RELIANCE Intelligent Lighting
Platform III

User Manual

UM-5005, Rev. 005, 2022/04/25

ADB SAFEGATE

A.0 Disclaimer / Standard Warranty

CE certification

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.

ETL certification

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

All Products Guarantee

ADB SAFEGATE will correct by repair or replacement per the applicable guarantee above, at its option, equipment or parts which fail because of mechanical, electrical or physical defects, provided that the goods have been properly handled and stored prior to installation, properly installed and properly operated after installation, and provided further that Buyer gives ADB SAFEGATE written notice of such defects after delivery of the goods to Buyer. Refer to the Safety section for more information on Material Handling Precautions and Storage precautions that must be followed.

ADB SAFEGATE reserves the right to examine goods upon which a claim is made. Said goods must be presented in the same condition as when the defect therein was discovered. ADB SAFEGATE furthers reserves the right to require the return of such goods to establish any claim.

ADB SAFEGATE's obligation under this guarantee is limited to making repair or replacement within a reasonable time after receipt of such written notice and does not include any other costs such as the cost of removal of defective part, installation of repaired product, labor or consequential damages of any kind, the exclusive remedy being to require such new parts to be furnished.

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Standard Products Guarantee

Products manufactured by ADB SAFEGATE are guaranteed against mechanical, electrical, and physical defects (excluding lamps) which may occur during proper and normal use for a period of two years from the date of ex-works delivery, and are guaranteed to be merchantable and fit for the ordinary purposes for which such products are made.

Note

See your sales order contract for a complete warranty description.

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.

FAA Certified products manufactured by ADB SAFEGATE

ADB SAFEGATE L858 Airfield Guidance Signs are warranted against mechanical and physical defects in design or manufacture for a period of 2 years from date of installation, per FAA AC 150/5345-44 (applicable edition).

ADB SAFEGATE LED products (with the exception of obstruction lighting) are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years from date of installation, per FAA EB67 (applicable edition). These FAA certified constant current (series) powered LED products must be installed, interfaced and powered with and through products certified under the FAA Airfield Lighting Equipment Program (ALECP) to be included in this 4 (four) year warranty. This includes, but is not limited to, interface with products such as Base Cans, Isolation Transformers, Connectors, Wiring, and Constant Current Regulators.

Note

See your sales order contract for a complete warranty description.

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.

Liability

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.

ADB SAFEGATE cannot be held responsible for injuries or damages resulting from non-standard, unintended uses of its equipment. The equipment is designed and intended only for the purpose described in the manual. Uses not described in the manual are considered unintended uses and may result in serious personal injury, death or property damage.

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

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.

1.1 Safety Instructions for airfield lighting systems

- Systems are operated from the mains with electrical voltages that are dangerous when touched. Maintenance and installation work on products and systems must be carried out only by properly trained personnel.

Note
Briefing, training and qualifications of the personnel involved, plus occupational safety, are the operator's responsibility.

- Before beginning work, the power supply must be switched off and secured against unintended restarting.
- The instructions provided in the technical documents must be complied with.

Note
These instructions contain information relevant to protection of the user, the maintenance personnel and other persons, objects in the surroundings of the equipment, and for proper operation.

Note
Important instructions are specially designated as such. These instructions must be meticulously followed to avoid accidents and damage to the equipment.

- Actions described in ICAO Airport Services Manual Part 9, "Airport Maintenance Practices" and FAA Advisory Circular AC 150/5340-26 "Maintenance of Airport Visual Aid Facilities" must be complied with.
- As a basic principle, during all works on electrical systems and equipment the accident prevention regulations laid down by the Employers' Liability Insurance Association must be complied with. This applies particularly for Accident Prevention Regulations BGV A3 (formerly VBG4) Electrical systems and Equipment, Employers' Liability Insurance Association's Instructions for Health and Safety at Work, Employers' Liability Insurance Association for Precision Engineering and Electrical Engineering BGFE.
- Work on airport lighting systems must, in accordance with EN 61821 (VDE 0161 Part 103), be carried out only by appropriately qualified personnel. Accordingly, all persons performing such work must possess relevant and documented training as well as fit-for-purpose experience and technical knowledge.
- Read installation instructions before starting installation.
- Contact ADB Safegate if you have any questions.
- Check warranty conditions for respective products. For further information visit adbsafegate.com/product-center/services-and-training/services-americas/warranty/ or adbsafegate.com/product-center/services-and-training/services-americas/product-returns/

1.2 Safety Messages

HAZARD Icons used in the 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 symbol 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.

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 this instruction can result in serious injury 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.
- 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.

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

- Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

Failure to follow this instruction can result in serious injury or 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 and kept free of condensation and dust.

Failure to follow this instruction can result in equipment damage

1.2.4 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 equipment damage

1.2.5 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. Repair or replace the malfunctioning component according to instructions provided in its manual.

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

1.2.6 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

1.2.7 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

2.0 Introduction

2.1 How to work with the manual

The **Safety** chapter contains general safety instructions regarding work with the RELIANCE™ Intelligent Lighting system. Instructions related to special actions are integrated into the different chapters wherever needed. For your own safety: Read the safety instructions thoroughly before starting work.

The **Introduction** chapter contains general information about the RELIANCE IL system like system components, technical data, characteristics and benefits.

The chapters **Installation, Operation, Maintenance,** and **Support** are activity-based chapters dedicated to special purposes within the product life cycle.

You can read the user manual as a whole for information or look up some details of interest for you. Please contact ADB SAFEGATE if you have further questions.

Tip

1. Familiarize with the structure and content.
2. Carry out the actions completely and in the given sequence.

2.2 Parts Supplied

The RELIANCE™ IL system consists of the following components:

- RELIANCE IL SRU *remotes* (also named SRUs or RUs) of the type that fits best to your system requirements
- the Control and Communication Unit (also named Central Unit or CU) that is built into the Control System for Airfield Lighting CCR type E
- the RFID handheld reader, and
- the maintenance software tool lucDMC

Note

As the delivery scope depends on your project, i. e. your individual system configuration, there can not be given a general parts supplied list. Contact ADB SAFEGATE sales and project management team for a parts list of your purchase order or personal consultation if needed. In general, your parts supplied list is part of your project documents.

2.3 Introduction to RELIANCE IL

The ADB SAFEGATE RELIANCE IL is one module of the Control System for Airfield Lighting (COSAL).The RELIANCE IL system (formerly called SCROLL) is fully integrated into the COSAL system and extends the functionality of conventional serious circuits providing control and monitoring features for individual lights, light segments or sensors using the serious circuit itself. RELIANCE IL needs no additional communications cable. That is why it is an important component of a modular A-SMGCS concept.

The ADB SAFEGATE RELIANCE IL consists of SRU remotes (also named RU) with FAA compliant connectors and a Control and Communication Unit (Central Unit, CU). The remotes are installed between the series circuit transformers and the Constant Current Regulator (CCR). The CU is installed directly into a slot of the CCR.

The close interaction between the CCR and CU, that is achieved by means of the internal communications connection, is a crucial prerequisite required to avoid overvoltages. Overvoltages are found in many systems, especially when huge light segments are switched all at once.

Four different types of remotes have been designed to allow the user to handle all possible kinds of lighting control:

- SRU 101: to control lights with one beam direction
- SRU 102: to control lights with two independent beam directions and only one secondary transformer connected
- SRU 111: to control lights with one beam direction, with redundant voltage limiting circuits to act as a part of a *SELV* configurated series circuit.
- SRU 112: to control lights with two independent beam directions and only one secondary transformer connected, with redundant voltage limiting circuits to act as a part of a "SELV" configurated series circuit

  Specific configurations for different lights switched in series by only one remote are also possible, as RELIANCE IL is available with a 300 W output. Using the parameterizing software lucDMC, individual control and monitoring numbers (addresses), communication parameters and segment numbers are assigned to the remotes via the series circuit line. The parameterization can also be done with the RFID reader DRH100.

  A blink feature can be set optionally. The blink feature is used for *RGLs* or *Runway Holding Position Lights* (*RHPL*). Communicating with the CUs, a centralized synchronization of the blink features of all remotes in a series circuit can also be established optionally.

  No manual adaptions or long-termed commissioning for the individual circuits are necessary, as the settings are programmed to be overtaken automatically every time the series circuit is switched on.

2.4 Functional description

The ADB SAFEGATE RELIANCE IL is a successor product of the COSAL SCROLL ILCMS system. RELIANCE IL allows the user to control and monitor individual lights in a constant current driven lighting series circuit. Individual lights or segments can be switched separately in a series circuit. This feature makes it possible to map an entire runway and / or taxiway or to group switchable stop bars with a common power supply. The system is designed to build up fail-safe airfield ground lighting systems. The RELIANCE IL SRU remotes serve to monitor every single light within a series circuit. RELIANCE IL (known in the industry as an *ILCMS*) form the basis of a dynamic runway map for lighting and precise monitoring, including detection of failures in neighboring components as required in ICAO Annex 14. The circuit is steerable phased, based on a thyristor and achieves *Root Mean Square* (*RMS*) currents of 1.6 to 6.6 Amperes (0.1 to 100 % light intensity).

The Airfield Ground Lighting Control and Monitoring System (ALCMS) processes control commands sent by *Air Traffic Control* (*ATC*) panels or *Aviation Safety Monitoring System* (*ASMS*) (e. g. radar monitoring) and decrypts the commands into logical lights segments and physical (often redundant) sections of a lighting circuits or single lights.

The lamp output is cut out by a electronic component when it receives a valid OFF command by the remote to force the series current to *bypass* the load. The *bypass* results in the lamp being switched off. The CCR is to be set completely OFF if all lights are supposed to be off. This action is meant to save energy.

In the opposite way, the *bypass* of the lamp is opened and the current flows through the lamp filament when the electronic component receives a valid ON command from the remote. The light switches ON. The outlet is bypassed when a overvoltage was measured at the lamp outlet. This way, high voltages at the lamp outlets are avoided.

Testing of the connected lamps is supposed to be executed cyclically with ON and OFF states in a cycle that is to be defined. Lamp test commands for sending the test results are fed into the series circuit automatically and cyclically when there are no detected commands.

The CU is installed into a slot of the CCR and monitors the data flow in the series circuit.

The CU listens the sensor line of the CCR and demodulates and filters the control commands. The CU also filters feedback created by the CCR and the remotes out of the series circuit marked by harmonic content. The CU forwards the calculated results to the Communication Unit of the CCR that is connected to the ALCMS.

CCR automatically resends the command when a faulty command is detected on the circuit line. This action is intended to guarantee a high level of reliability and reaction speed in case of a faulty command.

A special characteristic is that the CCR reduces the current synchronically to the control command if more than a defined percentage of the lights — relative to the dimensioning of the circuit and the number of lights that stay ON — must be switched off simultaneously to protect the circuit from overvoltages with damaging effects.

A method combining base band modulation of the voltage and a modified *Time Domain Multiple Access* (*TDMA*) is applied to avoid signal attenuation caused by the inductance of the transformer in the circuit. Applying this method the exchange of control commands and feedback between the CCR and the remotes is ensured. A fault-correcting, nested code with CCR check bits and a two-out-of-three selection method for data collection is applied to further increase communication reliability.

The remotes switch into fail-safe mode automatically after a defined time, if the the connection to CU is interrupted. The fail-safe mode might be set individually for every remote to the states ON or OFF.

Note

ON equals operation with the blink feature, if *RGL* operation is activated at the same time.

2.5 Functional Description Self-test Feature

The self-test consists of two switches inside the remote measuring the output voltage of the remote independently from each other and limit it. A SRU type 111 or 112 has two independent switches to handle single failures . To deactivate one of them via lucDMC to test whether one is broken. To understand this functionality, you can read the following steps of the self-test procedure executed by the remote switch(es):

Test Steps — Self-test:

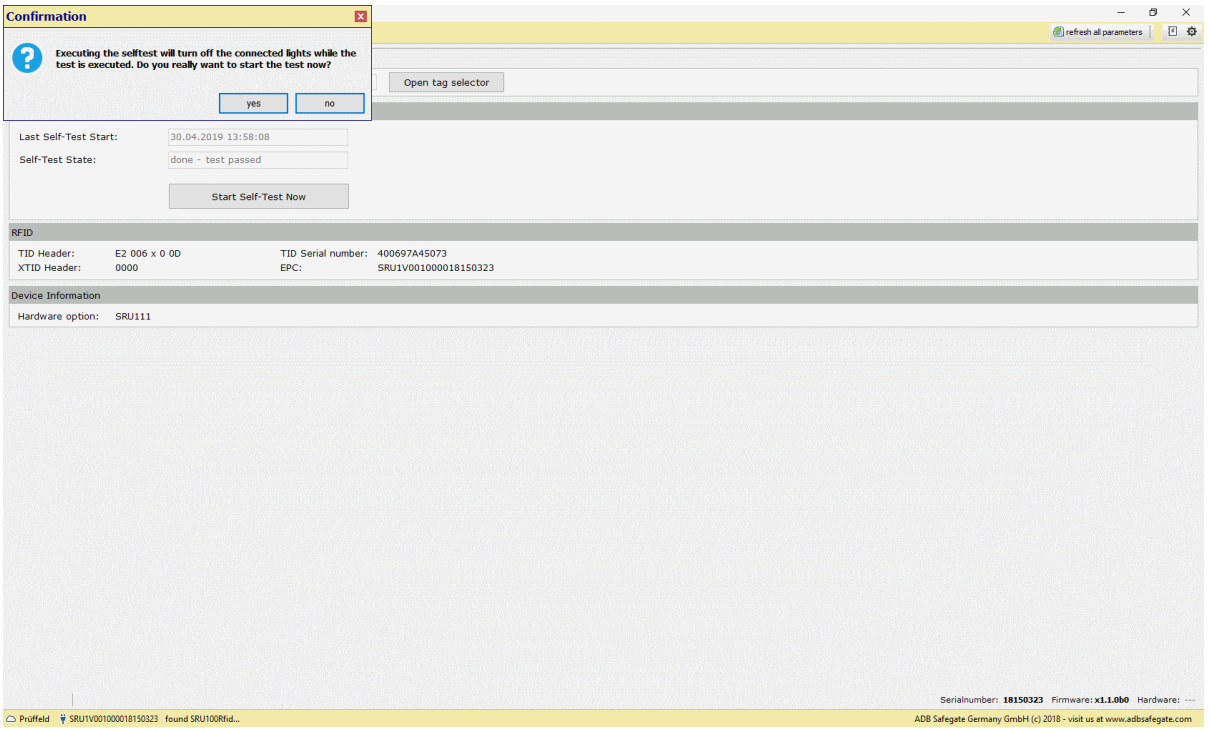
1. Check if current of the series circuit is above 4.0 A and remember last stored state.
2. Use lucDMC and the RFID reader DRH100 to start the self-test.
3. Check the result of the self-test.

Note

During the self-test, the lights will switch off.

The message "test done — test passed" is displayed in the **self test state** field if the test result was positive.

Figure 1: Test state — test passed



The test will be denied, the message is an indicator for a broken device.

If you choose the wrong current (less than 6,6 A), the error message "Test denied — wrong current" is displayed in the **self test state** field.

2.6 Planning data, restrictions and performance data

The current RELIANCE IL supports the operation of 70 individual lights (with single-channel remotes) or 140 individual lights (with dual-channel remotes) within one series circuit because the number of transformers is limited to 70. At the same time, individual co-ordinations of the CU and the remotes are avoided by setting a maximum value of an odd number. It is good to have (numbers of remotes + 10) to improve the reliability of communication.

Lights have to be grouped into segments and assigned to a segment address wherever it makes sense to do so in order to establish an optimized system implementation. It is possible to use up to 24 segment addresses (circuit segments) within one circuit. 24 segments can be switched by default. Segment size can vary from one to a maximum of 127 remotes.

One or two segment addresses are used if remotes are switched to ensure a completely independent operation of the connected lamps.

Highest level of reliability is achieved by choosing a rated output for the secondary transformer that is twice as high as the power loss of the equipment (usually lamps and secondary cables) connected to the lamp outlets of the remotes (SRU type 101 and 102 or 111 and 112). The power has to be at least 200 W.

Up to 24 lamps or lamp segments can be switched at once with one control command lasting less than one second.

Valid information related to blown halogen lamps or failed functions of remotes (hardware errors) are rated cyclically. Cycle time can be set to values from five seconds to several minutes.

NOTICE

It is important that, if components of the new RELIANCE IL are integrated into your circuit, the remaining components must be compatible.

2.7 General Information

2.7.1 Individual Light Control and Monitoring System

Compliance with Standards

European standards	DIN EN 62870 (VDE) 0161-105-SELV-2016-06
CE	

Uses

- ADB SAFEGATE — COSAL® (Control System for Airfield Lighting) powers, regulates and monitors individual lights in electrical series circuits
- Allows ATC (Air Traffic Controllers) to control centrally and remotely and monitor individual lights for Approach, runway, taxiway, stop bars and apron
- Communicates via existing airfield series circuit power line
- RELIANCE™ Intelligent Lighting (IL) is a module of the COSAL system to control and monitor individual lights remotely

Features

- Blink feature to control Runway Guard Lights (RGL)
- Cyclic lamp failure detection with parameterizable cycle setup

Benefits

- More safety and ground traffic efficiency
- No master unit necessary
- Central unit (CU) configurable via lucDMC; Remote units configurable via CU or RFID (with lucDMC)
- Thyristor controls the series circuit current and generates control commands sent to the RELIANCE Intelligent Lighting SRU in the series circuits
- Control and Monitoring System (CMS)
- No extra data cable for communication with remote units (RU) required
- Low power losses, low power consumption
- Up to 70 RUs and 24 segments per circuit
- Blink feature to control position holding lights and runway guard lights (optional)
- Capability to synchronize blink features (optional)
- Data transfer using a fault detecting code
- SRU types 111 and 112 provide output voltage < 50 V RMS to support SELV systems according to DIN EN 62780
- Redundant field bus interface in CCR and CU
- Low cost for maintenance due to feedback from the lamps
- It is possible to parameterize the remote without any power supply
- Reliable communication
- Protection of the light circuit against overcurrent in case of sudden load changes when big light segments are switched due to full integration of the regulator
- Automatical resending of commands for improved data transfer security
- Remote programming via the series circuit possible
- Synchronization of runway guard lights (optional)
- Cyclic lamp failure detection with adjustable cycle times
- Fail-safe mode can be set to ON or OFF for every remote

Design

- RELIANCE Intelligent Lighting consists of a CU for controlling and communication as well as various remotes
- RELIANCE Intelligent Lighting SRUs, are installed via plug-in connectors, compliant with the FAA requirements, between the lights and the lamp transformers of the series circuit

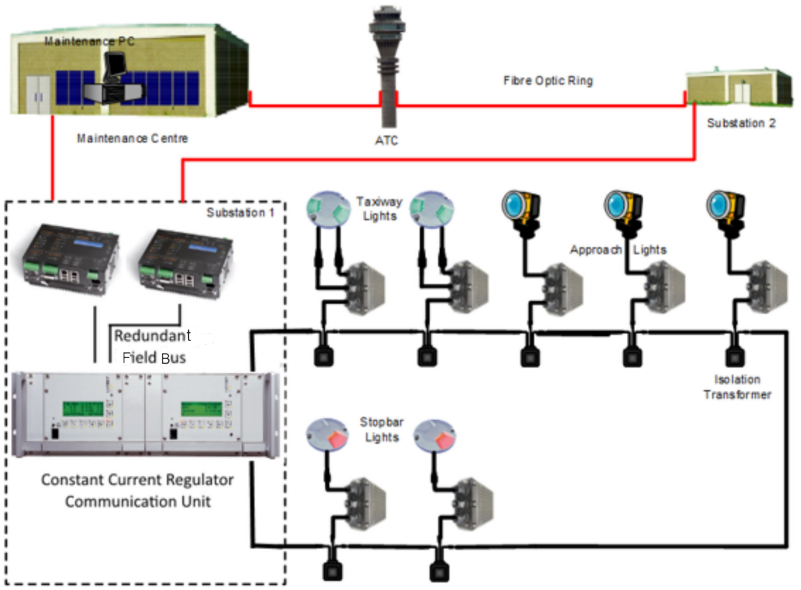
Recommendations and further Requirements

Reuse of existing installations and layout with maximum cable length or number of lights is to be verified.

Specific requirements for lamp transformers, e. g. in DIN EN 62870 systems, must be taken into account. Contact your technical sales representative for more information.

E-I-core transformers with 200 W power are recommended. An ADB SAFEGATE CCR type E is required as part of your RELIANCE ILCMS.

Network Topology



Option with RELIANCE Intelligent Lighting Central Unit (RELIANCE Intelligent Lighting CU) for RELIANCE Intelligent Lighting with Remote

In ADB SAFEGATE COSAL Constant Current Regulators E (CCRE) type 501-E, 505-E, 506-E, 805-E, 105E, 531-E, 525-E and 117-E is a RELIANCE Intelligent Lighting CU (which equals a master unit used by competitors). These regulator types are designed especially for use with RELIANCE Intelligent Lighting system when combined with a RELIANCE Intelligent Lighting SRU single-channel (type 101 or 111) or dual-channel remote (102 or 112). See ordering code table.

Optional RELIANCE Intelligent Lighting Remote with Voltage Limiter for DIN EN 62870 Systems

The RELIANCE Intelligent Lighting SRU type 111 and 112 is equipped with an optional voltage limiter to support your DIN EN 62870 system.

Circuit Specifications

Number of controlled and monitored lamps per circuit	70 individual lamps with single remotes; 140 individual lamps with dual remotes
Max. number of operated segments	24 segments at the same time
Max. number of remotes per segment	70
Switchable lamps per remote	1 or 2 depending on the SRU type
Switching capacity per channel	315 W depending type of remote

Note

- We reserve the right to further develop the products, make technical changes and change our specifications and designs at any time without previous notification. Characteristics and features of the products may differ from given information. Therefore performance can be different from the one specified, especially if you do not follow the intended use or fail to comply with our instructions.
- The specifications and descriptions in this data sheet are valid for products delivered from 05/01/2020. For further information to this data sheet please the ADB SAFEGATE sales team.

2.7.2 Individual Light Control and Monitoring System

Compliance with Standards (current Version)

European standards	DIN EN 62870 (VDE) 0161-105-SELV-2016-06 (for SRU 111 and SRU 112 only)
CE	

Uses

The ADB SAFEGATE RELIANCE™ Intelligent Lighting (IL) SRU (formerly called "SCROLL Remote Unit") is a component of the RELIANCE Intelligent Lighting Individual Light Control and Monitoring System that ensures the communication of the regulator with the individual lights or light segments.

Design

The RELIANCE Intelligent Lighting SRU is available in two basic design variants, i. e. with one

(SRU 101 or SRU 111) or two channels (SRU 102 or SRU 112):

RELIANCE Intelligent Lighting SRU — variant with one channel	**RELIANCE Intelligent Lighting SRU — variant with two channels**
	

The SRU types with one output is designed for unidirectional lights and the SRU types with two outputs for bidirectional lights. The additional cable is the input from the secondary transformer.

Features and Benefits

- Remote units configurable via CU or RFID (with lucDMC)
- SRU type 111 and 112 as part of a SELV system limit no-load voltage at the output to < 50 V RMS
- Parameterizing via RFID without cabling or power supply

Operating Conditions

Environment / Operating temperature range	-40 °C to +65 °C / -40 °F to +149 °F)
Storage and transport temperature	-55 °C to +85 °C / -67 °F to +185 °F)
Environment pressure	below 3000 meters

Power Specifications

Max. output	• SRU 101: 315W@CF2 (single-channel) • SRU 102: 315W@CF2 (dual-channel) • SRU 111: 190W@CF2 (single-channel) • SRU 112: 95W@CF2 (dual-channel) **Note** CF = Crest Factor
Power storage after power-off	Memory remains for 1 sec.
Min. series circuit current	I_{min} 2.8 A
Max. series circuit current	I_{max} 6.6 A / 50 Hz
Max. power loss	P_D 9.8 W (WigWag - RGL lights) , 4 to 5 Watt without WigWag
Insulation voltage	U_{ins} 5 kV
Test voltage	U_{inst} 10 kV

Protection Details

Protection details	**Values**
Enclosure protection class	IP 68 / NEMA 6 P
Lighting protection according to DIN EN / IEC 61000	20 kA (8 / 20 micro sec.)

Dimensions

Length × width × depth	Approx. 270 (with cables) × 140 80 mm
	10.6 x 5.5 x 3.15 in
Weight without packaging	Approx. 1.6 kg
	3.8 lb
Weight with packaging (in cardboard box)	Approx. 1.9 kg
	4.3 lb

Optional RELIANCE Intelligent Lighting SRU with Voltage Limiter for DIN 62870 Systems

The RELIANCE Intelligent Lighting SRU type 111 and 112 is equipped with an optional voltage limiter according to support your DIN EN 62870 system.

Ordering Code

Note

- A-codes: The A-codes are referring to SRU remotes that are not parameterized by ADB SAFEGATE before delivery. They can be ordered as a reserve and be parameterized later on by the airport staff. They are intended for example for commissioning in projects planned in the future or as spare parts.
- P-codes: If a SRU with P-code is ordered, a product with A-code is parameterized for its specific location on the airport and delivered to the customer. Parameterized means that this remote was programmed for a special location (light) with the address code of this light and only works at its intended place. The P-code products are are used in system projects in which these remotes are planned before ordering.

Product name	Description	Ordering Codes [1]
SRU 101	Remote (single-channel) with one output and up to 315W@CF2 of power, for unidirectional light	P1174 (parameterized) A4639 (not parameterized)
SRU 102	Remote (dual-channel) with two outputs and up to 315W@CF2 per output, for bidirectional lights	P1254 (parameterized) A4640 (not parameterized)
SRU 111	• Remote (single-channel) with one output including a voltage limiter to < 50 VAC (to be part of a DIN EN 62870 system), for unidirectional light • With implemented self-test feature to be used as additional safety check and maintenance support tool, max. output power 190W@CF2	P1255 (parameterized) A4560 (not parameterized)
SRU 112	• Remote (dual-channel) with two outputs including a voltage limiter to < 50VAC (to be part of a DIN EN 62870 system), for bidirectional lights • With implemented self-test feature to be used as additional safety check and maintenance support tool, max. output power 95W@CF2 / channel	P1306 (parameterized) A4641 (not parameterized)

Note

CF = Crest Factor

Notes

1 Refer to the note on A- and P-codes and read it carefully before ordering remotes.

Packaging Information

	Dimensions	Gross Weight
Length x width x depth	Approx. 390 x 255 x 95 mm /	Approx. 0.3 kg /
	15.4 x 10 x 3.7 in	0.7 lb

Features

Feature	Value / operation	Description
Mains failure bypass	Last lamp state is stored for at least 1 s in the remote	Defines how long last state is preserved
Lightning protection	Installed	
Self- test	Can be executed via RFID reader and lucDMC	Tool for additional safety check and maintenance support
Voltage limitation for DIN EN 62870 systems	Implemented in SRU 111 and SRU 112	Limits no-load voltage in case of lamp failure
Parameterizable state after turning-on		
Lamp failure detection	Two programmable thresholds	Peak voltage monitoring and RMS voltage monitoring
Short-circuit monitoring		Applicable
Fail-safe mode	Parameterizable to on or off	
Interruption monitoring		Parameterizable

We reserve the right to further develop the products, make technical changes and change our specifications and designs at any time without previous notification. Characteristics and features of the products may differ from given information. Therefore performance can be different from the one specified, especially if you do not follow the intended use or fail to comply with our instructions.

The specifications and descriptions in this data sheet are valid for products delivered from 05/01/2020. For further information to this data sheet please the ADB SAFEGATE sales team.

2.7.3 Overvoltage Protection

The RELIANCE IL SRU types 111 and 112 have an overvoltage protection feature integrated.

In case of a lamp failure or an overload of the output, the remote shorts-circuits the lamp transformer to avoid overvoltages. [1]

NOTICE

SRU remotes may not be connected to a lamp transformer, when the system is supplied with power. *Voltage peaks* of the transformer may overload the protective elements causing remote destruction.

2.7.4 *Self-test* Feature of Remote Types 111 and 112

In types 111 and 112 is a *self-test* feature implemented.

With the *self-test* feature, the monitor themselves and control whether the integrated voltage limiter is working.

The self-test can be started by using the .

DANGER

The self-test is to be used only as an indicator that does not guarantee safety of your DIN EN 62870 system. Before working on the circuit, the system must be disconnected from the mains or the voltage limiter functionality must be controlled manually. The airport safety plan has to ensure, the remote is working well with external measurement equipment.

[1] Conventional transformers, that are not approved for DIN EN 62870 system, do not guarantee a secure disconnection from the primary circuit. Conventional transformers do not provide a protective separation.

2.7.5 Constant Current Regulator E with RELIANCE IL Central Unit and SRU with Voltage Limiter

Compliance with Standards

IEC	IEC 61822 IEC 62870 IEC / DIN EN 62821 (VDE 0161-103)

Overview description

The ADB SAFEGATE Control System for Airfield Lighting – COSAL® is used for supplying, controlling and monitoring series circuits.

The Constant Current Regulator type E (CCRE)® is a component of the COSAL® system. The CCRE was developed specifically for use in airport lighting systems, and is designed to ensure dependable supply to series circuits featuring lights or taxi traffic signs.

Power specifications

Input voltage (for single- or two-phase power supply)	230 V AC/ 400 V AC ± 10%
Input current, depending on the regulator type involved	Max. 50 A / 80 A / 100 A
Line frequency	50 Hz ± 7.5%
Output current	Max. 6.6 A
Efficiency	> 80 %
Remote control voltage	1 x 24 V DC / 10 W
Optional	1 x 48 V DC / 10 W

Design

The CCRE is designed as a 19-inch drawer, featuring at the front a back-lit 4-line LCD display, plus a membrane keyboard for parameterization and manual operator control. A cubicle system (which can also be provided in different installation heights) serves to accommodate a maximum of 8 regulator drawers with up to 16 control circuits. Both the power and control connections are established by plugging in the plug connectors provided at the rear.

Features

- Direct field bus connection (CAN, RCOM, MODBUS, Profibus - simple or redundant)
- Parallel interface available
- Connection of other field bus systems (e.g. Interbus S) possible using a bus converter
- All operating parameters can be modified using intuitive menu prompting and an integrated membrane keyboard
- Parameterization alternatively via serial parameterization interface (RJ45) on the front panel
- Continual display of the following operational data of the regulator:
  - Circuit designation (e.g. TXE 006, THR 19-1, etc.)
  - Setpoint values of the categories, the series circuit current and the power rate (optional)
  - Actual values of the categories, the series circuit current and the power rate (optional)
- Continual display of the following data from the series circuit:
  - Insulation resistance value
  - Lamp failure (percentage / numerical)
- Storage of all operational parameters on a replaceable memory card, obviating the need for recalibration after a regulator replacement
- Insulation resistance display integrated in the regulator drawer

- Microprocessor-controlled, fully digital
- 8 brightness levels
- Integration option for a remote providing individual lamp control (RELIANCE IL)
- 1 or 2 control circuits in a 19-inch drawer
- Can be supplied for system cubicles, combined cubicles or for compact regulators
- On-the-spot operator control using a membrane keyboard
- Option for switching between local and remote control using a toggle switch or a separate lock switch

Option with RELIANCE IL Central Unit (CU) for RELIANCE IL SRU

In ADB SAFEGATE COSAL® Constant Current Regulators E (CCRE) type 501_E, 505-E, 506-E, 805-E, 105E, 531-E, 525-E and 117-E is a RELIANCE IL Central Unit (which equals a master unit used by competitors). These regulator types are designed especially for use with RELIANCE IL when combined with a SRU type 111 (single-channel) or 112 (dual-channel). See ordering code table.

Optional SRU with Voltage Limiter for DIN EN 62870 Systems

The RELIANCE IL SRU type 111 and 112 is equipped with an optional voltage limiter according to DIN EN 62870 to support your SELV functionality.

Technical Data

Parallel interface	Input: 24 V DC / 10 mA Output: 24 V DC / 30 mA
Optional	Input: 48 V DC / 10 mA Output: 48 V DC / 30 mA
Field bus	CAN, RCOM, MODBUS, Profibus - simple or redundant
Brightness levels	8, user-configurable on each level within the tolerance range of the current
Response time and shut-down behavior to IEC 61822 Control rate	30 A/s
Control precision	1%
Humidity (non-condensing)	Max. 95% rel.
Installation site / air pressure	< 2000 m above sea level
Operating temperature range	-5°C – +50°C
Transport / storage	-25°C – +55°C
Protection class	IP 40
Dimensions (W x H x D)	483 x 132 x 509 mm

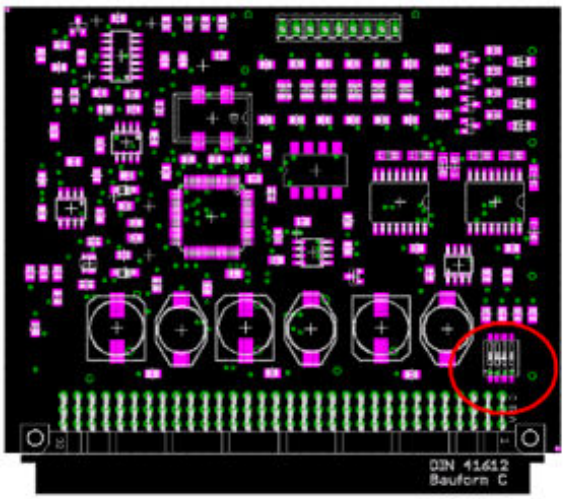
Ordering Code

Type	**Interface**			**Supply**				**Double CCRE**	**Lockswitch**
	CAN / RCOM	**Profibus**	**IL III**	**1-phase 50 A**	**2-phase 50 A**	**2-phase 80 A**	**2-phase 100 A**		
CCR 503-E	X			X					
CCR 507-E	X			X				X	
CCR 501-E	X		X	X					
CCR 505-E	X		X/X	X				X	
CCR 506-E	X		X/-	X				X	

CCR 806-E	X						X			
CCR 805-E	X		X				X			
CCR 106-E	X							X		
CCR 105-E	X		X					X		
CCR 530-E		X			X					X
CCR 531-E		X	X		X					X
CCR 522-E		X			X				X	X
CCR 525-E		X	X/X		X				X	X
CCR 116-E		X						X		X
CCR 117-E		X	X					X		X

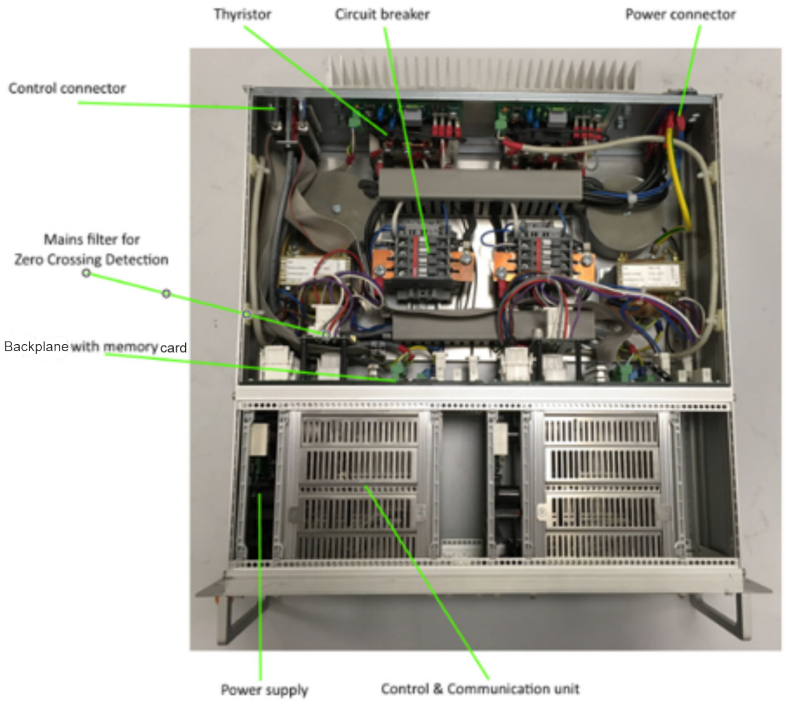
2.7.6 RELIANCE IL Control and Communication Unit

Figure 2: RELIANCE IL Central Unit



The ADB SAFEGATE RELIANCE IL Control and Communication Unit (CU) represents the functions of a master unit competitors sell. The Control Unit is — in contrast to competitor products — built into the ADB SAFEGATE Constant Current Regulator type E (CCRE®) with RELIANCE IL III option. It is an optional *Printed Circuit Board* (*PCB*) in the CCR that is detected by the ADB SAFEGATE CCR firmware. The CCR activates the RELIANCE IL SRU when the CU is detected. The Control and Communication Unit listens the series circuit and collects the feedback from the remotes. The feedback is sent to the CCR as telegrams.

Figure 3: COSAL CCRE with RELIANCE IL Central Unit



2.7.7 RFID Technology

All available ADB SAFEGATE devices can be parameterized using an RFID handheld reader in combination with lucDMC maintenance tool. See respective chapters for more detailed information.

2.7.8 RFID Handheld Reader DRH100

Compliance with Standards

European standards	UHF RFID, ETSI EN 302 208
CE	

Uses

- The ADB SAFEGATE RFID reader is a wireless data adapter that establishes a connection between ADB SAFEGATE remotes and ADB SAFEGATE software, and
- Allows the user to parameterize every ADB SAFEGATE remote equipped with a RFID antenna (indicated by the RFID symbol on or next to the remote)

Note

For usage it requires a PC with lucDMC software installed and a USB-A connector.

Features

- Buzzer (acoustic signal) and vibration alarm to indicate when connection is established
- Multi-function button (function is determined by the lucDMC software)

Technical Data

Max. RF output	Up to 50 mW
Electrical supply / input	5 V DC, 250 mA max. (via USB connector)
Temperature range	-20 °C to +50 °C
Protection class housing	IP 41
RFID standard	Standard short-range UHF RFID
Communication	5 V UART
Transmit frequency	868 MHz
Serial bus system	USB 2.0
Inflammability rating	ABS UL94 HB (flame retardant plastics)

Dimensions

Length × width × depth	Approx. 175 x 80 x 35 mm /
	6.89 x 3.15 x 1.38 x in
Weight without packaging	Approx.0,20 kg /
	0.44 lb
Weight with packaging (in cardboard box)	Approx. 0,35 kg /
	0.75 lb
Cable length	USB-C to USB-A ~1.50 m; 73.62 in (cable included in delivery)

RFID Label on the RELIANCE IL SRU

Every RELIANCE IL SRU is equipped with a label indicating where to place the RFID reader DRH100.

The orange connection waves symbol on the reader indicates where the RFID antenna is located, i. e. where the reader must be held in front of the remote to establish a connection.

lucDMC Interface for RELIANCE IL SRU Parameterizing

The RFID reader is designed to simplify RELIANCE IL SRU parameterizing process. Please contact the ADB SAFEGATE sales team for more information about the ADB SAFEGATE lucDMC (Device Management Console).

Scope of Delivery

- RFID handheld reader DRH100
- USB cable 2.0

Packaging Information

	Dimensions	Net weight
Length x width x depth	Approx. 345 x 245 x 75 mm /	Approx.0,15 kg /
	13.58 x 9.65 x x 2.95 in	0.33 lb

Note

- We reserve the right to further develop the products, make technical changes and change our specifications and designs at any time without previous notification. Characteristics and features of the products may differ from given information. Therefore performance can be different from the one specified, especially if you do not follow the intended use or fail to comply with our instructions.
- The specifications and descriptions in this data sheet are valid for products delivered from 05/01/2020. For further information to this data sheet please the ADB SAFEGATE sales team.

2.8 Maintenance Tool lucDMC

Description

The lucDMC program is used to parameterize a ADB SAFEGATE remote. For this purpose, you will need a parameterizing adapter by ADB SAFEGATE, as well as a network cable and a series cable (see also Section lucDMC Parameterizing Adapter). Installation of lucDMC is conditional on having a computer with Windows installed (10 or higher). In addition, various data from the device are displayed in graphical form. In addition, there are options for operating the constant-current regulator CCRE.

Uses

The ADB SAFEGATE lucDMC (Device Management Console) is a software compatible with all ADB SAFEGATE products. The tool is designed for configuration of circuit topologies and configuration of parameters.

The parameterizable settings may include among others:

- Auto symmetry correction
- interval to auto lamp check interval
- interval to Interval of command repeat
- intensity of modulation

The lucDMC tool also allows the user to:

- control circuit during commissioning
- check quality of feedback and
- store data on hard disk

Installation

For installation, the lucDMC CD-ROM has to be inserted in a suitable drive. Then you start the set-up program via the following path, and follow the instructions given:

“D:\\setup-lucDMC-vXXX.exe”

Important

The drive letter will depend on the system concerned. “XXX” in the filename stands for the program’s version number.

User Interface

ADB SAFEGATE devices can all be configured using lucDMC. lucDMC on your computer must be connected to the respective device to load the *Graphical User Interface* (*GUI*).

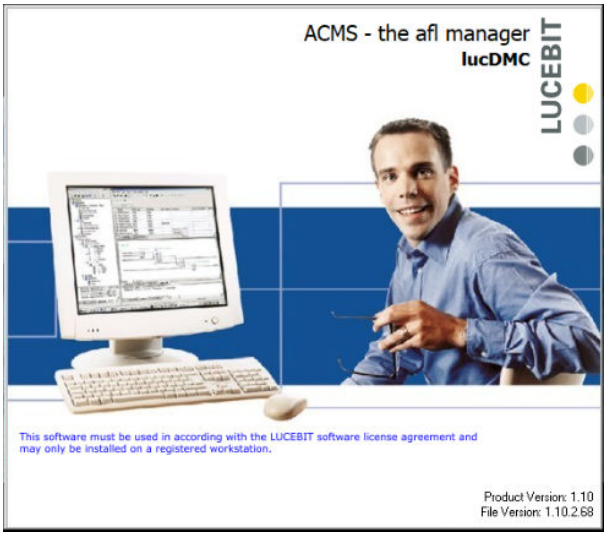
Note

lucDMC user interface looks different depending on the ADB SAFEGATE device connected. After connection has been established, the *GUI* design of the respective device is loaded due to device detection feature. Connections can be established via WLAN or USB cable depending on the device type.

2.8.1 User Interface lucDMC — main Start Window

When you start, you will see first the start window. There you will find the product version and the file version that may be requested for service purposes.

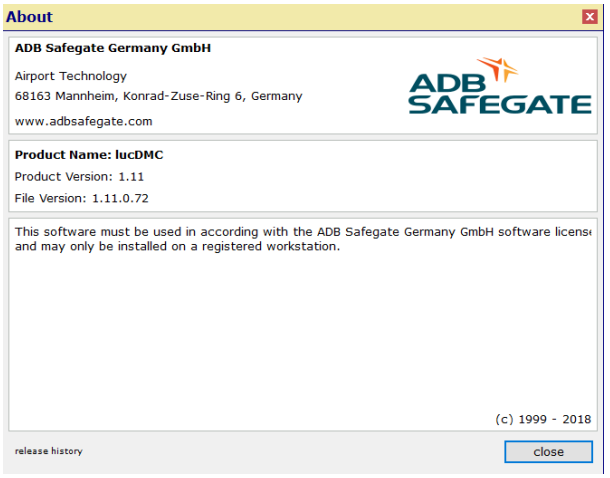
Figure 4: Start window — lucDMC



Note

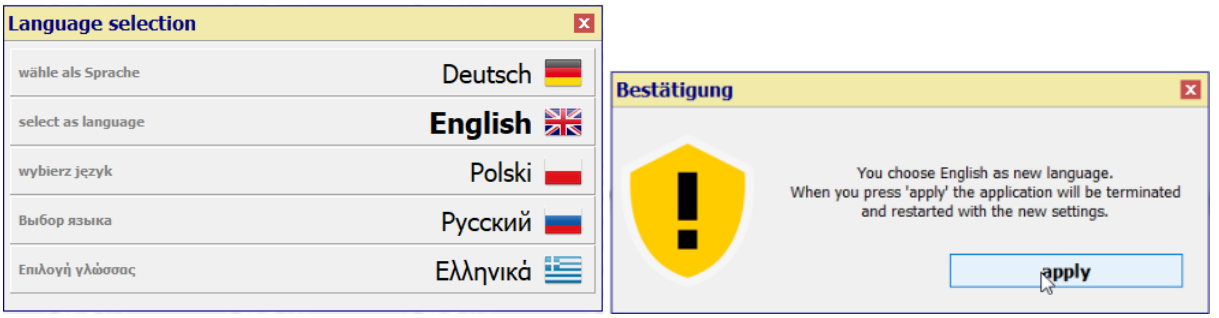
You can also find the version information clicking on the **About** menu point in the application window:

Figure 5: About window — lucDMC



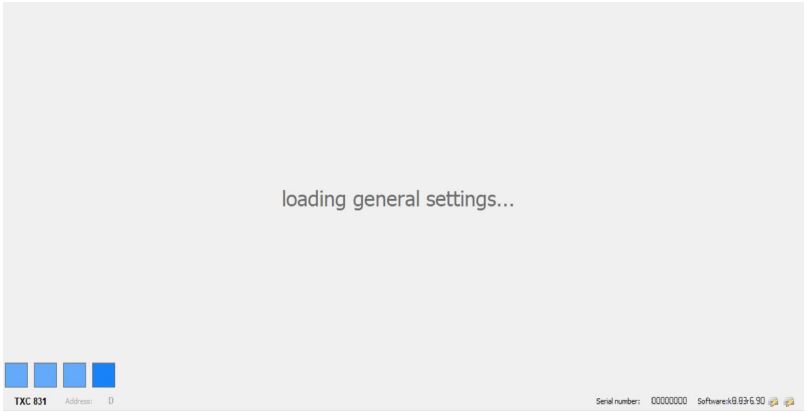
Then the **language selection** dialogue box will pop up: Select your language and confirm with the **apply** button.

Figure 6: Language selection window and confirmation dialogue box —lucDMC



After selecting the language, settings will load:

Figure 7: Start screen — loading settings



The main window is divided into three sections:

At the top is a toolbar with buttons for general functions.

In the middle section, different operator controls are displayed, depending on the particular device connected.

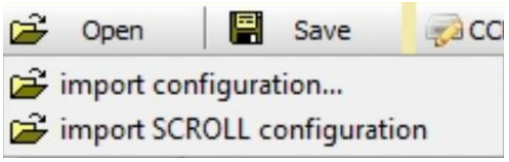
The bottom section contains the status line with information on **connection settings**, **connection status** and **manufacturer's data**.

Note

The operator interface will merely display the message `Searching for devices` **, if there is no** ADB SAFEGATE device connected yet.

2.8.2 User Interface lucDMC Toolbar

Figure 8: Tool bar lucDMC — menu Open > SCROLL configuration



With the **open** button, you can import a previous configuration file from a data carrier. The system will check whether the file selected is compatible with this device, if no ADB SAFEGATE device is connected yet.

When the pop-up menu is displayed for the constant-current regulator CCRE. You can choose from two options of the drop-down: **import configurations** or **import SCROLL configuration**.

For regulators equipped with RELIANCE IL, you can choose the menu option **import SCROLL configuration**. You can use this option to store the segment assignments of the remotes. The segment assignments of the remotes are stored separately here without regulator parameters.

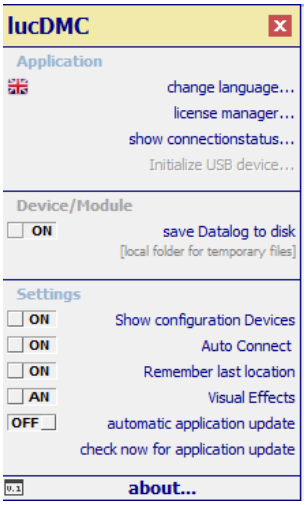
Use the "**save**" button to save on a data carrier the configuration of a device connected. This button will be displayed only if the computer has been connected to a ADB SAFEGATE remote or a configuration loaded beforehand.

2.8.3 lucDMC Overview — SCROLL Configuration

Device Configuration Tool lucDMC

When you click the settings button  , the following pop-up menu will be displayed:

Figure 9: Application window — lucDMC settings from toolbar



Under the **serial settings** menu option, you can set all the relevant interface parameters.

Under the **change language** menu option, you can choose between different languages. For this purpose, the application will be restarted.

Use the **license manager** menu option to request an user license from ADB SAFEGATE and install it after receiving it.

When you select the **connection status** menu option, the **connection status** window will be displayed at the bottom left.

Important

Program updates only work with an intact internet connection.

Note

If the **automatic application update** menu option has been switched on, then every time the program is started the system will automatically look for a new program version on the ADB SAFEGATE server.

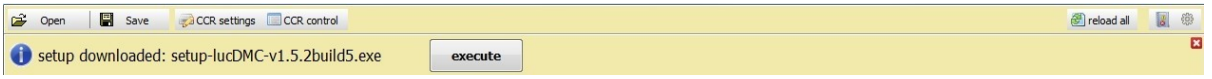
You can start this search routine manually straight away using the **check now for application update** menu option.

If there is a new program version available, the following message will be displayed under the toolbar:

Figure 10: Message `Update available` — lucDMC

After you click the **download** button, another message will appear:

Figure 11: Execute update download — lucDMC



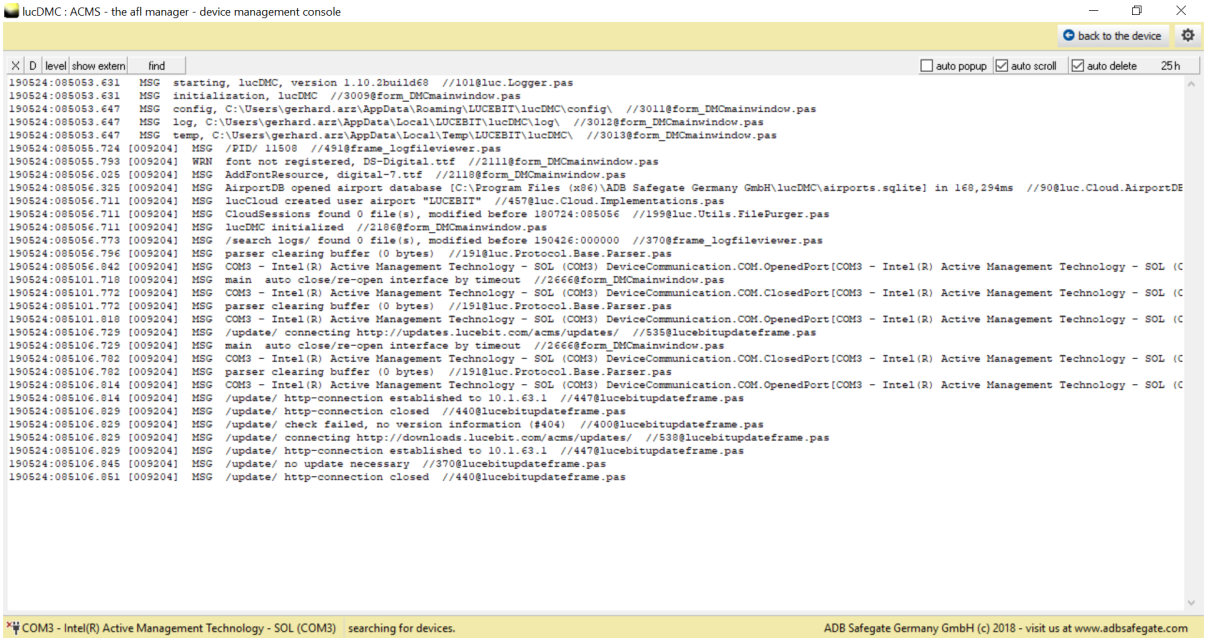
By clicking the **execute** button, you will first be asked if you want the setup file to be saved, and then the program update routine will be started. The further procedure is identical to that for first-time installation.

You can decline the offer of a program update at any time by using the red cross closing button .

Selecting the **About** menu option will open a window with information on the program and the manufacturer.

By clicking the  button, a log window with various event messages will be displayed in the middle section:

Figure 12: Event log — lucDMC



Note

A detailed interpretation of the messages is up to ADB SAFEGATE team. The messages are particularly important in the event of connection problems.

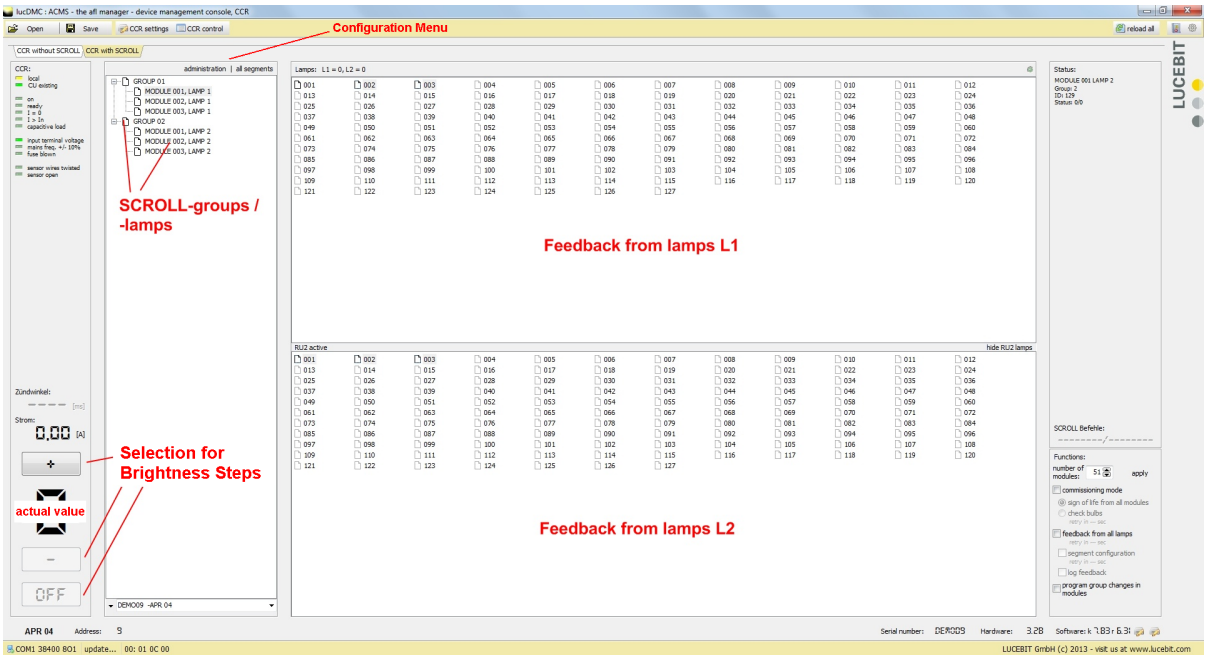
Additional buttons for data transfer will be displayed on the left next to the  button, in case a ADB SAFEGATE remote is connected.

You can use the **reload all** button to synchonize with parameters stored on the remote.

As soon as a parameter has been altered (control element marked in yellow), the button will be displayed. You can use this to send all altered parameters to the device.

Main View

Figure 13: Configuration menu — lucDMC

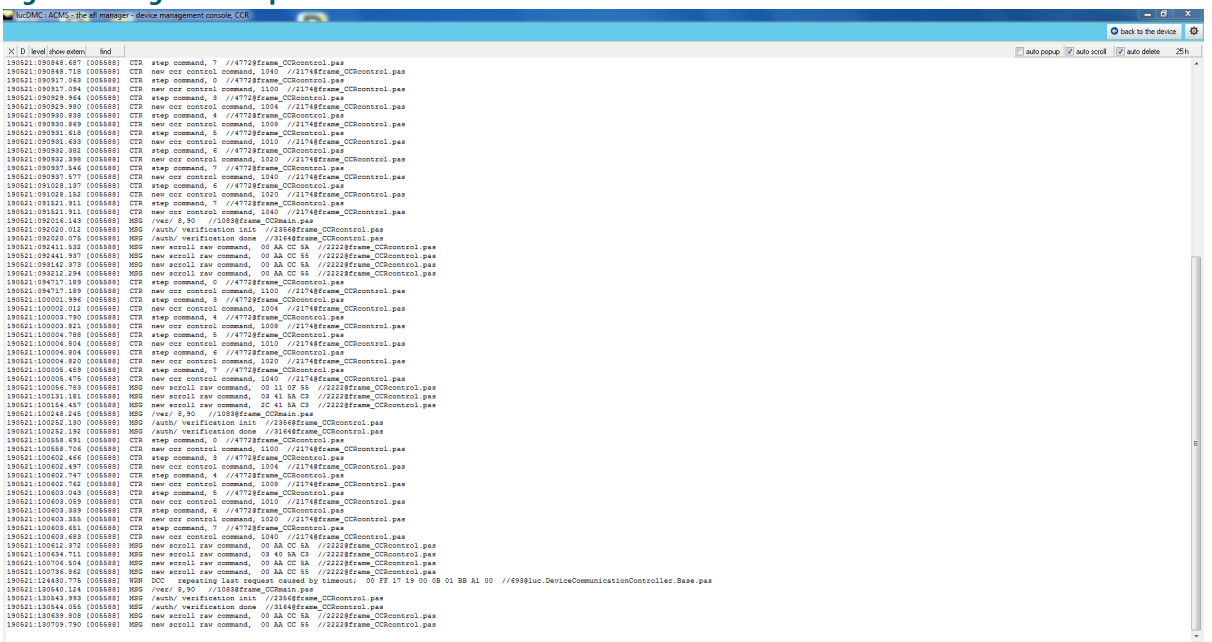


Expert Mode

Figure 14: Configuration menu — lucDMC

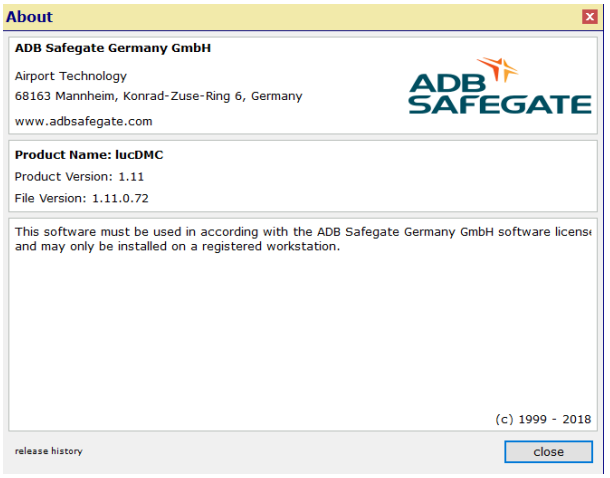
By clicking on the gear button you can select the **expert mode**. Here the expert mode log file can be opened and given it to the service technicians in case of service support:

Figure 15: Log file — Expert mode



About Window

Figure 16: About window — lucDMC



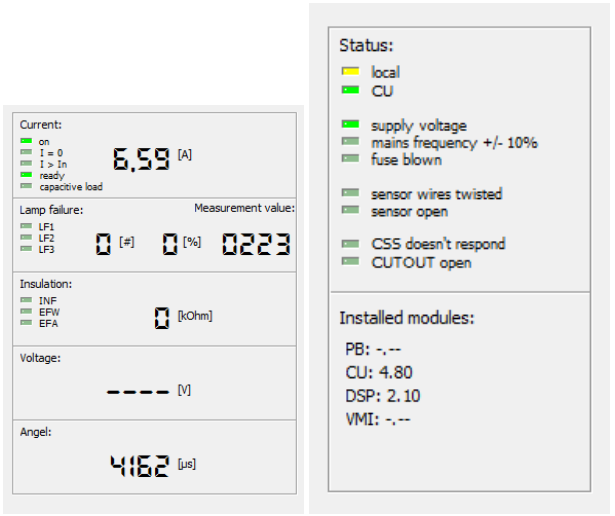
Click on **About** to open the **About** window. The window displays for example the current software version.

Note

The information displayed here may be important for service and maintenance purposes.

Statuses Regulator

Figure 17: Status view 1 and 2 — regulator lucDMC

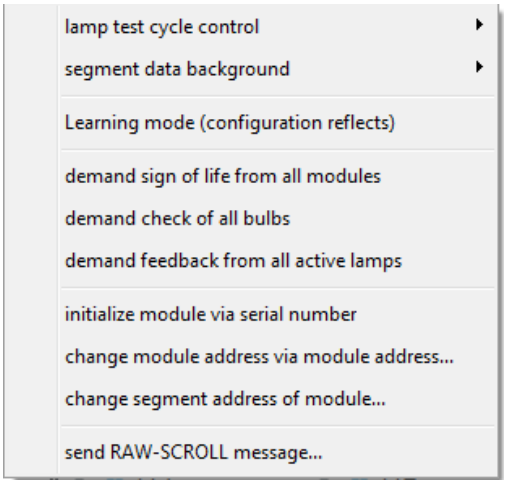


This status can be seen in the CCR and control tabs. It displays values and measurements set up for the regulator.

Administration Window — Configuration Menu for RELIANCE IL

Select a target level between 2.8 and 6.6 A to use the followings commands:

Figure 18: Commands drop-down menu — lucDMC



Command Legend

Demand sign of life from all modules

All remotes give feedback indicating the lamp 1's address.

Demand check of all bulbs

All remotes with working lamps give feedback indicating the addresses of remote 1 and 2.

Demand feedback from all active lamps

All remotes with enabled and working lamps give feedback indicating the addresses of remote 1 and 2.

Initialize module via serial number

Use this command to add a new remote to the series circuit.

Change module address via module address

Use this command to change the address of an previously parameterized remote.

Change segment address of module

Use this command to assign previously parameterized remotes to certain segments.

Send RAW-SCROLL message

Use this command to send all valid SCROLL telegrams, noted in the respective Excel table, to the remotes and the Central Unit.

lucDMC Tabs

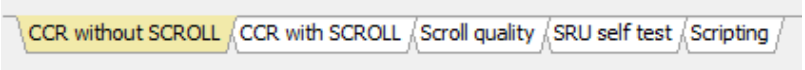


Table 1: lucDMC tabs

Tab name	Description
CCR without SCROLL	Menu to control regulators without SCROLL system
CCR with SCROLL	Menu to control regulators with SCROLL system
SCROLL quality	Menu that shows a diagram of received feedback from remotes
SRU self test	Menu to execute self-test feature (only available if self-test is implemented in the remote type — only for SRU 111 and SRU 112)
Scripting	Menu designed for product developers

lucDMC Icons

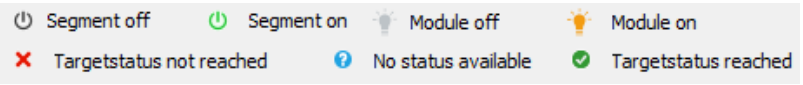


Table 2: Icons — lucDMC

Icon name	Description
Segment off	Segment is switched off
Segment on	Segment is switched on
Module off	Segment is switched off
Module on	Segment is switched on
Target status not reached	The switched state to be tested is not received (on or off) when sending feedback.
No status available	No feedback available as self-test has not been executed yet
Target status reached	The switched state to be tested is received (on or off) when sending feedback.

2.8.4 lucDMC Initialization

During the initialization phase, all parameters from the remote are transferrred to lucDMC. Various messages will appear in the operator interface, such as `searching for devices` followed by the name of the device concerned. In addition, a continuous display at the bottom on the left keeps you informed of the connection status.

Figure 19: Start window — loading configuration and settings

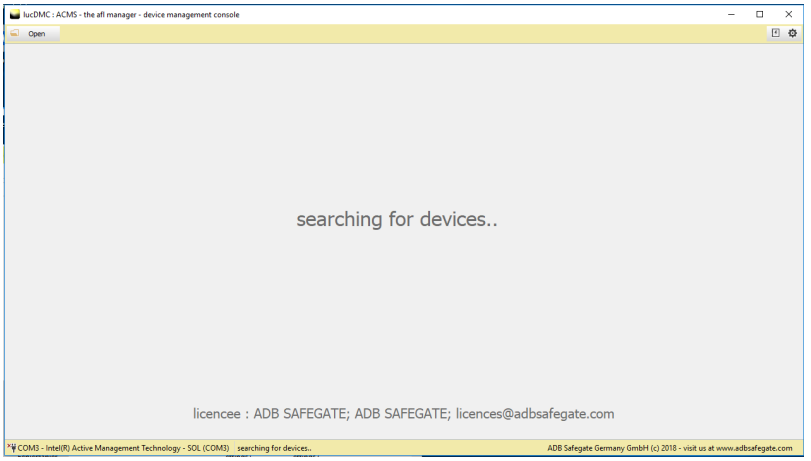
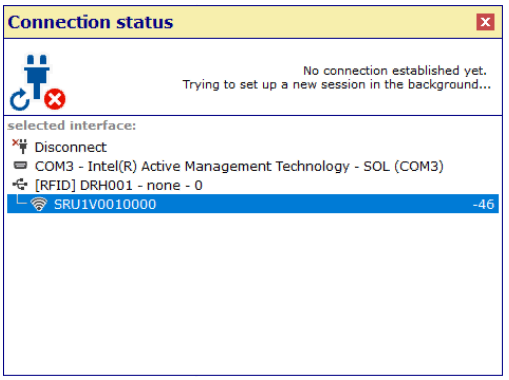


Figure 20: Connection status window



You can use the **CCR settings** button to display control elements in the operator interface for parameterizing the regulator.

You can use the **CCR control** button to display control elements in the operator interface for operating the regulator and for SCROLL configuration.

Above the status line, general information like circuit name and device address is continually displayed.

2.8.5 lucDMC General Settings

In the **general settings** tab, you can set regulator parameters like circuit name, brightness of the steps, etc. The meanings of the parameters can be found in the CCRE operating manual.

Figure 21: General circuit settings 1 — general settings tab

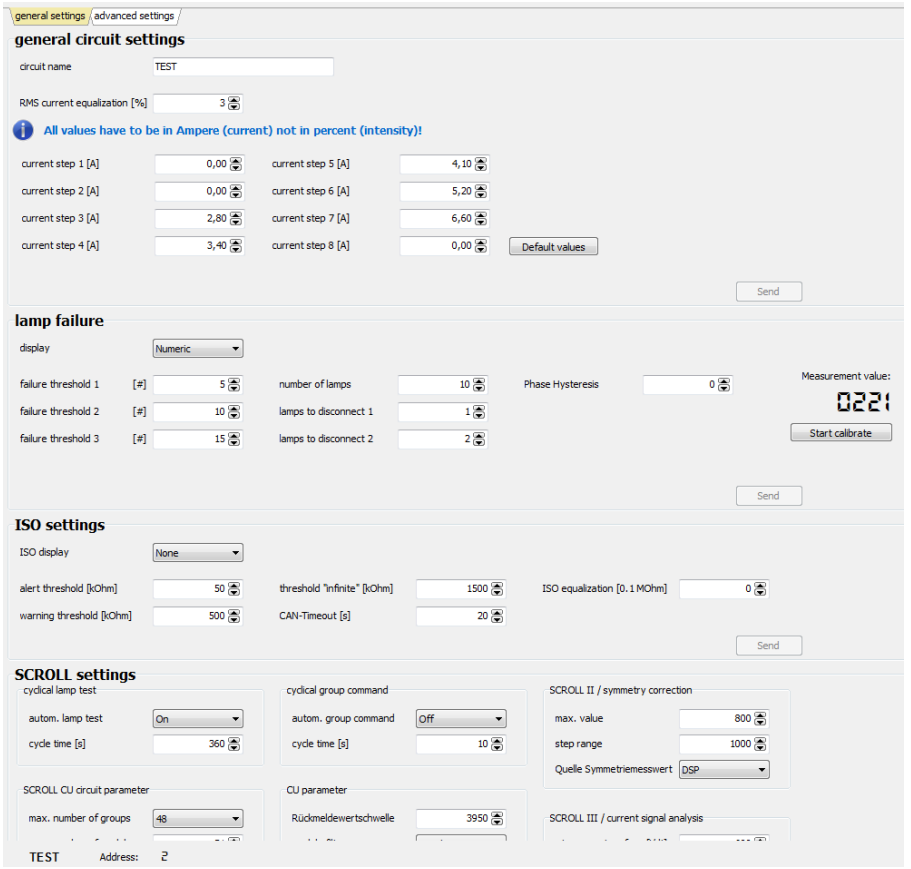
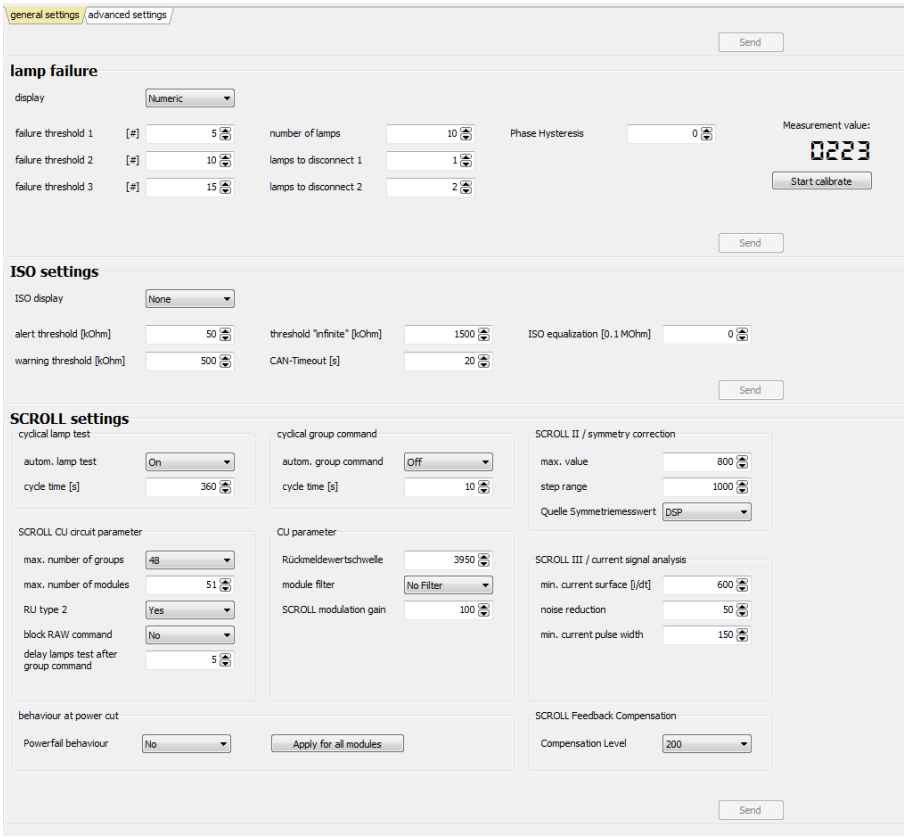
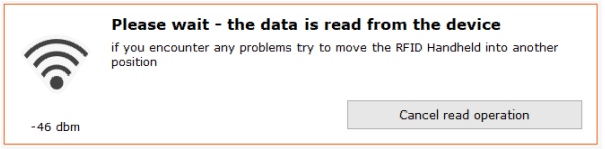


Figure 22: General circuit settings 2 — general settings settings tab



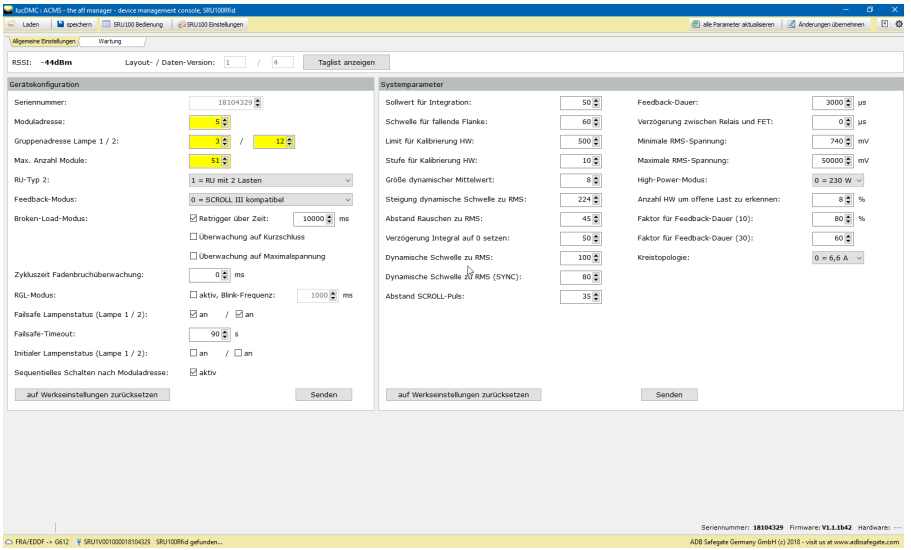
For RELIANCE IL configurations using the RFID handheld reader DRH100, the settings menu looks as below:

Figure 23: Dialogue box — reading data from device



Click on the remote on the list to configure or parameterize it.

Figure 24: Remote configuration via the RFID reader DRH100



2.8.6 IucDMC Advanced Settings

Under the **advanced settings** tab, you can set regulator parameters like PID contents, firing angles, etc. The meaning of the parameters can be found in the CCRE operating manual and will not be detailed here.

Important

All advanced settings are to be set only by properly trained personnel. Failure to follow the instruction may result in system breakdown.

CAUTION

Only skilled personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.

Note

Read all system component manuals before operating the equipment. A thorough understanding of system components and their operation will help you operate the equipment safely and efficiently.

Figure 25: Regulator parameters 1 — advanced settings

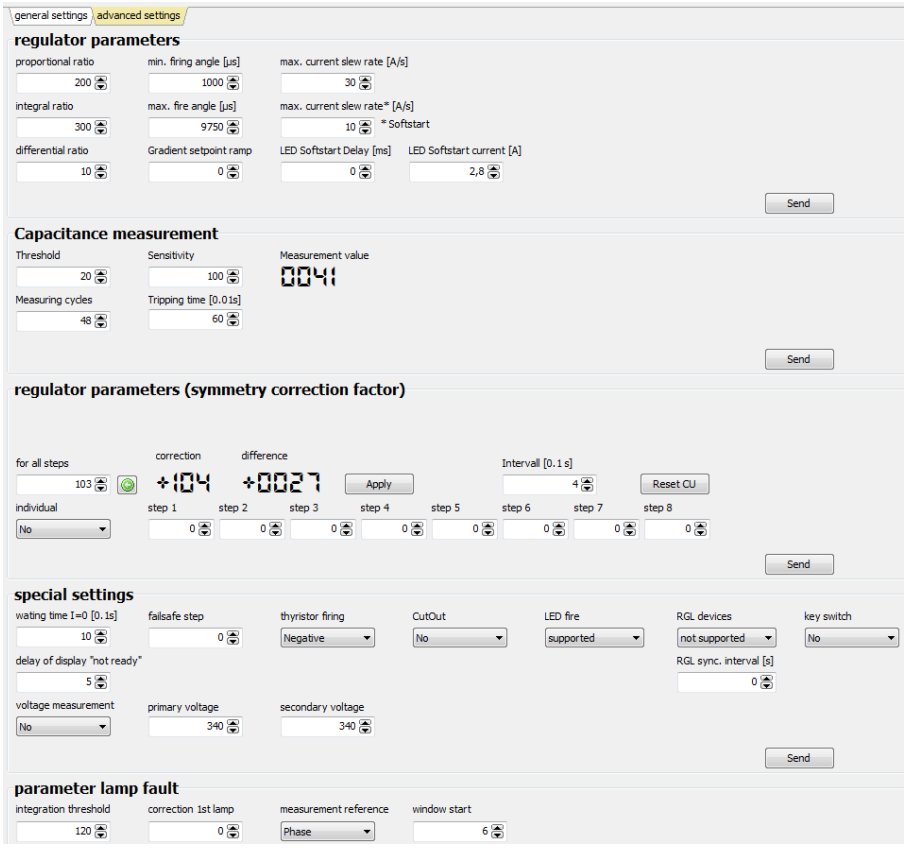


Figure 26: Regulator parameters 2 — advanced settings

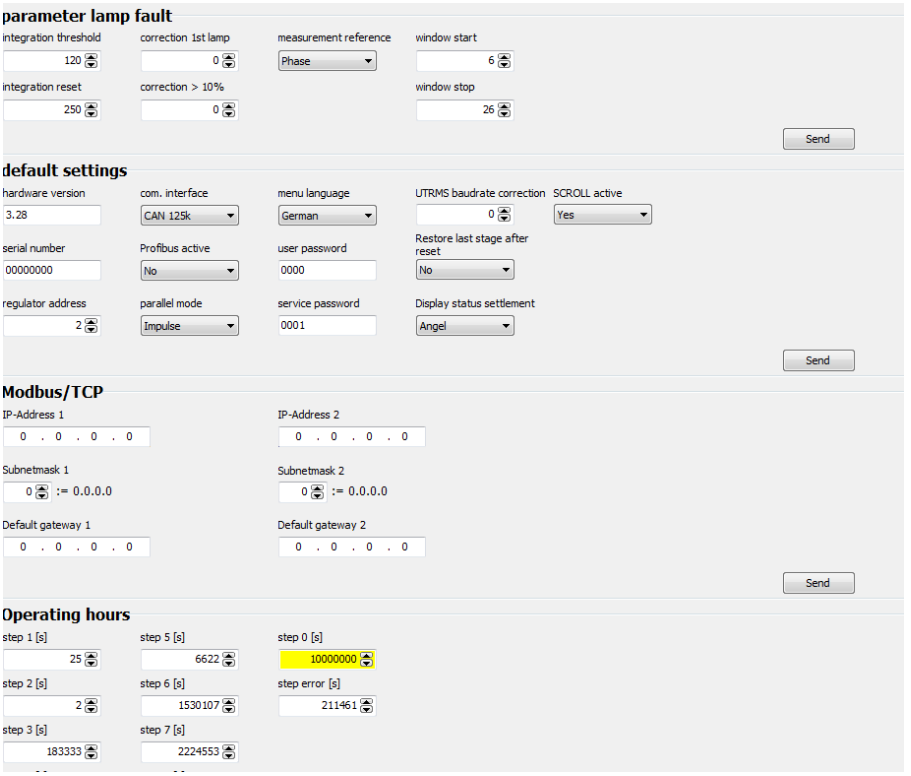
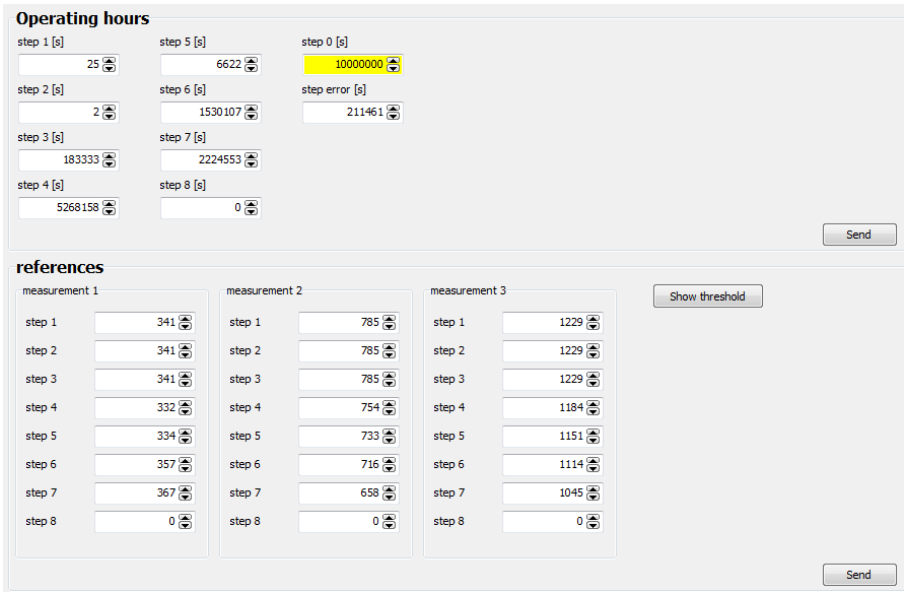


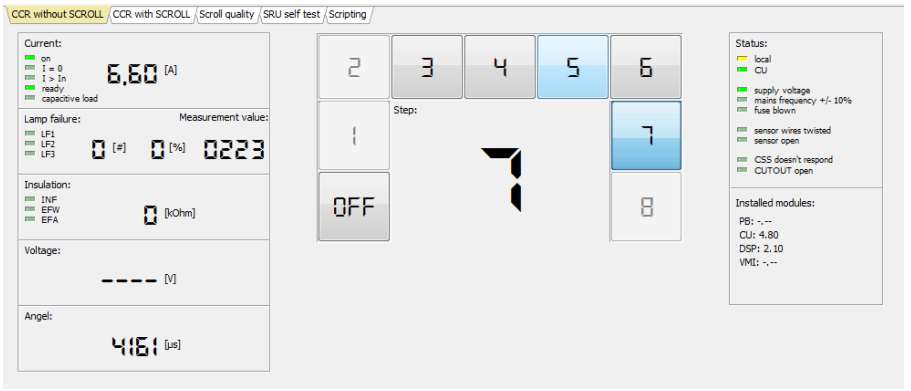
Figure 27: Regulator parameters 3 — advanced settings



CCRE without SCROLL Tab

In the **CCR without SCROLL** tab, all measured data from the regulator will be displayed on the left. You can use the keypad in the middle to switch the regulator on or off in the step you want. The regulator's status is displayed next to it on the right.

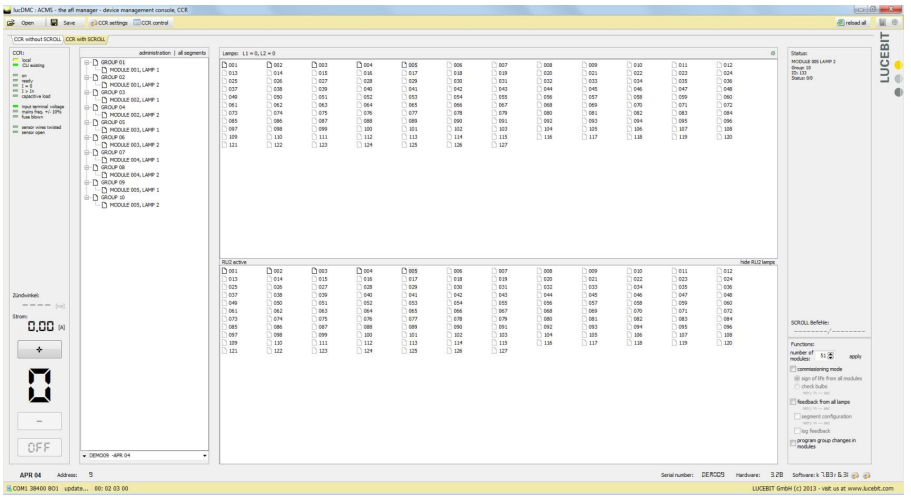
Figure 28: CCR without SCROLL tab



CCRE with SCROLL Tab

Under the **CCR with SCROLL** tab, regulator status, current measured value and control elements for switching the regulator on and off will be displayed on the left. Next to it on the right are the control elements for RELIANCE IL configuration. The method for handling this configuration can be found in the instructions for parameterizing the SRU and will not be detailed here.

Figure 29: CCR with SCROLL tab



2.8.7 lucDMC Parameterizing Adapter

This section deals with the parameterizing adapter. Refer to USB Dongle ADA004-RS232 data sheet for further information on the Parameterizing adapter USB Dongle ADA004 RS232.

Parameterizing adapter (USB Dongle ADA004-RS232)

- To be used with the lucDMC maintenance tool
- Converts the signals between the device and the COM port of a computer

Note

Refer to USB Dongle ADA004-RS232 data sheet for further information. lucDMC license can be provided via ADA004.

2.8.8 USB Dongle ADA004 RS232

Uses

The ADA 004-RS232 is a RS232 ro USB serial converter.

Supported Functions

- USB to serial converter (EIA-232-F, RS232)
- Native USB supported by ADB SAFEGATE's lucDMC
- Native USB supported by ADB SAFEGATE's ACMS HMI
- (Optional) ADB SAFEGATE License Dongle
- (Optional) ADB SAFEGATE License Cube

Details

The RJ45 pin layout is compatible to the maintenance interface (RJ45) of all ADB SAFEGATE products, CAT 6 twisted pair cable for Ethernet required.

VCP functionality is supported by Windows 10. Prior windows versions require an installation of a ADA004 VCP device driver, available separately.

Technical Data

Connector USB	USB C (USB C to USB A cable included)
Connector RS485	RJ45
Speed	Up to 250 kbps
Operating temperature	-5 °C to +50 °C
Storage temperature	-25 °C to +55 °C
Humidity	95% or less (non-condensating)
Protection class	IP30
Isolation voltage	+/- 50 V
Power	Powered via USB port
Dimensions (L x W x H)	49 x 38 x 28 mm
Weight	Approx. 25 g

RS233 connections

Pin 1	TXD
Pin 2	RXD
Pin 6	GND
Pin 3, 4, 5, 7, 8	NC

Note
All pins are insulated.

Recommended RJ45 Adapter

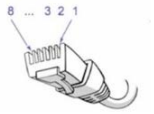
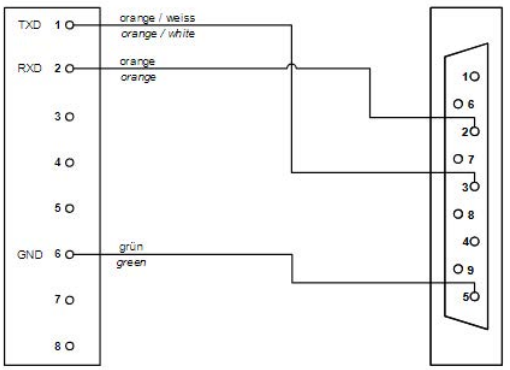
Type 1	Delock No.: 65527
Type 3	Delock No.: 6538

Note
Both standard types are available in the open market.

Ordering Code

ADA 004-RS232 (USB cable included)

Connection Diagram

RJ45 (connector T568B)	**RS232 (9 pins)**
	

3.0 Installation

The installation section covers the proper procedures for the installation of RELIANCE IL.

3.1 System Project Planning

The following requirements need to be fulfilled for overall system project planning:

- Traffic routing requirements (segment assignment, routes, etc.)
- Procedures to ensure system failures are avoided (redundancy, series circuit allocation, etc.)
- Maximum of possible load variation within the circuit (harmonic distortion, Crest factor)
- Maximum of allowed monitoring cycle time
- Route taken for primary cabling to ensure that the current flow direction is the same for all lamp transformers
- The transformer rating needs to be adequate to ensure transfer works

Note
Please contact ADB SAFEGATE project management team for further information.

3.2 Installing a SRU Remote

WARNING

Electric Shock
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.
- 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.

Failure to follow these warnings may result in serious injury or equipment damage.

ADB SAFEGATE RELIANCE IL SRU are rectangular units with screw-on housings. Please see product data sheet for dimensions and weight.

Remotes of type 101 or 111 are equipped with two cables. The first cable is used for connecting the remote to the series circuit transformer with a FAA style 1 compliant (2-pin) plug. The second cable, having a FAA style 3 compliant connector, is used to connect the remote to the light or sensor to be monitored.

Remotes of type 102 or 112 are equipped with three cables. The first cable is used for connecting the remote to the series circuit transformer with a FAA style 1 compliant cable. The second cable, having a FAA style 3 compliant connector, is used to connect the remote to the first light to be controlled or monitored. The third cable, having also a FAA style 3, compliant connector is used to connect the remote to the second light to be controlled or monitored.

1. Connect the first remote cable with a FAA style 1 the compliant plug to the CCR.
2. Connect the second cable to the light or sensor with the FAA style 3 compliant connector to the (first) light.
3. Connect the third cable to the light or sensor with the FAA style 3 compliant connector to the (first) light if you purchased a remote of type 101 or 111.

Tip

Seal all the connectors with shrink tubes or insulating tape.

All the remotes can be — just like the series circuit transformers — fitted in any arrangement and at any orientation.

Tip

It is recommended to mount the remotes horizontally or vertically one next to the other into the installation frame, with the cables hanging down, to enable easy access and maintainability.

NOTICE

The remotes and the connectors should not lie permanently in water.

The parameterizing process can be executed by the manufacturer as well as at site directly in line within the series circuit or using the parameterizing tool (RFID handheld reader DRH100). The applicable method depends on what requirement (regarding planning) exist for the lighting series circuit.

All the parameters are stored permanently in the *Electrically Erasable Programmable Read-Only Memory* (*EEPROM*) of the remote. Typical parameters are for example the fail-safe mode, the light address(es) (numbers) and one out of two segment addresses the remote can belong to.

Data for planning for every remote consists typically of the following parameters:

- remote type
- number of the lighting segment
- remote number in the series circuit
- segment addresses to be listened by the remote
- the unique identifier (remote ID which equals the light ID)
- mounting position

Note

Individual control and re-parameterization with other settings in the active series circuit using the individual series number is possible at any time.

NOTICE

You should install remote in a frame or on amounting rail to avoid cable breakage and prevent water from entering the enclosure. Proper installation in the slots simplifies work in the slot as cable connections can be followed easier.

3.3 Getting started with a new SRU

DANGER

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.

Before you can operate new RELIANCE IL SRU within a series circuit configuration is required.

First connect the remote to a regulator capable to be used with the RELIANCE IL system and configure it using the lucDMC software tool. For configuration instructions see Configuring a SRU — Default Parameters.

It is required to make the following settings:

1. Serial number: is a unique identifier for a remote within a system
2. Remote address: is a unique identifier for a remote within a series circuit
3. Segment for lamp 1: Lamp 1 has to be assigned to a specific segment.
4. Segment for lamp 2: Using Remotes SRU 102 or SRU 112, lamp 2 has to be assigned to another segment.

Note

For special purposes you can also assign a lamp to two different segments.

5. Maximum of remotes per series circuit: This setting is specially essential for series circuits containing SRU 102 or SRU 112.

Note

Make sure that the value is the same for all remotes in the series circuit as well as in the Central Unit of the respective regulator.

For use in series circuits with LED lights, additional settings to be made for the remotes include:

LED load: 'on' must be activated.

Note

- Special settings can be set by using "RAW telegram".
- Refer to RELIANCE IL SRU Remote CU Commands in lucDMC for instructions related the the settings made using 'RAW telegrams'

4.0 Operation

The operation section cover the operation characteristics of RELIANCE IL.

4.1 Commissioning Work

4.1.1 Commissioning List RELIANCE IL

When you change the systems configuration or parameters for commissioning, fill in the following list to document your changes for further service purposes:

Commissioning protocol for series circuits equipped with RELIANCE IL

Commissioner name_____

Commissioning date_____

Airport _____

Station _____

Power circuit_____

Measuring the series circuit

Loop impedance_____ Ohm

Insulation impedance_____ kOhm

Power values for brightness level set up?

Transformer tapping point_____ V

Power in secondary circuit at a level of 100%_____ A

Effective current match_____ %

Phase angle at a level of 100%_____ ms

RELIANCE IL settings

Automatic lamp failure test ON or OFF?

- Cycle time_____ sec.

Cyclic segment command On or OFF?

- Cycle time_____ sec.

Max. number of segments _____

Max. number of remotes_____

Remote – type 102 or 112 YES or NO?

Source of symmetric value (by default DSP) DSP or CU?

Capacity measurement

Measured value _____

Threshold set (half of measured value) _____

Parameters for the regulator

Symmetric corrective factor controlled at all levels?

Value saved for all levels?

CCR Operation with RELIANCE IL

Segments set up?

Feedback for all remotes at all levels checked?

Feedback for all lamps at all levels checked?

Thresholds for feedback checked at all levels?

Thresholds for feedback set up for all levels _____

Min. thresholds for feedback (bar chart)_____

External Circuit

Switch on all segments.

Individual lights – switching test executed?

Segments – switching test executed?

Direction of lighting beam controlled?

RELIANCE IL Settings 2

Remote filter set up?

Filter level ___

4.1.2 General Conditions for faultless Control

As control commands are modulated as an unnoticeable change of the phase angle onto the line, the CCR is not intended to be operated in a "complete sine mode".

The working setpoint of the CCR has to be adapted always and correctly to the maximum of possible load (when all lights are lighted).

The current flow duration during the working setpoint of the CCR ist to be set to a shorter time, if the expectable electrical brownouts in the lighting station are higher than -15 %.

NOTICE

The feedback depends on the specifications of the lamp transformer. As a result, only lamp transformers with the same specifications approved by ADB SAFEGATE may be installed in a series circuit. The rated power should be twice as high as the connected load to ensure best data transfer quality, at least 200 W.

All lamp transformers in the series circuit must be connected in the same current flow direction (polarity and orientation).

NOTICE

Only the same type of transformers by the same manufacturer should be used for replacement. Transformers with predefined direction of winding (phasing) and thyroidal transformers may not be used.

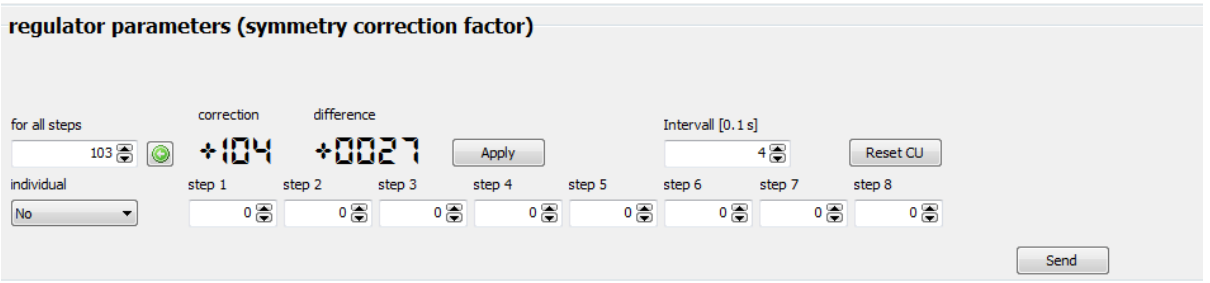
Control commands are prioritized higher than feedback. Control commands sent in short distances and repeatedly may impede monitoring.

4.1.3 Commissioning of a Series Circuit equipped with the RELIANCE IL using lucDMC

This section does not explain how a series circuit without RELIANCE IL is commissioned. For further information about commissioning of a series circuit in general contact the ADB SAFEGATE Service team. This section explains how the regulator parameters can be adapted with lucDMC to be suitable for RELIANCE IL use. Follow the following steps in the indicated order to commission the *Individual Light Control and Monitoring System* RELIANCE IL:

1. **Balance the signals by parameterizing the "symmetry correction factor " in advanced settings tab as follows:**

   Figure 30: Symmetry correction factor — regulator parameters

   a) Set the parameter **Interval** to "4".

   When the interval is set to 4, the regulator can change the correction value for the balancing of the signal automatically every 400 ms.

   b) Set the brightness rate for the CCRE to approximately 30 % (which equals 5,2 A).

   c) Watch the view for **correction** and **difference** in lucDMC.

   The CCRE automatically changes the correction factor so that the difference approximates 0. The difference will never be exactly 0 and keep this value. In a well-balanced circuit the differences varies between -20 and +20. The balancing process can last up to 2 minutes. The balancing process has been successful when the regulator has stopped changing the correction factor and the difference value is varying between +0 and -0.

   d) Hit the green arrow button and press **Apply**.

   e) Hit the **send** button below the brightness level fields on the right.
   The CCRE balanced the signals for the thyristor control. The correction values have been stored on the memory card.

   NOTICE

   You should check if the current flow direction of the primary cable is correct when the balancing of the signals by the CCRE has not been successful. The K and L sensor cable might be mixed up with each other.

2. **Check the current flow direction of the sensor cables and the external circuit**

   Operability of the RELIANCE IL depends on a properly planned and commissioned series circuit. The right orientation of the in- and out-going cables also belongs to a properly planned and commissioned series circuit. The entire series circuit must have the right orientation, which includes also winding directions of the coils inside the lamp transformers and the orientation of the sensor cables. Follow the steps described below to test if the orientation is correct:

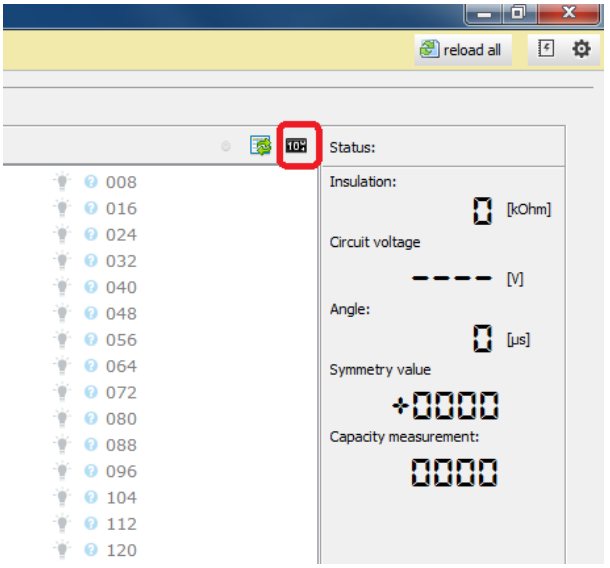
   a) Switch on the series circuit and set ist to a brightness level of 10 %.

   b) Wait at least 10 seconds for the remotes to go into fail-safe mode, which means all lights are lighted.

c) Start a lamp test in lucDMC: Select the **CCR with SCROLL** tab and click on the **start lamp test** button.

d) Watch the green LED lamp symbol as well as the timer next to the LED symbol:

Figure 31: Lamp test counter — CCR with SCROLL



The timer is supposed not to run longer than 7 seconds. The green LED symbol should blink for a short while when the lamp test is finished.

Tip

Switch off the regulator for a short while, swap the sensor cable and repeat the test if the timer counts up in an uncontrolled way.

---

3. Check the current flow direction of the external circuit

a) Switch on the series circuit and set is to a brightness level of 10 %.

b) Wait at least 10 seconds for the remotes (remote units) to go into fail-safe mode, which means all light are lighted.

c) Start a lamp test in lucDMC: Select the "**CCR with SCROLL** tab and click on the **start lamp test** button.

d) Check whether the lamp feedback is displayed correctly.

In case the lamp symbol is greyed out, the remote has not sent its feedback.

Tip

Swap the external circuit if no feedback is received or detected. If big blocks of lamp feedback is not displayed (e. g. remotes 12 to 20), the cause may be that the external cabling has been mixed up. In this case the external circuit can be swapped in the station for testing. Restart the lamp test again in this case. Check whether the feedback from the previously tested remotes is still missing (the lamp symbol is greyed out). If the feedback is still missing, you will know from which remote address on to start searching for the mixed up cabling.

4.2 Commands in normal Operation

Switching commands for the lamps are given in normal operation via segment [1] switching commands. The following circumstances must be considered for operation purposes:

- possibility to define up to 24 segment addresses within one series circuit
- a group has to consist of at least one and a maximum of 70 lamps
- feedback from the field is sent one after another by the remotes after requesting the feedback [2]
- order of sent feedback corresponds to the addresses
- request for feedback interval is parameterizable

4.3 Commands in Service operational Mode

Apart from time-optimized commands there are also special commands available in service operational mode.

For using the special commands, the Constant Current Regulator must be set to "local" mode (see Parameterizing the Constant Current Regulator) and a service PC with lucDMC must be connected to the regulator.

In service mode all commands that are required for extended function testing of the remote and the lights are available.

Configuration of the system or single remotes can be changed directly in the series circuit. Remotes can be controlled indicating the unique remote address or the unique series number for first address assignment (indicated on the remote label).

[1] In some of the technical documents and the user interface of lucDMC the term "group" is used instead of "segment". The term "segment" is used in technical documents to keep documentation consistent.

[2] In some sections of the technical documents and the user interface, the term "telegram" is used instead of "command".

4.4 Device Settings lucDMC — Device Configuration

Figure 32: Device configuration and system parameters — device settings

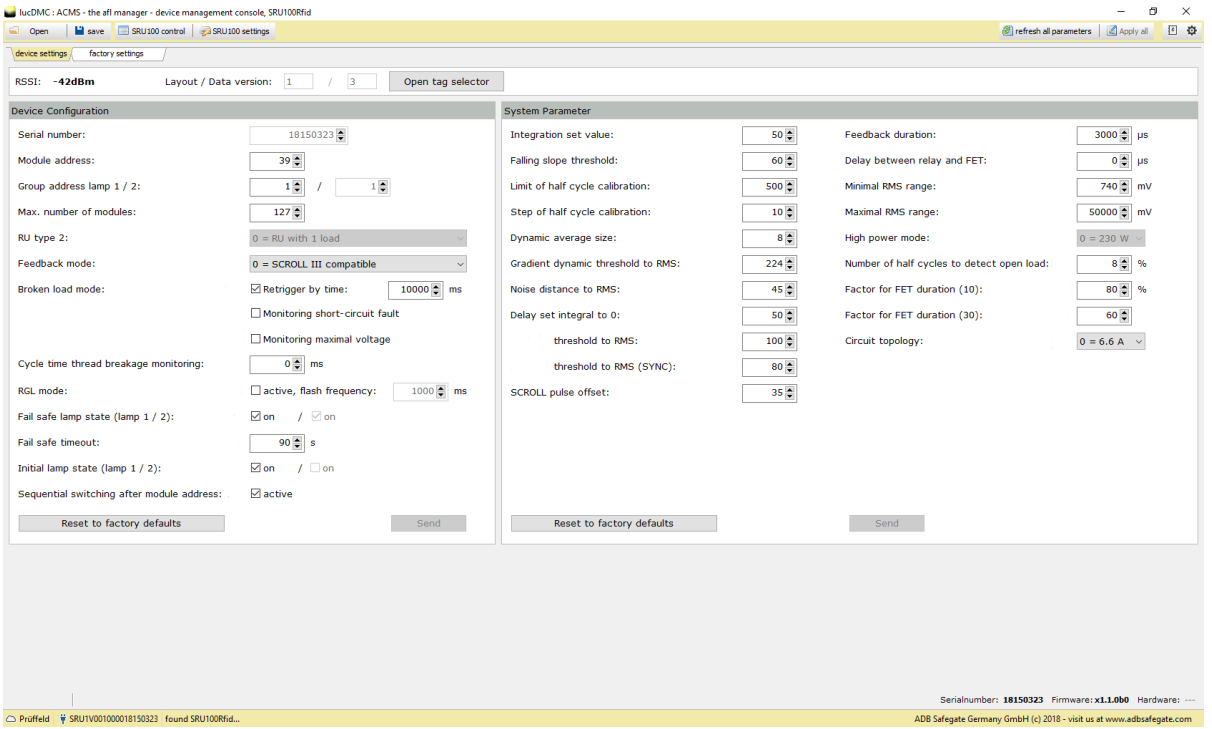


Table 3: Device configuration parameters — SRU and system

Device configuration parameters	Description
Serial number:	Serial number of remote
Module address:	Address of remote
Group address lamp 1 / 2:	Address of segment assigned to lamp 1 (and 2 depending on remote type)
Max. number of modules:	Max. number of remotes that can be installed into the circuit
RU type 2:	Value for SRU type compatibility (drop-down menu)
Feedback mode:	Value for SRU type compatibility for feedback test (drop-down menu)
Broken load mode – retrigger by time:	When a load has been detected to be defective, it will be checked after a period to be indicated here whether the load is still defective
Broken load mode – monitoring short-circuit fault:	The outlet is being monitored for short-circuit (applies if voltage is below the value indicated in the "minimum RMS range" field)
Broken load mode – monitoring maximal voltage:	Maximum RMS voltage is being measured: if the max, RMS voltage range is exceeded, it is indicated that the load is defective (applies if voltage is below the value indicated in the "maximum RMS range" field)
Minimum RMS range:	Smallest RMS voltage value possible (can be set individually)
Maximum RMS range:	Biggest RMS voltage value possible (can be set individually)
***RGL* (= *Runway Guard Light*):**	If check box is activated, the remote channel outputs are blinking with the frequency to be indicated here
Fail-safe lamp state (lamp 1 / 2):	When the lamps switch to fail-safe mode, the lamp can be set to on or off state
Fail-safe timeout:	Timeout after last received state: all the lamps switch to fail-safe mode after time to be indicated here (see fail-safe lamp state)

4.5 Device Settings lucDMC — System Parameters

Figure 33: Device configuration and system parameters — device settings

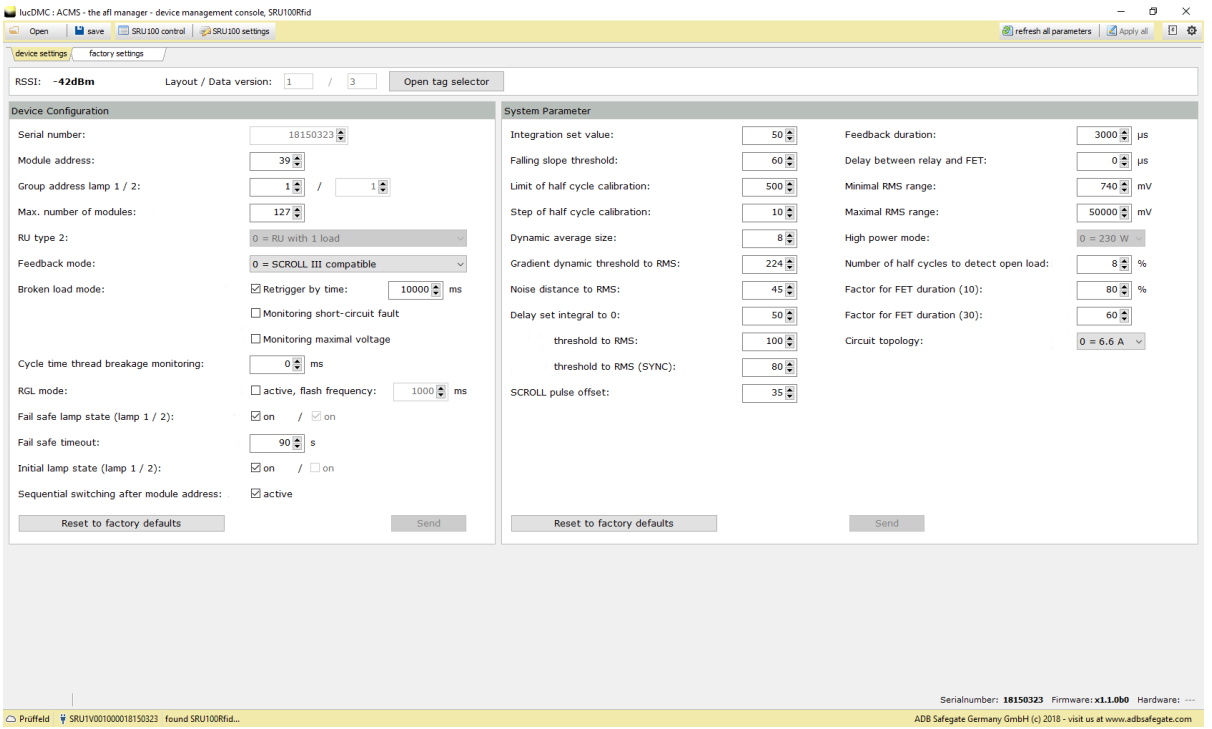


Table 4: System parameters — SCROLL remote and system

System parameters	Description
Integration set value (for communication):	Threshold for current flow detection
Failing slope threshold (for communication):	Threshold for detection current flow stop
Group address lamp 1 / 2:	Group address assigned to lamp 1 (and 2 depending on remote type)
Limit of half cycle calibration (for symmetric value comparison):	Maximum possible value for comparison
Step of half cycle calibration (for symmetric value comparison):	Jumping distance of value for comparison
Dynamic average size (for communication):	Dynamic threshold for current flow detection
Gradient dynamic threshold to RMS:	Increase of the dynamic threshold related to the RMS voltage
Noise distance to RMS (for communication):	Noise filter
Delay set integral to zero (for communication):	Timeout for current flow
Threshold to RMS (for communication):	Comparison of half cycles
Threshold to RMS (SYNC) (for communication):	Comparison of half-cycles for SYNC indicator
SCROLL pulse offset:	Internal parameter

Table 4: System parameters — SCROLL remote and system (Continued)

System parameters	Description
Feedback duration (for communication):	Signal strength of feedback
Delay between relay and FET (for communication):	Internal parameter
High power mode (for feedback):	Maximum output performance per channel
Number of half cycle to detect open load (for load monitoring):	Number of current half-cycles
Factor for FET duration (10) (for feedback):	Fine-adjustment for current stages from 10 % to 30 % or more
Factor for FET duration (30) (for feedback):	Fine-adjustment for current stages from 30 % or more
Circuit topology (for power supply)	Series circuit topology for 2,2 A or 6,6 A

4.6 Setting General Parameters in lucDMC for the Constant Current Regulator type E

1. Select the **general circuit parameters** tab.
2. Type in a circuit name into the **circuit name** text field.
   The circuit name to be indicated here will be shown on the LCD display of the CCRE and in the visualization systems of control technology station. Possible characters include all letters of the alphabet and numbers as well as some special characters like a hyphen or underscore, etc. The circuit name may only contain 8 characters.

Figure 34: Circuit name — general circuit settings

3. Select **general settings** tab and type in the desired values for the "**default settings**" (factory settings) parameters:

Figure 35: Default settings

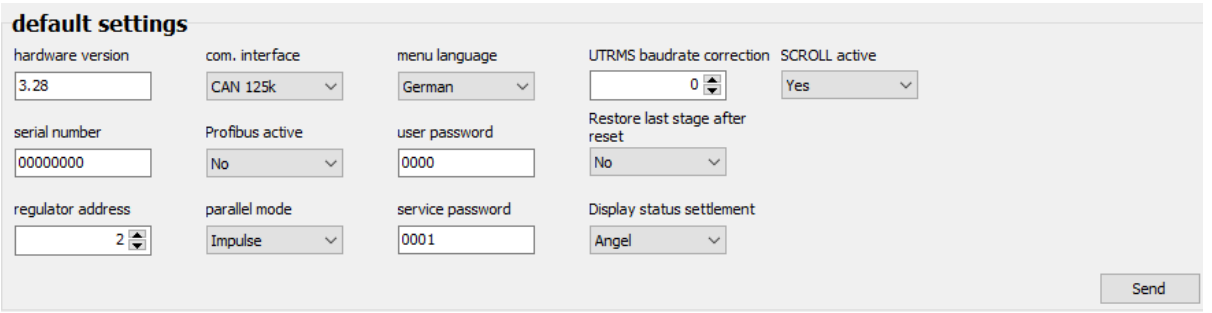


Table 5: Parameters — CCRE

Parameter	Description
Communication interface:	Indicates the interface to the respective control technology station
Menu language:	Defines the applied language in the regulator menu and all views on the display.
UTRMS baud rate correction:	Refer to “Advanced CCRE features” section in COSAL CCRE manual.
Serial number:	Serial number of CCRE; defined by ADB SAFEGATE production
Profibus activated:	CCRE has got an Profibus interface

Table 5: Parameters — CCRE (Continued)

Parameter	Description
User password:	The password for login to CCR menu can be set here
Service password:	The password for the login to advanced regulator menu can be set here. The password is personal identification number (PIN) that may consist of numbers from 0000 to 9999
Regulator address:	The device address for field bus communication must be set here if a field bus is connected
Parallel mode:	The parallel interface for the regulator can process two different types of signals: • impulses • statistical

The CCRE is equipped with an operating hour counter for each brightening level. It is available via lucDMC and field bus. Field bus is read only - lucDMC can also set the values.

4.7 Configuration Work

4.7.1 Configuration Possibilities

The maintenance tool lucDMC is an important tool for system adaption and optimization of the RELIANCE IL and the COSAL Constant Current Regulator type E.

The adequate parameters for your system are set at commissioning.

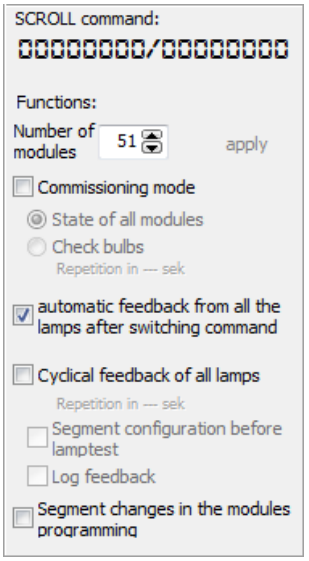
Note
Contact the ADB SAFEGATE Service team in case of extraordinary system malfunctions.

NOTICE
Do not change parameters without required know-how.

4.7.2 Configuring a SRU — Default Parameters

Make sure the check boxes **feedback from all lamps** and **commissioning mode** are not activated before programming a remote with the following routine :

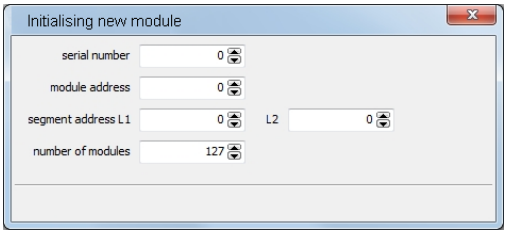
Figure 36: SCROLL commands view



1. Follow the steps described for Parameterizing the Constant Current Regulator .
2. Set the regulator to a level between 2.8 and 6.6 A.
3. Select **Administration** > **Initializing a remote via serial number** .

The following dialog box opens:

Figure 37: Dialogue box — initializing a new SRU



Note

Find the parameters to be defined in the respective excel list from commissioning.

Example for a SRU configuration list
Project:

Project example SRU 001 number: 5, SRU 001 number:8

Table 6: Project Example Values

CLB01	1	1	1	ANWCLB01-H201	SRU 102	09 09 0256
CLB01	1	1	2	ANWCLB01-H202	SRU 102	09 09 0256
CLB01	2	1	1	ANWCLB01-H203	SRU 101	09 09 0029
CLB01	3	2	1	ANWCLB01-H211	SRU 102	09 09 0257
CLB01	3	2	2	ANWCLB01-H212	SRU 102	09 09 0257
CLB01	4	2	1	ANWCLB01-H213	SRU 102	09 09 0258
CLB01	4	2	2	ANWCLB01-H214	SRU 102	09 09 0258

Table 6: Project Example Values (Continued)

CLB01	5	2	1	ANWCLB01-H215	SRU 101	09 09 0030
CLB01	6	3	1	ANWCLB01-H221	SRU 102	09 09 0259
CLB01	6	3	2	ANWCLB01-H222	SRU 102	09 09 0259
CLB01	7	3	1	ANWCLB01-H223	SRU 102	09 09 0260
CLB01	7	3	2	ANWCLB01-H224	SRU 102	09 09 0260
CLB01	8	3	1	ANWCLB01-H225	SRU 101	09 09 0031

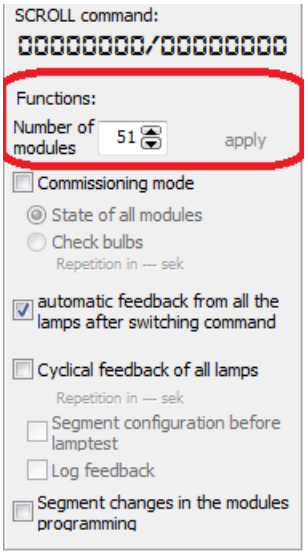
Note

The serial number consists of a 8-digit number that can be found at the end of the numerical code, e.g. the serial number 09 09 0256.

The segment numbers are assigned in the list to the respective lamp. The same applies to the remote address.

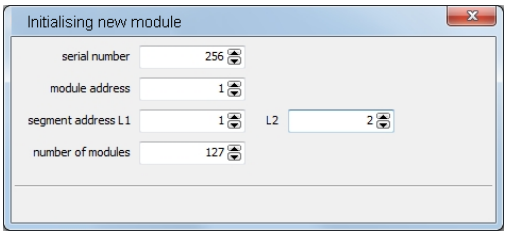
The maximum number of remotes is read out from the CU configuration in the **CCR with SCROLL** tab on the bottom right next to the lamps fields:

Figure 38: Functions — SCROLL command view



Sample data for module number 1 from the sample table:

Figure 39: Dialogue box — initializing a new SRU



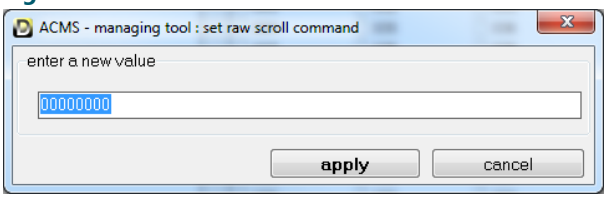
The parameters will be sent to the SRU after clicking the "**apply** button. The remote has been completely programmed and is ready for operation.

4.7.3 Configuring a SRU — Advanced Parameters

In some cases, further parameters are required. The main reason for this in most systems is operation of LED lights at SRUs.

RAW commands can be sent to the remotes via the window "set RAW command".

Figure 40: Set raw commands window



Note

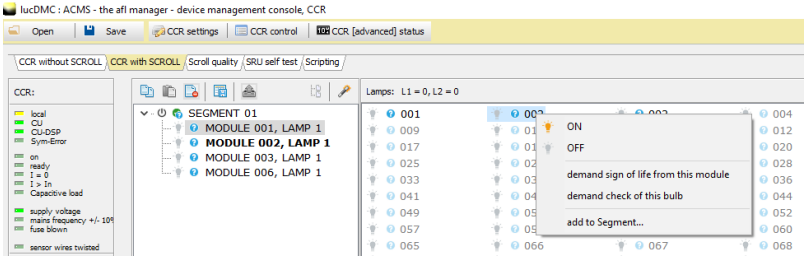
- Refer to Configuring a SRU — Default Parameters section.
- Refer to RELIANCE IL SRU Remote CU Commands in lucDMC for further information on possible commands.

4.7.4 Configuring a SRU Remote — how to assign a Lamp to a Segment

Note

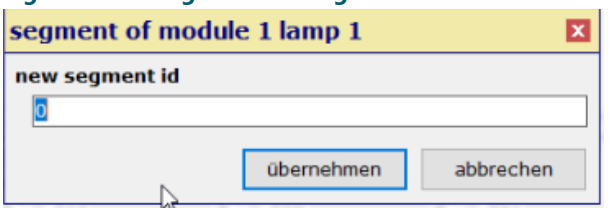
If you have a dual channel remote integrated into your system, you will see the first outlet L1 in the section above and outlet L2 in the section below.

Figure 41: L1 and L2 output — CCR with SCROLL tab



1. Right-click on the lamp.
2. Select **add to segment ...**.
   The window "segment of module 1 lamp" opens.

   Figure 42: Dialogue box — segment ID

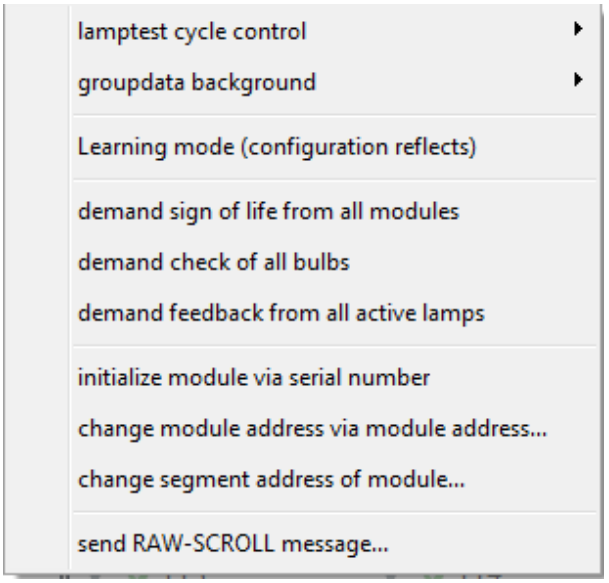
   

3. Enter a new value in the **new segment id** field and click **apply**.
   The new segment is transferred to the respective remote.

4.7.5 Configuring a SRU — change Address

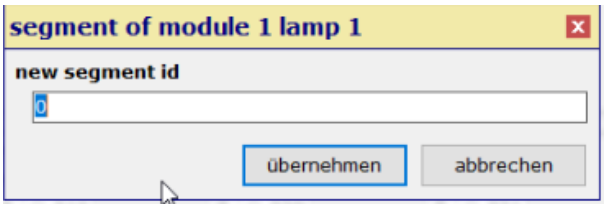
1. Open the lucDMC software.
2. Click on the tab **CCR with SCROLL**.
3. Right-click on the segment you want to change address for.
4. Select **change module address via module address**.

Figure 43: Drop-down menu — CCR with SCROLL tab



The dialog box opens.

Figure 44: Dialogue box — segment ID



You can type in a new remote address.

4.7.6 SRU Configuration Data

This section lists the values that can be set during configuration in the regulator for the RELIANCE IL using lucDMC.

Table 7: SRU configuration data

Data type	Designation	Functionality	Value range	Default	editable via RFID reader?	editable via SCROLL command?
u32	u32ModuleSerialNumber	Serial number of SRU	32bit	0	yes	yes
u8	u8ModuleAddress	Remote address (128 is not configured)	1-128	128	yes	yes
u8	u8GroupL1	Field for segment addresses for lamp 1	1-63	1	yes	yes
u8	u8GroupL2	Field for segment addresses for lamp 2	1-63	1	yes	yes
u8	u8MaxNoOfModules	Number of remotes in the circuit	1-127	127	yes	yes
u8	u8RUType2	Remote with 1 load = 0, RU with 2 loads = 1	0,1	0	yes	yes
u8	u8FeedbackMode	0 = SCRL-III compatible 1 = RM1 and 2 in different. half-wave polarities 2 = RM1 and 2 in different. half-wave polarities. plus remote address (even/uneven number) defines half wave 3 = RM1 and 2 in different. half-wave polarities. plus remote address (even/uneven number) defines half wave	0, 1, 2, 3	0	yes	yes
u8	u8RGLMode	0= RGL mode OFF, 1 = RGL mode ON	0,1	0	yes	yes
u8	u8BrokenLoadMode	0x00 = No retrigger (broken load will only be startet again, if circuit was without current) 0x01= Retrigger by timer (u16CheckBrokenLoadCycleTime_ms) 0x02 = Short-circuit monitoring activated 0x04 = Monitoring of max. voltage activated	Bit by bit	0x01	yes	yes
u16	u16CheckBrokenLoadCycleTime_ms	Cycle time in ms for testing a defective lamp in ON-state	900-30000	10000	yes	yes
u16	u16CheckLampOffState_ms	Cycle time in ms for testing a defective lamp in OFF-state (monitoring for thread break) in ms	0-60000	0	yes	yes
u16	u16RGLBlinkFrequency_ms	Blinking frequency RGL in ms	250-60000	1000	yes	yes
u16	u16FailsafeTimeout_s	Failsafe Timeout in s	5 - 3600	90	yes	yes
u8	u8FailsafeValue_A	state lamp 1 after fail-safe mode: 0 = OFF, 1 = ON	0, 1	1	yes	yes
u8	u8FailsafeValue_B	State lamp 2 after fail-safe mode: 0 = OFF, 1 = ON	0, 1	1	yes	yes
u8	u8InitialLampState_A	State Lamp 1 after powering the SRU: 0 = OFF, 1 = ON	0, 1	0	yes	yes

Table 7: SRU configuration data (Continued)

Data type	Designation	Functionality	Value range	Default	editable via RFID reader?	editable via SCROLL command?
u8	u8InitialLampState_B	State Lamp 2 after powering the SRU: 0 = OFF, 1 = ON	0, 1	0	yes	yes
u8	u8SequencedSwitchingEnabled	Sequenced switching using remote address	0, 1	1	yes	yes
u8	u8ExtendedFlags	0x01= RFID activated	Bit	0x01	yes	no
26 Bytes						

4.7.7 Configuring a SRU for LED Lights

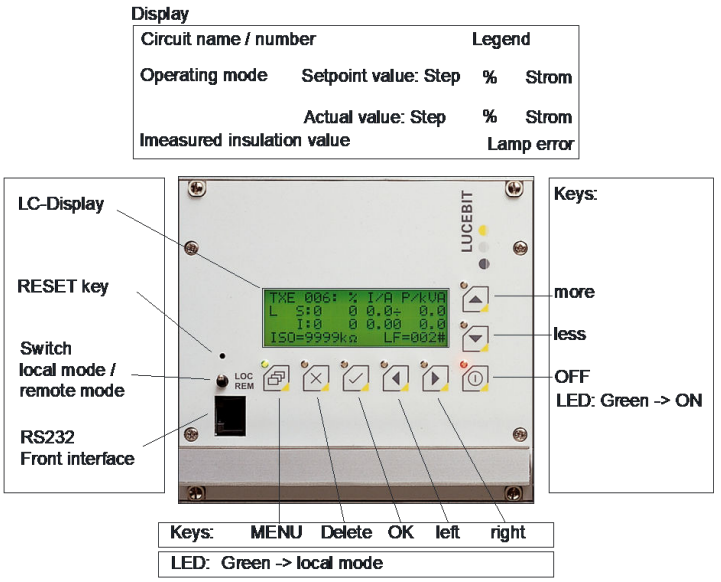
Refer to Configuring a SRU — Advanced Parameters section.

4.8 CCRE Interrelations

4.8.1 Constant Current Regulator Type E — Interface

The CCRE® interface is structured in the following way:

Figure 45: CCR display



4.8.2 Constant Current Regulator type E — nominal Current

The Constant Current Regulator must at series circuit nominal current (6.6 A) be set to the correct current flow duration of the thyristor.

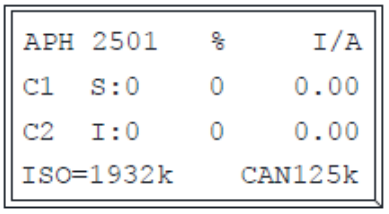
- The correct working point guarantees sufficient control reserves and low harmonic distortion.
- By choosing the correct output voltage tap of the transformer, the following conducting time should be achieved:

~ 6.1 ms without RELIANCE remotes,

~ 5.8 ms when using the ADB SAFEGATE RELIANCE IL

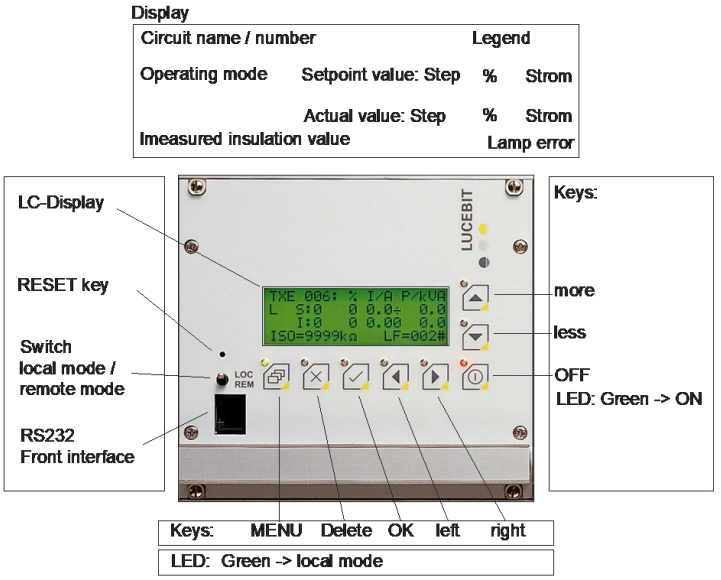
4.8.3 Constant Current Regulator type E — Error Messages

This section contains an example view of the CCRE LCD display view and some example error messages for operation:

CCRE LCD display view	Error messages
	APH 2501 Error! I>Imax Eliminate cause, reset device. --- APH 2501 Error! Sensor hot-wired Eliminate cause, press 'x'-button --- APH 2501 Error! overcurrent fuse Eliminate cause, reset device. --- APH 2501 Error! power frequency exceeds the limit last active step: --- APH 2501 Error! CSS did not respond Eliminate cause, press 'x'-button --- APH 2501 Error! I=0 Eliminate cause, press 'x'-button --- APH 2501 Error! Sensorline broken Eliminate cause, press 'x'-button --- APH 2501 Error! mains off last active step: --- Error! SIM-card coud not be read. Please reinitialize! --- APH 2501 Error! I=0 (capacitive) Eliminate cause, reset device. ---

For report of operating and fault conditions, the LCD display shows the messages in plain text. The conditions are additionally illustrated using LEDs in red and green. The LEDs next to the buttons on the CCR display indicate the follow ing :

Figure 46: CCR display — overview

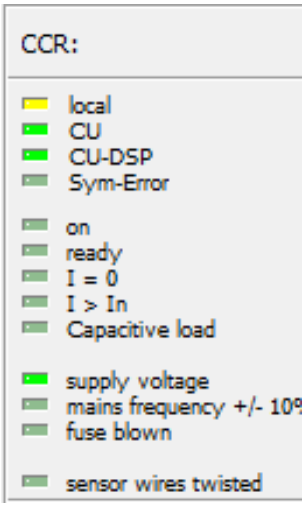


Button	Color	Condition	Meaning
	Green	ON	Local operating mode
	Red	Blinking	CAN/COM communication failed
	None	OFF	Remote operating mode, communication established
	Green	Blinking	Lamp failure 1
	Red	Blinking	Lamp failure 2
	Red	Blinking	General fault; check display messages
	Green	ON	Regulator is ON

Button	Color	Condition	Meaning
	Green	Blinking	Regulator is OFF, current cannot be regulated to the set value
	None	OFF	Regulator is OFF

CCRE Errors displayed in IucDMC

In the **CCR with SCROLL** and **CCR without SCROLL** tabs on the left side at the top, you can see errors for troubleshooting purposes:



Refer to the RELIANCE IL Troubleshooting section in the maintenance chapter for further information.

4.9 Parameterization Work

4.9.1 Parameterizing the Constant Current Regulator

Make sure you have the following equipment before you start: a PC with the lucDMC tool installed, a Ethernet cable and a programming adapter to connect the PC to the regulator.

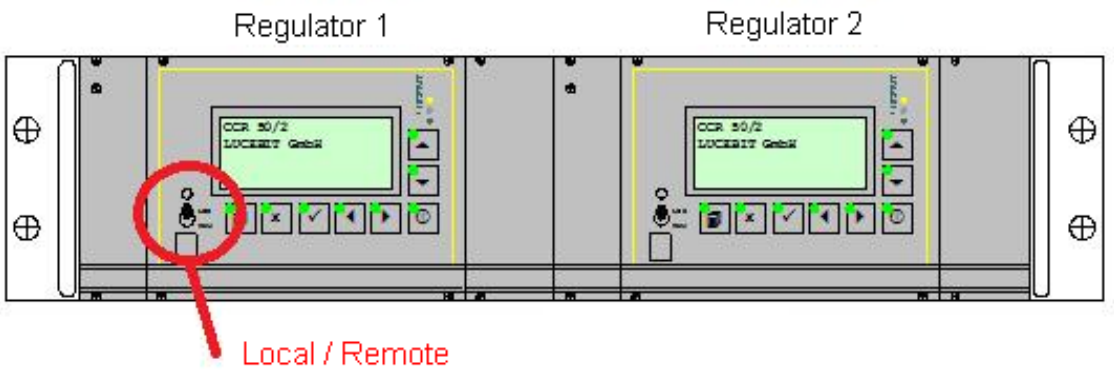
There are two possibilities for parameterizing the CCR:

- parameterization in the series circuit in a real system or
- parameterization via connection to a testing system

Note
Make sure you comply with all currently applicable safety requirements and have got all the required permissions to work with the airfield lighting system. Workers can be held responsible for non-compliance.

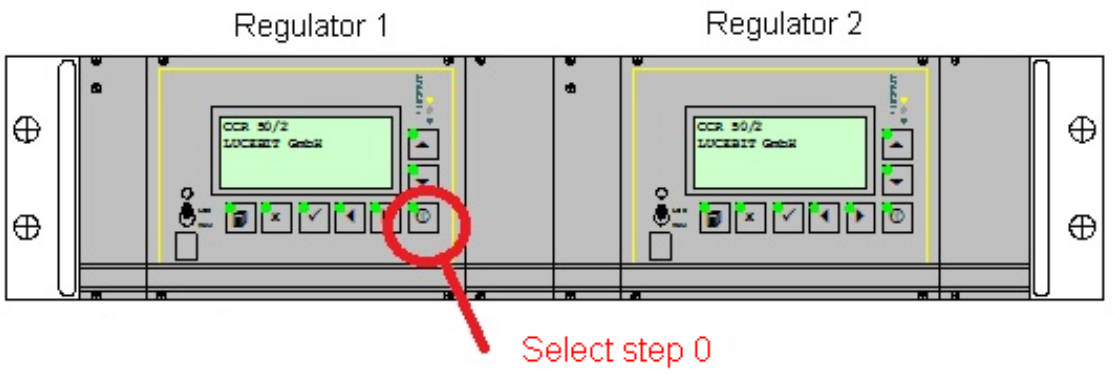
1. Connect the remote to the series circuit with the lamp, or with SRU 102 or SRU 112 with two lamps.
2. To start the configuration environment, press the toggle switch at the front of the regulator or press the key switch to operate the regulator in the local mode.

Figure 47: Switch for local / remote mode — regulator front



3. Select level 0 for switching of the lights.

Figure 48: Step selection — regulator front



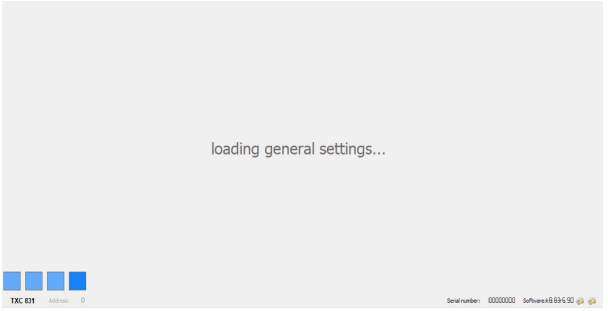
4. Connect the PC to the regulator:

   a) Connect the ADB SAFEGATE CCRE programming adapter via a network cable ito the RJ45 socket at the regulator's front.

   b) Connect the programming adapter via an extension cable for serial interfaces (RS232, COM) to the PC.

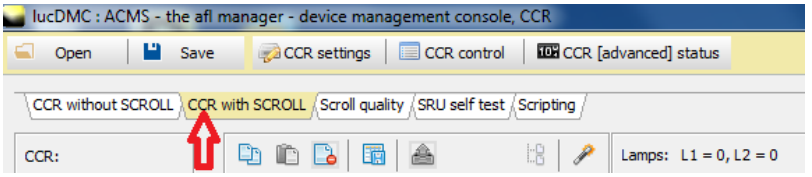
5. Start the lucDMC tool on the PC .

Figure 49: Start window — loading configuration and settings



6. Select the "**CCR with SCROLL**" tab:

Figure 50: CCR with SCROLL menu selection



The user interface for SCROLL opens. Refer to Parameterizing RELIANCE IL SRU Remotes using the RFID reader DRH100 section.

4.9.2 Parameterizing RELIANCE IL SRU Remotes using the RFID reader DRH100

All the RELIANCE IL SRU are equipped with an *Radio Frequency Identification* (“RFID) interface. The remotes do not have to be energized during the parameterizing process. ”

Note

Make sure to have the following tools available:

- a computer with a Windows system and the current version of the ADB SAFEGATE lucDMC (from version v1.10) tool installed
- a RFID reader DRH100 with a USB cable

1. Scan the label with the RFID symbol located at one side of the SRU remote with the RFID handheld reader:

   The label indicates where to place the RFID handheld reader. Place the reader with the reader’s front marked with a “red dot” radio symbol pointing to the interface position. Make sure the distance between the interface and the reader is as close as possible.

The reader sends a short vibration when the connection is established. The remote to be parameterized is displayed in the lucDMC **connection status** manager:

Figure 51: Connection status window — RFID reader

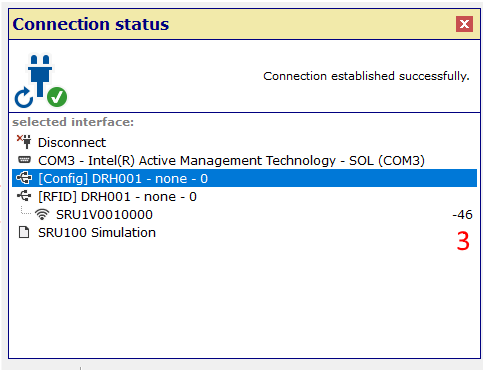


Table 8: Connection status window — view description

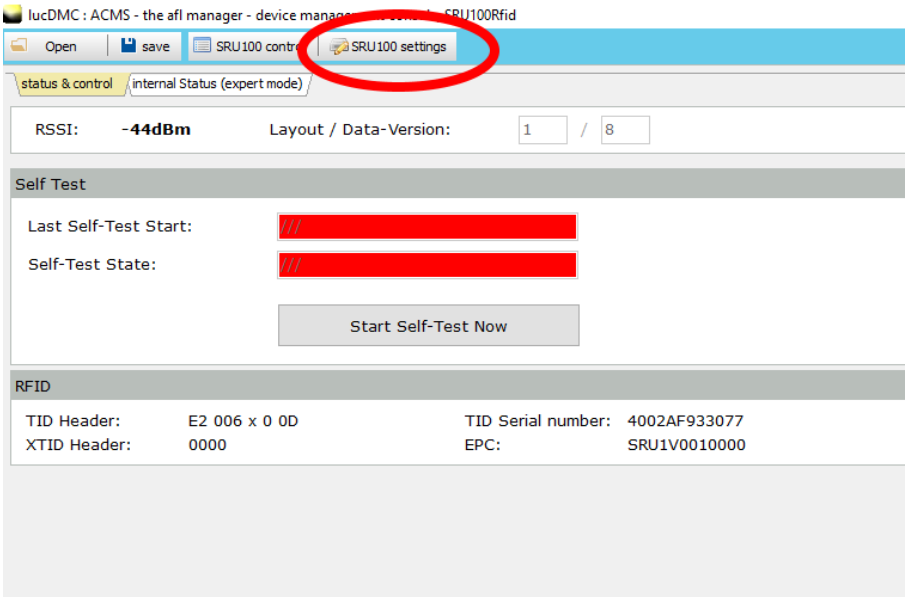
1:	DRH100 — RFID reader
2:	SRU — remote to be parameterized
3:	Describes signal strength

Note

The higher the number is, the better is the signal quality. Make sure to look at the algebraic signs.

2. Click on the SRU line (see figure, line 2) in the **connection status** window.
3. Follow the configuration steps before starting the parameterizing process . Refer to Configuring a SRU — Default Parameters
4. Click on **SRU settings** in the main window.
   The SRU configuration page is displayed:

Figure 52: SRU remote settings — status and control tab



Configuration parameters

Figure 53: Device configuration and system parameters — device settings

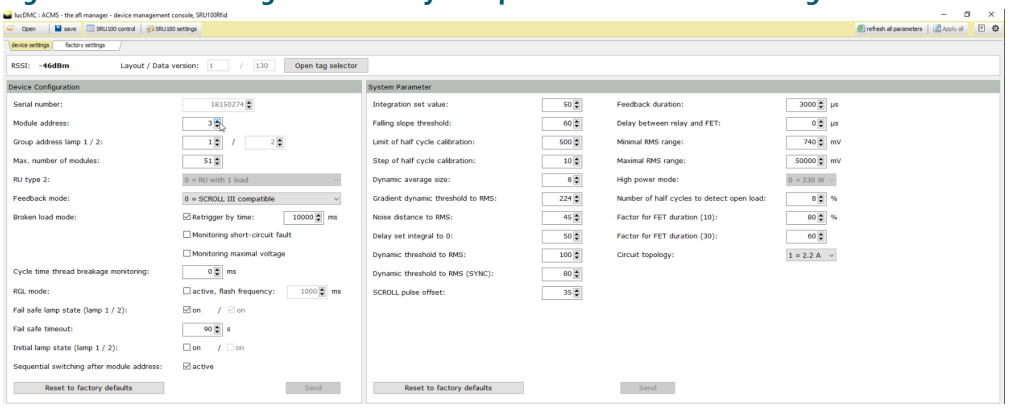


Table 9: Configuration and system parameters description

RSSI:	display signal intensity
Serial number:	SRU series number
Module address:	Remote address
Segment address lamp 1 / 2:	Segment addresses for both outlets **Note** For parameterizing SRU types 101 and 111 only the segment number of lamp 1 is needed.
Max. number of modules:	Maximum number of remotes in a circuit **Note** The maximum number of remotes integrated into the circuit must match the number of remotes stored in the Constant Current Regulator.
RU type 2:	Indicates whether a dual remote is installed in the circuit **Note** The configured number of remotes in the circuit is derived from the used hardware.
Feedback mode:	Modi for feedback (”compatible with SCROLLIII” is set as default)
Broken load mode — retrigger by time:	Time interval in milliseconds (SRU tests a load detected to be defective and switches it on again if necessary)
Monitoring short-circuit fault:	The minimum allowed output voltage can be tested (e. g. short-circuit test). **Note** The minimum output voltage can be set with parameter No. 19.
Monitoring maximal voltage:	The maximum allowed effective voltage can be monitored. **Note** The minimum output voltage can be set with parameter No. 19.
Cycle time thread breakage monitoring:	cycle time (frequency that indicated how often a halogen lamp is tested for a thread break. 0 indicated that no test has been executed.
RGL mode:	RGL mode with adjustment for blinking feature frequency

Table 9: Configuration and system parameters description (Continued)

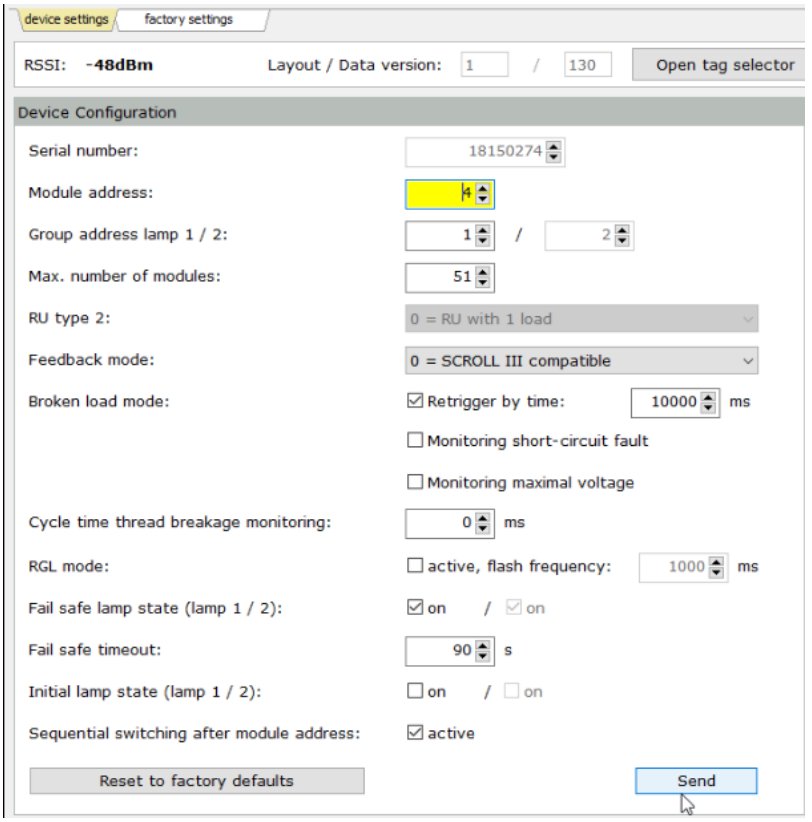
Fail-safe lamp state (lamp 1 / 2):	Fail-safe mode: if the checkbox for the respective lamp is checked, the load is switched on directly in case of a fail-safe; if the checkbox for the respective lamp is not checked, the load is switched off directly in case of a fail-safe
Fail-safe timeout:	Time-out of fail-safe mode (after the SRU has already received a SCROLL telegram)
Initial lamp state (lamp 1 / 2):	If the checkbox for the respective lamp is checked, the output is switched on directly after power is applied (i. e. after switching on the Constant Current Regulator).
Sequential switching after module address:	Improvement of the compatibility in case of sudden power variation for the Constant Current Regulator **Note** The remotes of a group are switched in a sequence with a delay of 20 milliseconds (Modulo 8).
Noise distance to RMS:	Parameter for system settings (is not being changed in normal operation)
Factor for FET duration:	Intensity of feedback (usual value range: from 2000 to 4500 µs)
Minimal / Maximal RMS range:	If the checkbox for parameter 9 or 10, respectively, for the respective lamp is checked, a fault is produced when the stored voltage values are exceeded or undercut. The remote gives the respective feedback. The load is switched off when the allowed voltage is exceeded.
High-power mode:	If the connected load exceeds 230 W, the High Power mode must be activated.
Number of half-cycles to detect open load:	Number of half-waves that need to occur one after the other to detect a defective load.

Note
In the lucDMC user interfaced "SRU 100" is used as a generic term intended to refer to all SRU types at the same time (SRU 101, SRU 102, SRU 111 and SRU 112).

5. Set the parameters from the above list that suit your needs.

A parameter field that has been changed recently is marked in yellow. The **send** button appears at the bottom right sight below the parameters list:

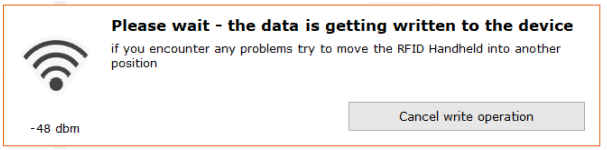
Figure 54: Settings change highlighting and send button — device settings



6. Hit the **send** button when you are finished.

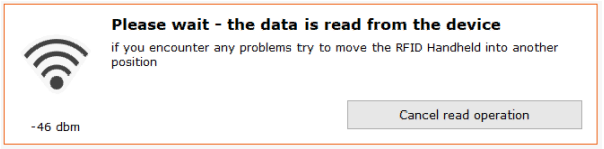
   Dialogue boxes open during the storing process:

Figure 55: Dialogue box — save data on the device



   You have the option to cancel during the process.

Figure 56: Dialogue box — read data from the device



All changed parameters are stored in the SRU now. All parameters are displayed without yellow marking again.

Note

You can make sure all the changed parameters have been sent by hitting the **refresh all parameters** button in the top right corner:

Figure 57: Refresh all parameters button — device settings

4.9.3 SRU Remote System Parameters

This section lists the values that can be set in the regulator for the RELIANCE IL for system parameterization using lucDMC.

Table 10: SRU remote system parameters description

Data type	Designation	Functionality	Value range	Default
u8	u8IntegrationBase	Integration set value	1-255	50
u8	u8FallingSlopeThr	Falling slope threshold	0-255	60
u16	u16HWCalibrationLimit	Limit of half cycle calibration	0-1000	500
u8	u8HWCalibrationStep	Calibration step	0-255	10
u8	u8DynAverageSize	Dynamic average size	1-255	8
u16	u16AdcZeroThr	Gradient dynamic threshold to RMS	1-512	224
u8	u8DynThr	Noise distance to RMS	1-255	45
u8	u8ZeroDelay	Set integral to 0	0-255	50
u8	u8DiffThr	Dynamic threshold to RMS Current	50-255	100
u8	u8DiffThrSYNC	Dynamic threshold to RMS current (SYNC)	50-255	80
u16	u16FbFetDuration_us	Duration of SCROLL feedback in microseconds	0-4000	3000
u16	u16RelayFetDelay_us	Delay between relay and FET in microseconds	0-1000	0
u16	u16FbLowerLoadVoltageThr	Lower threshold to detect a shorted load in mV RMS, 0 = no detect	0-50000	740
u16	u16FbUpperLoadVoltageThr	Upper threshold to detect a shorted load in mV RMS, 0 = no detect	0-50000	50000
u8	u8FbHighPowerMode	0 = 230W, 1 = 315 W	0, 1	0
u8	u8CMNoOfVoltageTripsFO	Number of overvoltage trips until remote detects a broken load	1-255	8
u8	u8PulseDiffThrAddValue	SCROLL pulse offset	0-255	35
u8	u8FactorFbVsCurrent10	Factor for FET duration in percent (5.4A >= current > 4.8A)	10-100	80
u8	u8FactorFbVsCurrent30	Factor for FET duration in percent (current > 5.4A)	10-100	60

4.9.4 Parameterizing the CCRE for Lamp Failure Measuring using lucDMC

This section does not explain how a series circuit without RELIANCE IL is commissioned. For further information about commissioning of a series circuit in general contact the ADB SAFEGATE service team and check Commissioning list RELIANCE IL and Planning data, restrictions and performance data sections.

This section explains how the regulator parameters can be adapted with lucDMC to be suitable for RELIANCE IL use. Do the following to execute lamp failure measuring:

Check the condition of the series circuit for completeness and functionality.

Tip

There must not be defective lamps or open transformers installed into the circuit.

DANGER

Avoid provisional installations such as short-circuit plugs.

4.10 Testing

4.10.1 Testing a RELIANCE IL SRU

Make sure you have available the table that contains the RELIANCE IL configuration of the respective series circuit or the parameters of the remote being tested are already known.

The test covers the assignments of the lamps to their segments, the module address and the preset maximum number of modules.

Typical excerpt from a RELIANCE IL configuration list:

Table 11: Project Example Data

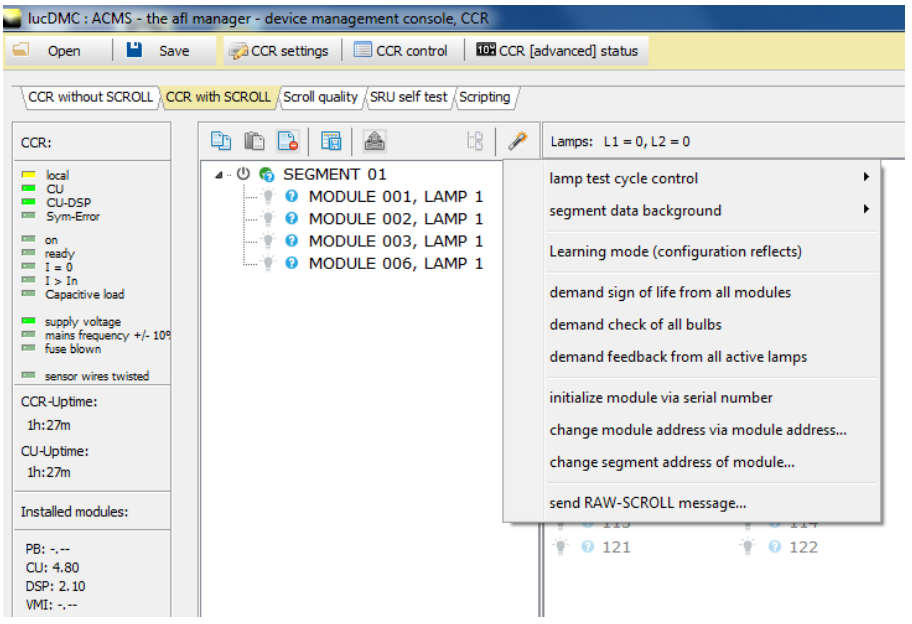
Project: sample project			SRU 101 Number: 5SRU002 number: 8			
Regulator	**Module no.**	**Segment no.**	**Lamp**	**Lamp ID**	**Type**	**Serial number**
CLB01	1	1	1	ANWCLB01-H201	SRU 102	09 09 0256
CLB01	1	1	2	ANWCLB01-H202	SRU 102	09 09 0256
CLB01	2	1	1	ANWCLB01-H203	SRU 101	09 09 0029

Example: Imagine you want to test the module from the sample list with the Serial Number 0909 0260.

Testing remote address:

1. Configure the remote with lucDMC Configuring a SRU remote - default parameters.
2. 2. Switch on the regulator and set a brightness level between 2.8 A and 6.6 A.
   The remotes will need at least 10 seconds to switch into fail-safe mode.
3. Make sure the lights connected to this remote are switched on.
4. Select **Administration** > **demand feedback from all active lamps** .

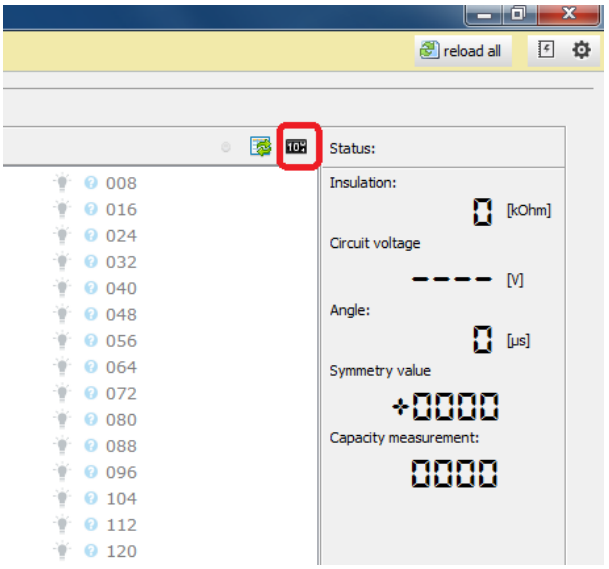
Figure 58: Drop-down menu — CCR with SCROLL tab



The lamp test routine runs. Every active light will answer indicating the remote address. This will be indicated visually by showing a green light icon.

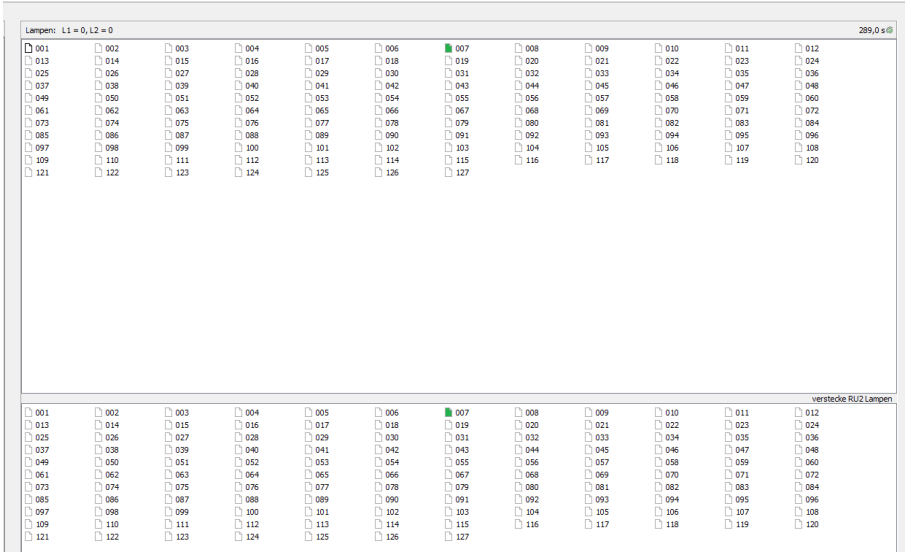
During the test routine (which can take up to 12 seconds, depending on the size of the circuit involved), a timer will run at the top right-hand edge of the lucDMC window:

Figure 59: Lamp test time counter



After the timer has expired, and the green indicator has lit up briefly, all feedback messages have been received. If the remote being tested (in this example the one with Serial Number 0909 0260), i.e. Module Address 7 has answered, its lamp indicator in the lucDMC will turn green, for Lamp 1 and Lamp 2 in each case:

Figure 60: Lamps at both outlets in the circuit

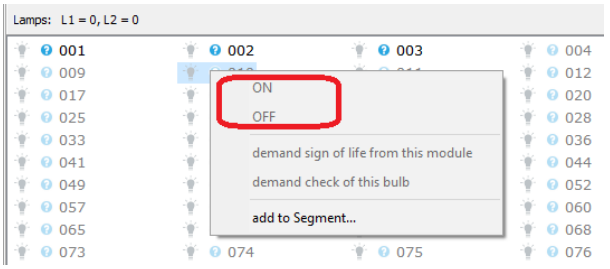


If the display for the remote being tested does not appear and the light connected is lit up, this behavior indicates that the remote is defective.

5. Right-click on the respective lamp od the remote address on the lucDMC screen to select the lamp.

6. Switch the light ON and OFF.

Figure 61: Drop-down menu — Switch a lamp on or off



7. Check whether the light is in the selected state.

If the light is in the state it is supposed to be, the lamp is intact. If it is not in the supposed state, the light is blown. Replace the light if it is necessary. Refer to Replacing a SRU remote.

4.10.2 Testing a SRU — Segment Assignment

1. Configure the remote with lucDMC. Refer to Configuring a SRU — Default Parameters.
2. Switch on the regulator to a set point level between 2.8 A and 6.6 A.

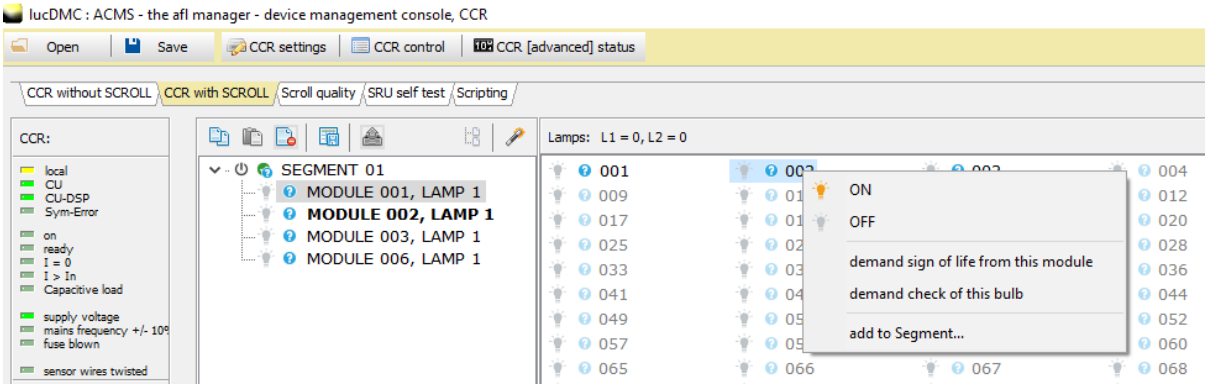
   The group information for the lamps of the modules concerned can be found in the RELIANCE IL configuration Table.

   If there is already a RELIANCE IL configuration with groups in the lucDMC, the next step “Segment (group) formation in the lucDMC” must be omitted.

   If you have a RFID handheld reader available for RELIANCE IL, you can scan the RFID tag labelto see the segment information.

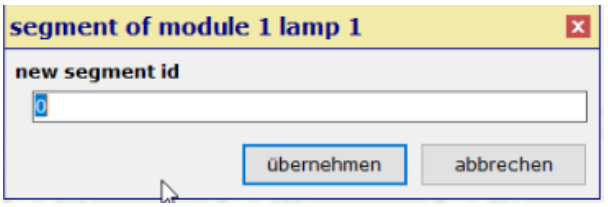
   Check the lamp feedback and the status of the light to verify whether the group switching command has been executed correctly.
3. Right-click on the lamp and assign the lamp to a segment by selecting **add to a segment** from the drop-down menu if not set by default to 1).

Figure 62: Drop-down menu — switch a segment



4. Drag and drop the lamp to the segment you want to assign the lamp to if you have integrated a RELIANCE IL SRU Remote. For SRU the dialog box **change property — group** opens. Type in the number of the segment you want to assign the lamp to.

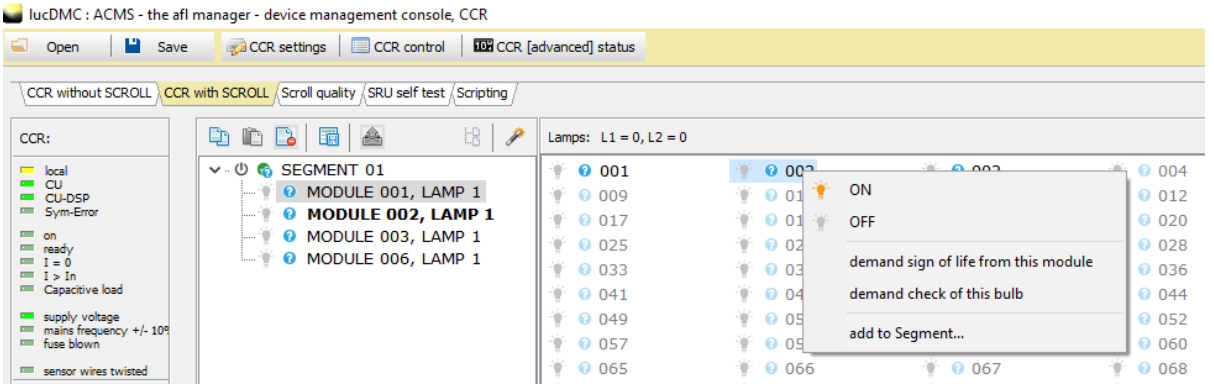
Figure 63: Dialogue box — add a new segment ID



5. Hit the **apply** button to save your changes.
6. Repeat the steps of the lamp test for the segment feedback.

7. Switch the segments ON and OFF by right-clicking on the segment (group) in the group structure tree and selecting the value from the drop-down-menu.

Figure 64: Drop-down menu — switch a segment



8. Check if the lamp status equals the selected state.

If the light is in the selected state, the group switching command has been executed correctly.

4.10.3 Testing the Lamp Failure Detection

1. Click on the first number on the feedback list displayed.
2. Right-click and select the command `ON` from the drop-down list to switch on the light.
3. Wait for the lamp to light up and the feedback of the lamp to be displayed.
4. If the feedback is not displayed switch off the CCR and replace the light.
5. Switch the on CCR and start at step 1.

4.10.4 RELIANCE IL SRU Remote CU Commands in lucDMC

Note

The commands may also be given using the Constant Current Regulator display menu. It is recommended to use the lucDMC tool for commands as it is more complicated and time-consuming with the regulator display menu. Refer to the respective section for more information.

Table 12: Segment commands — CU commands in lucDMC description

No.	Type Byte 3	Byte 2	Byte 1	Byte 0	Remarks	Implemented in SRU ?	downward compatible
1	**GroupCommand1 0x0F**	Group 24-17	Group 16-09	Group 08-01	Bit = 0: group off; bit = 1: group on	Yes	Yes

Table 13: Lamp test commands — CU commands in lucDMC — description

No.	Type Byte 3	Byte 2	Byte 1	Byte 0	Remarks	Implemented in remote	downward compatible
4	**LamptestCommand 0x55**	Standard 0x0F	0x11	0x00 or remote address	Remote(s) in ON state will respond; with MA <> 0, only addressed remote will respond, now in period 1 for L1 and 2 for L2; no response when filament burnt	Yes	Yes
		Group 0xF0	0x11	Segment Address	Remote(s) in ON state with provided segment address <> 0 will respond with the appropriate time slot for L1 and/or L2; no response when filament burnt or off	Yes	Yes
		Special 0xFF	0x11	0x00 or Module Address	Remote(s) in ON and OFF state of chosen lamp will respond; with MA <> 0, only addressed remote will respond, now in period 1 for L1 and 2 for L2; no response when filament burnt	Yes	Yes
		Module test 0x55	0x11	0x00 or Module Address	Remote responds sending ON and OFF state and answer if filament burnt; RU2 responds only for L1	Yes	Yes
		Special single lamp test 0x33	0x0C: L1, 0xC0: L2	0x00 or Module Address	Remote(s) in ON and OFF state will respond; with MA <> 0, only addressed remote will respond; no response when filament burnt	Yes	Yes

Table 13: Lamp test commands — CU commands in lucDMC — description (Continued)

No.	Type Byte 3	Byte 2	Byte 1	Byte 0	Remarks	Implemented in remote	downward compatible
		Single lamp test 0xAA	0x0C: L1, 0xC0: L2	0x00 or Module Address	Remote(s) in ON state of chosen lamp will respond; with MA <> 0, only addressed remote will respond; no response when filament burnt	Yes	Yes
		Result of self test request 0xCC	0xAA	0x00 or Module Address	Remote(s) will give as feedback the result of previous executed self-test success = response, no success of self-test = no response	Yes	No
		Noise level detection 0xEE	0x11	0x00	CU executes lamp test, remotes do not respond	No	No

Table 14: Individual commands — CU commands in lucDMC — description

No.	Type Byte 3	Byte 2	Byte 1	Byte 0	Remarks
5	**IndividualCommand 0x5A**	Module 0x3C	MSN:L2, LSN:L10x03: off, 0x0C: on	Remote address	Valid remote addresses: 0, 1-127
		Group 0x55	0x33: off, 0xCC: on	Regment address	Valid group addresses: 0, 1-63
		AssignWigWagMode 0xAA	WigWag-mode on/ off0x03: off, 0x0C: on	Segment address	Valid value: 0x03 = off, 0x0C = on, default = off
		AssignWigWagSpeed 0x33	WigWag speed	Segment address	Range 25..255, default = 100 (1 = 10ms) → 1s
		Execute self test 0xCC	0xAA	0x00 or segment address	Executes self-test; remote address 0 = all remotes

No.	Implemented in remote type SRU?	Downward compatible
5	Yes	Yes
	Yes	Yes
	Yes	Yes
	Yes	No

Table 15: Individual parameters — CU commands in lucDMC description

No.	Type Byte 3	Byte 2	Byte 1	Byte 0	Remarks
6	**IndividualParameter1 0xC3**	AssignGroupAddr: 0x5A	NewGroupAddr	Remote addresse	MSB of GroupAddr, 01: assign to L1; 10: assign to L2Valid segment addresses: 1-63
		AssignModuleAddr 0x66	NewModuleAddr	Remote address	Valid remote addresses: 1-127, 128 (not configured)
		AssignColdStartValue 0xA5	0x33: L1 off/L2 off0x3C: L1 on/L2 off0xC3: L1 off/L2 on0xCC: L1 on/L2 on	Remote address	Valid remote addresses: 1-127, Default L1 off/L2 off
		DefineRUType 0x96	0x33: RU1, 0xCC: RU2	Remote address	Activates/Deactivates channel 2 (Lamp2) dependent from RU hardware; default: RU1
7	**IndividualParameter2 0xCC**	SerialNo	SerialNo	Remote address	If RU-II-SN = 0, assign SN and ModuleAddress, else assign ModuleAddress onlyValid remote addresses: 1-127

No	Implemented in remote	Downward compatible
6	Yes	Yes
	Yes	Yes
	Yes	Yes
7	Yes	Yes

Table 16: Broadcast parameters — CU commands in lucDMC description

No.	Type Byte 3	Byte 2	Byte 1
8	**Broadcast Parameter I 0xF0**	MaxNoOfModules 0x99	0x11
		FailSafeValue 0xAA	L2: 0x33-off, 0xCC-on
		FailSafeTimeOut 0x33	NewFailSafeTimeOut(HiByte)
9	**Broadcast Parameter II 0x69**	Remote Feedback Duration 0x33	NewDurationValue (HiByte)
10	**BroadcastParameter III (1 telegram) 0x66**	WigWagSyncCMD 0x0F	0x22

No	Byte 0	Remarks	Hints	Implemented in remote	Downward compatible
8	NewNoOfModules	Range: 3-127 (odd no!), default 127	To be sent 3 times in a sequence with a pause of 0.5s; in RU-II valid only when received at least 2 times within 5 sec.	Yes	Yes
	L1: 0x33-off, 0xCC-on	Default ON		Yes	Yes
	NewFailSafeTimeOut(LoByte)	Range: 5-3600 [s], default 90		Yes	Yes
9	NewDurationValue (LoByte)			Yes	
10	0xCC			Yes	Yes

5.0 Maintenance

This section covers the maintenance procedures to maintain RELIANCE IL.

WARNING

Make sure that the power to the series circuit is OFF when you carry out maintenance.

CAUTION

Do not carry out any action on the fixture unless you have read and understood all the information in the SafetySection.

Important

Only switch off the system or execute changes at the system that restrict functionality completely or partially with prior authorization of the responsible traffic control representative.

NOTICE

An *Individual Light Control and Monitoring system* (*ILCMS*) can be integrated into an *Advanced Surface Movement Guidance and Control System* (*A-SMGCS*) that is supposed to fulfill safety-related functions. These safety requirements must be preserved.

5.1 Importance of Maintenance Requirements for Warranty Claims

ADB SAFEGATE will in the following cases decline any responsibility, nor will it accept any warranty claims:

- If the system has been handled negligently, contrary to the safety and work instructions currently applying
- In the event of inadequate maintenance, non-compliance with the recommendations given here, or inexpertly executed repairs performed by untrained or inadequately equipped personnel
- If the system is used for other than its intended purpose
- In the event of modifications to the system that have not been carried out by authorized specialist personnel

5.2 General Maintenance Remarks

An airfield's lighting system requires regular maintenance work.

Note

The operator is obligated, not least under the DIN EN 61821 standard, to keep these systems in a fully functional state by means of the maintenance routines specified by the manufacturer.

Note

Maintenance work thus directly influences the safety and functional efficiency of the system concerned. Maintenance work must be carried out only by specialist personnel who possess experience with series circuits, high voltage and lighting systems, in due compliance with the relevant safety regulations.

The tables provide an overview of the preventive maintenance work required when the system is operational.

Depending on the environmental conditions involved, different time intervals may also be necessary in order to assure maximized availability for each system.

The operational factors concerned are crucial in deciding on the maintenance intervals applying. A high volume of traffic at the airfield will necessitate shorter maintenance intervals, so that a maintenance schedule should be modified after several months of operation. You will find more maintenance instructions in the relevant device and system manuals.

5.3 Maintenance Notes for EN 62870 systems

This document applies to series circuits with an systemic approach and no additional suppressor circuit in which lights are supplied with power using a *Safety Extra-Low Voltage* (SELV, according to EN 62870). The notes are meant to be a supplementary info to the project-specific documents delivered with the product data sheets and the maintenance instructions in the maintenance section.

CAUTION

Warning — unauthorized changes in the installation may lead to death or serious injuries when touched while the system is not disconnected from supply voltage due to loss of safety extra-low voltage during operation
Do not change the installation in a manner not intended by the manufacturer, designer or the responsible airport technicians

Unintended changes include the following actions:

- Increase the preset supply voltage
- Integration of series circuit transformers not released for use with the installation
- Integration of transformers with increased type power
- Grounding of a pole of the lights' power supply

DANGER

Be careful when working on the system as the supply of the lights with Safety Extra-Low Voltage does not make the installation site safe by itself (the installation slot for the transformer or contact points with installation below the lights). Keep in mind that there are still high voltages in the serious circuit and follow the safety precautions.

Remember

The positive completion of the self-test is not a license for the user to rely on this functionality blind. An occasional check of the output voltage (lamp failure) during a lamp change is considered useful.

As the secondary side of the light-transformer is a current source, it is necessary to actively clamp the voltage. This could be provided by an electronic circuit which has to be checked cyclically to detect if the functionality is still active.

Using an active voltage limiter like SRU 111 and SRU 112 to meet the requirements of EN 62870, Safety Extra-Low Voltage, is not intended to allow people to work on powered circuits, but is meant to add an additional protection for example in case someone forgot to switch off the circuit.

Make sure that the power to the series circuit is OFF when working on the installation. Follow all common safety rules for working on electrical installations, when carrying out maintenance or installation.

CAUTION

Electrostatic Sensitive Devices
Disconnect all serious circuits from voltage and ground the circuits before working on the installation in the slot — only work using Personal Protective Equipment (PPE) if one or more circuits keep supplied with power (see EN 61821).
Risk of electrostatic shock

Voltage Limiter Limitations

The *Safety Extra-Low Voltage* cannot be achieved only by integrating the SRU with voltage limiter (SRU 112) into your system, but need to use a standardized approach for the systemic design of your installation including a specific requirement framework. The requirement framework for the compliance to the SELV standard (EN 62870) includes the following prerequisites:

- Selection of adequate serious circuit transformers to ensure:
  1. Safe cut-out
  2. Limitation of the type power
  3. Limitation of the operating voltage when it comes to insulation
- Limitation of the serious circuit voltage
- Sufficient insulation of the primary and secondary circuits against ground

Handling

The supply of the lights with *Safety Extra-Low Voltage* aims to simplify the maintenance and repairing procedure. The supply voltage in systems equipped with SELV will not exceed 50 VAC, even in case of light failure.

CAUTION

Risk of *Electrostatic Discharges* (*ESD*) in wet weather conditions or in series circuits with low insulation values
Wear *Personal Protective Equipment* (*PPE*) when working on parts of the circuit

Detailed working best practices for handling and maintenance must be defined by the responsible airport personnel. The best practices must be complied with for your own safety.

Lights supplied with SELV are marked with the the following symbol:  The symbol is located on or next to the light.

Apply the best practices for work related to light fixtures, if this symbol cannot be read or does not exist.

Maintenance Process

Maintain and test the lighting systems according to the requirements laid down in the work instructions to ensure the that the SELV system keeps functioning. For maintenance and testing focus especially on the followings aspects:

- Insulation values of the primary cabling

  One of the possible protective method is based on an not grounded primary power supply via the series circuit (IT net) and a secure interruption of the not grounded secondary circuit at the output of the series circuit transformer. Body currents caused by touching the secondary power supply are being minimized due to the high insulation values. One of the protective barriers is no longer effective if there is a ground fault in the primary circuit. The insulation values of circuits with more than 1000 VAC must be kept above 500 k ohm and the insulation values of circuits with up to 1000 VAC above 100 k ohm. Circuits with insulation values less than 500 or 100 k ohm, respectively, must be repaired as soon as possible.

  ### Important

  Be especially cautious when working on circuits with low insulation values. Do not work on circuits with low insulation values unless you wear suitable PPE or have disconnected the system from the mains and protected the system from reconnecting using a cut-out device.

- Testing the series circuit transformers when replacing a light fixture:

A failure of a series circuits transformer caused by an inadequate circuit structure or dimensioning of the insulation is unlikely to happen. Measure the current and voltage values at the supply connectors of the lights after replacing light fixtures regularly to avoid failures. The effective voltage must not exceed 50 VAC from pole to pole of the supply connectors. Measuring the voltage from of one of the connectors to ground potential is supposed to result in a leakage current far below 1 mA. Replace the series circuit transformer as a precaution, if the measured values are untypically high.

- Testing the readability of the SELV mark:

  The readability of the SELV mark is to be verified and if necessary replaced when testing the installation, especially after winter season. The work instructions for supply systems without SELV are to be applied, if there is no more visible mark.

Repairing Work

Use only the intended serious circuit transformers with a safe cut-out device for repair work.

DANGER

Series circuit transformers with a type power higher than 65 VA must not be used anyway (except the circuit is equipped with SRU 111 or SRU 112). Comply strictly with a maximum series circuit voltage of 1000 VAC.

Modifications of the series circuit leading to a series circuit voltage higher than the one preset at commissioning are prohibited. Follow the notes indicated on the power transformers of the regulator system. Modifications indicating that the SELV principle was applied for the installation are to be authorized by the responsible airport department, circuit designer or manufacturer, if extensions in the circuit are considered necessary.

Documented Maintenance and Repair Activities

Maintenance and repair works on a lighting system with serious circuit technology are regulated in “DIN EN 61821”.

All maintenance and repair works have to be executed with the system disconnected from the mains according to “DIN EN 61821. ” *Live works* on the secondary side of series circuits are only allowed following the safety requirements, if works are based on the hazard analysis for a systemic integration of “DIN EN 62870” (*SELV* based power supply). The safety requirements include that workers wear *PPE* for a voltage level up to 50 VAC and regular testing of the insulation values of the primary cables. This permission does not apply for transformer installation slots or other installation sites.

Tip

It is recommended for lighting operators to document all the maintenance and repair works on the serious circuits with SELV power supply in a life cycle document to prove the compliance with the applicable requirements. Persons working on series circuits are required to get written approvals and be given adequate safety training how to work on serious circuits.

Important

The responsible airport personnel has to provide work instruction for workers on how to work on lighting systems in the languages of the workers. The working instructions have to include all the required safety measures to be undertaken.

5.4 RELIANCE IL — Product Maintenance

NOTICE

Maintenance personnel must refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9, Airport maintenance practices and in FAA Advisory Circular AC150/5340-26. Below we provide a list of recommended maintenance tasks to ensure that the equipment is in correct operating condition.

Table 17: RELIANCE IL maintenance schedule table

Interval	Maintenance task	Action
Daily	•General check of the ground lighting •HMI ATS functional test •HMI ATS technical test	•Check all regulators and ISO drawer units for flawless functioning
	•Check instrumentation and control system	
Weekly	• Functional tests of the stop bars	
Monthly	•Control of specific supply parameters of remote control systems •Control of specific supply parameters in substations and other airfield lighting equipment •Control of correspondence between instructions and the display current values of brightness steps in CCRs •Control of on-site setting of the units if setting controls are greater than a10 mn angle	
Semiannually	•Test of spare parts (*HMI)* •*HMI* test in default condition •Control of autonomy of specific power supply for substation (HMI) •*Surge suppressor* components (*HMI*) •Check of insulation and continuity of the airfield lighting circuits •Checks of condition of regulator lighting arresters •Checks of defect reporting and control/commands of regulators •Check of the general condition of cable channels on the runways •Check of the inset light connectors: condition of cable and connector (resistance to *traction* and *watertightness*, *wear*)	

Table 17: RELIANCE IL maintenance schedule table (Continued)

Interval	Maintenance task	Action
Anually	•Visual control of remote control cables •Control of tightening of regulator connections •Check of loading of regulator circuits •Control of cleanliness of the regulators •Analysis and archiving of regulator monitoring sheets •Full visual check of manholes •Check of concrete slabs •Visual check of condition of conduits and pipes •Visual check of the light intensities (at night) •General check of cable entanglement •Check instrumentation and control system	•Check instrumentation and control system for soiling and clean if necessary; •Check and clean control cubicle fans; Visual inspection of fuses and protective devices; •Check plug contacts of the regulators for flawless condition; Check fixing screws of the regulators and *plug-in card handles*; •Check local operator control and operator control functions; •Check cabling in the transformer and *regulator cubicle*s for mechanical stress and damage; •Visual inspection of *surge arresters* and current transformers on the transformer modules for mechanical damage; •Check ground connections; •Check regulator's manual/automatic switchover feature; •Perform and calibrate genuine rms value measurements of the circuit currents in all operational phases of the series circuits; •Create measurement report for regulator circuits; •Check lamp failure signaling, recalibrate threshold values; •Check plug connections of the ISO drawer unit and the individual plug-in cards; •Check insulation values of the control circuits; •Check ISO coupling device – coupling relay and high- voltage fuse; •Check documentation for completeness
Bi-anually	•Control of electrical/optical characteristics of the remote control cables	
Every 5 years	•Check of the condition of sensitive crossings (possible obstructions)	
Manufacturer checks	•Maintenance of components of the remote control system	

5.5 How to detect a faulty Remote

There are two options for detecting a faulty remote:

1. The *Control and Monitoring system* (control PC in the *Air Traffic Tower*) or the lucDMC tool, respectively, receives no feedback from the lamp failure detection system, although the light is working.
2. The lights connected to the remote remain turned off when you try to turn it on.
3. Execute the self-test on SRU 111 and SRU 112.

Note

You should check if the respective light works correctly before replacing the remote. You can do so by connecting a series circuit transformer.

5.6 Troubleshooting

5.6.1 How Product Troubleshooting is structured

Table 18: Troubleshooting example table

Section	Expectable content
Action in the event of a system or component malfunction	Safety message
Maintenance and repair	Safety message
Arc Flash protection - understanding the *arc flash* warning labels	See FAA advisory: AC150/5340-26 (latest edition) Each piece of equipment operating at 50 volts or more and not de-energized while work is being performed, must be evaluated for arc flash hazard and shock protection. This evaluation will determine the boundaries (i.e. prohibited, limited, restricted, etc.) of the arc flash and shock hazards. The evaluation will inform employees of what PPE must be worn. When the evaluation is complete, an arc flash hazard warning label must be affixed to the equipment and be conspicuous to employees who may work on the energized equipment.
Troubleshooting support	Provides data to support isolation of faulty component(s) upon failure of the product including block diagram(s), major function diagrams, wiring diagram identification of functional circuits, diagrams (i.e. power distribution, wiring, cabling), mechanical drawings, and a troubleshooting logic/flow chart.
Product Troubleshooting Table	Table providing a visual depiction of the troubleshooting / fault isolation process.

Table 19: Example product — troubleshooting guide table

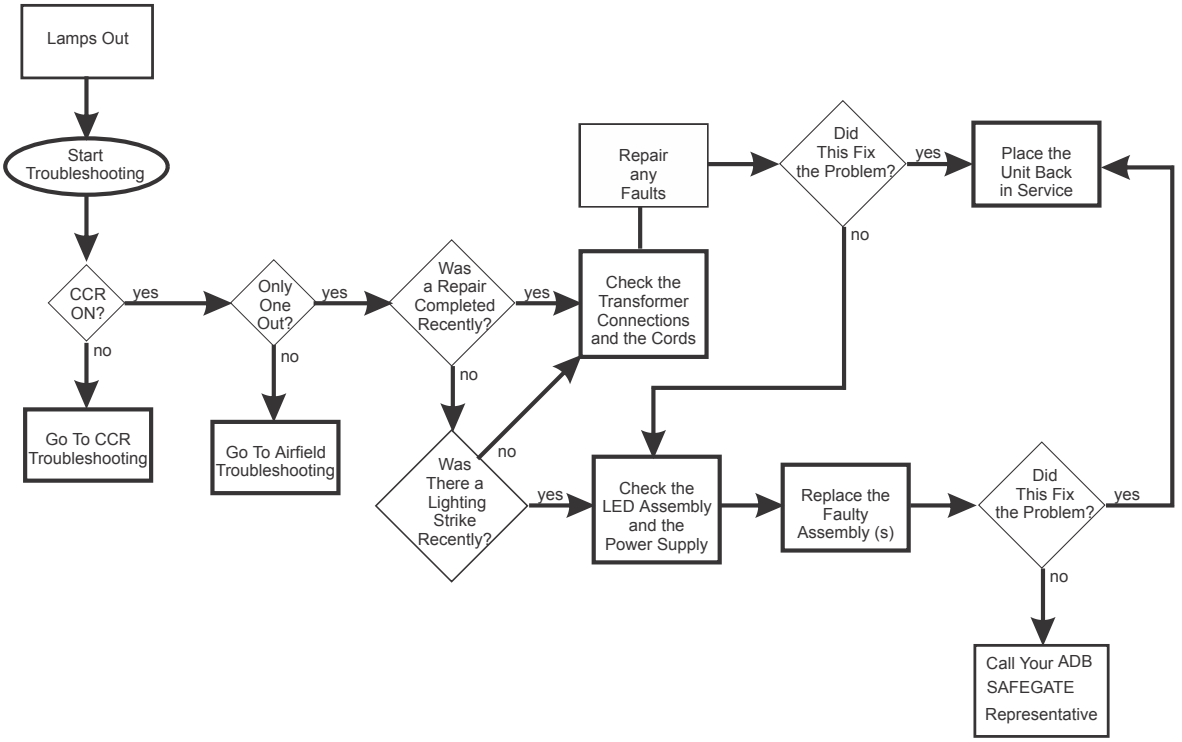
Problem examples	Possible cause examples	Corrective action — examples
Lamp/LED not energizing	Defective lamp / LED assembly	Replace lamp / assembly
	Loose or broken contacts	Make sure cable connections are ok
	Power supply failure	Mains on / reestablish connection
	Fixture wires pinched	Replace wires
	Defective isolation transformer	Change isolation transformer
	Defective remote control device	Repair /replace remote control device
Lamp not turning on at normal level	Continuity incorrect	Make sure the continuity is correct
	Isolation transformer secondary current incorrect	Make sure the current is correct
	Wrong fixture installed	Install the correct fixture
Improper color	Filter broken	Replace filter
	Filter bracket broken	Replace filter bracket
Short lamp / LED life	Current too high (series circuit applications)	Reduce current
		Take respective measures
	Water in assembly	Remove water
	Component failure	Repair / replace component
Distorted light beam output	Broken, damaged or wrong prism / lens, if applicable	Replace prism / lens
Water inside product enclosure	Damaged or missing prism seals or top cover O-ring	Replace prism seals or cover o-ring
	Fixture wires pinched or broken insulation	Replace wires and insulation

This can be illustrated either using a flow diagram or a chart presenting the common signs of an error, the steps to test for which component the error is caused and then, a process for correcting the error.

Table 20: Product troubleshooting illustrations definition

Section	Content requirements
Product troubleshooting illustrations	Figure(s) providing supporting information/details such as block diagrams, major function diagrams, wiring diagrams, etc., as required to assist in the product troubleshooting / fault isolation process.

Figure 65: Flow chart graphic example



5.6.2 RELIANCE IL Troubleshooting

For troubleshooting, 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:

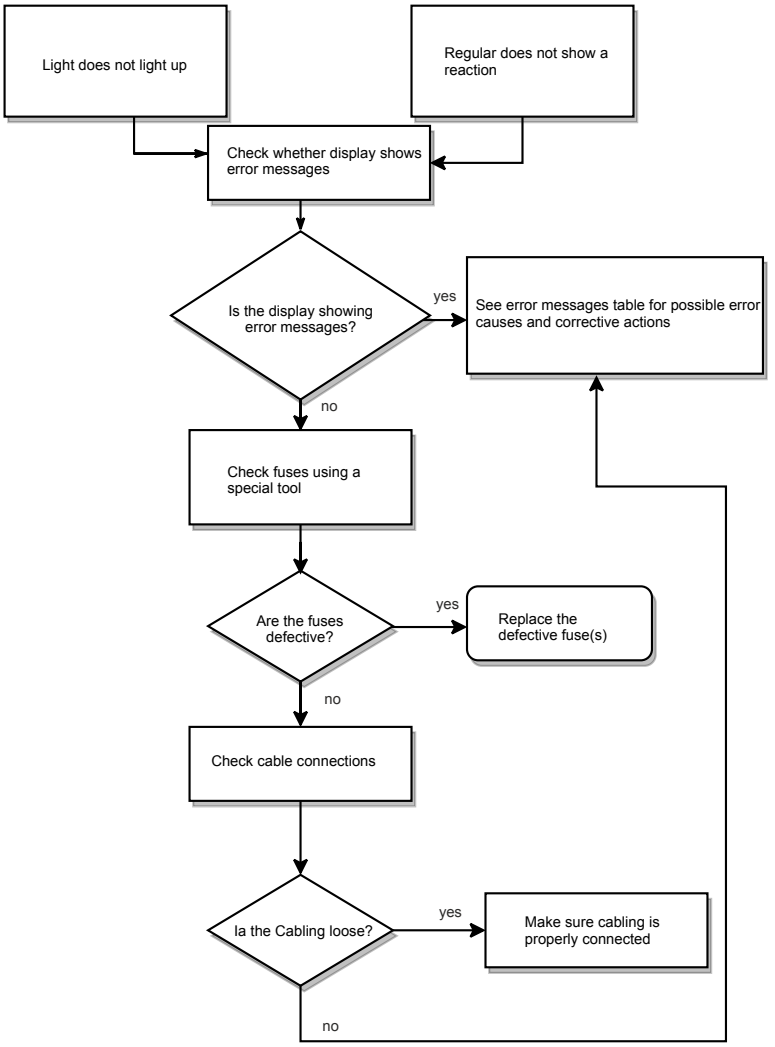
- Use the service software to check the detailed messages from the system and the individual lights.
- If the system has been reconfigured using lucDMC, please check whether the new configuration is free from faults, complete and corresponds to the system architecture.
- If the malfunction occurs only 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.
- Surge arresters installed in the station must be taken into due account and tested when checking the supply cable.
- For trouble-shooting in the outdoor cabling, it may be helpful to regularly measure and record the cable resistances during maintenance work.

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

Table 21: RELIANCE IL — Troubleshooting guide table

Problem	Possible cause	Corrective action
No communication between CCREand lucDMC	cables not connected properly	Make sure cable connections are ok
	False interface is selected	Select the right interface

Figure 66: RELIANCE IL troubleshooting flow chart



CAUTION

Use a*NH-plug safety handle* to test fuse functionality to protect yourself from electrical shock.

Figure 67: *NH-plug safety handle* example

Table 22: Error messages regulator

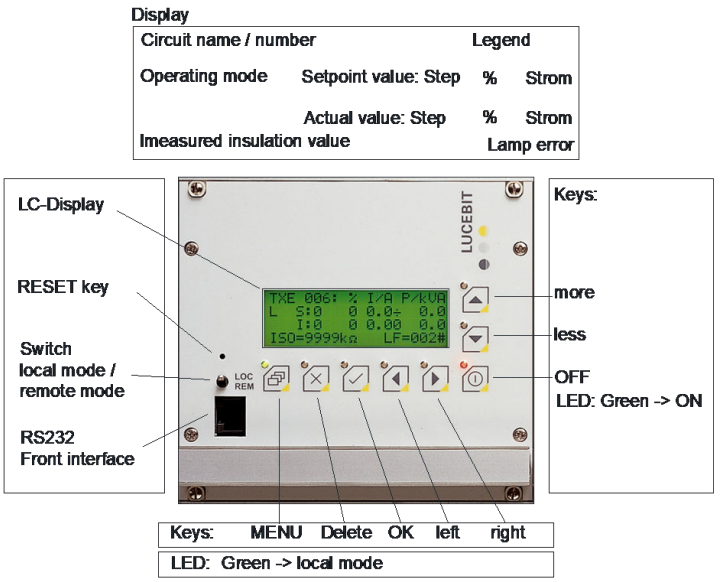
Problem / error message	Possible cause	Corrective action / required check
"I = 0" (no current / voltage flows)	Broken cable (*FLYCY cable*)	Measure *loop impedance*, find and replace broken cable (open-circuit between the slots or cable from regulator to transformer)
"ISO: no communication"	No connection to IME(Insulation measurement device for series circuits)	Check configuration and physical connection to IME
"No communication"	No remote connection (CAN bus, Mod bus or Profi bus)	Reestablish remote bus connection; change voltage transformer
	Voltage transformer (NGU001 broken	
Display not working	Fuse broken	Consult fuse position in the map (look up circuit number shown on the upper regulator screen) → check fuse using an *NH fuse handle* (if red dot is out, it is broken)
	No supply voltage incoming	Measure supply voltage with a volt meter and check power supply, check external circuit (measure ISO values, check *FLYCY* cable, impedance of external circuit and loop impedance)
Error message appears after switching on	Regulator defective	Check fuse → if fuse ok, set in new regulator for testing if problem persists → if persisting, send regulator to ADB SAFEGATE service team; check connectors in the regulator
	Contact pins of female connector bent	Replace individual parts like controller module for testing → if problem persists, send regulator to ADB SAFEGATE or contact the ADB SAFEGATE service team
	Fuses of switches inside of regulator broken	Send regulator to ADB SAFEGATE service team
	If regulator and its parts ok, external circuit architecture might be damaged	Measure ISO values (if in k Ω, corrective actions are required, M Ω is perfect); check external cables, measure external impedance and loop value (8 Ω is default; infinity symbol is displayed if defective as it indicates broken cable); measure values of *FLYCY* cable (might be damaged by heavy machines crossing the airfield)
	Transfomer broken	Check if cable connections have firm hold and of screws are properly tightened
"Connect sensor cable"	Sensor cable is not connected	Reconnect the sensor, press X button and tighten the screw

Table 22: Error messages regulator (Continued)

Problem / error message	Possible cause	Corrective action / required check
Lights do not light up after switching the regulator	Remote mode is activated (intended for switching from the control tower)	Switch to local mode
	Cut-out device is activated	Deactivate cut-out device
	Locale mode is activated if more than one regulator cannot be switched (intended for switching directly on the regulator)	
	Short-circuit within the secondary transformer	Replace secondary transformer → if problem persists, send secondary transformer to ADB SAFEGATE or call a ADB SAFEGATE service technician for replacement
	SRU is defective	Connect lucDMC (via RFID technology) to detect failure cause → test the RELIANCE IL to check if lamp or remote is defective (see Testing section of the manual) → replace lamp or remote
	Cable to regulator or SRU is defective	Measure cable and replace it if Needed
	Lamp of the light is defective	Replace lamp and reconnect circuit
	The regulator controller module without the RELIANCE IL CU is inserted	Remove current controller module and insert regulator with RELIANCE IL CU (PBG003 vs. PBG007) **Note** Lights can be controlled without RELIANCE IL but not individual light segments.
	Memory card was not inserted properly	Place the card at the same place as in the old regulator (there are two different cards at different places), as RELIANCE IL is adapted to individual airport structure at commissioning; check whether the designations on the display are still the same as before regulator change

The CCRE interface is structured in the following way:

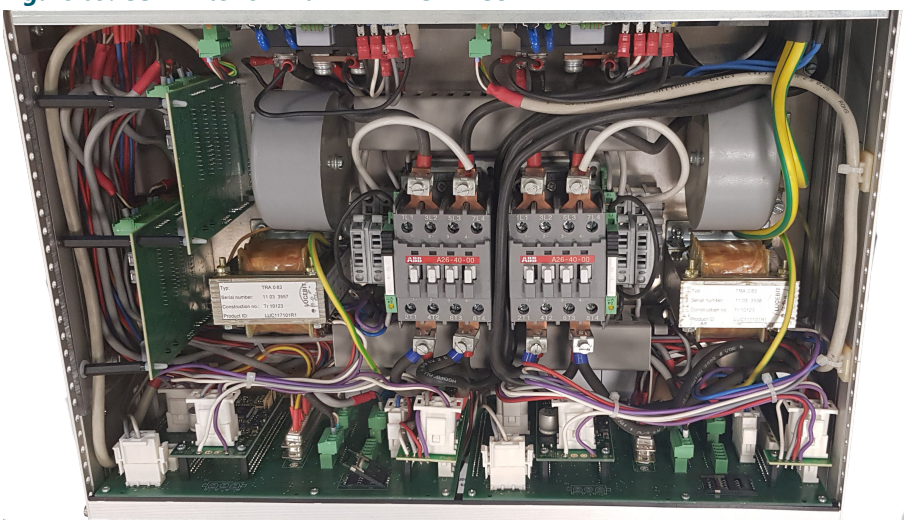
Figure 68: CCRE display and front panel buttons



The description above the photo shows what is shown on the LC display. The remarks on the sides and below the photo describe the buttons, handles and the ports placed next to the display.

Refer to COSAL CCRE manual for further information.

Figure 69: CCRE interior with RELIANCE IL CU



CAUTION

Make sure that the rated voltage of the equipment is in accordance with the local supply voltage.

CAUTION

The current regulation is +/- 100 mA. To make an acceptable readjustment of the output current, the precision of the meter should be better than 0.5% for the adjusted value.

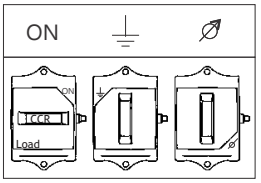
CAUTION

Inspection for damaged cables and / or connectors.

DANGER

Make sure you have turned off the regulator before working on the serial circuit. Usage of an ADB SAFEGATE *cut-out device* is recommended. Refer to the series *cut-out device* (type SCO) manual for further information.

Figure 70: Cut-out device operating positions



NOTICE

Make sure you disconnect the external circuit before working on a remote. Failure to disconnect the circuit may destroy the remote.

5.7 Self-test Feature

5.7.1 Functional Description Self-test Feature

The self-test consists of two switches inside the remote measuring the output voltage of the remote independently from each other and limit it. A SRU type 111 or 112 has two independent switches to handle single failures . To deactivate one of them via lucDMC to test whether one is broken. To understand this functionality, you can read the following steps of the self-test procedure executed by the remote switch(es):

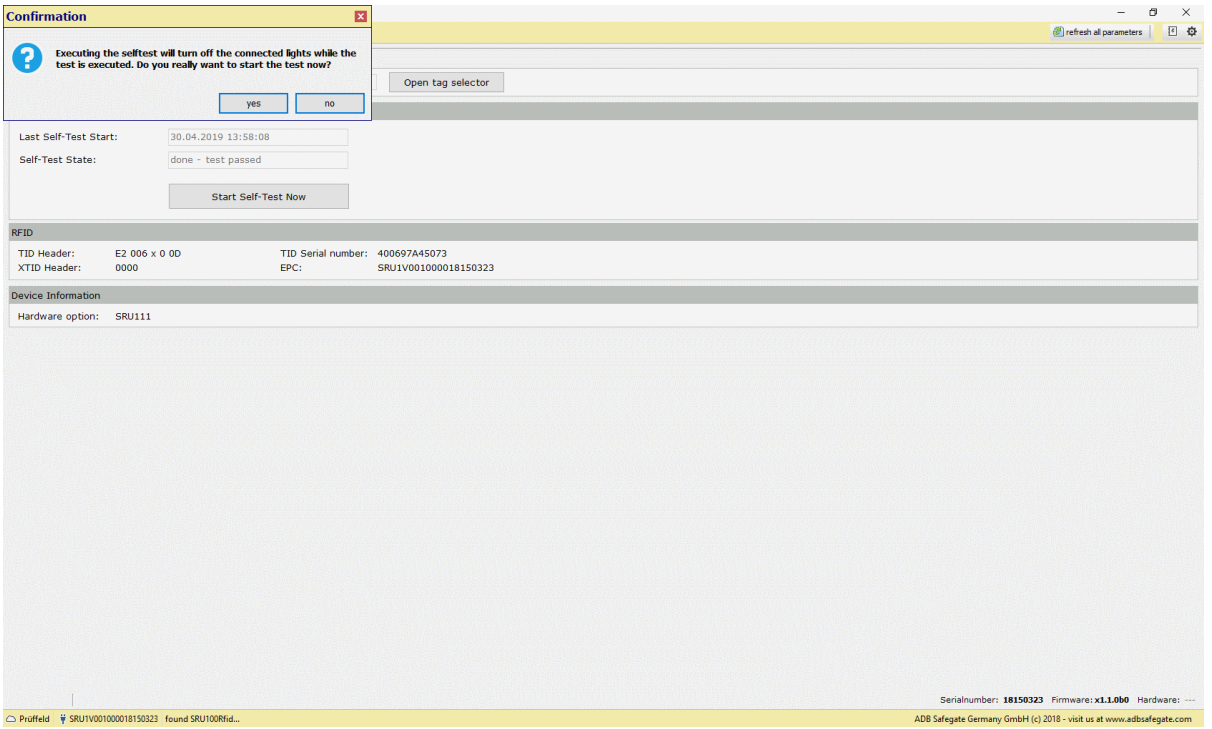
Test Steps — Self-test:

1. Check if current of the series circuit is above 4.0 A and remember last stored state.
2. Use lucDMC and the RFID reader DRH100 to start the self-test.
3. Check the result of the self-test.

> **Note**
> During the self-test, the lights will switch off.

The message "test done — test passed" is displayed in the **self test state** field if the test result was positive.

Figure 71: Test state — test passed



The test will be denied, the message is an indicator for a broken device.

If you choose the wrong current (less than 6,6 A), the error message "Test denied — wrong current" is displayed in the **self test state** field.

5.7.2 Self-test Feature without RFID reader DRH100 — SRU Type 111 and 112

In SRU 111 and SRU 112 is a self-test feature implemented. See Functional Description Self-test Feature for test result message description.

The types 111 and 112 limit voltage using a switch that measures SRU output and limits it. The self-test can be triggered with the RFID reader DRH100 using a CCRE and the lucDMC maintenance tool. Individual remotes can be tested this way. The self-test can also triggered in the series circuit for all remotes installed in the circuit.

DANGER

The self-test feature serves only as an additional tool, but does not guarantee absolute safety. It keeps being a device testing itself, but it can be used as a technical aid. The self-test feature serves only as an additional maintenance tool. It is not meant to replace the check with an external measurement device.

DANGER

Make sure you switch off the regulator before you connect the regulator to the series circuit.

Follow the following steps to execute a self-test for a single remote using an RFID reader DRH100:

1. Start the lucDMC tool.
2. Select an airport for the project from the drop-down list in the start window.

Figure 72: Log-in window — location selection airport

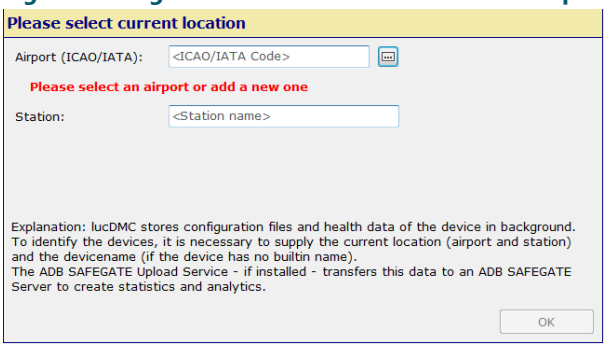
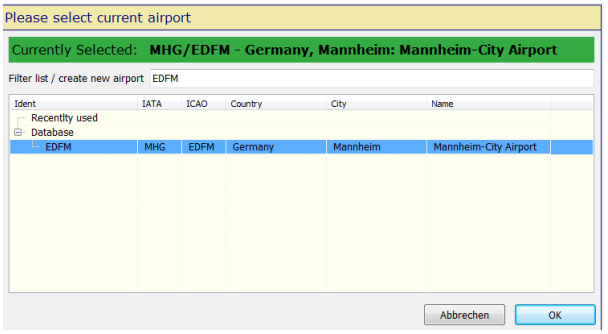


Figure 73: List of selected airports example

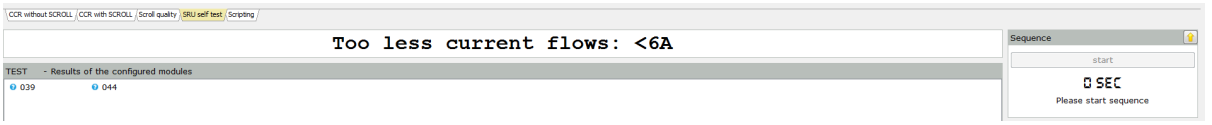


3. Type a station name in the station field. See dialog box above.
4. Check the box **group change in ...programming** when the remotes are configured.
5. Select the **CCR with SCROLL** tab.
6. Go to **CCR settings** and navigate to **advanced settings** > **default** .
7.
8. Set the self-test to ON instead of OFF.
9. Select the highest brightness level 7 that equals by default 6,6 A.

Note

If you select a setting with a current flow less than 6,6 A you will receive an error message. The error message "`too less current flows`" is displayed. The SRU self test cannot be executed in this case. The self test button is not active in CCR with SCROLL or **CCR without SCROLL** tabs.

Figure 74: Self-test results view



Tip

You can hit **save screen shot** in most self test windows to document error cases if you wish. You also have the option **reset view** which can only be selected after finishing self-test. The **reset view** button deletes the test results after test.

10. Select the **CCR control** tab and navigate to **SRU self-test**.
    The buttons to start self- test, etc., are now active
11. Hit the **start** button in the **sequence** section on the right side of the screen to execute the test.
    The timer in the **sequence** section is counting down for 40 seconds until test results are received. The message "`Self-test will be executed` is displayed during test. The tested lamps are being switched off during test and switched on again as test is finished. The test results are stored in lucDMC.

Note

A question mark sign is shown next to the lamp address number before and during test. When test is finished, the question mark symbol is replaced by a green check mark — if the state of the lamp (actual value, i. e. ON or OFF) equals the nominal value — or a red cross symbol — if the actual value does not equal the nominal value.

12. Shut down lucDMC when you finished the self-test or hit **reset view** to delete the current results in lucDMC and restart test.

    There are five states that are shown in the test life cycle:

Figure 75: Sequence view lamp test

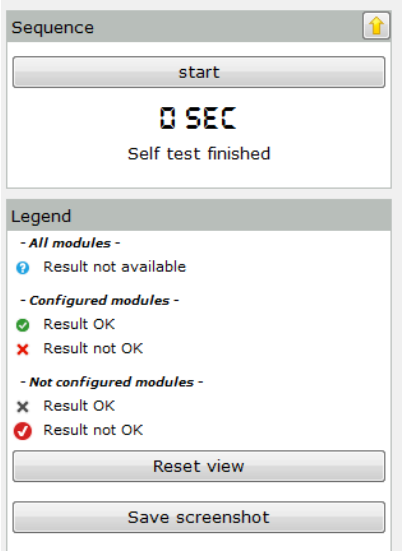
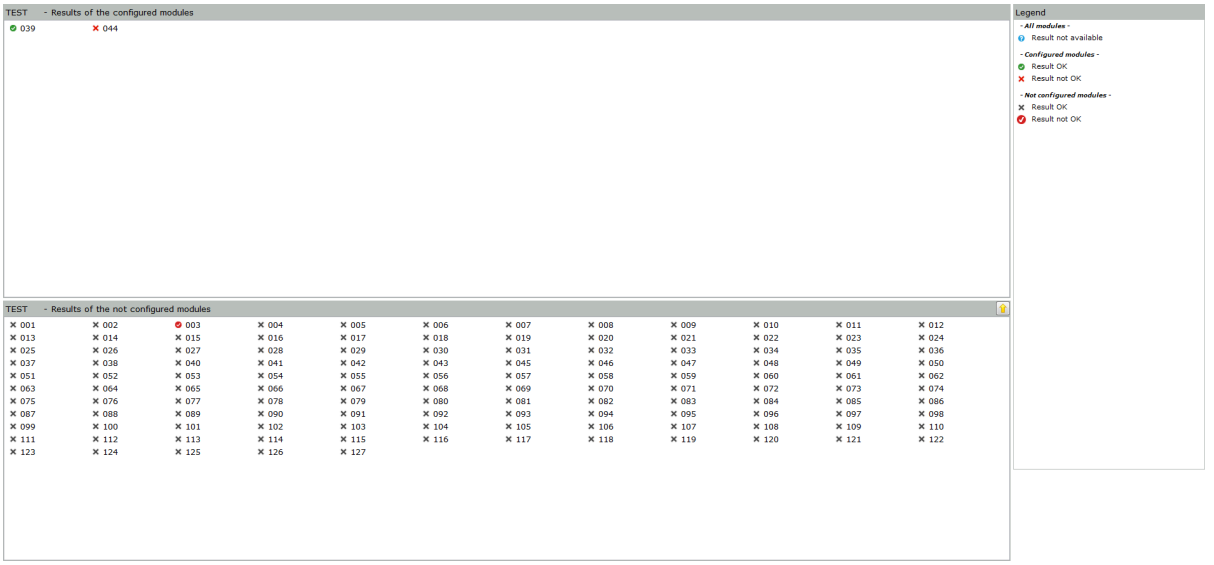


Table 23: Lamp test results — legend description

State	Description
All remotes — result not available	Self-test has not be executed yet / test results not received
Configured modules — result ok (green check mark)	Received actual value equals preset nominal value
Configured modules — result ok (green check mark)	Received actual value does not equal preset nominal value
Not configured value — result ok (grey cross symbol)	No feedback is received from lamps not considered to be configured
Not configured value — result not ok (red check mark)	Feedback is received from lamps not considered to be configured

In the following example all five states are represented:

Figure 76: Self-test result example — different states



In this example the lamps with lamp addresses 39 and 3 are configured in the series circuit while lamp with address 44 is not configured in the circuit. That means lamp 39 sent feedback and its state equals the nominal value while 44 cannot send feedback as it is not configured and lamp 3 sends feedback although it is not supposed to send feedback. Lamp 3 sends feedback as it is configured although it is not assigned to the test segment.

Important

The configuration set in IL III must equal the configuration set in the circuit. If the configuration in lucDMC, especially for segment assignment, does not equal the actual configuration in the circuit, you will not be able to achieve to control the lamp segments you aim to control.

Tip

Use the RFID reader DRH100 to check the remote addresses assigned to the lamps.

5.7.3 Self-test Feature using RFID reader DRH100 — SRU Type 111 and 112

In SRU 111 and SRU 112 is a self-test feature implemented.

Note

Make sure the right firmware is installed. If the right firmware is not installed, you will not be able to see the self-test button in the user interface.

The types 111 and 112 limit voltage using a switch that measures SRU remote output and limits it. The self-test can be triggered with the RFID reader DRH100 using a Constant Current Regulator type E and the lucDMC maintenance tool. Individual remotes can be tested this way. The self-test can also triggered in the series circuit for all remotes installed in the circuit.

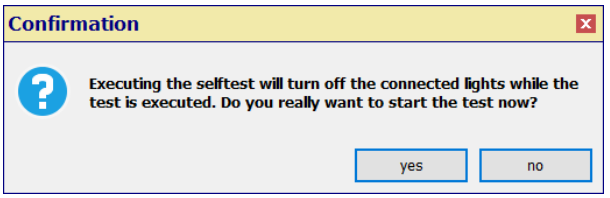
DANGER

The self-test feature serves only as an additional tool, but does not guarantee absolute safety. To be 100 % sure you should measure the output with an appropriate voltmeter. It keeps being a device testing itself, but it can be used as a technical aid.

Follow the following steps to execute a self-test for a single remote using an RFID reader DRH100:

1. Start the lucDMC tool.
2. Place the RFID handheld reader on the RFID label of the SRU. Refer to RFID handheld reader DRH100 data sheet RFID Handheld Reader DRH100 for further information.
   A short vibration signalizes when connection is established. The user interface opens.
3. Click on the **Status and Control** tab.
4. Hit the **Self test** button.
5. Confirm with **Start self test now**.
   A dialog box pops up to ask you for confirmation.

   Figure 77: Dialogue box — Confirm start of the self-test

6. Click **yes** to confirm test start and close the dialog box. See Functional Description Self-test Feature for test result message description.
7. Shut down lucDMC when you finished the self-test.

5.8 Replacing a SRU

Before replacing a remote it is required to know the following parameters set up in the faulty remote:

- Serial number
- Remote address
- Segment lamp 1
- Segment lamp 2 (only for SRU 102 or SRU 112)
- Maximum number of remotes in a series circuit
- Is there a LED light connected?

DANGER

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

1. Disconnect and lock out electrical power.
2. Allow only skilled personnel to make repairs.
3. Repair or replace the malfunctioning component according to instructions provided in its manual.

1. Get a list of the RELIANCE IL configuration to find out the parameters mentioned above.

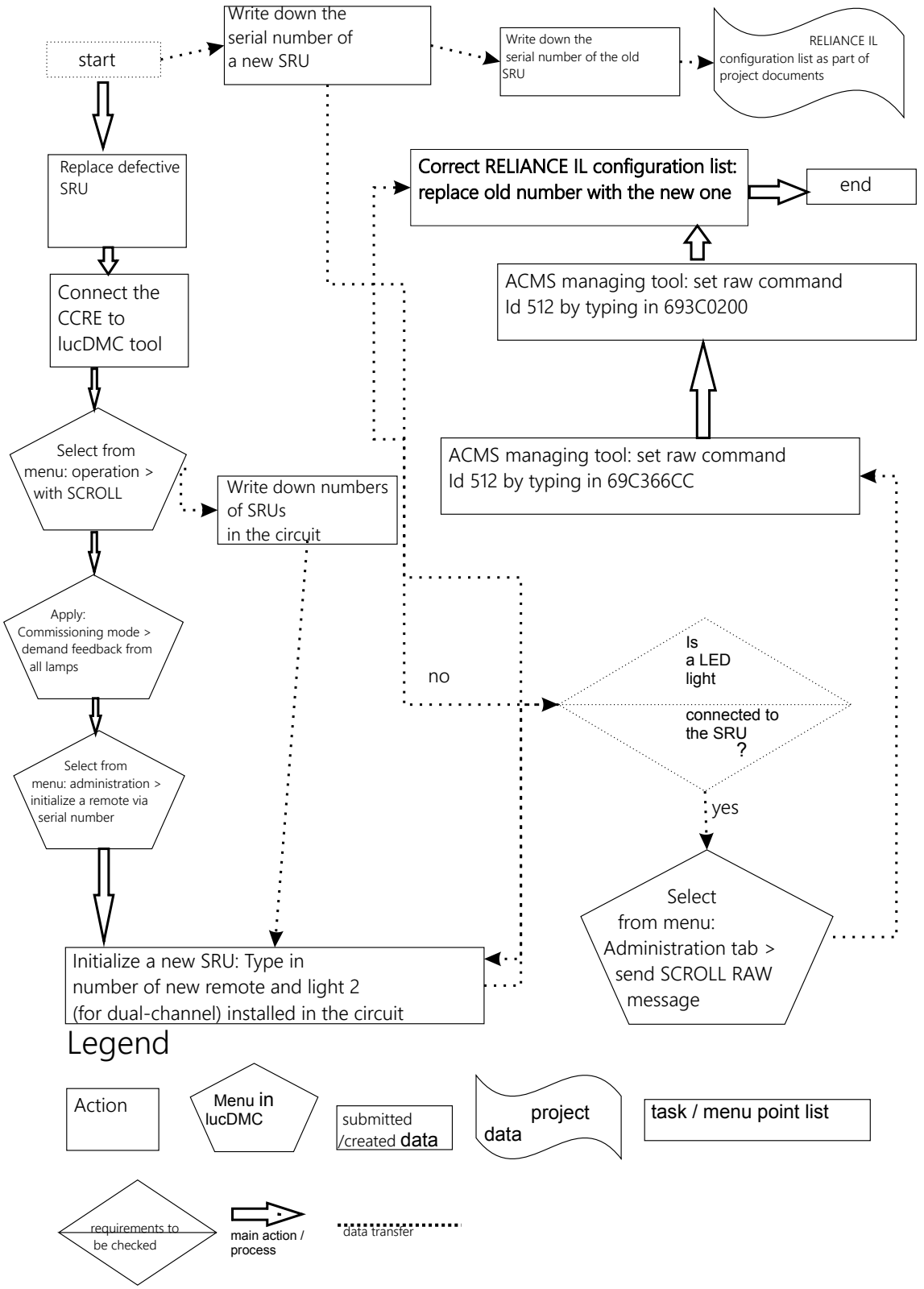
Tip

With the new generation of SRU you will not need a list. You can scan the info using the RFID handheld reader to get the necessary parameters.

2. Fetch the faulty remote.
3. Install the new remote.
4. Check the serial number of the faulty remote noted on its silver-colored name plate.
5. Parameterize the remote by following the steps described in the section Parameterizing the Constant Current Regulator

The diagram below shows the workflow of remote replacement in detail:

Figure 78: Flow chart — how to replace a SRU



5.9 RELIANCE IL Parameters to be checked in lucDMC

For a regulator with RELIANCE IL CU the following regulator parameters have to be checked in the lucDMC user interface:

- Is the symmetric corrective factor to be found under CCR settings > advanced settings still ok (as it was set at commissioning)? — The symmetric corrective factor should not vary to much (variations between - 30 and + 30 are acceptable)

> **Note**
> The regulator must be switched on before checking the symmetric corrective factor.

- The Trigger angle to be found under **Status** on the right side of the CCR with SCROLL (tab) should be between 5 and 5.5 milliseconds.

> **Tip**
> Compare the settings to the settings documented in your commissioning protocol.

- Is the lamp symbol on or off? — The feedback is correct if a check mark is shown.
- Is the remote and the lamp symbol red? — click on administration (magic wand icon) and select "feedback from all remotes". A green check mark appears if the remotes are working. Light bulb icon is greyed out, if the light is blown.

> **Note**
> Symmetric corrective factor is not correct and does vary a lot, if the remote is defective. No more feedback from the regulator will be received.

Follow the steps indicated in the testing section and the self test section of the manual to check if remote are broken.

- Is **Automatic feedback from all remotes** after giving a switching command activated?
- Is **Cyclic feedback from all lamps** activated during segment test phase?
- Are all the green lamp symbols in the **SCROLL Quality** tab located above the threshold?— If the regulator stays ON, but all segments are OFF, the shown feedback (marked by a dot) should be below the threshold.

> **Remember**
> Wait a few minutes after starting the test as values need to level off.

- Is the ignition angle setpoint within a normalized range between 5 and 5.5 milliseconds? — The ignition angle can be checked in lucDMC in the **CCR with SCROLL** tab in the menu point on the right.

5.10 Setting the Parameters for a new RELIANCE IL SRU dual-channel

Refer to Device Settings lucDMC — System Parameters for detailed list of parameters.

Note
You should only change the first four lines. "Factory settings" can be restored by clicking the respective button if you made a mistake.

1. Type in the new remote address.
2. Set **RU with two loads** for a SRU 102 or SRU 112.
3. Select **0 = 300 W** or **1 = 230 W** for **High-power mode**.
4. Select **2,2 A** or **6,6 A** for circuit topology.
5. Assign segments to lamp 1 and lamp 2 by dragging and dropping the lamps into the structure tree or by right-clicking on the lamps and using the menu.
6. Hit the **send** button to save your changes.

5.11 Check List for the Circuit in Case of RELIANCE IL Failure

When you have checked all the parameters for the regulator concerning RELIANCE IL system operation and the settings are fine, you should check the following:

If you have checked

- Are the cables connected at the right place (check wiring diagram) after cable replacement? — After cable replacement due to break is might happen that the wrong cables have been connected.
- Are the same transformer types installed as before the transformer replacement? — This is important as RELIANCE IL requires certain transformer types.
- Is the *FLYCY cable* ok? — It sometimes happens that heavy construction machines destroy the circuit cables. An indicator for cable break is if a series of remotes suddenly do not send their feedback any more.
- Is the regulator controller module (Control and Communication Unit) fitted correctly into the regulator? — If the CU is not connected properly to the regulator, the error message "`sensor line open`" is shown on the regulator display.
- Is the regulator connected properly to the transformer in the internal circuit to which lights are connected to?

5.12 Replacing the Internal Components

Contact ADB SAFEGATE for information on replacing internal components which includes the *PCBs*.

Website: www.adbsafegate.com

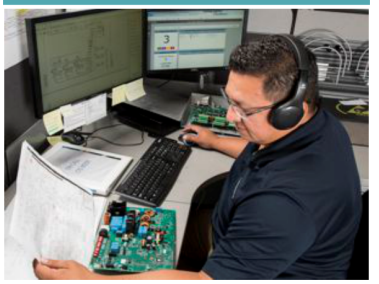
ADB SAFEGATE Technical Service & Support (International): +49 621 8755 76 - 0

Appendix A: SUPPORT

Our experienced engineers are available for support and service at all times, 24 hour/7 days a week. They are part of a dynamic organization making sure the entire ADB SAFEGATE is committed to minimal disturbance for airport operations.

ADB SAFEGATE Support

Live Technical Support - Americas
If at any time you have a question or concern about your product, just contact ADB SAFEGATE's technical service department. Trained in all areas of system issues, troubleshooting, quality control and technical assistance, our highly experienced Technical support specialists are available 24 hours a day, seven days a week to provide assistance over the phone.
ADB SAFEGATE **Americas Technical Service & Support (US & Canada): +1-800-545-4157**
ADB SAFEGATE Americas Technical Service & Support (International): +1-614-861-1304
During regular business hours, you can also Chat with a Service Technician. We look forward to working with you!
Before You Call
When you have an airfield lighting or system control system problem it is our goal to support airfield maintenance staff as quickly as possible. To support this effort we ask that you have the following information ready before calling.



- The *airport code*
- If not with an airport, then company name (prefer customer id number)
- Contact phone number and email address
- Product with part number preferable or product number
- Have you reviewed the product's manual and troubleshooting guide
- Do you have a *True RMS* meter available (and any other necessary tools)
- Be located with the product ready to troubleshoot

Note
For more information, see www.adbsafegate.com, or contact ADB SAFEGATE Support via email at support@adbsafegate.com or
Brussels: +32 2 722 17 11
Rest of Europe: +46 (0) 40 699 17 40
Americas: +1 614 861 1304. Press 3 for technical service or press 4 for sales support.
China: +86 (10) 8476 0106

A.1 Telephoning Customer Service

When you call for technical assistance, you should have the appropriate product documentation at hand. Be prepared to give the following information:

- To what product does the question relate?
- The exact wording of any messages that appeared on the Operator Interface screens (Computer System related assistance only).
- What happened, and what you were doing before and during when the problem occurred.
- How have you tried to solve the problem.

A.2 ADB SAFEGATE Website

The ADB SAFEGATE website, www.adbsafegate.com, offers information regarding our airport solutions, products, company, news, links, downloads, references, contacts and more.

A.3 Disposal

Tip

You can also contact the ADB SAFEGATE customer service team to get information on adequate disposal options or recycling of electrical devices delivered by ADB SAFEGATE.

NOTICE

Electrical equipment that is not in use or needed anymore, must be disposed according to the applicable legal environmental regulations. Electrical must not be disposed with household waste. Follow the applicable regulations established by the responsible local authorities. Contact the responsible local authorities for more information on local waste disposal sites or recycling centers.

A.3.1 Recycling

A.3.1.1 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.

A.3.1.2 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 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 *ROHS/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.

Company Addresses

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