**ML-ACR**

**Automatic Charging Relays**

7620100 / 762100 / 7622100 / 7623100

- Magnetic Latch (ML) - draws very low current in the ON or OFF states, and draws moderate current for very short time when changing state.
- Start Isolation (SI)—can be configured for temporary isolation of House loads from Engine circuit during engine cranking to protect sensitive electronics.
- Engine Isolation (EI)—can be configured for isolation of two engines while both are running to protect engine electronics and maximize alternator output.
- Senses charging on two battery banks.
- LED output to remotely indicate when batteries are combined or isolated.
- Tin-plated copper studs for maximum conductivity and corrosion resistance.
- Label recesses for circuit identification.
- Silver alloy contacts provide high reliability for switching live loads.
- Includes a Remote Control Contura Switch (2146).
- Includes a Deutsch DTM connector (mating part not included but required).

### Specifications

**12 Volt DC**

- Wire Size and Current Ratings
  - See table below
- Bi-stable
- Operating Voltage (contacts): 9.16V DC
- Control Voltage: 9-16V DC

**24 Volt DC**

- Wire Size and Current Ratings
  - See table below
- Bi-stable
- Operating Voltage (contacts): 18-32V DC
- Control Voltage: 18-32V DC

**Relay Contact Position:**

- Combine (30 sec.): 13.5V
- Combine (90 sec.): 13.0V
- Open Low (10 sec.): 12.35V
- Open Low (30 sec.): 12.75V
- Open High: 16.2V

**Live Current Switching:**

- 300A @ 12V DC - 10,000 Cycles
- 150A @ 24V DC - 10,000 Cycles

**Terminal Stud Size:**

- 3/8”-16 (M10)
- 3/8”-16 (30 mm)

**Terminal Ring Diameter Clearance:**

- 1.18” (30 mm)
- 1.18” (30 mm)

**Control Circuit Current Draw:**

- <40 mA

### Remote Control Contura Switch

- Action: SPDT, ON-OFF-ON
- Seals: Internal & External Gasket Panel Seal
- Mounting Hole: 0.83” x 1.45” (21.08 mm x 36.83 mm)
- LED Rating: 100,000 hours half-life
- Harness Connector: Deutsch DTM Series DTM 06-6S
- Required Receptacle Shell: Deutsch Industries at www.laddinc.com
- Wedgelock: WM-6P
- Terminal Pins: 1060-20-0122†
- Sealing Plugs: 0413-204-2005†
- Hand Crimp Tooling: DTM-04-6P

### Regulatory

Meets ISO 8846 and SAE J1171 external ignition protection requirements. CE marked, Rated IP66.

### Control Switch Remote Operation

Optional Contura Control Switch—sustained (SPDT) ON-OFF-ON.

The Control Switch should be mounted in a convenient location near helm controls to allow for quick access.

NOTE: Alternatively use a momentary (SPDT) ON-OFF-ON or momentary push button switch to provide cross connect and/or battery isolation.

### Control Switch Remote Indication or ML-ACR Status

NOTE: The remote switch has two LEDs (top and bottom). These LEDs operate simultaneously—either they are both ON or both OFF.

### Overview of Application

The ML-Series ACR automatically combines batteries during charging, and isolates batteries when there is no charging sensed on either battery bank.

#### ML-ACR Function

- **12 Volt DC Operation**
  - Automatically combines battery banks when sensed voltage levels are:
  - Above 13.5V for 30 sec.
  - Above 13.0V for 90 sec.

- **24 Volt DC Operation**
  - Automatically combines battery banks when sensed voltage levels are:
  - Below 9.6V (undervoltage lockout)
  - Below 12.35V for 1.0 sec.
  - Below 12.75V for 30 sec.
  - Above 16.2V (overvoltage lockout)

#### Start Isolation or Engine Isolation

The isolation inputs enable one of two functions depending on how the inputs are configured.

**NOTE:** The ML-Series ACR can be configured for Start Isolation or Engine Isolation, but not both.

- **Start Isolation** - Temporary isolation (3–5 minutes) of house loads from the engine circuit during engine cranking to protect sensitive electronics. Configure Start Isolation when there are heavy cranking loads causing sags and spikes that might damage electronics in the House circuit. See page 3.
- **Engine Isolation** - Isolate two engines while both are running to protect engine electronics, and to maximize alternator output. Configure Engine Isolation when the engine manufacturer requires it, and when there are separate batteries for each engine. See page 3.

### Undervoltage or Overvoltage Lockout

- Undervoltage lockout prevents batteries from being combined when either battery is below 9.6V@12V DC operation or 19.2V@24V DC operation.
- Overvoltage lockout prevents batteries from being combined when either battery is above 16.2V@12V DC operation or 32.4V@24V DC operation.

### Control Switch Remote Operation

#### To connect (combine) battery banks

- Switch to “ON” combines battery banks to provide more battery power in hard starting situations.

#### To isolate battery banks

- Switch to “OFF” - when the battery banks are isolated using the Control Switch, the battery banks remain isolated, and for at least 30 seconds after the control switch is returned to the “AUTO” position.

### Control Switch Remote Indication or ML-ACR Status

NOTE: The remote switch has two LEDs (top and bottom). These LEDs operate simultaneously—either they are both ON or both OFF.

### Guarantee

Blue Sea Systems stands behind its products for as long as you own them. Find detailed information at www.bluesea.com/about. For customer service, call 800.222.7617.
### Overview of Application (continued)

**Manual Control Override Knob PN 7622B / 7622100B / PN 7623B / 7623100B**

The Manual Control Override Knob provides:
- an added level of safety that allows manual ON-OFF control with or without power
- LOCK OFF for servicing the electrical system

Remote LEDs in control switch indicate when ML-Series ACR is in manual override condition.

**Manual Control Override Knob Operations**

<table>
<thead>
<tr>
<th>To combine battery banks</th>
<th>With Override Knob in REMOTE position, push button until latched (Push to Latch On).</th>
</tr>
</thead>
<tbody>
<tr>
<td>To isolate battery banks that are connected</td>
<td>Rotate Override Knob to right to release button from Latch On mode (button pops up). Rotate Override Knob to left (REMOTE position).</td>
</tr>
<tr>
<td>To prevent remote operation</td>
<td>Rotate Override Knob to right (LOCK OFF position).</td>
</tr>
<tr>
<td>To secure for servicing</td>
<td>With Override Knob in LOCK OFF position, pass cable tie through hole.</td>
</tr>
</tbody>
</table>

* Operating the Manual Control Override Knob will override automatic operation of the ML-Series ACR for 10 minutes if the override forces a change in switch state.
* The ML-Series ACR will wait 10 minutes if it attempts to automatically close while the manual knob is rotated to LOCK OFF.

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### Installation Instructions

**Mounting**

Install the ML-Series ACR as close as possible to both battery banks so that positive and negative wires are as short as possible, and voltage drop in these wires is kept to a minimum†. To avoid corrosion to terminals and connecting wires, mount in a dry and protected location. Avoid mounting directly above vented lead acid batteries so that the ACR is not exposed to corrosive gasses expelled from the batteries.

† Because the ACR senses the voltage between its negative ground connection and its positive sense connections, both positive and negative wires should be as short as possible so that the influence of voltage drop on sensed voltage levels is minimized.

**High Current Primary Circuit Connections**

For help selecting the appropriate wire size and circuit protection rating, go to www.bluesea.com and click the Circuit Wizard quick link.

**To connect high current circuit wires:**
1. Connect the battery banks to the stud terminals marked A and B.
2. Torque the high current terminal stud nuts to 140 in-lbs (15.5 N•m) maximum.

**NOTES:**
- Stud terminals A and B are interchangeable. Either battery bank can be connected to A or B.
- If the ACR is to be used for cross connect, fuses between ACR terminals A and B and each battery positive are not required according to ABYC guidelines. If the ACR is not used for cross connect, install fuses to prevent a hazard if there is damage to the wires connecting the batteries to the ACR. The fuses should be placed as close as possible to the batteries so that most of the wire is protected.

**Optional Control Circuit Connections (wires contained in the wire harness)**

**Cross Connect or Isolate Battery Banks**

Use a sustained (SPDT) ON-OFF-ON Remote Control Switch (sold separately)

Alternatively a momentary (SPDT) ON-OFF-(ON) Remote Control Switch, or two momentary push button switches (sold separately) can provide cross connect and/or battery isolation. The Control Switch should be mounted in a convenient location near helm controls to allow for quick access.

**NOTE:** Use 16 AWG wire for all Control Circuit connections to meet ABYC minimum wire size requirement.

**Circuit Wizard**

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**Control Circuit Connection**

Connect the black wire in the wire harness to DC ground at the main ground terminal busbar.

**Optional Control Circuit Connections (wires contained in the wire harness)**

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**Cross Connect or Isolate Battery Banks Using Optional Control Switch**

Use Control Switch (sold separately) – momentary or sustained single pole double throw (SPDT) to provide these settings:
- **CROSS CONNECT** (I) - Battery banks are combined to provide more battery power in hard starting situations.
- **ISOLATE** (O) - Battery banks are isolated until the Control Switch is returned to AUTO (center position).

When the Control Switch is returned to AUTO, the ACR returns to automatic mode.

**To enable cross connect and isolation, connect:**
- Red wire from harness to center (common) of SPDT switch.
- **Cross Connect** terminal of SPDT switch to DC positive through 2A circuit protection.
- **Isolate** terminal of SPDT switch to DC negative (ground).

**To enable temporary cross connect using momentary push-button switch:**
- Connect the red wire from the harness to one side of a momentary push-button switch, (sold separately).
- Connect the other side of the push button switch to DC positive through 2A circuit protection.

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**CAUTION**

- These instructions are intended to provide assistance with the installation of this product, and are not a substitute for a more comprehensive understanding of electrical systems. We strongly recommend that a competent electrical professional perform the installation of this product.
- The illustrations wiring diagram represents a common installation and is not meant to be a guide for wiring a specific vessel. The wiring diagram shows a single battery bank installation.
- Disconnect all negative battery connections before beginning the installation.
- All unused control wires should be carefully insulated from each other and from accidental contact using heat shrink tubing or electrical tape. External contact or shorting between control wires can lead to malfunction.

[960035700 Rev.001]
Start Isolation
The ML-Series ACR can be configured to automatically open temporarily (3-5 minutes) when voltage is sensed on any one of up to three start-isolation inputs. Enable this feature to isolate Start circuits from the House circuit and prevent starting current transients from interfering with sensitive house electronics.

To enable Start Isolation:
• Connect the brown wire (ISOLATION #1) from the harness to the terminal or wire running from the start key switch to the starter solenoid. Make this connection through a 2 Amp in-line fuse. This connection must be to the line that is positive only when cranking the engine, as shown below.

To enable Start Isolation for two or three engines starting from the same battery:
• Connect the green wire (ISOLATION #2) to ENGINE #2 in the same manner as above.
• Connect the orange wire (ISOLATION #3) to ENGINE #3 in the same manner as above.

Start Isolation Installation

Engine Isolation
The ML-Series ACR can be configured to automatically open when two engines are simultaneously running to ensure that two running engines are never electrically connected. Enable this feature to reduce noise and communication cross-talk between engines, and to maximize total potential alternator output.

To enable Engine Isolation for two engines:
• Connect the brown wire (ISOLATION #1) from the harness to the ON terminal of the start key switch on one engine. Make this connection through a 2 Amp in-line fuse. This connection must be to the line that is positive only while the engine is normally running.
• Connect the green wire (ISOLATION #2) to ENGINE #2 in the same manner as above.

To enable Engine Isolation for three engines:
• Connect the brown wire (ISOLATION #1) to ENGINE #1, the green wire (ISOLATION #2) to ENGINE #2, and the orange wire (ISOLATION #3) to ENGINE #3 in the same manner as above.

Engine Isolation Installation

Legend
Optional connection

NOTE: Use circuit protection only if ACR is not used for emergency cross-connect.

NOTE: The remote switch has two LEDs. These LEDs operate simultaneously and are either both ON or both OFF.

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NOTE: The remote switch has two LEDs. These LEDs operate simultaneously and are either both ON or both OFF.

Legend
Optional connection
4. Remote indicator lamp (Optional)
   Use Blue Sea Systems LED 8033 (amber), 8171 (red), or 8172 (green).

To install a remote LED indicator:
- Connect switch pin 8 to DC positive protected by a 2 Amp in-line fuse.
- Connect pin 7 to the yellow wire from the harness.