Digital Switching Systems

ECS III
Programmable
Digital
Multiplexing
System

Carling Technologies
New ECS III

Carling Technologies continues a heritage of innovation with the next generation in switching technology... the Electronic Control System III, (ECS III).

The ECS III features the latest in digital multiplex technology, creating a safer and fully configurable control system for the marine environment. With numerous advantages to both the marine manufacturer and the end operator, the ECS III truly defines a revolution in switch technology. While providing a flexible system with a new aesthetic look, the ECS III also simplifies and enhances the end operator’s switching environment. Beyond product differentiation, the ECS III eliminates complex wiring while increasing switching features and functionality, and simplifies troubleshooting.

As future product enhancements necessitate more complex switching applications, Carling Technologies has the answer. Turn the page to open your eyes to a revolution in switching technology...

The Carling Technologies’ ECS III.
The ECS III

A basic ECS III consists of at least one Electronic Control Processor (ECP™), Operator Control Module (OCM)™ and Electronic Communications Cable (ECC)™.

Electronic Control Processor (ECP)
The heart of the ECS is the Electronic Control Processor (ECP). The ECP receives switching commands from the OCM(s), translates the commands and activates or de-activates the appropriate circuits in the boat’s electrical system. One ECP can control up to 16 separate circuits/accessories. Up to four ECP’s can be linked together to provide control for up to 64 separate circuits/accessories. Each circuit is protected by its own resettable thermal circuit protector within the ECP.

Manual circuit-override switches are designed into the ECP. In the unlikely event of a system failure, these switches provide a fast and convenient way to override the ECS’ electronics, without bypassing the unit’s circuit protection (in accordance with ABYC* recommendations). The manual circuit-override can also be used to switch ON/OFF circuits, without powering up the entire ECS.

The ECP is factory programmable to meet your application needs.

Standard Operator Control Modules (OCMs)
Standard OCMs are backlit and are offered in two configurations: four button and eight button. OCMs include LEDs, which are illuminated when an individual button is activated. Numerous OCM colors, markings and illumination options are available.

Custom Operator Control Modules (OCMs)
Custom OCM shapes, colors and configurations can be designed for your panel to meet your switching, marking and illumination needs.

Electronic Communications Cable (ECC)
Switching commands are transmitted from the OCM(s) to the ECP via the ECC. The ECC can be supplied in any length to suit your application needs.

* ABYC: American Boat & Yacht Council
Each ECS contains a base software program which has been developed to provide boatbuilders and end users with the maximum benefit of digital switching technology. The following are some of the standard software features provided with every Carling ECS:

### Load Protection and Circuit Shutdown

Voltage monitoring software and battery drain protection are standard, and can be assigned to individual buttons on the OCM. This feature minimizes the chances of the voltage level dropping to a non-operational low level, by shutting down low priority circuits during low voltage situations.

The software constantly monitors the battery voltage and electrical components that are being operated by the ECP. The normal operating range for the 12V ECP to function properly is between 9 volts and 16 volts. The normal operating range for the 24V ECP to function properly is between 18 and 32 volts.

The ECP can automatically turn OFF components at a specific voltage level. By assigning a priority level to each circuit, the ECS knows which electrical circuit to turn OFF, and in which order, when the battery voltage drops below the programmed Low Voltage Level. Priority Level One Circuits will always remain ON.

The operator can override the Circuit Shut Down by pressing the corresponding button on the OCM.

### Sleep Mode

The ECP provides battery protection by reducing the amount of current that the ECS draws when it is not being used.

- **Shut Down**: The ECP can be programmed to shut down after a customer defined set time.
- **Restart**: The ECP will reboot its normal operations.

### Dedicated Bilge Pump Circuits

Many boats utilizing bilge pumps have an automatic float switch to turn the bilge pump ON in the event of a high water situation. The ECS has provisions to connect the auto float switch to the same circuit protector as the manual bilge pump, eliminating the need for additional circuit protection, or even worse, leaving the auto bilge circuit unprotected. The float switch connection is independent of the ECS electronics, and power will be maintained to this connection even if the master power switch on the ECS is turned OFF. Additionally, the switched line doubles as a sensor which can be configured to detect if the float switch has turned the bilge pump ON and will indicate this on the keypad (in accordance with ABYC recommendations).

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### Key Benefits of the ECS III:

- Simplified operator control, comfort and safety
- Ease of installation
- Reduced labor installation time
- Simplified wiring resulting in weight reduction and space savings
- Ease of serviceability and troubleshooting
- Programmable and expandable switching functions
### Additional Standard Software Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Ignition Sensing</strong></td>
<td>The ECS can be tied to the ignition switch so some features only work when the key is in the ON or accessory position. Other circuits (ie, bilge) would work regardless of ignition switch position.</td>
</tr>
<tr>
<td><strong>Backlighting</strong></td>
<td>OCM backlighting is controlled by either a particular switch button press or by the position of the ignition switch.</td>
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<tr>
<td><strong>Low Battery Sensing</strong></td>
<td>The ECS can be configured to sense battery voltage and turn OFF non-critical loads as the battery starts to drain. The levels (x2) at which circuits are turned OFF are customer configurable.</td>
</tr>
<tr>
<td><strong>Automatic Shutdown</strong></td>
<td>The ECS can be configured to turn OFF all functions after a prescribed period of inactivity.</td>
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<tr>
<td><strong>Configurable Always On Circuits</strong></td>
<td>Circuits (relays) can be configured to be ON all of the time. This allows the ECP to be used as a distribution panel (ie. for stereo memory) as well as a switching system.</td>
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<tr>
<td><strong>Bilge Pump Auto Detect Circuit</strong></td>
<td>The ECS will detect when a bilge pump has been turned ON by a float switch, &amp; will indicate this on the OCM (as required by the ABYC).</td>
</tr>
<tr>
<td><strong>Cloned Switches</strong></td>
<td>Individual circuits can be controlled with multiple switch buttons in multiple locations.</td>
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<tr>
<td><strong>Dimming</strong></td>
<td>The ECS can be configured to dim the function indication LEDs to a preset value by turning on a particular circuit, typically the navigation or anchor lights.</td>
</tr>
<tr>
<td><strong>Lock-out Circuits</strong></td>
<td>Lock-out Circuits can be configured to not work if another specific circuit is ON. This is an ideal configuration for motor reversing circuits.</td>
</tr>
<tr>
<td><strong>Tripped Circuit Breaker Sensing</strong></td>
<td>The ECS will detect when a circuit breaker has tripped and will indicate the trip with a rapid flashing LED on the OCM.</td>
</tr>
<tr>
<td><strong>Remote-Reset Circuit Breaker (pending)</strong></td>
<td>Using an auto-reset thermal circuit breaker, the ECS is capable of remotely resetting circuits.</td>
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### Hardware Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Multiple ECPs</strong></td>
<td>Up to 4 ECPs, totalling up to 64 circuits per ECS.</td>
</tr>
<tr>
<td><strong>Dedicated Bilge Pump Circuits (x2)</strong></td>
<td>One switched output for manual control and one unswitched output for float switch connection on a common circuit breaker.</td>
</tr>
<tr>
<td><strong>Multiple OCMs</strong></td>
<td>Up to 16 OCMs per ECS, using standard 4 &amp; 8 button boards.</td>
</tr>
<tr>
<td><strong>Override Switches (x8)</strong></td>
<td>Provides manual conventional switching as a back-up for critical circuits. Maintains circuit protection.</td>
</tr>
<tr>
<td><strong>Circuit Protection</strong></td>
<td>Carling Technologies’ thermal circuit breakers.</td>
</tr>
<tr>
<td><strong>Auxiliary Digital Input</strong></td>
<td>Each ECP has a digital input for connection of an external sensor or discrete switch.</td>
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<tr>
<td><strong>Master Power ON-OFF Switch</strong></td>
<td>Turns the ECS OFF to avoid battery drain, during extended periods of non-use.</td>
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</table>
**Primary Circuit Configurations** (actuated by one button push)

<table>
<thead>
<tr>
<th>Circuit Configuration</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Toggle</strong></td>
<td>Turns circuit(s) ON with one press, OFF with the next press.</td>
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<tr>
<td><strong>Momentary</strong></td>
<td>Turns circuit(s) ON while pressed.</td>
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<tr>
<td><strong>Countdown</strong></td>
<td>Turns circuit(s) ON with one press. Turns circuit(s) OFF automatically after preset period of time. Can be configured to have LED flash during countdown.</td>
</tr>
<tr>
<td><strong>Intermittent</strong></td>
<td>Turns circuit(s) ON with one press. Circuit(s) will cycle ON and OFF automatically at a preset rate until the button is pressed again. Can be configured to have LED flash during OFF portion of the cycle.</td>
</tr>
<tr>
<td><strong>Inclusive Scroll</strong></td>
<td>Turns ON one circuit with first press. Turns ON successive circuits with additional presses. Previous circuits stay ON. Turns OFF all circuits with last press. Controls up to eight circuits.</td>
</tr>
<tr>
<td><strong>Reverse Inclusive Scroll</strong></td>
<td>Turns ON all configured circuits with first press. Turns OFF successive circuits with additional presses until all circuits are OFF. Controls up to eight circuits.</td>
</tr>
</tbody>
</table>

**Secondary Circuit Configurations** (actuated by pressing & holding button for approximately 3 seconds)

<table>
<thead>
<tr>
<th>Circuit Configuration</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Countdown</strong></td>
<td>Turns circuit(s) ON with one press. Turns OFF automatically after preset period of time. Can be configured to have LED flash during countdown time.</td>
</tr>
<tr>
<td><strong>Cancel</strong></td>
<td>Turns OFF all circuits associated with a scroll primary function</td>
</tr>
<tr>
<td><strong>Intermittent</strong></td>
<td>Turns circuit(s) ON with one press. Circuit(s) will cycle ON and OFF automatically at a preset rate until the button is pressed again. Can be configured to have LED flash during OFF portion of the cycle.</td>
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</tbody>
</table>
**Recommended System**

**Voltage**
- 12V nominal system: 9-16V
- 24V nominal system: 18-32V

**Switch Life (keypad)**
exceeds one million operations per button

**ECP Current**
100A maximum


**Operating Temperature**
- -30°C to + 50°C

**Storage Temperature**
- -40°C to + 50°C

**Humidity**
- MIL-STD-202F

**Salt Spray**
- MIL-STD-202F

**RCA Abrasion Wear Test (keypad)**
- 100 times

**Mechanical**

**PC Board**
- .093 thick FR-4

**Relay**
- 12V, 8 positions @ 15A and 25A
- 24V, 8 positions @ 10A and 16A

**Cover Housing (ECP)**
- PBT/ABS, Black

**Cover Gasket (ECP)**
- Translucent silicone rubber, durometer: 40±5

**Cover Screws**
- Cover screws 302SS

**Connectors (ECP)**
- Deutsch DT13-4P, -12PA, -08PA

**Connectors (OCM)**
- Deutsch DT13-4P

**Power Lug**
- Brass Alloy, electroplated bright tin

**Power Lug Hardware**
- Brass Alloy Hex Nuts, Lock Washers, Flat Washers

**Information Labels**
- Opaque polyester, white background, black and red printing

**Typical Actuation Force of Buttons on Keypad**
- 890 grams

**Recommended Mounting**

1. The ECP should be mounted in an area easily accessible to the operator to allow:
   a. access to integrated manual circuit override switches for critical loads.
   b. access to thermal protectors, so they can be reset if a circuit has an overload condition.

2. Suggested ECP mounting: 45° to 90° (vertical), or on a hinged door for easy accessibility.

3. If cover of ECP is removed, after replacing cover, torque screws to 8 - 10 in-lbs.

**General Notes:**
1. ECS must be wired directly to battery. Do not branch ECS power from starter lines.
2. Circuit protect system per ABYC standards.
3. Diagram represents recommended wiring only.
4. A hard reset of the system may be necessary should power become unstable.

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**ECS III Typical Wiring Diagram**

**Recommended Mounting**

1. The ECP should be mounted in an area easily accessible to the operator to allow:
   a. access to integrated manual circuit override switches for critical loads.
   b. access to thermal protectors, so they can be reset if a circuit has an overload condition.

2. Suggested ECP mounting: 45° to 90° (vertical), or on a hinged door for easy accessibility.

3. If cover of ECP is removed, after replacing cover, torque screws to 8 - 10 in-lbs.

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**Circuit Protection**

**Rating**
- 3 to 40A, 125-250VAC, 32VDC

**Approvals**
- UL/ CUL

**Dielectric Strength**
- 1500 VAC/ 1 minute

**Interrupting capacity**
- 1000 amps

**Resettable overload capacity**
- 10x rated current

**Insulation Resistance**
- 100M ohms

** Voltage drop**
- < 0.25 V

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> www.carlingtech.com
Connection Diagram

OM

- Keypad Switch Button
- Function Indication LED
- Backlighting LED
- OCM Address Configuration Module

ECC

- 4 Wire bus
- AUX Digital Input
- Configuration Memory (Read / write capability)
- Relay Driver
- Thermal Circuit Breaker
- Battery

ECP

- AUX Digital Input
- Configuration Memory (Read / write capability)
- Relay Driver
- Thermal Circuit Breaker
- Battery

MULTIPLE OCMs AS REQUIRED

MULTIPLE ECPs AS REQUIRED

OM

- Keypad Switch Button
- Function Indication LED
- Backlighting LED
- OCM Address Configuration Module

ECC

- AUX Digital Input
- Configuration Memory (Read / write capability)
- Relay Driver
- Thermal Circuit Breaker
- Battery

ECP

- AUX Digital Input
- Configuration Memory (Read / write capability)
- Relay Driver
- Thermal Circuit Breaker
- Battery
Recommended System

Voltage: 9-16V
Switch Life (keypad): exceeds one million operations per button
ECP Current: 100A maximum
Standby Current - OFF: 15mA in sleep mode
Memory Type: Flash

Dimensions:
- 11.280 [286.51] mm
- 4.880 [123.5] mm
- 3.033 [77.04] mm
- 9.291 [235.99] mm
- 11.820 [300.23] mm
- 3.051 [77.48] mm

Materials:
- All Stainless Steel Hardware
- DEUTSCH P/N DT13-12PA (MATING CONNECTOR IS DT06-12SA)
- DEUTSCH P/N DT13-08PA (MATING CONNECTOR IS DT06-08SA)
- 2X1/4 - 20 UNC-2A POWER STUD

Other:
- OVERIDE SWITCHES (QTY 8)
- PUSH TO RESET CIRCUIT BREAKER (QTY 16)
ECS III Dimensional Specifications

Dimensional Specifications
### ELECTRONIC CONTROL SYSTEM
**Configuration Sheet**

**SUBMITTED BY:**
Name/Company:  
Phone/email:  

**CUSTOMER INFORMATION:**
Contact Name:  
Company Name:  
Address: City, State, ZIP:  
Phone: email:  

**APPLICATION INFORMATION:**
Type Of Boat:  
Boat Model(s):  
Panel Source & Contact:  

# Of Operator Stations:  
Total # Of Controlled Loads:  
Total # Of OCMs:  

### 1. ENTER GLOBAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
<th>Setting</th>
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<tbody>
<tr>
<td>Ignore Ignition</td>
<td>ON/OFF</td>
<td>ON</td>
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<tr>
<td>Backlight On Ignition</td>
<td>ON/OFF</td>
<td>OFF</td>
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<tr>
<td>Inactivity Power Down Time</td>
<td>0 (No Shutdown) to 54 hours in 10 minute increments</td>
<td>10 Hours</td>
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<tr>
<td>Count Down On Time</td>
<td>3 seconds to 12 minutes, 42 seconds in 3 second increments</td>
<td>3 Minutes</td>
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<tr>
<td>Intermittent On-Time</td>
<td>3 seconds to 12 minutes, 42 seconds in 3 second increments</td>
<td>1 Minute</td>
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<tr>
<td>Intermittent Off-Time</td>
<td>3 seconds to 12 minutes, 42 seconds in 3 second increments</td>
<td>1 Minute</td>
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<tr>
<td>Low Voltage Stage 1</td>
<td>helvetica</td>
<td>9.8V</td>
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<tr>
<td>Low Voltage Stage 2</td>
<td>6.0V to Stage 1 - .1V in .1V increments</td>
<td>9.2V</td>
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</tbody>
</table>

### 2. ENTER LOAD CIRCUIT SPECIFICATIONS (see notes.)

<table>
<thead>
<tr>
<th>Circuit #</th>
<th>Function</th>
<th>Master Override</th>
<th>Load Current</th>
<th>Inrush</th>
<th>Load Preference</th>
<th>CB Rating</th>
<th>Shutdown Priority</th>
<th>Std/Accy</th>
<th>Comments</th>
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**Notes:**
- Master override is available on up to 8 circuits per ECP.
- If inrush current is unknown, please provide as much information about the load as possible such as MFG, MFG P/N etc.
- Available circuit breaker ratings are: 3.0A, 4.0A, 5.0A, 6.0A, 7.0A, 8.0A, 10A, 12A, 15A, 20A & 25A.
- Add information for additional circuits. If more than 16 circuits are required.
- Circuit numbers do not correspond to actual connections to the ECS. Refer to customer kit drawing for connection details.
### 3A. ENTER OCM SPECIFICATIONS (see notes.)

<table>
<thead>
<tr>
<th>Color:</th>
<th>Orientation:</th>
<th>Button #</th>
<th>Primary Function</th>
<th>Secondary Function</th>
<th>Options</th>
<th>Circuit(s)</th>
<th>Marking</th>
<th>Comments</th>
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<tr>
<td></td>
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### 3B. ENTER OCM SPECIFICATIONS (see notes.)

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**Notes:**
- Enter OCM Specifications for each OCM.
- Leave button numbers 5-8 blank for a four button OCM.
- Secondary Functions: Intermittent, Count Down, Dimmer and Cancel.
- Options: Backlights, Flash LED and Clone.
- Not all options are applicable to all functions.

### 4. ENTER ECC SPECIFICATIONS

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**ECC Specification**

**Style 1: Daisy Chain Configuration**

(Other configurations available. Consult factory.)

*As required. Specify as many lengths as are needed.*
Carling leads the way in digital switching technology with the ECS III

Multiplex switching technology offers many benefits over traditional analog switching, to both the manufacturer and to the end user. The marine manufacturer benefits from decreased wiring time, expense, weight, and complexity, while the end operator benefits from increased control, switching flexibility and a safer boating environment.

Leading the revolution in the marine market for digital switching technology, Carling Technologies’ ECS III delivers on a promise to simplify marine equipment. Don’t wait for the future to drive you, catch the wave and switch to a simpler world of switching technology.

For more information:

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- email us at sales@carlingtech.com,
- or call us at the location closest to you, listed on the back cover of this catalog.

Let us show you how we can put the power of digital switching in your control!
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Carling Technologies, Inc. (Seller) warrants that goods sold hereunder shall be free of defects in material and workmanship for one year from date of shipment. In the event of such defects, the Seller’s only obligation shall be the replacement or the cost of the defective goods, themselves, excluding, without limitation, labor costs, which are or may be required in connection with the replacement or reinstallation of the goods. This warranty is the Seller’s sole obligation and excludes all other remedies or warranties, express or implied, including warranties of merchantability and fitness for a particular purpose, whether or not purposes or specifications are described herein. This Warranty expressly excludes any and all incidental, special and/or consequential damages of any nature. Seller further disclaims any responsibility for injury to person or damage to or loss of property or value caused by any product which has been subjected to misuse, negligence, or accident, or misused, or modified or repaired by a person or persons not authorized by the Seller or which have been improperly installed.

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This catalog includes the complete line of Carlingswitch brand electrical switches for most any power switching need. Included are rocker, toggle, pushbutton, rotary and sealed switches with a wide variety of circuits, ratings, terminations, colors, illuminations, and legends. Worldwide certifications, UL1500, CE marked.

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