Glossary

ATC (Automatic Temperature Compensation)

Automatic Temperature Compensation automatically corrects the measured conductivity value based on the temperature of the solution (with use of temperature sensor).

Auto-Buffer Recognition

identifies and ensures correct pH buffer values are being used during calibration of a pH controller.

Base

is an alkaline substance, and in some controllers, the menu option: "DOSE [Base]" means that you intend dosing an alkaline substance to increase the pH.

Biocide Dosing (Non-Oxidising)

Biocide is usually dosed according to 28-day timer programs set up by the user. Each of the timer programs can be programmed to operate either Biocide Pump A or Biocide Pump B on any combination of days per week, on a 1, 2, 3 or 4 week cycle. A typical biocide program consists of 3 consecutive time durations:

Duration 1: Pre-bleed
Duration 2: Biocide dosing with bleed lock-out
Duration 3: Bleed Lock-out

Pre-Bleed & Bleed Lock-out

Pre-Bleed and Bleed Lock-out, when used together, achieve a much more effective kill from the dosing of both biocides into the water system, without resulting in high conductivity and scaling conditions.

Pre-Bleed reduces the system conductivity prior to biocide dosing to allow for a longer Bleed Lock-out duration without the risk of entering scaling conditions. This occurs automatically prior to Biocide A or B dosing, for a time which is programmable by the user. During this time, the TDS is controlled to 87% of the regular setpoint. (This setpoint, called the Pre-bleed Setpoint, is programmable in some controllers).

Bleed Lock-out prevents any bleed-off during and after biocide dosing. Bleed Lock-out is automatic during biocide dosing but is programmable for a time period immediately after biocide dosing as well. By preventing bleed-off during and after biocide dosing, the system is ensured of receiving maximum benefit from the dosed biocide, as no biocide is flushed to drain.

The controller has a programmable lock-out setpoint, which is the temporary TDS setpoint automatically set during bleed lock-out. This should be programmed as the maximum permissible TDS level allowed without going into scale conditions.

Biocide A Dosing is explained in the example below:

Program Item	Setting
Setpoint	1000 TDS
Program 3	Pump A

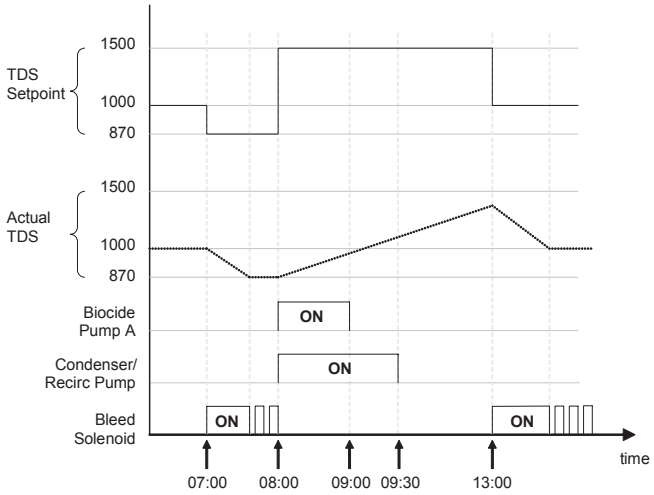
Program Item	Setting
Dose for	0060m
Bleed L/O time	0240m

Start time	07h00
Pre-bleed P/B*	0060m

* P/B setpoint = Setpt x 87%

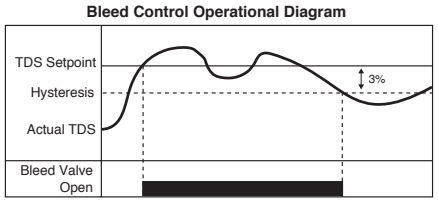
L/O setpoint	Setpt+50%
O/P ON time**	30m

** Delay off time after A dose



Bleed (or Bleed Control)

is the term commonly used for conductivity control of cooling tower water via a dump solenoid valve. The DIGICHEM-XP2 and DIGICHEM Plus+ controllers control the system water to a pre-determined level. This is the programmed Conductivity Setpoint. Control is achieved by regulating the solenoid valve to bleed system water to drain, causing make-up water to dilute the system. The Setpoint is entered via the controller menu as a value. The manifolds have check valves to ensure that injected chemical foes not interfere with the conductivity reading. The controller has hysteresis (ie dead band) which prevents rapid switching of the bleed solenoid valve when the actual conductivity hovers around the setpoint.



Bleed Cycle

is a programmable ON/OFF time cycle in the DIGICHEM-XP2 and DIGICHEM Plus+ controllers. The bleed rate can be slowed down with this programmable bleed cycle. This can eliminate flooding if the drain tends to block, by creating a slower bleed-off. Another benefit of using a bleed cycle is if the system bleeds continuously for long periods of time with weak manifold flow, interrupting the solenoid valve on a regular interval, ensures that chemical dosed into the manifold returns to the tower.

Blowdown

is the withdrawal of water from an evaporating water

system to maintain a solids balance within specified limits of concentration of those solids. This term is often used when describing the conductivity bleed control in a steaming boiler.

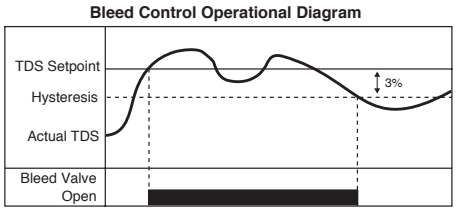
Cell Constant
or K factor is the ratio of the distance between the 2 metal plates and surface area of the 2 metal plates during measurement. Typical cell constants include K=0.1, K=1, K=10.

Cl or Chlorine
is commonly used to disinfect water in drinking water, swimming pools, cooling water systems and wastewater systems. Chlorine may be present in 2 forms – Free and Total Chlorine. Free Chlorine combines with contaminants to form Total Chlorine. The common method of measurement used by the colorimeter is based on the USEPA-approved DPD method of chlorine measurement.

Coagulation
is the process of destabilisation of stable suspensions of fine material or colloidal particles of water. Coagulation followed by flocculation results in the formation of larger aggregated particles which are easier to remove during water treatment.

Conductivity
is the parameter representing the capacity of ions in an aqueous solution to carry electrical current. Units are commonly microsiemans per centimeter.

Conductivity Control - DIGICHEM Controllers
The DIGICHEM controls the system water to a pre-determined conductivity/TDS. This is done by regulating the solenoid valve to bleed system water to drain, causing make-up water to dilute the system. The setpoint is entered as an actual number. The hysteresis (ie. deadband) is fixed at 3% (or programmable in some controllers) to prevent rapid switching of the solenoid valve, illustrated below:



DPD
method is US EPA accepted for reporting drinking water analyses (Free and Total Chlorine) and wastewater analyses (Total Chlorine only).

DO
is the amount of free (not chemically combined) oxygen dissolved in water, wastewater, or other liquid, usually expressed in milligrams per liter, parts per million, or percent of saturation.

Flocculation
is the process which encourages coagulated (destabilized) particles to coalesce into larger particles. It involves stirring water in which floc has formed to induce the particles to coalesce and grow.

FTU
stands for Formazin turbidity units.

Inhibitor Dosing
Inhibitor is a chemical which when dosed into cooling tower systems reduces the possibility of corrsion in the system being. It can be dosed via one of the following methods:

- On a programmable duty cycle, ie. dose time followed by idle time, repeated.
- % of bleed time (This effectively achieves turn-down on the fixed speed pump, ie. duty cycle reduces dose rate).
- % of bleed time, but dosing delayed until the end of the bleed operation.
- Proportional to make-up, (or bleed in the DIGICHEM Plus+) via batch dosing. This is achieved by dosing a certain volume of chemical every time a pre-determined volume of make-up water enters the tower. (An internal counter totalises the pulses from an optional water meter to trigger the pump at each total counted).

IP
stands for 'Ingress Protection'. An IP number is used to specify the environmental protection of enclosures around electronic equipment. These ratings are determined by specific tests. The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the number, the better the protection.

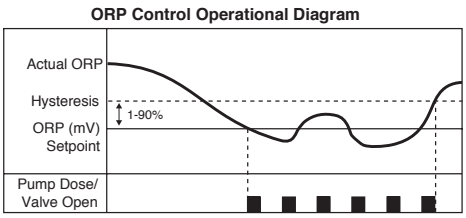
ISE
or Ion Selective Electrode is a specialty electrode used for the measurement of ion concentration.

kPA
or kilopascal refers to a unit of pressure. 101.3 kPa = 1 atm = 14.503 psi. There are 1000 pascals in 1 kilopascal. Some systems are rated in bar instead of kPa. 1 bar = 100 kPa.

ORP (Oxidation Reduction Potential)
is the electric potential required to transfer electrons from one compound or element (the Oxidant) to another compound (the Reductant); used as a qualitative measure of the state of oxidation in water treatment systems. ORP electrodes can detect the presence of strong oxidants or reductants in the treatment plant's influent lines. ORP can also control chlorine additions to raw sewage (prechlorination) for odor control. Examples of oxidizing agents include

oxygen, ozone, chlorine, and peroxide. ORP is also known as Redox Potential.

In cooling towers, dosing takes place to increase the ORP level in order to maintain an ORP (mV) Setpoint. The diagram below illustrates the operation of a simple system.



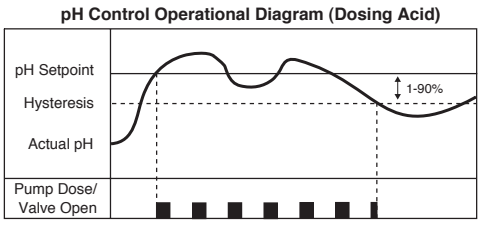
NTU

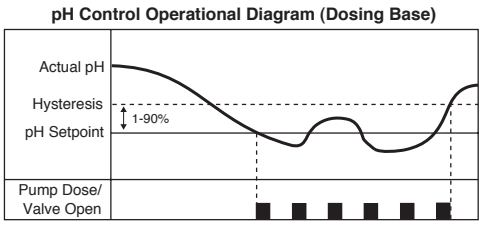
stands for Nephelometric turbidity units, and is the common variable used to measure Turbidity

pH

The logarithm of the reciprocal of the concentration of hydrogen ions (H+)in a medium, like water (log10{1/[H+]}). pH values range from 0 to 14, giving the relative acidity or alkalinity of a medium, with a pH of 7 being neutral, and lower values being acidic, and higher values being alkaline.

In cooling towers, dosing takes place to maintain the pH at a pre-determined level. The diagrams below illustrate the operation of a simple system. When dosing Chlorine in cooling towers, dosing Acid to reduce the pH is the most common application.





pH Slope

is the voltage produced per pH and is theoretically 59.12mV per pH at 25 °C. However in practice it can be anywhere between 50 to 58 mV.

TDS (Total Dissolved Solids)

commonly estimated from the electrical conductivity of the water. Pure water is a poor conductor of electricity. Impurities dissolved in the water cause an increase in the ability of the water to conduct electricity. TDS, usually measured in mg/L, parts per million (ppm) or parts per thousand (ppt), thus becomes an indirect measure of the level of impurities in the water.

TDS Conversion Factor

factor for converting Conductivity to TDS value to best suit the specific sample being measured (e.g. KCl = 0.5, 442 = 0.67 @ 25 °C).

Temperature Coefficient

indicates the temperature influence in the chemical equilibrium (eg. disassociation) of the solution due to non-linearity of intrinsic salt/chemical property varies from one sample to another (typically 2.1%/°C at 25 °C).

Temperature Compensation

in some controllers is usually necessary as most electrochemical parameters (i.e. pH, Conductivity, DO) are temperature dependent and most applications require some form of temperature compensation to ensure standardized measured values. Please refer to the definitions for ATC.

Turbidity

an optical effect caused by dispersion of and interference with light rays. It is caused by suspended solids but cannot be directly related to the quantity of solids present as it is also affected by the size, colour, and shape of the solids present. It is not to be confused with true colour which is independent of suspended solids. The most common variable used to measure Turbidity is NTU.