NEPTUNE
SYSTEMS

Apex WAV

QuickStart Guide

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PACKAGE CONTENTS

The WAV 2-pump starter kit comes with these items in the box from Neptune Systems:

- WAV pumps (2)
- WAV magnetic mount sets (2)
- 1LINK AquaBus module
- 24VDC power supply
- 6' Aquabus cable
- Packet of screws for mounting the 1LINK module

If any of these items are missing, please contact Neptune Systems Support (see last page for contact information).

FIRMWARE

IMPORTANT: Your Apex Base Unit must be running firmware version 4.40 or higher to support the WAV. The current firmware version can be checked from the Apex Display on the Self-Test screen. If needed, please upgrade the Apex Base Unit firmware before proceeding with the installation of the 1LINK and WAV(s). See the Firmware Updates page on the Neptune Systems web site for firmware upgrade instructions. Do not connect any WAV pumps to the 1LINK module until the 1LINK module firmware has been updated.

ASSEMBLY

WARNING
THE WAV MOUNTS CONTAIN POWERFUL MAGNETS

Be extremely careful not to allow the magnets to snap togther, as damage to the mounts and/or personal injury may result.

Assembling the WAV pump

1. Unpack a WAV pump and magnetic mount set.
2. Carefully separate the two halves of the magnetic mount. Retain the packing material used as a spacer between the magnets for future use.

3. Set aside the outer magnet.

4. Pick up a WAV, and hold it upright (with the cable at the top)
   a. Note that the inner magnet assembly has a center channel with 3 round bumps and 1 rectangular ridge.   The ridge is near the bottom of the inner mount.

b. In your other hand, pick up the inner magnet and hold it as shown in the image below, with the rectangular ridge at the bottom.
c. Starting with the inner magnet below the pump, slide the inner magnet upward onto the track on the back side of the WAV pump.
d. Center the mount on the pump initially; you can change the angle of the pump as desired later.

5. Repeat for the second pump and mount set.
6. Keep the two outer magnets well separated; _do not allow them to snap together_.

INSTALLATION

1. Mount the 1LINK as desired; a packet of 4 screws are included for this purpose.
2. Position the 24VDC power supply in a safe place where it is unlikely to get wet or splashed.
3. Install the WAVs in your display tank as desired. The recommended starting point and most common usage will be to have a WAV on the left and right side of the tank. To install each WAV:
   1) Place the WAV in your tank with the inner mount up against the tank wall in the desired position.
   2) **SLOWLY and CAREFULLY** place the outer magnet assembly up against the outside of the tank directly opposite the WAV inner mount. Rotate the outer mount as needed to mate up with the inner mount magnet.

NOTE: The outer mount magnet is sealed and submersible and can be placed, for example, in an aquarium overflow if desired.

NOTE: The top of the pump is where the cable goes into the pump. When the pump is upright, you may change the direction of flow +/- 20° by sliding the pump within its mount. You may also rotate entire the pump any amount desired to point the flow in any direction desired within the +/- 20° adjustment range of the mount.

To reposition a pump:

1. Completely pull off the outer magnet
2. Move the pump away from the inside of tank wall slightly
3. Reposition the pump as desired
4. Carefully put the outer magnet back into place.

Do not drag the mounts across the glass or acrylic; there are large O-rings on both halves of the magnet mount which may become dislodged or be damaged.

INITIAL CONNECTIONS - 1LINK

Plug one end of the included AquaBus cable into either of the AquaBus ports on the 1LINK and the other end into an available AquaBus port anywhere on your existing Apex system. It makes no difference which AquaBus port is used and you do not need to power down the system when connecting AquaBus accessories as the system is plug-and-play. Then connect the included power supply to the 24V jack on the 1LINK. Plug the power supply into a regular wall outlet or power strip outlet. Plugging in the 1LINK power supply into an Apex EnergyBar outlet is not recommended. Ensure that the AquaBus cable and both power supply cables have a drip loop

WARNING: NEVER plug standard USB devices into any AquaBus connector or AquaBus accessories into computer USB ports. Damage to the AquaBus accessory and/or USB device may result.

STARTUP – 1LINK

As soon as the 1LINK is connected to an active AquaBus, the module will power up and begin to initialize. When first connected to an Apex Base Unit (through the AquaBus), the 1LINK will automatically be assigned an AquaBus address and be added to the Apex configuration. The LED Status indicator on the 1LINK will flash while it is being initialized. This takes a second or two. Once initialized, the LED Status indicator will be solid green. The LED Status indicator will flash green if communication with the Apex Base Unit is lost.

INITIAL CONNECTION - WAV

Connect the WAVs only after the 1LINK has been successfully connected and the status LED is lit solid green. There are three numbered 1LINK ports; connect each WAV to any of the three.
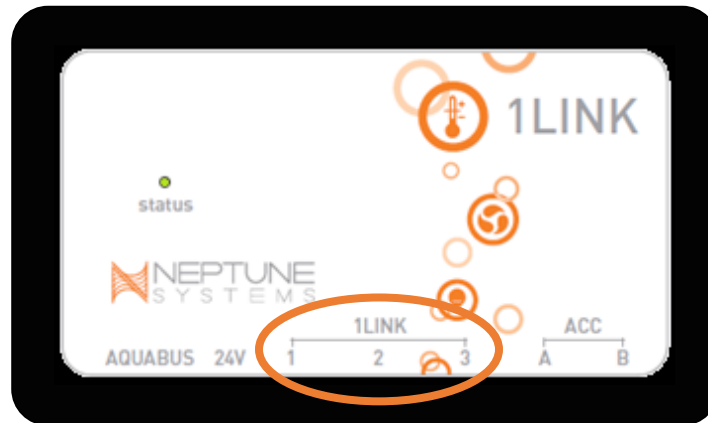
VERIFY THE INSTALLATION

Verify the 1LINK and WAVs were initialized and added to the Apex configuration:

> **Apex Display:** Setup –> Module Setup –> Modify Name – from this screen, you can see all AquaBus modules installed on the system.

> **Classic Apex Web Interface:** Configuration –> Module Setup – Verify the 1LINK is listed in the Apex Module List and note the module number assigned to it.

There will be two programmable outlets automatically created when you connect the 1LINK to your Apex system. They will be called LINKA_X_1 and LINKB_X_2 where 'X' is the module number automatically assigned to your 1LINK. These outlets correspond to the 24VDC ACC ports on the 1LINK; they are for use with Neptune Systems accessory products; they will not be used for your WAV installation.

There will also be a single outlet created for each connected WAV, named WAV_#_1; each WAV will have a unique AquaBus address.

You should also see a FLO tile on the APEX Fusion dashboard.   There will not be a FLO tile on the classic dashboard. If you do not see the LINKA, LINKB, and WAV outlet tiles on the classic dashboard or the LINKA, LINKB, and WAV outlet tiles and the FLO tile on the APEX Fusion dashboard, check the respective unused tiles area.

PROGRAMMING (APEX FUSION INTERFACE)

There is no programming of the 1LINK necessary in APEX Fusion for WAV operation. You will program only the WAV outlets. To program a WAV using APEX Fusion, click the cog icon on the WAV tile from the Fusion dashboard, then using the Fusion graphical scheduler interface, create your desired WAV schedule. Refer to the WAV Modes section later in this document for details of each of the 9 available WAV operating modes.

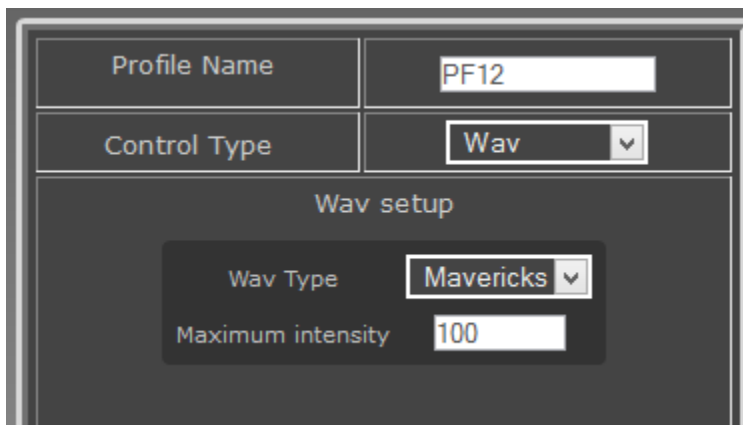Here is a sample WAV schedule created in APEX Fusion:
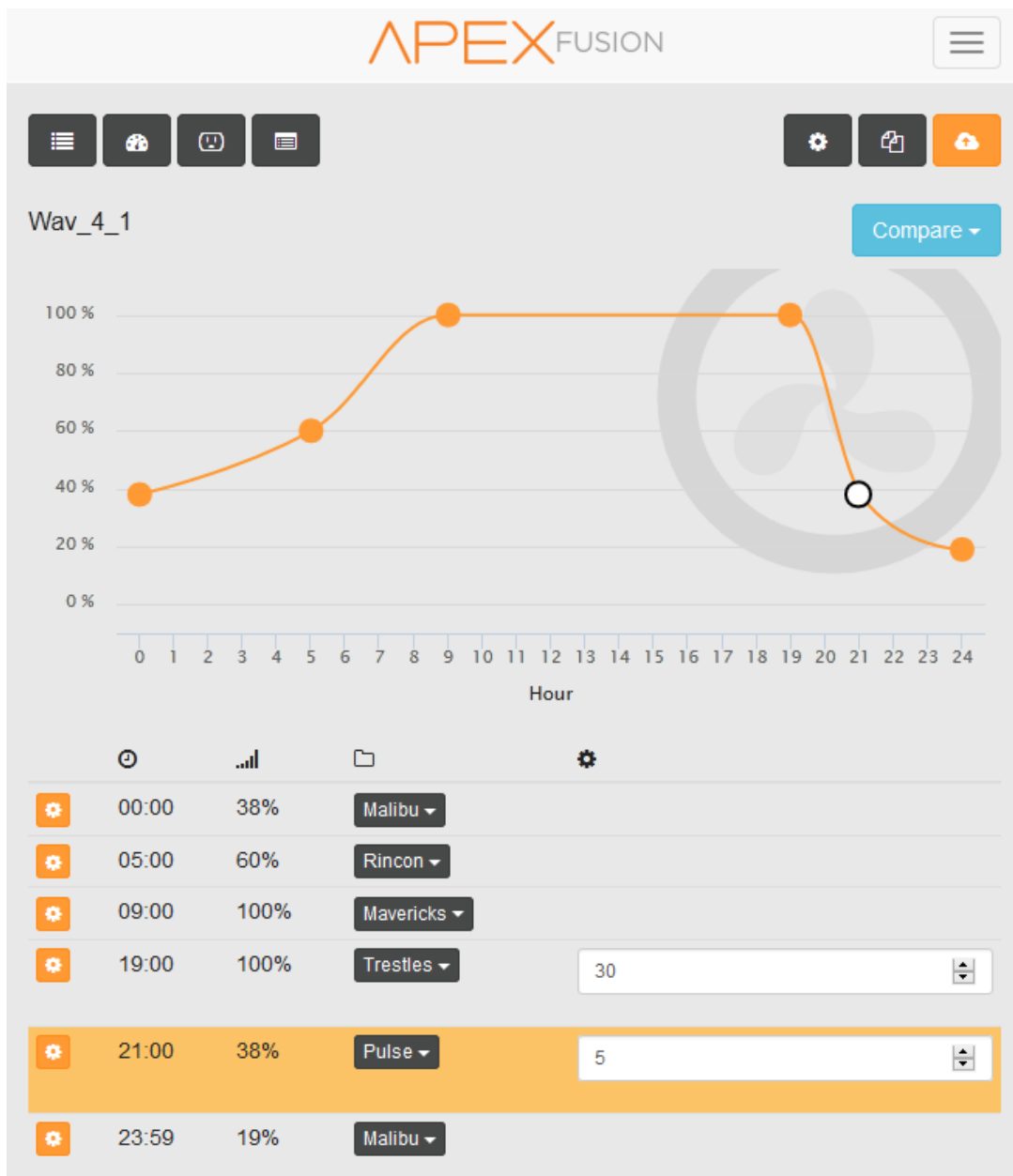
PROGRAMMING (CLASSIC WEB INTERFACE)

There is no programming of the 1LINK necessary in the Classic Dashboard for WAV operation. You will program only the WAV outlets. Refer to the Apex Setup and Programming Guide or the Comprehensive Reference Manual for detailed instructions on how to configure and program profiles and outlets. This QuickStart Guide assumes a basic level of understanding of profiles, outlets, and the use of the Classic Dashboard Interface. Refer to the WAV Types/Modes of Operation section later in this document for details of the options available within a WAV profile.

WAV PROFILE TYPE

The WAV has a new type of a profile which you can use to configure your pumps. For information about using profiles, please refer to the Comprehensive Reference Manual.

Profile Name – Any unique name you chose consisting of 8 characters or less; only A-Z, a-z, 0-9, - (hyphen) and _ (underscore) are permitted.

Control Type – Select 'Wav'

Wav Type – Select the appropriate mode.
The remaining options will vary depending on the WAV Type (mode) selected.
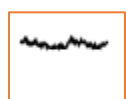
WAV TYPES/MODES OF OPERATION

There are 7 primary modes or control types available in the APEX Fusion WAV scheduler and in profiles.

Constant– a simple mode which gives an unchanging intensity.

Mavericks – A high-energy flow mode with random small and large changes in intensity such as is typical of a reef.

Malibu – A lower-energy, gentler mode than *Mavericks*, *Malibu* simulates typical flow in a lagoon or sheltered coastal area.

Pulse – A simple yet flexible mode which creates pulses at a configurable period, *Pulse* may be used to create a standing wave. Pulse duration in seconds may be configured; this duration describes the time that the pump will be on, as well the time that the pump will be off between cycles. Pulse mode oscillates between 1% pump intensity and the configured intensity.

Pipeline – A more powerful version of *Pulse*, *Pipeline* may be used to create a large standing wave, potentially at the cost of more pump noise. Pulse duration in seconds may be configured; this duration describes the time that the pump will be on, as well the time that the pump will be off between cycles. Pipeline mode oscillates between the WAV being off and the configured intensity

Rincon – A complex mode consisting of a long slow rise and fall in intensity, followed by another at roughly half the intensity of the first; the cycle then repeats. Each cycle lasts approximately 87 minutes.
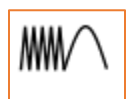
Trestles – A complex mode consisting of a long slow rise and fall in intensity, followed by a period of rapid pulses; the cycle then repeats. Each cycle lasts approximately 87 minutes. Duration of the rapid pulses may be configured.

When more than one WAV is present, an additional 3 modes are available; each requires a Reference pump to be specified.

Mirror – This mode causes the pump to be synchronized with and operate in the same mode as another WAV pump. If you use 100% for the intensity, the WAV

will do exactly the same pattern as the Reference pump. However, you may choose an intensity value less than 100%, which will cause the WAV to operate the same as the Reference pump, but the operation of the WAV will be proportionally scaled at a reduced intensity.
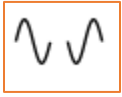
Inverse – *Inverse* is similar to *Mirror*, except that the WAV will do the opposite pattern of the Reference Pump. *Inverse* is intended for use only in conjunction with the 6 primary WAV modes which have a varying pattern; use of *Inverse* with *Constant* mode on the Reference Pump is not recommended.

Back – a special mode intended for WAV mounted on the rear wall of a tank. The *Back* flow pattern is simply a slowly varying sine wave pattern. The available options are a Maximum Intensity (%) setting and Reference Pump setting. A WAV in *Back* mode will operate in sync with the selected Reference pump.

WAV MONITORING AND ALERTS

The WAV has the capability to report various abnormal conditions; there are 4 types of WAV alarms:

Position Error Alarm – The WAV can sense if its position has been changed, such as might happen if the pump gets solidly bumped during maintenance, or if someone has removed the outer magnet mount and the pump has fallen to the bottom of the tank.

Stall Alarm – The WAV can sense a stall condition which might be caused by sand in the pump or by an obstruction blocking propeller movement.

Voltage Alarm – the WAV can detect and report a low or high voltage condition with the 24VDC input power.

Temperature Alarm – the WAV can sense and report a high internal temperature.

These alarms may be individually enabled or disabled for each WAV through the Classic Dashboard Configuration->Module Setup page. All four are enabled by default.

After initial installation of a WAV and anytime the position of the WAV is changed, the pump's base or home position should be reset using the Set Home Position button as seen in the image below. After the Home Position is set, any significant change in the position of the WAV will trigger a Position Alarm error (if the Position Alarm option is enabled).

NOTE: Before setting the Home Position of each of your WAVs, the WAV outlet(s) must be turned OFF.

Optionally, the WAV Alarms may also be configured and the Home Position of each WAV set using the display menu.

⚠️   Before setting the Home Position of each of your WAVs, the WAV outlet(s) must be turned OFF.

• To set the WAV Home Position using the Apex web pages, navigate to Configuration -> Module Setup. Then click the Set Home Position button.

• To enable or disable any of the WAV Alarms using the Apex web pages, navigate to Configuration -> Module Setup. Then click to enable or disable the 4 WAV Alarms

as desired; a checkmark means that alarm is enabled. When done, click the Update button.

- To enable or disable any of the WAV Alarms using the Apex display, navigate to Setup -> Module Setup -> Config Module -> WAV_#, then choose the Alarm you wish to enabled or disable. Press the center button to toggle between On and Off. Press the Exit or Home button when done.

- To set the Home Position using the Apex display, navigate to Setup -> Module Setup -> Config Module -> WAV_# ->

If none of the 4 WAV Alarms are present, the WAV tile in APEX Fusion will show an OK status; if any enabled WAV Alarm is active, it will be displayed on the Fusion tile.
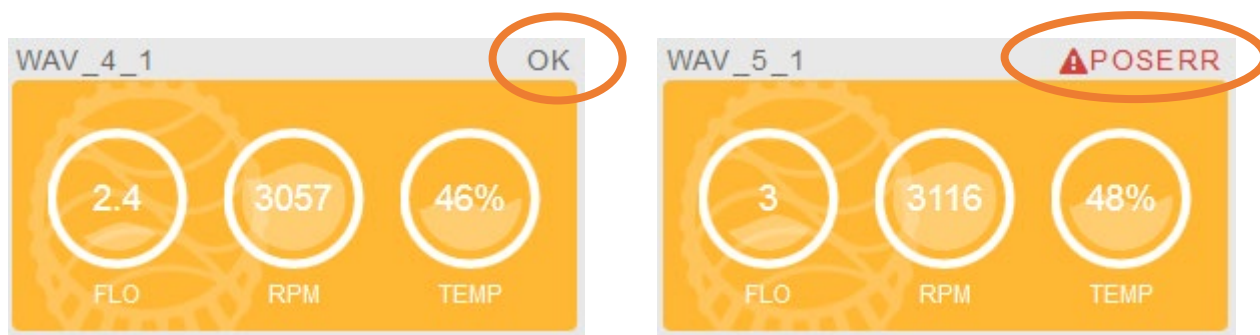
On the WAV tile, a TEMP value equating to the current internal temperature of the WAV is displayed. The normal range of TEMP will be 40-60%.

A new programming command has been introduced to allow WAV alarms to be reported via Apex email and audible alarms, and via APEX Fusion email and SMS alerts. The syntax is:

If Error *WAV-output-name* Then [ON/OFF]

Here is an example used in a program for the email outlet:

    Set OFF
    If Temp < 77.0 Then ON
    If Temp > 78.5 Then ON
    If pH < 7.90 Then ON
    If pH > 8.25 Then ON
    If Leak1 CLOSED Then ON
    If Error WAV_Left Then ON

FLO

Since the WAV constantly communicates with APEX Fusion, it knows exactly how much flow it is producing and logs a new measurement simply called **FLO**. FLO is shown on a tile in APEX Fusion.
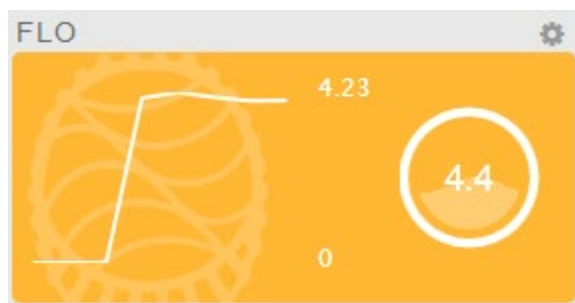
Data from all of the WAVs in your aquarium are aggregated. The size of your tank is factored in, and calculations are done to determine the number of tank volume turnovers per hour, which is then scaled to a FLO number from 0 to 10; the scale is non-linear, similar to the Richter scale used to measure earthquakes.   For example, the difference between FLO values of 6 and 7 is much greater than the difference between 2 and 3.
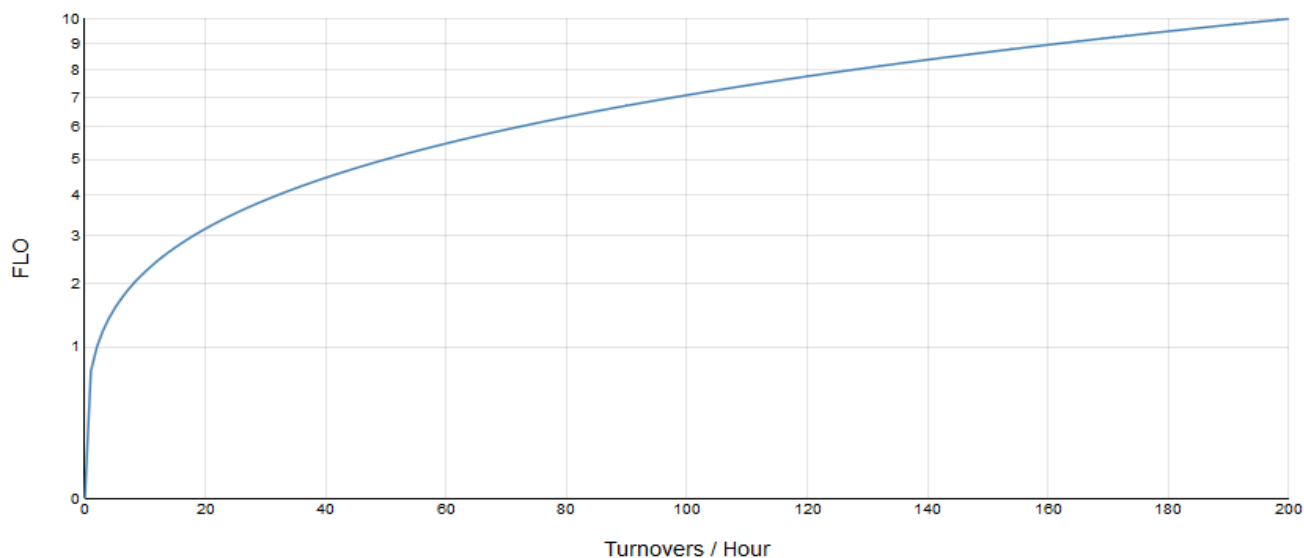
FLO values are also displayed on a graph in APEX Fusion.

FLO

Minimum: 0   Average: 3.64   Maximum: 5.63
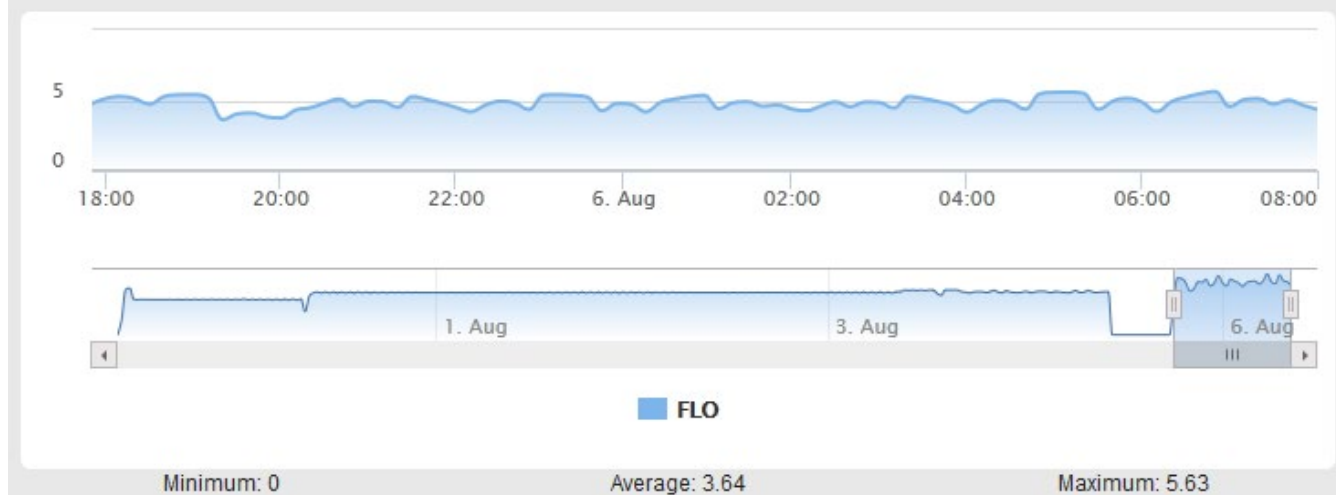
You can use the FLO number and FLO graph to assess the overall level of flow in your tank. Suggested flow ranges for varying types of marine aquariums:

FLO Value	Best For
0-4	Fish-only
4-5	Common LPS coral
5-6	Common SPS coral
6-7	High-flow SPS coral
7-10	Extreme flow for SPS coral

You can use this number to compare to others who use the WAV in their aquarium or simply compare to your own history of FLO in your aquarium.

You need to configure the FLOW tile after your WAVs are first installed. To configure the tile, click the cog icon.

FLO Configuration

Tank Volume	-	180		+
Units	Gallons			
Wav_4_1	Include			
Wav_5_1	Include			

- Change the Tank Volume value to match the size of your tank. This should be just the tank volume, not system total water volume.
- All WAVs are Included by default. If you have WAVs in multiple tanks, for example in your display tank and in a quarantine tank, you will want to exclude the WAV(s) in the QT so that only the data for the tank's WAVs are used in the FLO calculations.

Click the Send button to apply the new FLO tile settings.

MAINTENANCE

The WAVs should be given routine periodic cleaning like other in-tank powerheads to remove buildup of coralline algae and other algae growths as needed. The WAVs should also be immediately cleaned if it is known or believed that sand has gotten into the pump.

1. Carefully dismount the WAV, as always being extremely careful with the magnets.
2. Carefully remove the inner mount, the impeller cover, and the impeller assembly. The impeller assembly is removed by carefully using the two tabs on the impeller assembly and twisting counterclockwise to unlock it from the pump body.
3. Under running water, flush out any sand or other particulate matter from the outside and inside off the pump body, from the impeller, and from the inner magnet mount.
4. Ensure that no sand particles are stuck in the small vents at the rear of the pump body. Flush or blow out any sand if possible. If necessary, use a piece of wire, toothpick, dental pick, small screwdriver, or other suitable implement to carefully loosen any stuck particles.
5. Soak the components in a solution of white vinegar and water as needed to remove any encrustations.
6. A toothbrush or similar mon-metallic brush may be used to facilitate cleaning.
7. Rinse thoroughly.
8. Reassemble and reinstall the WAV.

The inner magnetic mount utilizes an advanced isolation mounting mechanism. For information about maintenance of the WAV magnetic mount, visit this link:

https://www.neptunesystems.com/getstarted/wav/maintenance/magnet

NEPTUNE SYSTEMS LIMITED WARRANTY

Neptune Systems warrants this product to be free from defects in material and workmanship for a period of 1 year from the date of purchase. If repair or adjustment is necessary and has not been the result of abuse, Neptune Systems warrants this product to be free from defects in material and workmanship for a period of 1 year from the date of purchase. If repair or adjustment is necessary and has not been the result of abuse, misuse, or accidental damage, within the 1-year period, please return the product with proof of purchase, and correction of the defect will be made without charge.

For your protection, items being returned must be carefully packed to prevent damage in shipment and insured against possible damage or loss. Neptune Systems will not be responsible for damage resulting from careless or insufficient packaging. Before returning please obtain a return authorization (RMA) number from Neptune Systems. Returned merchandise will not be accepted without a RMA number. To obtain assistance with your Neptune Systems product, contact Neptune Systems technical support by phone or via the Technical Support Contact Web Page at https://www.neptunesystems.com.

Except for the warranty set forth above, Neptune Systems is not responsible for any damages including, but not limited to, consequential damage occurring out of or relating to the delivery, use or performance of Neptune Systems' products. Buyer's remedies for breach of warranty shall be limited to repair, or replacement and full or partial adjustment to purchase price.

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Apex WAV QuickStart Guide 1.1

The symbols to the right mean that according to local laws and regulations your product should be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Some collection points accept products for free. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.