OCTOPUS 4000

Aquatic monitor, control & alarm system

INSTALLING THE COMPONENTS

Version 1.0

AQUADYNE

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Contents

Octopus 4000 Features

- Continuous monitor, control and alarm of water temperature, conductivity, pH and oxidation reduction potential (ORP)
- 16 timers
- Wave maker system (4 interval timers)
- High quality (US manufactured) probes
- $H_2O/S^{™}$ software with menu-driven programming
- One auxiliary (aux) input for digital device such as power failure, water level or flow; alarming only
- Local audible alarm and optional remote dial-up pager alarm capability. Email alarming with TCP/IP connection and AquaWeb II PC software
- X-10 technology used for parameter control of peripheral equipment such as pumps, dosers, and lighting
- Powerful datalogging capability that holds up to 7-days of hourly probe data
- 9V AC power transformer with optional 9V DC battery backup
- Infrared printer port supporting a hand-held HP printer for data reporting and graphical analysis
- Communication port - supporting direct or remote (modem or TCP/IP) PC connection
- AquaWeb™ - PC software application allowing Octopus 4000 users to perform advanced graphical analysis of current and historical data, datalogging and configuration viewing and changing from PC

The Octopus 4000 is constructed with high quality components. The heart of the Octopus 4000 is an INTEL microprocessor which manages all of the activities of the controller. All information gathered by the controller is processed digitally. The Octopus 4000 architecture includes Digital Signal Processing (DSP) hardware and software that provides accurate and repeatable readings over the life of the Octopus 4000.

AQUADYNE™ is committed to building products that meet world class standards of quality and workmanship. If you have any questions regarding the use of this product, contact support@aquadyne.com or sales@aquadyne.com.

The following symbols are used throughout the Octopus 4000 User Guides to draw attention to important user information.

Highlights items which will save you time and effort, and increase your understanding of the Octopus 4000 operation.

The CAUTION logo highlights items which are critical to safety or which may cause the Octopus to malfunction or become damaged.

Octopus 4000 controller

Octopus 4000 ports & connectors

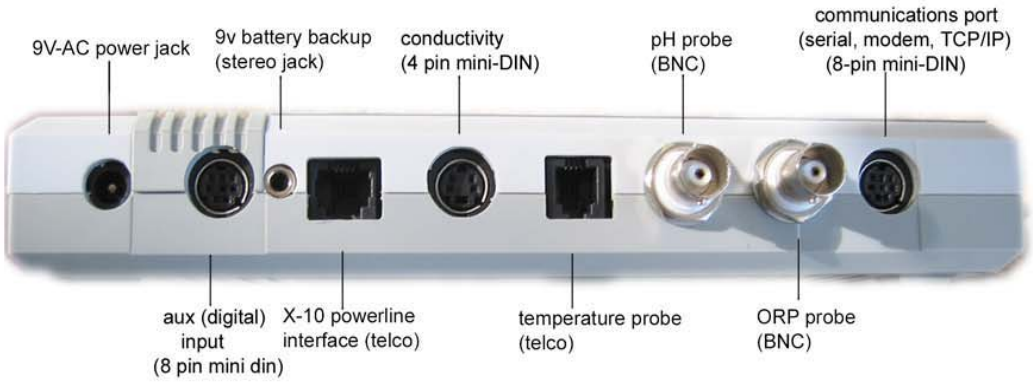

Figure 1.1 Octopus controller and ports

Status Lights

Parameter Status Lights

The Parameter Status Lights located on the face of the Octopus indicate whether a particular water parameter system is active. Figure 1.2 describes parameter status lights and their meanings. See Step 14 for parameter control programming.

Parameter Status Lights	
○	No Light. (Parameter is within setpoints and no dosing required, OR control system is not activated.)
Conductivity	
●	Solid Green. (System is dosing to lower conductivity value.)
✳	Flashing Green. Dwell State. (Will read conductivity again after dwell time is complete.)
●	Solid Red. (System is Dosing to raise conductivity value.)
✳	Flashing Red. Dwell State. (Will read conductivity again after dwell time is complete.)
Temperature	
●	Solid Green. Chiller On. (Current temperature is too high.)
✳	Flashing Green. Chiller Dwell State. (Dwell time to prevent compressor burn out.)
●	Solid Red. Heater On. (Current temperature too low.)
pH	
●	Solid Green. (pH buffer is dosing to raise pH.)
✳	Flashing Green. Dwell State. (Will read pH again after dwell time is complete.)
●	Solid Orange. (CO_2 is Dosing to lower pH.)
✳	Flashing Orange. Dwell State. (Will read pH again after dwell time is complete.)
ORP	
●	Solid Red. (Ozone is dosing to raise ORP.)

Figure 1.2 Parameter Status Lights

System Status Light

The System Status Light located at the bottom of the Octopus 4000 indicates the general condition of the Octopus 4000 controller operating system. Figure 1.3 summarizes the System Status Lights and their meanings.

System Status Lights	
●	Solid Green. Operating properly and available for data entry.
✳	Flashing Green. Busy processing data.
✳ ✳	Flashing Green/Orange. Sending commands through the power line to the Satellite Modules.
✳	Flashing Red. Controller hardware failure. Unplug the Octopus controller and call Aquadyne customer service.

Figure 1.3 System Status Lights

Powering the Octopus 4000

Primary power for the Octopus is provided by an A/C wall-mount transformer. A UL, CSA or CE approved transformer rated for the correct input voltage (110V or 220V) is used to power the Octopus. The output voltage to the Octopus must be 9V AC. Using an incorrect power supply can cause damage to the controller and/or can result in inconsistent controller functioning and probe reading(s).

The Octopus design incorporates FLASH Memory, RAM, and a battery backed-up real-time clock. Should power be lost, none of the parameter setpoints or configuration data will be lost. In the event of a power failure, data in the datalog will be erased. The Octopus 4000 battery (factory replaceable only) should be replaced every 4-7 years.

Backup power may be provided by either of two methods:

- 9-volt backup “battery pack” p/n 63-200696, see Step 8.
- UPS (Uninterrupted Power Supply) Backup Power System . (The Octopus 4000 A/C wall-mount transformer is plugged into UPS.)

The backup battery-pack is an inexpensive means of providing about 45 minutes of backup power during a power failure. While operating from the battery pack, the Octopus will continue to operate normally until the battery is exhausted.

If a UPS system is used as a backup power source, it may be purchased from Aquadyne (p/n 63-200166). A UPS backup is a good idea if you require more than 45 minutes of backup power, or if you wish to backup other critical peripheral or communications equipment such as a pump, bio-filter or modem. The duration of backup of the UPS is reduced by the addition of such equipment.

Your Octopus is a precision laboratory instrument that could be damaged by unexpected power surges or fluctuations.

The use of a quality surge protection device is highly recommended, and is required to preserve your warranty. DO NOT USE a surge suppressor between an Octopus power line interface and a control module (see steps 4 & 5)

Control Capability

H_2O/S software is used to program the Octopus 4000 and give it the capability for parameter control as well as monitoring.

Control Using X-10 Management

The probes gather information and relay it to the Octopus controller. The controller then sends commands through the X-10 power line interface to the control modules. The control modules receive signals from the Octopus via the X-10 power line interface turning devices on or off as needed. Each device that the Octopus controls, such as a heater or chiller, has its own control module. As many as 256 addresses can be used.

CAUTION

The proper and reliable functioning of the Octopus and the X-10 control system is dependent on the proper installation of the Octopus, the X-10 Power Line Interface, and each Control Module. Other electrical devices, such as motors, ballasts, and dimmer switches produce electrical interference that may affect X-10 signaling. See steps 4, 5 , 20 and 22 for complete instructions regarding X-10 management and control.

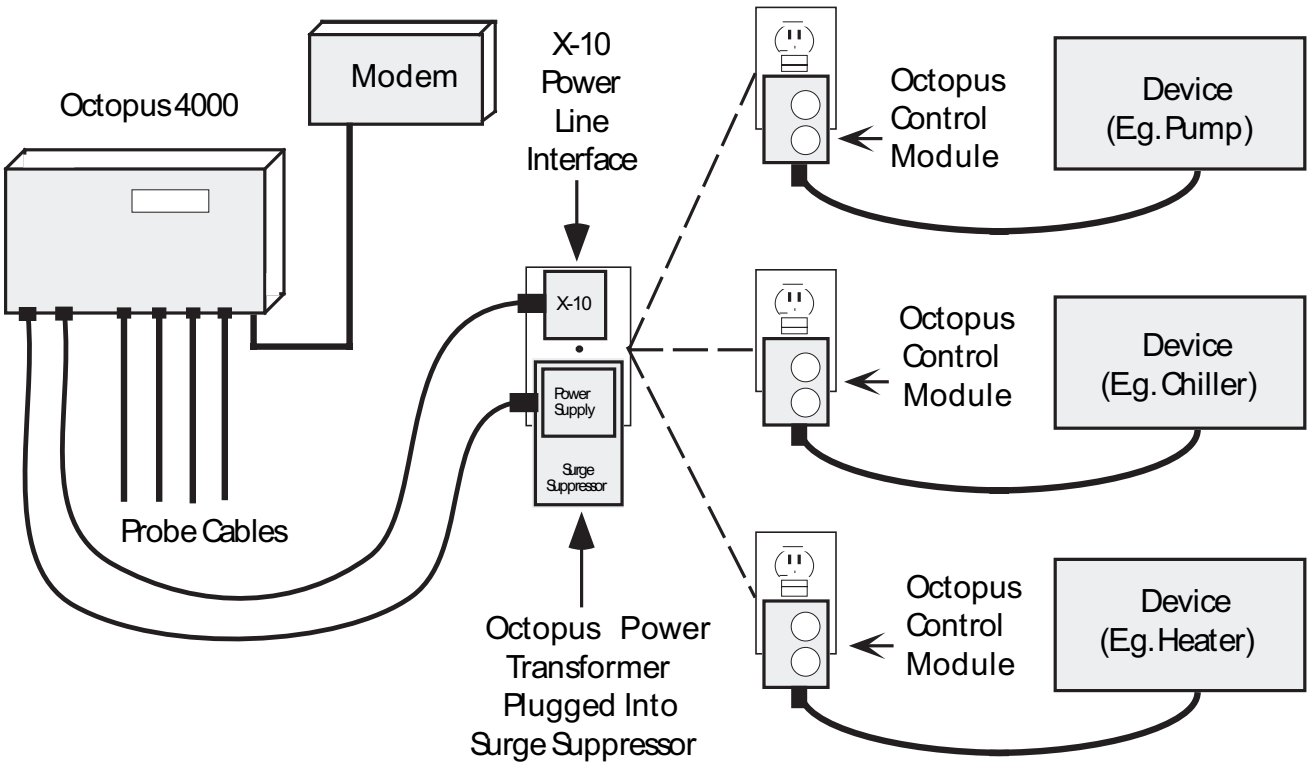

figure 1.4 Octopus Control System Components

The Octopus 4000 incorporates several mechanisms to protect your aquatic environment from controller failure. For example, the controller is engineered to overcome problems associated with power fluctuations through the periodic re-sending of control module commands to make sure that an X-10 control is “latched” in the correct state.

Lighting System

The lighting system will support up to 16 independent lighting times. Each channel has one ON and OFF time per 24-hour period. With separate lighting timers, there is a high degree of flexibility in setting up your lighting system. See steps 4, 5, 17 and 22 for complete instruction.

System Hold

The H_2O/S system hold software is a feature designed to aid in the feeding of fish and invertebrates. When the Octopus controller is put into feed mode, all systems, except the Lighting and WaveMaker systems, are shut down for a period of time selected by the user. At the end of the specified time (user selectable 0 to 60 minutes) all systems are turned back on and will restart within 5 minutes. If desired, the system hold option may be turned off by setting the feed time to 0 minutes. The Octopus controller will then no longer prompt you to enter the system hold mode. See step 19 for complete instruction.

WaveMaker System

The H_2O/S Dual Channel WaveMaker software feature allows the Octopus 4000 to control two independent wave or surge generation systems. Each system supports two pumps which are driven by Control Modules. The cycle time for each pump is selected by the user, from 1-999 minutes (over 16 hours). See steps 4, 5, 18 and 22 for complete instruction.

Alarm System

The H_20/S alarm system software provides visual and audible notification in the event that a monitored parameter exceeds the user defined range. The pager alarm system used in conjunction with a modem provides remote alarm notification via a digital pager. See steps 6 and 21 for complete instruction.

Infrared Printer Port

The infrared printer port located at the bottom left of the face of the Octopus 4000 is standard. This port provides access for the optional infrared datalog reporting feature. Using the Infrared Printer data collected by the Octopus 4000 can be printed out in a variety of formats, including the current data, the high and low points of data collected within the last 24 hours, 48 hours, or 1 week. Temperature, pH, and ORP can be graphed. See #6 of the *Operation And Maintenance* guide for additional information.

Before proceeding with installing and programming the Octopus 4000, read the important safety information below.

Stop–Read this first

CAUTION

Do NOT ALLOW Controller TO GET WET!

Your Octopus 4000 controller is not waterproof and cannot be submerged, permitted to get wet or exposed to high humidity. To avoid splashing the unit, install it properly as described in this chapter.

Avoid Dangerous Operating Conditions.

Do not operate the Octopus controller under any of the following conditions:

- With wet hands
- If you are standing in water
- If the controller is wet
- If there is salt creep on the box

KEEP pH AND ORP PROBE TIPS WET AT ALL TIMES

To prevent loss of accuracy in the pH and ORP probes, be sure to keep the tips wet at all times. NOTE: Do not completely submerge probes. Refer to probe installation procedures (Step 2) for complete instruction.

Install all electrical cords correctly.
Always take care when using electricity around water. To prevent water from running down the cord of an aquarium device, always use a drip loop as shown in Figure 1.5. To create a drip loop, make sure that the cord extends below the outlet so that any runoff will not enter the outlet or the device. The Octopus controller and ALL other aquatic environment devices should be plugged into a GFCI outlet. Install the controller above the water level to avoid damage in case of tank overflow.

If you are not familiar with installation of electrical equipment, it is strongly recommended that you hire a licensed electrician.

CAUTION

In addition to a surge suppressor, a Ground Fault Circuit Interrupter (GFCI) should be part of your installation. A GFCI is a sensitive device which immediately cuts off the electricity flow when an electric current leak is detected. **All devices that are part of the Octopus 4000 system should be connected to a GFCI protected circuit.** If you do not have one installed already, you should purchase one. They are inexpensive and are available at any electronics or hardware store. **Don't wait, a GFCI can save your life!**

Follow the required installation and/or programming steps in table 1.1 for your application.

Step(s) to perform	Monitor	Monitor & Control	Monitor, Control &/or Alarm	Other Octopus 4000 features
1. Mount controller 2. Install Probes	✓	✓	✓	
3. Install digital input hardware			✓	
4. Install X-10 power line interface		✓	✓	
5. Install and address control module(s)		✓	✓	
6. Install communication equipment	✓	✓	✓	
7. Power up the controller	✓	✓	✓	
8. Install 9-volt battery backup	✓	✓	✓	✓
9. Set system clock	✓	✓	✓	✓
10. Enter protective password				✓
11. Select conductivity temp compensation	✓	✓	✓	
12. Select a conductivity range	✓	✓	✓	✓
13. Select a temperature scale	✓	✓	✓	✓
14. Enter setpoint and control range values	✓	✓	✓	
15. Set alarm range values	✓	✓	✓	
16. Set up digital input alarm			✓	
17. Set up lighting timer system			✓	✓
18. Set up wavemaker system			✓	✓
19. Set up system hold control			✓	✓
20. Assign system control addresses		✓	✓	
21. Set up pager alarm system	✓	✓	✓	
22. Enable system control		✓	✓	
23. Test system control/timer configuration		✓	✓	

Table 1.1 Steps for installing and programming an Octopus 4000 controller

Step 1 - Mounting the Octopus Controller

The Octopus controller will need to be installed within 5 to 10 feet of the probes. (Standard probe length is 10'. Probe extensions and/or custom cable lengths are available but should not exceed 50 feet.)

The controller comes with two mounting hangers for easy installation. See "Stop-Read This First" (page 1-11) for important safety information regarding placement of the controller and power supply (transformer).

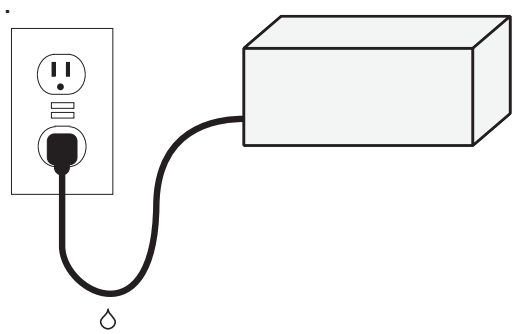

Figure 1.5 Protective Drip Loop GFCI Outlet

Step 2 - Install the Probes

Probes connect to the bottom of the Octopus 4000 and gather information and relay it to the Octopus 4000 for processing and display on the screen.

To ensure proper operation and accuracy, follow the installation procedures described below for all probes.

1. Select a location for all probes that:
   a. is away from sources of electrical interference such as UV sterilizers, fluorescent lighting, ballasts, pumps, etc. Electric noise from these devices may cause interference and result in inaccurate readings.
   b. has adequate water flow over the probe tips at all times.
   c. places probe in vertical position. Any water disturbance, including horizontal or inverse installation may result in air bubbles passing probe tips and may cause inaccurate readings.
   d. places the probe so that the top of the probe is above the waterline. The probe should be positioned so that ONLY ABOUT HALF of the probe shaft is immersed in water. None of the probes can be fully submerged.
2. Plug the probe connector cables into the designated port at the bottom of the Octopus 4000 controller.
3. Calibrate pH, ORP and conductivity probes. See #3 of *Operation And Maintenance* guide for complete instructions.
4. Read and follow specific installation instructions for temperature, pH, ORP and conductivity probe as defined in the following sections.

The Octopus is a precision instrument that has been designed to interface with high-quality probes manufactured in the USA to Aquadyne specifications. The use of other probes not tested by Aquadyne is not recommended and will not be supported. A genuine Aquadyne probe can be identified easily by the presence of a date code stamped on the top of the probe shaft. A magnifying glass may be necessary to see the date code which will be 4 digits showing either the month/year or the week/year of manufacture.

To prevent loss of accuracy in the pH and ORP probes, be sure to keep the tips wet at all times. NOTE: Do not completely submerge probes. Refer to probe installation procedures (Step 2) for complete instruction.

Installing the temperature, pH and ORP probes

In addition to requirements set forth at the beginning of Step 2, follow the below 6 steps in regard to installation of the temperature, pH & ORP probes:

1. Temperature, pH, and ORP probes must be placed within 6” of each other.
2. Flow rates across the pH and ORP probes should be limited to < 10 GPM.
3. pH and ORP probe tips must be kept wet at all times. The probes should be installed immediately after their tips are exposed to air. If probes are allowed to dry, they may be damaged which could result in inaccurate readings.
4. Remove probe caps before calibration and placement in system.
5. To prevent damage to the ORP probe sensor, FIRST REMOVE THE TAPE OVER THE VENT SEAL on the protective cap, then remove the protective cap.
6. Install temperature, pH and ORP probes according to one of the following 3 installation methods:

In-line location using a tee-fitting (Figure 1.6)

In-line location using a tee-fitting is recommended. In-line probe placement is a little more difficult and requires some extra plumbing, but this method ensures that water is moving across the probe tips at all times and minimizes algae growth on the probe tips providing for more accurate readings. Compression fittings are available in 1/2" for lab grade probes and 3/8" for standard grade probes. Be sure to install water shut-off valves, as shown in figure 1.6 to permit easier probe replacement and service. All fittings must be secured so there is no water leakage. A by pass is recommended to allow easier replacement and servicing of probes. It is important that the in-line probe extend no more than 50% into the flow stream.

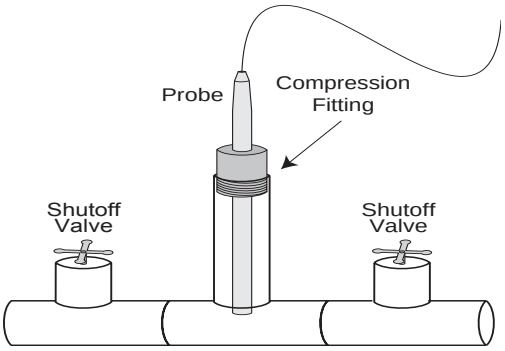

Figure 1.6 Inline

In-filter float (Figure 1.7)

This method keeps probes from being submerged (or drying out), and is economical to construct. To construct a probe float, punch a hole (slightly smaller than the probe diameter) through a small piece of styrofoam. Do not allow probe cables to get wet.

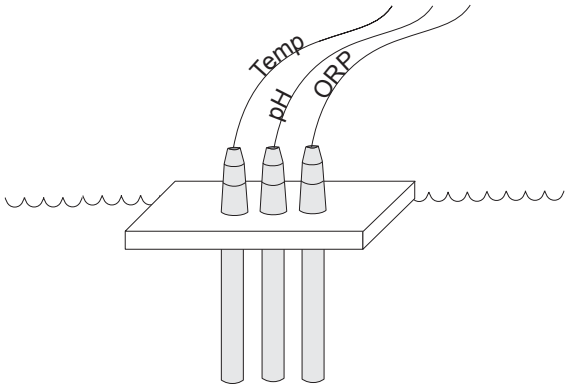

figure 1.7 in-filter float

In-filter (Figure 1.8)

Use probe mounts that attach to the sides of the filter or sump.

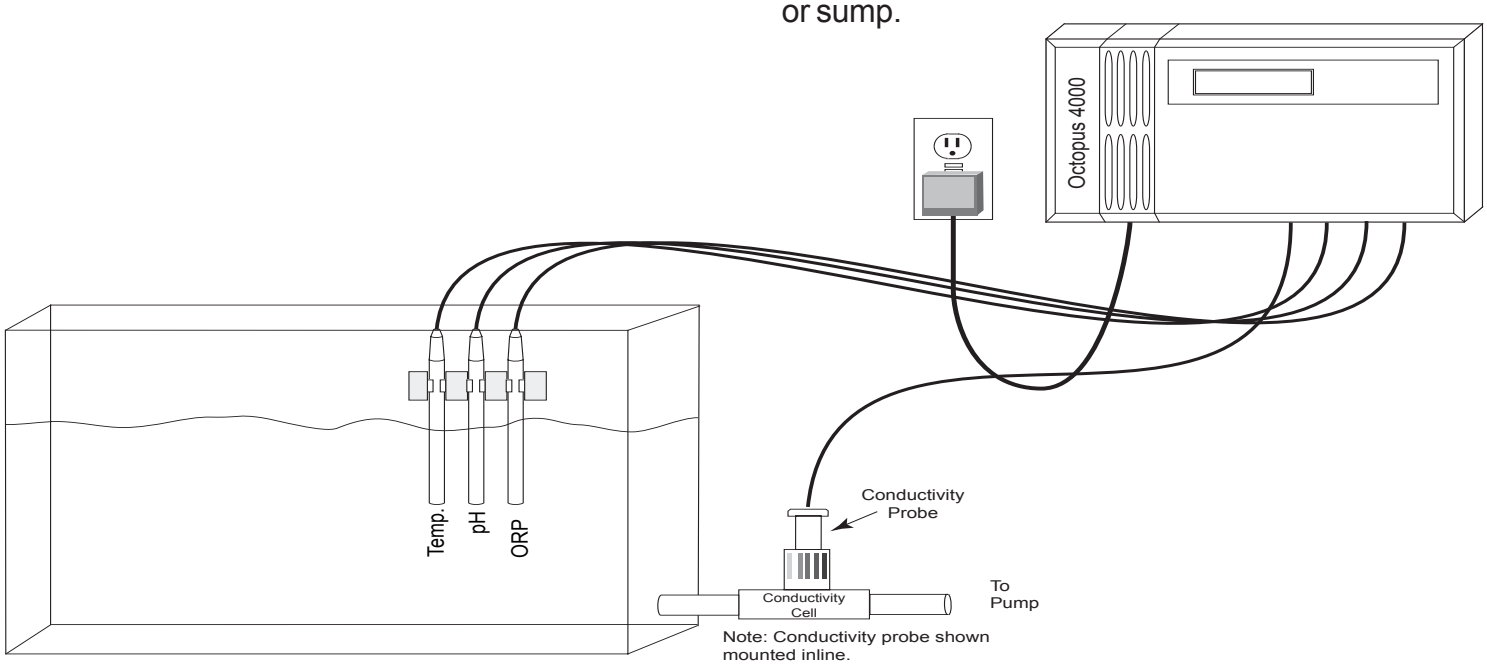

figure 1.8 in-filter float

Installing the Conductivity Probe

In addition to requirements set forth at the beginning of Step 2, follow the below 3 steps in regard to installation of the conductivity probe:

1. The conductivity probe must be installed at least 24” from the temperature, pH and ORP probes. If the probes are too close together interference may result in inaccurate parameter readings.
2. A conductivity probe must be located in a controlled volume environment. Use one of the following installation methods to ensure accurate readings.
3. Remove probe cap before calibration and placement in system.

Conductivity cell (figure 1.9)

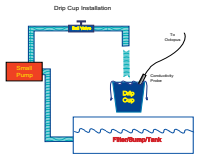

figure 1.9 conductivity cell

Using a conductivity cell is the recommended in-line installation method. A conductivity cell reduces the chances that the conductivity probe will be affected by alternate ground (conductive) paths. Installation should provide that about 10% of the probe protrudes into the cell. Aquadyne provides a “scoremark” on all conductivity probes that guide installation and assure proper insertion.
Off-Line Location (figure 1.10)

The “Drip Cup” installation is a second option for conductivity probe installation. As illustrated in Figure 1.10, a portion of water from the pump discharge line is diverted to a small cup-type arrangement. The water flows in and out of the cup at a rate of about 1 cup per minute. In a drip cup installation, there is no compression fitting to control insertion depth—you must carefully position the probe so that the end of the probe is approximately 1 inch from the bottom of the cup.

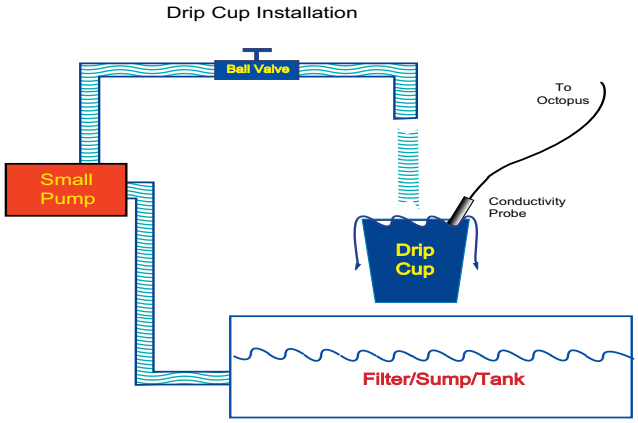

Figure 1.10 drip cup

Stabilization Period for Probes

After the probes are installed, there is a period of time required for each probe to stabilize in its new environment. The conductivity probe will be the first to stabilize in only 5 minutes, followed by the temperature probe which requires about 10 to 15 minutes. The pH and ORP probes will take considerably longer to stabilize. Their readings are much more sensitive. The pH probe will stabilize in about 24 hours while the ORP probe may require 48 hours.

Do not enable Octopus water parameter controls until probes have stabilized.

Step 3—Install Digital Input Hardware

The Octopus 4000 has one digital input. System conditions, such as high or low water levels, high or low pressures, or power failure can be detected and alarmed using Octopus 4000 digital input hardware. These devices use a switch and relay that detect and alarm when an electrical circuit changes from open-circuit to closed-circuit position, or vice versa. This section provides instructions for installing a float switch (water level detection) and a power fail detection.

Aquadyne offers digital input devices for water levels, pressures, flow, and power fail detect

.

Aquadyne offers an optional 8-pin connector and wire that can be used to hook up a miscellaneous digital input.

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Installing a Float Switch

A float switch consists of a stationary stem and a float that moves up and down with the water level. When the float is in the raised position, it is in the CLOSED position. When the float is lowered, it is in the OPEN position.

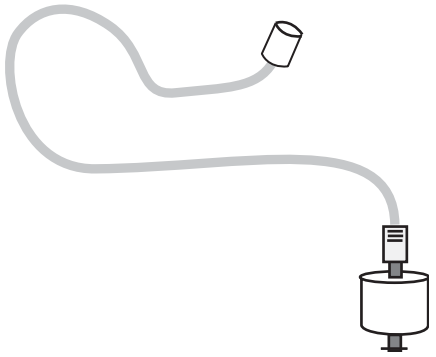


figure 1.11 float switch with 8-pin connector

Once the float switch has been installed in the tank or filter, connect the 8-pin connector to the bottom of the Octopus (see figure 1.1).

Installing a Power Fail Detector

This 9-volt wall mount device is configured with an 8-pin connector. Install the unit as follows:

1. Plug the 9-volt power detect switch into a 110-V outlet.
2. Connect the 8-pin connector to the bottom of the Octopus (see figure 1.1).

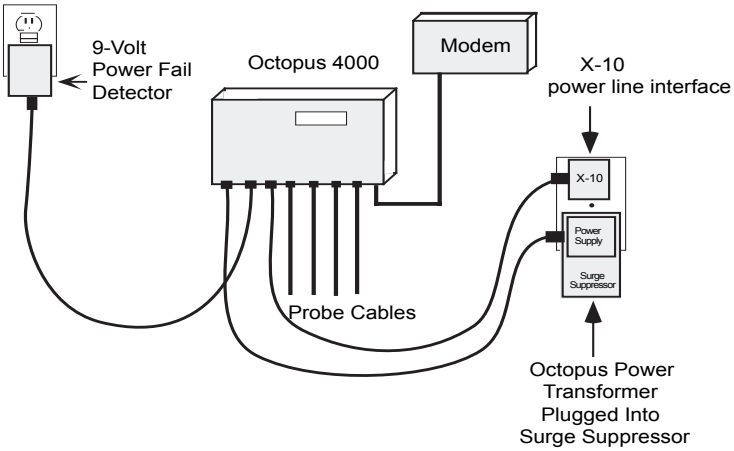


Figure 1.12 Power Fail Detect Installation

See step 16 for complete programming instructions for alarm capability. In order for an alarm page to be sent alerting of a power fail, the Octopus and modem must be powered with some type of battery back up.

CAUTION

The reliability of the digital input circuit is dependent on the use of low impedance switches and wiring. For customers wiring multiple switches in series, the total resistance of the switches should not exceed 200 ohms.

Step 4—Install X-10 Power Line Interface

When the Octopus 4000 senses a parameter in the control or alarm range, it communicates to the powerline interface. The powerline interface than sends on/off commands to the control module. To install the X-10 Power Line Interface, simply plug it into a GFCI electrical outlet. Then use the 4-wire interconnect cable provided with your unit to connect the X-10 Power Line Interface to the Octopus 4000 controller (see figure 1.4). For proper initialization of these components, connect the X-10 Power Line Interface and Control modules before powering up your Octopus 4000 unit.

Step 5—Install and Address Control Module(s)

The Control modules can be located wherever electrical power is available.

The X-10 Power Line Interface and all Control modules must be installed on circuits on the SAME PHASE in the electrical sub-panel. The distance of A/C wiring between the X-10 power line interface and any control module cannot exceed 50 feet..

If the X-10 Power Line Interface and the Control modules are not on the same phase, they will not be able to communicate with each other, except by means of an X-10 signal bridge.

Do not plug control modules or X-10 power line interface into power strips equipped with surge suppression. Surge suppression can filter out the Octopus X-10 control command signals.

UPS power supplies have built in noise and surge suppression and will block X-10 control signals.

One Control module will be needed for each peripheral device you want to control (see figure 1.4). To install the Control module, simply plug the module into a GFCI-protected electrical outlet. Then plug the device to be controlled (i.e., pump, heater, chiller) into the bottom of the Control module. See figure 1.13.

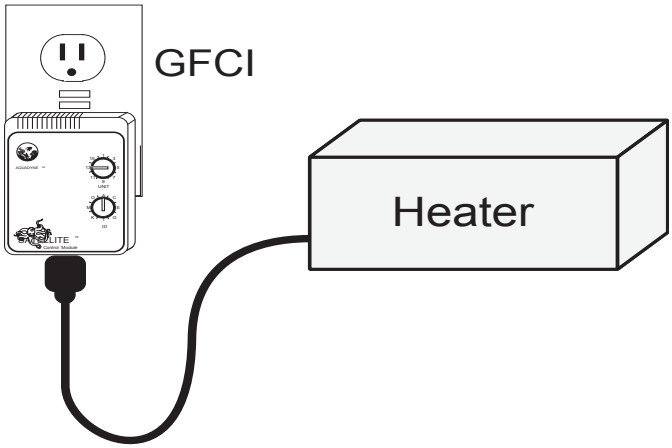


Figure 1.13 Control Module Installation

Be sure you do not exceed the power specifications of the Control module. Most plug-in control modules operate on power lines up to 110 volts and can be used with devices up to 15 amps. control modules which operate with higher voltage and amperage are available through Aquadyne distributors. Wall receptacle control modules are also available.

CAUTION

A sticker on each satellite module indicates the maximum load-rating of the device.

DO NOT OVERLOAD. Equipment such as compressors and pump motors can exceed the load rating of a control module. Verify with the manufacturer of your peripheral device that the surge current at startup does not exceed the load rating of the control module. Damage to the control module could result!

In addition, be sure you are using the correct plug configuration.

The Octopus identifies each control module by its own code, which is called an address. The address is selected using the two dials on the face of the control module (see figure 1.14). The alpha dial allows selections A-P and the numeric dial allows selection 1-16. The control address shown in Figure 1.14 is A-3.

A control address must be set for each control module. Control module ids must also be set and enabled at the Octopus - see steps 20 and 22 for complete programming instructions. See the following column for Octopus 4000 pre-programmed default addresses.

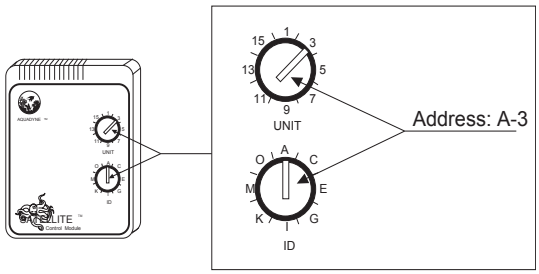


Figure 1.14 Addressing a Control Module

Default Control Addresses

H-1 Heater
C-1 Chiller
O-1 Ozonizer
D-1 Buffer System (pH)
D-2 CO2 Doser
F-1 Main Pump
A-1 Alarm Module
C-2 Low Cond. Control
C-3 High cond. Control

P-1 WaveMaker Pump 1A
P-2 WaveMaker Pump 1B
P-3 WaveMaker Pump 2A
P-4 WaveMaker Pump 2B

L-1 Timer 1
L-2 Timer 2
L-3 Timer 3
L-4 Timer 4
L-5 Timer 5
L-6 Timer 6
•
•
•
L-16 Timer 16

Step 6 - Install The Communication Equipment

There are two optional communication features available for the Octopus 4000 system:

- Alarm Paging
- AquaWeb for Windows

Alarm Paging allows your digital pager to receive an alarm page when a water quality parameter goes outside the acceptable range or when a digital input switch signals an alarm condition. The pager message identifies the Octopus 4000 unit via the last 3 digits of the unit serial number, which parameter is involved, and whether the alarm represents a high or low condition. Step 21 provides complete instruction on programming the pager feature.

AquaWeb PC software is an integrated desktop application that offers networking and remote access to Aquadyne controllers. Once installed and properly configured, AquaWeb uses Microsoft Access to store water-quality data and configuration data for one or many Aquadyne controllers. The data is permanently stored on a PC or a centralized server where the data can be shared and analyzed by one or many users. (An Octopus controller holds up to 7 days of hourly values for all water parameters values. A power cycle to the unit will erase this buffer.)

AquaWeb is a powerful analytical tool. After downloading the controller datalog, AquaWeb will display the data in a graphical format using simple line or statistical graphs that identify underlying trends, giving the user information helpful in fine-tuning parameter setpoints and control and alarm ranges.

Nodes (controllers) are graphically displayed using an intuitively simple hierarchical tree-structured view. AquaWeb uses the Windows Dial Up Networking system and an integrated schedule to “poll” each unit and download the node datalog at user-defined intervals.

AquaWeb's security system allows only authorized users access to the system. Authorized users have the ability to access the Octopus 4000 internal datalog and configuration. Statistical, configuration and node reports are available as well as the ability to view current data. Configuration changes can be uploaded from your PC to the Octopus controller. Autopoll is a separate application included with AquaWeb software. The Autopoll application allows scheduled retrieval of controller datalog at set intervals. Autopoll must be running in order for an email alarm (TCP/IP connections only) to be sent.

The Octopus 4000 has one communications port. Communication with the Octopus 4000 can be made in one of the following methods:

- locally - via direct connection to PC
- remote - via phone line with modem (required for alarm paging)
- remote - TCP/IP via ethergadget (static IP required)

Table 1.2 shows product functionality options when using 1 of these 3 communication methods.

Installing the modem for remote access (required for alarm paging)

The Aquadyne modem (p/n 63-200186) and modem cable (RS-232 p/n 63-010806) are preconfigured to work with the Octopus 4000 unit.

1. **Connect the modem and Octopus unit** - Plug in the modem cable by inserting the 25-pin connector into the modem. The mini-DIN end of the cable is inserted into the Octopus at the serial port. The connectors are keyed and can only be installed one way. Make sure that the plugs on the cable are fully inserted into the jacks on the Octopus controller and the modem. See figure 1.15.

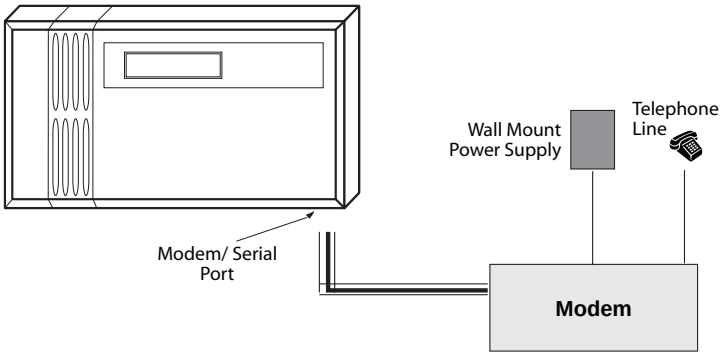


Figure 1.15 Connecting a Modem

Communication Feature	Connection Options		
	Direct	Modem	TCP/IP **(static IP required)**
AquaWebII PC software	✓	✓	✓
Alarm paging to digital pager		✓	
Email alarming with AquaWebII			✓

Table 1.2 Communication features

Aquadyne modems are configured with the following default settings on the dip-switches (at the back of the modem "DUDUUUDD" for switch positions 1-8 respectively. Verify that the dip-switch settings are in the correct positions.

There could be problems in modem operation and pager functionality if the telephone line is shared. For proper operation, the modem will require a dedicated telephone line.

2. **Power for the Modem -** Aquadyne modems are powered by a small wall-mount transformer, as shown in Figure 1.15. Plug the end of the power cord into the back of the modem. Then plug the modem wall transformer into a wall receptacle or, preferably, into a surge suppressor powerstrip. The Octopus and the modem must be powered in order to send pages. If you want to receive pages in the event of power failure, both the Octopus and the modem should be plugged in to back up power supplies.

A small power switch is located on the back of the modem. Set the power switch on the modem to the ON position. When the modem has power, several red lights should be illuminated on the front of the device.

3. **Connect the modem and phone** - The modem is supplied with a 6' telephone cable. Plug the phone cable into the back of the modem in the jack labeled LINE. (DO NOT plug the cable into the jack labeled PHONE.) Connect the other end of the phone line to the closest ANALOG telco (telephone company) live telephone jack.

4. After the modem has been properly configured and is powered, power cycle the Octopus controller in order to properly initialize the modem. This will properly initialize the modem for alarm paging and remote modem access.

5. For AquaWeb PC users, it is required that your PC modem be compatible with and properly installed under Windows as a recognized "Plug and Play" device. We strongly recommend the use of a US Robotics Modem "Sportster" since this is the only modem Aquadyne offers technical support on. Your modem MUST be installed on a separate COM port such as "COM3", with its own independent IRQ assigned. To make sure your machine meets these requirements, consult with a computer technician.

PC modem port configuration must match the default communication (datalogger menu) settings of the Octopus. The default settings are: baud rate 19,200 and data format 81N.

If you are using AquaWeb, you will also need to configure the modem to auto-answer.

Installing the direct connect cable for local access

The Octopus 4000 Controller can be connected directly to a PC running AquaWeb.

Aquadyne direct connect cables (RS-232 AquaWeb PC cable DB9) are available in 10', 25' and 50' lengths. Connect the 8-pin mini-DIN into the Octopus 4000 serial port. Plug the DB9 into one of your PC comm ports. Verify that the PC comm port is configured to match the Octopus 4000 communication settings. The default settings are: baud rate 19,200 and data format of 81N. The connectors are keyed and can only be installed one way. Make sure that the plugs on the cable are fully inserted into the jacks on the Octopus controller and the PC. A serial to USB adapter may be used if your PC does not have a standard 9 pin comm port.

> Use of any cable other than that supplied by Aquadyne may result in an incomplete connection or, in extreme cases, damage to the Octopus or computer.
>
> The cable utilized for Direct Cable connection is a non-standard cable. It can be ordered from your aquarium professional.

Installing and configuring Ethergadget for remote access via TCP/IP

With a properly configured ethergadget (terminal server) an Octopus 4000 can be assessed over an internet connection to a PC running AquaWeb II PC software. It is essential that the ethergadget be configured with a static IP address and port number. (Check with your ISP, internet service provider, or MIS department to verify that a static IP address is available). Detailed instructions on ethergadget configuration are provided in the *Ethergadget Configuration Guide*. After configuring the ethergadget with a static IP address, connect the ethergadget cable by inserting the 25-pin connector into the ethergadget. The 8-pin mini-DIN end of the cable is inserted into the Octopus at the serial port. The connectors are keyed and can only be installed one way. Make sure that the plugs on the cable are fully inserted into the jacks on the Octopus controller and the ethergadget. Connect the ethergadget to an existing hub via category 5 cable for network accessibility.

Email alarming is available with TCP/IP connections in conjunction with AquaWeb II PC desktop application. See *Ethergadget Configuration Guide* for configuration information.

Configuring Windows Communication ports setting to support AquaWeb

1. Display Hardware from the Device Manager on your PC; figure 1.16.

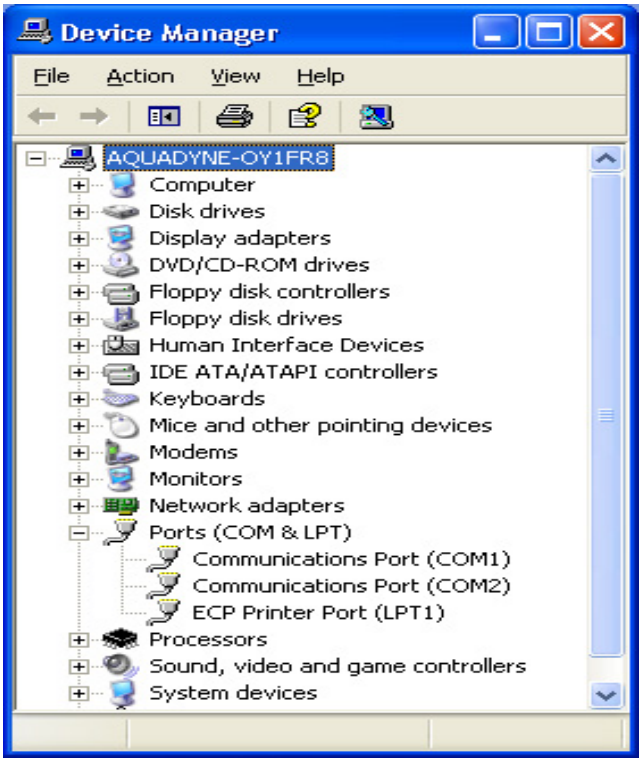


Figure 1.16 System Properties

2. Select the desired Modem Icon or comm port. For direct connection, click on comm port to be assigned, select port settings, then advanced. For modem connections, click on modem to be assigned, then select advanced, then advanced port settings. Make any necessary configuration changes to Windows here. *Make sure that no other program or device is attached to the port you are assigning for AquaWeb.*

For both connections, make sure that the "use FIFO" buffers is checked in the upper left hand corner and move both sliders to the far left position as shown in Figure 1.17.

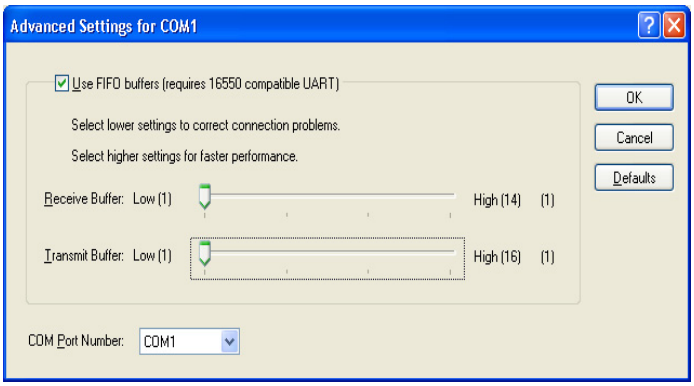


Figure 1.17 Advanced Port Settings

3. Click OK to change the communications settings and exit out of the communications control and proceed with starting AquaWeb.

Installing AquaWeb software

Install AquaWeb software according to the instructions supplied with the CD. It is VERY important that you review the ReadMe file BEFORE installation.

Starting and configuring AquaWeb software

1. On the Windows taskbar, click Start, Programs, AquaWeb.
2. The "login" dialog box will then be displayed, type your name and password, and click OK.

The default name and password for first time use is:

Name: Administrator
Password: Octopi

Both are case sensitive.

3. Click OK on the login screen to open AquaWeb. AquaWeb is ready when you see a sample Network map displayed as a "tree" list. Figure 1.18.

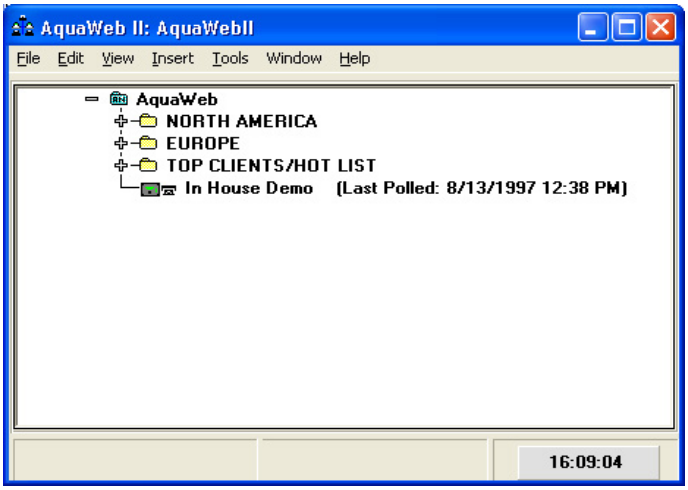


Figure 1.18 AquaWeb "Tree list"

Configuring AquaWeb for specific Connection type

See AquaWeb "help" which will be installed when the program is loaded for information regarding inserting node information for direct and modem controller connections.

Configuring the Octopus 4000 for communication with AquaWeb

Setup→Datalogger

For the Octopus to function with AquaWeb, you must insure that the Data Interval, Data format, and Baud rate are set properly within the $H_2O/S^{™}$ software of your Octopus.

Make sure that the datalogger options in the Octopus are set as follows:

Data Interval = 0 minutes
Baud Rate = 19,200 baud
Data Format = 8,1,N (8 data bits, 1 stop bit, no pariy)

Step 7 - Powering up the Octopus 4000

Plug the end of the cable from the power transformer into the power jack located on the bottom left of the Octopus 4000 (see figure 1.1). Be sure to use the protective power cord drip loop to prevent water from running down the cord into the Octopus 4000 controller. The cord should extend below the outlet so that any runoff will not enter the electrical outlet.

When the controller is first plugged in, it goes through a diagnostic self check. The screen will show a series of messages indicating that a self diagnosis is in progress See figure 1.19.

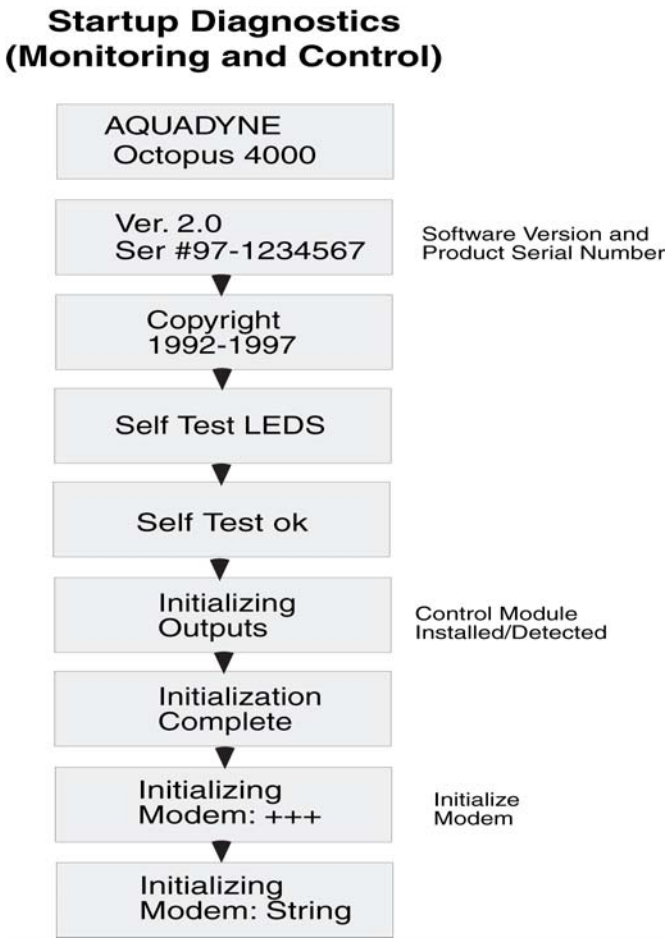


Figure 1.19 Startup Diagnostics

> Power to the Octopus should be provided after all X-10 components and communications equipment are powered, connected and programmed through the Octopus. The Octopus recognizes these peripheral devices while performing startup diagnostics.

When powering up the Octopus for the first time, make note of your system serial number and $H_2O/S^{™}$ software version. This information is required should you find it necessary to obtain technical support.

When the current status screen begins to display you will notice that the top line of the display will show the current probe readings. The second line will show system activity such as systems being activated, and/or alarms occurring.

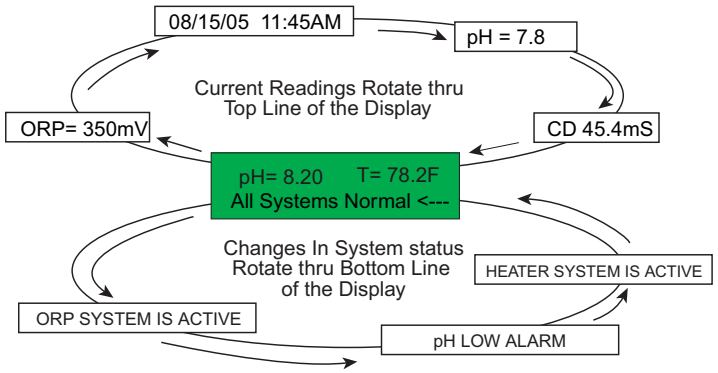


Figure 1.20 Current Status Window

Step 8—Install the 9-Volt Backup Battery Pack

To install the 9-Volt Backup Battery Pack, simply plug in the battery backup to the bottom of the Octopus controller.

Note: You need to install two 9V Alkaline batteries into the battery backup pack. Do not use rechargeable batteries. See figure 1.21 • Battery Backup Installation.

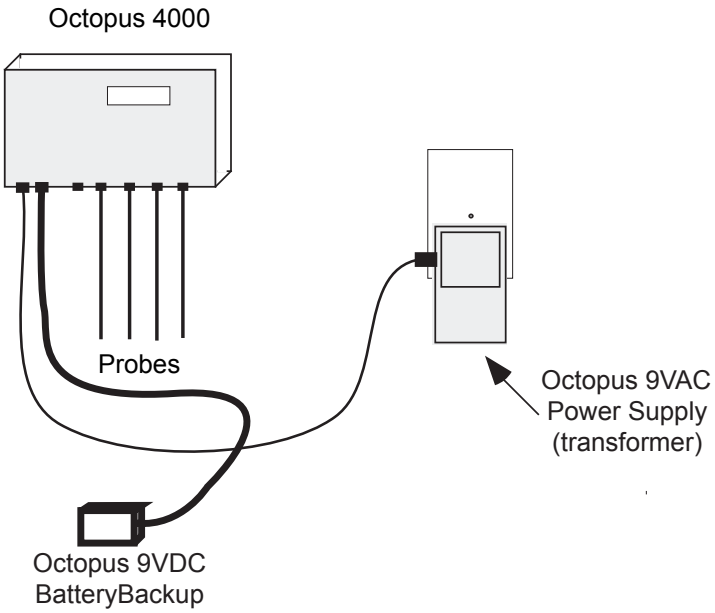


Figure 1.21 Battery Backup Installation

The backup battery-pack is an inexpensive means of providing about 45 minutes of backup power during a power failure. While operating from the battery pack, the Octopus will continue to function normally until the battery is exhausted.

If a UPS system is used as a backup power source, it may be purchased from Aquadyne. A UPS backup is a good idea if you require more than 45 minutes of backup power, or if you wish to backup other critical peripheral such as a pump, bio-filter or communications equipment such as a modem. The duration of backup of the UPS is reduced by the addition of such equipment.

Please note that the 9-Volt Backup Battery incorporates special hardware designed by Aquadyne specifically for the Octopus. The use of any other voltage source could cause damage to your Octopus.

The 9 volt batteries should be tested and replaced as needed.

You are now ready for the second half of the installation process: Programming the Octopus H_2O/S software (Steps 9-23).

Understanding Water Quality Parameters

Increasing your understanding of basic water chemistry will enhance your ability to interpret the data generated by the Octopus 4000. With the controller's assistance you can cultivate the ultimate aquatic environment. The following pages cover four components vital to creating the optimal aquatic habitat: pH, ORP, temperature and conductivity.

Temperature

It is frequently desirable that the temperature of an aquatic environment remain stable over the course of a day. Varying a degree or two (Fahrenheit) is sometimes acceptable, but larger fluctuations can cause problems.

A heater or chiller is very helpful in maintaining correct temperatures. In some environments it may be sufficient to heat or air condition the room the aquatic environment is in. The body temperature of aquatic pets and all other cold blooded animals is determined by their environment. As temperatures cool, metabolic processes slow down. The ideal temperature is one at which your fish are active, eating and growing.

The ideal temperature range for salt water environments is 75° to 78° F. The ideal range for fresh water environments is 76° to 80° F. If you have questions about the requirements of a particular species, refer to the specialist at your local fish store.

Temperature should be altered gradually, with changes of no more than 2 °F or 1 °C in a 24-hour period. The Octopus controller is ideal for maintaining water temperature since it makes constant incremental alterations.

pH

The pH of water refers to the degree to which an aquatic environment is acidic or alkaline. The pH scale ranges from 0 to 14.0, with a pH of 7.0 being neutral. Below 7.0 is acidic, and above 7.0 is basic. Natural sea water, for example, has a pH of about 8.3 which is slightly alkaline. The typical pH range for tropical marine fish is between 7.6 and 8.5.

The pH of an aquatic environment fluctuates naturally from day to night. The pH tends to fall at night and rise, due to photosynthesis by plants, during the day. Therefore, a range of readings over the course of the day is normal, and a single test may not mean very much.

Wide fluctuations in pH can be fatal to fish and marine organisms. Therefore, small changes of no more than 0.1 unit of pH a day can be made by adding a buffer solution.

ORP

Oxidation Reduction Potential (ORP) is a measurement of the potential for chemical reactions which occur in water. This potential is determined by measuring the millivolts (mV) present in the water.

ORP provides a useful indication of water purity. High ORP values indicate oxidation reactions greatly exceed reducing reactions. Low ORP values indicate reducing reactions greatly exceed oxidation reactions. Low ORP values indicate a high level of organic material in the water corresponding to the inability to break down proteins (fish waste and food). ORP values in natural sea water typically range from 350 to 400 mV. This corresponds to the ideal range for aquariums as well.

In response to low ORP values ozone and/or chlorine can be introduced into the water. ORP readings should be analyzed in terms of trends instead of absolute values.

A drop in pH often raises ORP values.

Conductivity

As its name implies conductivity measures the ability of a sample to conduct an electrical current. For liquids, conductivity is dependent on the amount of ionic compounds dissolved in the sample. Conductivity is useful for measuring salinity. As a general rule, as ion concentration increases, conductivity rises. Although the conductivity measurement can not differentiate between the contributions from specific ions, it does give a general indication of the total ion concentration.

Conductivity is measured in μS. (microsiemens) and ms (millisiemens). The conductivity scale choices in the Octopus are 0-1000 μS (low range), or 0-100 ms (high range). The first scale is a much more sensitive scale since it reflects changes in conductivity of only one microSiemen (1μS). The second scale is less sensitive and reflects conductivity changes in increments of 100 μS. Saltwater, for example, ranges from about 45,000 to 55,000 uS (45ms - 55ms), whereas freshwater conductivity is typically between 800 and 1,500 uS, depending on the water source. Hydroponic and other applications can vary across a broad range as well, depending on the crop and the stage of growth.

In saltwater, conductivity is generally used to determine the approximate salinity equivalent. Because all aquatic systems will experience a loss of water through evaporation, salinity will gradually rise over time. A decreasing salinity is often reflected by changes in the growth of algae (Esp. blue-green or other “slimy” algae, and a decline in the health of invertebrates.) The following graph and table show the relationship between conductivity and salinity.

For freshwater applications, conductivity is generally used to determine the general water quality.

In hydroponic applications conductivity is useful in measuring the concentration of nutrient solutions. Proper conductivity levels for various types of plants, in varying stages of growth are listed in the following table.

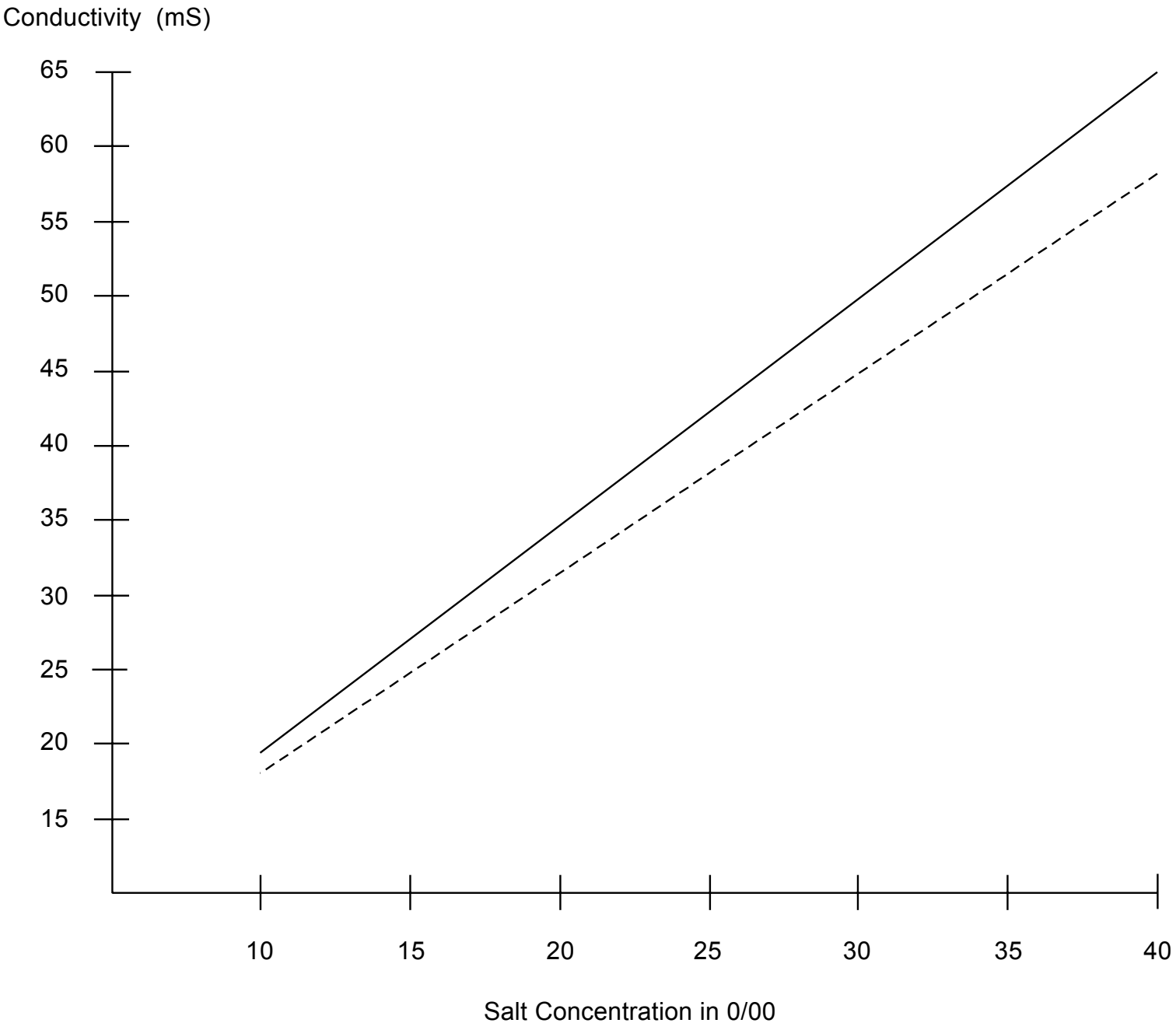
Stage	Fruiting Plants	Leafy Plants
Seedling	1600-1800µS	1400-1600µS
Average	2500µS	1800µS
Fruiting	2400-2600µS	N/A

The datalog and graphing features of AquaWeb PC software convert conductivity values into salinity.

Conductivity vs. Salt Concentration

Conductivity will vary with temperature. Conductivity values shown at 25 ° C (77° F) and 30 ° C (86° F)

Note: This table is for information only. It is not required for calibration.



Conductivity, Salinity, and Density Comparison

Conductivity will vary with temperature. Conductivity values shown at 25 ° C (77° F) and 30 ° C (86° F)

Note: This table is for information only. It is not required for calibration.

Conductivity at 25° C (mS/cm)	Salinity at at 25° C ($^0/_{00}$)	Density at 25° C ($^0/_{00}$) (g/cm^3)
40.0	25.2	1.0187
41.0	26.2	1.0193
42.0	26.9	1.0198
43.0	27.7	1.0204
44.0	28.4	1.0209
45.0	29.1	1.0214
46.0	29.8	1.0220
47.0	30.5	1.0225
48.0	31.3	1.0232
49.0	32.0	1.0238
50.0	32.7	1.0244
51.0	33.4	1.0250
52.0	34.1	1.0256
53.0	34.8	1.0262
54.0	35.5	1.0268
55.0	36.1	1.0274

Product Warranty

Aquadyne Computer Corporation warrants articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service. Aquadyne's obligation under this warranty is limited to making good at its factory any defective controller or satellite which is returned intact to Aquadyne within one year of delivery of the product to the original purchaser. The shipping must be prepaid until the product has been determined to be defective.
Probes supplied by Aquadyne carry a 90-day warranty from date of purchase with the same conditions as the controller and satellite warranty. Aquadyne warrants any repair or replacement of its products for thirty (30) days or for the remainder of the original warranty, whichever period is longer.

This warranty shall not apply to any article of equipment which has been repaired or altered outside the Aquadyne Computer Corporation factory , nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.

Aquadyne's warranty obligation has limited transportation expenses. Products believed by buyer to be defective shall be returned to Aquadyne, transportation and insurance prepaid by buyer. If Aquadyne determines the product is defective in operation, workmanship or material, the product will be repaired or replaced and returned to the buyer with transportation and insurance prepaid. If Aquadyne determines that the product is operating normally and the buyer was misusing the product, Aquadyne may charge the buyer for labor and shipping charges.

Aquadyne will give the buyer every possible consideration and will notify the buyer of products not subject to warranty allowance; and promptly upon receiving such notice, the buyer will notify Aquadyne as to whether the product should be repaired, returned to the buyer without repair or otherwise disposed of. Products left in Aquadyne's possession longer than thirty (30) days without the buyer's notice of disposition will be subject to a stocking and handling charge. For replaced items, the buyer will pay the established Aquadyne price. For repair labor, the buyer will pay Aquadyne's established maintenance service rate. Under all circumstances, a product not subject to warranty coverage will free Aquadyne of all transportation charges.

EXCEPT FOR THE EXPRESS WARRANTY SET FORTH HEREIN, AQUADYNE COMPUTER CORPORATION GRANTS NO WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS. THE STATED EXPRESS WARRANTY IS IN LIEU OF ALL LIABILITIES OR OBLIGATIONS OF AQUADYNE COMPUTER CORPORATION FOR DAMAGES INCLUDING, BUT NOT LIMITED TO, CONSEQUENTIAL DAMAGES OCCURRING OUT OF OR IN CONNECTION WITH THE DELIVERY, USE OR PERFORMANCE OF AQUADYNE COMPUTER CORPORATION PRODUCTS.

Buyer's remedies for breach of warranty shall be limited to repair, or replacement subject to adjustment as stated herein, and full or partial adjustment to purchase price.