

ARTICLE

# Protecting ultra violet water treatment plants



## Water treatment

Improvement of global water supplies is becoming an increasing environmental issue, with access to clean water supplies decreasing, and half of the world's population lacking adequate water purification systems.

Water can be boiled, filtered, have contaminations either absorbed or displaced out of flow, be chemically disinfected by addition of chemicals, or be radiated to improve quality. Generally in a large scale treatment plant a mixture of options will be utilised to achieve required quality standards within a suitable cost.

Today, UV treatment utilising a special submerged ultra violet lamp is gaining in popularity. This chemical free process uses a photochemical reaction to destroy parasites such as Cryptosporidia or Giardia, which are proven to be extremely resistant to chemical disinfectants.

The light, producing ultraviolet radiation at about 260nm, is encased inside the pipe work and a regulated flow rate of water against radiation power level is maintained from the UV source. This ensures correct levels of radiation absorption by the water being treated.

## Issues

UV light is emitted when an electrical current passes through the mercury vapour, located within a tube like lamp constructed from quartz. This allows 93% of the lamp's UV light to pass to the outside. Water enters into the reactor chamber and swirls around the light source, with

the exposure to the UV light killing the microbes within the reactor chamber. When the electricity supply suffers, through a voltage sag created by a lightning strike or some other network fault, the UV light is reduced significantly.

A 5% drop in voltage equates to a 10% drop in lamp power (square law). Any larger dip will result in unacceptable levels of intensity. It is mandatory that manufacturers' recommended voltage levels are maintained to ensure correct water treatment.

If the supply dips to typically 65% of nominal supply for as little as 35msecs, the UV light will shut down. It will automatically restart only after the bulb has cooled down sufficiently to allow a re-strike, however this can take as long as 5 to 10 minutes. Unfortunately during this time water is passing through the system and emerging untreated and unlike a chemical treatment there is no residual effect. In this instance untreated water remains untreated and has to be ejected from the system or managed with another alternative.

If there is a complete power outage, the whole process stops.

## Solution

To ensure consistent power to protection the water process against network generated sags, ABB's Active Voltage Conditioners (AVC) provides the following capability.



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01 City of Montreal 2 x  
2000 kVA PCS100-AVC to  
protect UV filtration

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- Correct for deep voltage sags (1-phase up to >80% correction) in less than ½ cycle.
- Continuously regulate the voltage supply to +/- 10%.
- Maintain voltage balance to all loads.
- Be 99% efficient to significantly reduce energy demands.
- Have a small product footprint for on site installation.

#### References

The City of Montreal, Canada recently installed two ABB 2000 kVA 600 Vac Active Voltage Conditioners at their Charles des Bailleys water treatment facility, This initiative followed another USA municipale authority who recently installed 12 ABB 350 kVA AVC units in their UV water treatment plant.

To find out more about ABB's power protection solutions:

Web: [www.abb.com/ups](http://www.abb.com/ups)

Email: [powerconditioning@abb.com](mailto:powerconditioning@abb.com)

#### Additional information

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