



# Barnacle Adjustment Module

## Operation & Installation Manual

Version 1.4, 2021



**Module in  
2" Bronze Tee**



**Module in Groco  
A/C Strainer**

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# Table of Contents

	Page #
<b>1.0 Introduction</b>	<b>3</b>
<b>2.0 Installation Guidelines</b>	<b>3</b>
<b>3.0 Installation Details</b>	<b>3</b>
<b>3.1 Groco Strainers</b>	<b>4</b>
<b>3.2 Larger Systems</b>	<b>4</b>
<b>3.3 AC Module Connections</b>	<b>4</b>
<b>3.4 DC Module Connections</b>	<b>5</b>
<b>3.5 Bonding Considerations</b>	<b>6</b>
<b>4.0 User Cautions</b>	<b>6</b>
<b>5.0 Warranty and Repair</b>	<b>6</b>

## **APPENDICES and DRAWINGS**

1.0. **Introduction:** Phase Dynamics Marine Division is pleased to offer a new class of Barnacle Prevention Modules. It is designed to assist in preventing barnacle larvae from attaching to seawater plumbing systems, connection piping and inside of air conditioning condensing coils. The unique patented design allows for simple installations within the filter system by replacing the filter cap or within the sea water lines after the through hull valve. The Module can be simply installed in various sea water hose sizes with adapters or directly plumbed after the through hull valve. The basic system is UNS Alloy C95400 bronze specifically for the marine environment. Electronics are embedded within the module for simplicity and ease of installation. The system can be purchased with an AC or DC circuit for power. The module is typically connected to the AC powered sea water pump and will be operational during the time that it is on. Alternatively, can be connected to a constant DC power source of 12 to 24 VDC.

### 1.1. How Does It Work?



The Cypris Larvae: This is the second stage of the larvae which is looking for a place to “settle” permanently. At this stage it only has a few days to find the point of settlement or die. Also, at this stage of growth a second and third photosensitive “eye” is grown to assist in finding a colony of mature barnacles. These larvae are the only ones with photo-receptors. The mature colonies emit a red wavelength that attracts them. The barnacles are the only member of the shell families that cannot move once they are “settled” and they do not have a shell formed beforehand. The UV-A wavelength is used to make the larvae temporarily blind and not want to “settle” in the hoses and air-conditioning system. The strainer basket cannot catch them since they are still a larva of approximate size 0.020” or smaller before they settle.

This system is designed based on scientific data published in biological articles over the past 50 years. The UV-A light is less than 10 watts but effectively “stuns” the larvae instead of killing it. UV-A is not harmful to humans unlike the UV-B & C wavelengths and it does not kill bacteria. This system produces no harmful chlorine or hydrogen gas like other systems and is environmentally friendly. Multiple units can be simply placed at the through hull fittings to eliminate barnacles throughout the system including the long inlet lines on larger yachts. Other units can be placed at the strainer by replacing the plastic basket cap. This system can be installed without professional assistance.

2.0. **Installation Guidelines:** Depending upon line lengths and configuration it may be best to add additional modules in long lines and large a/c systems. It will not prevent algae, grass, mud or other materials from collecting in the strainer. In cases where there are algae mats and other dense matter the strainer may need to be cleaned more often as these will hide the UV Light and reduce its ability to stun the barnacle larvae. Pre-installation existing shell stage barnacles within the piping and a/c coils will continue to be active after the Barnacle Adjustment Module is installed. The best time to install the Module is after the system has been cleaned using appropriate solutions to remove the encrustations. You may see barnacles in the strainer basket that got there as the young or adult shell version of a barnacle. These will close their shell when the light is on and reduce their growth but will not kill them. Be certain to use a Bonding wire to the side of the Module when using the 2” Tee in an isolated hose. Plan appropriately for laying the wire going to the Pump Control System. The Module will come with an AC or DC marine wire of 16AWG

and connector appropriate for the power requested. A DC cable and connector will not work on a AC Module and vice versa to assist in system safety.

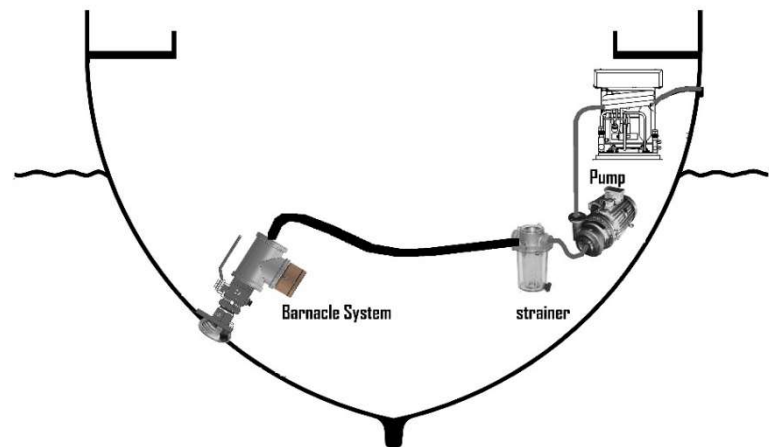
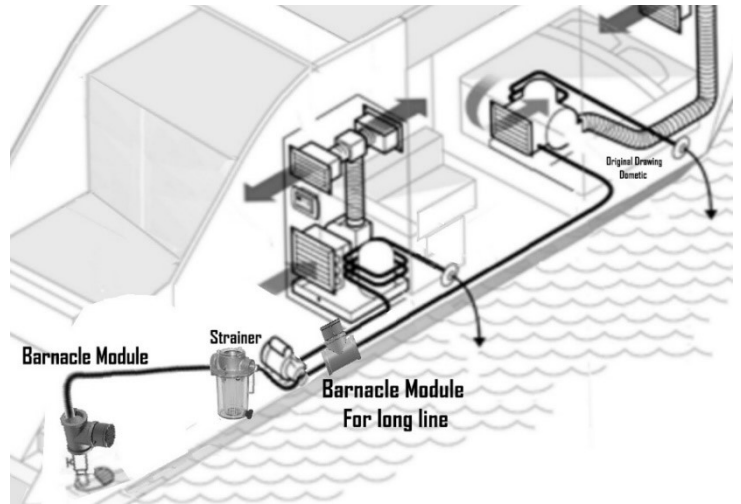
### 3.0. Installation Details:

3.1. Groco Strainer Models AARG-500, 750, 755, 1000, 1210, 1250, 1500 Series (see Appendix 1) have different sizes of plastic top caps. Please make certain that the correct BAM Module is used to install in place of the existing top plastic cap. This should have been established before ordering the BAM Module. The Module will simply screw into the Groco Strainer and seal as the original top cap. Provision on the top of the Module has been made for the use of a spanner wrench when necessary to loosen when cleaning the strainer basket. When tightening the Module please follow the original Groco recommendation of hand tightening only.

3.2. **Larger Systems:** In case of larger systems and other brands of Strainers the Module should be located at the earliest convenient location after the through hull valve for the A/C cooling water preferably in a 2" hose. This will provide protection from barnacle encrustation in the hose to the strainer. If the inlet hose is smaller than 2", the 2" Tee can be adapted to any size of hose using standard available NPT reducers and hose nozzle adapters. There is no need to remove the Barnacle module after installation as any debris will end up in the downstream strainers. There may be a need to put a second BAM Module at the downstream strainer depending upon the distance of the hose from the strainer. In the first photo below the distance between the through hull valve and the strainer was over 8 feet. A Module was placed as shown and another at the Groco downstream to keep the 2" line from having barnacle issues. This also assures that barnacles in the hose see the UV-A light when the pump turns back on and are again stunned preventing settlement in the A/C condensing system. Barnacle Cyprids are known not to settle in non-flowing water situations.



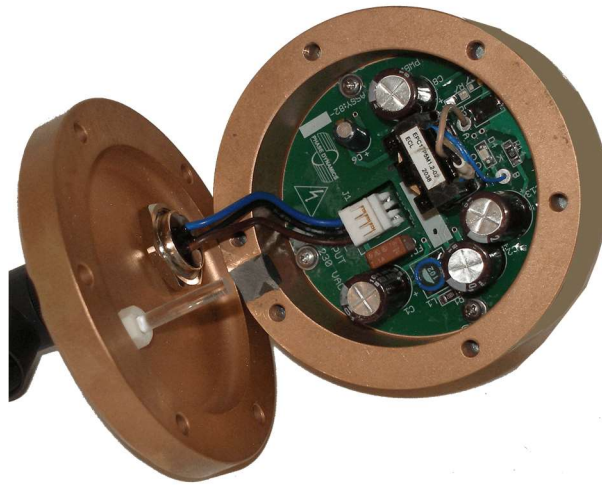
**West Bay 78**



**3.3. AC Module Connections:** The Module wire cable is manufactured with the screw on connector attached. This is with round 16 AWG three wire marine cable with standard colors of black, white and earth green. This 3-wire cable and connector will only work with AC Electronics. It is recommended that the green earth ground is made at the air conditioner pump control station. This wire is terminated inside of the 3-position female connector although it is not connected to the body of the BAM Module. This is to prevent interference with the Bonding Ground which should be made separately to the body of the Module. The two outer pins are for 110/240 VAC. Inside of the lid the two connections made on the AC board which are for the "L" & "N" (line and neutral) or L1 and L2 for 240 VAC connections. Although these are marked the wire can land on either as the AC is totally isolated from both sides of the circuit within the Module. The 120/240 VAC Module is capable of handling either voltage automatically.

The opposite end of the cable should be connected to the AC input to the A/C pump wiring so that the Module will be active when the pump is turned "On" by the A/C unit. This can also be wired into the A/C control system instead of the pump itself. Since the Module pulls a maximum of 0.2 ampere of alternating current (at 110 VAC or 220 VAC) the length of the cable is not important since 16 AWG will be appropriate for any length. Maximum AC voltage is 265 VAC and a minimum of 100 VAC. Maximum usable hours should be approximately 50,000 hours (approximately 6 years) of on operation. The LED will degrade slowly over this lifetime. The circuit is short circuit, over temperature and over current protected. A one ampere fuse on the circuit board is in place to prevent the Module from pulling excessive current. The fuse

can easily be replaced by removing the lid to the Module. The fuse is in a socket for ease of removal. Be careful when removing the lid as there is a light pipe for the blue LED which is extending down from the lid. A white connector is on the end of the connector wire which can be unplugged from the circuit board if necessary.



AC Circuit Board With Lid, Connector & Light Pipe

3.4. **DC Module Connections:** Applications where the A/C connection is not accessible or it would be easier to use a constant DC power supply the Module can be purchased with a DC circuit board and cable which will cover a voltage range from 12 VDC to 28 VDC without any adjustments required. The 16 AWG DC Marine Cable with a DC configured screw on connector is supplied with the DC Module. The cable supplied will only work with the DC Electronics. The maximum current draw will be 1 ampere. Any length of marine cable will be appropriate without worry about the voltage drop. The Module will operate 100% of the time or can be switched through the pump circuit at a 12/24 VDC point if available or by use of a relay. Maximum usable hours should be 50,000 hours (approximately 6 years). The DC circuit is short circuit, over temperature and over current protected. A 2-ampere fuse is in place to prevent the Module from pulling any excessive current. The fuse can easily be replaced by removing the lid to the Module. The fuse is in a socket for ease of removal. Be careful when removing the lid as there is a light pipe for the blue LED which is extending down from the lid. A white connector is on the end of the connector wire which can be unplugged from the circuit board if necessary.



3" Configuration, DC Circuit Board with Lid, Connector & Light Pipe



3.5. **Bonding Connections:** A bronze through hull valve or strainer is typically already bonded so if the Tee is screwed on directly to the already bonded valve no additional effort is required. If the Tee and Module is placed into a hose the Module should be bonded at either of the 10-24 screw holes on the side of the Module.

4.0. **User Cautions:** There are no user replaceable components in this module. If there are any difficulties or concerns, please contact the Factory.

4.1. **Do not arrange the Module such that the AC or DC cable connector end can be dropped into the bilge.** Salt water is conductive. Wire tie or otherwise limit the length of the cable such that if left disconnected it will not reach bilge water in the worst case.

4.2. **Be certain that power is off to the A/C or Barnacle Module before servicing the Module.**

4.3. **The Module with the center mounted 3 pin connector** is easily removed by unscrewing the metal collar at the base of the cable connector and then pulling straight upward. The cable connector end is “Keyed” and therefore must be properly oriented before plugging it into the receptacle. After it is seated then you can tighten the holding ring. This connector has different pins active for an AC versus DC cables. The proper cable was sent with the Module.

4.4. **If the Module is damaged contact the factory for possible solutions.**

4.5. **Do not drop or break the glass optical window.** If window is damaged replace the Module with a blind plug of suitable material or the original GROCO screw in cap. The LED cavity is sealed from the electronics via sealed feedthroughs and should not leak salt water through them if the glass is broken. The bright blue indicator light on the lid will not illuminate if the glass is broken. Current and voltages will be limited immediately by the circuitry.

5.0. **Warranty and Repair:** The Module has a two-year warranty on materials and labor to repair any module. Module must be shipped in proper packaging back to the Factory prepaid.

During the warranty period, Phase Dynamics will, at its option, either repair or replace products which are defective. For warranty service or repair, this product must be returned to Phase Dynamics. User damaged parts will have a service charge for repair. Buyer shall prepay shipping charges to Phase Dynamics and Phase Dynamics shall pay shipping charges to return the product to the Buyer. However, Buyer shall pay ALL shipping charges, duties, and taxes for products returned to (or from) Phase Dynamics from (or to) a country other than the contiguous states of the United States of America.

Phase Dynamics warrants that its software and firmware designated by Phase Dynamics for use with an instrument will execute its programming instructions when properly installed on that instrument. Phase Dynamics does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

#### **LIMITATION OF WARRANTY**

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

#### **EXCLUSIVE REMEDIES**

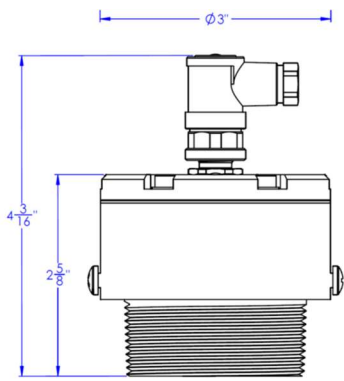
The remedies provided herein are Buyer's sole and exclusive remedies. Phase Dynamics shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

#### **SAFETY INFORMATION**

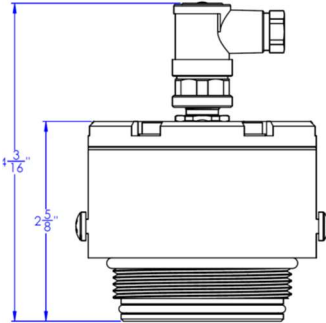
SEE USER CAUTIONS SECTION. THIS PRODUCT AND RELATED DOCUMENTATION MUST BE REVIEWED FOR FAMILIARIZATION WITH SAFETY AND INSTRUCTIONS BEFORE INSTALLATION AND OPERATION.



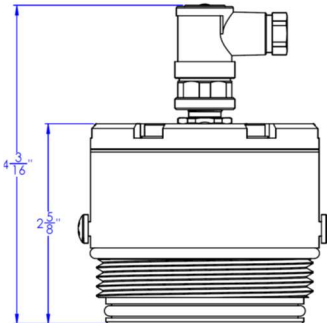
# Appendices and Drawings



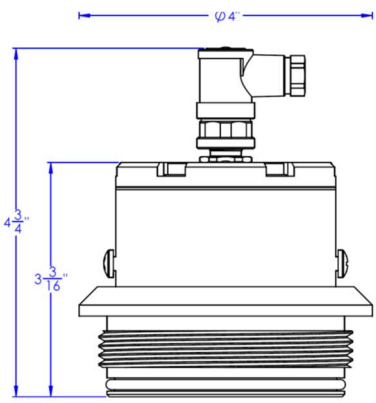
2" NPT for TEE



2" Strainer



2.5" Strainer



3" Strainer



Module in  
2" Bronze Tee Adapt to Hose



Module in  
A/C Strainer

## APPENDIX 1 – GROCO Strainer Module Numbers

GROCO Model	Thread In/Out	GROCO Plastic Cap	BAM Module	BAM O-Rings
ARG-500	1/2"	ARG-501	2.0" SAE 2-orings	2-135
ARG-750	3/4"	ARG-501	2.0" SAE 2-orings	2-135
ARG-755	3/4"	ARG-501	2.0" SAE 2-orings	2-135
ARG-1000	1"	ARG-1001	2.5" SAE 2-orings	2-229
ARG-1210	1-1/4"	ARG-1001	2.5" SAE 2-orings	2-229
ARG-1250	1-1/4"	ARG-1001	2.5" SAE 2-orings	2-229
ARG-1500	1-1/2"	ARG-1501	3" SAE Adapter	2-234
ARG-2015	2"	ARG-1501	3" SAE Adapter	2-234
ARG-2000	2"	ARG-1501	3" SAE Adapter	2-234

**MODEL ARG**  
BRONZE CASTINGS  
CLEAR SIGHT GLASS



PERCO Model	Thread In/Out	PERCO Cap	PERCO Basket Diameter	BAM Module
493004	1/2"	49300499E	1-13/16"	N/A*
493005	3/4"	49300599E	1-13/16"	N/A*
493006	1"	49300699E	2-5/8"	N/A*
493007	1-1/4"	49300799E	2-5/8"	N/A*
493008	1-1/2"	49300899E	3-15/16"	N/A*
493009	2"	49300999E	3-15/16"	N/A*
493010	2-1/2"	49301099E	3-15/16"	N/A*



\* Not Available in 2021 Use 2" TEE