RELIANCE Intelligent Lighting

Individual Lamp Control & Monitoring System

Platform II

RELIANCE INTELLIGENT LIGHTING

Master

Remote

Compliance with Standards

FAA: Approved for use with SMGCS Systems. This includes both Stop Bar and Runway Guard Light control/monitoring according to AC 150/5340-28 (Current Edition); manufactured to AC 120-57 (Current Edition).

ICAO: Complies with CAT I/II/III ICAO lamp supervision requirements. Supports A-SMGCS for enhanced aircraft guidance in all weather conditions. Supports safety of airport operations by integration in runway safety nets.

IEC: Developed in accordance with IEC 61508

Introduction

The RELIANCE® Intelligent Lighting (IL) is ADB SAFEGATE's state-of-the art individual lamp control and monitoring system. RELIANCE Intelligent Lighting provides a radical leap in performance over prior airfield power line carrier systems. The system is designed to communicate on the existing airfield series circuit power line without requiring separate dedicated cabling.

Uses

RELIANCE Intelligent Lighting provides distributed intelligence in the airfield to control and monitor a variety of airfield lighting devices. It can be used in the following applications:

- Key component of (Advanced-) Surface Movement Guidance Control Systems: (A-)SMGCS
- Stop bar control and monitoring: taxiway routing support.
- Elevated and in-pavement Runway Guard Light (RGL) control and monitoring, CAT II/III monitoring support.
- Failed-lamp detection and location identification.
- Interface with aircraft/vehicle presence sensors (option).
- Selective control and monitoring of various airfield lighting devices.

The system provides relevant information concerning the status of connected airfield lighting devices to both airport maintenance and air traffic control personnel.

Furthermore RELIANCE Intelligent Lighting:

- Supports the optimization of traffic volume, flexibility, maintainability and airside safety.
- Ensures reliable guidance for aircraft on the ground during CAT I, II or III conditions, increasing safety and reducing the risk of runway incursions.
- Automatically detects and reports lamp failures, decreasing downtime and maintenance costs.

Customer Benefits

- Faster, predictable and more robust power line carrier communication method ensures highest reliability even for long airfield circuits that contain large number of lamps.
- Increased number of slots per day as a result of higher traffic throughput and better control of ground traffic movements.
- Flexible routing functionality and safe operation under all traffic and environmental conditions resulting in reduced ATC workload.
- Precise control of each segment of runways, taxiways, and stop bar lighting.
- Adjacent lamp failure reporting.
- Most economic solution for modernization projects through power line communication on existing circuits.
- Easy future upgrade of installed RELIANCE Intelligent Lighting systems.
- A step-by-step migration strategy can then be implemented.
- Optimized planning of runway and taxiway maintenance downtimes.
- Worldwide availability of our regional Technical Service staff for technical support and site services on short notice.

RELIANCE Intelligent Lighting Platform II Technology

- Communicates using a radio frequency signal imposed on the high- voltage airfield series circuit cable - no separate communication cable needed.
- Communication quality is automatically optimized for each series circuit in a permanent background process.
- New communication principle together with forward error correction drastically reduces signal disturbance caused by impulse and narrow band interferences.
- Main system elements: RELIANCE IL Master (in the substation), RELIANCE IL Remotes (for individual control and monitoring of lights in the field). In addition, RELIANCE IL Utility Remote for communication with and energy supply for local field sensors.

RELIANCE Intelligent Lighting

Features

- No separate communication cable required. RF signal on high voltage power cable for lighting control.
- Most cost-effective and proven solution for existing ground lighting systems.
- User friendly integrated web server allows easy operation and system status recognition.
- Up to 11 different frequency bands can be used in parallel, and up to 32 different timeslots which allow an increase in the number of independent communication channels up to 176.
- Fast and predictable switching times through the use of reliable communication methods and limited repeater levels.
- Synchronizing of control systems in different vaults by Ethernet in compliance with IEEE 1588.
- Single Frequency Network system includes an automatic network configuration function. This functionality provides for dynamic communication adaptation in all environmental conditions (such as humidity variation). The system dynamically checks repeater settings and automatically sets them, even if a Remote in the communication path has failed.
- Less crosstalk due to symmetrical design of coupling components (transmit and receive path), independent communication channels and lower transmission power compared to similar systems in the market.
- Can be used as a stand-alone monitoring system or integrated with an ALCS (Airfield Lighting Control System).
- Individual control of different functions in one lamp circuit. For example, a combination of Stop Bar and Lead-In Circuit.
- Optional Runway Guard Light Remotes, automatic start and net-synchronous Wig-Wag operation, independent from Master meeting FAA requirements.
- Firmware and application software can be downloaded into either the Master (substation) or Remotes (field units).
- State-of-the-art diagnostic tools provide a quick overview about communication behavior. Network management system provides detailed routing statistics to ensure reliable communication quality.
- Communication measurements can be taken in advance within one day to analyze existing airfield infrastructure.
- Field sensors can be integrated via Utility Remotes into the RELIANCE Intelligent Lighting lamp control and monitoring circuit for detection and transmission of local surveillance information via power line communication.
- Able to work with any kind of CCR and designed for 40 Ampere peak current.

Main Characteristics and Figures

- Up to 300 Remotes per circuit, providing a potential of 600 individually addressable lights per circuit.
- Up to 20 km roundtrip circuit length.
- Configurable block evaluation modes include full feedback, small sample feedback, and optimistic feedback.
- Can command 10 blocks to 10 distinct states with one power-line message. Can command all blocks to one state with one powerline message.
- Switches up to 120 lights in 10 different groups in less than 1 second.
- Switches 5 stopbar/lead-on lights simultaneously and presents real-back indication in less than 1 second.
- Status poll provides detailed Remote and lamp parameters.

Integrated System Control

Overall system configuration and control is realized via a control process with integrated web server for configuration and maintenance.

- Each circuit is equipped with a microprocessor-controlled Master for tracking, recording and management of state of all Remotes in the circuit.
- The Master communicates with all the Remotes (not light fixtures) in a circuit and polls all lamps independent from the control system.

Overall System Specifications

Description	Remote	Master
Operating temperature	-40 °C to +65 °C	0 °C to +55 °C
Storage temperature	-55 °C to +85 °C	-40 °C to +75 °C
Operating humidity	Max. 100 %	Max. 95 % non condensing
Series circuit operating voltage	-	Max. 5000 V AC RMS
Min. / max. Power line current	1.8 up to 6.9 A RMS	1.8 up to 6.9 A RMS
Series circuit peak voltage	-	Max. 15 kV
Maximum switching power secondary side of transformer	300 W (single Remote) Ch A + Ch B < 300 W (dual)	-
Maximum circuit load (CCR power)	-	30 kVA
Power consumption	Max. 8 W at 6.6 A	Max. 15 W for power supply 115-230 V Max. 65 W on primary circuit at 6.6 A

Description	Remote	Master
Enclosure protection level	IP 68 / NEMA 6 P	IP 20
LAN connection to upper control system	-	IEEE 802.3 100 BaseT / IEEE1588 PTP
Net voltage of power supply	-	115 - 230 V AC ±15 %, 50/60 Hz
MTBF	> 200.000 h	> 200.000 h
Indicative MTTR	< 30 min	< 60 min
Lightning protection	20 kA (8/20 micro sec.)	17 kA (8/20 micro sec.)

Description	Remote	Master
EMC (CE approved)	Compliant to the EN 61000-6-4 (EMC emission standard) Compliant to the EN 61000-6-2 and 6-5 (EMC immunity standard) Compliant to the 60950 (IT equipment standard)	
Power Up Mode	On; Off; Flashing; Maintained (last commanded state)	
Fail-Safe Mode	On; Off; Flashing, Maintained (last commanded state)	
Number of controlled and monitored lamps per unit	1 or 2	Up to 300 Remotes or 600 lights, if dual Remotes are used
Number of I/O Remotes per circuit	-	Max. 16
Transmit Frequency	11 different frequency bands between 20 kHz and 200 kHz	
Data transmission rate power line	Up to 8 kbps	Up to 8 kbps

Description	Remote	Master
Dimensions (W x H x D) / Weight	208 x 78 x 142 / 2.2 kg (single Remote) / 2.3 kg (dual)	435.8 x 177.5 x 421.5mm / 22.3 kg
Lamp failure reaction	Short is placed across isolation transformer as soon as lamp filament failure detected	-
Power Storage after Power-Off	Remote does not reset and remains in operation, if circuit power loss < 1.5 sec. Remote start up time is less than 1 sec.	-

Circuit Specifications

Cable type L-824 is recommended, for example FLYCY or equivalent. The following parameters (*) represent the specific characteristic needed in an equivalent L-824 cable. Reuse of existing installations and layout with maximum cable length or number of lights to be verified.

Cable type (specification)	L-824
Capacity of the cable	<165 nF/km [1]
Inductance of the cable	<0.20 mH/km [1]
typical impedance (125 kHz)	35 Ohm
Attenuation of the signal at 125 kHz	<5.8 dB/km [1]
Length of serial circuit	20 km roundtrip (12.4 miles) maximum
Insulation resistance of the series circuit against the L-824 shield or ground	50 Megaohms minimum [2]
Secondary transformer attenuation	≤ 23 dB at 100 kHz [1]

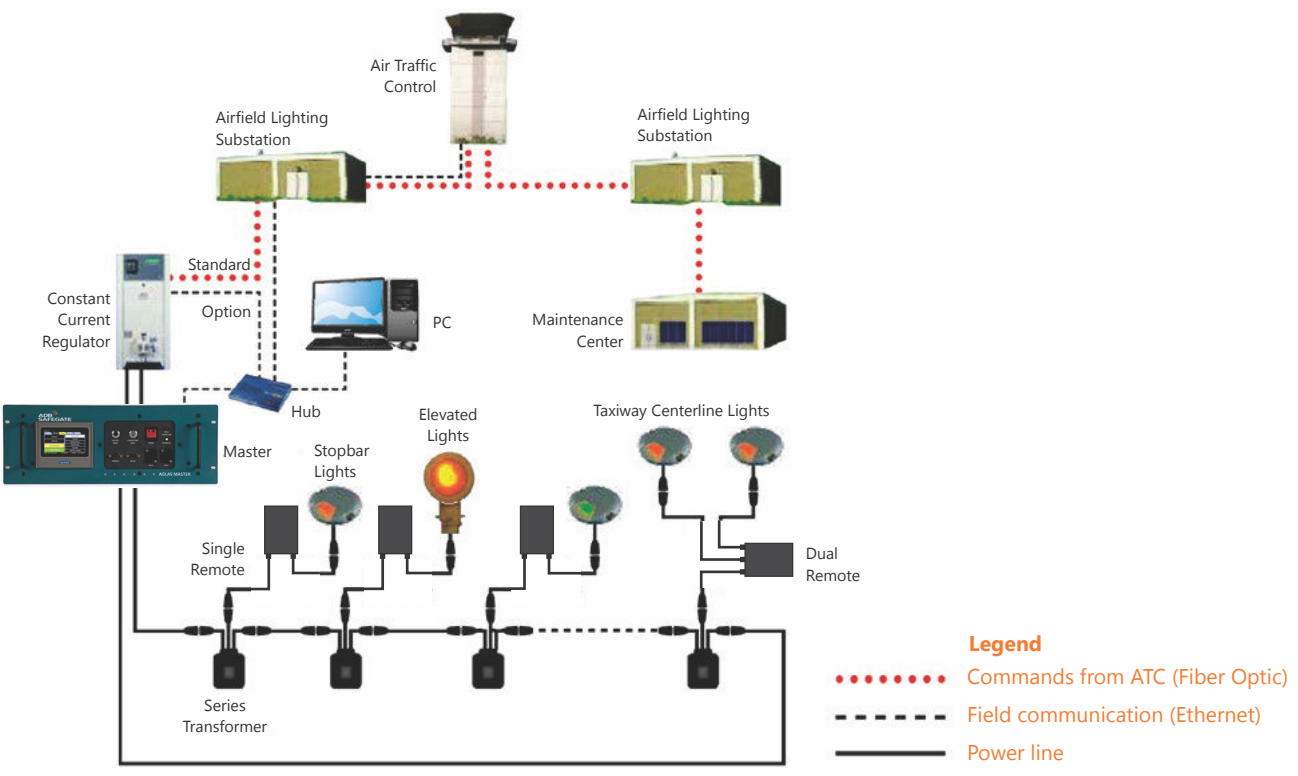
Notes

[1] Contact ADB Safegate for support

[2] Technical requirement, not excluding ICAO /FAA compliance

RELIANCE Intelligent Lighting

System Overview



Ordering Code: Masters

RELIANCE IL Master, 19" Rack Mount	AGC1110
RELIANCE IL Master, Wall Mount, Door Open Left	AGC2110
RELIANCE IL Master, Wall Mount, Door Open Right	AGC3110

Ordering Code: Remotes

RELIANCE IL Single Channel Remote, FAA Style 7	AGC4170
RELIANCE IL Single Channel Remote, FAA Style 8	AGC4180
RELIANCE IL Single Channel Remote, FAA Style 7, Initial Flash Off	AGC4270
RELIANCE IL Single Channel Remote, FAA Style 7, Initial Flash On	AGC4370
RELIANCE IL Dual Channel Remote, FAA Style 7	AGC5170
RELIANCE IL Dual Channel Remote, FAA Style 7, Channel A Initial Flash On, Channel B Initial Flash Off	AGC5470
RELIANCE IL Utility Remote	AGC6110