Bow thruster

In 1982 Vetus introduced the first bow thruster for boats. Since this first introduction, the bow thruster has become a firmly established concept in the boating world.

The thrust force

It is the thrust force which is the true measure of a bow thruster's usefulness and not the output of the electric or hydraulic motor in kW or hp. The nominal thrust force is a combination of the motor power, the shape of the propeller and the efficiency losses inside the tunnel. Vetus electrical bow thrusters have a very high thrust of between 17 and 23 kgf per kW motor power. The required thrust force to counter the effects of the wind is now calculated by dividing the turning moment by the distance (B) between the center of the bow thruster tunnel and the pivot point of the boat.
Note: the further forward the tunnel can be positioned, the greater effect the thruster will have.

Calculation example

The boat has an overall length of 11 meter and the lateral wind draft measures 18 m². It is required that the bow can be controlled easily when wind force Beaufort 5 applies. At wind force Beaufort 5, the wind pressure is: r = 41 to 74 N/m², i.e. p (average) = 60 N/m².

The required torque reads:

T = wind pressure x wind draft x reduction factor x distance center of effort to pivot point, (= approx. half the ship's length)
T = 60 N/m² x 18 m² x 0,75 x 11 m = 4455 Nm²

The required thrust force is calculated as follows:

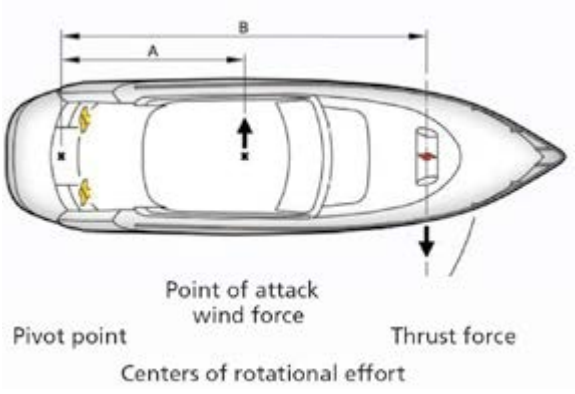
$$F = \frac{\text{torque}}{\text{distance between center of bow thruster and the pivot point of the boat (with the transom as pivot of the boat)}} = \frac{4455\ \text{Nm}}{10.5\ \text{m}}$$

= 420 N (42 kgf)

The Vetus bow thruster which is most suitable for this particular vessel is the 55 kgf model (25 kgf in the case of Beaufort 4 and 75 kgf in the case of Beaufort 6). Always bear in mind that the effective performance of a bow thruster will vary with each particular boat, as the displacement, the shape of the underwater section and the positioning of the bow thruster will always be variable factors. As a rule of thumb it can be assumed that the stern thruster may be "one model smaller" than the bow thruster model, as it has been calculated. Therefore, in this case a stern thruster type 35 kgf will be the correct model.

Below is a selection table of bow thruster model against recommended boat length. Please note that this table is given for general guidance only and the calculation shown above should be used whenever possible.

The turning moment



The turning moment is calculated by multiplying the wind force by the distance (A) between the center of effort of the wind and the center of rotation of the boat. In order to simplify this somewhat: for the vast majority of boats a rule of thumb may be applied that the turning moment is calculated by multiplying the wind force by half of the boat's overall length.

Selection table	
Thrust force	**Boat length**
25 kgf	suitable for boats from 5.5 to 8.5 meters in length
35 kgf	suitable for boats from 6.5 to 10 meters in length
55 kgf	suitable for boats from 8.5 to 12.5 meters in length
60 kgf	suitable for boats from 9 to 13 meters in length
75 kgf	suitable for boats from 10.5 to 15 meters in length
95 kgf	suitable for boats from 12 to 17 meters in length
125 kgf	suitable for boats from 14 to 20 meters in length
160 kgf	suitable for boats from 16.5 to 22 meters in length
220 kgf	suitable for boats from 19.5 to 26 meters in length
230 kgf*	suitable for boats from 20 to 26.5 meters in length
285 kgf	suitable for boats from 22 to 29 meters in length
310 kgf*	suitable for boats from 22 to 29 meters in lengthr
410 kgf*	suitable for boats from 27 to 34 meters in length
550 kgf*	suitable for boats from 33 to 43 meters in length

*Only available as hydraulically driven bow thruster