LINC 360

Individual Lamp Control & Monitoring System (ILCMS)

ADB SAFEGATE
LINC360

Compliance with Standards

FAA: Approved for use with SMGCS Systems. This includes both Stop Bar and Runway Guard Light control/monitoring according to AC 150/5340-30 (Current Edition), AC 150/5345-56BAC (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

Uses

LINC 360 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 LINC 360:

- 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 LINC 360 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.

LINC 360 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: LINC 360 Controller (in the substation), LINC 360 Remotes (for individual control and monitoring of lights in the field). In addition, LINC 360 Utility Device for communication with and energy supply for local field sensors.

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.

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- 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 Airfield Lighting Control System (ALCS).
- 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 Controller meeting FAA requirements.
- Firmware and application software can be downloaded into either the Controller (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 Devices into the LINC 360 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 or AXON EQ Lights 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 Controller for tracking, recording and management of state of all Remotes in the circuit.
- The Controller communicates with all the Remotes (or integrated AXON EQ light fixtures) in a circuit and polls all lamps independent from the control system.

Overall System Specifications

Description	Remote	Controller
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 8.25A RMS	1.8 up to 8.25A RMS
Maximum Open Circuit Voltage		10,000 V AC 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

Description	Remote	Controller
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	Controller
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)	
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 Utility Devices 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	Controller
Dimensions (W x H x D) / Weight	204 x 76 x 140 mm / 1.2 kg (single Remote) / 1.3 kg (dual)	420.7 x 177.8 x 504.8 mm / 29.82 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

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System Overview

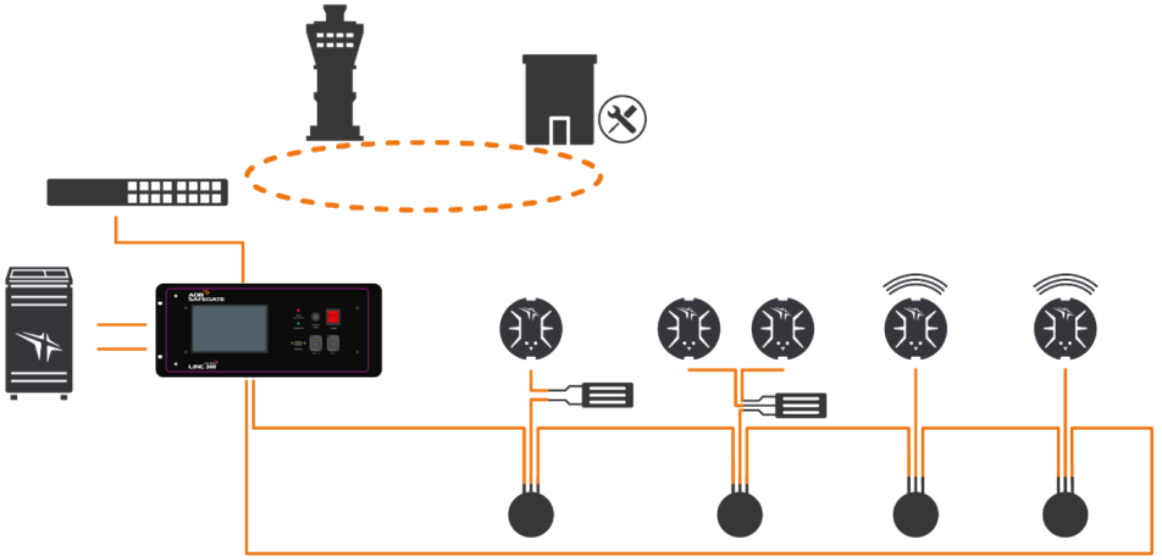

Table 1: Ordering Code: Controllers

Description	Part No.
LINC 360 Controller, 19" Rack Mount, EU plug	LINCC000000001 01
LINC 360 Controller, Wall Mount, Door Open Left (EU)	LINCC000000002 01
LINC 360 Controller, Wall Mount, Door Open Right (EU)	LINCC000000003 01
LINC 360 Controller, 19" Rack Mount, US plug	LINCC0000000011 1
LINC 360 Controller, Wall Mount, Door Open Left (US)	LINCC000000002 11
LINC 360 Controller, Wall Mount, Door Open Right (US)	LINCC000000003 11
LINC 360 Controller, 19" Rack Mount, UK plug	LINCC000000001 21
LINC 360 Controller, Wall Mount, Door Open Left (UK)	LINCC000000002 21
LINC 360 Controller, Wall Mount, Door Open Right (UK)	LINCC000000003 21

Table 2: Ordering Code: Remotes

Description	Part No.
LINC 360 Single Channel Remote, FAA Style 7	AGC4170
LINC 360 Single Channel Remote, FAA Style 8	AGC4180
LINC 360 Single Channel Remote, FAA Style 7, Initial Flash Off	AGC4270
LINC 360 Single Channel Remote, FAA Style 7, Initial Flash On	AGC4370
LINC 360 Dual Channel Remote, FAA Style 7	AGC5170
LINC 360 Dual Channel Remote, FAA Style 7, Channel A Initial Flash On, Channel B Initial Flash Off	AGC5470
LINC 360 Utility Device (Above Ground Installation only)	AGC6110
LINC 360 Power Remote 13.5 Vdc	LINCP000001300 01

Axon EQ with integrated modem: please consult the Axon Lights Datasheet.