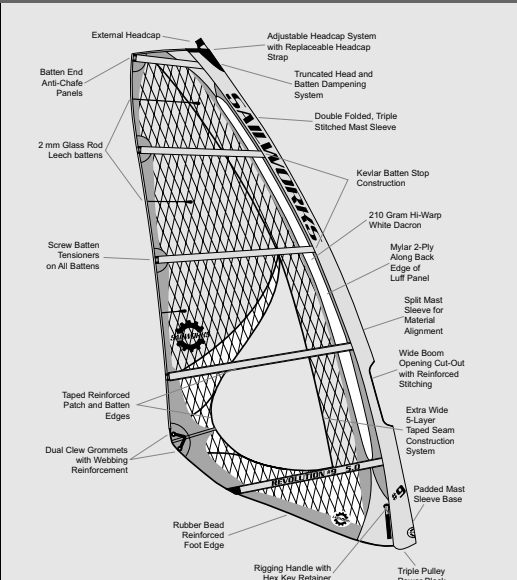
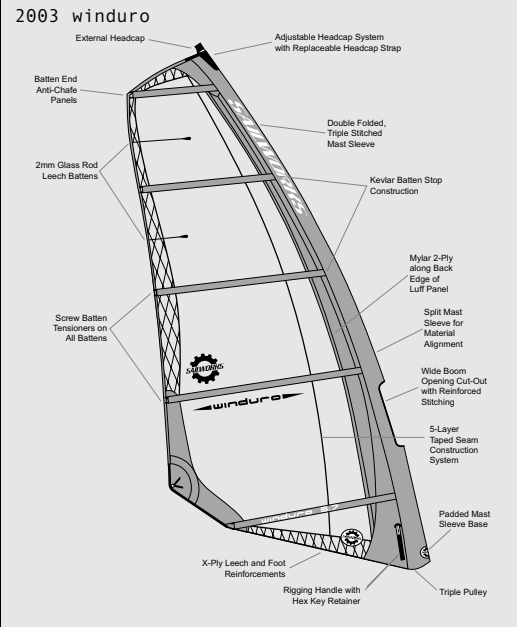


SAIL MAINTENANCE

- Shake the sand off before rolling up your sail at the beach, as this will help keep the monofilm clear. Most scratches to the monofilm are caused by sand and grit abrading the sail while it's rolled up.
- Rinse with fresh water occasionally, including inside the mast sleeve, to avoid salt and sand buildup.
- Avoid rigging on hard or abrasive surfaces.
- If left rigged for extended periods, release the outhaul and downhaul.
- Store your rigged sail out of direct sunlight. UV degrades monofilm.
- To prevent creases in the monofilm, roll your sail tightly, use a sail tie to keep it rolled tightly and store the sail where it won't get flattened.
- Repair tears promptly through a qualified sail repairperson. Make temporary repairs to the monofilm with Mylar packing tape or a sticker on both sides.
- Do not use solvents for cleaning near seams, as this will dissolve the seam tape adhesives. Use water and mild soap. To remove tar spots or sticker adhesive residue use a citrus based cleaner.
- When on the beach, secure your sail from blowing away.
- Avoid getting sand or dirt inside the mast sleeve and batten pockets. This reduces sail performance by increasing friction and wear on the mast and battens.
- Loosen the batten tension if you are not going to use the sail for an extended period.



2003 revolution#9



2003 winduro

2003 revolution#9 and winduro rigging and tuning guide

▼ revolution #9



winduro ▲

revolution#9	2.9	winduro	5.0
	3.2		5.7
	3.5		6.4
	3.8		7.4
	4.0		
	4.2		
	4.4		
	4.6		
	4.8		
	5.0		
	5.2		
	5.4		
	5.8		



>www.sailworks.com<

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Design: Bridgeworks
Printed in Canada
Photography:
Michael Hildreth
Bruce Peterson
Martin Sundberg



Thank you for purchasing this 2003 Sailworks Revolution#9 or Winduro

The Revolution or Winduro are simple, yet highly developed sails that offers stunning versatility, power and handling. They can be adjusted and tuned to suit a wide variety of conditions. To fully understand and experience the potential of the Revo or Winduro, please take a few minutes to read this rigging guide.



REVOLUTION # 9 DIMENSIONS							REQUIRED MAST*							
SIZE m ²	LUFF MED. (cm/ft)	BOOM MED. (cm/ft)	BOOM MAX. (cm/ft)	WEIGHT (kg/lbs)	# BTNS	MAST SLEEVE	IDEAL MAST	MCS CURVE %	IMCS STIFFNESS	LIPSTICK 370	400	430	JOYSTICK 430	460
2.9	346/11'4"	130/4'4"	135/4'6"	2.5/5.5	5	OPEN	370	12	15 - 19					
3.2	352/11'7"	133/4'5"	138/4'7"	2.6/5.7	5	OPEN	370	12	15 - 19					
3.5	365/12'0"	137/4'6"	142/4'8"	2.7/5.9	5	OPEN	370	12	15 - 19					
3.8	384/12'7"	142/4'8"	147/4'10"	2.8/6.2	5	OPEN	370	12	15 - 19					
4.0	398/13'1"	147/4'10"	152/5'0"	2.9/6.4	5	OPEN	400	12	17 - 21					
4.2	405/13'3"	152/5'0"	157/5'2"	3.0/6.6	5	OPEN	400	12	17 - 21					
4.4	413/13'7"	157/5'2"	162/5'4"	3.1/6.8	5	OPEN	400	12	17 - 21					
4.6	417/13'8"	162/5'4"	167/5'6"	3.2/7.0	5	OPEN	400	12	17 - 21					
4.8	421/13'10"	164/5'5"	169/5'7"	3.3/7.2	5	OPEN	430	12	21 - 26					
5.0	424/13'11"	170/5'7"	175/5'9"	3.3/7.3	5	OPEN	430	12	21 - 26					
5.2	436/14'3"	172/5'8"	177/5'10"	3.4/7.5	5	OPEN	430	12	21 - 26					
5.4	446/14'8"	175/5'9"	180/5'11"	3.5/7.7	5	OPEN	430	12	21 - 26					
5.8	454/14'11"	186/6'1"	191/6'3"	3.7/8.1	5	OPEN	430	12	21 - 26					

WINDURO DIMENSIONS							REQUIRED MAST					
SIZE m ²	LUFF MED. (cm/ft)	BOOM MED. (cm/ft)	BOOM MAX. (cm/ft)	WEIGHT (kg/lbs)	# BTNS	MAST SLEEVE	IDEAL MAST	MCS CURVE %	IMCS STIFFNESS	430	JOYSTICK 460	490
5.0	426/14'0"	169/5'7"	174/5'9"	3.0/6.6	5	OPEN	430	12.0	21 - 25			
5.7	452/14'10"	185/6'1"	190/6'3"	3.2/7.0	5	OPEN	430	12.0	21 - 25			
6.4	469/15'5"	192/6'4"	197/6'6"	3.5/7.7	6	OPEN	460	12.0	24 - 26			
7.4	495/16'3"	209/6'10"	214/7'0"	4.0/8.8	6	FIXED	460	12.0	24 - 30			

USE THE RIGHT MAST

One of the most important choices you make when rigging a sail is which mast you put in the mast sleeve. Specifically the length, curve and stiffness of the mast, and how closely these parameters match the sail. The mast is quite literally the backbone of the rig and it governs the sail's performance. The mast requirement for each Revo & Winduro are printed on the sailbag and at the tack of the sail. Your mast must be within this required range, regardless of the brand or model. The Revo & Winduro sails are designed around Sailworks "constant curve" masts that exhibit a nominal MCS curve profile of 64% at the base and 76% at the tip. If in doubt about the suitability of your mast, consult with your Sailworks dealer or contact us directly through our web page: www.sailworks.com

Not all sail sizes will work on the same mast. Sailworks sails are designed around an equivalency ratio of static pre-tensioning per square meter. This means larger sails need more pre-tensioning and smaller sails need less. Thus, larger sails need longer and stiffer masts while smaller sails require shorter and softer masts. Two of the most common compatibility problems are:

- Using too long, or too stiff a mast. This restricts wind range by over-tensioning the sail.
- Using too short or too soft a mast. This restricts wind range by insufficiently stabilizing the sail.

Each Revo and Winduro sail size is designed and balanced on a specific Sailworks mast to suit conditions typical for the "average" size sailor (140 - 190 lb./ 63 - 86 kg). If you are lighter than this average, or prefer a softer handling feel, consider using the next mast softer or shorter listed in the

table. Heavier sailors can use a slightly stiffer mast to increase rig tension and stability.

Certain Revo sizes (3.8, 4.6 and 5.8 m²) and Winduro sizes (5.7 and 7.4 m²) are "cross-over" sizes in that they can be rigged effectively on two different mast lengths, depending in the weight of the rider. Sailors over 90 kilograms (200 lbs) should consider using the next longer (and stiffer) mast than what is recommended on these sizes.

SET THE HEADCAP LENGTH

All the Revo and Winduro sails, except the Winduro 7.4, have a double adjustable headcap system that allows you to adjust the length at either end of the strap. This also allows you to replace the strap at the beach if it wears out. A spare strap is included with this rigging guide, and it is long enough for use with a longer mast. The strap installed on the sail is the correct length for the "optimum" mast length.

Check the luff length of your sail - (printed at the tack and on the sailbag), and compare it to your mast length. If your mast is shorter than the luff length, adjust the headcap strap so the headcap sits as close to the top of the mast sleeve as you can set it. If your mast is longer than the luff length, estimate the amount of mast that will extend out the top of the sleeve (mast length minus luff length). Adjust the strap so that the top of the headcap is 1-2 cm shorter than this distance away from the top of the mast sleeve to allow for the strap to cinch tight.

RIG ASSEMBLY**1. INSERT THE MAST**

Pull the sail down the mast in sections using first the tack handle then the boom opening to help you. Working the mast tip to the top of the sleeve before trying to pull the tack all the way down to the base of the mast. To prevent excessive wrinkling and creasing of the luff panel, try to avoid laying the sail down on the ground before the mast is all the way in. Keep the battens all rotated to the under-side of the mast. Check that the headcap is seated completely in the mast cap and that the two-piece coupling of the mast is joined completely before applying downhaul tension.

2. INSERT THE MAST BASE

If your mast is shorter than the sail's luff length, estimate the amount of mast base extension needed (luff length minus mast length), and adjust your base extension. Your downhaul pulley system should have 6:1 purchase and enough line to make lacing easy. The Power Block triple pulley on the sail works best with 4 or 5 mm line. Lace the downhaul line, keeping the path of line looping in the same direction each time you feed it through the Power Block and through your base pulleys. We recommend lacing counter-clockwise working from the underside upwards to the top pulley. Try not to cross the lines, as this increases friction and makes the downhaul harder to pull. Do not fully downhaul the sail yet - leave the downhaul just "hand-tight", or at 50% maximum tension.

3. ATTACH THE BOOM

Adjust your boom to the length specified for the sail. Attach the boom at your preferred boom height. If in doubt as to where to place the boom, attach it to the mast at the middle of the boom opening and re-adjust it after the sail is fully rigged. Be careful not to attach it too high in the boom opening, as you must account for the sail to be downhauled further. Also be careful not to pinch the mast sleeve or your uphaul line under the boom clamp. Do not set the outhaul yet.

4. TENSION THE STREAMLINED BATTEN TENSIONERS (SBT's)

The battens are tensioned using the hex-key tool found under the Velcro tab above the tack handle. Insert the hex-key into the cap screw inside the end of each SBT at the leech end of each batten. Turn the hex-key to the right (clockwise) to tighten. Tension the battens **JUST** until the small wrinkles across the

batten pockets disappear.

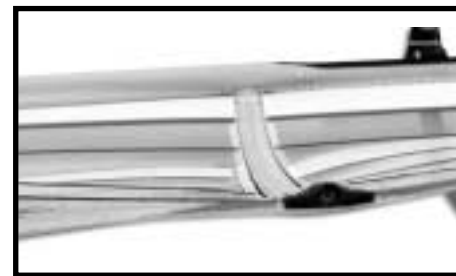
Look for continuous smooth shape to the sailcloth adjacent to the batten pocket (see photos). You should see a smooth reflection, with no wrinkles alongside the battens.

**CAUTION: DO NOT OVER-TENSION THE BATTENS - POOR ROTATION, EXCESSIVE FOIL DEPTH AND DAMAGE TO THE SAIL CAN RESULT.**

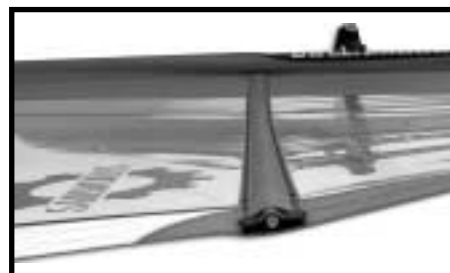
Replace the hex-key tool back in its pocket above the tack handle. You will need to re-tighten the batten tension after your first few uses as the sail stretches and sets into its final shape. Once the batten tension is set, it's not necessary to release batten tension after each session.



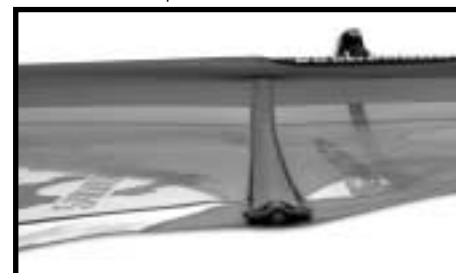
▲ revolution#9 needs batten tension



▲ revolution#9 perfect batten tension



▼ winduro needs batten tension



▼ winduro perfect batten tension

5. TUNING THE DOWNHAUL

There are two key indicators of correct downhaul tension. One is the position of the batten tips (front ends) relative to the mast, particularly the batten just above the boom. The other is profile angle of the upper battens and tension distribution around the head and leech. The downhaul is the primary controller of the sail's shape and performance. With the boom on, but no outhaul pulled, discover the downhaul's effect by slowly pulling and releasing the downhaul line a few times. Watch the change in depth and tension of the leading edge (front 1/3 of the sail), and the flattening and loosening of the head and leech area as more downhaul is pulled. Specifically notice the change in the angles, or twist, of the upper battens. The top batten should twist open to leeward the furthest - called "progressive twist". Twist is cut into the panel layout and seam shape of the sail, but is ultimately controlled by the downhaul tension. More downhaul induces more twist; less downhaul allows less twist. Twist improves sail efficiency by lowering the center of effort and making the sail easier to control.

5. TUNING THE DOWNHAUL (continued)

The head and leech looseness that creates the twist in the sail's shape is a drag-reducing feature that improves the overall aerodynamic efficiency of the sail. Note that it is more significant how far IN from the leech looseness extends, rather than how far DOWN the leech it extends.

The optimum downhaul setting gives a tight luff with a lean entry. The leech area between upper battens should become loose in arced lines from the ends of the battens around the front of the teardrop ends of the mini battens. The front end of the batten above the boom should be at or very near the back edge of the mast.

Use less downhaul to increase foil depth for more power, to tighten the leech for better pumping; and to reduce twist and increase power in the upper part of the sail. Use more downhaul to tighten and flatten the leading edge of the sail, to lower the center of effort and to induce more twist. Refer to the tuning graphics on the next page for visual references.

Once you're familiar with the correct downhaul setting, re-check the headcap length vs. mast base height. If necessary, readjust these so that the tack pulley sits very close to the mast base cleat, and the amount of mast extending out the top of the mast sleeve is minimized. Never use both mast base extension AND headcap extension - eliminate one and minimize the other.

If needed, use an easy-rig or downhauling crank so that it is easier to make the correct settings.

To ensure that the sail is tuned properly, you must make a judgment upon the wind conditions you are about to use the sail in, and tune the sail according to your size, skill and abilities to handle those conditions.



revolution#9

6. BALANCE THE OUTHAUL SETTING

Release any outhaul tension and allow the sail to relax naturally. For reaching conditions at medium downhaul settings, pull the outhaul a minimum of 2.5 cm (1 inch) from this neutral position. Cleat off the outhaul line. Check the foil depth by pushing on the sail area near the front of the boom or standing it up in the wind. Under pressure, the sail will increase in depth as the battens pull back from the mast. When luffing or without pressure, the sail will flatten.

winduro

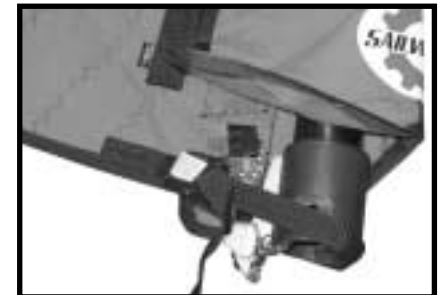
Less outhaul makes the sail fuller, moves the center of effort (power) further back and creates more power for accelerating and deep reaching. This setting is harder to control when over-powered or sailing upwind. More outhaul makes the sail flatter, moves the center of effort (power) further forward and creates a lean, tight foil that is more efficient for upwind sailing or over-powered conditions. Whenever you significantly change downhaul, you will need to adjust the outhaul tension too.

By design, the Revo and Winduro sails are exceptionally responsive to changes in outhaul settings. Use the outhaul as a throttle control for more or less power. Set the sail fuller with less outhaul for more power. Set the sail flatter with more outhaul for more stability and control in high winds. Set the downhaul first to match the wind conditions, and then adjust your outhaul settings.

7. TACK STRAP

The Winduro sails have a tack strap at the foot of the sail should be looped around the lower edge of the mast base. This strap is used to increase the tension that runs along the foot edge of the sail and to make the foot area deeper. The tack strap is particularly useful for improving rig control when very overpowered. In these circumstances, apply lots of tension on the tack strap to increase the depth and tension in the lower half of the sail. This increases the disparity of rig tension between the upper and lower sections, effectively increasing sail twist, which improves rig control by lowering the center of effort.

winduro tack



Q "How does the downhaul affect the outhaul; why do I need to adjust both?"

A When you downhaul a sail, you are essentially bending the mast into the curve of the sail's mast sleeve. As you pull more downhaul, the clew moves away from the mast, increasing the boom length. As you ease off the downhaul, the clew moves toward the mast, decreasing boom length.

Q "How do I rig my sail for bump & jump conditions?"

A Set your sail up with more downhaul and less outhaul to get the maximum power and twist for control in gusts and chop.

Q "What do I do if I keep getting backwinded when wave sailing?"

A Flatten the sail more by pulling the outhaul and downhaul so the batten above the boom clears the mast. If the foil is too deep it will backwind as you change direction on a wave. A flatter sail will be more controllable in wave riding, but less powerful to get up on a plane.

Q "Why do I keep getting pitched forward?"

A The sail needs more downhaul to flatten the upper section of the sail and increase the amount of twist. This will streamline the upper section of the sail and lower the center of effort.

Q "Why does my back arm get tired? I'm having a hard time sheeting in?"

A The sail needs more outhaul. This will move the draft forward and improve directional stability and control.

Q "Why does the draft profile seem to move around a lot?"

A You need more downhaul to stabilize the sail shape better. Increase the downhaul tension, and then use the outhaul to create foil depth for power as required.

Q "Why is the downhaul difficult to pull?"

A Make sure your downhaul lines are not crossed through the pulleys, especially the last loop that goes to the cleat. Make sure your line diameter isn't too thick. Use a fresh piece of line. Try using an easy-rig or downhaul crank.

Q "Why don't my battens rotate very easily?"

A Check that the battens are not over tensioned, as excessive batten tension will impede rotation. Increase the downhaul tension. Insufficient downhaul impedes batten rotation.

Q "Why can't I get planing when I feel I should be able to?"

A Ease the downhaul slightly. Too much downhaul flattens the foil and excessively loosens the leech, which gives you more control in heavy wind, but less power in light wind. Ease the outhaul to deepen the foil shape. Too much outhaul will also flatten the sail and take power away, which is good for high wind control but not for light wind power.

- If it doesn't feel right, it probably isn't. A well-tuned rig should be effortless to sail and control. Take the time to explore different settings and make the changes necessary to balance the aerodynamic forces from the sail.
- Once you have found settings (boom length, mast base length, boom height, mast step position, downhaul and outhaul position, harness line position) that feel balanced, record the position of each adjustment so that they are easy to repeat next session. Mark the settings with a waterproof marker right on your equipment.



2003 revolution #9



2003 winduro

light wind settings



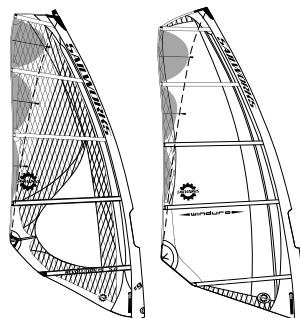
2003 revolution#9



2003 winduro

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winduro

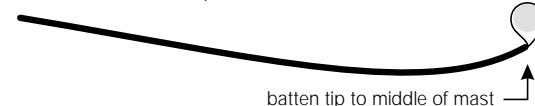


light wind settings

Maximum power but unstable and difficult to control when overpowered.

- Downhaul:
- Leech shows looseness along the edge between battens and extends in to the teardrop at the end of the mini battens
 - Batten tip above boom sits beside mast, but never extends past it. Batten tip will hit mast during rotation.
- Outhaul:
- Deeper foil, less twist
 - Pull the outhaul about 1-2 cm from neutral position
 - Boom length becomes shorter

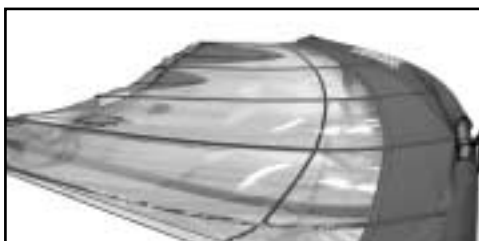
cross section profile of batten above boom



mid-range settings



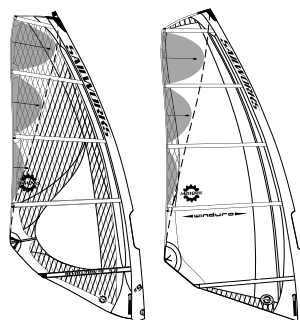
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2003 winduro

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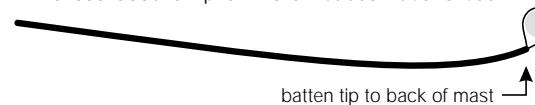


mid-range settings

Good all-round settings for maximum power and control.

- Downhaul:
- Leech shows looseness extending in 5-10 cm (2-4") beyond teardrop at the end of the mini battens
 - Batten tip above boom sits at back edge of mast with slight overlap. Batten tip may hit mast during rotation.
- Outhaul:
- Lean foil, moderate twist
 - Pull the outhaul about 2-3 cm from neutral
 - Boom set at medium specified length

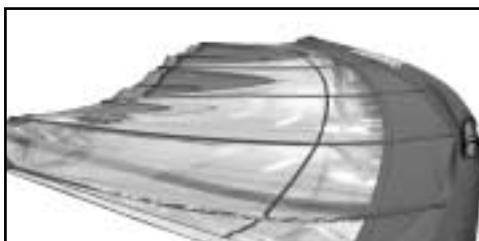
cross section profile of batten above boom



high wind settings



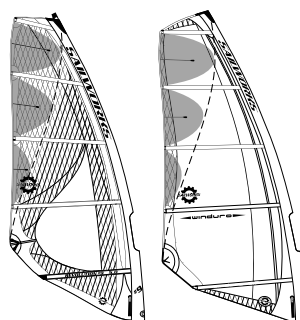
2003 revolution#9



2003 winduro

revo

winduro



high wind settings

Maximum control and stability but not powerful in light winds.

- Downhaul:
- Leech shows looseness extending in 15-20 cm (6-8") beyond teardrop at the end of the mini battens
 - Batten tip above boom sits behind mast. Batten tip will not hit mast during rotation.
- Outhaul:
- Flatter foil, more twist
 - Pull the outhaul about 4 cm from neutral
 - Boom length becomes longer

cross section profile of batten above boom

