



VMM6 Series

Contura Digital Switch Module, 6 Rocker



User's Manual

Revision 1.0

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<http://www.maretron.com>

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WARNING

- Opening the VMM6 device voids warranties set forth by Carling Technologies.
- Please ensure that you read and understand this manual before installation and use.
- The VMM6 must be installed in accordance with standards set forth by ABYC and other applicable agencies.

Introduction

Congratulations on your purchase of the Maretron VMM6 Series Contura Digital Switch Module, 6 Rocker. Carling Technologies has proudly designed and built your VMM6 to the highest standards for reliability and accurate service.

The VMM6 is a sealed, IP68 rated, digital switch module ready to deliver years of dependable operation within the harsh demands of the marine environment. The VMM6 features Carling's popular Contura rocker switch styles. The VMM6 reduces installation time and the complexity and cost of traditional wiring harnesses by utilizing NMEA 2000® CAN interface technology and screwless, snap-in mounting tabs. With internal optical interrupt switches replacing traditional mechanical switch contacts, the VMM6 has an unrivaled product life cycle.

The VMM6 connects directly to an NMEA 2000® network through the use of the VMM to NMEA 2000® Adapter Cable. Configure the VMM6 by using a Maretron USB100 or IPG100 tethering the NMEA2000® network to a PC running N2KAnalyzer. Control MPower and other Maretron systems with the VMM6 through an NMEA 2000® Network. Using standard NMEA 2000® messaging, the VMM6 can illuminate any of its 12 blue LED lights for status of circuit state or for use as backlighting.

The VMM6 is available in 6 standard configurations. Custom configurations are available with a minimum order quantity of 100 pieces.

Please carefully read and follow these instructions for installation, configuration, and usage of the Maretron VMM6 module to ensure optimal performance.

Features

- Mechanical Detent Provides Tactile and Audible Switch Operation
- Configurable Operation and Appearance Aspect
- Accepts Aftermarket Switch Actuators
- All Switch Positions have Blue LED's
- Horizontal or Vertical Mounting Options
- Screwless, Snap-In Mounting
- IP68 Rated with Plug for Unused Connector
- NMEA 2000 CAN Protocol
- LED Feedback of Controlled Circuit State
- Low Current Consumption (Max Current 150mA)
- NMEA 2000 LEN: 3
- Operating Voltage: 9 - 32 VDC
- Endurance Tested to Reach Minimum of 250,000 Operations

For Technical Specifications please refer to page 12

Theory of Operation

The mechanical throw type for each switch must be programmed into the module via CAN message(s). Switch position will be reported via the NMEA2000® Standard 127501 “Binary Status Report” message. To allow each switch to report up to three discrete positions, the top and bottom switch positions will be considered separate binary (on or off) switches and will be numbered as follows:



There is a total of twelve blue LEDs, each configurable via CAN message to act as a backlight or a function indicator. The LEDs are located under the top and bottom of each actuator. All LEDs set as backlights will share the same brightness and on/off values. LEDs set as status indicators can be tied to a channel of any device on the CAN network that reports the NMEA2000® standard “Binary Status Report” message. When the associated channel reports it is in the “on” state, the LED will be turned on. When the associated channel reports it is in the “off” state, the LED state will turn off.

Hardware Description

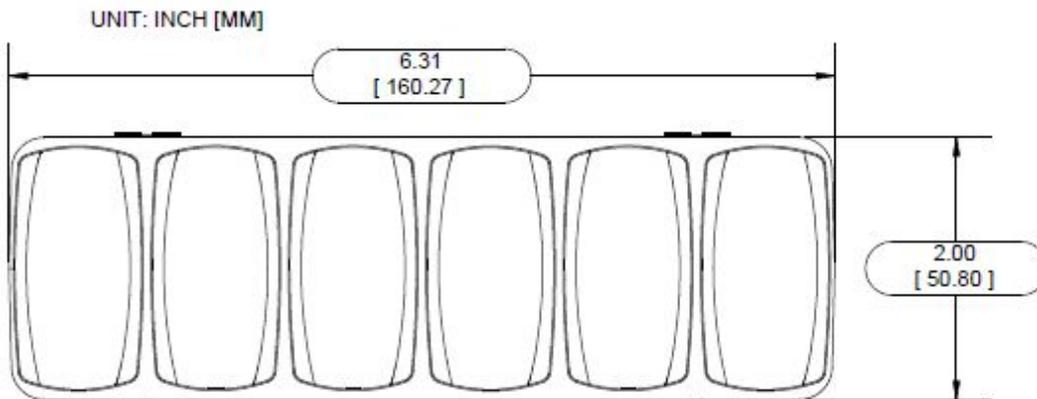


Figure 1 - Hardware Description Front View

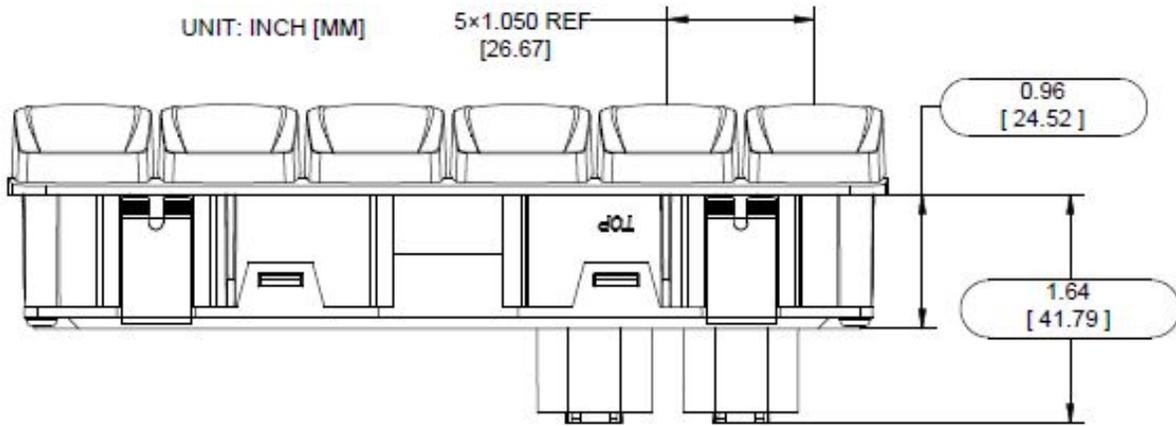


Figure 2 - Hardware Description Top View

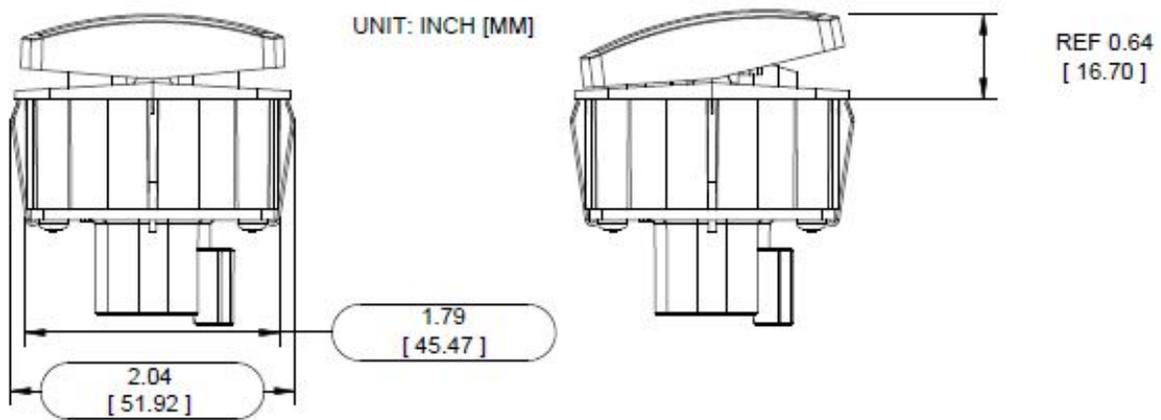


Figure 3 - Hardware Description Side View

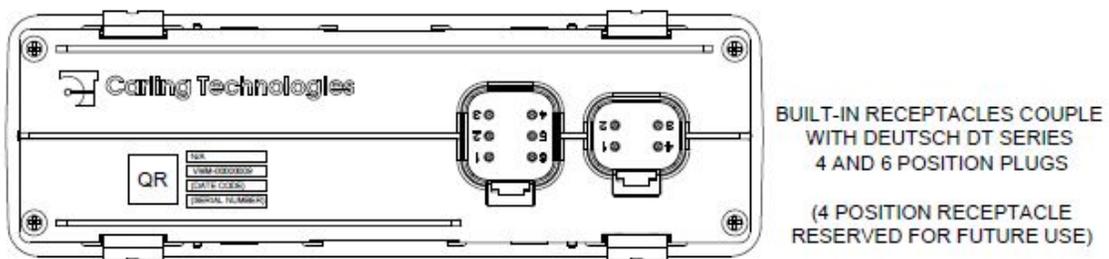


Figure 4 - Hardware Description Back View

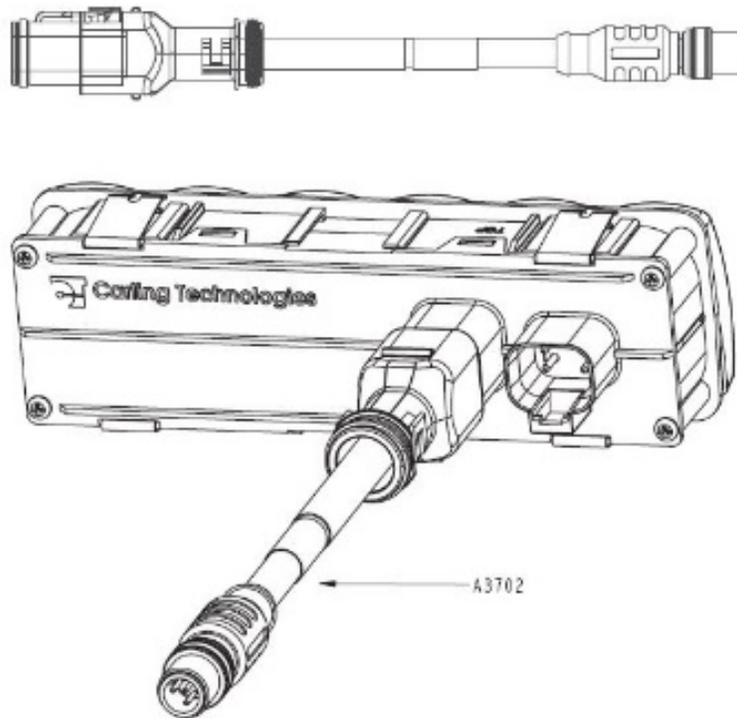


Figure 5 – Optional VMM to NMEA 2000® Adapter Cable - .2m (A3702)

Ordering Options

The VMM6 can be ordered in 6 different convenient configurations as outlined in *Table 1*. Custom Configurations are available with a minimum order of 100 units. Contact Marine.Sales@carlingtech.com for a custom quotation.

Table 1 – Ordering Options

PART NUMBER	DESCRIPTION
A3702	VMM to NMEA 2000® Adapter Cable - .2m (3702)
A3801-1	Contura II (ALL Position Momentary ON) w/ VMM to NMEA 2000® Adapter Cable .2m
A3801-2	Contura II (Right Switch 3-Position) w/ VMM to NMEA 2000® Adapter Cable .2m
A3801-3	Contura V (All Positions Momentary ON) w/ VMM to NMEA 2000® Adapter Cable .2m
A3801-4	Contura V (Right Switch 3-Position) w/ VMM to NMEA 2000® Adapter Cable .2m
A3801-5	No Actuators (ALL Positions Momentary ON) w/ VMM to NMEA 2000® Adapter Cable .2m
A3801-6	No Actuators (Right Switch 3-Position) w/ VMM to NMEA 2000® Adapter Cable .2m

Installation

Installing the Maretron VMM6 involves the following steps.

Unpacking the Box

When unpacking the box containing the Maretron VMM6, you should find the following items:

- 1 – VMM6 Digital Switch Module
- 1 – VMM6 User's Manual on USB flash drive
- 1 – VMM6 Panel Installation Template
- 1 – Warranty Registration Card
- 1 – A3702 VMM to NMEA 2000® Adapter Cable - .2m

If any of these items are missing or damaged, please contact Maretron Technical Support (please refer to page 15 for contact information).

Choosing Installation Location

Please consider the following when choosing a mounting location.

- The VMM6 is waterproof, so it can be installed in a damp or dry location.
- Consider mounting depth. (6" recommended clearance needed for proper cable bend radius)
- The VMM6 is temperature-rated to 85°C (185°F). Mount VMM6 away from engines or engine rooms where the operating temperature exceeds the specified limit.
- After mounting, ensure cable strain relief.

Mounting the VMM6

Locate the panel mounting template supplied with the VMM6. After cutting the panel mounting hole, simply press the VMM6 into panel cutout. The VMM6 mounting tabs will securely hold the unit into place provided the minimum panel thickness of 0.06" (1.5 mm) is present. The use of silicone sealant is acceptable to prevent water intrusion behind the unit and in some cases to secure the unit. Do not use permanent adhesive to secure unit. Certain adhesives such as methacrylate will cause cracking of the plastic enclosure. Adhesive use for installation will void warranty of VMM6 unit. For reference to the needed panel cutout dimensions see *Figure 6*.

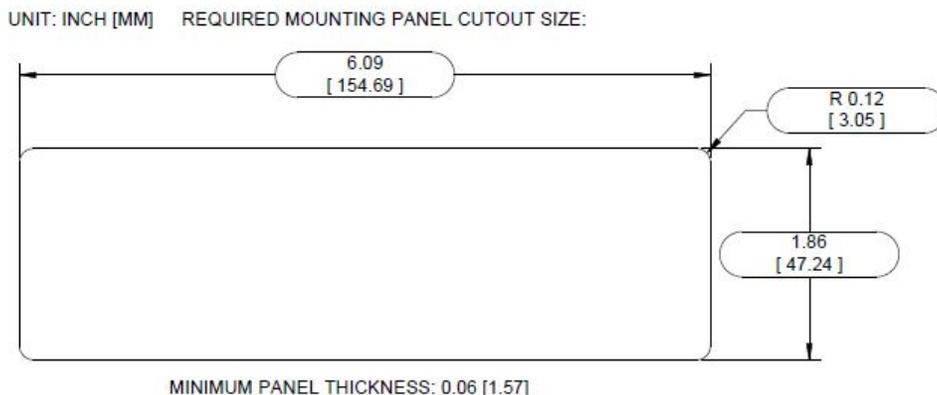


Figure 6 – Mounting Panel Cutout Dimension

Connecting the VMM6

Connecting the VMM6 consists of plugging the unit into the vessel's NMEA 2000® network. The unit can be connected to the NMEA 2000 network directly with the 6 position Deutsch DT Series receptacle molded into the unit or via use of the A3702 VMM to NMEA 2000® Adapter Cable.

Connector Pin Description

Table 2 – 4 Position Connector Pin Description

Connector Pin No. (Location)	Description
1	Reserved for Future Use
2	Reserved for Future Use
3	Reserved for Future Use
4	Reserved for Future Use

Table 3 – 6 Position Connector Pin Description

Connector Pin No. (Location)	Description
1	NET_H (CAN_H)
2	NET_L (CAN_L)
3	Unused
4	Unused
5	NET_C (Batt. -)
6	NET_S (Batt. +)

NMEA 2000® Connection

The NMEA 2000® connector is the round five-pin male connector found on the VMM to NMEA 2000® Adapter Cable. This connector is known as a DeviceNet micro connector. You connect the VMM6 to a NMEA 2000® network using a Maretron NMEA 2000® cable (or compatible cable) by connecting the female end of the cable to the male NMEA 2000 connector on the VMM to NMEA 2000® Adapter Cable (note the key on the male connector and keyway on the female connector). Be sure the cable is connected securely and that the collar on the cable connector is tightened firmly. Connect the other end of the cable by plugging into the 6 position connector on the rear of the VMM6, applying pressure until the connector latch clicks. The VMM6 is designed so that you can plug or unplug it from an NMEA 2000® network while the power to the network is connected or disconnected. Please follow recommended practices for installing NMEA 2000® network products.

NMEA 2000 connections can be made using pre-assembled leads or may be made using field attachable connectors and cables (See: *Figure 7*).

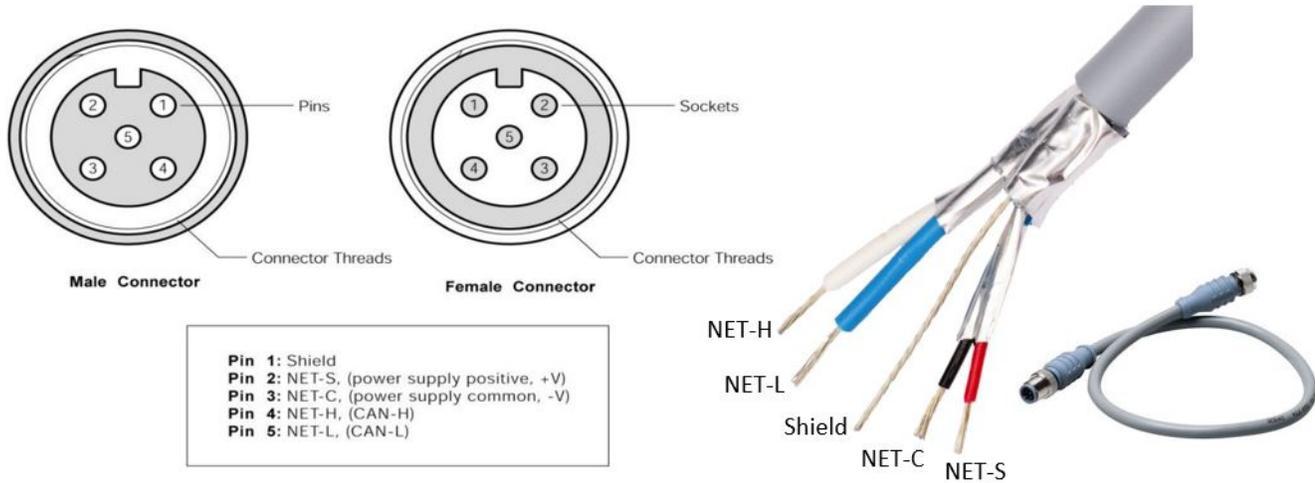


Figure 7 - NMEA 2000 Connectors

Please refer to the Maretron website (www.maretron.com/products/cabling.php) for relevant products.

Configuring the VMM6

The VMM6 transmits data over an NMEA 2000® network as it is shipped from the factory. The default device instance is "Instance 51". The default data instance whose state is reflected by the LED's on the VMM6 is "Instance 32". The unit will pair with Maretron CLMD12 and CLMD16 to toggle each unit's first 6 ECB's ON and OFF. If more than one CLMD12, CLMD16 or one of each unit is on the same NMEA 2000® network the VMM6 unit will have to be configured. Depending on desired switch control, default configuration may not work for your application and custom configuration will be needed. The VMM6 is configured using Maretron N2KAnalyzer®. The following sections describe the configurable parameters of the VMM6.

General Tab

General | Advanced

Instance:

Switch #1

Positions: 2

Top Data Instance: 0 Indicator: 1 Use As Backlight: ON

Bottom Data Instance: 32 Indicator: 1 Use As Backlight: OFF

Switch #2

Positions: 2

Top Data Instance: 0 Indicator: 1 Use As Backlight: ON

Bottom Data Instance: 32 Indicator: 2 Use As Backlight: OFF

Switch #3

Positions: 2

Top Data Instance: 0 Indicator: 1 Use As Backlight: ON

Bottom Data Instance: 32 Indicator: 4 Use As Backlight: OFF

Switch #4

Positions: ?

Load Config From File... Save Config To File... Restore Factory Defaults

Get Config From Device Put Config To Device Close

RED text indicates a changed parameter that has not yet been put to the device

Figure 8 – General Tab Dialog Box

Instance

When connected to a NMEA 2000® network this read-only field will indicate the indicator bank instance value that will be transmitted with the switch status in the 127501 Binary Status Report status message. To change the value of this field, change the value of the VMM6 device instance, as shown in Advanced Tab.

Switch #n

The VMM6 has six switches. The top and bottom of each switch has a separate indicator output number. Reference the indicator number needed from

Table 4 – Indicator Reference Number

Switch Number	Top Indicator Number	Bottom Indicator Number
1	1	2
2	3	4
3	5	6
4	7	8
5	9	10
6	11	12

Positions

Each switch has a “Positions” setting which controls its behavior, and settings which control the lighting of the LED’s behind the top and the bottom of each switch.

There are two possible settings for this parameter that control the behavior of the switch:

2 Position: The rocker switch acts as a two-position toggle switch. When powered on, the indicator for the top of the switch will transmit the state OFF, and the indicator for the bottom of the switch will transmit the state ON, and these two values will remain the same until the top of the switch is pressed. When the top of the switch is pressed, the indicator for the top of the switch will transmit the state ON, and the indicator for the bottom of the switch will transmit the state OFF, and these two values will remain the same until the bottom of the switch is pressed. When the bottom of the switch is pressed, the indicator for the top of the switch will transmit the state OFF, and the indicator for the bottom of the switch will transmit the state ON, and these two values will remain the same until the top of the switch is pressed.

3 Positions: The rocker switch acts as two momentary switches. When powered on, the indicator for the top of the switch will transmit the state OFF, and the indicator for the bottom of the switch will also transmit the state OFF. When the top of the switch is pressed, the indicator for the top of the switch will transmit the state ON as long as the top of the switch is pressed. When the top of the switch is released, the indicator for the top of the switch will again transmit the state OFF. When the bottom of the switch is pressed, the indicator for the bottom of the switch will transmit the state ON as long as the bottom of the switch is pressed. When the bottom of the switch is released, the indicator for the bottom of the switch will again transmit the state OFF.

Top and Bottom Data Instance and Indicator

If the *Use As Backlight* option is deselected, this *Data Instance* and *Indicator* will be the instance information in which the VMM6 will be tethered to via PGN.

The LED behind the corresponding switch will be lit or flashing whenever the *Indicator* that corresponds to the selected *Data Instance* is transmitting an On or fault state on the network. The LED on the switch will be dark otherwise.

(If the “Use As Backlight” option is selected the value of these fields will be ignored.)

Top and Bottom Use As Backlight

If this option is selected, then the LED behind the top (or bottom, as appropriate) of the switch will be lit at all times, and the “Data Instance” and “Indicator” fields will be ignored.

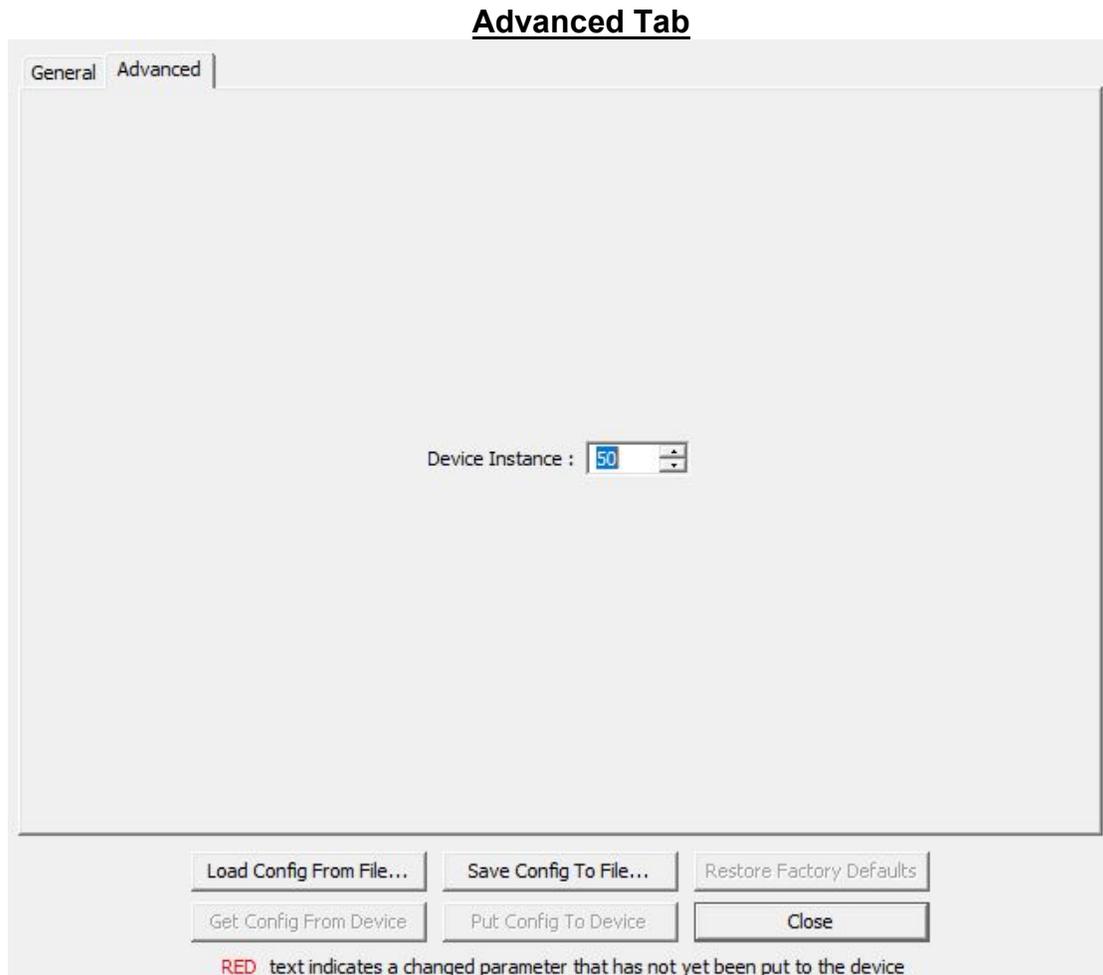


Figure 9 – Advanced Tab Dialog Box

This tab contains the Device Instance setting; If there are multiple instances of this device on a network, each would be set to a separate instance.

Maintenance

Regular maintenance is important to ensure continued proper operation of the Maretron VMM6. Perform the following tasks periodically:

- Clean the unit with a soft cloth. Do not use chemical cleaners as they may remove paint and markings or may corrode the CLMD16 enclosure or seals. Do not use any astringent cleaners such as acetone, MEK, Alcohol, Etc. These cleaners will deteriorate the VMM6 unit's casing and actuators.
- Ensure that the unit is mounted securely and cannot be moved relative to the mounting surface.
- Check the security of the cable connected to the NMEA 2000® connector and tighten if necessary.

Troubleshooting

If you notice unexpected operation of the Maretron VMM6, follow the troubleshooting procedures in this section to remedy simple problems. If these steps do not solve your problem, please contact Maretron Technical Support. Refer to page 15 for contact information.

Table 5 - Troubleshooting Symptoms and Check Procedure

Symptom	Troubleshooting Procedure
VMM6 Module Un-Responsive	<ul style="list-style-type: none">• Check Connections to VMM to NMEA 2000® Adapter Cable.• Using a Maretron USB100 or Maretron IPG100, connect to the NMEA 2000® network and ensure device is configured.
Any other problems	<ul style="list-style-type: none">• Please refer to the VMM6 product page on the Maretron website for additional troubleshooting suggestions.

Technical Specifications

As Carling is constantly improving its products, all specifications are subject to change without notice.

Certifications

Parameter	Comment
NMEA 2000® Standard	Certified
CE Mark	Recreational Craft Directive 2014/35/EU

NMEA 2000® Parameter Group Numbers (PGNs)

Description	PGN #	PGN Name	Default Rate
Periodic Data PGNs	127501	Binary Status Report	1 time / 15 seconds and on switch change
Response to Requested PGNs	126996	Product Information	N/A
	126998	Configuration Information	N/A
	065300	Proprietary	N/A
Protocol PGNs	059392	ISO Acknowledge	N/A
	059904	ISO Request	N/A
	060928	ISO Address Claim	N/A
	065240	ISO Address Command	N/A
	126208	NMEA Request/Command/Acknowledge	N/A
	126993	Heartbeat	1 time / 60 seconds

Electrical

Parameter	Value	Comment
Operating Voltage	9 to 32 VDC	
Power Consumption	150 mA	NMEA 2000® Interface
Load Equivalence Number (LEN)	3	NMEA 2000® Spec. (1LEN = 50 mA)
Communication	CAN 2.0b	NMEA 2000® Interface
Programming	Proprietary	Via Maretron USB100 or IPG100
Insulation Resistance	ISO 16750-2	500VDC with a duration of 60s
Electrical Endurance	Minimum 250,000 Operations	50k cycles at T _{min} , 150k cycles at T _{nom} , 50k cycles at T _{max}

Mechanical

Parameter	Value	Comment
Size	6.31" x 2.0" x 2.25" (160.27mm x 50.8mm x 58.49mm)	
Weight	0.5 lb. (0.22 kg)	
Material	Housing - Acetal, UV stabilized Back Cover - Acetal, UV stabilized Rocker – Polycarbonate / Nylon Mounting Clips – Stainless steel	
Functions	Actuator function varies with PN selection.	A3801-1 (ALL Position Momentary ON) A3801-2 (Right Switch is 3 Position) A3801-3 (All Positions Momentary ON) A3801-4 (Right Switch is 3 Position) A3801-5 No Actuators (ALL Positions Momentary ON) A3801-6 No Actuators (Right Switch 3 Position)
Illumination	12- Independent LEDs	1- Located under each actuator throw
Dimming	N/A	
Connection	1- Deutsch DT-Series 4 pin receptacle 1- Deutsch DT-Series 6 pin receptacle	
Mounting	Front panel press-in Installation and frond panel removable	

Environmental Operation

Parameter	Value
Operating Temperature	-40°C to 85°C
Ingress Protection	IP68
Storage Temperature	-40°C to 85°C
Ignition Protection	Ignition Protected

Environmental Testing

Parameter	Standard	Conditions
High Temperature Soak	EN 60068-2-2:2007	96hrs. @ 85°C
Low Temperature Soak	EN 60068-2-1:2007	96 hrs. @ -40°C
Temperature Cycling (Operating)	IEC 60068-2-14:2009	-40°C - 85°C (2 cycles of 8 hrs.)
Temperature Shock (Storage)	IEC 60068-2-14:2009	T _{min} = -40°C, T _{max} = 85°C
Simulated Solar Radiation	EN 60068-2-5:2010 (Procedure B)	10 days @ 40°C
Ignition Protection	ISO 8846	
Altitude (Transport)	EN 60068-2-13:1999	ALT _{min} = Sea Level, ALT _{max} = 13600m
Humidity (Soak)	EN 60068-2-78:2002	RH = 93% +/-3%, Exposure 10 days
Humidity - Cyclic	EN 60068-2-30:2005	RH (> 90%), 6 cycles of 24hrs
Dust Ingress	IEC 60529:2001	Method EN60529 Section 13 Result IP6X
Water Ingress	DIN 40050-9:1993 IEC 60529:2001	Method as DIN 40050-9 Result IPX7
Mechanical Shock - Drop Test	EN 60068-2-31:1993	500mm free-fall, all faces of 3 axes
Mechanical - Shock	60068-2-27:2009	500m/s ² , pulse duration 11ms
Mechanical - Bump	60068-2-29:1993	400m/s ² 6ms shock pulses, 3 axes
Vibration (General)	60068-2-6: 1996	Sine shaped sweep 5 Hz to 500 Hz Amplitude, 5g, (20 Cycles in each plane)
Vibration (Random)	EN 60068-2-64:1995 (Method 1)	Random excitation at 10, 150, 220, and 350 Hz breakpoint frequencies, 5 hours in each axis
Vibration (Resonant Search)	60068-2-6: 1996	frequency range 10 Hz – 2 kHz @ 5G (5 Minutes at each resonant point)
Chemical Resistance	ISO 16750-5 (Method 2)	Test method = B
Salt Spray	EN 60068-2-52: 1996	Chamber Temperature = 35°C (level 4 severity)
Electrical (Operating Voltage)		Min.: 9VDC Max.: 32VDC
Electrical (Over Voltage)	for Un=12V and Un=24V ISO 16750-2	Test for impaired function +24V, +36V @ 65°C
Electrical (Reverse Polarity)		12V systems: -24V for 5 minutes
Electrical (Short Circuit)		Operate at: +16V, +32V
Electrical (Supply Voltage Test)		Slow Decrease/Increase: Test according to ISO16750-2- 4.5 Momentary Drop: Apply the test pulse according to ISO 16750-2 (Figure 4 for 12V system, Figure 5 for 24V system)
Component Test - Electrical Transients Immunity	ISO 11452-2:2004	100V/m, 20MHz to 2GHz
Component Test - Electrical Transients Emissions	ISO 13766:2006 Section 5 Annex D and Annex E	Distance of 1 m in the horizontal and vertical polarization, 30 MHz to 1 GHz
Component Test - Electrical Transients Conducted	ISO 7637-2:2004	Method as per ISO 7637-2-Annex A2
Electrostatic Discharge (ESD)	ISO 10605	+/- 8 kV (Direct), +/- 15 kV (Air)

Technical Support

If you require technical support for Maretron products, you can reach us in any of the following ways:

Telephone: 1-866-550-9100
Fax: 1-602-861-1777
E-mail: support@maretron.com
World Wide Web: <http://www.maretron.com>
Mail: Carling Technologies, Inc.
Attn: Maretron Technical Support
120 Intracoastal Pointe Dr.
Jupiter, FL 33477 USA



Figure 10 - Technical Support QR Code

Scan this QR code with your smartphone for full technical information and a copy of this installation manual.

Maretron (2 Year) Limited Warranty

Carling Technologies warrants the Maretron® CLMD16 to be free from defects in materials and workmanship for two (2) years from the date of original purchase. If within the applicable period any such products shall be proved to Carling's satisfaction to fail to meet the above limited warranty, such products shall be repaired or replaced at Carling's option. Purchaser's exclusive remedy and Carling's sole obligation hereunder, provided product is returned pursuant to the return requirements below, shall be limited to the repair or replacement, at Carling's option, of any product not meeting the above limited warranty and which is returned to Carling; or if Carling is unable to deliver a replacement that is free from defects in materials or workmanship, Purchaser's payment for such product will be refunded. Carling assumes no liability whatsoever for expenses of removing any defective product or part or for installing the repaired product or part or a replacement therefore or for any loss or damage to equipment in connection with which Maretron® products or parts shall be used. With respect to products not manufactured by Carling, Carling's warranty obligation shall in all respects conform to and be limited to the warranty actually extended to Carling by its supplier. The foregoing warranties shall not apply with respect to products subjected to negligence, misuse, misapplication, accident, damages by circumstances beyond Carling's control, to improper installation, operation, maintenance, or storage, or to other than normal use or service.

THE FOREGOING WARRANTIES ARE EXPRESSLY IN LIEU OF AND EXCLUDES ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE.

Statements made by any person, including representatives of Carling, which are inconsistent or in conflict with the terms of this Limited Warranty, shall not be binding upon Carling unless reduced to writing and approved by an officer of Carling.

IN NO CASE WILL CARLING BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, DAMAGES FOR LOSS OF USE, LOSS OF ANTICIPATED PROFITS OR SAVINGS, OR ANY OTHER LOSS INCURRED BECAUSE OF INTERRUPTION OF SERVICE. IN NO EVENT SHALL CARLING'S AGGREGATE LIABILITY EXCEED THE PURCHASE PRICE OF THE PRODUCT(S) INVOLVED. CARLING SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES, WHETHER ARISING OUT OF BREACH OF CONTRACT OR WARRANTY, TORT (INCLUDING NEGLIGENCE), OR OTHER THEORIES OF LAW WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY CARLING, OR ANY UNDERTAKINGS, ACTS OR OMISSIONS RELATING THERETO.

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Warranty Return Procedure:

To apply for warranty claims, contact Carling Technologies or one of its Maretron dealers to describe the problem and determine the appropriate course of action. If a return is necessary, place the product in its original packaging together with proof of purchase and complete a Return Merchandise Authorization (RMA) on the following web page:

https://www.maretron.com/rma_request.php

You will be contacted by email with instructions on where to send the unit for repair / evaluation. You are responsible for all shipping and insurance charges. Carling will return the replaced or repaired product with all shipping and handling prepaid except for requests requiring expedited shipping (i.e., overnight shipments). Failure to follow this warranty return procedure could result in the product's warranty becoming null and void.

Carling reserves the right to modify or replace, at its sole discretion, without prior notification, the warranty listed above. To obtain a copy of the then current warranty policy for Maretron® products, please go to the following web page:

<http://www.maretron.com/company/warranty.php>

Appendix A – NMEA 2000® Interfacing

This appendix is intended to relate specific characteristics of the VMM6 to how they are communicated via NMEA 2000® messages in order to help ascertain whether the messaging implemented by the VMM6 is compatible with other NMEA 2000® products. It is not a complete description of the messages. If you require detailed information on the messages, please obtain a copy of the NMEA 2000® standard documents from the National Marine Electronics Association (www.nmea.org).

VMM6 NMEA 2000® Periodic Data Transmitted PGNs

PGN 127501 – Binary Status Report

The VMM6 uses this PGN to transmit the state of the 12 switch throws.

Field 1: Indicator Bank Instance – This field identifies the particular indicator bank to which this PGN applies. Please refer to Configuring the VMM6 on page 7 for instructions on how to program the value of this field.

2: Indicator #1 – This field indicates the state of button #1.

The state will be one of the following values:

- “OFF” – The button is not pressed
- “ON” – The button is pressed (please refer to “Positions” on page 9 for a description of the switch mechanism relationship with operation)

3 to 13: indicates the state of the 12 switch throws. 2 to 12 respectively.