

Aquadyne Tech Tip

Title: PC Ground Loops

Unstable parameter readings attributable to induced voltage or a ground loop.

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Keywords:

AquaWeb, unstable readings, fluctuations, PC connection, RS-485, RS-232, network, direct wire connection, ground loop, probes, pH, ORP, temperature, readings, LCD arrows, instability, induced voltage.

Symptoms

Probe parameter readings are unstable, do not settle, or are in a constant state of flux (changing).

Probe values are stable but incorrect.

Arrows are indicated in the LCD display.

Products Affected

- Octopus 2000, 3000
- AquaGuard AG300, AquaGuard AG500,
- AquaNode ES

Possible Causes

- Failure of a probe, probe connector or probe cable.
- An electrical ground-loop caused by the induction or coupling of a voltage source such as a high energy lighting system, electrical ballast's, pumps etc, to the Aquadyne computer, its probes or probe wiring.
- An electrical ground-loop induced through an RS-232 or RS-485 connection to a PC or other device which operates at a different voltage or ground reference level.

This tech tip is concerned only with problems induced as a result of connecting a PC computer to an Aquadyne computer.

Resolution

If the PC is the root cause of the problem, this can be confirmed by disconnecting the PC and observing that the parameter readings change and return to a stable non-fluctuating status. If this is the case, the computer is causing a problem should be immediately disconnected to prevent possible electrical shock. The computer system can then be repaired by a qualified electrician.

- When troubleshooting the PC, insure that the computer is connected to a GOOD earth ground and the computer is operating correctly. Have the computer's power supply tested to insure that there is no leakage from the primary power source to the computer's internal ground. Eliminate all sources of radiated or induced voltage source from the PC.
- Connect the shielded serial cable connecting the Aquadyne computer known good earth ground.
- Install an effective RS-232 or RS-485 optical isolation device between the computer and the controller which breaks the connection between the computer and the controller..
- A PC computer system with a faulty or defective power supply or other internal system leaking voltage from the computers own internal ground plane.

When a defective computer is connected to an external device such as an Aquadyne computer, an electrical path is created for power to flow between the devices. This is known as a ground loop. Because the computer is operating at a higher or lower ground potential, low-voltage precision measuring devices such as an Aquadyne computer can be affected and incorrect readings can result.

Probe life is significantly reduced if ground loop condition is not corrected. The typical life span of a laboratory grade pH probe with proper maintenance should be between 12 and 18 months in a normal environment. With a ground loop present, this can be reduced down to less than one month. The probes should not be allowed to operate for an extended period of time in such an environment.

WARNING! The presence of a ground loop condition represents a potential hazardous condition that could result in injury or death to the user. Aquadyne assumes no responsibility with respect to such risks and recommends that a qualified electrician be consulted immediately.

Related Articles

Additional Information:

Prior to contacting Aquadyne Technical Service please read the appropriate manual sections relevant to your problem, and also consulting the trouble-shooting guide located at the back of the user manual.

If you have completed any tests or experiments to isolate and diagnose your system please make notes and have them available to help our technicians troubleshoot and answer your questions.

When Contacting Aquadyne Technical Service please be ready to provide the following information so that we may help you in the quickest most effective manner.

1. Who are you: Your complete name address, daytime phone number, and an email address if you have one.
2. Which Aquadyne product(s) are involved? The Aquadyne model or product part number, the part number revision letter, the system serial number and the software version number. The software version number is displayed each time the power-up sequence is initiated. The serial number and software version are available in the NEW PASSWORD menu. Entering the new password AQDYN will also display the serial number and software version. After observing and recording the Software Version and Serial Number, press ENTER four times to return to the Status Screen.

Technical Support is available from 9:00 AM to 5:00 PM, PST, (858) 569-2082 Monday through Friday. You may also send mail to support@aquadyne.com.

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