

# CONTROL & MONITORING

## ACE

### Advanced Control Equipment



ACE2 Wall Mount Assembly

### Compliance with Standards

**FAA:** Monitoring: Certified to AC 150/5345-10 (Current Edition). ETL Certified.  
Insulation Resistance: AC 150/5340-26 Chapter 3, Section 2, para. 27.

### Overview

The ACE2 can operate either as the remote interface between the L-890 ALCMS and any controlled element in the airfield lighting vault or as the stand-alone constant current regulator (CCR) monitor, performing all L-827/L-829 functions in accordance with FAA AC 150 / 5345-10. The ACE2 is a universal device that can be used to control any type of CCR and/or controlled element regardless of the manufacturer.

The ACE2 can be packaged as a remote mount, wall mount, CCR internal mount, or Combo Box. A remote mount is typically placed on top of the CCR. The wall mount is typically bolted to a wall or can be mounted on the front of a CCR. The internal mount is mounted inside a ADB Safegate L-828 CCR (Also called a L-829 CCR). The Combo Box Assembly is a wall-mount version, which houses the ACE controller board. The Combo Box Assembly also houses the IRMS board and the CVM, which are normally mounted inside a ADB Safegate L-829 CCR.

Each CCR and controllable item is connected to an ACE2. The ACE2 is a microprocessor-based module that includes all of the communication, control commands, input/output inter-face, and fail-safe functionality for the controlled element.

**Note:** For those applications that require:

- Connection with up to a four-circuit L-847
- Up to eight discrete input or outputs

Use ADB SAFEGATE's first generation ACE system. Request data sheet 2016 for more information.

### Remote Mount Assembly

44A6605 - X 0

#### Lamps Out Monitoring

0 = Without lamps-out monitoring  
1 = With lamps-out monitoring

### Combo Box Assembly

44A6602 - X X X X 0

#### CCR Output Current

1 = 6.6 A  
2 = 20 A

#### IRMS Monitoring

0 = Without IRMS  
1 = With IRMS

#### Current Voltage Monitoring

0 = Without CVM  
1 = With CVM

#### Lamps-Out Monitoring

0 = Without lamps-out monitoring  
1 = 1 channel lamps-out monitoring  
2 = 2 channel lamps-out monitoring  
3 = 3 channel lamps-out monitoring

#### Display

1 = Included  
2 = Not Included

### Wall Mount Assembly

44A6507 - X X X 0

#### Mounting

2 = Wall mount

#### Display

1 = LCD display

#### Lamps Out Monitoring

0 = Without lamps-out monitoring  
1 = 1 channel lamps-out monitoring  
2 = 2 channel lamps-out monitoring

### Fiber Optic Cable Assembly

44A6006 - X X X X

Fiber optic cable length in feet  
(5-foot increments only)\*

#### Note

\* Not to exceed 25 feet. For applications greater than 25 feet, contact the ADB SAFEGATE Sales Department.

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### CVM/IRM Enclosure\*

44A6415 - X X 0

#### Current Voltage Module Monitoring Options

- 0 = IRMS only (no CVM)
- 1 = 6.6 A (requires 1 fiber optic cable assembly, see 44A6006-XXXX)
- 2 = 20 A (requires 1 fiber optic cable assembly, see 44A6006-XXXX)

#### IRMS Option

- 0 = Without IRMS
- 1 = With IRMS (requires 2 fiber optic cable assemblies, see 44A6006-XXXX)

#### Note:

\* For use with Remote Mount or Wall Mount Assembly

### Theory of Operation

The Advanced Control Equipment (ACE2™) represents the heart of ADB SAFEGATE's airfield lighting distributed control system. Distributed control technology has many advantages over traditional central control, including but not limited to: cost-effectiveness, system expandability, ease of maintenance, ease of installation, interchangeable parts, and ease of troubleshooting. In a distributed control scenario, each ACE2 unit is locally installed at or near a controllable item (CCR, Generator, ATS, etc.). Each ACE2 would, in turn, talk with the airfield lighting control network and execute remote lighting commands. Multiple ACE2 units can be daisy-chained together, making system expansion very easy.

The ACE2 is a universal device that can be used to control any type of CCR and/or controlled element regardless of the manufacturer. The printed circuit boards are mounted inside a small and rugged environmental enclosure that can be mounted on top of the CCR, wall mounted or directly attached to the door of an ADB Safegate L-828 CCR.

The ACE2 consists of a microprocessor-based module(s) that includes all of the communication, control commands, input/output interface, and fail-safe functionality for the controlled element.

The ACE2 is ADB SAFEGATE's second generation distributed control/monitor system. ACE2 network communications are compatible with ADB SAFEGATE's first generation system simply called ACE. Thus ACE and ACE2 units can be connected on the same distributed network.

### Communication

Each of the ACE2 units connected to a CCR or other controllable device will have a unique factory set number and a field programmable communication address. This address is used by the ADB SAFEGATE L-890 ALCMS to direct lighting commands to the corresponding ACE2, which in turn executes the commands and returns the operational status of the element back to the ALCMS.

Each ACE2 is connected to redundant communication networks via two RS-422 serial communication ports located on the main printed circuit board. The ACE network is comprised of a communications server and all the daisy-chained ACE2 and ACE (if present) units in the lighting vault. Both the ACE2 and ACE devices can be connected to the same network. The communications server stays in constant communication with all the ACE2 and ACE units in both of the

networks while at the same time staying in constant contact with the main ALCMS network. This communications protocol dictates that the local ACE2 store all data and parameters specific to the controlled element. This characteristic frees up the ALCMS computers from having to store the parameters for each of the controlled elements. The result of this is real-time communication between all of the ACE2 and ACE units and the rest of the ADB SAFEGATE L-890 ALCMS, even if a network connection fails in one of the ACE2 or ACE units.

### Input/Output Interface

The ACE2 incorporates an input/output interface that supports full FAA L-827/L-829 CCR control monitoring capabilities. The pluggable terminal blocks provide an easy-to-service point of connection.

The latching output relays can be configured to control CCR brightness steps or simple ON/OFF control as required by the controlled element. The input lines can be configured to monitor any external event that is determined by a discrete dry contact closure. Some examples include generator monitoring, monitoring of Automatic Transfer Switch position, and control of Circuit Selector Switch loops. In addition, the ACE2 can be optionally expanded to perform CCR input voltage and current monitoring as well as airfield circuit cable Insulation Resistance Monitoring.

### Fail-safe Functionality

Each ACE2 unit provides a self-contained fail-safe feature. This feature insures default airfield lighting operation in the event of an L-890 ALCMS component failure or even a complete ALCMS failure. In addition, each ACE2 can monitor its output and verify that the proper command is executed. The fail-safe system also permits maintenance of portions of the control system without changing the operational status of the lighting system. The fail-safe system is by definition only used in the ALCMS modes, and must be set up by a qualified ADB SAFEGATE technician.

The fail-safe mode of each ACE2 unit is defined per requirements of the airport/owner. The fail-safe modes are as follows:

#### Latching Fail-safe Mode:

This mode is executed as follows:

- If the CCR was switched ON before the failure, it will remain ON at the same brightness level.
- If the CCR was switched OFF before the failure, it will remain OFF.

#### Simple Fail-safe Mode:

This mode is executed as follows:

- After a failure occurs, the CCR will switch ON to a predetermined brightness level without regard to the current step.

**Smart Fail-safe Mode:**

This mode is executed as follows:

- If the CCR was switched ON before the failure, it will remain ON at the same brightness level.
- If the CCR was switched OFF before the failure, it will switch ON to a predetermined brightness level.

**Graphics User Interface (GUI)**

The ACE2 graphic user interface (GUI) consists of the 128 x 64 pixel monochrome LCD display and four momentary switch buttons. In typical modes of operation, the upper half of the LCD displays a monitored parameter or in the stand-alone mode a configuration menu. The first string of the LCD lower half is reserved for warning and alarm messages in "reverse color". Reverse color means that the background is white and the text is blue. The second string is split to indicate several fields and displays:

- Brightness step. Reverse color means protective shutdown, blank – OFF.
- Remote ("Rmt")/Local ("Lcl" reverse color)
- Primary power present ("PP") / loss of power ("LoP" reverse color)
- RS422 channel A message received ('A')
- RS422 channel B message received ('B')
- IRMS response received (small 'W'), megging has been reported (large 'W')

**Specifications**

Input Voltage:	85 to 256 VAC, 12 VA, 50/60 Hz
Input Power:	12VA maximum
Operating Conditions:	-10 to +55 °C (+14 to +131 °F)
Altitude:	Sea Level to 10,000 feet

**Dimensions**

Remote Mount:	13.3 × 10.4 × 3.9 in (33.8 × 26.4 × 9.9 cm)
Wall Mount:	13.2 × 11.3 × 4.2 in (33.5 × 28.7 × 10.7 cm)
Internal Mount:	13.2 × 10.3 × 2.7 in (33.5 × 26.2 × 6.9 cm)
Combo Box:	20.0 × 20.0 × 8.7 in (50.8 × 50.8 × 22.1 cm)