

Digital Switching Systems

ECS III
Programmable
Digital
Multiplexing
System



Contents

Introduction	1
Features & Benefits.	3
Additional Software Features	4
Hardware Features	4
Circuit Configurations	5
Typical Wiring Diagram	6
General Specifications	6
Connection Diagram	7
Dimensional Specifications	8
Configuration Sheet	10
Contact Information.	12

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

Standard Software Features

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. Each circuit can be assigned one of three levels of battery protection. 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.

- a. Shut Down: The ECP can be programmed to shut down after a customer defined set time.
- b. 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).

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

Ignition Sensing	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.	Bilge Pump Auto Detect Circuit	The ECS will detect when a bilge pump has been turned ON by a float switch, & will indicate this on the OCM (as required by the ABYC).
Backlighting	OCM backlighting is controlled by either a particular switch button press or by the position of the ignition switch.	Cloned Switches	Individual circuits can be controlled with multiple switch buttons in multiple locations.
Low Battery Sensing	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.	Dimming	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.
Automatic Shutdown	The ECS can be configured to turn OFF all functions after a prescribed period of inactivity.	Lock-out Circuits	Lock-out Circuits can be configured to not work if another specific circuit is ON. This is an ideal configuration for motor reversing circuits.
Configurable Always On Circuits	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.	Tripped Circuit Breaker Sensing (pending)	The ECS will detect when a circuit breaker has tripped and will indicate the trip with a rapid flashing LED on the OCM.
		Remote-Reset Circuit Breaker (pending)	Using an auto-reset thermal circuit breaker, the ECS is capable of remotely resetting circuits.

Hardware Features

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

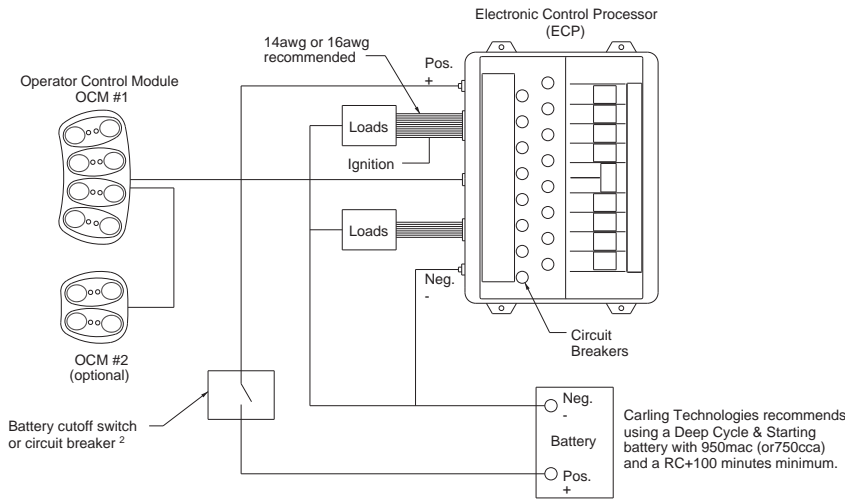
Primary Circuit Configurations (actuated by one button push)

<i>Toggle</i>	Turns circuit(s) ON with one press, OFF with the next press.	<i>Exclusive Scroll</i>	Turns ON 1 st circuit with first press. Turns ON 2 nd circuit with 2 nd press, turning OFF 1 st circuit. Controls up to eight circuits.
<i>Momentary</i>	Turns circuit(s) ON while pressed.	<i>Binary Scroll</i> (00, 01, 10, 11)	Turns ON 1 st circuit with first press. Turns ON 2 nd circuit with 2 nd press turning OFF first circuit. Turns 1 st circuit back ON leaving 2 nd circuit ON with next press, counting in binary . Controls up to four circuits.
<i>Countdown</i>	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.	<i>Reverse Binary Scroll</i>	Binary Scroll with reverse count.
<i>Intermittent</i>	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.	<i>Momentary Scroll</i>	Turns ON 1 st circuit while button is pressed and held. After releasing button, the next press and hold will turn ON the 2 nd circuit. Ideal for hatch up/down from one button.
<i>Inclusive Scroll</i>	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.	<i>Master Toggle</i>	Controls up to four circuits. Turns circuits on with one press. Circuits can now be individually turned OFF and back ON with separate buttons. Second press will turn all associated circuits that are ON, OFF. Allows for master control of lights with separate remote controls.
<i>Reverse Inclusive Scroll</i>	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.		

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

<i>Countdown</i>	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.	<i>Intermittent</i>	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.
<i>Cancel</i>	Turns OFF all circuits associated with a scroll primary function		

ECS III Typical Wiring Diagram



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.

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.

Electrical

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

Standby Current - OFF

15mA max. in sleep mode

Memory Type

Flash

Environmental (Meets EMC Directive 89/336/EEC, as amended by 92/31/EEC and 93/68/EEC)

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

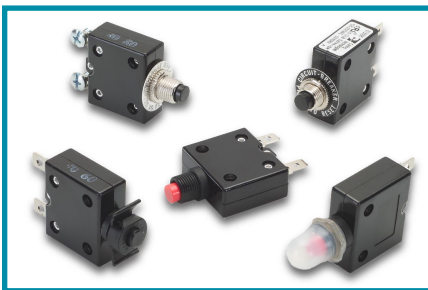
Information Labels

Opaque polyester, white background, black and red printing

Typical Actuation Force of Buttons on Keypad

890 grams

CLB-Series Thermal Circuit Protection



OVERLOAD	TRIP TIME
100%	NO TRIP
150%	TRIP IN 1 HR
200%	5 - 35 SEC.
300%	1.5-9 SEC.
400%	0.9 - 5.5 SEC.
500%	0.5 - 3.5 SEC.
600%	0.3 - 2.8 SEC.

Circuit Protection Rating

CLBXX311ANNRA

Approvals

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

Dielectric Strength

UL/CUL

Interrupting capacity

1500 VAC/ 1 minute

Resettable overload capacity

1000 amps

Insulation Resistance

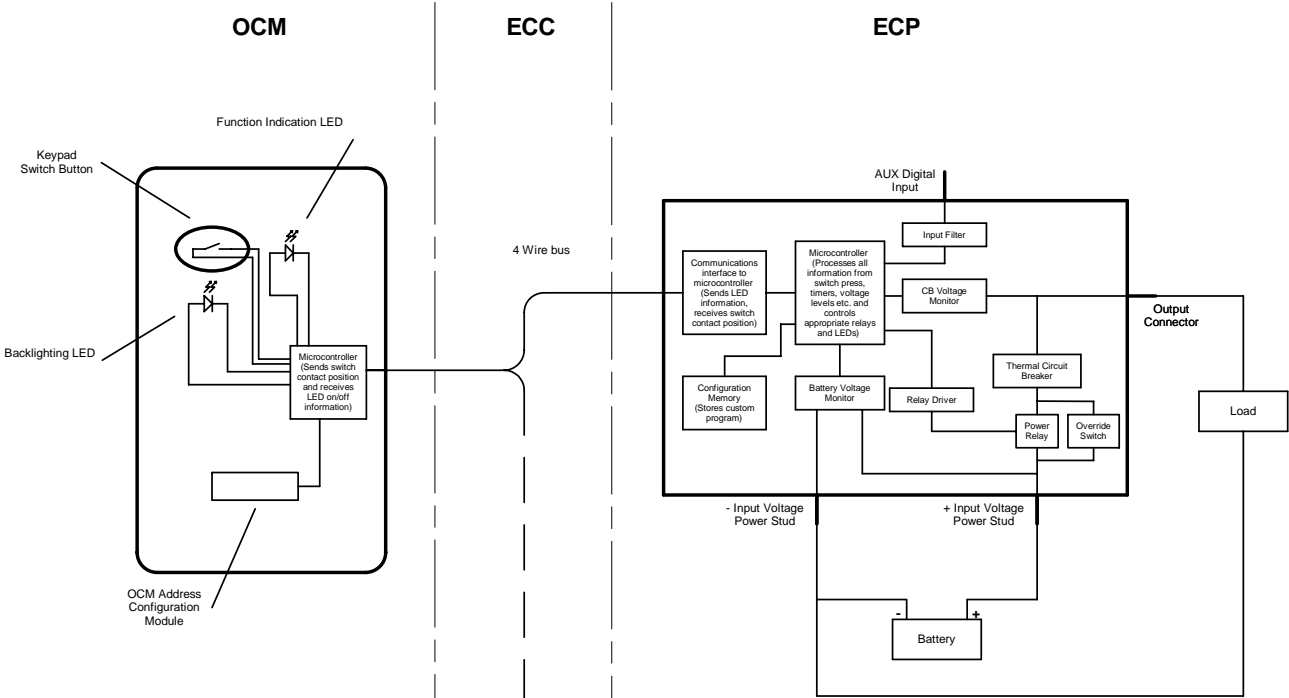
10x rated current

Voltage drop

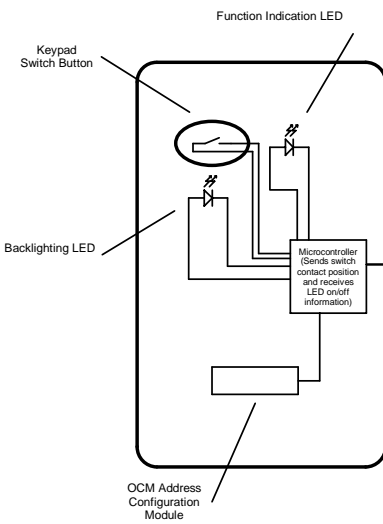
100M ohms

< 0.25 V

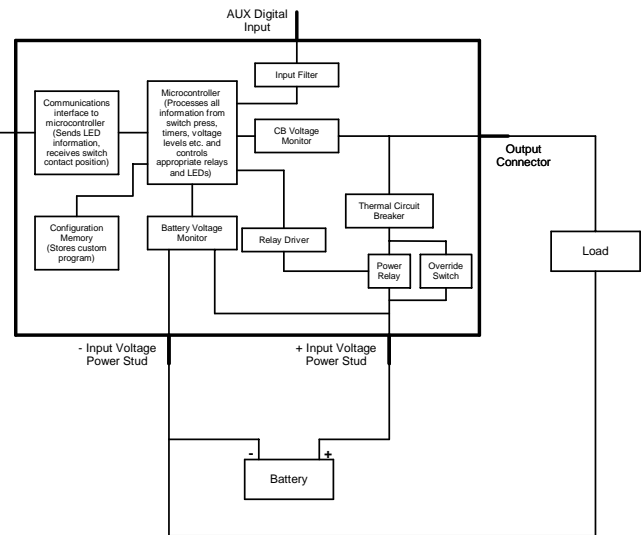
Connection Diagram



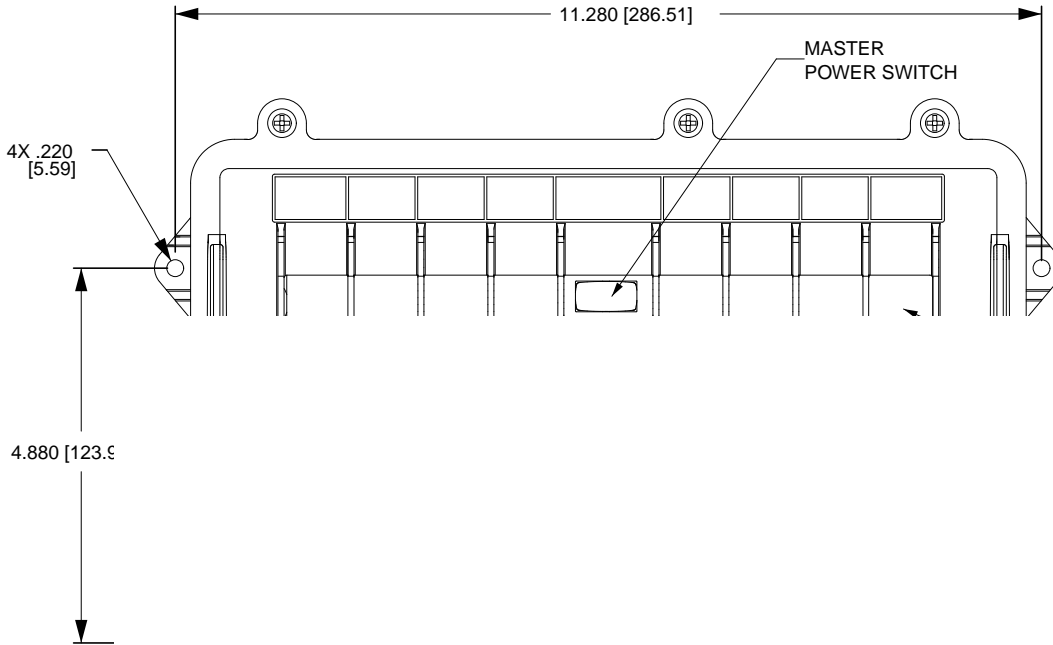
MULTIPLE OCMs AS REQUIRED



MULTIPLE ECPs AS REQUIRED



Dimensional Specifications

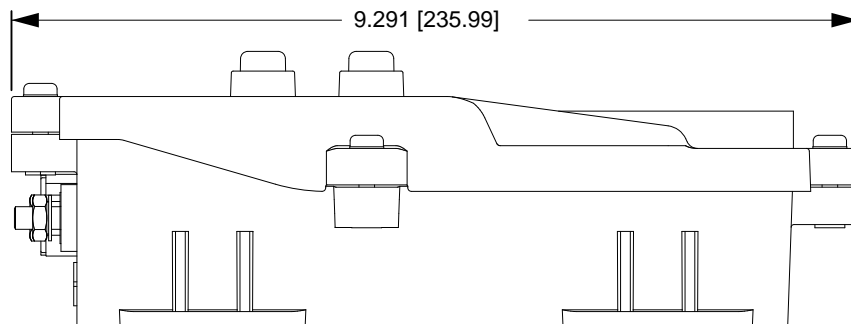
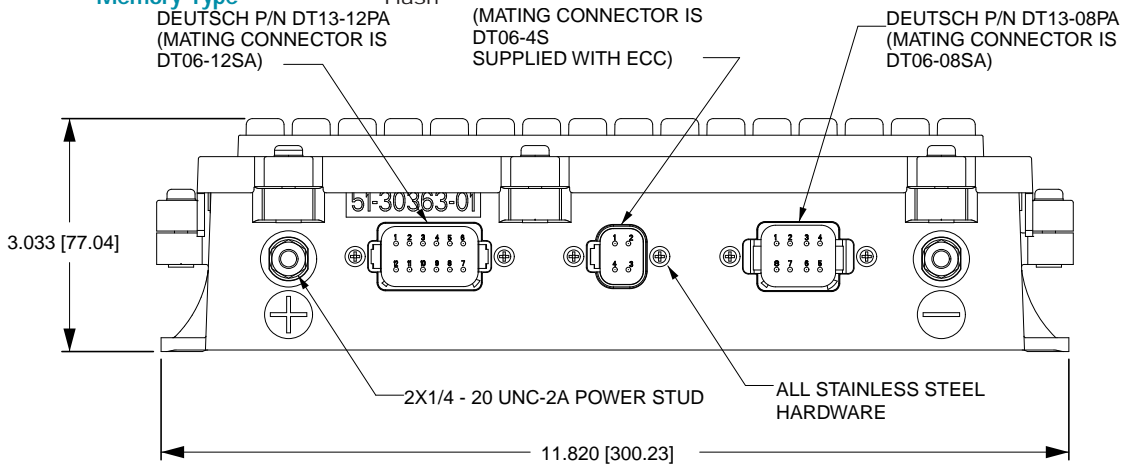


HES

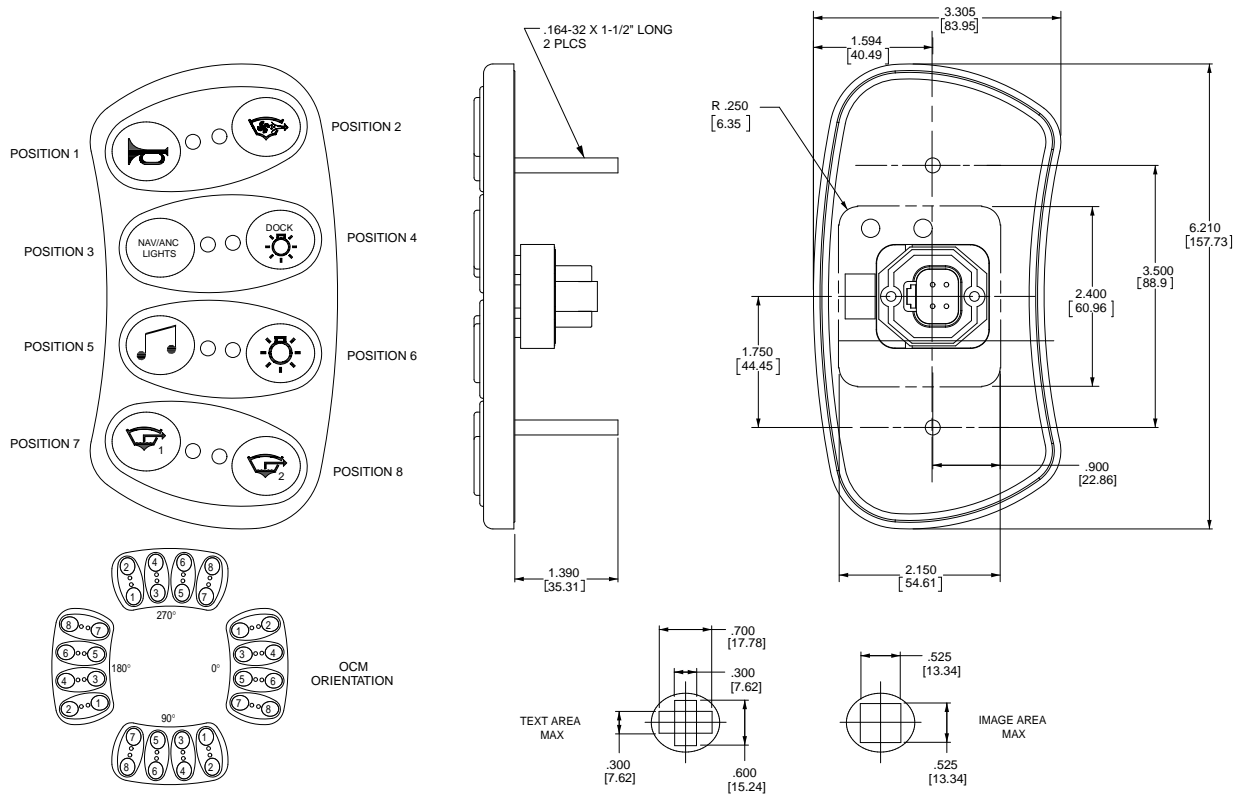
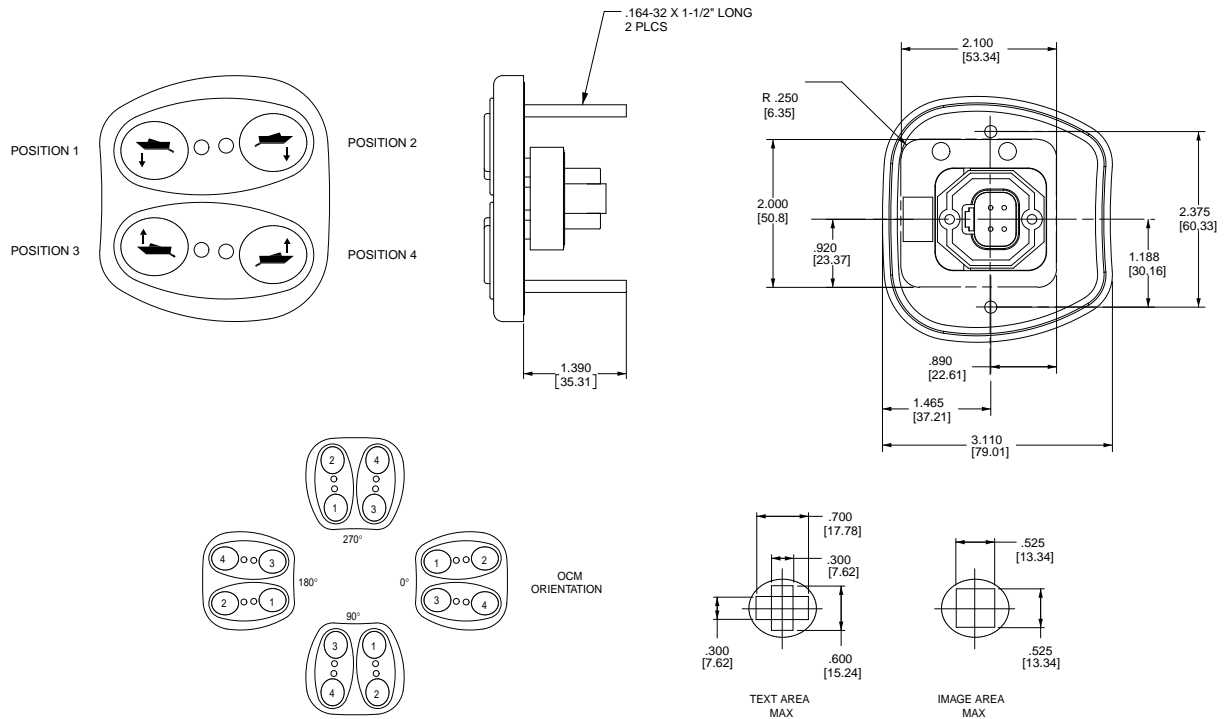
RCUIT

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



Dimensional Specifications





Electronic Control System Configuration Sheet

*** Please fax completed forms to 860-793-9231 or email to: sales@carlingtech.com ***

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):		Boat Length:	
Panel Source & Contact:			
# Of Operator Stations:		Total # Of Controlled Loads:	
		Total # Of OCMs:	

1. ENTER GLOBAL PARAMETERS

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

2. ENTER LOAD CIRCUIT SPECIFICATIONS (see notes.)

Circuit #	Function	Master Override	Load Current	Inrush	Load Preference	CB Rating	Shutdown Priority	Std/Accy	Comments
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

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, 13A, 15A, 20A & 25A.

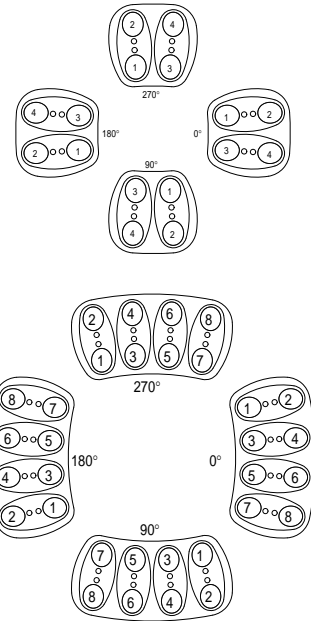
Add information for additional circuits, If more than 16 circuits are required

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.)						
Color:		Orientation:				
Button #	Primary Function	Secondary Function	Options	Circuit(s)	Marking	Comments
1						
2						
3						
4						
5						
6						
7						
8						

3B. ENTER OCM SPECIFICATIONS (see notes.)						
Color:		Orientation:				
Button #	Primary Function	Secondary Function	Options	Circuit(s)	Marking	Comments
1						
2						
3						
4						
5						
6						
7						
8						

OCM Orientation



Notes:

Enter OCM Specifications for each OCM.

Leave button numbers 5-8 blank for a four button OCM.

Primary Functions: Momentary, Toggle, Intermittent, Inclusive Scroll, Reverse Inclusive Scroll, Exclusive Scroll, Binary Scroll, Reverse Binary Scroll, & Count Down.

Secondary Functions: Intermittent, Count Down, Dimmer and Cancel.

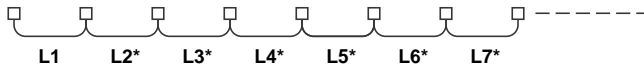
Options: Backlights, Flash LED and Clone.

Not all options are applicable to all functions.

4. ENTER ECC SPECIFICATIONS			
Cable Section	Section Length	Cable Section	Section Length
L1		L7	
L2		L8	
L3		L9	
L4		L10	
L5		L11	
L6		L12	

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:

For more information on the ECS III, please:

- visit our web site at www.carlingtech.com,
- 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!



Other Carling Technologies Catalogs

Switches and Controls

Rocker, Toggle, Pushbutton & Rotary Switches



Carling Technologies
Innovative Design. Proven Solutions.

Switches and Controls

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.

Circuit Protection

Hi-Mag & Ground Fault Protection



Carling Technologies
Innovative Design. Proven Solutions.

Circuit Protection

This catalog details Carling circuit protection products including hydraulic/magnetic circuit breakers and ground fault breakers. Breakers range from 0.1 to 700 amps Hi-inrush delay curves, Front Panel Snap-in Mounting styles, Rockerguard Bezels, Dual-Coil functions, and Quick Connect Terminals are included. Worldwide certifications, including UL1500, UL489 and CE marked. A Carling thermal circuit protection catalog is also available.

Power Distribution Centers

Power Distribution and Battery Disconnects



Carling Technologies
Innovative Design. Proven Solutions.

Power Distribution Centers

This catalog includes the complete line of standard AC and DC Power Distribution Centers and Battery Disconnects. All products are designed to fit into industry standard racks, from 1RU to 3RU, and utilize Carling hydraulic/magnetic circuit breakers.

Warranty Policy

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 misapplied, or modified or repaired by a person or persons not authorized by the Seller or which have been improperly installed.

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