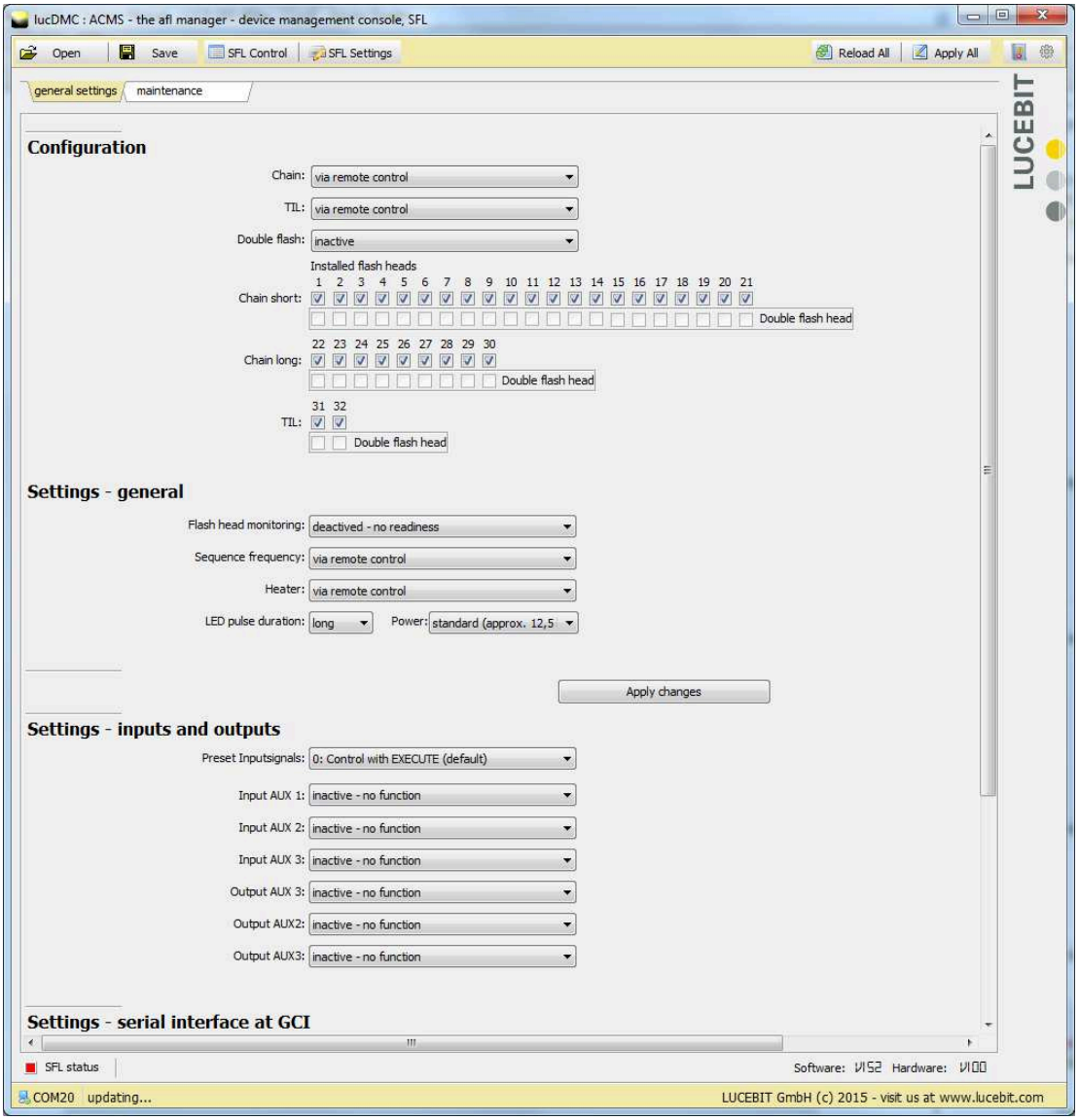


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8.8 SFL settings

8.8.1 General settings

In the general system settings, the basic configuration and any operating modes of the systems are specified.



Configuration	
Chain:	**Via remote control:** The configuration can be set and altered via the remote control. **Long, remote control ignored:** The full chain has been installed, and is being operated as a fixed configuration. It is not possible to alter the configuration via the remote control. **Short, remote control ignored:** The reduced chain Lights 1 to 21 has been installed, and is being operated as a fixed configuration. It is not possible to alter the configuration via the remote control. **Not available, remote control ignored:** No chain (Lights 1 to 30) installed. The remote control of the chain is blocked.
TIL:	**Via remote control:** The threshold identification lights (TILs) can be switched using the remote control. **Not available, remote control ignored:** No threshold identification lights (TILs) installed. The remote control of the TILs is blocked.

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Configuration	
Double flashing light:	**Deactivated:** No inset flashing lights as a double light pair have been installed in the system. **Activated:** Inset flashing lights as a double-light pair have been installed in the system. The positions of the double lights must be stated in the following flashing light matrix.
Flash heads installed:	**Short chain:** In this matrix, it is necessary to mark Light Positions 1 to 21, which are fitted with a flashing light. If the "*Double-flash*" function has been activated above, the slave lights of an inset double flashing light can also be assigned to a position. **Long chain:** In this matrix, Light Positions 22 to 30, which are fitted with a flashing light, must be marked correspondingly. **TIL:** Here, the threshold identification lights (TILs) installed must be marked.

Settings - General	
Flash head monitoring:	**Activated – continuous readiness** **Deactivated – no readiness** Here you specify whether the system changes automatically to readiness mode when the light is switched off.
Sequence frequency	It is here that the sequence frequency of the flash chain is set. **Via remote control:** The sequence frequency can be set and altered using the remote control. **2 Hz, remote control ignored:** The sequence frequency is set to a fixed 2 sequences per second. It is not possible to alter the configuration via the remote control system. **1 Hz, remote control ignored:** The sequence frequency is set to a fixed 1 sequence per second. It is not possible to change the configuration via the remote control system.
Elevated LED pulse duration	The ON duration of the elevated flashing lights can be set between short and long. This does not alter the brightness. Remember that the thermal pulse loading of the LEDs will rise with a short flash duration. **Long -** standard setting **Short -** shorter light flash with increased LED energization
Power	If the optional LED flashing lights with a higher light output have been installed, you can choose here between the nominal brightnesses. If brightness values are stated here, these will be merely examples for high and low brightnesses. The actual brightness values can be found in the technical data for the flashing lights installed. **Standard:** The nominal brightness is reduced to the standard value. This ensures a significantly longer useful lifetime of the LEDs and the power section of the light. Thanks to the lower thermal loading, this operating mode is also recommended for use in zones with high ambient temperatures. **High:** The maximum possible nominal brightness of the high-performance flashing lights is configured

Settings – inputs and outputs	
This is where the appropriate functions to the variable control inputs and signal outputs of the parallel interface are assigned.	
Input AUX 1: Input AUX 2:	Here, one of the following functions is assigned to the corresponding control input. **Deactivated – no function:** Input without function. **Activated - 1Hz/2Hz (1 -> 2Hz):** The control input switches over the sequence frequency. A signal applied activates 2 Hz. **Activated - chain short/long (1 -> long):** The control input switches over the chain's configuration. A signal applied activates the entire chain (1 - 30).
Input AUX 3:	Not freely available. May be required internally for the local control function. The setting should not be altered.

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Settings – inputs and outputs	
Output AUX 1: Output AUX 2:	Here, one of the following functions is assigned to the corresponding signal output. **Deactivated – no function:** Output without function. **Activated - 1Hz/2 Hz (1 -> 2Hz):** Signals the ongoing sequence frequency. 0 (no signal): 1 Hz, 1 (active signal): 2 Hz **Activated - chain short/long (1 -> long):** Signals the ongoing configuration of the chain. 0 (no signal): reduced chain (1 - 21), 1 (active signal): full chain (1 - 30) **Activated - 1Hz/2 Hz (1 -> 2Hz):** Signals the ongoing sequence frequency. 0 (no signal): 1 Hz, 1 (active signal): 2 Hz
Output AUX 3:	Not freely available. May be required internally for the function of the local control system. The setting should not be altered.

Settings – serial interface on the communication module (GCI)

The additional maintenance interface on the communication module is set up here. The interface is intended only for use by the ADB SAFEGATE service personnel. The settings should not be altered.

Setting – failure signal

It is here that the second signaling threshold (LF2) is specified for the chain's light failure threshold without TILs.

The entry value has to lie between 2 and 30 failed lights.

Accept changes

This is used to transfer the entries of all data from all sides to the control module. This switch has equal rights to the switch in the header menu.

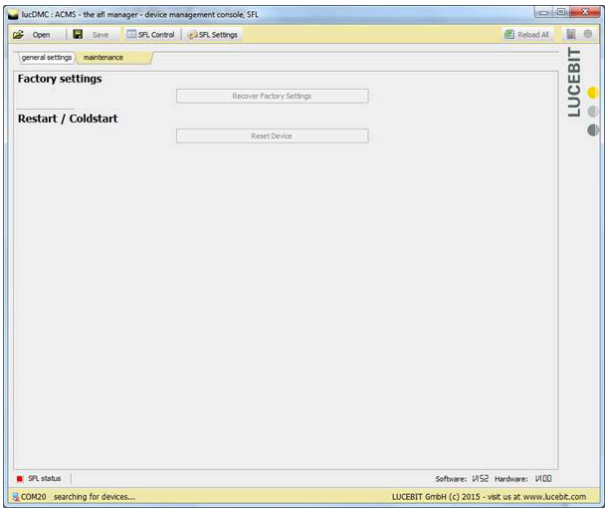
8.8.2 Factory Settings and System Restart

Factory Settings

To reset all configuration data of the control module to the default values set in the factory, click the **Recover Factory Settings** button.

Restart / Coldstart

To trigger a master reset of the control module, click the **Reset Device** button.



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9.0 Maintenance

9.1 Regular or unscheduled maintenance work

The components of the flash lighting system are designed for maintenance-free operation.

In order to assure the availability of the SFL, the system must be regularly checked for the following points, and any faults remedied appropriately:

- Overvoltage protection modules in the lighting station
  - Check the protective equipment and replace any defective modules. Each module has a visual indicator (Green = Good, Red = Replace)
- Flashing lights
  - Check for secure fit on the mounting and correct alignment of the light
  - Mechanical damage to the housing
  - Soiling of the optical system
  - Moisture in the light (if necessary, replace the moisture bonding agent)
  - Damage to the feeder cable
    - Abraded areas in the vicinity of the mounting, due to loose attachment
    - Animal bites at the cable
- Connection between isolating unit and flashing lights
  - Damage to the cables, e.g. intermediate plug-connectors and connecting joints
  - Abraded areas, particularly in the vicinity of the cable bends
  - Animal bites
- Isolating unit and connection point to the main supply cable
  - Damage to the housings
  - Damage and leaks (visual inspection)
  - Damage to the cables, connecting joints or housings
- Isolating unit and connection point to the main supply cable
  - Animal bites
- The supply to the flashing light through the isolating unit is designed as a safety extra-low voltage (SELV). In order to retain the protective effect, no active part of the feeder may be grounded. Any damage to the insulation must be repaired, and the insulating effect restored. If there are any doubts concerning the quality of the insulation, an appropriate test measuring routine must be carried out with the system switched off.
- The isolating unit establishes dependable isolation between the mains supply and the power supply to the lights. If there is any damage to the isolating unit or the connecting cables, the unit must be replaced immediately.
- The flashing lights are connected to the supply cable via the PDU800-SFL isolating units. These isolating units contain overvoltage protection elements with a low response threshold. This means the cables must never be tested with voltages above 400V when the isolating units are connected!

9.2 Repairing the SFL

For repairs to the SFL, only original spare parts and components may be used.

If a light has been replaced or detached from its mounting, the same alignment of the light must be restored.

The new light must be coded with the address of the light replaced.

Note

For instructions on aligning and addressing the AXON elevated flashing light, see the "Maintenance" and "Workshop Maintenance" chapters in UM-5078.

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10.0 Troubleshooting

10.1 Troubleshooting help

For trouble-shooting, always consult the project drawings, where the actual architecture and configuration of the system are described.

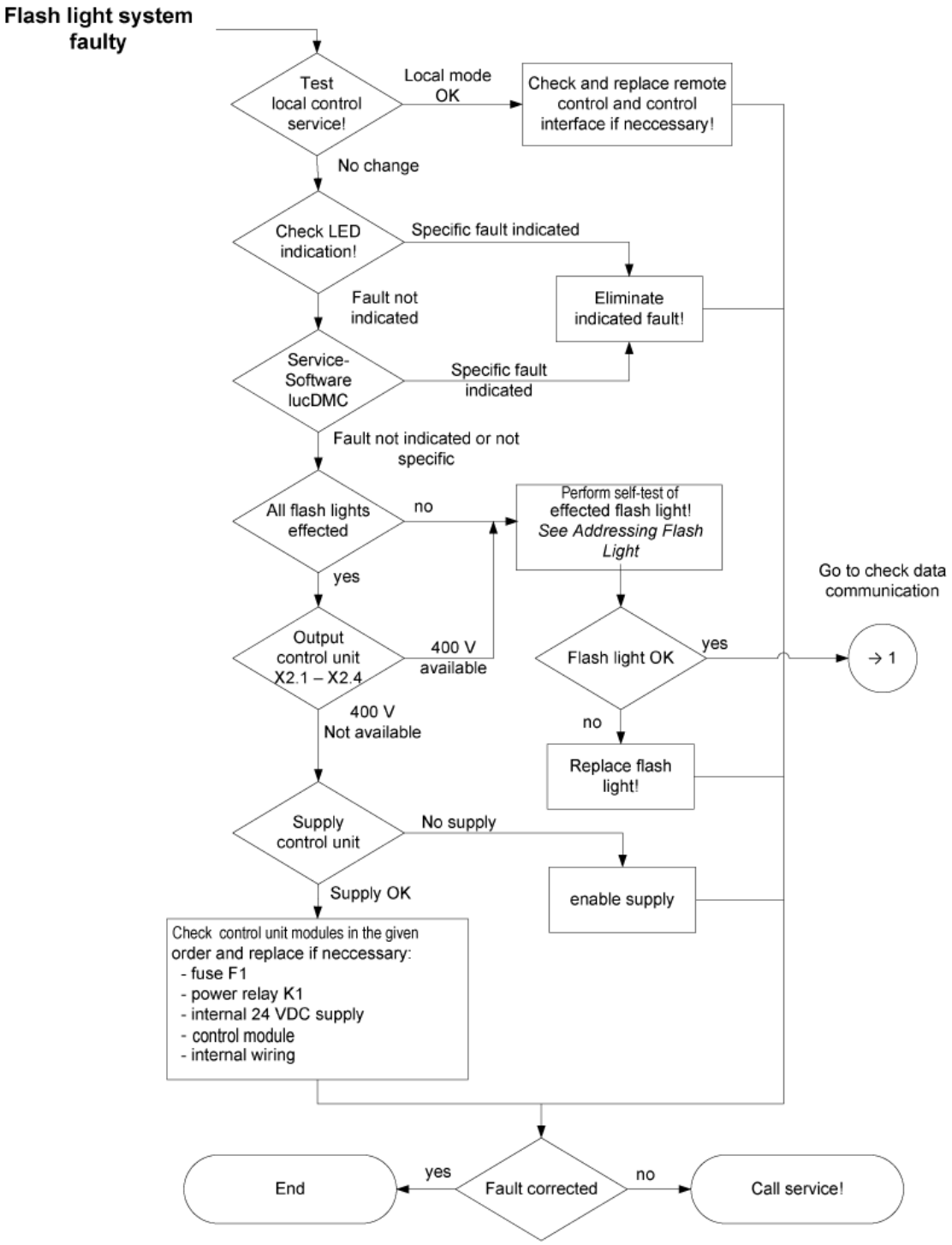
In the event of malfunctions in the system, the following points should always be addressed and checked:

- Please note that a positive switch-off of the threshold identification lights is unlocked only via the service local control system in position 0 of the rotary switch.
- Is the rotary switch of the service local control system in the right position, and has the system configuration been correctly set?
- Use the service software to check the detailed messages from the system and the individual flashing lights.
- If the system has been reconfigured using lucDMC, please check whether the new configuration is free from faults and complete, and corresponds to the system's architecture.
- If the malfunction occurs only in remote control mode, check whether the control system is setting a valid signal configuration for the brightness command, and whether in the case of parallel control the transfer signal is being given correctly.
- The overvoltage modules installed in the station must be taken into due account, and tested when checking the supply cable.
- In the event of malfunctions in the data link, then independently of the trouble-shooting help, the overvoltage protection module should be removed and function-checked.
- For trouble-shooting in the outdoor cabling, it may be helpful to regularly measure and record the cable resistances during maintenance work.
- Please note that high-voltage tests must never be carried out on the supply cable with PDU800-SFL isolating units and overvoltage protection unit OLP800D-SFL connected. A high-voltage measuring procedure will trigger the overvoltage protection elements, and may destroy the arresters and any filters installed.

For fast detection and elimination of malfunctions, you can proceed in accordance with the trouble-shooting tree, see Figure 23 and Figure 24. The optional lucDMC service software enables you, in addition, to view and analyze the detailed information.

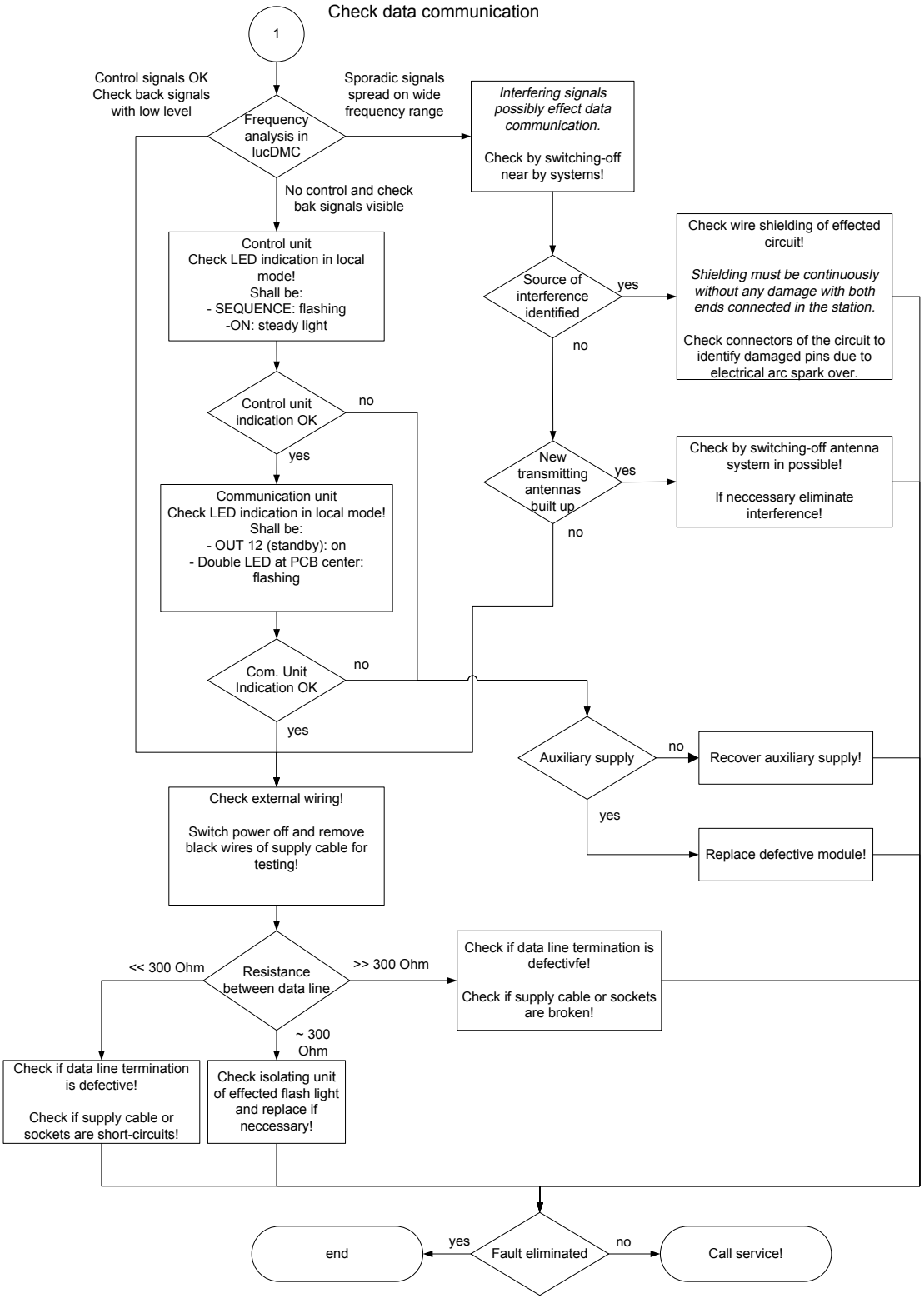
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Figure 23: Troubleshooting tree 1: Power supply and control system



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Figure 24: Troubleshooting tree 2: Data transmission



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11.0 System planning

11.1 Supply cable

Thanks to its flexible parameterization options, the SFL system is suitable for any system configuration.

The number and types of the lights concerned must be planned and positioned in compliance with the relevant national and international regulations.

Information on the lights, the optical and mechanical data, and interfaces, can be found in the documentation for the lights. The lights must be suitable for use in the SFL system. Lights other than LED flashing lights are not available for the system.

The cabling must be executed in accordance with the procedures and preferred cable types described in this manual. You will find detailed information on this in § Installation.

If lengths other than those listed here are required for the supply cable, the cross-sectional areas must be modified accordingly. The necessity for a maximum cable resistance of 12 Ohm must be complied with here for the single cable length. This resistance is determined from the output terminal of the control unit to the cable joint at Light Position 1.

The supply cable does not necessarily have to be used with the same conductor cross-sectional area throughout. To optimize the costs involved, the supply route can be divided up into different sub-segments. The cable's resistance is then entailed by the series connection of the segments. If there are different conductor cross-sectional areas involved, then the largest cross-sectional area planned must be that exiting from the station and leading to the next-smaller one.

The resistance of the different segments can be calculated with the following formula:

$$R_{Leitung} = \sum_{Segment=1}^{n} \frac{L_{Segment}}{56 \left[\frac{m}{\Omega * mm^2}\right] * A_{Segment}} \leq 12\,\Omega$$

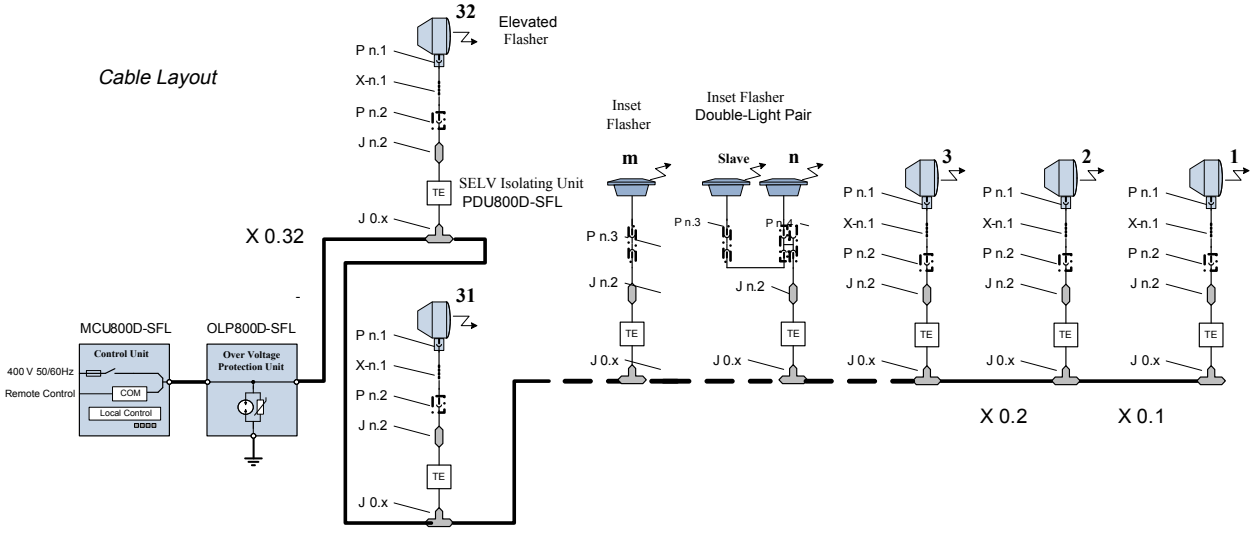
L: Length of segment in m (cable length)

A: Conductor cross - sectional area of the segment in mm^2

In actual practice, the use of not more than 2 different cable cross-sectional areas for the supply cable has proved sufficient. The smaller cross-sectional area (e.g. 2.5 mm^2) for connections between flashing lights 1 to 32 and a larger cross-sectional area (e.g. 4 - 6 mm^2) for the feeder from the station

For simple determination of the conductor resistance, the values for copper cables with standard cross-sectional areas are listed in the Table 15.

Figure 25: SFL System Component Layout



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Table 15: Copper cable values for copper conductors at 20°C

	Cable cross-sectional area				
Cable length	**2.5 mm²**	**4.0 mm²**	**6.0 mm²**	**10.0 mm²**	**16.0 mm²**
100 m	0.7 Ω	0.4 Ω	0.3 Ω	0.2 Ω	0.1 Ω
200 m	1.4 Ω	0.9 Ω	0.6 Ω	0.4 Ω	0.2 Ω
300 m	2.1 Ω	1.3 Ω	0.9 Ω	0.5 Ω	0.3 Ω
400 m	2.9 Ω	1.8 Ω	1.2 Ω	0.7 Ω	0.4 Ω
500 m	3.6 Ω	2.2 Ω	1.5 Ω	0.9 Ω	0.6 Ω
600 m	4.3 Ω	2.7 Ω	1.8 Ω	1.1 Ω	0.7 Ω
700 m	5.0 Ω	3.1 Ω	2.1 Ω	1.3 Ω	0.8 Ω
800 m	5.7 Ω	3.6 Ω	2.4 Ω	1.4 Ω	0.9 Ω
900 m	6.4 Ω	4.0 Ω	2.7 Ω	1.6 Ω	1.0 Ω
1000 m	7.1 Ω	4.5 Ω	3.0 Ω	1.8 Ω	1.1 Ω
1100 m	7.9 Ω	4.9 Ω	3.3 Ω	2.0 Ω	1.2 Ω
1200 m	8.6 Ω	5.4 Ω	3.6 Ω	2.1 Ω	1.3 Ω
1300 m	9.3 Ω	5.8 Ω	3.9 Ω	2.3 Ω	1.5 Ω
1400 m	10.0 Ω	6.3 Ω	4.2 Ω	2.5 Ω	1.6 Ω
1500 m	10.7 Ω	6.7 Ω	4.5 Ω	2.7 Ω	1.7 Ω
1600 m	11.4 Ω	7.1 Ω	4.8 Ω	2.9 Ω	1.8 Ω
1700 m	**not applicable**	7.6 Ω	5.1 Ω	3.0 Ω	1.9 Ω
1800 m	**not applicable**	8.0 Ω	5.4 Ω	3.2 Ω	2.0 Ω
1900 m	**not applicable**	8.5 Ω	5.7 Ω	3.4 Ω	2.1 Ω
2000 m	**not applicable**	8.9 Ω	6.0 Ω	3.6 Ω	2.2 Ω
2100 m	**not applicable**	9.4 Ω	6.3 Ω	3.8 Ω	2.3 Ω
2200 m	**not applicable**	9.8 Ω	6.5 Ω	3.9 Ω	2.5 Ω
2300 m	**not applicable**	10.3 Ω	6.8 Ω	4.1 Ω	2.6 Ω
2400 m	**not applicable**	10.7 Ω	7.1 Ω	4.3 Ω	2.7 Ω
2500 m	**not applicable**	11.2 Ω	7.4 Ω	4.5 Ω	2.8 Ω
2600 m	**not applicable**	11.6 Ω	7.7 Ω	4.6 Ω	2.9 Ω
2700 m	**not applicable**	**not applicable**	8.0 Ω	4.8 Ω	3.0 Ω
2800 m	**not applicable**	**not applicable**	8.3 Ω	5.0 Ω	3.1 Ω
2900 m	**not applicable**	**not applicable**	8.6 Ω	5.2 Ω	3.2 Ω
3000 m	**not applicable**	**not applicable**	8.9 Ω	5.4 Ω	3.3 Ω
3100 m	**not applicable**	**not applicable**	9.2 Ω	5.5 Ω	3.5 Ω
3200 m	**not applicable**	**not applicable**	9.5 Ω	5.7 Ω	3.6 Ω
3300 m	**not applicable**	**not applicable**	9.8 Ω	5.9 Ω	3.7 Ω
3400 m	**not applicable**	**not applicable**	10.1 Ω	6.1 Ω	3.8 Ω
3500 m	**not applicable**	**not applicable**	10.4 Ω	6.3 Ω	3.9 Ω
3600 m	**not applicable**	**not applicable**	10.7 Ω	6.4 Ω	4.0 Ω
3700 m	**not applicable**	**not applicable**	11.0 Ω	6.6 Ω	4.1 Ω
3800 m	**not applicable**	**not applicable**	11.3 Ω	6.8 Ω	4.2 Ω
3900 m	**not applicable**	**not applicable**	11.6 Ω	7.0 Ω	4.4 Ω
4000 m	**not applicable**	**not applicable**	11.9 Ω	7.1 Ω	4.5 Ω

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NOTICE

The table cells which are marked with "**not applicable**" indicate that the cable cannot be used with resistance values above 12 Ohms. For the related cable lengths, a higher wire size is required for cable cross-sectional areas with 2.5 or 4.0 mm².

The standard cable type is NYY-O 4x X RE.

If different types of cable are being used, care must be taken to ensure for data transmission a surge impedance similar to NYY-O 4x X RE. Different types of cable shall not be mixed.

If existing cables are to be used in a modification job, the cables' characteristics may have to be metrologically determined. Adapter elements may be needed for the existing cables. If you require any assistance with the planning work, we are always at your disposal.

11.2 Overvoltage protection for the supply cable

In order to achieve adequate protection of the control unit against overvoltages on the supply cable, the OLP 800D-SFL overvoltage protection unit has to be installed.

In order not to route the discharge currents unnecessarily through the building and into the control unit, the overvoltage protection modules should be installed as close as possible to the building's cable inlet. The arresters (ground connections) should have a cross-sectional area of minimum 10 mm² and, if at all possible, be routed directly to the building's ground potential. Since in the event of a trip the arrester carries high pulse currents, care must be taken to ensure a sufficient distance from other cables and the protected inner side of the supply cable. The place of installation is specific to the system involved, and is specified in the project drawings.

Note

The arrester should be routed directly to the building's equipotential bonding rail or to the building's earth electrode. Never route the arrester to the protective earth distribution inside the low-voltage distribution panel. This might cause the high leakage currents to be coupled into the building's power supply.

11.3 Light connecting cable

The output cable marked in yellow of the PDU800-SFL isolating unit must be extended as far as the light via a straight joint with a light connecting cable.

The maximum length of the connecting cable must not exceed 25 m with a cable cross-sectional area of 2.5 mm².

The lights' connecting cables are available in different variants. The permanently installed light connecting cables and the associated connecting cables, plus the mating connectors for fastening the connecting cables, are included in the lights' scope of delivery. To select the connection variant, please consult the current data sheet for the flashing lights.

The elevated lights are supplied for installation on a frangible coupling with a compatible 4-pole plug connector with dimensions in accordance with FAA AC 150/5345-26 PLUG-CLASS A, TYPE II, STYLE I and a receptacle with dimensions in accordance with FAA AC 150/5345-26 RECEPTACLE-CLASS A, TYPE II, STYLE 8. The receptacle has a cable length of 2 m for connecting to the isolating unit or an extension.

For mast installation without a frangible coupling, an elevated light is available with a 5-pole, severable cable connector. This enables a longer connecting cable to the isolating unit to be created simply on site.

For cable and connector options of the AXON elevated flashing light, see the "Ordering Code" section of the ICAO Approach Flash and Runway Threshold Indicator Light datasheet (DS-5126).

Inset lights are always supplied with a cast 5-pole plug connector with dimensions in accordance with FAA AC 150/5345-26 PLUG-CLASS A, TYPE II, STYLE I. The mating piece with a 5-pole receptacle with dimensions in accordance with FAA AC 150/5345-26 RECEPTACLE-CLASS A, TYPE II, STYLE 7 and a 2 m connecting cable is supplied with every inset light.

For creating a double light pair, an H-cable connector is provided with the inset light set for linking the inset lights concerned.

If connecting cables are produced on the spot or the connections are lengthened, then for reasons of availability standard H07RN-F 5G2.5 cables are frequently used. This standard cable contains a protective conductor. Since the supply to the flashing lights is passed through the isolating unit with a safety extra-low voltage (SELV), the protective conductor must not be used or connected!

When creating a double light pair, the installation shells of the two inset flashing lights must be conductively connected to each other via sufficient equipotential bonding (> 4 mm²)!

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11.4 Protective measures

The main power supply has been designed as a totally insulated, fully enclosed system. Connection joints or junction boxes are made from insulating materials, and always in fully-cast design internally. A protective conductor is accordingly not provided in the supply cable.

If different types of joints or boxes are to be used, care must be taken to ensure the same characteristics of double insulation for non-conductive housings. If this cannot be implemented, or you do not wish it, the degree of protection for the primary cabling must be modified, and if necessary protective conductors and equipotential bonding systems must be planned separately. In order not to affect the cable's characteristics, we recommend that this protective conductor be separately routed.

If because of airport stipulations a lightning protection system is specified for outdoor areas, this must be installed separately from the supply for the flash lighting system. The arresters must, in order to avoid interference, be laid at a sufficient distance from the supply cables to the flash lighting system.

The power supply to the flashing lights features safety extra-low voltage (SELV). The isolating unit PDU800-SFL reduces the 400 VAC supply to approx. ~36 VAC using a dependably isolated transformer. The data lines are likewise dependably decoupled electrically, so that the supply voltage cannot cause a disruptive discharge on the lights' side if the supply cable is damaged.

The SELV protection feature enables staff to work on the lights without restrictions even when it they are in powered-up mode, thus significantly facilitating system maintenance. The system can be used quite safely in the outdoor areas of the airport. In contrast to the high-voltage engineering involved in gas discharge flashes, no hazardous touch voltages can occur here, even if light housings have been damaged (accident, vandalism, etc.).

NOTICE

When planning the cabling for the lights, please remember that in the safety extra-low voltage supply (SELV) it is forbidden under the relevant standard to connect an active conductor to the ground potential.

The choice of miniature circuit-breaker in the control unit (all-pole switch-off 5 x10 A, Characteristic K) is designed as line protection for the outdoor system with a minimum cross-sectional area of 2.5 mm^2. This means the supply cable is protected against thermal overloading even in the event of a short-circuit. By reason of the fusing characteristic involved, when the maximum conductor resistance is utilized there could be no instantaneous tripping in the event of a short-circuit in the supply cable. If by reason of special local regulations instantaneous tripping is required, the cables' cross-sectional areas must be increased correspondingly.

11.5 Power supply to the control unit

The SFL system requires a 3-phase 400 V 50/60Hz supply (L1, L2, L3, N).

In the context of the power supply, and in particular when UPS systems are being used, please remember that the phase loads are highly asymmetrical.

The main power (~1.4 kVA) is tapped between Phases 1 and 2. Phase 3 is required for the auxiliary supply and for synchronizing the system. When the chain's power supply is switched on, the initial charging of the lights' capacitors and the start-up of the power supplies may cause a higher level of power consumption for brief periods.

For selective fuse protection of the flash lighting system in the low-voltage distribution panel, the fusing characteristic K of the internal fuse must be taken into due account.

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12.0 System data and functions in overview

Connection:	3 phase, 400 V, 50/60Hz, 1.4 kW, asymmetrical load, main load on L1-L2 Internal miniature circuit-breaker 4-pole 10 A, tripping characteristic K
Power-up behavior:	Making current limitation using time-delayed charging start after system power-up. Operational time-delay approx. 1 s after power-up. Standby mode for avoiding the time-delay is possible.
Power supply to the light chain:	Power supply and data transmission via a power cable with minimized cross-sectional areas. Maximum permissible simple feeder resistance of 12 Ω.
Power supply to the flashing lights:	Safety extra-low voltage (SELV) and data transmission decoupled from the main supply by an isolating unit. 4-pole connecting cable 2.5 mm^2 with maximally 25 m feeder length. Light connection via 4-pole plug connector.
Protection classes:	▪ Main supply is routed into the field as a totally insulated enclosed system without a protective conductor. ▪ Power supply from the isolating unit as safety extra-low voltage (SELV) permits unrestricted working while the flashing light is switched on. Dependable protection even if the light housing is damaged (due to accident or vandalism). ▪ Lightning protection must be planned separately if needed.
System configurations:	▪ Full chain: 30 flash lights + 2 threshold identification lights ▪ Reduced chain: 21 flash lights + 2 threshold identification lights ▪ Threshold lighting: 2 threshold identification lights Special configurations possible. Each standard configuration can be dynamically switched over to a reduced standard configuration. The threshold identification lights can be switched separately from the upstream chain.
Light configurations:	Single light: Elevated lights or inset lights for a light at the addressed position. Power supply and control are provided for each light via an isolating unit. Double light: Two inset lights form, as a light pair (master and slave), a light at the addressed position in order to increase the brightness. Power supply and control are provided via a shared isolating unit.
Sequence frequencies:	1 Hz and 2 Hz permanently configured or dynamically alterable through the control system.
Brightness steps:	100 %, 10 %, 3 %
Readiness mode:	In order to avoid a time-delay at power-up and for continuous monitoring the system offers a readiness mode.
Monitoring:	▪ Individual-light monitoring. ▪ Continuous monitoring in readiness mode. ▪ Monitoring of the threshold lights with automatic switch-off in the event of an individual fault.
Operator control:	Service operator control option integrated in the control unit Operator control, detailed monitoring and system configuration using the lucDMC service software package

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Interfaces for remote control:	▪ 24 VDC control inputs (8) and signal outputs (12) for parallel control ▪ optionally redundant CAN-Bus interface for linking up to a ADB SAFEGATE remote control system ▪ optionally redundant RS485 interfaces with MODBUS/RTU, RCOM or RCOM plus protocol ▪ optionally redundant ETHERNET interface with MODBUS/TCP protocol ▪ optionally redundant PROFIBUS DP interface
Standards:	ICAO Annex 14, Aerodrome Design Manual Part 4; Visual Aids; Fourth Edition – 2004 STANAG 3316 Manual for Lighting Systems on Airfields / Airfields for NATO and National Installations (HB BA); General Reprint No. 174 DIN VDE V 0161 - 11 (VDE V 0161 - 11)

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13.0 Technical data

13.1 Control unit MCU800D-SFL in the standard housing

Supply voltage:	400 V, 50/60 Hz, 3-phase
Connected load:	1.4 kW, asymmetrical load, main load on L1 – L2 Internal miniature circuit-breaker 4-pole 10 A, tripping characteristic K
Supply terminals:	5 x 1.5 mm² to 4 mm²
Output terminals to the flash chain:	5 x 1.5 mm² to 6 mm²
Operating temperature:	-25°C – +45°C (without easy-to-use control system)
Humidity:	10% ... 90%, not condensing
Degree of protection:	IP 43
Elevation above sea level (operation):	-100 m ... +2 500 m
Housing:	Metal housing for wall mounting, 600 mm x 600 mm x 210 mm (B x H x D), ~22 kg
Standards:	ICAO Annex 14, Aerodrome Design Manual Part 4; Visual Aids; Fourth Edition – 2004 STANAG 3316 Manual for Lighting Systems on Airfields / Airfields for NATO and National Installations (HB BA); General Reprint No. 174 DIN VDE V 0161 ‑ 11 (VDE V 0161 ‑ 11)

13.2 Isolating unit PDU800D-SFL

Supply voltage:	340 - 400 V, 50/60 Hz
Output to flashing light:	Safety extra-low voltage ~ 36 V, 5 A (SELV compliant)
Operating temperature:	-40°C .. +55°C
Elevation above sea level (operation):	-100 m ... +2 500 m
Connecting cable:	Molded cable (5 x 2.5 mm²) approx. 2.2 m (protective conductor incorporated in the cable is not used or connected)
Feeder cable:	Molded cable (4 x 2.5 mm²) approx. 1 m with yellow marking protective conductor incorporated in the cable is not used or connected)
Housing:	Fully cast PU housing
Degree of protection:	IP 68 up to 1 m immersion depth
Dimensions:	142 mm x 192 mm (D x L) without cables
Weight:	~ 6.5 kg
Standards:	Aerodrome Design Manual Part 4; Visual Aids; Fourth Edition – 2004 DIN VDE V 0161 ‑ 11 (VDE V 0161 ‑ 11)

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14.0 Spare Parts

Table 16: Reliance Flash System Spare Parts

Part	Description	Part Number
Frangible Coupling	Frangible Coupling, 2"-11,5 NPS	061.186
Base Plate	Base Plate, 2"-11,5 NPS	061.607
Shallow Base	Eurobase, Waterproof Shallow Base with O-Ring 7080.90.650	211.319
QPD Plug	Phoenix Plug Connector (QPD Nut Included)	300.241
QPD Dust Cap	Phoenix Dust Cap - To Seal Off Unused Connections	300.243
QPD H Connector	Phoenix H Connector (QPD Nuts Not Included)	300.244
QPD Receptacle	Phoenix Receptacle Connector (QPD Nut Included)	300.245
QPD Nut	Phoenix Nut - Replacement Nut for Reusing Plug or Receptacle	300.246
OLP Line Surge	Supply Line Surge Protection Device with Indicator	A3534
OLP Data Surge	Data Line Surge Protection Device with Indicator	A5325
OLP Data Monitor	Remote Monitoring Module for Data Line Overvoltage Protection - Optional	A5326
OLP800D-SFL	Overvoltage Protection Unit - Optional	P1006
JBX800D-SFL	T-Connection Junction Box	P1029
PDU800D-SFL	PDU SELV Isolating Unit	P864
PSD800D-SFL	Dongle for Inset Lights	P1030
lucDMC	lucDMC + License Dongle for 1 PC	P1299
lucDMC	lucDMC + License Dongle for 2 PC	P1300
lucDMC	lucDMC + License Dongle for 3 PC	P1301
lucDMC	lucDMC + License Dongle for 4 PC	P1302
lucDMC	lucDMC + License Dongle for 5 PC	P1303

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Figure 26: Inset Flasher IL868D Spare Parts

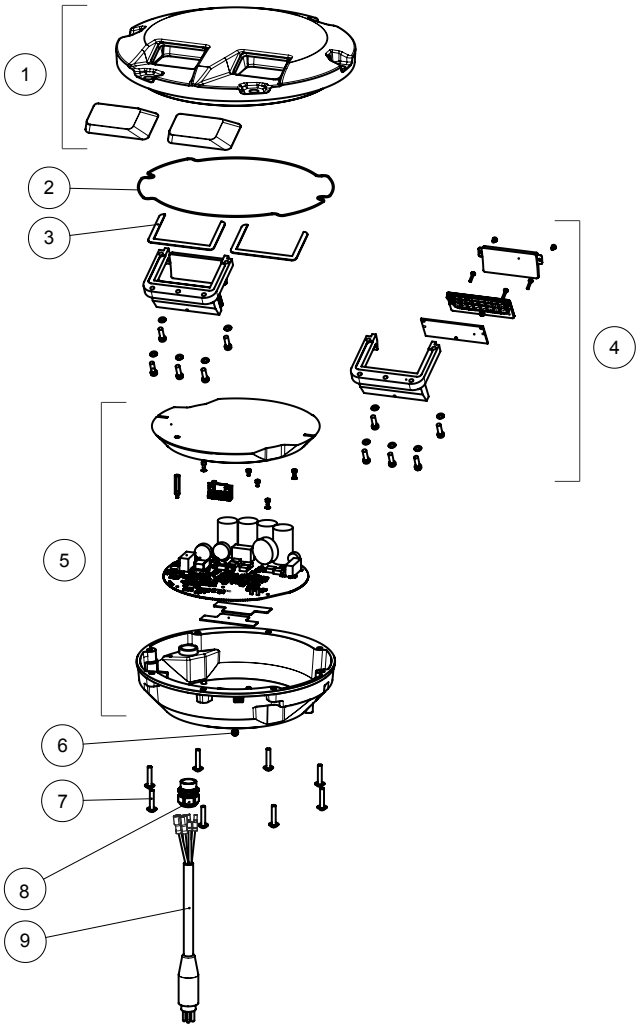


Table 17: Inset Flasher IL868D Spare Parts

Item	Description	Part Number
1	Top Cover Assembly, IL868D	SP.882.507
2	Flat Gasket, IL868D, 10pk	SP.801.712
3	LED Underlay, IL868D, 2pk	SP.801.711
4	LED Engine IL868D, Warm White (Includes hardware)	SP.801.553
4	LED Engine IL868D, Cold White (Includes hardware)	SP.801.559
5	Bottom Pan Assembly, IL868D	SP.801.114.PT
6	Pressure Relief Screw, M5, 10pk	SP.801.750
7	Screw M5x25 (for mounting top cover to bottom pan), 100pk	SP.099.287
8	Cable gland M20x1.5	SP.091.952
9	5-Pole Cable Assembly with Phoenix Connector, for IL868D, (includes cable gland and terminals), 280 mm	SP.205.042
9	5-Pole Cable Assembly with FAA Style 1 Connector, for IL868D, (includes cable gland and terminals), 300 mm	SP.205.043

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Figure 27: Elevated Flasher EL817D Spare Parts

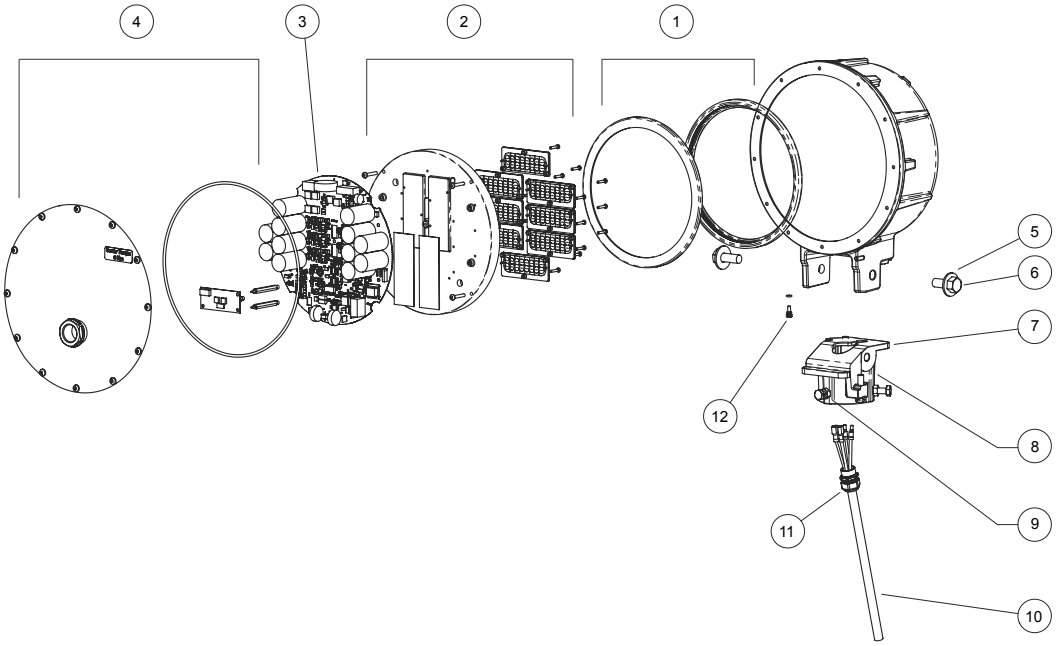


Table 18: Elevated Flasher EL817D Spare Parts

Item	Description	Part Number
1	Front Glass & Gasket Kit (Legacy 6 screw model)	SP.202.165.1
1	Front Glass & Gasket Kit (12 screw model)	SP.202.165.5
2	LED Assembly, Warm Light (Legacy 6 screw model) (includes housing, plate, LEDs, cable, optics, and hardware)	SP.801.550.1
2	LED Assembly, Cold White (Legacy 6 screw model) (includes housing, plate, LEDs, cable, optics, and hardware)	SP.801.554.1
2	LED Assembly, Cold White (12 screw model) (includes plate, LEDs, cable, optics, and hardware)	SP.804.554.5
3	Main PCB Assembly (includes address PCB, cable, and hardware)	SP.803.523
4	Back Plate Assembly (Legacy 6 screws model) (includes o-ring, screws, and sight glass)	SP.202.652
4	Back Plate Assembly (12 screws model) (includes o-ring, screws, and sight glass)	SP.202.652.5
5	Flat Washer M12x32D, A4	7283.04.865
6	Hex Screw M12x30, A4	099.148
7	Slip Fitter for Elevated Flasher	SP.013252
8	Slip Fitter Set of Leveling Screws	SP.099.137
9	Slip Fitter Mounting Hardware Kit	1406.00.395
10	4-Pole Cable Assembly with Phoenix Connector, for EL817D, (includes cable gland and terminals), 280 mm	SP.205.046
10	4-Pole Cable Assembly with FAA Style 1 Connector, for EL817D, (includes cable gland and terminals), 300 mm	SP.205.016
11	Cable gland M20x1.5	SP.091.952
12	Pressure Release Screw Kit (includes o-ring), 10pk	SP.4072.24.940

Note

The above table lists the spare parts for the RELIANCE elevated flashing light EL 817D-SFL/TIL. For spare parts for the AXON elevated flashing light, including the RFID AXON Flasher Programming Tool, see UM-5078.

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Figure 28: MCU800D Spare Parts

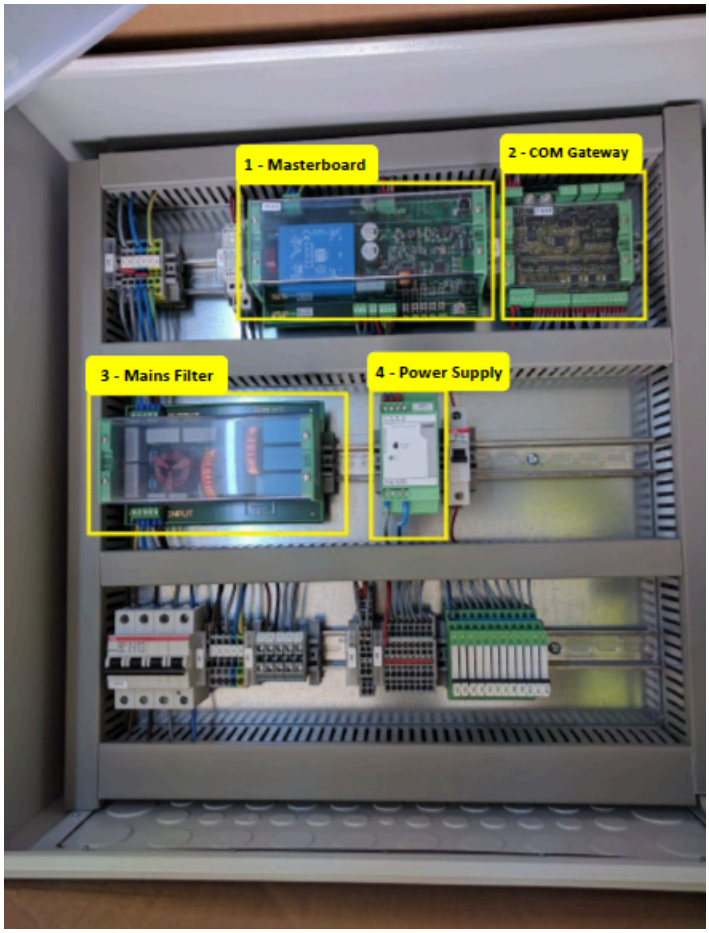


Table 19: MCU800D Spare Parts

Item	Description	Part Number
1	Master Board	SP.A3446
2	Communication Gateway	SP.A3447
3	Mains Filter PCB	SP.A3913
4	Power Supply Unit, MINI-PS-100-240AC/24DC/2	SP.A1608
Not Pictured	Comm Interface Local GCIL001	SP.A3905
Not Pictured	USB Cable, 2m	SP.A4756

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Appendix A: INTEROPERABILITY

Table 20: SFL/TIL (IL868D)

Base type	Required O-ring	Bolt installation		Stud installation	
		Required dimension	Recommended torque	Required nut	Recommended torque
ADB 12 in Eurobase	O-ring D259.3×5.7 SP.013114/10 pc SP.013115/100 pc	1411.20.482, metric screw kit 12 in M10×25 mm	21 Nm + Loctite 2701 or 638	1411.20.500, self-locking nut kit 12 in M10 H100	21 Nm[1]
L-868 with flange	O-ring D259.3×5.7 SP.013114/10 pc SP.013115/100 pc	1411.20.452, UNC Screw kit	Reference EB83	N/A	N/A

[1] Do not use Loctite or washer with self-locking nut.

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Appendix B: Support

Your airport needs fast, reliable support when technical issues affect operations. ADB SAFEGATE provides 24/7 phone support by experienced technical service and support teams to help you troubleshoot issues and reduce disruption.

For general product information, solutions and more, visit the ADB SAFEGATE website, www.adbsafegate.com.

Global Technical Service & Support

For support in Europe, the Middle East, Africa and Asia Pacific, contact ADB SAFEGATE's technical support specialists. Trained in all areas of system issues, troubleshooting, quality control and technical assistance, our highly experienced Technical support specialists offers 24/7 phone support.

- Europe: **+32-2-722-17-11**
- China: **+86-10-8476-0106**
- Middle East and Africa: **+971-4-452-7575**

Live Technical Support – Americas

For support in the Americas, contact ADB SAFEGATE's U.S.-based technical support specialists. The team provides support for airfield lighting products, power and control systems, weather systems, and Safedock A-VDGS.

Phone support is available 24/7.

- United States: **+1-800-545-4157**
- Canada: **+1-905-631-1597**

You can also reach the Americas support team by email during regular business hours:

- Airfield Technical Service: techservice.us@adbsafegate.com
- Apron (previously Gate) Technical Service: gateservice.us@adbsafegate.com
- Weather Customer Service: CustomerServiceWeather@adbsafegate.com

Before You Call

Help us resolve your issue faster by having the right information ready before you contact Technical Support.

For Airfield Lighting, Control Systems, and Weather Product Issues

Please review the following before calling:

- Review the product manual and troubleshooting guide.
- Be near the product and ready to troubleshoot.
- Have a True RMS Multimeter available, along with any other necessary tools.
- Have the following information ready:
  - Airport code
  - Company name, phone number, and email address
  - Product number or part number, if available

For Safedock A-VDGS Issues

Please collect the following information before calling:

- Gate number
- Flight number
- Aircraft type
- Time of the event
- Description of the issue
- Any actions already taken to resolve the issue
- CCTV footage of the incident, if available, to help align the event with the Safedock log file

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B.1 Recycling

B.1.1 Local Authority Recycling

The disposal of ADB SAFEGATE products is to be made at an applicable collection point for the recycling of electrical and electronic equipment. The correct disposal of equipment prevents any potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling. The recycling of materials helps to conserve natural resources. For more detailed information about recycling of products, contact your local authority city office.

B.1.2 ADB SAFEGATE Recycling

ADB SAFEGATE is fully committed to environmentally-conscious manufacturing with strict monitoring of our own processes as well as supplier components and sub-contractor operations. ADB SAFEGATE offers a recycling program for our products to all customers worldwide, whether or not the products were sold within the European Union (EU).

ADB SAFEGATE products and/or specific electrical and electronic component parts which are fully removed/separated from any customer equipment and returned will be accepted for our recycling program.

All items returned must be clearly labeled as follows:

- For Restriction of Hazardous Substances (*RoHS*)/Waste Electrical and Electronic Equipment (*WEEE*) Recycling
- Sender contact information (Name, Business Address, Phone number).
- Main Unit Serial Number.

ADB SAFEGATE will continue to monitor and update according for any future requirements for *EU directives* as and when *EU member states* implement new *regulations* and or *amendments*. It is our aim to maintain our *compliance plan* and assist our customers.

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