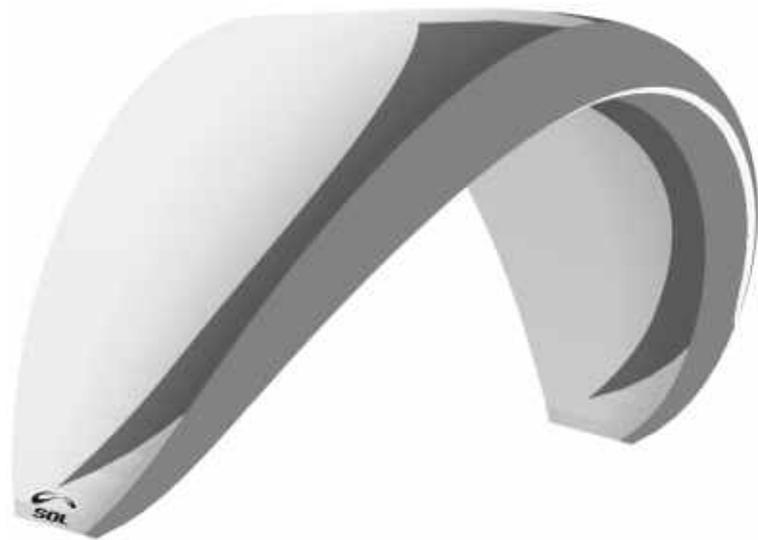


Pilots' Manual



KANGAROO³

to live up

TANDEM LTF 2 / EN C



V. Jan/2010

PLEASE READ THIS MANUAL CAREFULLY AND NOTE THE FOLLOWING DETAILS

THIS PARAGLIDER MEETS AT THE TIME OF DELIVERY THE REQUIREMENTS OF THE LTF (LUFTTÜCHTIGKEITSFORDERUNGEN) CERTIFICATION OR OF THE EN 926 (EURO NORM).

ANY ALTERATIONS TO THE PARAGLIDER WILL RENDER ITS CERTIFICATION NULL AND VOID !

THE USE OF THIS PARAGLIDER IS SOLELY AT THE USER'S OWN RISK !

MANUFACTURER AND DISTRIBUTOR DO NOT ACCEPT ANY LIABILITY.

PILOTS ARE RESPONSIBLE FOR THEIR OWN SAFETY AND THEIR PARAGLIDER'S AIRWORTHINESS.

THE AUTHOR ASSUMES, THAT THE PILOT IS IN POSSESSION OF A VALID PARAGLIDING LICENCE !

INDEX

Welcome to the SOL family	45
About SOL	46
Philosophy	47
THE KANGAROO 3	48
Kangaroo 3 - The Design	49
Technical Data	50
Total take-off weight	51
Materials	51
Top/Bottom.....	51
Profiles.....	51
Internal Diagonal Reinforcements.....	51
Reinforcements.....	51
Lines.....	52
Straps.....	52
Quick Links.....	52
Pulleys.....	52
Suspension Systems	52
Trimmer	55
Backpack	55
Harness	56
Flight	56
Pre-Flight.....	56
Take-Off Checklist.....	57
Take-Off.....	57
Performance.....	58
Turns.....	58
Positive Spiral.....	59
Thermal Flight and Lift or “Soaring”.....	59
Active Flight.....	60
Accelerated Flight.....	61
Landing.....	61
Instalation of tow release.....	61
Rain and Humidity.....	62
Motorized Flight and Acrobatic.....	62
Behavior in Extreme Maneuvers	62
Lateral Asymmetric Closing (Closed).....	62
Full Stall.....	63
Negative Turns.....	63
Wingover.....	64



Frontal Symmetric Closing.....	64
Line Over.....	64
Parachutal stall.....	65
Emergency Flying.....	65
Maneuvers for Fast Descent.....	65
Spiral.....	65
Ears.....	66
B-Stall.....	67
Keep, Maintenance and Repairs.....	68
Storage.....	68
Cleaning.....	68
Folding.....	68
Repairs.....	69
Zipper.....	69
Pulleys.....	70
Tears.....	70
Line breakage.....	70
Sealings.....	70
Recommendations for a long life.....	71
SOL Warranty 3 Years/300 hours.....	73
Warranty Terms.....	73
Warranty Conditions.....	73
Not Covered Under This Warranty.....	74
Final Words.....	76
Data Base.....	77
Certification LTF/EN KANGAROO 3.....	79
Line Plan.....	80
Overral Plan.....	81
Flight Log.....	82
Inspection.....	83

WELCOME TO THE SOL FAMILY!

Thank you for selecting a **SOL** paraglider. You have just acquired a high quality product, manufactured under one of the most demanding industry standards worldwide.

We trust your **Kangaroo 3** will bring you many great life memories you will cherish forever.

We would like you to read this manual carefully and thoroughly. In it, you will find important information about using your new equipment.

In the event you should have any questions about its usage or should you wish to be updated on the latest news at **SOL**, we remain at your disposal at our Sales and Service Departments at the telephone **+55 (47) 3275-7753** and through the e-mail addresses **info@solsports.com.br** and **export@solsports.com.br**.

Don't forget to access our website often at **www.solsports.com.br** to keep current on the latest models' launchings, results and news from the world of paragliding. At this site you will also be able to:

Subscribe to our newsletter
 Register your new paraglider for **SOL** Warranty eligibility

Welcome to the SOL Family!



ABOUT SOL

Founded in 1991, after six months of research and many visits to several manufacturing facilities and suppliers, **SOL** began its production in partnership with the European brands Condor, Comet and Nova, and became autonomous in 1999 with its own testing and development centers.

From the beginning **SOL** has adopted the philosophy of utilizing certified designs, manufactured with imported materials of the highest quality by specialized and skilled-trained staff.

In 1995, the company moved to its current facility, occupying an area of 3.400 m² and has at its disposal a team of 140 employees, 22 of which are pilots. **SOL** provides a comprehensive benefits package such as Health Plan, Life Insurance, partnerships with pharmacies, transportation vouchers, incentive getaways to employees who outperform each month, and education grants.

At **SOL**, we take extreme measures to maintain our machinery and manufacturing equipment current with the world market. This way, we safeguard our accuracy everyday in the production process, control and assuring the high quality of **SOL** brand and products throughout 65 countries around the world.

SOL is one of the few paragliding enterprises worldwide to have its own manufacturing facilities able to test every new model before making it available to the market, which fosters the reliability necessary for excellent performance when flying.

In early 2004 **SOL** became certified by DHV, which is the most respected regulating body of free-flying worldwide. Its mandate is to make sure its members have the capacity to reproduce faithfully the certified equipment on an industrial scale. Few facilities in the world possess this certification in their manufacturing process. **SOL** was one of the firsts to obtain it.

It is part of our history the most important distance world records for paragliding as well as national and worldschampionships won by pilots using equipments developed and produced by SOL Paragliders.

PHILOSOPHY

SOL's philosophy is to introduce products that are considerably better than current ones, in order to guarantee significant advancements in four aspects: **Safety, Performance, Ease of Operation and Innovation.**

Safety: The new product has to offer a level of safety that is at par or better than the one it is replacing;

Performance: The new product must perform better than the one it is replacing;

Ease of Operation: The new product must display higher levels and better operational ease than the one it is replacing;

Innovation: New products must display real benefits to the user, facilitating free-flying, increased safety, or both.

The development process and design of every new product begins at the computer. Drawing Software, 2D, 3D modeling and simulation are utilized before the actual manufacturing of prototypes, in order to ensure greater accuracy in each new design.



KANGAROO 3

KANGAROO 3 is the result of a difficult task of offering a successor to the paraglider that made difference in terms of concept of canopy for tandem flight.

The former paraglider is a symbol for world records, tandem flights with performance and resources much beyond the ones found in the market. Nothing could be left in this project. Easy taking off, climbing the thermals, higher performance and easy landing.

After a year of testing, many prototypes and many hours flying, the result is **KANGAROO 3** which innovates in the building of a 61 cells, of which 14 are closed, tandem canopy, hybrid fabrics, 6,26 of real A/R and 4,38 projected A/R.

The combination between equilibrium and the canopy tension makes its performance more stable and gives comfort during the flight.

KANGAROO 3 has a **LTF 2 / EN-C** certificate with great concepts, its inflation is easy and progressive with a positive pressure in the risers making feel exactly in which stage the paraglider is.

In the air **KANGAROO 3** is pure joy, pressure in the brakes is perfect, when applied progressively they reach a exact rotation, the direction changes are dynamic and enjoyable and also allows a perfect use of the ascends.

KANGAROO 3 has been projected to have a bigger resistance to deflation and easy in the reinflation.

The sink rate and the speed performance are excellent for a paraglider with such safety. Making its route to the sky your XC is much easier.

The characteristics of **KANGAROO 3** inspire confidence making you search for higher goals.

We hope you enjoy every moment.



KANGAROO 3 - THE DESIGN

KANGAROO 3 shows equilibrium between real A/R and projected A/R and is a canopy with more curves but not too many, resulting in a canopy that climbs easily the thermals and stable speed.

A bigger tension was given to the stability putting a bigger tension in the panels and position with less drag at the maximum speed.

KANGAROO 3 has 61 diagonal cells, of which 14 are closed, connected to the profiles with a better distribution of load in the whole canopy allowing a better rigidity, extra and intra back cleaner with less aerodynamic drag.

KANGAROO 3 was computer designed and its profile was chosen due its performance and stability. The superior characteristics offer big interval between speed, with excellent stability during the flight.

At the closed front part of the profile the reinforcements Diax/Carbon Mylar guarantee stability and precision. The openings of the cells are in the intraback.

Dacron integrated reinforcements, displayed diagonally at the suspension points guarantee an equal distribution of load in the canopy.

Big opening in the profiles allow a internal ventilation without affecting profile and promote a good reinflation. The connection along the points were reduced making the induced drag close to the profile reduced and thus increasing the performance. Careful selections of the best materials allowed improve this project..

You can find more details of the materials chosen in the material section.

Recommendations:

- This paraglider corresponds at the time of its delivery to the certification of norm LTF/EN;
- Any equipment alteration will result in the cancellation of this respective certification;
- Flying with this equipment shall be performed at the individual's own risk;
- The manufacturer and its representatives are not liable and therefore not responsible for any misuse nor mishandling of this equipment;
- It is a basic assumption that the pilot is certified to fly this paraglider;
- Every pilot is responsible for the maintenance and assessment of equipment usability;
- This paraglider is not recommended to be used at flying schools.



TECHNICAL DATA

Tamanhos		
Zoom Factor	1,22	
Cell Number	61	
Projected Wingspan	12,02	m
Projected Surface	32,98	m ²
Projected A/R	4,38	
Real Wingspan	15,86	m
Real Surface	40,16	m ²
Real A/R	6,26	
Line Diameter	1- 1,2- 1,4- 1,5- 2,1- 2,5	mm
Height	945	cm
Profile Max	3,20	cm
Profile Min	0,37	cm
Weight	9,25	kg
Legal Takeoff Weight*	140/210	kg
Recommended weight for takeoff*	140/210	kg
Sink Rate Min	1	m/s
Min Speed	23 - 25	km/h
Trim Speed	42 - 45	km/h
Max Speed	48 - 52	km/h
Glide Ratio	9,5	
Places	2	
Certification Tandem	LTF 2 / EN C	

- Pilot + Passenger + harnesses + canopy;
- Line specifications are detailed in the line plans, they are measured under a 5kg load;
- The line lengths as specified in the line plans include the end loops;
- The paragliders' details are in the central cell;
- Date and pilot of test flight will have to be written in space provided!
- The performance data depends from the position of the pilot, the aerodynamic, style of the harness and the type of clothing worn (Speed arms, leg cover, etc).



TOTAL WEIGHT ON TAKEOFF

The **Kangaroo 3** has been certified for a defined weight range. If your weight range falls between two sizes, we recommend the following:

-If you desire better speed, accurate commands, and if you usually fly over mountains and/or extreme conditions, you should choose to fly near the middle to maximum suggested weight.

-If you desire a better sink ratio, and if you usually fly above flat elevations, and light conditions, you should choose to fly near the minimum suggested weight.

MATERIALS

Top / Bottom

Gelvenor Nylon rip stop coated with silicon and polyurethane. Selected among other types of fabrics in the current market because of its durability, resistance to UV deterioration and stretch ripping. Two types of fabrics, ensuring an optimum combination of weight and durability.

Gelvenor LCN066 OLKS 49 g/m²
WTX 40 g/m²

Profiles

Pro-Nyl Nylon rip stop coated with polyurethane.

Pro-Nyl Hard Finish

Internal Diagonal Reinforcements

Pro-Nyl rip stop coated with polyurethane. Selected for its stability and stretching resistance, which is vital to your paraglider in maintaining its flight safety characteristics longevity.

Reinforcements

Mylar laminated reinforcement. Selected to improve long term durability. Its function is to maintain the main shape and attitude of attack, without sacrificing your paraglider's characteristics during takeoff and flight.

Bainbridge Mylar Diax 60/120 P



Lines

Resistance of the lines (new):

1,0 mm Cousin Vectran > 100 kg

1,2 mm Cousin Vectran > 150 kg

1,4 mm Cousin Vectran > 200 kg

1,5 mm Cousin Superaram > 150 Kg

2,1 mm Cousin Superaram > 260 Kg

2,5 mm Cousin Superaram > 360 kg

Risers

Fitanew 19 x 2,0 mm Flat Multi 1600kg

Quick Links

Ansung Precidion 4mm 800kg

Pulleys

Charly / Austrialpin / Ansung

All components are of the highest grade and were selected with the long-term durability of your equipment in mind.

SUSPENSION SYSTEM

The **Kangaroo 3** lines consist of a beige Technora Core of high resistance to tension and has low distortion rate, covered by a layer of colored polyester. The set is made of individual lines, with sewn ties on both extremities.

The main inferior lines and the main line of the brakes are 1,5 mm, 2,1 mm and 2.5 mm diameter.

The intermediate and superior lines are Vectran with a resistance up to 40% higher than the regular lines, making a set of light lines, thin and with high durability.

Diameter 1,0 - 1,2 and 1,4 mm.

The upper lines distinguish themselves (next to the inside layer) and the main lines, which are connected to the Quick Links. These, in turn connect to the main lines on the risers. The stabilizers' lines are connected to the same Quick Links.

The brake lines come out of the trailing edge, through the master line and are linked to the toggles, passing through a pulley attached to the 'D' riser.

Lines 'A' and the brake lines are of different color in order to facilitate takeoff preparation. The Quick Links are triangular shaped and are made of inox stainless steel.

On the brakes' master lines, there is a mark at the ideal setting point, at which height the toggles are affixed. This setting should not be altered as it ensures adequate and sufficient path and room for the toggles in case of emergency situations during flight and landing. Further more, in this position the paraglider is not constantly on a stall.

Warning:

In the event of one or more brake lines get stuck during flight, or if a toggle is lost due to a line brake, the canopy can still be flown by applying gentle pulling of the D risers, therefore controlling directional changes.

The **Kangaroo 3** has 5 risers. All A lines are attached to the "A1" riser, one-line to the "A2" riser thus facilitating rapid descents by doing big ears. The B lines are attached to the B riser, the C riser leads to all the C lines and the break, D in the D

Comparing with a mono glider, the risers of the **Kangaroo 3** are shorter in order to compensate the height of the tandem connection that connects the passenger with the pilot.

The pilot is connected behind the passenger on the shorter end of the tandem connection thus reaching easier the control handles and risers. In case of a big weight difference between pilot and passenger, the tandem connection offers various points to fix the passenger always maintaining the ideal position of balance.



Illustration:



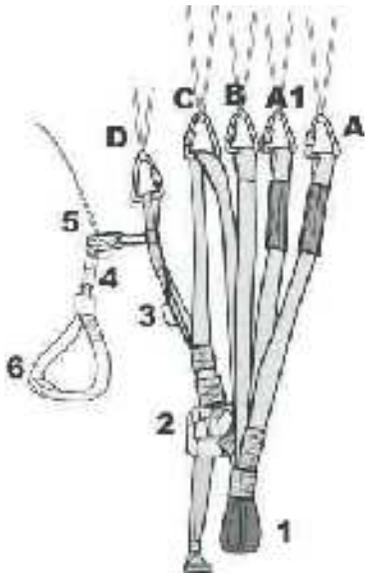
Risers

- A1 - Ear
- F - Toggle
- E - Trimmer

Tandem spreads:

1. Main carabinerl;
2. Rescue system connectio;
3. Pilot.
4. Passanger heavier than pilot
5. Passanger similar lighter than pilot;
6. Passanger light than pilot;

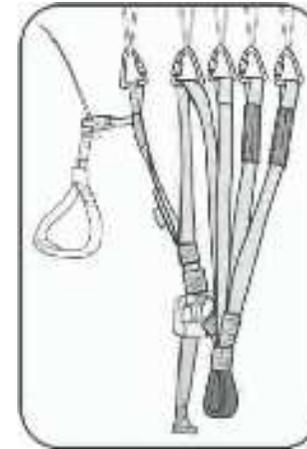
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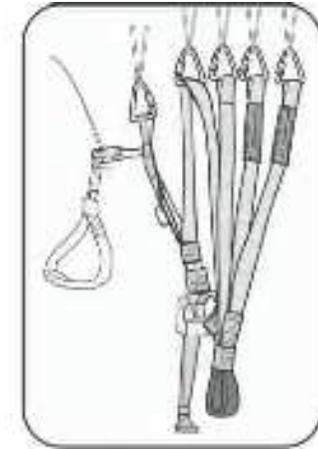
Risers:

1. Connection tanden spreads
2. Trimmer
3. Magnetic clip
4. Swivel
5. Break pulley
6. Toggle

TRIMMER



Trimmer open (acelerated)



Trimmer closed

Warning:

- The application of the trimmer results in an increase of velocity.
- The application of the trimmer decreases the angle of attack and turns the paraglider more vulnerable for collapses.
- Never let go of the toggles !
- Opening the paraglider - pay attention when handling the paraglider when is open on the floor, pull only by the profile reinforcemnts.

BACKPACK

Your backpack was designed with comfort and practicality in mind. Its format allows for good content distribution. Shoulder straps and back support are padded so that comfort is not compromised during walks. For larger equipment capacity, your backpack has an expandable compartment, which can easily be enlarged without sacrificing the layout. Two different pocket sizes at the front allow for easy storage of small articles.

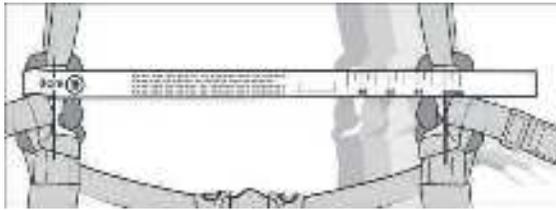


HARNESSES

Any harness of type ABS are recommended for the **Kangaroo 3**, tested with large clips set at 41 cm and 46 cm heights from the board, depending on the harness size. Care must be taken because the large clips height affects the brake position when set at 'normal'.

The regulated distance between the large clips (adjustable at the chest) is 44 cm . Variations of more than 4 cm above these ones will alter the fundamental characteristics of the canopy and are potentially dangerous.

SOL give free together all gliders and harnesses, since february 2007, a Measuring Tape to help pilots to check the distance between carabiners.



Warning:

-Cross straps may jeopardize flying and do not improve safety.

FLIGHT

First Flight:

A careful First Flight is necessary with every paraglider, the **Kangaroo 3** is no exception. This flight must take place on a practice hill.

After unpacking the paraglider and laying out it in a horseshoe shape position, the following steps must be taken:

-The paraglider must be laid out in such a way that, when tension is applied to risers 'A', the canopy center should be extended before the extremities. This allows for an easy takeoff with good directional stability;

-Special attention must be paid to the wind's direction upon the lifting of the canopy, so that the two halves are inflated symmetrically;

- All lines must be organized and completely free of any entanglements. Special attention must also be paid to the lines 'A', which must be free right from the risers 'A' (with the red mark) to the canopy;
- Same priority and care must be given to the brake lines, which must also be completely free and without any possibility of entanglement on any obstacle during takeoff;
- All lines should be checked and all the risers in appropriate order. When the risers are aligned and not twisted, the brake lines will be free from the pulleys (on the rear risers) to the canopy's rear edge;
- It is extremely important that no entanglements nor bunched lines are present ;
- Any line going under the canopy or overline may result in disastrous consequences;
- Before and after each flight the lines, risers, quick links and canopy must be checked for any possible damage.

Warning:

In case there is any damage present, as insignificant as it may be, the canopy should not be flown!

TAKEOFF PRE-FLIGHT CHECKLIST DO NOT FORGET

01. Make sure reserve is OK? Opening device and pins activated?
02. Helmet
03. Large Carabiners Closed
04. Harness – Connected Locks
05. 'A' risers in hands
06. Untangled brakes in hand
07. You must be in the center of canopy
08. Takeoff path is clear
09. Paraglider and pilot aligned with the wind
10. Airspace ahead of takeoff area is clear.
11. Check if the distance between carabiners is correct.

Takeoff:

It's very easy to fly the **Kangaroo 3**. When ready to takeoff, the pilot must take risers 'A', 'A1' together with the toggles.

In order to differentiate between the lines, line 'A' and risers 'A' inclusive are marked with a different color.

Before takeoff, a last check is required to ensure all the equipment is laid out properly.



The arms must be extended to the side, as if they were extensions of risers 'A'. A decisive run allows for a quick and stable inflation. Canopy overtakes are not common.

After the initial inflation momentum, the pilot must keep the tension forward on risers 'A' (pushing them ahead, and not pulling them downwards), until the canopy is above your head.

At this point, the brakes must be carefully activated, ensuring room for the possibility of directional changes.

A move to underneath the center of the paraglider is the best method for corrections, provided there is room for it.

The pilot glances at last upwards to ensure the canopy is properly located above, completely unobstructed and inflated.

At this point, the pilot decides whether or not to takeoff. Reverse takeoffs in strong wind conditions are also very easy to execute.

Due to risk of takeoff with entangled lines (twist), it is highly recommended to take some time and practice reverse takeoffs on a small, leveled hill initially.

Performance

The **Kangaroo 3** in its normal flight, performs better with the hands lifted, applying 25 cm the canopy enters safely the minimum speed range. In order to accelerate, use the speed stirrup, which will give you an increase around 8 - 10 km/h.

Turns:

The **Kangaroo 3** is very sensitive, responding instantly to turn commands. Leveled turns can be achieved with the shifting of weight on the risers with minimum altitude loss.

A combination of weight shifting and breaking technique is the most efficient way of executing turns in any situation. The given brake utilized determines the radius of turns.

By activating the brakes on the outside edge of the turns, as well as applying maximum weight shifting on the risers, the efficiency and resistance to collapse in turbulences (at the edge of thermals) is increased.

In case it becomes necessary to perform turns in a constrained space with the **Kangaroo 3**, we recommend you to release the outside brake in the given turn and pull a little more the brake on the inside of the turn.

Warning:

By pulling either brake too strongly or suddenly, there is a danger of creating a negative spiral!

The **Kangaroo 3** glides best when no brakes are applied.

Positive Spiral:

When the pilot activates just one brake, slowly and progressively, the **Kangaroo 3** inclines sideways in a sharp angle and enters a steep and quick turn, which may become a positive spiral.

During a spiral the rotation radius can be controlled by the greatest or smallest force applied to the inside brake. In order to come out of it, the pilot must release the brake slowly and shift his/her weight lightly to the outside of the turn.

A sudden exit may result in an exaggerated momentum forward of the canopy, and collapsing it. For this reason, on exiting the last turn, the inside brake of a given turn must be softly applied again.

In case the canopy collapses during this process, the spiral must be counter acted, as the active canopy area will be reduced.

Warning:

- Never combine ears with spirals. The canopy active area reduction plus the 'G' force, by the centrifugal effect, may result in line and/or canopy damage.
- Exiting of any spiral at great speeds must be piloted.
- This manouver requires high altitudes (at least 600 meter over ground) and is dangerous due to high descent ratio pilot can loose the altitude reference. Never do this manouver without sufficient experience.
- A turn with an incline beyond 60° is considered aerobic.

Thermaling and Soaring:

In turbulent conditions, the paraglider must be flown with the brakes softly applied. An increase in angle of attack is achieved by this measure, resulting in greater canopy stability.

The pendulum effect back and forth must be avoided! The canopy must remain on top of the pilot. For this purpose, the speed must be increased by releasing the brakes upon entering a thermal (depending on its intensity) or braking on exit. This is part of the basic technique on active flying.



During flights over mountainous terrain, it is highly recommended a minimum height of 50m be kept, for safety reasons.

It is extremely important to know and respect flying regulations, especially so when the airspace within close proximity of canyons is shared among several pilots, where last minute anti-collision maneuvers are not executable.

Warning:

-The **Kangaroo 3** requires active flying in turbulences! This can avoid canopy closings and deformations.

Active flight

For best performance during your flight, it is important to be always sensitive to what your canopy is trying to communicate. The key elements of active flying are the advancements and tension control.

When the canopy moves ahead of you, carefully apply the brakes, so that the canopy returns to be above you, and if the canopy moves behind you, you must release the brakes.

Flying with the brakes lightly applied (+/- 20 cm) allows the canopy to fly slightly behind. In turbulent circumstances the internal paraglider tension may change, which you will feel on the brakes. The idea is to maintain a constant tension, and in case you feel loss of tension, lift your hands up quickly to the original position.

Avoid flying excessively with the brakes on because you might brake to the point of stopping the canopy from flying. Always consider your aerodynamic speed. Your movements can be symmetric or asymmetric and both or one brake can be applied.

These adjustments will make for a more controlled flight, and help in eliminating the possibility of collapse.

We suggest that you do ground practice runs and advancing simulations. Tension loss can be simulated well on the ground.

Warning:

Neither pilot nor any paraglider are immune to collapses; therefore active flying will decrease the chances of happening. When flying in turbulent conditions, be more active and avoid great advancements of the canopy by anticipating yourself too quickly with your response movements. Always maintain altitude awareness and do not get into excessive commanding mode. We advise you to maintain brake tension and avoid flying in extreme turbulent conditions.



Accelerated Flight:

It is recommended to use the accelerator when flying against the wind or in descending current zones. Due to a decreased angle of attack, the canopy may collapse easier as set at the normal position. The pilot must remember that the higher the speed, the more dynamic the collapse response or symmetric closing will be.

The Landing:

It's very easy to land with the **Kangaroo 3**. The final approach stage must be done in straight line upwind. During this final glide, the paraglider must be decelerated slowly and at about 1 m from the ground the pilot must stall the canopy, according to the conditions.

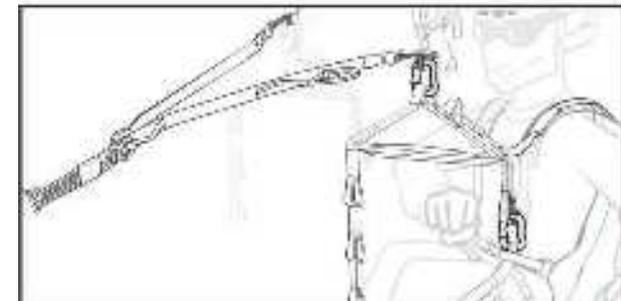
With a strong head wind, the pilot should break only slightly or eventually don't even brake at all, and utilizing just the risers 'C' to de-inflate and overcome the canopy after the landing. By breaking during a landing in strong wind conditions, you may expose the canopy to the wind, which could lead to the pilot being dragged backwards. The final approach must be done always in a straight line. Sharp and alternating turns may produce a dangerous pendulum movement close to the ground.

Instalation of tow release

The **Kangaroo 3** can be used for towed flight as long as is connected to the towed flight system (Tow release).

It must be connected to the same carabiners that join the harness with the paraglider. It is activated through an activator that is strategically located and when is pulled it releases the equipment to fly. During the taking off it is necessary to avoid a small angle of the cable with the ground.

A taking off with tow release help needs instructions and appropriate procedures. Make sure that you have the necessary knowledge and that the operation is made in a safe and correct way.



Rain and Humidity:

It is not advisable to fly the **Kangaroo 3** in rainy days or with a wet paraglider, since the in-flight maneuvers become more sensitive and a reserve deployment may occur upon exiting a B-Stoll or in the event of excessive usage of breaks.

Motorized Flight and Acrobatic Flight:

The **Kangaroo 3** has not been designed for motorized flight, or acrobatics. Although it has been successfully used for these purposes by some pilots.

BEHAVIOUR IN EXTREME MANOEUVRES

Warning:

-Extreme maneuvers must be executed under the supervision of a qualified instructor, on safe courses and with the entire infrastructure available for above ground and water flying!

Lateral Asymmetric Closing (Closing):

Like any other canopy, a negative angle of attack will result in a closing. In order to maintain directional control upon a lateral asymmetric closing, the brakes must be applied on the open side.

In case of a major closing, the amount of braking must be well graduated, in such way to avoid the airflow displacement (stall) on the open section of the canopy.

To facilitate the canopy re-inflation during a collapse, the steps above must be followed in conjunction with a long and slow brake pumping action (2 seconds) with the toggle on the closed side. The shifting of weight on the opposite side riser of the closing will also assist with the re-inflation and increase safety, requiring less brake action and keeping away from the stall point.

In case the pilot does not compensate with the brakes, the **Kangaroo 3** in most situations will inflate by itself even in major asymmetric collapses. The **Kangaroo 3** can make a complete revolution and in the event it does not open on its own, without action, the paraglider will begin a positive spiral.

The pilot must lightly apply the brake on the external side to stop a spiral and at the same time shift his/her weight on the same side until the canopy is stabilized. Exactly at this stage of pendulum effect under the canopy, it is important that the pilot controls carefully the amount of force applied on the brakes, and often it is needed to decrease the force. Once a straight flight is achieved, the closed side can be re-inflated by the pumping action.

Warning:

If the pilot does not actively terminate the spiral, it will continue all the way to the ground!

Full Stall:

To create a 'Full Stall', the pilot must pull both brakes to the end, and hold them tightly in this position.

In this situation, the **Kangaroo 3** flies in most times on reverse, in a forward horseshoe shaped tie. The canopy must be stabilized before the procedure for normal flight re-entry is initiated. Any attempt of recover during the beginning stages of a stall, when the paraglider reverses suddenly can result in a sudden push forward of the canopy.

When recovering from a 'Full Stall', both brakes must be released slowly simultaneously and symmetrically ($> = 1$ second). The **Kangaroo 3** will move forward gradually and begin normal flying. An asymmetric recovery (releasing one brake before the other) of a 'Full Stall' is utilized only by test pilots to simulate a paraglider being expelled out of a thermal and must not be attempted by pilots!

Negative Turns:

To induce a fast Negative Turn (LTF) or starting from the minimum speed (EN), the pilot must pull tightly and quickly one toggle right to the end of it. During the negative spiral, the canopy rotates relatively fast around its center, with its inner side flying backwards.

When entering an unintentional Negative Turn, the pilot must recover as soon as it is noticed by releasing the brake slightly so that the canopy will accelerate and returns to a stable flight, without losing too much altitude.

When a negative turn is intentionally prolonged, the **Kangaroo 3** accelerates forward asymmetrically. A frontal asymmetric closing should not be underestimated. To recover from an intentional negative spiral, the pilot must release the pulled brake and pay close attention to a strong canopy surge ahead.



Wingover:

In order to perform a 'Wingover' the pilot must generate a strong pendulum effect by alternating turns on both sides. A complete closing of the canopy is possible.

Warning:

A turn with an incline beyond 60° is considered aerobic.

Frontal Symmetric Closing:

Risers 'A' and 'A1' are tightly pulled until a complete closing of the Leading edge is achieved, then quickly release the risers until it is closed.

The pilot should not hold the risers after the closing. Special attention must be paid to ensure enough altitude is available.

The **Kangaroo 3**, on most instances, recovers on its own from a frontal asymmetric closing.

In turbulent conditions, a front dive may occur, which must be overcome by accurate brake control.

Line-Over:

In the eventuality of lines going over the canopy during flight, the pilot must take the following steps:

-Try to maintain a straight flight: Shift the weight to the open side of the paraglider and assist with a light brake tension on the open side.

-To re open: Pull the stabilizer line on the closed side (first line of riser 'B' of a different color) until the line entanglement is cleared.

-If the line-over is serious, if it's not possible to maintain a stable flight (spiral) and if there is sufficient altitude (>400 m), there is a chance of resolving this malfunction by executing a 'Full Stall'.

In case the above maneuver does not solve the problem, or if the altitude is not sufficient, the pilot can activate the emergency parachute (reserve).

Warning:

Line-Overs are generally the result of poor preparation before takeoff, collapses during aerobatics or lateral asymmetric closings.

Parachutal:

The **Kangaroo 3** does not have parachutal stall tendencies and recovers on its own from an intentional parachutal stall induced by braking commands.

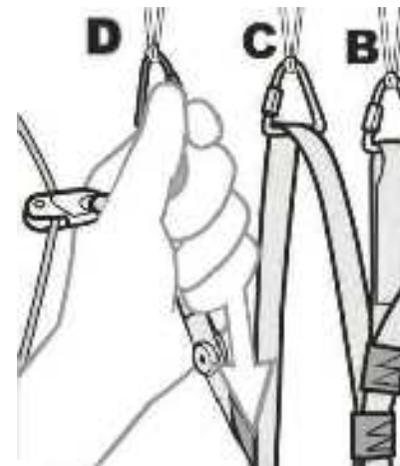
In the event of a parachutal stall upon coming out of a B-Stall, it is enough just to pull the risers 'A' downwards or the accelerator, thus reducing the angle of attack, therefore reorganizing the air flow contact to the canopy.

Emergency Flying:

In case braking controls are impossible, the canopy can be driven by utilizing risers 'D' and eventually land.

Pay close attention to the length of the command, which should be shorter than braking commands.

Illustration



FAST DESCENT MANEUVERS

Spiral:

Spirals, as described earlier, carry a high rate of descent. Therefore high accelerations (G) make it impossible to hold them for an extended period of time. The spiral force may cause the pilot to faint and to lose flying controls, and crash. Furthermore, they will exert a lot of force and affect the pilot and equipment alike.



The pilot should never exercise this maneuver in turbulences or with wide lateral angles. In windy conditions, the pilot must be aware of oscillations during the maneuver.

Warning:

- Exiting out of a fast spiral must be piloted.
- The pilot must never combine ears with spirals!

Ears:

By pulling simultaneously the external riser 'A1' at about 18 cm, the canopy tips will close.

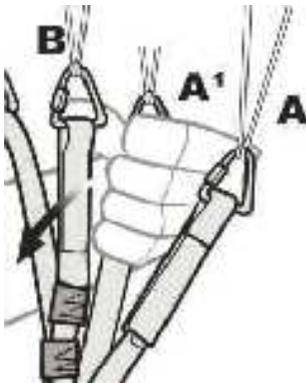
The canopy remains completely maneuverable through the activating of unilateral brakes or the shifting of weight towards the risers, flying at a fast descending rate (up to approximately 5m/s).

In order to recover, the pilot must release the external riser 'A1' lines. Usually the canopy re opens by itself, but the pilot can assist with a slow and quick pumping.

Warning:

- SOL** does not recommend combining big ears with the accelerator. This combination may result in a large asymmetric closing.
- SOL** does not recommend combining of ears and spirals, as this may exceed the allowable load.

Illustration



B-Stall:

To induce a 'B-Stall', the pilot must pull the risers 'B' simultaneously, between 15 and 20cm. There will be a shift of air flow on the outer layer and the canopy will initiate a parachutal phase.

By releasing the risers 'B' quickly the airflow recoils on the outer layer and the canopy returns to its normal flight position. In case the canopy does not recover to normal flight, refer to the section on parachutal.

The momentum of return creates a forward motion by the canopy. We recommend avoiding braking the paraglider eliminating the possibility of a parachutal stall.

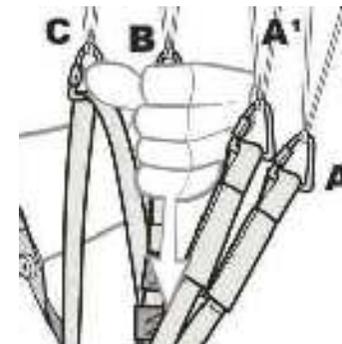
The load applied on the 'B' lines during this maneuver is not beneficial to your paraglider. Use this maneuver only in emergencies.

In the event risers 'B' are pulled too quickly or too deeply, a horseshoe may occur towards the front. In order to regain normal flight, the pilot must apply the brakes lightly.

Warning:

- All fast descent maneuvers must be executed in light conditions and at sufficient altitude, so that they can be performed as necessary under extreme flying conditions;
- 'Full Stalls' and negative spirals must be avoided, regardless of the paraglider being flown. Incorrect recoveries and exits can result in disastrous consequences;
- The best flight technique is to fly safely and correctly. This way you will never need to descend rapidly!

Illustration



UP KEEP, MAINTENANCE AND REPAIRS

Warning:

-A good maintenance will extend the life of your **Kangaroo 3** for many years to come.

Storage:

The paraglider must be stored dry, in a dry place, protected from UV light and away from chemical products.

Cleaning:

Cleaning must be performed only when it is absolutely necessary. We recommend the use of water only with a smooth sponge or cloth.

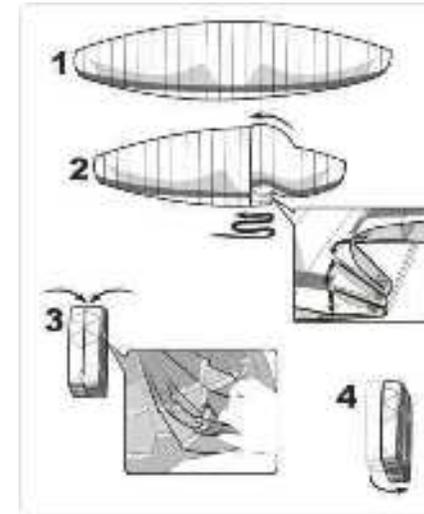
Do not use any chemical product, since it will damage the material permanently.

Folding:

By following each step properly, you will be helping to preserve the life span of your equipment:

Warning:

- Open the canopy completely on the ground;
- Place all the lines spread by the inner layer and risers in the middle outside the canopy on the trailing edge;
- We recommend folding your paraglider like an accordion. This will keep the profile reinforcements (Mylar/Carbon) from being crumpled and/or folded. By using this folding method, the paraglider will keep its takeoff and flight characteristics for longer;
- Keep folding to approximately 50 cm
- Remove all the air by sliding your hand from the trailing edge to the leading edge;
- Make sure the volume is a little smaller than the protection bag;
- Avoid multiple folds at the same place.



Steps:

1. Open the canopy completely;
2. Packing the glider "accordion wise" as shown in the figures;
3. Place each profile reinforcement over the corresponding cell;
4. Bring together the two parts and roll the canopy up without compressing too strongly.

Repairs:

Repairs must be performed only by the manufacturer, distributor or authorized personnel.

Zipper

The backpack zipper must open and close softly. If there is any difficulty to move it you must apply paraffin or a spray lubricant to diminish the attrition among the components. You will notice the difference when you move it.

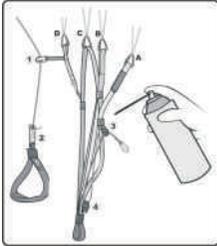


It is possible most of the times you fix by yourself the zipper. In case it does not close any more just pull it until the beginning of the position and with a pliers press both sides of the zipper.



Pulleys

It is important you keep pulleys lubricated because in case they do not work may consume the speedy handle or axle, apply paraffin or lubricant spray, read carefully about the lubricant to avoid spots and fabric consume. Do not apply on the sewing lines.



Attention:

When buying the lubricant make sure that this product do not attack the material properties. This may affect the fabric and lines resistance.

Tears

Along with your kit you get small adhesives for repair. Small tears up to 10 cm away from the line points may be fixed by you. Beyond that we advise you the maintenance be made by the manufacturer or by the registered workshop.

- Clean the spot where the adhesive will be applied with a humid cloth.
- It must be at least 2,5 cm more of the adhesive than the tear.
- Make the edges rounded to avoid to unglue after is glue.
- Apply on both sides of the tear.

Line breakage

Along with your kit you get a 1.1 thickness line to make a little repair. When you repair we advise you to sew the unsewed point after you check the measure. Do not knot because it may diminish up to 80 % of the line resistance.

Sealings

Along with your kit you get sealings for the carabiners. Do not leave your risers without them because they avoid the movement of the screw nut making it impossible their opening.



Deterioration Recommendations for a long life:



- The **Kangaroo 3** fabric is made mainly out of Nylon, which like any other synthetic material is sensitive to UV light radiation, causing it to decompose, losing its mechanical resistance, and thus increasing its porosity. For this reason, the unnecessary exposure to sun light, which carries a high UV radiation level in high altitudes must be avoided;
- It is highly recommended to leave the paraglider stored away and well protected when its not being used;
- The lines on the **Kangaroo 3** are made of a Aramide (Technora), with a Polyester cover. Individual line Overloads beyond the normal range in flight must be avoided, because an excessive deformation of the canopy is irreversible, and becoming permanent;
- The same way, folding and creasing the lines must be avoided, specially the main lines;
- The canopy must be opened only on a clean surface area, since dirty can penetrate in the canopy's fiber, shorten the lines or spoiling the fabric;
- The lines must be kept from any entanglements on takeoff to prevent excessive deformation;
- Never step over the lines or canopy, above all on hard surface;
- Keep away sand, stones or snow from entering the canopy cells because any weight on the trailing edge slows the canopy down, possibly creating a stall. Furthermore, sharp corners may cut the fabric;
- During takeoffs and landings in windy conditions, a run-away canopy may hit the ground strongly and the shock may rupture the material;
- In case of line entanglement the brake lines may peel-off or a main line may get cut by a brake line, due to friction;



-On landing, avoid letting the Leading Edge fall forward and downward towards the ground because this may damage the materials that form the front of the paraglider and/or rip the sewn areas;

-The manipulation of the paraglider during ground takeoff, or a lot of wind speed up the aging process of your equipment;



-After a tree or water landing, the lines must be checked and tested. In case of salt-water contact, the paraglider must be soaked and washed with fresh water. Salt water might decrease the lines' resistance even if soaked with fresh water. The lines must be changed after contact with salt water. Never dry the paraglider directly under the sun. This must be done in a shaded area;

-A Line Plan can be found in this manual or can be obtained with the manufacturer or distributor;

-It is recommended that the canopy should not be folded in the same symmetric position in relation to the center, this way the center cell will not be always exposed, therefore keeping the central cell from fatigue overtime;

-The **Kangaroo 3** must be brought in for inspection by the manufacturer or distributor once a year;

-The annual revisions are a basic condition for warranty validation. The certification will be lost should this not happen;

-Always check your equipment after an incident or in case the canopy has been stored for a long time.

Warning:

Your **Kangaroo 3** was designed, tested and certified to perform the best. Any alteration of your paraglider will nullify your certification and jeopardize your safety. For these reasons we strongly recommend you to avoid altering anything on your paraglider.



SOL WARRANTY - 3 YEARS/300 HOURS

Every paraglider manufactured has a Warranty of 3 Years or 300 Hours of Flight, whichever comes first.

Our development technology, through the utilization of quality materials and the adoption of new manufacturing processes, allows us to offer you, our client this added bonus.

This warranty is defined as repair or substitution of the defective equipment parts determined by the producer.

Warranty Terms:

1º) This warranty covers any materials, and manufacturing defects.

2º) This Warranty covers every paraglider certified EN or DHV for leisure activities, excluding professional equipment (schools, competitions, acro, etc.).

Warranty Pre-requisites:

1º) A three-copied filled-out form: One copy to be sent to **SOL Paragliders** within 30 days after purchase; one copy to the sales person and one copy to the purchaser;

2º) All flights must be logged providing information on date, place and length of flight;

3º) The equipment must be kept in accordance with the instructions provided in this manual. All the storage, folding, cleaning and care instructions must be carefully taken;

4º) Maintenance and inspections can only be performed by the manufacturer or authorized shop and must be properly documented;

5º) The first inspection check is mandatory completing 24 months or 100 flights, whichever comes first. After the first inspection any wing has to be checked yearly or at each 100 flights, whichever comes first. In any of these inspections may occur that a shorter period of time for the next inspection will be defined (f.ex. 6 months or 50 flights). It is of utmost importance to follow these guidelines. Without performing the mandatory inspections, the paraglider loses its certification and the respective **SOL** warranty becomes null and void.

6º) The owner is responsible for all shipping expenses to and from the manufacturer;



7°) In order to make a plea for repair or equipment exchange, or equipment repair, which shall be decided and performed only **SOL Paragliders**, the owner must send the manufacturer the following:

- a) The Paraglider in question, and copies of all previous inspections and flight registry;
- b) Original copy of the Warranty Registration Form **SOL Paragliders**.

This Warranty Does Not Cover:

- 1°) Any alterations on original fabric colors, lines and risers;
- 2°) Any damage caused by chemical products, sand, friction, cleaning products or salt water;
- 3°) Any damage caused as a result of errors during operation of the Paraglider, incidents or emergency situations;
- 4°) Any damage caused by inadequate operation of the Paraglider;
- 5°) Paragliders that may have been subjected of any alteration from the original design and without proper permission from **SOL Paragliders**.
- 6°) Damages caused by inappropriate transport, storage or settings of the paraglider.
- 7°) Damages caused by the use of not compatible components with the paraglider.
- 8°) Damages caused by the use of inappropriate packaging for the transport.
- 9°) Paragliders without original identification label and serial number.
- 10°) Handling inadequately to the instructions given in the owner's manual.

Environment and Nature

Finally one request: practice our sport and conserve our environment. Please, remain in the pathways, don't throw your trash to the nature, don't make any unnecessary noise and respect the sensitive biological equilibrium of the nature!

Recycling

The materials used to manufacture a paraglide need recycling. Please send to **SOL Paragliders** or to a official workshop the equipment no more in use. There they will be recycled.



FINAL WORDS

Safety is the major theme of our sport. In order to fly safely, pilots must train, study, practice and be alert to the dangers around us.

In order to achieve excellent safety levels, we must fly regularly as much as possible, don't go beyond our limitations and avoid exposing ourselves to unnecessary dangers. Learning to fly is a slow process and takes years, so don't pressure yourself. If conditions are not favorable, keep your equipment stored away.

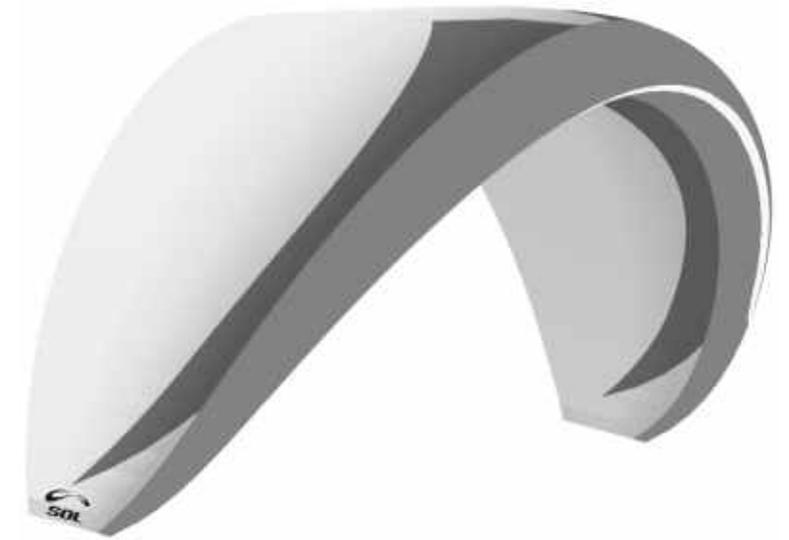
Don't overestimate your skills and be honest with yourself. Every year we see many accidents which in most cases could be prevented with a minor adjustment.

We are part of the community in which we live: friends, family and even people we don't necessarily know worry about us. Our obligation towards this community is to keep ourselves healthy and that at each landing we will be one landing happier than before. We fly so that we can feel more alive.

We wish you good and safe flights with your **Kangaroo 3**.

SOL Paragliding Team

Data Base | Dados



KANGAROO³
to live up

TANDEM LTF 2 / EN C



CERTIFICATION DHV: KANGAROO 3

Data of the Paraglider | Dados do Paraglider

Category | Categoria:

Paraglider

Name of the Paraglider | Nome do Paraglider:

SOL KANGAROO 3

Manufacturer | Fábrica:

Sol Sports Industria e Comércio Ltda

Test nº | Número do Teste:

DHV GS-01-1873-10

Type of the applied Test | Tipo de teste aplicado:

Lufttüchtigkeitsforderungen für HG und GS NFL II-35/03

EN 926-2:2005

Date of the Certification | Data da Certificação:

2010-02-01

Support of the Certification (DEU) | Suporte da Certificação (ALE):

Sol Sports Industria e Comércio Ltda

Support of the Certification (AUS) | Suporte da Certificação (AUS):

Sol Sports Industria e Comércio Ltda

Limits of Operation | Limites de Operação

Classification | Classificação:

LTF Biplace 2 / EN - C

Restriction of Harness | Restrição de Selete:

None | Nenhuma

All up weight in the Flight | Peso total no voo:

140 kg - 210 kg

Number of Seats | Número de Assentos:

2

Support Tow | Suporte para Reboque:

Yes | Sim

Interval of Inspection | Intervalo de Inspeção:

12 months | 12 meses

Characteristics | Características

Trimmers | Trimmers:

Yes | Sim

Accelerator | Acelerador:

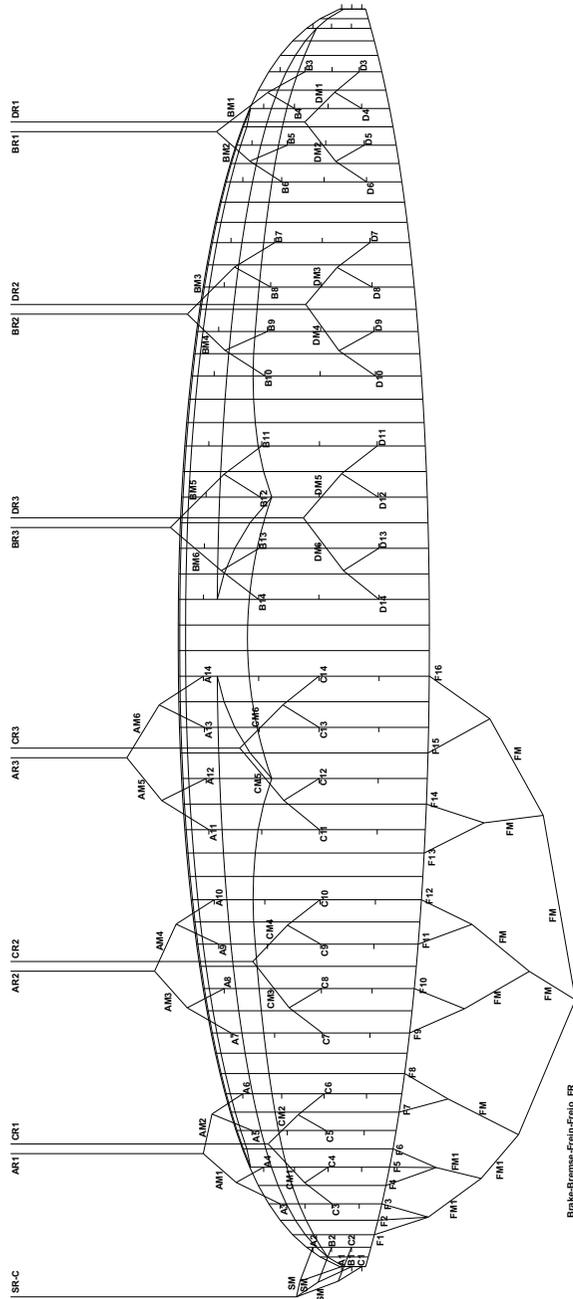
No | Não

Weight of the Paraglider | Peso do Parapente:

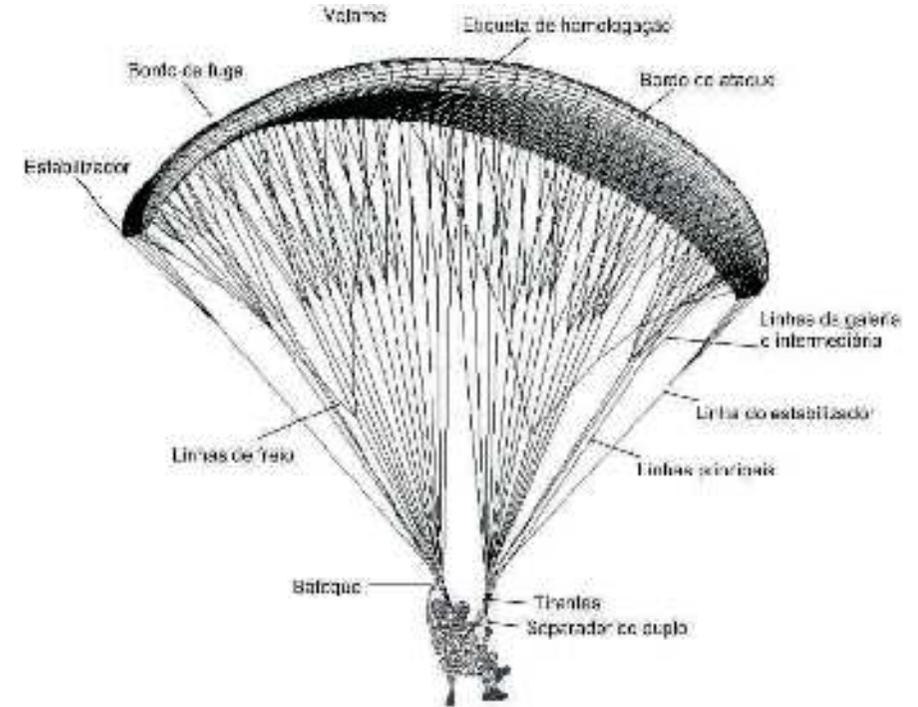
9,25 Kg



LINE PLAN | PLANO DE LINHAS



OVERALL PLAN | VISTA GERAL



	English	Português	Français	Deutsch
1	Overall Plan	Vista Geral	Vue d'ensemble	Gesamtansicht
2	Brake lines	Linhas de freio	Suspentes de frein	Bremsleinen
3	Top Lines	Linhas superiores	Suspentes hautes	Galerieleinen
4	Stabilo	Estabilizador	Stabilisateur	Stabilo
5	Trailing edge	Bordo de fuga	Bord de fuite	Austrittskante
6	Labels	Etiquetas	Fiche technique	Typenschild
7	Leading Edge	Bordo de ataque	Bord d'attaque	Eintrittskante
8	Middle Lines	Linhas intermediárias	Suspentes intermediaires	Mittlere Leinen
9	Stabilo Line	Linha estabilizador	Suspente du stabilisateur	Stabiloleine
10	Main Lines	Linhas principais	Suspentes basses	Stammleinen
11	Risers	Tirantes	Elevateurs	Tragegurte
12	Brake Handle	Batoque de freio	Poignée de frein	Bremsgriffe



