

# RELIANCE Power ACE3

## Advanced Control Equipment

L-827/L-829



ACE3 Combo Box



ACE3 integrated into a CCR

### 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 RELIANCE® Power ACE3 distributed control and monitoring unit (DCMU) provides full L-827/L-829 monitoring in conjunction with an Airport Lighting Control and Monitoring System (ALCMS), or it can be used as a stand-alone unit for local monitoring. The ACE3 is a universal device that can be used to control any type of constant current regulator (CCR) and/or controlled element regardless of the manufacturer. Each ACE enclosure is installed locally at each device that requires control and/or monitoring in the airfield lighting electrical vault.

The ACE3 unit can be packaged as a CCR internal mount, a Combo Box Assembly, and an I/O ACE.

- The Internal Mount ACE3 mount is integrated inside an ADB Safegate L-828 CCR. Installing the ACE unit converts it into an L-829 CCR.
- The Combo Box is an L-827 that houses the ACE3 unit, IRMS board, and CVM2 (Current and Voltage Monitoring Unit Gen. 2).
- The I/O ACE3 is used to control and monitor any non-CCR components, such as generators, ATS units, Circuit Selectors, etc.

The I/O ACE3 unit has the ability to accept a combination of up to seven (7) expansion cards, either input or output, to meet the I/O needs of the control system. Each expansion card contains eight (8) interface points, each point with its own dedicated common. This, in addition to the five (5) outputs and three (3) inputs available on the primary Default Card, allows the ACE3 to connect up to 61 outputs, 59 inputs, or a combination inputs and outputs to suit the individual control needs of the airport.

Each CCR and controllable item is connected to an ACE3. The ACE3 is a microprocessor-based module that includes all of the communication, control commands, input/output interface, and fail safe functionality for the controlled element.

### Theory of Operation

The Advanced Control Equipment (ACE™) is a primary component 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 ACE3 unit is locally installed at or near a controllable item (CCR, Generator, ATS, etc.). Each ACE3 would, in turn, talk with the airfield lighting control network and execute remote lighting commands. Multiple ACE3 units can be daisy-chained together, making system expansion very easy.

The ACE3 is a universal device that can be used to control any type of CCR and/or controlled element regardless of the manufacturer. Printed circuit boards are mounted inside a small, rugged environmental enclosure that can be mounted on the wall or integrated into the door of an ADB Safegate L-828 CCR.

The ACE3 is ADB Safegate's third generation distributed control/monitor system. ACE3 network communications are compatible with ADB Safegate's first and second generation system. Thus ACE, ACE2, and ACE3 units can be connected on the same distributed network. The ACE3 is also backward compatible with a Liberty DCMU installation.

### Communication

Each of the ACE3 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 ACE3, which in turn executes the commands and returns the operational status of the element back to the ALCMS.

Each ACE3 is connected to redundant communication networks via either two RS-422 serial communication ports or two Ethernet ports located on the main printed circuit board.

The ACE network is comprised of a communications server and all the daisy-chained ACE units in the lighting vault. All ACE devices can be connected to the same network. The communications server stays in constant communication with all the different ACE units in both networks while at the same time staying in constant contact with the main ALCMS network. This communications protocol dictates that the local ACE3 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. This results in real-time communication between all ACE units and the rest of the L-890 ALCMS, even if a network connection fails in one of the ACE units.

The ACE3 also provides an 802.11 wireless networking option, which can provide a wireless communication backup and can be used for diagnostics and future mobile application interaction.

# RELIANCE Power ACE3

## Interface

The ACE3 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 ACE3 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 ACE3 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 ACE3 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 ACE3 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.

## Insulation Resistance Monitoring

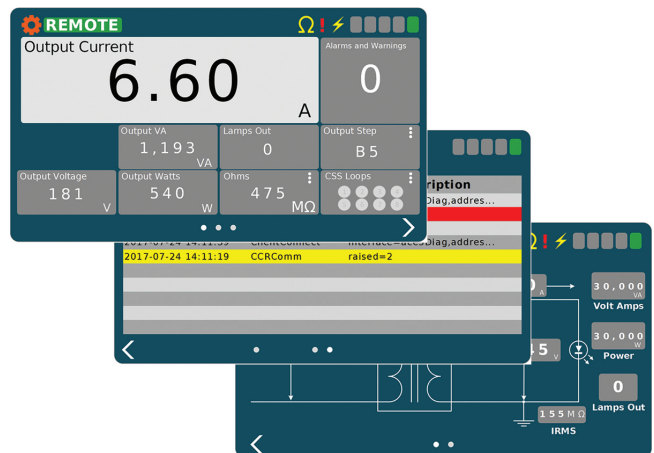
The ACE3 IRMS option will allow the user to test the insulation resistance of the field circuit automatically from the CCR. The user can set up an automated testing schedule to allow the circuit to be tested automatically. The IRMS data will be archived locally at the ACE3 unit, as well as forwarded to the ALCMS. This will allow the user the ability to not only view trending data on the ALCMS, but also display the trending graphs on the ACE3 display locally. This now gives an airport the ability to test, archive and view trending graphs, even if the CCR is not integrated into an ALCMS.

## Graphics User Interface (GUI)

The ACE3 graphic user interface (GUI) consists of a 7-inch 800 x 480 pixel full-color LCD touchscreen. In typical modes of operation, the ACE3 will display several tiles, which contain all available output data. The user can select the individual tiles to make it more prominent on the screen. Other data available on the screen include:

- Brightness step
- Remote/Local
- Primary power present / loss of power
- Communication
- IRMS status
- CCR Cycle Count
- Total Run Time
- Run Time per Step

The ACE3 GUI also contains a localized event database to allow the user to view alarms/warnings for the individual device without the need to interface with the higher level control system



## Ordering Code

### Type

C = Combo box  
I/O  
I = I/O

### Input Power

D = 24 VDC  
A = 95-265 VAC

### Field Current

6 = 6.6A  
2 = 20A  
0 = I/O ACE3 Only

### Output Monitoring

N = None  
C = CVM<sup>1</sup>  
I = IRMS<sup>1</sup>  
B = Both CVM and IRMS<sup>1</sup>

### D

### Input Expansion Modules

n = Input cards (0-7)<sup>2</sup>

### Output Expansion Modules

n = Output cards (0-7)<sup>2</sup>

### Notes

- 1 Only available with Combo Box Type
- 2 Total number of Input and Output cards cannot exceed 7

ACE3         D

## Specifications

Input Voltage:	22-28 VDC or 95 to 265 VAC, 50/60 Hz
Input Power:	12 VA maximum
Input Expansion Card:	Rated at 12-240 VAC/VDC
Output Expansion Card:	Rated at 12-240 VAC/VDC (Fused 2A)
Operating Conditions:	-10 to +55 °C (+14 to +131 °F)
Altitude:	Sea Level to 10,000 feet

## Dimensions (External Mount Enclosures)

I/O:	14 × 17.5 × 8.6 in (35.56 × 44.45 × 21.84 cm)
Internal Mount:	12 × 9 × 2.8 in (30.48 × 22.86 × 7.1 cm)
Combo Box:	14 × 17.5 × 8.6 in (35.56 × 44.45 × 21.84 cm)