Variable speed drives cut water hammer for treatment works

CD19 EN REVB 2007

Case notes

Eight ABB industrial drives help avoid water hammer

ABB drives smooth out demand

Howden Water Treatment Works near Selkirk, Scotland, is a facility owned by Scottish Water, Borders Office, consisting of a borehole pumping station as well as the treatment works itself.

Faced with the danger of extreme water turbulence in the pipework, so-called water hammer, the company decided to install variable speed drives to control it.

Water hammer occurs when the flow of water in a pipe is stopped suddenly, causing a shock wave to ripple through the water and impact on the structure of the pipes, leading to damage. Over time, this can result in burst pipes, causing possible injury to operators. Using a variable speed drive allows demand to be smoothed out, reducing the sudden stops and starts that lead to water hammer.

The drives were supplied and installed at Howden by ABB Drives Alliance member EDC (Scotland) in Renfrewshire.

Consultants Ramsay + Primrose, say: “We have four pumps at the boreholes serving a common contact tank. The ABB drives are particularly useful on the high lift pumps because they allow us to set the rate of filling of the main storage tanks to approximately match demand. This limits the number of stops and starts required and reduces the damaging effects of water hammer.”

Eight ABB industrial drives are used on the two applications – four on the pumping station and four at the treatment works. Two of the drives for the boreholes, pump 5 million litres per day, with the other units pumping 6.6 million litres and 10 million litres per day respectively. The treatment works’ four drives pump 5 million litres and 10 million litres per day in adjustable combinations. The rated duty of the works is 16 million litres per day.

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Ramsay + Primrose add: “We set the filling of the tanks to match the demand, assisting with the regulation of the treatment demand of the system.”

The soft start capabilities of the drives are also critical to the application, helping the facility meet the electricity utility’s regulations on motor starts. To reduce the current at start-up, these must not exceed 68 A at 11,000 V and each motor must be started separately, with a two second minimum time between starts. Active harmonic filters limit the distortion to the supply at the point of common coupling.

Solved problem

- Potential problem of water hammer causing damage to pipes and possible injury to staff.

Solution

- Installation of eight ABB industrial drives to smooth out demand.

Benefits

- Sudden stops that lead to water hammer are reduced.
- Harmonic filters limit distortion to the supply.

The treatment works’ four drives pump 5 million litres and 10 million litres per day in adjustable combinations

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