

# RACO electric actuators

STEEL WATER ENGINEERING  
FLOOD GATES

RACO



## RACO electric actuators employment in hydraulic engineering steelwork - Closure of a flood gate by means of two electro actuators in synchronisation over RACOMATIC®

With a width of 47.6 meters and a backup height of 6 meters, the weir system in Döbeln is one of the largest high-water-protection projects of the past years. It was instructed by the State of Saxony and the City of Döbeln after the devastating flood disasters in the years 2002 and 2013. The company RACO participated in this future-oriented project and could once more use their more than 60 years of experience in the project planning, manufacture and control of high-performance electric actuators.



The demands made on every individual RACO electric actuators involved an actuation force of 80 tons and a stroke of 4500 mm. Since the electro-cylinders were attached to the foundations by means of Cardan suspension, this required an exact calculation of the bending stress on our part. With the aid of the "Finite Element Method", our engineers checked the CAD data and confirmed the safety factors of the components which were within the stress flux pattern.

In order to enable the routing of the enormous masses of water of the Freiburger Mulde (depression) in an emergency, heavy-duty RACO high-performance electric actuators are in use to withstand the stroke forces of up to 805 kN. These rugged RACO electric actuators are designed so that they guarantee a long operational life-span under the prevailing conditions. They are provided with special corrosion protection for hydraulic engineering steelwork. Furthermore, they require energy only when being used, which points to their resource-protective energy efficiency. A likewise installed retention brake latches the RACO electric actuators in their respective positions and in this way also offers protection in case of a power failure. A manual actuation can be adapted to manual control in an emergency.

The uniform adjustment of the weir valves with 28 tons weight requires a special mechatronic fine adjustment: RACO, with their control technicians, also participated in the concept for the control of the entire system. In each case, two electro-cylinders work in synchronisation in order to move a weir gate. The micro-PLC from RACOMATIC® is provided with a full-text display and already includes the local control which is located in the switchgear cabinets, as well as the gangway over the flood backup gates. From there, communication to the control room is established in the machine house. This control has a visualisation for the operation of the complete weir system and is provided with an emergency power-generating set.

## Realisation of the control concept

For the preparation of our control concept, the requirement on maximum security for the City of Döbeln against renewed flooding was always in the foreground. The RACOMATIC® is provided with the functionality of local control and therefore is effectively installed in direct range of vision of the flood backup gates.

Our concept provides for the situation where, in case of a failure of the higher-level control in the operating house, the two weir gates can be activated autonomously with a separate local control in each case. Also a switchover of the local control of the operation for one flood backup gate to the other is possible. The semi-automatic and manual operation is provided both for the electric actuators pairs at the respective flood backup gate and for their interlocking cylinders. In case of power failure, an individual switchgear cabinet can be operated with a mobile emergency generating set (e.g. from the fire department).

## Emergency manual operation

In accordance with the specifications of **DIN 19704**, with activation of the manual actuation, the main drive is automatically blocked electrically and, in case of multi-side-driven applications, all drive units simultaneously. In electrical operation, the manual actuation must be isolated mechanically. The brakes of the main drive may be vented only after the coupling of the manual actuation, and must be closed again before decoupling. A controlled water overflow is thus enabled without a complete "lowering" of the weir valve in the fully-opened state being implemented through a simple release of the retention brakes.



For the manual operation of a weir valve with the two electric actuators, RACO additionally supplies two attachable gears with self-locking handwheel, which are flanged on the motor shaft end behind the brake housing. A mechanical brake venting of the electro-cylinder is implemented in this case "automatically".

**Would you like to find out more about our products? We would be glad to advise you!**

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