

RACO electric actuators

STEEL WATER ENGINEERING
ACTUATION OF A PIVOTING BRIDGE

RACO



RACO electric actuator employment in hydro mechanical engineering steelwork - Actuation of a pivoting bridge segment by means of two electric actuators in synchronisation

RACO electric actuators are used for flap bridges for movement and interlocking. The scope of delivery of the company RACO includes both the electric cylinders for the bridge drives, as well as the RACOMATIC® e.g. for synchronising circuit, as well as the project planning. The movement profiles for the opening and closing of the flap bridge can be programmed individually and control-activated in optional operating modes. The RACOMATIC® for the synchronising circuit includes a micro-PLC, which can also be used as a local control. In the same way, a manual control of every electric cylinder is possible in order to carry out an adjustment in the tolerance range.



The City Marina IJdock in the centre of Amsterdam is the new hot spot for sailing vessels and motorboats. The central yacht harbour is enclosed by the new courthouse and the Room Mate Hotel.

Ref. the project:

By means of two electric cylinders, the movable segment of a flap bridge is positioned. The architecturally appealing design provides for the horizontal installation of the two electric cylinders below the fixed part of the flap bridge on the southern bank. The movable bridge segment is pressed over a hinge from the horizontal position into the vertical opening position.

The control of the entire flap bridge system, including the traffic lights etc., is implemented video-monitored from the central control room of the City of Amsterdam. Over a hotline, the opening of the bridge and thus access to the "City Marina" port can be requested. For the application of the "drive command" for the actuation of the movable bridge segment, the synchronising circuit for the two electric cylinders is provided, which can also be used as a local control.

Significant characteristics:

- The security concept provides that one electric cylinder alone can hold the bridge segment. By the venting of the retention brake, an electric actuator can be "dragged" by the second electric actuator and thus the bridge segment can be driven with reduced speed in an emergency.
- The load-change reactions with wind load in the opened, vertical setting of the bridge segment are a further boundary condition. This determines an increased brake torque of the electro-magnetic brake on each electric actuator which is adapted to the wind load.
- The synchronising circuit for the two electric actuator is capable of being used autonomously as a local control and of control-activating each electric actuator separately in an emergency.
- The distortion of the steel structure with fluctuating ambient temperatures is compensated by a force-monitored control activation for the placement of the bridge segment on the opposite bank.
- The sea climate places high demands on corrosion protection and the ceramic coating of the sleeve.

RACO concept / function:

The scope of delivery of the company RACO includes two electric cylinders of the Type K1T10 and the RACOMATIC® for the synchronising circuit. The drive system is implemented redundantly with the two electric actuators. If a voltage failure occurs during a movement of the bridge segment, the RACOMATIC® can be kept active by means of an interruption-free power supply (UPS), in order to intercept the bridge segment and keep it securely in position (safety concept: "fail fix"). The required safety standards concerning fall protection and personal safety were realised using redundant system components and the higher-level main control, including sensor technology. As a further safety feature, both electric cylinders are also provided with a security catch nut, as well as the main nut of the ball screw drive.



The comb profile between the segments in the area of pedestrians and cyclists!

In order to balance the tolerances in the steel structure, the regulating speeds of the electric actuators were adjusted individually so that, within the movement between start and stop signal, different paths are driven. As a result, the support points are reached precisely.

In this way the maximum regulating speed is exploited during opening of the bridge over the entire lift. The "park position" of the bridge segment in the open setting is freely optional within a range. The low-play, precision-ground ball screw drive from RACO is the core of the electro-cylinder. This can take up the resulting load-change reactions. During closing of the bridge, the aspect "safe switch-off" of the electric cylinders is especially important in the position where the bridge segment has reached the support point on the opposite bank. This is achieved over the RACO torque control system, which is active in creep motion prior to reaching the support point.

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

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