

# CL-Series BatteryLink™ ACR

PN 7600

## Features

- Automatic control for charging dual battery banks
- Voltage sensing for charge source on either battery bank
- Remote sensing to avoid voltage drop issues
- Low current draw: less than 12mA open, 175mA closed
- Input filtering for noise rejection
- Noise-free circuitry will not interfere with other devices
- Current limiting allows choosing wiring for charging currents without the need to oversize conductors for connected load currents
- Adjustable COMBINING (automatic connecting) voltage and OVERVOLTAGE disconnect
- UNDERVOLTAGE lockout to prevent automatic closure if second battery is discharged below 4 volts (when using dual voltage sensing)
- Indicators for UNDERVOLTAGE, COMBINED, and OVERVOLTAGE
- Internal time delay prevents relay action for transient conditions, voltage must be within range for approximately one minute to cause closure, relay will open when overvoltage is detected for approximately 15 seconds.
- Meets SAE J1171 - External ignition protection requirements

Blue Sea Systems Inc.  
425 Sequoia Drive  
Bellingham, WA 98226 USA

Phone (360) 738-8230  
Fax (360) 734-4195  
E-mail [conductor@blueseas.com](mailto:conductor@blueseas.com)  
www.blueseas.com

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## Specifications

Automatic Combined Voltage	Adjustable from 12.2V to 14V • Preset to 13.5 (13.4 to 13.6)
Automatic Undervoltage Disconnect voltage	6% Lower than combining (closing) • Preset to 12.7 (12.6 to 12.8)
Automatic Overvoltage Disconnect	Adjustable from 13.5V to 15.5V • Preset to 15.0 (14.85 to 15.15)
ON/OFF Time Delay	Approximately 1 min. for charge/discharge
OFF Delay	Approximately 15 sec. for overvoltage

## Additional Applications

- Remote battery charging for anchor windlass, bow thrusters, nav station
- Load control to prevent over discharge

## Description

The CL-Series BatteryLink™ ACR connected into your boat's electrical system provides automatic control for charging dual battery banks. The ACR has two parts:

- A relay - a switch that is activated by an electrically powered magnetic coil.
- An electronic circuit that senses the voltage level of the boat's batteries and signals the relay to switch:
  - Closed when voltage is high (the ACR's COMBINE voltage)
  - Open when voltage is lower (the ACR's UNDERVOLTAGE voltage)

When the voltage level of the battery bank being charged reaches a certain level, both battery banks are automatically connected and charged.

## Guarantee

Any Blue Sea Systems product with which a customer is not satisfied may be returned for a refund or replacement at any time.

# Installation Instructions

## Mounting

- Select a mounting location near the battery banks or the battery switch.
- Choose a cool, dry, and well-ventilated location if possible. The CL-Series BatteryLink™ ACR may become very warm when operating at full current capacity or in current limiting mode.
- Avoid locations directly above batteries where corrosive fumes may be present.
- Do not mount directly to a conductive surface because of the proximity of the mounting screws to the main electrical terminals.
- Mount the relay securely with #8 or M4 screws.

## Wiring

Use interconnecting wiring that provides acceptable voltage drops at the intended charging currents. Wiring should have at least 60 Amp current-carrying capacity to be compatible with the current limiting feature of the CL-Series BatteryLink™ ACR. Use:

- At least 8 AWG wire for a connection length of 6 feet or less
- At least 6 AWG wire or larger, according to voltage drop calculations, for runs longer than 6 feet

ABYC E-11 recommends circuit protection within 7 inches of each battery connection or source of power. Circuit protection may be as far as 40 inches from a source of power other than a battery, or 72 inches from a battery if the wiring is protected by a sheath or enclosure.

To avoid nuisance tripping or fuse blowing, the wire should be:

- Sized to carry the full capacity of the charging source
- Protected by a time-delay fuse (e.g., Bussmann TFC rated 75A or larger) or thermal circuit breaker (e.g., Bussmann 187 rated 150A).

## Current-limiting

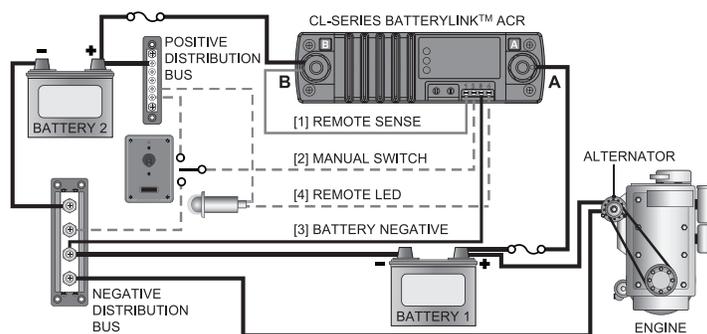
The current-limiting feature of the CL-Series BatteryLink™ ACR prevents excessive current from flowing through it and can be treated as a self-limiting protective element. The current handling capacity is shown in this table. Time delay allows brief currents up to 150 Amps.

Time	Current Rating
Continuous	60 Amperes
7 Minute	90 Amperes
2 Minute	120 Amperes

## Electrical Connections

The wiring configuration below represents a common installation but is not meant to be a guide for any specific vessel. Consult a marine electrical professional for a wiring configuration applicable to your boat.

Disconnect the positive battery connections before beginning the installation. If there is a possibility of tools causing a short to grounded metal or conductors, disconnect the negative terminals before disconnecting the positive terminals.



- Gray dashed [2] and [4] lines indicate optional connections
- Gray solid [1] line indicates a recommended but not required connection

## Typical Configuration - Sense One Battery Bank

**To sense the voltage level of the battery bank connected to your boat's charging source:**

- Connect Terminal A to the battery bank connected to the charging source.
- Connect Terminal B to the battery bank not connected to the charging source.
- Connect Terminal 3 to the main negative bus or the negative terminal of the nearest battery.

## Sense Both Battery Banks

When charging sources are attached to both battery banks, the CL-Series BatteryLink™ ACR can be connected to sense the voltage levels of both battery banks. Use this configuration, for example, when the alternator is connected to one battery bank, and the battery charger is connected to the other battery bank.

**To sense both batteries banks:**

- Connect Terminal 1 to Terminal B with a jumper wire.

Configuring the CL-Series BatteryLink™ ACR to sense both battery banks also establishes Undervoltage lockout. This lockout prevents automatic connection of both battery banks if the second battery bank is discharged below 4 volts. When the voltage levels of the battery banks are considerably different, they should not be connected -- the current through the CL-Series BatteryLink™ ACR may be high enough to fuse the internal relay.

If the voltage drop in the line connected from the battery bank to Terminal B is expected to be less than 3%, connecting Terminal 1 to Terminal B with a short jumper is suitable. If voltage drop is expected to be more than 3%, for example, when connecting widely separated batteries, mount the CL-Series BatteryLink™ ACR near the battery bank connected to Terminal A and use a sensing wire from terminal 1 to the battery bank connected to Terminal B. The remote sensing wire carries less than 0.2A when the relay is closed so this conductor can be 16 AWG and should be protected against faults with a suitable fuse (any value between 2A and 20A) at the battery connection.

# Installation Instructions (continued)

## Manually Connect and Disconnect Battery Banks

A control switch such as a Blue Sea Systems Switch Panel PN 8270 may be used to manually connect and disconnect battery banks by overriding the CL-Series BatteryLink™ ACR voltage sensing circuit.

### To connect a manual override switch:

- Connect Terminal 2 to the center common terminal of a ON-OFF-ON single pole, double throw switch.
  - Connect negative and positive to the outside terminals of the switch.
- When Terminal 2 is switched to the positive supply, the relay is closed whenever the voltage is greater than about 9 volts at either terminal.
  - When Terminal 2 is switched to the negative supply line, the relay is held open.
  - When the switch is in the center position, the CL-Series BatteryLink™ ACR operates automatically to close and open the relay when it senses the presence of charging voltages. The control signal to Terminal 2 passes very little current and can be supplied from any fused positive source.

## Remote LED indicator

If you want to be able to determine at a remote location when the battery banks are connected, a remote LED indicator can be connected to the CL-Series BatteryLink™ ACR.

Suitable LED indicators are Blue Sea Systems 8033 (amber), 8171 (red), or 8172 (green).

### To connect an LED indicator:

- Connect the red wire of the LED to a positive source.
- Connect the yellow wire of the LED to Terminal 4.

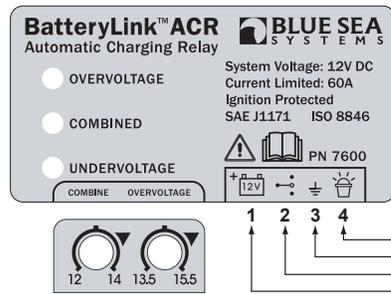
# Operation

When all wiring is complete and has been checked, restore battery connections. The relay may momentarily energize when power is first applied. The automatic charging circuit has a time delay of approximately one minute to reduce cycling caused by noise in the system.

## Indicator Lights

There are three LED indicator lights on the CL-Series BatteryLink™ ACR:

- UNDERVOLTAGE
- COMBINED
- OVERVOLTAGE



The amber UNDERVOLTAGE indicator lights when:

- There is no charging source present
- The voltage level of the sensed battery is less than the COMBINED value
- There is a charging source on one battery and the other battery is less than 4 volts.

The UNDERVOLTAGE indicator is normally on when the batteries are being discharged. When the UNDERVOLTAGE indicator is on, the battery banks are disconnected in approximately one minute.

If the voltage on Terminal A or Terminal 1 remains high enough for approximately one minute, the green COMBINED indicator lights, the relay closes, and the battery banks are connected.

If the voltage exceeds the OVERVOLTAGE setting, the red OVERVOLTAGE indicator lights and, after a few seconds delay, the green indicator goes out. When the OVERVOLTAGE indicator is on, the battery banks are not connected.

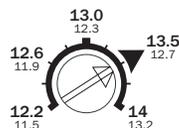
To facilitate adjustment of the CL-Series BatteryLink™ ACR voltage settings, OVERVOLTAGE and UNDERVOLTAGE indicator lights operate without a time delay. However, the relay closure only occurs if the voltage is in range for the period of the time delay.

## Adjusting Voltage Settings

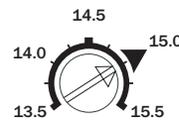
The CL-Series BatteryLink™ ACR is preset at the factory for COMBINED voltage, UNDERVOLTAGE, and OVERVOLTAGE values that are consistent with typical charging systems and flooded lead acid batteries. COMBINED and OVERVOLTAGE have default settings of 13.5V and 15.0V respectively. The triangles (▼) on the product label show the normal settings for conventional charging service. For most systems, no adjustment is necessary.

These values can be changed to meet your specific needs. For example, some batteries such as Gel Cell and AGM are sensitive to overcharging so you may want to set OVERVOLTAGE lower than nominal. Also, if the ACR is used to control loads, COMBINE and OVERVOLTAGE can be set downward to shut off appliances to reserve capacity for starting, navigation, and communication.

The CL-Series BatteryLink™ ACR has two potentiometers to adjust these settings to the user's preferences.



Combining Adjustment (close/open)



Overvoltage Adjustment (open)

The COMBINED potentiometer adjusts the COMBINED voltage to the user's preference. Changing the COMBINED setting automatically changes the OPEN voltage as well because the OPEN voltage is fixed at 6% below the COMBINED voltage.

The OVERVOLTAGE potentiometer is used to adjust the voltage at which the CL-Series BatteryLink™ ACR switch opens in response to high voltage. This is a protection feature when one battery needs to be charged at a lower voltage than the other. It also protects the second battery bank in the event of an overvoltage condition produced by the alternator.

The potentiometer adjustment range covers about 270 degrees of rotation. Do not use excessive force - this adjustment requires only a little torque within the rotation range; it should not be forced beyond the end stops. If you do want to make an adjustment, note the orientation of the screwdriver as you adjust. There are end stops at approximately 4 O'clock and 8 O'clock and it may be necessary to turn gently to find those stops and then return to the intended adjustment.

Some high current chargers in inverter/charger systems drive very high current pulses into the system. The average voltage may be in range, but the peak voltages may cause the OVERVOLTAGE light to come on. Connecting the CL-Series BatteryLink™ ACR negative connection and positive connection directly to the batteries can reduce the effects of voltage drop in the wiring and prevent these chargers from interfering with the CL-Series BatteryLink™ ACR. It may be necessary to adjust the OVERVOLTAGE setting up to its maximum value if such a charger is driving a smaller battery system that does not readily accept this rate of charge.

## Undervoltage Lockout

The voltage sensing circuits in the CL-Series BatteryLink™ ACR prevents the relay from automatically closing if either sensing terminal is connected to a voltage source at a voltage less than 4 volts.

## Emergency Starting

The CL-Series BatteryLink™ ACR is designed for automatic control for charging dual battery banks. When it is manually closed, it allows a starting battery to be supplemented by the house battery. However, this use should be limited to smaller engines. Even occasional use to connect both battery banks for emergency starting may overstress the relay contacts and reduce life. The CL-Series BatteryLink™ ACR current limiting system permits high peak currents for a few seconds, which may be adequate to start a small diesel or a small to medium sized gasoline engine in good working condition. Also, starting currents may exceed the capacity of the CL-Series BatteryLink™ ACR's current limiting capability, which causes the protective circuit to temporarily open.

Many battery management systems include a manual emergency cross connect battery switch or a "1-2-Both" battery switch. If either of these are available, it is preferable to use that device for emergency engine starting.