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Case Study

Rotork actuators with *Profibus*

Rotork actuators with Profibus – 18th June 2011

Profibus-enabled actuators *support advanced water treatment plants*

Sector: Water & Wastewater Treatment

Category: Control Networks, Electric Actuators

Products: IQ Standard, IQT Standard Profibus



Overview

Rotork IQPro intelligent electric actuators with Profibus two-wire digital control provide an adaptable, reliable and economical solution for automated valve monitoring and control. Two recent projects undertaken by Wessex Water serve to illustrate the benefits of adopting Profibus-enabled Rotork actuators for automated valve control in new-build schemes and modernisation programmes in existing plants.



SCADA screen at Maundown, monitoring the operation of rapid gravity filters

The Reason

Maundown water treatment plant was originally built in the 1960s and first extended in the early 1970s. The site has recently been entirely redeveloped to further improve the quality of drinking water, upgrade the water treatment facilities and meet the increased demand for water from the 200,000 customers served in central Somerset.

The Solution

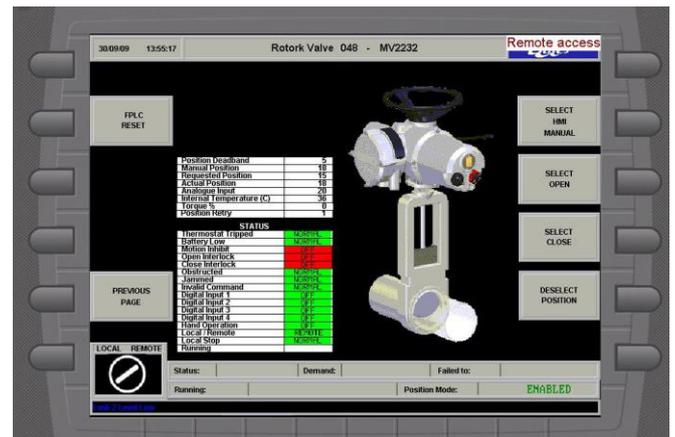
More than 200 Rotork intelligent electric valve actuators have been installed throughout the £25 million project at Maundown. Under PLC control, Profibus-enabled Rotork IQ and IQT electric actuators operate penstocks and butterfly valves to control the flow of water and sequential backwashing operations throughout the new state-of-the-art treatment plant, comprising raw water screening, dissolved air flotation, rapid gravity filtration and granular activated carbon treatment followed by chlorine contact tanks. As well as increasing the treatment capacity to 82.4 MI/D, the improved treatment processes

overcome taste and odour problems caused by increased algal blooms in the local water sources resulting from changing weather patterns. Swanage sewage treatment works utilises the latest membrane bioreactor technology to produce high quality effluent that exceeds EU standards and is cleaner than the sea into which it is discharged. The site treats sewage for a population of around 10,000 which can more than double when the area is busy with holiday makers. A major plant upgrade at the site has introduced automation and energy saving measures, whilst increasing the size of the membrane treatment plant to provide spare capacity for future demand. Following preliminary screening and grit removal, sewage enters Kubota membrane plants installed in six large tanks for biological treatment and disinfection. The upgrade involved doubling the number of membrane plants in each tank to thirty-six thus considerably increasing the treatment capacity without exceeding the confines of the existing works' footprint. Automation of the treatment process has also enabled it to run with increased efficiency and reduced energy consumption.



HMI screen at Maundown. The Rotork actuators can be interrogated, monitored and controlled at these stations

Central to the upgrade, Profibus-enabled Rotork IQT actuators have been installed to operate butterfly and plug valves on new pipework throughout the plant. On each of the membrane plants, the Rotork actuators operate inlet isolation and outlet modulating valves for the sewage, together with air, sodium hypochlorite and wash water injection valves. Other IQT actuators controls permeate isolation valves used for automated sequential flushing to maintain membrane efficiency. In total fifty-one actuators are installed on each tank to provide automatic sequencing of the sewage treatment, membrane cleaning and backwashing processes.



HMI screen at Swanage, displaying actuator status

At both sites, the Rotork actuators are linked on Profibus-DP two wire networks to PLCs in motor control centres. These are controlled by a PLC and SCADA system written by Wessex Water's in-house Automation Team. The control PLC is a twin CPU (Central Processing Unit) configuration, with one dedicated to the control and monitoring of the actuators whilst the other runs the complex automation process, resulting in the collection of control, status and full diagnostic data from each actuator without any PLC speed

or memory limitations.

Diagnostic information, stored in the actuators' data loggers, is available locally at the valve, on nearby HMIs, on site SCADA systems and remotely at Wessex Water's regional operation centre at Bath, some sixty miles from both sites. Remote diagnosis is recognised by Wessex Water as a cost effective method of maintenance and service as it enables the right operational staff to be sent to site when required. Diagnostics also allow the plant to run with increased efficiency by ensuring that maintenance is only performed when it is absolutely necessary, ruling out the need for over-cautious routine maintenance schedules.

The Benefits



IQT actuators controlling the backwashing sequences on the membrane plants at Swanage

The sophisticated control benefits provided by Rotork IQPro actuation technology combine with Rotork's legendary mechanical design features to deliver long term low cost of ownership, optimum reliability and maximum plant availability.

Amongst these features, the double-sealed, IP68 watertight and temporarily submersible enclosure ensures that the actuator will operate reliably in the most challenging environments. 'Non-intrusive' set-up and commissioning technology eliminates the need to remove the actuator's electrical covers on-site once the electric connections are made in the separately sealed terminal compartment.

A spokesperson added:

"With the high level of process automation enabled by the Rotork actuators comes the added benefit of process integrity auditability, together with highly reliable and accurate process control. The effective use of Profibus technology has allowed significant installation savings in cabling, terminations, PLC hardware and labour."

As a further assistance to maintenance, the actuators utilise Rotork's 'bumpless' Profibus interface module, enabling individual motorised valves to be disconnected without disrupting communication with other devices on the network.

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PUB000-178-00
Issue 06/11

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