Plug & Play
Aquarium™

130 Liter

34 Gallons

Red Sea MAX

The Complete Reef System

USER MANUAL

Red Sea

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Preface

Congratulations on your purchase of the **Red Sea MAX**.

The unique and colorful underwater world of the coral reef and its inhabitants has captivated mankind for ages. Since the early years aquatic hobbyists have tried to duplicate this wonderland in their own homes, focusing on the equipment and technologies required to achieve this aim.

Red Sea developed the MAX to provide a complete reef-ready system so that from the beginning, you can focus on the aquarium's inhabitants rather than the hardware.

This manual includes the set-up and operational instructions for the MAX aquarium with a focus on how to establish and maintain a healthy and successful reef aquarium.

We hope that you enjoy your MAX.

1 Introduction

The Red Sea MAX approach to the coral reef experience is to replicate a natural marine environment as closely as possible. In the ocean, coral reefs flourish only where specific physical, conditions prevail such as sufficient light, adequate current, stable temperature and water clarity. The Red Sea MAX provides a system that creates these conditions allowing you to keep a thriving, healthy reef aquarium right in your own home.

Lighting

Light is the primary energy source in a coral reef ecosystem. Some of the reef organisms such as algae, phytoplankton and zooxanthelae convert the light into chemical energy that other reef inhabitants consume in turn. Invertebrates, such as corals and anemones, rely on sufficient light to promote photosynthesis. These photosynthetic invertebrates harbor symbiotic algae called zooxanthelae that consume the nitrogenous components and carbon dioxide (CO_2) from the coral, converting it into nutrients and oxygen for the coral itself. The spectrum of light is of paramount importance because those wavelengths (color) of light found at the natural depths of coral reefs maximize the ability of the zooxanthelae to photosynthesize.

The intensity of the light is also important, though it is impractical for a home aquarium to provide the high light intensity present at natural reefs. As a general rule, a light intensity of 1 watt per liter of water is sufficient for marine invertebrates.

As with most other organisms, the fish and invertebrates require both light and dark periods for healthy biological functioning. The photoperiod needed for photosynthesis is 10-12 hours.

The Red Sea MAX features a complete lighting system, including two 55-watt T5 power compact fluorescent bulbs with a high-polish, textured aluminum reflector, designed specifically to attain the lighting requirements for a healthy reef ecosystem. It provides 1 watt per liter of clear blue sky color (10,000 K) with a 1:1 ratio to pure actinic blue (420nm wavelength peak) to enhance the growth and health of even the delicate stony corals (SPS) and duplicate the exquisite fluorescent colors of the reef invertebrates. The lighting comes with a built-in timer to ensure a consistent photoperiod and moonlight periods to complete the natural environment.

Water movement and circulation

Water movement constitutes another critical physical parameter in reef aquariums. The extensive biological effects of currents, specifically their role in transporting nutrients and oxygen, make them crucial for static coral reef species. Water flow increases the food supply, promotes gas exchange and improves enzyme action, as well as fuels metabolism, respiration rates, calcification rates and photosynthesis rates. At the same time, it provides proper flushing of mucus, decreasing disease, and sedimentation damage.

Sufficient water movement helps maintain proper water quality parameters. The turbulence "breaks" the water surface to promote gas exchange (especially the removal of CO_2) and prevents the accumulation of bio-film, which reduces light penetration. Good water currents eliminate stagnant areas where decomposing organic matter will otherwise accumulate.

The Red Sea MAX features two 550 lph (145 gph) circulation pumps with adjustable direction outlets for sufficient water movement, according to the desired aquascaping and invertebrate positions.

Temperature

Reef inhabitants are used to very stable temperature conditions which may vary slowly within a fairly narrow range. Since the organisms' metabolic rates change with temperature, it is essential to avoid any sudden or dramatic changes.

Most ambient temperature conditions around an aquarium are lower than the recommended temperature for a reef and the fan-cooled hood of the MAX dissipates only a small amount of heat; therefore, under such conditions, only a heater is required.

In warmer climates, where the ambient temperature is above the maximum recommended, a chiller should be added to the system.

We strongly recommend maintaining a temperature range of 24-27°C (76-83°F), unless there is reason to do otherwise.

Filtration

Coral reefs develop and flourish only in ocean areas with clear, unpolluted, sediment-free water that allows adequate light penetration. Keeping the reef's delicate creatures in a closed system requires special attention to the water quality by maintaining parameters within the narrow range that supports life. The aquarium's main pollutant results from the decomposition of organic matter in the ecosystem. An efficient filtration system removes the coarse pollutants from the aquarium before they are converted into toxic agents, which usually exist in a dissolved form and are more difficult to remove.

A filtration system is made up of a number of elements, each performing complimentary tasks.

The heart of a reef filtration system is the protein skimmer which removes the vast majority of the wastes produced by the aquarium inhabitants, as well as thoroughly oxygenating the water.

Mechanical filtration removes the large organic substances, such as dead fish and plant matter, excess food, as well as sediment from the water column, and moves it to a user-accessible location.

Although the mechanical filtration system removes most of the fine organic material, what remains begins to decompose. Some of these organic particles, known as dissolved organic carbons (DOCs), are too small to be picked up by the protein skimmer, causing build-up in the water and giving it a yellowish hue. The chemical filtration action of active carbon essentially acts as a large sponge, absorbing these impurities from the water.

The last stage in the decomposition of organic matter is mineralization, where bacteria convert organic matter into inorganic materials, such as ammonia and ortho-phosphate, which can be harmful to the aquarium inhabitants. Through the process of nitrification, a special species of nitrifying bacteria converts toxic ammonia into less toxic nitrate. In order to provide the bacteria with the large contact area and high flow rate it needs to develop into a colony, biological filter media has been added to the filtration system.

The Red Sea MAX features a 4-stage reef filtration system driven by two 550 lph (145 gph) submersible pumps, sufficient to circulate the entire water volume of the tank 10 times per hour. It is designed to prevent clogging and the build-up of organics, maintaining the ideal water quality for a reef aquarium. The system is comprised of the following:

- **Protein skimmer**: The turbo air injector protein skimmer provides a constant mixture of fine air bubbles (0.5-0.8mm in diameter) and water, creating a thick, dry and stable foam of partially dissolved organics. The MAX skimmer filters the entire water volume of the tank almost 4 times per hour
- **Mechanical filtration**: The mechanical filtration media consist of double-stage sponges to trap coarse and fine particles. Their position at the inlet of the filtration provides easy access for routine cleaning.
- **Activate carbon**: The 4mm (0.15”) granulate activate carbon is highly porous, phosphate-free charcoal. It removes any DOCs for at least two months, depending on the aquarium bio-load.
- **Biological media**: The highly porous ceramic bio-media provides enormous surface area (420m^2/l) for nitrifying bacteria colonization.

2 Safety

PLEASE READ AND FOLLOW ALL SAFETY INSTRUCTIONS

DANGER - To avoid possible electric shock, special care should be taken since water is employed in the use of aquarium equipment. For each of the following situations, do not attempt repairs yourself; return the appliance to an authorized service facility for service or discard the appliance.

WARNING: To guard against injury, basic safety precautions should be observed, including the following:

a. Do not operate any appliance if it has a damaged cord or plug, if it is malfunctioning, or if it is dropped or damaged in any manner.
b. To avoid the possibility of the appliance plug or receptacle getting wet, position the aquarium stand and tank to one side of a wall mounted receptacle to prevent water from dripping onto the receptacle or plug. A "drip loop" shown to the right, should be arranged by the user for each cord connecting an aquarium appliance to a receptacle.

The "drip loop" is the part of the cord below the level of the receptacle, or the connector. Use an extension cord, if necessary, to prevent water traveling along the cord and coming into contact with the receptacle. If the plug or receptacle does get wet, DO NOT unplug the cord. Disconnect the fuse or circuit breaker that supplies power to the appliance. Then unplug the device and examine for presence of water in the receptacle.

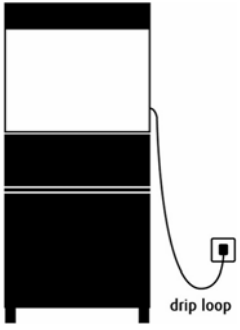


Figure 1: Drip Loop

c. Close supervision is necessary when any appliance is used by or near children.
d. To avoid injury, do not contact moving parts.
e. Always unplug an appliance from an outlet when not in use, before putting on or taking off parts, and before cleaning. Never pull the cord itself to remove the plug from the outlet. Grasp the plug and pull to disconnect.

f. Do not use an appliance for other than intended use. The use of attachments not recommended or sold by the appliance manufacturer may cause an unsafe condition.
g. Do not install or store the appliance where it will be exposed to the weather or to temperatures below freezing.
h. Make sure an appliance mounted on a tank is securely installed before operating it.
i. Read and observe all the important notices on the appliance.
j. If an extension cord is necessary, a cord with a proper rating should be used. A cord rated for less amperes or watts than the appliance rating may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.

3 MAX Setup

The Red Sea MAX aquarium system comprises the following:

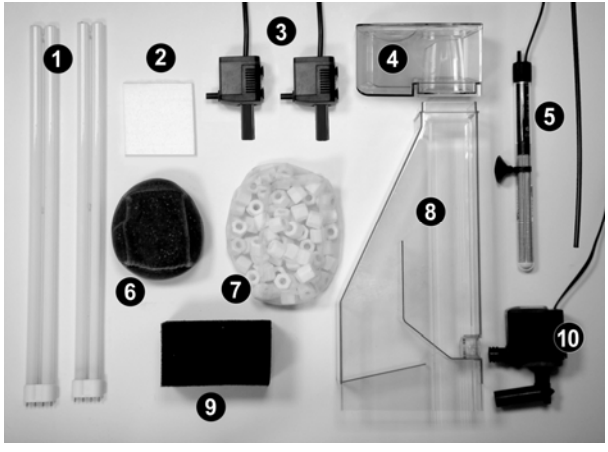


Figure 2: MAX contents

1 Light bulbs
2 Mechanical filter (fine)
3 Circulation pumps x 2
4 Skimmer collection cup
5 Heater
6 Carbon filter
7 Biological filter
8 Protein skimmer
9 Mechanical filter (coarse)
10 Protein skimmer pump

Location

The first step in setting up the aquarium is to choose the location. The location should be decided upon in advance because, **once filled with substrate, rocks and water, the aquarium must not be moved**. Consider the following parameters in choosing the location.

Tank weight and support

The tank weighs about 200 kg (440lbs) once full of water, reef base and live rock. If choosing not to use the Red Sea MAX stand, consider this weight when selecting the aquarium support. If the support you choose is not designed as an aquarium stand, ensure that it can withstand the weight, and that it remains balanced and level. Red Sea MAX, like all glass aquariums, may crack if subjected to sudden movement as a result of uneven water pressure on the glass walls.

Accessibility

In choosing the location, be sure to consider the ability to raise the hood and skimmer collection cup for regular maintenance. Make sure that you can reach the power center switches located at the rear on the right-hand side of the MAX

and that the power center can be removed from its niche. Be certain that the area surrounding the aquarium is waterproof, and consider moving away anything that water might damage.

Room temperature

The site selection may affect proper temperature maintenance. It is recommended to keep ambient temperature within the same range as a healthy tank (24-27°C / 76-83°F) to facilitate proper temperature parameters. Avoid placing the tank in front of an air conditioner, heating vents or direct sunlight. A well ventilated room with moderate light is the best place to position the aquarium.

Unpacking the aquarium

Please read this section carefully before proceeding. Note that the empty aquarium weighs approximately 25kg (55lbs); therefore two people are required to move it.

To unpack the aquarium

1. Remove the protective packaging from around the hood.
2. Remove the hinge pins from either side of the hood opening and set aside.
3. Holding your hand under the hood from the middle of the opening, lift the hood and gently place it aside for later assembly.
4. Remove the light tubes, cardboard box and packaging materials from inside the tank.
5. With one person positioned at either side of the tank, grasp the aquarium's top rim and lift it gently out of the box and **onto a flat surface.**
6. Open the inner cardboard box and remove all of the parts.
7. Read the Pre-Operating Instructions before assembling.

4 Pre-operating instructions

Before installing a new aquarium it is advisable to inspect it for leaks to make sure that no damage has occurred during transport.

1. Fill the tank to the bottom of the inner rim with **fresh** water. Wait for 15 minutes and inspect for any signs of leakage.
2. Siphon the water from the tank to empty it.

NOTE Do not try to move the aquarium with any water inside

Assembly

Biological filter material

1. Rinse the biological filter material in its mesh bag under running water.
2. Slide it all the way to the bottom of the filter media chamber at the back-left corner of the aquarium.

Figure 3: Biological filter material

Carbon filter material

1. Wash the carbon filter material under running water several times to remove residual dust.
2. Slide it into the biological filter chamber, resting it on top of the biological filter material.

Figure 4: Carbon filter

Circulation pumps (x 2)

1. Disassemble and reassemble the pumps, in order to familiarize yourself with their inner parts.
2. Position the first pump in the filter media chamber with the intake pipe pointing down and the pump outlet inline with the outermost hole in the smoked glass wall.

Figure 5: Circulation pump

3. Insert the direction nozzle into the pump outlet through the hole. Ensure that the two components are securely attached so the pump does not move when you wiggle the nozzle.

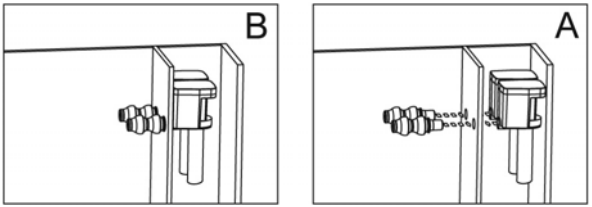


Figure 6: Installing circulation pumps

4. Place the pump's electrical cord in the cord channel that runs the length of the aquarium's back rim, threading it through the outermost cord channel at the other end of the aquarium and out through the cord access hole.
5. Repeat steps 1-4 for the second pump, attaching it to the other nozzle through the remaining hole in the smoked glass wall, and threading the cord through the middle cord channel at the other end of the tank.

Heater

1. Inspect the heater for damage or cracks.
2. Set the thermostat to approximately 26°C (79°F).
3. Insert the heater into the small heater chamber, which is adjacent to the filter media chamber.

Figure 7: Heater

4. Attach the heater securely to the wall using the suction cup provided.
5. Thread the heater cord through the channel to the other end of the tank, threading it through the innermost of the three channels at the other end and out through the cord access hole.

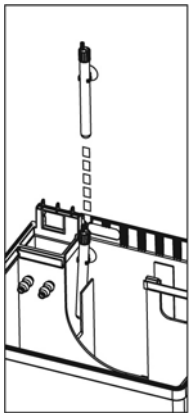


Figure 8: Threading the heater cord

Cable channel covers

With the three cables from the circulation pumps and heater held in the cable channel, snap the left cable channel cover first and then the right cable channel cover into position.

Protein skimmer

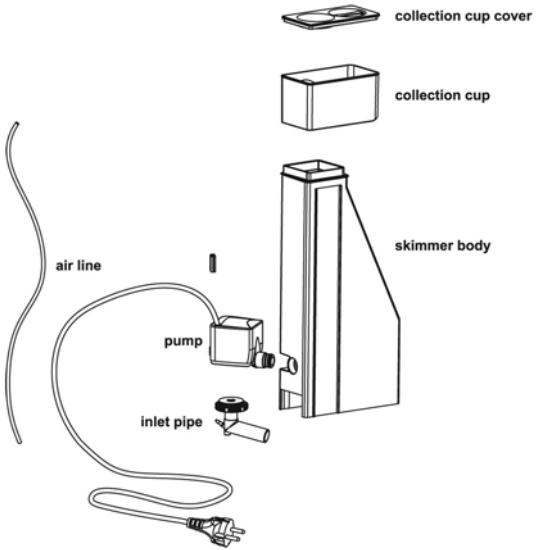


Figure 9: Protein skimmer parts

1. Disassemble the skimmer pump and inspect the components (impeller, impeller housing, inlet pipe, bayonet connector, flow valve and air pipe).
2. Reassemble the pump, ensuring that the pieces are securely attached, and that the inlet and outlet are parallel.
3. Ensure that the double connectors are holding the cord and air hose together.
4. Insert the outlet of the pump into the inlet hole in the side of the skimmer body (wetting the O–ring will make it easier to perform this operation). Make sure that the pump is pushed in fully.
5. Hold the assembled skimmer above the skimmer chamber with the pump side towards the power center.

   Notice the ribs on the front and back of the skimmer.

Figure 10: Skimmer assembled

6. Holding the pump air hose and power cord up out of the tank, slide the skimmer assembly into the skimmer chamber with the wide end down, lining up the skimmer ribs with the vertical glass strips in the chamber. Bring the skimmer to rest with the top of the skimmer in line with the top of the aquarium frame. Make sure that there is no pressure being put on the air line.
7. Thread the pump cord and hose through the cord access hole, leaving the flow valve above the skimmer chamber.

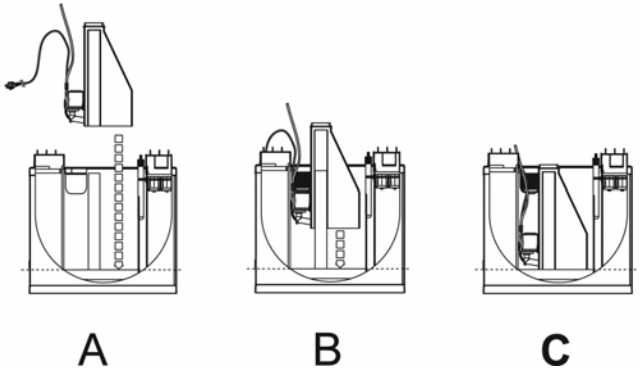


Figure 11: Inserting protein skimmer

8. The collection cup should be placed in position after the hood has been attached (see below).

Mechanical filtration material

1. Slide the coarse black foam vertically into the skimmer chamber, bringing it to rest on top of the skimmer pump.
2. Place the fine white pad on top of the black foam in the chamber, whilst ensuring that no pressure is put on the air line.

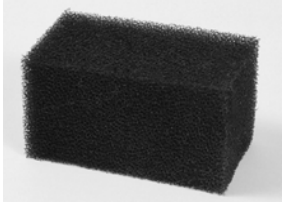


Figure 12: Mechanical filtration material

Filter comb and shutter

1. Slide the filter comb into position in the hole at the top of the tank's back wall.

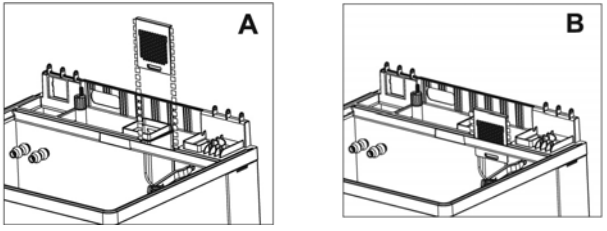
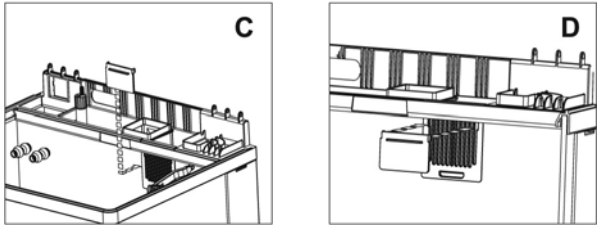


Figure 13: Inserting filter comb

2. Attach the filter shutter to the ribs in the filter comb and push it down to its lowest position.



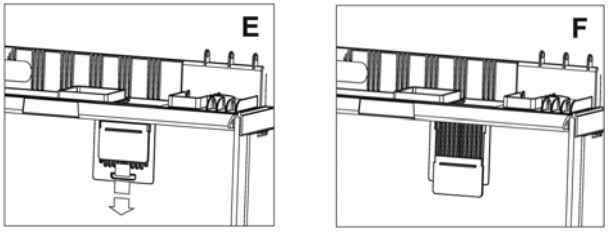


Figure 14: Attaching and positioning filter shutter

Light tubes

NOTE Only use Red Sea Max lighting tubes. The hood is designed for the special T5 tubes, which are smaller than the regular T6 power compacts (biax).

1. Using the protective packaging as a cushion, place the hood upside down on a level surface.
2. Remove the 8 plastic screws from the light's transparent lens.

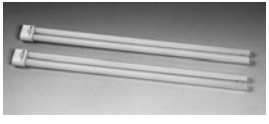


Figure 15: Light tubes

3. Remove the lens and place in on a smooth surface to prevent scratches.
4. Place the lighting tubes in position by first inserting the electrical connectors into their sockets and then pushing the tubes into the metal clips. A small amount of force may be required to push the tube through the opening in the hood.

Figure 16: Inserting bulb

5. Replace the cover securely, ensuring that the gasket around its inner edge is properly positioned.
6. Replace the 8 screws. You are now ready to place the hood on the aquarium.

NOTE After initial assembly, replacing the light tubes can be performed with the hood attached to the aquarium.

To attach the hood

1. Thread the hood's electrical cord through the cord access hole in the top of the tank.
2. Place the hood on top of the tank, lining up the cutout in the hood with the protein skimmer chamber of the tank.
3. Make sure that the hood fits securely around the rim of the tank; it may be necessary to adjust the position of the hood supports to do this.
4. Place the lighting control cover onto the hood.


Figure 17: Positioning lighting control cover

5. Hold the skimmer cover in the "open" position over the skimmer chamber, lining up its hinges with those of the hood.

Figure 18: Positioning skimmer hood

6. Insert the hood pins that you removed for unpacking, attaching both the skimmer cover and the lighting control cover to the hood. The covers should open and close easily with the pins securing the hinge.


Figure 19: Attaching the skimmer hood

To secure the hood supports

1. Fold back the front of the hood.
2. With one hand, lift the open hood and support it.
3. With your free hand, straighten the hood supports on either side of the hood and insert the support pins to connect the supports to the hood as shown (some force will be required). Do not use any tools (pliers or hammer) to perform this operation. If you have difficulty, check the alignment of the pins with the hole and try again.

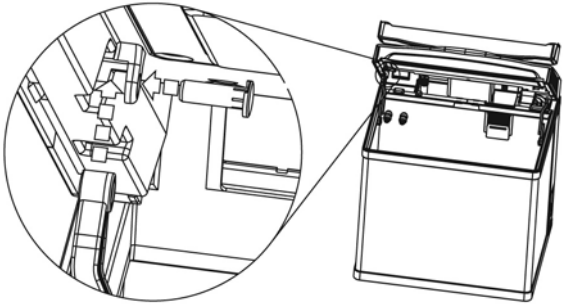


Figure 20: Securing the hood supports

4. To lower the open hood, bend the supports out towards the front of the aquarium.

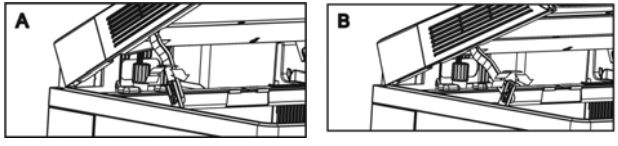


Figure 21: Lowering the hood

NOTE To disassemble the hood from the aquarium, remove the hood support pins by inserting the end of a small screwdriver into the small recess in the head of the pin. Thereafter, remove the hood pins from the hood hinges at the back.

Skimmer collection cup

Figure 22: Skimmer collection cup

1. Assemble the collection cup with its lid.
2. Open the skimmer chamber cover in the hood.
3. Line up the hole in the cup bottom with the top of the skimmer.
4. Attach the collection cup to the skimmer, with the cup protruding in the direction of the filter media chamber.

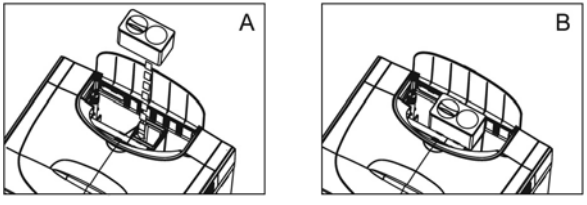


Figure 23: Attaching the skimmer collection cup

Power center

Figure 24: Power center

1. **Ensure that your hands are dry.**
2. Remove the power center splash cover by sliding it away from the power cord and lifting. Familiarize yourself with how the splash cover locks in position.

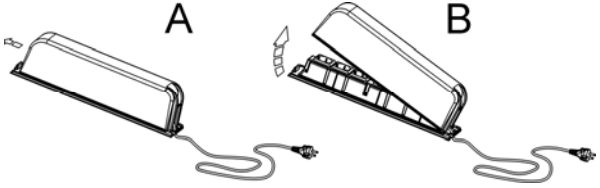


Figure 25: Removing the splash cover

3. Connect the cables from the various components to the power center in the following order, placing the plugs in the matching sockets:
4. Connect the circulation pumps in the two sockets #4 and #5.
5. Connect the heater plug in socket #3.
6. Connect the skimmer plug in socket #2.
7. Connect the hood cord in socket #1.
8. Gather the component cables together and replace the splash cover.

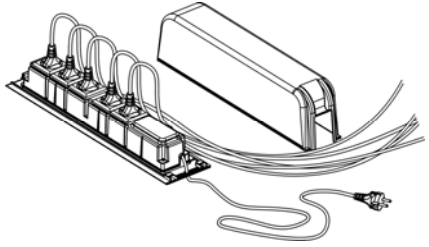


Figure 26: Replacing the splash cover

9. Insert the power center, narrow side in and **component power cords down**, into the niche in the back right corner of the aquarium. Use the lip at the bottom of the niche to position the box properly.

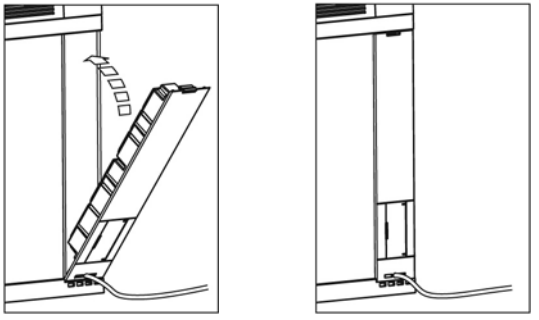


Figure 27: Inserting power center

10. Open the control panel on the outside of the power center and make sure all the switches are set to OFF ("O" pressed down and the "I" up).

Figure 28: Control panel

Operating the lighting hood

Open the lighting control panel. You will see a timer and a switch, that control the main T5 daylights and the LED moonlights respectively.

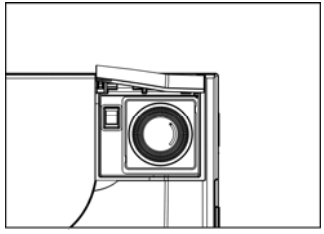


Figure 29: Timer and switch

The timer has a protective transparent splash cover to protect the system from water damage. **Always dry your hands before removing the splash cover.** Make sure that it is always replaced after adjusting the timer.

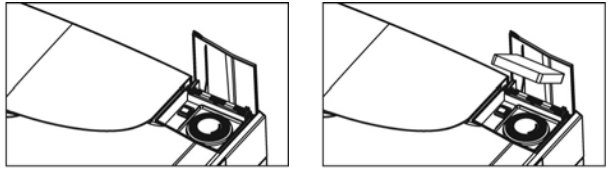


Figure 30: Removing the splash cover

The timer has a 3-position switch:

- I (ON position) – Daylights on, moonlights off
- O (OFF position – Daylights off, moonlights on
- Clock symbol – Automatically changes between the "I" and "O" settings according to the preset of the timer.

The switch turns off the moonlights in the event that you do not want them on automatically when the daylights are off.

Setting the timer

Each black segment switch around the face of the timer represents ¼ of an hour. Move the segment switches to the outer position for the time you want the daylights to be on and to the inner position for the time you want the daylights to be off.

Once you have the MAX fully operational and switched on, you can set the actual time by rotating the dial until the arrow is opposite the current time.

To test that the hood is functioning correctly carry out the following procedure:

1. Plug the Red Sea MAX power center cord into the wall socket and switch on the uppermost switch, which will turn on the hood.
2. Set the timer's three-position switch to the ON position ("I"). The daylights and the cooling fan will turn on. The moonlights will be off.
3. Set the moonlight switch to the ON position ("I") and move the timer's three-position switch to the OFF position ("O"). The daylights and the cooling fan will turn off. The moonlights will be on. Toggling the moonlight will switch them on and off.
4. **Make sure all switches are set to OFF.** Disconnect the MAX from the power.

Congratulations, you have completed the assembly of your MAX and can now move it to its chosen location. You are now ready to set up your reef tank.

Preparing the saltwater

Seawater naturally contains all of the elements necessary for marine life. Although collecting saltwater directly from the ocean has its appeal, it also has drawbacks such as pollution, pathogens and algae, and therefore it is recommended to use synthetic seawater.

Synthetic salt mixes are available for use with pure fresh water, containing all the necessary minerals in the right proportions. Please follow these guidelines for preparing saltwater.

Salinity and specific gravity

Salinity is a measure of the total amount of dissolved minerals and salt in the water, expressed in parts per thousand (ppt, 0/00) or grams per liter. The average salinity of ocean water is about 35 ppt. **Specific gravity** (SG) is defined as the ratio of the density of the liquid in question to the density of pure water. Since the density of a liquid varies with temperature, so does specific gravity. The specific gravity of seawater at 35 ppt and 25°C (77°F) is 1.026. The desired range for a marine aquarium is 1.022 to 1.028. Use a hydrometer to estimate the salinity and specific gravity in marine systems.

The freshwater source

Although municipal tap water is readily available, you should avoid using it in your reef aquarium. Tap water is not pure, and contains elements detrimental to the aquarium inhabitants, such as chlorine, fluoride and metals. It also contains nitrates, phosphates and silicate, the major nutrients for noxious algae bloom. **We strongly recommend reverse osmosis (RO) or distilled water**. If you must use tap water, treat it with conditioners to eliminate heavy metals, chlorine and chloramines.

Red Sea Coral Pro

The **Red Sea MAX Starter Kit** provides you with **Red Sea Coral Pro** salt. It was formulated specifically for reef aquariums, based on natural salt harvested through solar evaporation of water from the Red Sea. It is enriched with other refined minerals to replicate natural seawater, but with higher calcium levels (450ppm), balanced alkalinity and pH to benefit your corals. This salt is designed specifically for reverse osmosis (RO) water and should not be used with tap water.

Mixing the salt

The **only** time you can mix the saltwater in the tank is during setup, when the tank is empty. You must never pour a synthetic sea salt mix directly into an aquarium with animals.

When preparing seawater for water changes use another inert container, such as a plastic bucket.

HINT When mixing saltwater, **always add the water first** and then the salt, to avoid the formation of insoluble precipitates.

To mix the salt

1. Fill the aquarium with RO water until both the aquarium and filtration chamber are full.
2. **Make sure your hands are dry**.
3. Connect the MAX to the power supply.
4. Turn the lights on.
5. Direct the two pump nozzles down.
6. Activate the two circulation pumps and the skimmer pump.
7. Switch on the heater if the water temperature is below 24°C (75°F).
8. Add 4.5kg (9.9lbs) of Red Sea Coral Pro salt to achieve a salinity of 35 ppt.
9. Wait 20-30 minutes. The pump action should help the salt dissolve completely.
10. Measure the salinity with a hydrometer, following the hydrometer instructions.
11. Add water or salt as necessary to achieve desired salinity.

HINT The warmer the water, the faster the salt will dissolve.

Preparing the substrate

You can set up your reef tank with or without substrate at the bottom. We recommend an aragonite substrate base of at least 5 cm (2”) which will help in maintaining a healthy reef. In an established tank, when the substrate matures, it takes on the characteristics of "live sand" in that millions of microorganisms populate it. These creatures promote a successful aquarium, helping with the biological filtration processes of nitrification, denitrification and the consumption/decomposition of uneaten food. The substrate also provides a natural habitat for small worms and crustaceans that help clean the tank from detritus and play a major role in the delicate ecosystem's food chain.

Aragonite-based substrate helps keep the water chemistry balanced. As it dissolves slowly in water, it releases calcium ions and carbonates that help maintain proper pH and alkalinity for good coral growth.

For optimal substrate effect, add a 5-7 cm (2-2.7") layer of substrate, such as **Red Sea Reef Base.**

HINT The deeper the layer, the greater the benefits of the denitrification – up to 10 cm (4").

Red Sea Reef Base provides an ideal substrate for all marine fish and invertebrate aquariums. It consists of natural reef sand spheres mixed with coral chips, both made of aragonite. The spheres are highly porous, calcareous shells of simple protozoa (foraminifiers), which provide excellent media for both aerobic (nitrifying) and anaerobic (denitrifying) biological filtration. This natural source of aragonite provides high buffer capacity over extended periods to maintain stable pH and alkalinity.

Washing the substrate

Although Red Sea Reef Base has already been washed prior to shipping, we recommend repeating the process before use.

1. Rinse the substrate thoroughly under running water.
2. Spread it evenly on the tank bottom.
3. Note the change in water level as a result; remove excess water and store it for later use.

Live Rock

Live rocks are small pieces of stony reef rubble naturally broken off from their source. The main advantage of these porous, aragonite-based rocks lies in their colonization by large amounts of beneficial bacteria and other microorganisms, including nitrifying and denitrifying bacteria, macro-algae, sponges, worms and other invertebrates. These organisms help maintain adequate water parameters and establish the natural food chains. Live rock also has great aesthetic appeal.

As a rule, you should add 1 kg (2.2lbs) of live rock per 10 liters (2.6 gallons) of tank volume. The exact amount will vary with

the type of rock you choose, but it should occupy at least forty percent of the tank volume.

Your rock's viability when you receive it depends on several factors: harvesting, shipping and pre-purchase maintenance. Unfortunately, much of the live rock available to hobbyists requires a curing process to rid it of the organisms that died during shipping and to reseed it with living beneficial ones. Signs of whitish-gray film on newly purchased rocks indicate that the live organisms have died and must be cured or cycled. **Your live rock must be fully cured before you can add any fish or invertebrates to the aquarium.** We therefore highly recommend purchasing your live rock from a reputable dealer, or to perform the cycle process yourself inside MAX.

If you have purchased cured live rocks, or live rocks from a mature aquarium, you can skip this section.

Cycle

The curing process, which initiates the biological processes, such as the nitrogen cycle and the recolonization of microorganisms, typically takes 1-4 weeks depending on the type of rock and the method used. Although many organisms die during transport, much of the fauna does survive. During the cycling period the ammonia levels rise rapidly as bacteria process the dead organisms. The elevated ammonia levels can cause even more organisms to die, which produces even more ammonia. The populations of nitrifying and denitrifying bacteria grow accordingly, eventually processing all the ammonia and nitrite, reducing them to undetectable levels.

To initiate and boost the seeding of nitrifying and denitrifying bacteria in the bio-filter media and live rocks, the **Red Sea MAX Starter Kit** (optional purchase) includes **Red Sea NitroBac**. This specially designed formula contains a concentrated blend of nitrifying bacteria that quickly and effectively stabilize the nitrification process. **You can add it directly to the aquarium during the initial setup and add 50 ml every week during the cycle period.**

To cure the live rocks

1. Wash all the rocks with **saltwater** and remove any grayish or slimy areas, which harbor decaying microorganisms. This will help minimize ammonia levels.
2. Remove any signs of algae.
3. Place the live rock in the tank. Ensure that only small areas are in contact with the tank bottom or other rocks. Try to build as many caves as possible such that the larger rocks sit on the bottom and the smaller ones on top. **It is important to build a stable structure that provides the rock with good water circulation. Do not block the pump outlets or filtration chamber opening.**

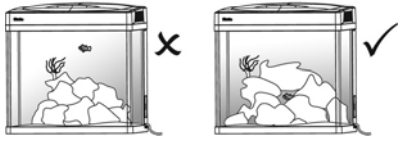


Figure 31: Water circulation

4. Direct the pump nozzles to produce good water movement throughout the tank.
5. Add 50 ml (1.7 oz) of Red Sea NitroBac.
6. Program the lighting system, starting with a 6-hour period of light on the first day.
7. Gradually increase this interval by 1 hour every two days until it reaches 12-14 hours per day.
8. Test the water parameters, especially ammonia and nitrite.
9. Change 10-25% of the water weekly, siphoning out any settled debris.
10. Start a regular maintenance program (see next chapter).

Algae blooms

During the cycle process, you can expect a series of algae blooms. First the brown diatom algae will appear, followed by red cyanobacteria and then green filamentous algae. These algae blooms constitute a natural and typical part of the cycle in reef tanks. They will disappear naturally, giving way to patches of desirable purple-pink coralline algae on the live rocks.

To control this algae bloom, introduce some "cleaning" herbivores to the new aquarium. These "janitors" play an important long-term role, keeping your aquarium in good condition. They help control algae, remove detritus, eliminate the occasional small dead fish trapped in the rockwork and scavenge for scraps of food that fall to the bottom or between rocks. They play an especially important role if your tank has substrate, keeping it clean and aerated. We recommend the following species:

- Brittlestar starfish
- Pistol shrimp
- Detrital feeding sea cucumbers

Additionally, we recommend introducing herbivorous snails, such as *Asraea tuncta*, or Turban snail. The blue-legged hermit crab, *Clibanarius tricolor*, plays a similar role, as does the attractive skunk cleaner shrimp, *Lysmata grabhami*.

When the ammonia and nitrite levels have peaked and subsequently reach zero, you have finished the cycle.

Stocking the tank

After the Red Sea MAX has finished the cycle and the algae blooms are under control, your aquarium is ready for fish and invertebrates. Here are some guidelines to help you stock a healthy and successful aquarium:

- **Compatibility of species**: Before adding any fish or invertebrates, familiarize yourself with any compatibility issues among your desired species. Tank inhabitant compatibility is crucial to a successful and healthy reef aquarium. Incompatible species will increase stress in the fish, increasing the risk of disease and considerable loss.

- **Stocking rate**: Stock your aquarium gradually to allow the biological filtration to catch up to the new inhabitants.
- **Introducing species**: Introduce the more docile species first. This allows them to acclimate themselves to the aquarium before you add larger, more active and aggressive species.

Stocking fish and invertebrates

Once you have selected the species, you must determine how many fish you can successfully keep in MAX. While that depends on many factors, in general, you should stock no more than 1 cm (0.4") of fully grown fish per 4 liters (1 gallon) of free water volume. We recommend that you stock no more than 35 cm (14") of fully grown fish. Remember to consider the desired species' maximum sizes when calculating this figure.

Invertebrates

Among the many species of invertebrates available to the hobbyist, you will find many differences in the natural habitats of these creatures that dictate the physical conditions required for them to flourish, such as light and current. Corals adapt well to different lighting conditions, but some are more sensitive to change than others. Corals take time to adjust to new environments, and you can help this process along.

If your corals come from a mature reef aquarium:

- Try to place them such that their new environment duplicates the original lighting and currents as closely as possible. You will know that the coral has adjusted when it expands fully and displays full coloration.
- Continue to monitor the coral's adjustment to its new location. If it appears to shrink and decrease its coloration, relocate it to another position.

Acclimation

The water that holds the fish and invertebrates during packaging has a different pH, temperature and salinity from those of your aquarium. Fish, and especially invertebrates, react easily to even minor changes in these parameters, so proper acclimation is the key to their successful relocation.

To acclimatize your tank

1. Place the fish/coral/invertebrate, with all of the water from its bag, into a bucket. Set the bucket on the floor next to MAX.
2. With some air line tubing and a flow valve, run a siphon drip line from MAX to the bucket.
3. Start a siphon and slowly allow the tank water to drip into the bucket, using the valve to adjust the drip rate. Keep the drip fairly slow; too fast a drip can change the parameters too quickly and shock the creatures.

4. When the volume of water that has dripped into the bucket has reached twice the original bag water quantity, test the pH, salinity and temperature of the water in the bucket. If they match the tank's parameters, you can transfer all the livestock to the aquarium. If not, continue with the drip method until the parameters match. Be sure to remove water from the bucket, if necessary, to prevent overflow.

The stocked aquarium

The above steps should simplify and demystify the setup and stocking processes for a reef aquarium. Remember to research the needs of your desired fish and invertebrates to guarantee that at the outset you have the time, energy and resources to invest in their care. Be sure to resist the temptation to add all the inhabitants at once. By stocking your aquarium slowly, you greatly increase the inhabitants' chances of survival and your chances of long-term success. With proper setup, diligent patience and care, your Red Sea MAX aquarium and its inhabitants will thrive, providing you with a beautiful, fascinating ocean setting in your home.

5 Caring for the reef

The long-term success and health of the inhabitants of your MAX aquarium depends on you.

Proper planning makes reef care easier to manage, and quicker to perform. This will leave you more time for the real goal: enjoying your aquarium. Care of the tank should follow a logical, regular pattern. Divide the tasks into daily, weekly and monthly procedures, including equipment checks, feeding, water parameter testing and adjustments. You may find it helpful to make a systematic checklist of care activities, and to keep a log of the activities performed.

Your log does not need to be complicated. You will need to track the following:

- The tank's parameters – pH, salinity, temperature, etc.
- Information specific to each animal – when you added them, their approximate size, date of death (it happens in the most successful aquariums) and possible cause, etc.
- The general appearance of the tank and individual species.
- Equipment changes – when you changed bulbs or replaced heaters, etc.

By tracking this information you can head off problems before they become insurmountable.

Daily reef care procedures

Check the appearance of your fish and corals.

Fish

Check the fishes' behavior. Look for signs of aggression (bites or injuries), diseases or missing inhabitants (the prompt removal of carcasses is crucial). If you spot any signs of illness, treat the affected fish in a quarantine tank; most treatments are highly toxic to marine invertebrates.

Corals

Check the polyp expansions, looking for signs of stress, such as closed polyps (i.e. for long periods), fading colors or loose

tissue. If necessary, relocate the stressed coral to an area with more adequate light and current. If all the corals show signs of stress, it most likely results from water parameters, particularly pH or salinity.

Water color and turbidity

The aquarium water should be clear. Several factors may account for turbid water:

- **White or milky water** unrelated to calcium/buffer additives can result from ammonia buildup. This occurs through decomposing organic matter or rotting carcasses. In such a case, the water will also emit an unpleasant odor. If this occurs, you should:
  1. Test the ammonia level and pH.
  2. Change up to 50% of the water volume.
  3. Look for dead animals.
  4. Replace any carbon filter in use for more than 2 months.
- **Yellow water**: This usually indicates that the carbon needs replacing. The yellow color results from the buildup of humic acids from decomposed algae and other substances.
- **Green water**: This indicates an algae outbreak; it rarely occurs in marine aquariums.
- **Milky water from air bubbles**: This usually indicates faulty pump action. Check the water level near the pumps and look for signs of clogging.

Circulation

Maintain adequate water circulation by checking that both circulation pumps are working well and are pointed in the right directions. If you notice any regression in currents, check the inlet pipes at the bottom of each pump and the outlet nozzles for any obstructions (snails, crabs, carbon chips, etc.). To do so, follow this procedure:

1. Turn the pumps off at the power center.
2. Lift the hood and secure the supports.
3. Remove the left cable channel cover.
4. Remove the outlet nozzles from the pumps and examine each one for blockage.
5. Remove the pumps from the filter chamber.
6. Examine the inlet pipes and the impeller chamber.
7. Return the pumps to their original positions and secure the nozzles back in place.
8. Turn the pumps on at the power center.

Protein skimmer functioning

Check the skimmer neck and gauge the foam production; adjust the air flow valve as required to get a stable dry foam. **Proper skimmer functioning should number among your chief reef care concerns.** Therefore, cultivate the practice of emptying the collection cup daily. The chamber should have a constant movement of air bubbles throughout. If the water in the chamber becomes clear and the skimmed material

production decreases over time (i.e. more than a week with regular feeding), first check the setting of the air valve flow and then check the skimmer pump and air line intake for clogging:

1. Turn off the skimmer pump at the power center.
2. Open the skimmer cover.
3. Disconnect the collection cup from the skimmer body.
4. Remove the mechanical filter materials on top of the pump.
5. Slowly lift the skimmer body, removing it from the chamber.
6. Gently pull the pump off the skimmer body and return the skimmer to the chamber.
7. Open the impeller housing and check for calcium buildup, damage to the impeller or the presence of foreign objects.
8. To clean the air line and air intake nipple, submerge the inlet assembly with its air line in a bucket of hot water.
9. Clean the parts and reassemble the pump.
10. Reconnect the pump to the skimmer and slide the skimmer back into the chamber as before. Keep the air line out of the water.
11. Turn on the skimmer at the power center.
12. Gauge the air suction and the water/air mixture. If it still seems inadequate, check again for blockage and repeat steps 1-11.
13. Clean the collection cup and reconnect it to the skimmer.
14. Replace the filters atop the pump, keeping the air line out.
15. Close the skimmer cover.

Water level

Estimate the evaporation rate. **Avoid water level drops of more than 3 cm (1.2")**: this much evaporation dramatically raises salinity. Use RO water to replenish the evaporated water and test with a hydrometer.

Water temperature control

Monitor the temperature at least twice/day, looking for dramatic fluctuations. Avoid temperature differences of more than 2°C during the day. During season changes and when heating or cooling the house, monitor the tank temperature more frequently, adjusting the heater as necessary. Red Sea MAX's climate control system works best to keep the water temperature at 24-27°C (76-83°F) in a room of a stable 24°C (76°F) or cooler.

If the water temperature falls below 24°C (76°F)

1. Lift the skimmer cover and gently lift the heater enough to see its operation light.
2. Turn the thermostat control knob to raise the temperature by 2°.
3. One hour later, test the temperature again. **Never change the temperature by more than 2° at a time.**

If the water temperature rises above 28°C (82°F) for more than a day

1. Consider the use of a chiller accessory. A 1/10 HP chiller will suffice for the MAX's volume.
2. To set up the chiller pump, remove the cover from the chiller opening in the top frame (it is located above the heater / chiller section of the filter chamber).
3. Position the chiller pump in the triangle-shaped niche formed by the skimmer and the heater chamber wall.
4. Pull out the inlet/outlet pipes through the opening in the back of the frame.
5. Position the return pipe from the chiller directly into the heater chamber.

Surface film buildup

Look for any accumulation of surface bio-film. This occurs naturally when light organic compounds, such as fatty acids and insoluble proteins, concentrate on the surface. The Red Sea MAX filtration system continues to work even if the water level drops 5 cm (2"). To ensure proper surface skimming, adjust the level of the shutter attached to the filter comb:

1. Lift the hood and secure the supports.
2. Adjust the shutter level 2 cm (0.8") below the surface of the water will suffice for efficient surface skimming.
3. Check the water level in the circulation pump chamber.
4. After one hour, lower the shutter to its bottom position.
5. **Do not leave the shutter in a raised position without supervision as this could cause the water level in the filter to drop and cease filtration.**

Algae blooms

Look for any signs of algae blooms – green filamentous, cyanobacteria or diatoms. Both desirable and undesirable algae will thrive in your tank, which provides the perfect environment: water, light, nitrogen and phosphates. Algae control techniques range from preventive to biological, mechanical, physical and chemical.

Different algae serve different functions. At the basic level, they serve as biological indicators, giving you signs of overall system health. The algae in the system generally include:

Diatoms

These ubiquitous, single-celled algae prove mostly beneficial in nutrient cycling, out-competing undesirable organisms. They appear at the first stages of the cycle period, as described in the previous chapter. Though they may appear as a brownish film on tank walls, live rocks and gravel, diatoms rarely cause problems in marine aquariums. They proliferate under high silicate conditions; these algae consume the silicate, bringing its level down.

Blue-green, cyanobacteria

These organisms actually appear dark red to the naked eye. Closely related to bacteria, these algae often constitute the scum on polluted, poorly aerated or circulated, over-fertilized waters. These algae feel slimy to the touch. The presence of the clusters, threads and chains of these organisms indicates a circulation or filtration problem in marine aquariums.

Green filamentous

These hairy, dark green algae spread throughout the tank, especially on live rock where coralline algae do not proliferate well. Hair algae can easily overgrow other specimens in the aquarium, including coral. To control their population, introduce herbivores. Small tangs and many species of sea urchins perform this function well. Astrea snails and blue-leg hermit crabs also help.

Algae prevention

Chemical activity

Algae thrive in nutrient-rich water. Initially, provide as little phosphate and nitrate for them as possible.

Circulation

Most micro-algae do better under stagnant conditions. Keep the water moving and monitor your pump's performance.

Filtration

Protein skimmers reign supreme in preventing micro-algae; they expediently remove organics that might otherwise fuel algae growth. Monitor your skimmer performance regularly and keep it clean.

Macro-algae

These organisms help to control micro-algae. They cut down on the light that the micro-algae need and use some of the nutrients otherwise available for undesirable forms. The fast-growing caulerpa and encrusting corallines (a group of red algae resembling coral) are best.

Pollutants

Do not overfeed. Perform frequent, partial water changes to dilute nutrients.

Biological controls

Turbo and astrea snails, and herbivorous fish such as blennies, graze on the algae. Snails tend to be both popular and effective scavengers for this purpose.

Feeding

As you might expect, the feeding and nutrition of marine life forms is one of the most important factors in keeping healthy

aquarium inhabitants. Fish comprise an extremely diverse group, especially when it comes to diet.

Obviously, no single food will meet the dietary needs of all aquatic species at all life stages. Many attractive species, such as butterfly fish and mandarins, rarely populate aquariums, as they have special dietary requirements that they can only meet in their natural environments.

Many fish have adapted to certain types of feeding. Knowledge of these idiosyncrasies will enable the home aquarist to properly select food for the fish.

Feeding time offers the best opportunity to assess your fishes' condition. You should look for:

- Fish that do not approach the food.
- Fish that cannot swallow or bite the food. If you spot this second group, consider changing the size of the pieces you offer.

Frequency

Feed frequently in small quantities; never let excess food accumulate and rot. This beneficial method of "underfeeding" mirrors the situation these species encounter in the wild.

Food

Red Sea MAX includes **Red Sea MarineGro** fish food. This granular fish food provides all the nutrients for your ornamental marine fish, enhancing their coloration and immune system. The unique dispenser lid offers convenient, hygienic and measured delivery to avoid overfeeding.

Although **MarineGro** provides a complete diet for most marine fish, you should provide other sources of food and nutrition for the herbivores and carnivores in your aquarium:

Frozen foods

Available in myriad types, sizes and formats, these specimens prove more palatable to some stock, and often cost much less than "fresh" food. Processed properly, these products provide the same nutrition as fresh food. They tend to come in cubes, packs of single species (brine shrimp, krill) or blends.

Green foods

Dried, flaked, pellets or frozen – certain herbivores prefer these. Macro-algae are a natural source for these (such algae as ulva, caulerpa or spirolina). You might also try steamed okra, zucchini and similar greens, although in the long run they contribute to oxalic acid buildup. Lettuce and other leafy greens serve well as filler, but offer insignificant nutritional benefit.

Weekly reef care

Water quality parameters

To achieve and maintain a successful reef aquarium, you must control the physical and chemical limits of the reef environment. The start of this manual discussed the physical requirements and how Red Sea MAX makes it easy for you to maintain them.

This section covers the desired water parameters as described in the chart below. Following the cycle period, when the system has run for several months, many users routinely skip ammonia and nitrite checks, but you must check the following parameters regularly:

Nitrate levels

Check nitrate levels at least as often as you change the water.

pH and Alkalinity

Check pH and alkalinity weekly, especially if you use calcium additives regularly. If pH drops, take corrective action by reducing feeds, adding buffer supplements and increasing water changes.

Salinity

Check salinity/specific gravity weekly.

These recommendations follow years of aquarist experience, but you may get slightly different figures from other experts. To clarify the basis for each recommendation, a brief description of each parameter's importance follows the table.

Parameter	Recommended for MAX	Ocean
Salinity	35 ppt; sg = 1.026	Variable
Temperature	24-29°C (77-84°F) for marine 24-27°C (77-80°F) for reef	Variable
pH	7.8-8.5 for marine 8.2-8.4 for reef	8.0-8.3
Alkalinity	2.5-4.5 meq./L 7-15 dKH	2.5 meq/L 7 dKH
Calcium	380-450 ppm	420 ppm
Magnesium	1250-1350 ppm	1280 ppm
Phosphate	< 0.03 ppm	0.005 ppm
Ammonia	< 0.1 ppm	Variable (typically < 0.1 ppm)
Nitrite	< 0.2 ppm typically	Variable (typically < 0.0001 ppm)
Nitrate	< 10 ppm	Variable (typically < 0.1 ppm)
Silica	< 2 ppm	< 0.06 – 2.7 ppm
Strontium	5-15 ppm	8 ppm
Iron	0.1-0.2 ppm	0.000006 ppm
Iodine	Control not recommended	0.06 ppm total of all forms

The first chapter discussed water temperature and salinity. To monitor the other parameters, the **Red Sea MAX Starter Kit** provides you with the **Red Sea Marine Lab**, consisting of test kits for:

- Ammonia
- Nitrite
- Nitrate
- pH
- Alkalinity
- Calcium Pro

Red Sea also offers test kits for phosphate, silicate and magnesium. Contact your local fish store for details.

pH

Several factors contribute to the importance of monitoring your marine aquarium's pH level. Chief among them is that aquatic organisms thrive only within a certain range that varies from organism to organism. Changes in pH affect fundamental processes in many marine organisms, such as calcification, or the deposition of calcium carbonate skeletons.

pH levels should remain in the 8.2-8.4 range for a reef aquarium.

pH may drop during daylight for several reasons:

- Excessive CO_2
- Alkalinity decreases
- Excessive nitrification
- Organic matter buildup

If you detect other indications of organic matter buildup, consider reducing the food quantity and partially changing the water.

Alkalinity

Alkalinity means the amount of acid required to lower the pH, as well as indicates the store of bicarbonate (HCO_3) and carbonate (CO_3) in the water.

Corals absorb bicarbonate, convert it to carbonate, and then combine the carbonate with calcium to form calcium carbonate skeletons. The prevailing wisdom among marine biologists favors the notion that certain organisms calcify more quickly at higher alkalinity than naturally occurs in seawater. Bicarbonate intake thus becomes a limiting factor in the calcification rate among many corals. This stems partially from the fact that both photosynthesis and calcification compete for bicarbonate, and the bicarbonate concentration starts out low. For these reasons, coral reef husbandry requires close attention to alkalinity. Without supplementation, alkalinity levels will drop as corals consume the bicarbonate. **You should maintain alkalinity in the 2.4-4.5 meq/L (7-15 dKH) range**. Higher levels, although they do not adversely affect the coral, do increase the likelihood of decreased calcium concentration.

For boosting alkalinity, use **Red Sea Success Buff**. Its unique formula of carbonate and bicarbonate effectively increases alkalinity to the desired levels.

Calcium

As mentioned above, corals primarily use calcium carbonate to form their skeletons. Most of the calcium comes from the surrounding water. Consequently, aquariums with growing coral, calcareous red algae, tridacnids and halimeda become rapidly depleted of calcium. Once the calcium level drops below 360 ppm, corals can no longer absorb enough of it, and they stop growing. Therefore, **keep the calcium level at 380-450 ppm**. Higher levels, although they do not adversely affect the coral, do increase the likelihood of decreased alkalinity.

Always monitor alkalinity when adding calcium. For optimum balance, use **Red Sea Success Calcium** and **Red Sea Success Buff** together.

For long-term calcium management, use a product such as **Red Sea Success Calk**. As a result of continuous research into hard coral growth, Red Sea developed this superior alternative to kalkwasser, calcium reactors and calcium chloride supplements. Success Calk safely and simply replenishes the calcium and carbonate as the corals remove them from the water. To determine proper dosage for these treatments, monitor the calcium and alkalinity using test kits.

Magnesium

Magnesium's primary importance lies in its effect on the alkalinity/calcium balance in reef aquariums. Some corals and coralline algae deplete magnesium by absorbing it into their growing skeletons.

Seawater and reef aquarium water ideally have calcium carbonate at super-saturation levels. This naturally causes calcium to precipitate out of solution, forming crystals. Magnesium binds to these crystals, effectively blocking their surface and preventing further growth that would otherwise pull more calcium out of the solution. This helps keep calcium and alkalinity at natural levels.

You should maintain magnesium levels of 1200-1400 ppm. We recommend using **Red Sea SUCCESS Magnesium** supplement to bring the concentration up to par.

Phosphate

Inorganic orthophosphate occurs in aquariums in several chemical forms (H_3PO_4, $H_2PO_4^-$, HPO_4^{-2}, and PO_4^{-3}). Most test kits measure this form of phosphate; it will typically accumulate in reef aquariums. These phosphates enter the aquarium with food, added water and some methods of calcium and alkalinity supplementation.

If allowed to accumulate above natural levels, phosphates can present two problems:

- Calcification inhibition
- Algae growth

For these reasons, **keep the phosphate below 0.03 ppm**. To accomplish this, incorporate periodic water changes, good skimming, balanced feeding and proper maintenance.

Ammonia

As mentioned earlier, ammonia results from the decomposition of organic matter, and from the excretory processes of fish. It is highly toxic to marine life. In an established aquarium, the nitrifying bacteria rapidly convert ammonia to nitrite, nitrate and nitrogen gas, compounds with much less toxicity to fish than ammonia itself. **Ammonia levels should not rise above 0.1 ppm**.

To maintain low-to-zero levels of ammonia, combine periodic water changes, good skimming, balanced feeding and good maintenance.

Nitrite

Seawater makes nitrite far less toxic than fresh water does. As an intermediate product of ammonia oxidation, nitrite demands little or no attention from the reef aquarist. Nevertheless, tracking nitrite can prove instructive by demonstrating the biochemical processes at work in the aquarium. **Nitrite levels should not exceed 0.1 ppm**.

Nitrate

The nitrification process ends with the production of nitrate. Nitrate abundance usually results in the growth of algae and potential pests such as dinoflagellates, whose growth are spurred by nitrate. At the levels normally found in reef aquariums, nitrates carry no particular toxicity; in fact the zooxanthellae corals consume it as a nitrogen source.

To maintain low levels of nitrate, combine periodic water changes, the use of a deep sand bed (DSB) and balanced feeding.

Iodine

Both organic and inorganic iodine exist in the ocean. Their complex involvement in various cycles still constitutes an area of active research. Iodine predominates in two forms; iodate (IO_3) and iodide (I). **Together, these two forms should account for about 0.06 ppm**.

Among the primary organisms in reef aquariums that "use" iodine, you will find both micro- and macro-algae, as well as some soft corals.

Iodine overdoses will prove highly toxic to corals. Unless you have severe macro-algae excess and a fully stocked tank with soft corals, use iodine sparingly if at all.

Cleaning

Since cleaning the system disrupts the inhabitants anyway, exploit the opportunity to clean thoroughly.

1. Wipe down the outside of the hood and glass as well as the transparent lens to get rid of algae and salt crests. **Do not use detergents or soap, only fresh water and a clean rag**. To clean algae from the inside of the glass, use a sharp razor or cleaning magnets.

2. Remove and inspect the mechanical filtration media for excessive debris. Rinse them under tap water.
3. Clean the skimmer collection cup and neck.

Supplements

Add supplements in accordance with the tested water parameters and the appearance / behaviour of the inhabitants. **Do not overdose.** Some supplements, such as iodine, are toxic in high doses.

Invertebrate feeding

The first step in understanding and addressing the dietary needs of a reef invertebrate is to identify the feeding strategies of a given specimen.

Coral

Most symbiotic corals need to supplement the products of photosynthesis with hosted zooxanthellae. Very few species are truly autotrophic; most will slowly starve if not fed in captivity. Unfortunately the aquarist cannot always discern such a gradual process; the net daily deficit amounts to only a few percent. Most popular coral specimens feed on zooplankton, other nanoplankton (bacteria, floc, mucus) or absorb nutrients from the water. Most corals require feeding.

Anemones

Anemones consume pieces of mussel or shrimp, placed directly on the tentacles or mouth.

Fish supply stores stock many different commercial liquid foods. We recommend **Red Sea CoralGro.** CoralGro's complete, balanced formulation supplies all the nutritional requirements for marine invertebrates.

Monthly reef care: water changes

While we recommend changing 10% of the tank water every week, if that proves too difficult, replace 25-30% of the water at least once a month. Frequent partial water changes help to dilute undesirable substances.

1. Siphon away the amount of water to be replaced.
2. Pre-mix the replacement seawater to achieve temperature and specific gravity that match the tank water parameters.
3. Slowly add the newly mixed water.
4. Check the parameters again, and adjust as necessary.

Take this opportunity to vacuum part of the substrate or bare bottom and bare live rock areas, rearrange the décor and perhaps move around some of the livestock.

Bimonthly or More Reef Care

Some reef care activities need not take place as frequently. Review the following list for details:

Change the carbon filter

Replace the active carbon filter every two months.

Clean the bio-filter media

Every 3-4 months, clean the bio-filter of accumulated debris. Immerse it in clean saltwater and shake gently, so as not to damage the fauna.

Clean the pump impellers and housing

Calcium carbonate builds up on the pump motors. Every 6 months, submerge each pump in a mixture of hot water and vinegar. Remember to properly turn off and disconnect each pump.

Add reef base

Reef Base, as aragonite, slowly dissolves, breaking up into calcium and carbonate. It may decrease in volume as much as 10-15% annually. Replenish it to ensure a deep sand bed.

Change the lamps

Over two years, the intensity of the fluorescent lamps will decrease as much as 50% and the spectrum will narrow towards the red end, which can promote algae bloom.

Warranty

Red Sea Aquarium Products Limited Warranty

The limited warranty sets forth all Red Sea Fish Pharm Ltd (Red Sea) responsibilities regarding this product. There are no other express or implied warranties from Red Sea.

Red Sea warrants your product against defects in materials and workmanship for a period of 12 months, valid from the date of original purchase and will repair this product free of charge (not including shipping costs) with new/rebuilt parts. Damage to the aquarium glass or to the florescent tubes is not included. The precondition for the warranty is that the stipulated set-up routine is observed. In the event that a problem develops with this product during or after the warranty period contact your local dealer or Red Sea (at the company address indicated) for details of your nearest authorized service center.

The warranty is extended only to the original purchaser. Proof of date of purchase will be required before warranty performance is rendered. This warranty only covers failures due to defects in materials or workmanship which occur during normal use. It does not cover damage which occurs in shipment or failures which result from misuse, abuse, neglect, improper installation, operation, mishandling, misapplication, alteration, modification or service by anyone other than an authorized Red Sea service center.

Red Sea shall not be liable for incidental or consequential damages resulting from the use of this product, or arising out of any breach of this warranty. All express and implied warranties, including the warranties of saleability and fitness for particular purpose, are limited to the applicable warranty period set forth above.

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