SIDE-POWER

Thruster systems

# Thruster size calculations for

## General thruster sizing advice:

### Basic facts

- Any thruster will do *a* job in any boat. It is a matter of countering the opposing forces. If the opposing forces are 0 (no wind and no current, *any thruster* will move *any boat*.
- The weight / displacement of the boat is not a real opposing force to the thrusters ability to move the boat in the desired direction. However, it is an important factor for how fast a thruster can move the boat. But, as most pleasure boats have a relatively large windage compared to their weight / displacement, this is not a factor that is considered when calculating the thruster size for a pleasure boat.

  However, If the boat is more heavy than "normal" compared to its windage, you should consider increasing the size of thruster so that it is not seen by the user as underpowered because it moves the boat unusually slowly.

### Choosing the right size to offer your customers

- As you will also see from the explanation of the calculation table we have made a listing of what the different performance numbers means in "normal language" and compared to average thruster sizes used today. While the choise of thruster should as the rest of the equipment reflect the boats "quality" target and price level, it is also important to remember that as with main engine sizing there is a minimum size necessary for it to do a reasonable job.
- If the boat has twin engines it is less of a problem to go into the OK / Economy area as you with such boats can help with the engines when the conditions are really rough.
- When a thruster is standard equipment in the boat, it is normal that the size is chosen in the OK / Economy area as it is a part of the boats base price.
- It is now normal that boatbuilders that have a "OK / Economy" thruster as standard in a boat also offer an upgrade thruster as an option to pay extra for. We think this is the right way to go as the demand for thruster performance can be as different as the demand for different main engine sizes in a boat. Different customers wants and needs different performance, all depending on how they use the boat and what they are used to or is expecting.

  The Sidepower range of thrusters are developet to help make the offering of upgrade thrusters as easy as possible by having several thrusters available in the same tunnel diameter. This is important so that the important work a boatbuilder can do to make the tunnel installation as perfect as possible to get the best possible performance and low noise level.
- When a thruster is only sold as an option that the customer pays "directly" for it is normal to offer a thruster in the Normal / Good area as the customer will then have a higher expectation to the performance. This is more like a retrofit situation where we see that if somebody desides to install a thruster in their boat, they always choose a good size thruster to be sure that the "investment" is not a waste because the thruster did not do the job as well as they want.
- Sailboats are often a little different in the calculations than motorboats. It is normal for sailboats that the main calculation result "A" that shows the maximum windspeed that the thruster can move the boat against is relatively high even when the thruster is "too small" for the boat. The reason is that the pivot point of a sailboat is close to the back end of the keel which puts it much further forward than on a motorboat where it is normally approximately 15% from the stern. Because of this the leverage advantage for the thruster in a sailboat is often very good, but the problem is that this number only say at which windspeed the thruster can move the bow against the wind. It is thereby very important to also consider the "B" value in the calculation which tells you when the whole boat will fall away from the wind, even if the will pivot so that the bow is moved against the wind.

### Beware:

If you wish to use these Sidepower calculations to choose a size of thruster from another manufacturer there are many traps to fall into:

- Many thruster manufacturers use only a "Hp" rating of their thrusters. This is a very misleading term as it has nothing at all to do with the thrusters actual performance.
- There are also many thruster manufacturers that quote a thrust figure without explaining what or where this is measured, or if it is tested at all. We have found that several brands are quoted at 12V / 24V at the thruster and this is virtually impossible to achieve in anything near a normal installation
- Probably the most intentional misleading that some manufacturers do is that they give their thrusters a "name" that most people will think is the performance. They are covering themselves by quoting the "real" (at which voltage ?) figure in their technical specifications.

### Our advice:

Make sure you always get a correct thrust rating with a description of what this number means of the thruster you are considering.

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## Explanation of calculation table:

### ( A )

This windspeed is the calculated maximum speed of a direct (90o) sidewind that the thruster will turn the bow against. When you get closer to the maximum, the bow will be turned very slowly towards the wind, and the whole boat will generally drift away from the wind. We advice to if possible choose a thruster size so that this number is never less than 17,5 knots.

- OK / Economy : 17,5 - 19,5 knots
- Normal / Good : 19,6 - 22,5 knots
- High power : 22,6 + knots
- If this calculation shows more than 25 knots, and the ( B ) calculation shows more than 21-22 knots, an ON / OFF thruster will start moving the bow very fast so that if anybody is on the foredeck they can fall over. This size of thruster is normally only desired on rather large boats were soft start systems or proportionally controlled hydraulic thrusters would be available.

| Sidepower thruster model | SP55S |
|---|---|
| **( A )** Turn bow against maximum direct side-wind of | 20,2 kn<br>Beaufort 5,75<br>10,4 m/s |
| **( B )** Thruster equals total windpressure at | 14,0 kn<br>Beaufort 4,5<br>7,2 m/s |
| **( C )** Equal size bow+stern thruster moves sideways against: | 19,8 kn |

### ( B )

This windspeed is the calculated speed of a direct (90o) sidewind where the boats pivot point will stay in the same place, i.e. the bow moves into the wind and the stern falls off.
We advice that this number is never less than 13,5 knots.

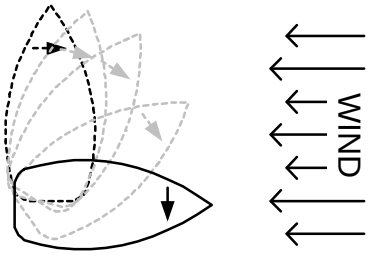
### ( C )

We generally advice the use of the same sternthruster as bowthruster. The exeption is if you ensure a better electric installation of the sternthruster compared to the bowthruster, in which case a thruster of 20-30% less performance will move the boat about directly side-ways.

## Boat behaviour with different thruster sizes

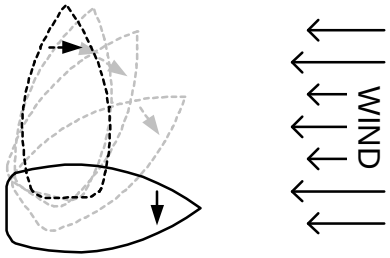
### When windspeed is less than ( B ) in calculation:

When the thruster push more than the total windpush on the boat you will see a degree of this behaviour. The amount of movement against the wind will depend very much on the thruster and pivot point positions. Depending on also the weight / displacement of the boat the bow can move relatively fast against the wind, and it will also when the boat have turned some move the boat further sideways.



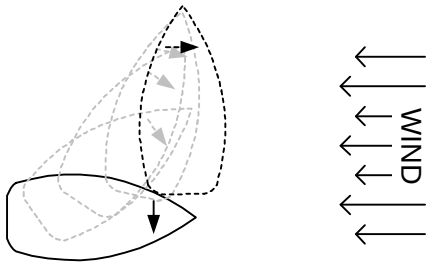

### When windspeed is approximately the same as ( B ) in calculation

When the thruster push equal to the total windpush on the boat, the boat will basically turn around its pivot point, except it will move a little more "sideways" later in the process as there are less wind pressure "holding" against the boat when you have turned the bow against it.




### When windspeed is more than ( B ) in calculation.

When the thruster push less than the total windpush on the boat you will see a degree of this behaviour.
If getting close to the maximum windspeed where the thruster can move the bow against the wind, the total boat movement away from the wind gets very big and the thruster will use a very long time to move the bow against the wind.




***Note!The thrusters performances are calculated at "normal" running voltage (10,5 / 21V) and with adviced installation. All calculations are based on direct sidewind so that performance is of course better if the wind comes at a different angle.***