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WHAT IS GROUND LOOP?

Ground loop can be a mysterious thing. Have you ever had a controller that was hard to calibrate, or whose readings jumped around? Welcome to the world of ground loop. It is an interfering electromagnetic energy that “gets in the way” of an instrument’s proper operation. The source could be as simple as electricity leaked into your water from a pump motor, or as spurious as the radiated electromagnetic field from a nearby elevator motor. If there is an electrical potential difference between the solution being measured and the instrument, then there will be a flow of ground loop current. Generally, the common reasons for the presence of ground loop are:

- An ineffective earth ground, often from the use of plastic pipe and tanks.
- “Dirty” electrical motors, pumps, mixers, valves, etc. (that leak or radiate electricity into the solution being measured).
- Grounding problems, such as from conductivity or other probes that put voltage into the fluid.
- A fluctuating reference ground due to earth changes or influences from within the facility.

Often, you won’t know you have a ground loop problem until after you sell and install a system. The first indication is frequently a controller (pH, ORP or conductivity) that just won’t calibrate, where readings move up and down and refuse to stabilize. Electricity (ground loop) will always follow the path of least resistance, which will be right through your electrode unless you divert the current flow. The first thing to do is to measure your reading in a beaker of the sample solution, and to compare it to the instrument reading. If the readings correlate, you may have an instrument problem – if not, think ground loop.

Sometimes, you can measure a ground loop with a digital voltmeter. This is done by putting one probe into the fluid being measured, and the other to a good earth ground (like a metal cold water pipe). That’s about all the direct measurement you can do – everything else is indirect or by inference. You, or an electrician, should verify that you have (or create) a true earth ground connected to buried metal. If the problem persists, another choice is to install a ground loop interrupt device in your electrical circuit. This can be built into the controller, an electrode, or function as an external unit. In any case, these devices provide a path of lesser resistance for the ground loop, with a solution ground probe or a DC current isolator that interrupts and eliminates the ground loop. If none of this works, change things – move the location of the installation, swap out the individual pieces of system equipment, or pray. Ground loop can be a mysterious thing.