

## Case note

# ABB drives help Yorkshire Water bring three-phase power to remote pumps



ABB standard drive range of low voltage AC drives used to create a synthetic three-phase supply

Yorkshire Water supplies its customers with around 1.24 billion litres of drinking water each day as well as collecting, treating and disposing of about one billion litres of wastewater safely back into the environment.

Yorkshire Water has a large number of wastewater pumping stations serving rural areas of Yorkshire, and employs this system to power the submersible sump pump motors. These in turn pump the wastewater to the treatment works.

Nick Cooper of Yorkshire Water says: "The cost of installing a three-phase supply at these remote sites can be prohibitive and varies with the distance from the supply network."

To overcome this, Yorkshire Water employs split-phase supplies, a single-phase system using two live lines and a neutral line. These provide a 240/480 V, three-wire single-phase system for areas such as farms and small industrial

areas. The challenge for Yorkshire Water is that its pumps are all three-phase units and need a three-phase supply.

The existing system also used capacitors and contactors which tended to be troublesome.

### Creating three-phases from two

Yorkshire Water asked ABB Drives Alliance member Halcyon Drives to look at the problem. Halcyon solved it using the ABB standard drive range of low voltage AC drives, with ratings of 22 kW. They used the existing split-phase supply to create a synthetic three-phase supply. This works by connecting the 480 V supply to the drive on two of its input phases. The drive then converts the AC input supply to DC, converts this back to AC and outputs a three-phase 415 V supply. The DC link stabilisation feature of the drives prevents voltage oscillation caused by weak supply voltages.

### Wide ranging benefits

As well as the cost savings of installing a three-phase supply, using drives in this way avoids the need capacitors and contactors. Since the low voltage drives have been installed at the sites maintenance has been reduced.

Other benefits include the ability to vary flow rates as demand changes, soft starting and stopping to avoid excessive wear and tear on the pumps, the ability to maintain constant pressure through the proportional integral derivative (PID) feature of the drives and the energy saving abilities of centrifugal pumps. Also the ability to run ABB's pump cleaning software, which runs a pump forward and reverse alternately to remove blockages.

Adds Cooper: "One of the other advantages the drives give us is the ability to log data to diagnose faults, while the three-phase ability gives us a much wider choice of standard submersible pumps."

A number of installations are now in operation throughout Yorkshire Water's area. These sites are the Black Horse, Kirklington, Pickhill, Tunstall and Colburn Village Pump Stations.

### Challenge

- Remote pumping sites needing expensive three-phase supplies

### Solution

- ABB standard drives use the existing split-phase supply to create a synthetic three-phase supply.

### Benefits

- Avoids cost of running three-phase supply to remote sites
- Removes need to use capacitors and contactors
- Better control flow rates using variable-speed drives
- Potential to use pump cleaning software to keep pumps clear of debris
- Ability to log data to diagnose faults



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