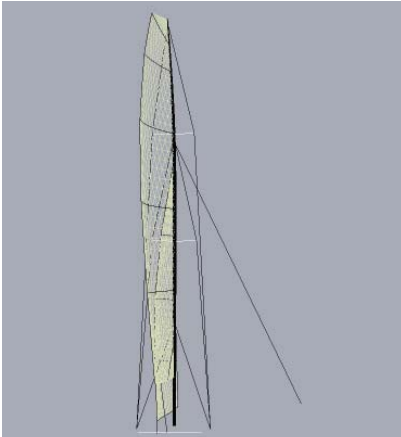


49er Mast Users Manual



Southern Spars 49er Mast Users Manual

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49erclass

Introduction

Southern Spars is the licensed supplier of the 49er rig. The three piece male moulded mast is made from 100% standard modulus carbon and is available through licensed 49er dealers.

In carbonising the 49er rig, the goal was to develop a rig that could be easily and accurately reproduced with an emphasis on the details that affect performance.

The focus was on how to achieve consistency of: bend, weight and CG. 'Bend' is determined by the tube stiffness, spreader angle and spreader stiffness, while weight and CG are controlled through strict quality control of materials.

It was also important to ensure the rig retained its ability to perform through the full wind range while targeting an ideal crew weight of 155-160kg.



Before building the first prototype rig, many hours were spent running finite element studies of the mast-sail combination to ensure the rig performed properly throughout the full wind range.

Theoretical rig setup (dock tune) was established and the boat was run through a range of conditions using the software to simulate real sailing loads to output the deformed sailing shapes of the mast and sail. The mast stiffness and sail design was changed many times and fine tuned using the software before it was made and sent sailing. Independent on-the-water testing was conducted by Julian Bethwaite and his team, using the first prototype rig in conditions ranging from 5-30 knots along with a range of crew weights.

The rig has been developed as a 3 piece mast. The longest section is less than 4m so it is able to be easily freighted around the world. Both sets of spreaders are identical and interchangeable. The spreaders slide over the tube joining spigots between the mast tubes and are separate parts. This allows simple assembly and ensures that the spreaders can be easily transported separately and protected from damage.

Southern Spars have developed a unique system where the spreaders automatically line up when the mast sections are fitted together.

The main and spinnaker halyard sheaves are incorporated into the masthead fitting.

Purchase systems for the Main and Jib halyards are now attached to the mast base to give more travel and easier access for adjustment. The main halyard has a 2:1 purchase at the head, plus a 2:1 adjustment at the base.

For more information about Southern Spars, visit the website @ www.southernspars.com

Care

Washdown

Ensure the spar is washed down after each sail and all salt has been removed. This will help prevent corrosion of parts.

The mast should be thoroughly washed down once a month, inside and out, to keep it in top condition.

Paint Scratches

Paint scratches should be touched up to avoid bare carbon being exposed to the elements.

Southern Spars uses a two-pot polyurethane (gloss). Any polyurethane paint system can be used to touch up over this.

Travel

When shipping your mast, or travelling by road, it is important to package it well using the Southern Spars covers.

Ensure that rigging is removed to prevent the stays from wearing or banging against the mast.

It is recommended a full inspection is performed when re-rigging the mast.

Rig Inspections

New Stays will stretch slightly after sailing; therefore it is important to re-inspect your tuning each day for the first 2-3 sessions after sailing with the new rigging.

Tape any clevis pins or sharp edges to prevent tearing of the gennaker.

Weekly Inspections

- All halyards, taping etc should be checked on a weekly basis

Monthly Inspections

- Check to see that all sheaves are free turning and well lubricated
- Check for wear on stays and spreaders

Bi-annual Inspection & Re-rigging Inspection

- Check all fittings for wear
- Check mast for cracking
- Check spreaders for wear

Setup Quick Guide

1. Fit spreaders to midsection. Slide top spreader over join at top of midsection. Slide bottom spreader over bottom join.
2. Fit main halyard and gennaker halyard going either side of upper bolt
3. Fit jib halyard
4. Join mast sections together
5. Thread halyards through mast base
6. Attach mastbase
7. Align spreaders with mast base and ensure sail track is aligned. Tightly fasten screws.
8. Fit upper stays to bolt and run through top spreader
9. Fit shrouds (just below top spreader), and run through bottom spreader
10. Fit forestay and lowers
11. Tie trapeze lines through both ends of Dynex loop



Setup Tips

Useful Tools when Assembling the Mast

- Spanner for M5 nuts
- 3mm Allen Key
- Electrical tape
- 5m of 4mm wire as a threading guide wire

Halyard Threading

The main halyard is 3mm dynex rope with a 4mm Spectra tail.

Remove the sheaves in the head fitting and tie the end of the halyard to the lower clevis pin on the back of the head fitting. Remove the upper stay bolt. The main halyard is a 2 to 1 system and goes through the shackle that attaches to the head of the mainsail.



Once you thread the main halyard (behind upper bolt) and gennaker halyard (in front of upper bolt) through the tip section pull tight and tape into place. At this point look up inside the tip section to check the halyards aren't twisted.

Thread the jib halyard through the Harken HK 302 exit block at the top of the midsection. Then thread the jib halyard through the midsection and tape into place.



Now run the main and gennaker halyards through the midsection, again pulling each halyard tight once they have gone through. Check that the halyards are not twisted.

Thread the halyards through the bottom section and out the mastbase. It is best to do this with the mastbase not attached to the mast. The gennaker halyard exits out of the front of the mastbase.

The main and jib halyards exit through the back sheaves in the mastbase. Before re-attaching the mastbase do a final check that the halyards are not twisted and are running freely.

Joining the Mast

The top join has two locating screws and the bottom join has three screws. These screws should be done up tightly with the curved washers underneath, located correctly on the mast.



To join the mast together, slide the top spreader (spreader with Dynex loop on) over the join at the top of the midsection. Fit locating screw. Slide bottom spreader over join at the bottom of the midsection. Fit locating screws.

Now align the spreaders with the mastbase, making sure that the sail track is aligned. Once aligned, tightly fasten locating screws.

When attaching the spreaders and joining the mast sections make sure that the joins butt up against each other. The angled cuts are done at exactly 22.5%.

If you are to fit a replacement to your rig and it doesn't accurately align, lightly sand the join of the mast and use a small rats tail file in the fastening hole so the screw doesn't pull the mast out of alignment.

Attaching Trapeze Lines

When attaching the trapeze lines to the Dynex loops at the top spreader, make sure both trapeze lines go through both loops.

Do not attach one trapeze line to one loop, then the other trapeze line to the other loop – both trapeze lines need to be through both loops.

Attaching Stays

Please note: The T bars on rigging need to be “long neck” T Bar hooks, otherwise you will not fit these in the mast correctly.

Fit one end of one of the uppers (stays with eyes on both ends) onto the uppers bolt making sure there is a washer on each side between the mast and upper stays. Then bolt through mast, ensuring the gennaker halyard is in front of the pin and the main halyard is behind the pin. Fit the second upper stay and tighten uppers bolt. Remove the clevis pins and retainer stay plates from the outer ends of the top spreaders. Place stay into hook, then refit stay retainer back into spreader with the hook opening facing forwards.

Next fit the shrouds by inserting the T-bar end of the stay in the mast. This should be inserted just beneath the top spreader. Remove the clevis pins and retainer stay plates from the outer ends of the bottom spreaders. Place stay into hook, then refit stay retainer back into spreader with the hook opening facing forwards.



Fit the forestay to the mast by inserting the forestay on the front of the mast just above the top spreader. Fit the lowers in the bottom section.

Before putting the rig up, perform a final check, confirm that all fittings are attached correctly, nuts are tightened, and that all clevis pins and sharp pieces are taped.

NOTE: Under Class rules, the mast sections and spreaders must be able to come apart for measurement purposes.

Tuning Guide

Over the next couple of years the top sailors in the class will develop and fine tune the fastest settings for the new carbon rig.

We will continually update the tuning guide with as much of that information as possible, this will be available on our website.

Mastbend



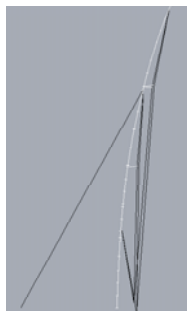
The old rig went best with a straight bottom section. The top section was relatively soft and this produced a dynamic response that automatically depowered the rig in gusts.

The new rig relies more on the square top for depowering. There is less luffcurve in the top of the main so the head will open automatically in gusts to an even greater degree than the old rig.

To support the square head, we made the top of the rig a lot stiffer. The lower section of the mast has a very similar stiffness to the old rig, however the whole rig needs to be set up with a more even bend to get a good balance on the helm.

If you set up the mast straight in the lower sections like before, then the boat will feel stalled and go slow. Forget about the way the mast looked before and set up the bend so that the main looks good.

There will be less change in sail depth through the wind range and the main will retain a tighter leech for longer, so you will probably set up the main slightly flatter than before.



Rig Tension

The mast is stiffer overall, so the shroud tensions will be different.

Use the same forestay tension as before: 29-30 on the loose. The top of the mast is a lot stiffer, so the uppers will probably

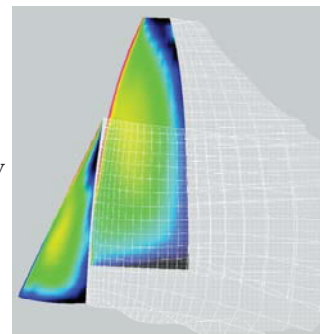
require more tension to set the head at the right depth.

The head needs to be flatter than before for the head to work, so it may take some time to get used to looking at the flatter top. You probably won't need as high loads on the lowers to keep the lower section straight.

Don't worry about the tension of the main shrouds. As long as the forestay is at the right tension and the uppers and lowers have the main set up at the right depth and behaving right through the wind range then the shrouds are at the right tension.

This style of rig is probably a little more sensitive to lowers tension than the old rig, and fine tuning them will make big differences to the balance through the wind range.

Happy sailing, and please email any tips or tuning information that we can use to develop a more detailed guide to onedesign@southernspars.com



Dealers

49er masts, rigging, spare parts and covers are available from the following suppliers:

Argentina

Martin Bulloch Marine
San Fernando
P: +54 11 4745 8428

Martin Bulloch
info@bulloch.com
www.bulloch.com

Australia

Bethwaite Design
Woollahra Sailing Club
Vickery Ave, Rose Bay
NSW 2029
Australia
P: +61 2 9371 6338

Clynton Wade-Lehman
clynton@bethwaite.com
www.bethwaite.com

Southern Europe

Nautivela srl
via Gardone 8,
Milano
Italy
P: +39 02 55212116
F: +39 02 55212116

Paolo Portiglia
paolo@nautivela.com
www.nautivela.com

Japan

Performance Sailcraft Japan
3 13 31, Ayase shi
Kamitsuchitana Minami
Kanagawa Ken, 252
Japan
P: +81 467 76 1051
F: +81 467 76 1052

Takao Otani
psj@psjpn.co.jp
www.psjpn.co.jp



New Zealand

Mackay Boats Ltd
24 Manga Rd
Silverdale, Auckland
New Zealand
P: +64 9 426 4306

Dave Mackay
dave@mackayboats.com
www.mackayboats.com

Europe

Ovington Boats Ltd
Tanners Bank
North Shields
Tyne & Wear, NE30 1JH
Great Britain
P: +44 (0) 77 19 59 49 49

Chris Turner
chris@ovington.co.uk
www.ovingtonboats.co.uk

USA

Laser Performance North America
300 Highpoint Ave
Portsmouth RI 02871
USA
P: +1 401 683 0400

Devin Kelly
devin.kelly@laserperformance.com
www.laserperformance.com

49er Mast Parts

Below is a list of 49er parts supplied by Southern Spars and available through 49er dealers.

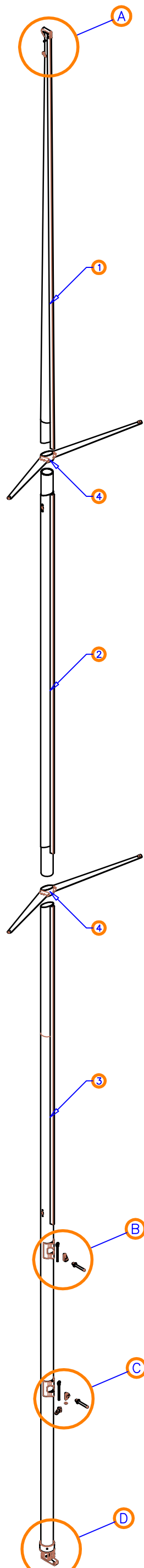
- 590-0460 Complete Mast**
Mast sections and spreaders excluding rigging
- 550-0200 Wire Rigging Set**
Dyform forestay, lowers; shrouds & uppers; excludes stay adjusters
- 590-0480 Halyard Set**
Main and jib halyards with tails; spinnaker halyard
- 500-0062 Tiller Extension Standard**
Including urethane universal
- 500-0063 Tiller Extension Extra Light**
Including urethane universal
- 590-0484 Rigging Bag**
Including urethane universal
- 590-0485 Mast Cover Rig Mast**
Including urethane universal
- 590-0486 Mast Cover Travelling**
Including urethane universal



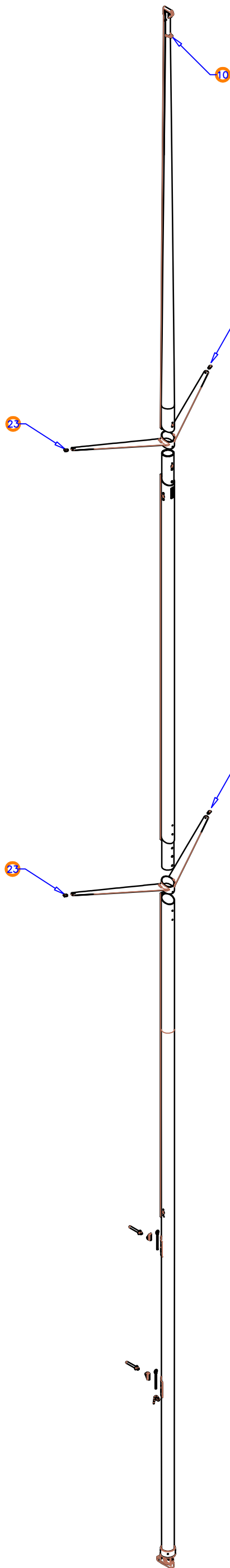
49er Spare Mast Parts

- 590-0461 Top Section**
Complete with masthead and all fittings
- 590-0462 Middle Section**
Complete with all fittings
- 590-0463 Bottom Section**
Complete with mastbase and all fittings
- 590-0482 Spreaders (ea)**
Excluding stay retainers and pins
- 590-0474 Stay Retainer Ring**
Spreader end retainer ring
- 590-0465 Mastbase**
Complete with sheaves
- 590-0464 Gooseneck/Vang Bracket**
Gooseneck bracket, Vang bracket without pin
- 590-0473 Gooseneck Pin**
Complete with vang attachment ring

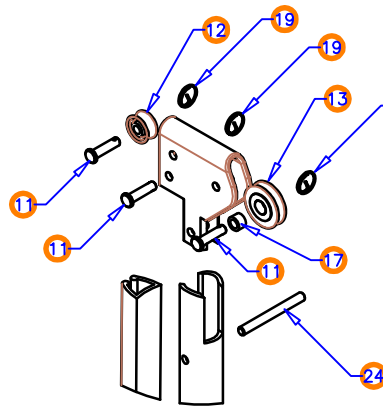




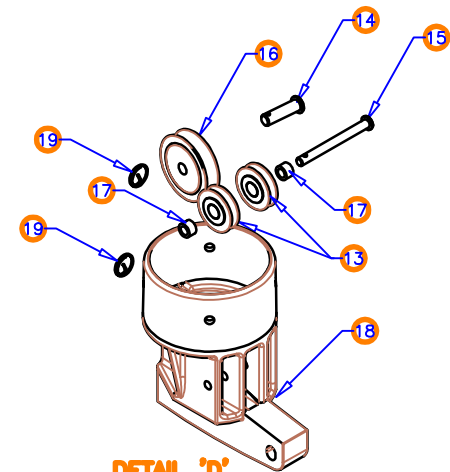
AFT VIEW ISOMETRIC
SCALE: NTS



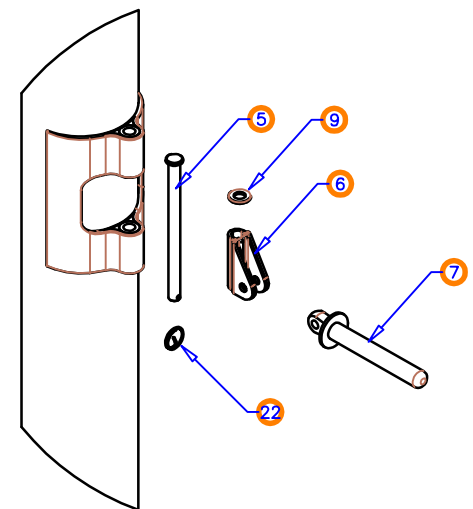
FWD VIEW ISOMETRIC
SCALE: NTS



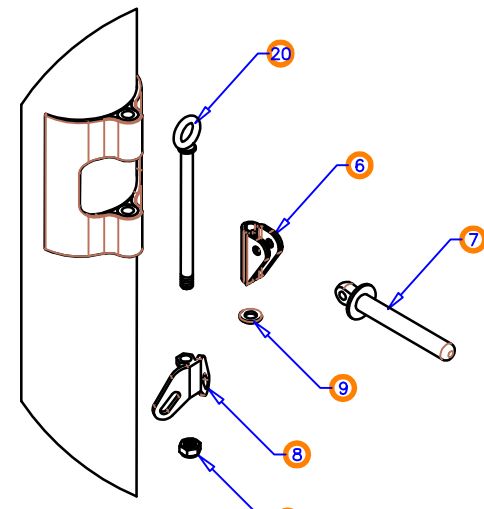
DETAIL 'A' MASTHEAD
SCALE: 1:2



DETAIL 'D' MASTBASE
SCALE: 1:2
SUB ASSEMBLY PART#: 590-0465



DETAIL 'B' VANG BRACKET
SCALE: 1:2



DETAIL 'C' GOOSENECK BRACKET
SCALE: 1:2

DESIGN BOM					
ITEM	DESCRIPTION	PART No.	REV	QTY	
1	49er TOP SECTION (COMPLETE)	590-0461	A	1	EA
2	49er MIDDLE SECTION (COMPLETE)	590-0462	A	1	EA
3	49er BOTTOM SECTION (COMPLETE)	590-0463	A	1	EA
4	49er ONE-PIECE SPREADER	590-0482	A	2	EA
5	CLEVIS PIN 1/4 x 3.1/2 92390A182	150-1107		1	EA
6	RILEY RM882 GOOSENECK TOGGLE	150-1085		2	EA
7	RILEY RM879 GOOSENECK	040-0372		2	1
8	HALYARD CLEAT HANGER	590-0476	A	1	EA
9	WASHER 6MM FLAT MMC 90965A170	080-0295		2	EA
10	SADDLE WITH EYE RONSTAN RF1058	150-1104	A	1	EA
11	CLEVIS PIN 3/16 x 3/4 MMC 92390A102	150-0017		3	EA
12	SHEAVE 16mm HARKEN 415	040-0859		1	EA
13	SHEAVE 25mm x 8mm A4986-8	040-0857		3	EA
14	CLEVIS PIN 1/4 x 7/8 MMC 92390A186	150-1105		1	EA
15	CLEVIS PIN 3/16 x 2 MMC 92390A112	150-1106		1	EA
16	SHEAVE 38mm HARKEN 307	040-0293		1	EA
17	BUSH	303-1346	A	3	EA
18	MAST BASE ALLOY CASTING	590-0418	A	1	EA
19	SPLIT RINGS RONSTAN RF113	150-0059		6	EA
20	CLEVIS PIN 1/4 - 20 x 4 1/2	590-0473		1	EA
21	1/4-20 NYLOC NUT	080-0307		1	EA
22	SPLIT RINGS RONSTAN RF114	150-1259		1	EA
23	STAY RETAINER	322-0205	A	4	EA
24	THREADED PIN 46mm	319-0023	A	1	EA

REV	DATE	REVISION	DRAWN	APPROVED	PROJECT
A	25-11-08	FIRST ISSUE	STEVE M	MATT S	49er MAST MAST LAYOUT CUSTOMER SPARES
B	13/02/09	SPIGOT ARRANGEMENT & STAY RETAINERS UPDATED	STEVE M	ANDREW B	

DRAWN IN THIRD ANGLE PROJECTION 	 www.southernspars.com ph: +64 9 358 3315 fax: +64 9 358 3309 <small>THIS DRAWING IS THE PROPERTY OF SOUTHERN SPARS AND MUST NOT BE REPRODUCED OR USED FOR ANY PURPOSE, OTHER THAN IN CONNECTION WITH THE PROJECT OF DESIGN FOR WHICH IT WAS DRAWN, WITHOUT SOUTHERN SPARS' PRIOR WRITTEN CONSENT. COPYRIGHT © SOUTHERN SPARS.</small>	DO NOT SCALE DRAWING ALL DIMENSIONS IN mm UNLESS OTHERWISE SPECIFIED FINISH AS SHOWN ANGLES REFER SOUTHERN SPARS STANDARDS FOR WIRE SFC WEIGHT SCALE: 1:10 PRINT SIZE: A1 SHEETS: 1/1	MATERIAL: --- FINISH: --- WEIGHT: --- SCALE: 1:10 PRINT SIZE: A1 SHEETS: 1/1 PART No / BOM CODE: 590-0460
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Warranty

Southern Spars will remedy faulty workmanship provided that any claim by the Customer for remedy of workmanship was notified to Southern Spars in writing within 12 months of the delivery date of the mast.

Southern Spars will, if requested to do so, use reasonable endeavours to assign to the Customer the benefit of guarantees and warranties given to Southern Spars by third party suppliers or manufacturers.

The warranties above do not extend to and Southern Spars shall not in any event be liable for any failure or damage arising from fair wear and tear.

Any claim shall be made directly to the Dealer from whom the rig was purchased.



About Southern Spars

Southern Spars has established its place as a world leader in the design, construction, installation and servicing of carbon fibre masts, booms, composite components and rigging. Its rigs power a wide range of yachts, from one-design class yachts to grand prix racing yachts, cruising yachts and superyachts.

Innovation, quality and an insatiable desire to produce what the customer requires runs through the company's culture. These qualities have contributed to producing product for numerous race victories, including the Volvo Ocean Race, Vendee Globe, America's Cup, Sydney-Hobart, plus supplying rigs to some of the hottest one-design classes such as Melges 24's, Melges 32's and Farr 40's. The same design expertise, manufacturing methods, materials and components utilised on these racing rigs are applied to every rig built by Southern.

In recent years, Southern Spars has expanded into rig service and manufacturing composite rigging. The specialist rig service business Rig Pro, has service centres worldwide. The Composite Rigging division, based in RI, USA manufactures custom lightweight rigging products, including Southern Spars carbon EC6+ rigging used on dinghys through to superyachts.

Southern Spars has centres in the USA, France, South Africa, and headquarters in Auckland, New Zealand. It is supported by the North Marine Group and shares the resources of that group of companies.

For more information: www.southernspars.com

Southern Spars | onedesign@southernspars.com | www.southernspars.com

COMPOSITE SPARS & RIGGING | COMPONENTS | GLOBAL SERVICE

