

Kemp Sails

Tuning the fractional rig

This guide covers the basics of setting up fractional rigs, but we suggest that you read it in conjunction with our masthead tuning guide, which explains a number of principles and definitions applicable to both types of rig.

Fractional rigs - so called because the forestay and cap shrouds join the mast some way from the top - are becoming increasingly popular on performance cruising yachts. But their ratios have changed significantly over the past 20 years or so. Whereas we used to see a good many 3/4 rigs - in other words, with the hounds at about 75% of the mast's height - they've now given way to 7/8, 9/10 and even 15/16 configurations. Those of the latter persuasion may sound as though they're practically masthead rigs, but they're not; often having swept-back spreaders and relatively bendy masts, they're far closer in nature to a fractional. Another trend is towards double spreaders and smaller mast sections, which are now even found on some 30-footers. The benefits include less weight and windage aloft. On the other hand, they're more complex to set up.

Fractional principles

The most popular style of fractional rig has the cap shrouds taken over swept-back spreaders - so they not only support the mast athwartships, but also pull it back, against the forestay. As a result, a backstay isn't always needed; given sufficient sweep-back on the caps, the mast will stay up without one. Nonetheless, most fractionally-rigged yachts have a backstay to provide more control over mast bend and to lend extra support downwind in heavy conditions.

Since the cap shrouds are responsible for countering forestay sag, they need to be substantially tighter than those on a masthead rig. How much help they get from the backstay depends on the position of the hounds. With a 3/4 rig, for example, the backstay will do little more than bend the topmast, whereas it exerts more influence over a forestay that's only a foot or two below the masthead.

Fractional gains

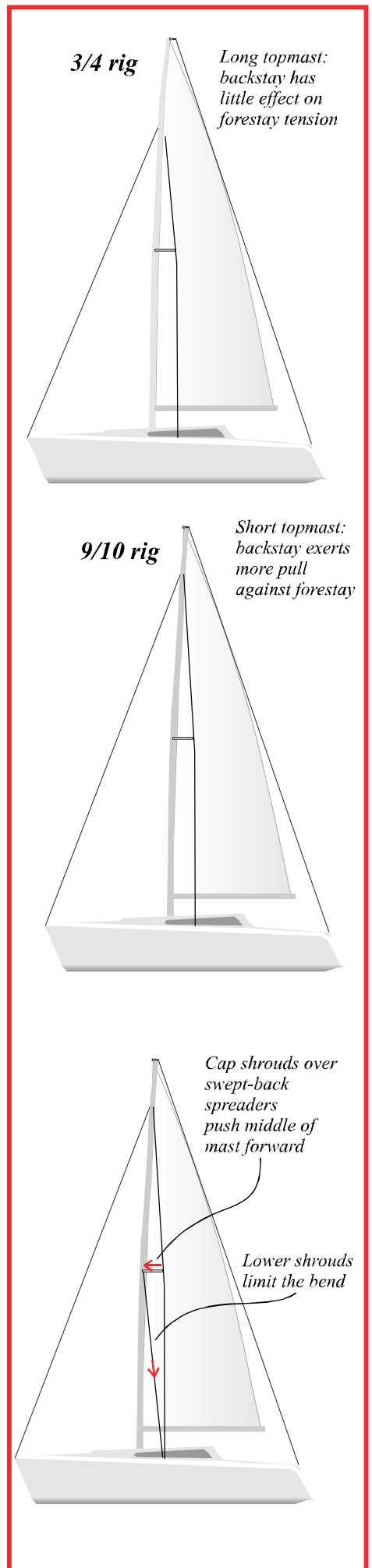
By its very nature, a fractional rig will normally have a relatively larger mainsail and smaller foretriangle than a masthead equivalent. Not only is the main more important because of its size, but it's more demanding to trim due to the rig's inherent "tweakability" - by bending the mast, you can de-power it for strong conditions without needing to reef. The down-side is that there's more scope for getting things wrong.

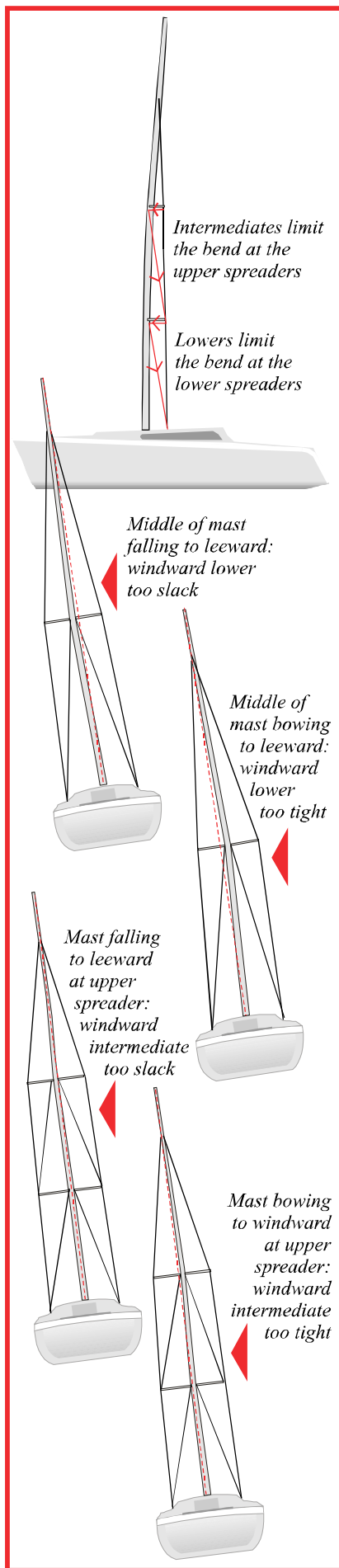
Rake and pre-bend

The initial set-up is similar to that of a masthead rig; the mast must be straight and upright athwartships, the bottlescrews hand-tightened, and the forestay length set to allow a little rake. Fractional rigs generally need more rake than mastheads, but 2 or 3° is a good starting point. Check with the designer, builder, class association or other owners to see what's recommended.

As for the pre-bend, fractional rigs again need more as a rule - it guards against inversion (particularly important since you have no forward lowers or babystay) and makes it easier to bend the mast further in strong conditions.

Bear in mind that, with swept-back spreaders, tensioning the cap shrouds will automatically push the middle of the mast forward. The greater the sweep-back, the greater the effect.





Limiting the bend

Now that you've completed the initial preparation, it's time to wind the cap shrouds down tightly. You're aiming for about 25% of their breaking strain, but don't worry about measuring the tension at this stage - you'll be able to see whether it's right when you start sailing.

As you tension the caps, the mast will start to bend. Carry on until you have about twice the amount of pre-bend you want; taking up the lowers will then pull the middle of the mast back and remove half the bend. Except in a small number of cases, the caps should always be substantially tighter than the lowers, whose principal function is to control how far the mast will bend when you tension the backstay.

The precise amount of pre-bend is something your sailmaker will need to know, so he can match the curve in the mainsail's luff to the bend in the mast. If you can't find out what the measurement should be for your boat, aim for half the mast's fore-and-aft measurement.

Since the lowers are relatively slack, they will let the mast bend further when you pull on the backstay. If your sail becomes too flat when you apply backstay tension, the lowers should be tighter to keep the mast straighter.

Intermediate action

Intermediates on double-spreader rigs control mast bend at the upper spreaders, in the same way that the lowers work further down.

Set up the caps, then adjust the intermediates and lowers to ensure an even curve all the way up the mast. Adjusting the intermediates is easier if they terminate at the chainplates, but often they're attached to the lower spreaders so you'll need to climb the mast.

Checking under way

As with a masthead rig, pick a day with flat water and enough wind to heel the boat 15-20° under full sail.

It's even more important with a fractional rig that the leeward cap shroud should not go slack - otherwise the rig will pivot around the windward shroud and become subjected to unfair twisting strains. If the caps are too slack, take up a turn or two on the leeward bottlescrew, then tack and do the same on the opposite side.

Your other check is to sight up the back of the mast for kinks or S-bends. Since you've already made sure the masthead is central - and the cap shrouds tight enough to stop it falling away to leeward - only the lowers and/or intermediates should need adjusting at this stage. If the middle of the mast is falling away on a single-spreader rig, tension the windward lower. If there's a bow to windward, ease it off a little.

With double-spreader rigs, it's easy to get S-bends: the diagrams illustrate some of the problems and solutions.

