Operating Instructions
UP Makalu 2

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Welcome in our team

Congratulations on the purchase of your new UP paraglider. With the UP Makalu 2 you have chosen a wing that represents the maximum in safety, performance and quality in our sport.

Please take a little time to complete and send the reply card found in the back of this manual. This way we can keep you informed of all new products and developments at UP, as well as any technical information about the UP Makalu 2.

We would also be delighted to hear any feedback you have concerning the glider. It is only through your feedback that we can continue to develop world-class paragliders that appeal to the majority of pilots.

If you have any questions regarding your paraglider or auxiliary equipment please ask your local dealer or feel free to contact us here at UP directly.

Your UP Europe Team

Safety instructions

Paragliding is an extremely demanding sport requiring the highest levels of attention, judgement, maturity, and self-discipline. Due to the inherent risks in flying this or any paraglider, no warranty of any kind can be made against accidents, injury, equipment failure, and/or death. This glider is not covered by product liability insurance. Do not fly it unless you are personally willing to assume all risks inherent in the sport of paragliding and all responsibility for any property damage, injury, or death, which may result from use of this paraglider.

Please read this owner's manual thoroughly before your first flight with the UP Makalu 2 so that you are fully acquainted with your new glider. This manual gives you information on the entire specific and general flying characteristics of the UP Makalu 2, but it does not replace attending a paragliding school. It is important to note the following points:

- at the time of delivery the UP Makalu 2 conforms to German Hang Gliding Association (DHV) and/or AFNOR (SHV and ACPUL) requirements (see certification information later in this manual)
- any changes being made outside the permitted range of adjustment invalidate any and all claims under the warranty
- using this paraglider is exclusively at the risk of the user; the manufacturer or distributor assumes no responsibility for accidents occurring while using it.
- it is assumed that the pilot is in possession of the necessary qualifications and provisions of any relevant laws are observed

- when reselling the wing please make sure you also give this manual to the new owner. The manual is an integrated part of the paraglider and is required for the wing to keep its certification.

Development of paragliders at UP

UP Europe can look back on an extremely successful history in the development of hang- and paragliders.

Developing of a new glider begins with a detailed and exact market analysis, and on this basis a new product concept emerges. In close cooperation with our customers we define the characteristics we wish to incorporate in the new design.

Once we have these characteristics, and using the latest CAD software, we develop a three-dimensional computer model, which is subjected to initial tests and simulations. The model data are then transmitted directly to our production facility the first prototype is built.

This prototype is then subjected to a rigorous series of flight tests and modifications. If necessary further prototypes are built, and testing continues until the team is happy that all the original criteria have been met or exceeded.

Finally, the last prototype is presented to the DHV and/or AFNOR for certification. Only when this is completed will the glider be released to join the rest of the UP range.

Technical description

The UP Makalu 2 was developed by UP to satisfy the demand from low airtime pilots for a fast and secure intermediate paraglider with outstanding take-off attributes.

As with all UP products, the materials used have been carefully chosen for their outstanding quality and strength, to guarantee a long and trouble-free service life.

Technical Data

	UP Makalu 2				
Size	XS	S	M	L	XL
Flat area	23,8 m²	26,0 m²	28,5 m²	31,0 m²	33,6 m²
Projected area	20,9 m²	22,8 m²	25,0 m²	27,2 m²	29,5 m²
Flat span	10,9 m	11,4 m	11,9 m	12,4 m	12,9 m
Projected span	8,8 m	9,2 m	9,6 m	10,0 m	10,4 m
Flat aspect ratio	5,0	5,0	5,0	5,0	5,0
Projected aspect ratio	3,7	3,7	3,7	3,7	3,7
No. of supported ribs	22	22	22	22	22
No. of cells (top surface)	42	42	42	42	42
No. of cells (bottom surf.)	42	42	42	42	42
Average line length	6,14 m	6,43 m	6,73 m	7,02 m	7,30 m
Total line length	349 m	365 m	382 m	398 m	414 m
Total number of lines	170	170	170	170	170
Line dimensions [mm]	1,1 / 1,7 / 2,15 (2,3 XL)				
Glider weight	5,5 kg	6,0 kg	6,3 kg	6,6 kg	6,8 kg
DHV Category*	1-2	1-2	1-2	1-2	1-2
DHV Hook-in weight (daN)	55-75	65-85	80-105	95-120	110-150

* Please contact UP directly for information regarding the latest certification progress.

Further construction details, including line lengths, are included in the certification specification sheets which form part of this manual. Any technical changes will appear in the appendix.

Canopy material

The UP Makalu 2 is constructed from polyamide cloth, which is particularly stretch-resistant and durable, and is specially treated for maximum UV resistance.

After an extensive series of tests and years of practical experience we have found that the best material is a high tenacity polyamide “New Sky-Tex”, from Porcher Marine (France), with the designation 9092 E85A (upper and lower surface; cloth weight 46 g/mm²) and 9092 E29A (ribs and V-ribs; cloth weight 45 g/mm²). This material consistently exhibits excellent porosity values and has a remarkably good colourfastness with the latest PU coating.

Construction of the canopy

The canopy of the UP Makalu 2 is composed of 42 cells and 43 profile ribs. To keep the line quantity to a minimum, only every other cell on the UP Makalu 2 is suspended.

In order to optimally transfer loads also to the ribs that aren’t suspended we use a number of internal V-band mini ribs. Along the A-, B- and C- connection points these V-bands continue al the way out into the wingtips. Along the D-connection points a horizontal tape stabilises the wing from the inside, making for increased rigidity during extreme manoeuvres.

This construction method was originally developed for the high-performance gliders in our range but has

already proven itself in models such as the UP Kantega, the UP Summit 2 and the UP Trango.
The basic outline of the new UP Makalu 2 also takes its inspiration from the bigger brothers in the range, giving it a sporty and agile look that fits perfectly in with the rest of the UP range.

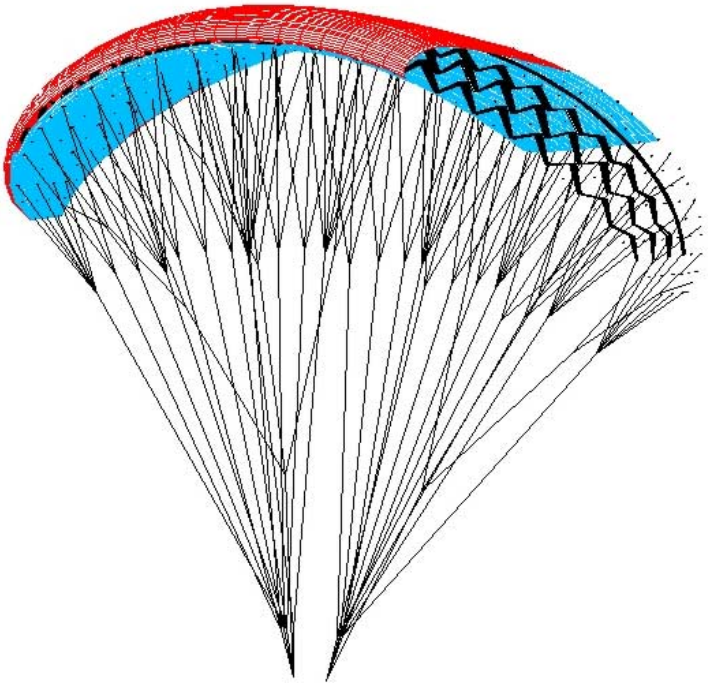


Illustration 1: Construction of the canopy with ribs and V-tapes

Line material

In the UP Makalu 2 we use 1.1, 1.7 and 2.15 mm diameter Cousin Trestec Technora® (Superaram®) lines. These lines are made with a special Co-Aramide core and show considerably higher break-loads than other lines with standard Aramide core material. Furthermore they are far less susceptible to

weakening through kinks than any of the other Aramide lines we have tested. And finally this new line shows much less tendency towards stretching than any Dyneema based lines. This is of great importance in order to avoid adversely influencing the flight characteristics through uneven stretching across the span of your new wing.

The demands for the main brake lines are slightly different; since stretching is of less importance in this particular line we have opted for a line with a Dyneema core, also from Cousin Trestec, which shows a higher strength when knotted than other products.

Line system

The entire line system is formed from individual lines, which are sewn and looped at both ends. The single line levels are connected over a special hoop technology ("handshake") to prevent a weakening of the core and a loss of strength. The lines and stitching are subject to rigorous production controls, to ensure high and consistent manufacturing quality.

The lines of each wing section consist of four groups and the brake lines:

A-Lines: A1-A3

B-Lines: B1-B3

C-Lines: C1-C3 / S1

D-Lines: D1-D2

Brake Lines: BRK1

The brake lines are collected at one main control line per side. This control line runs through a pulley attached to the D-Riser and is marked with a black dot

at the point where it should loop around the D-ring. The brake is pre-set so that the glider is at 0 degree brake when the toggle is free. Please don't change the main brake lines without checking the new length carefully at a suitable training hill before flying!

The line bundles (A, B, C and D) are colour coded for easy identification and handling. All main lines of each level are looped together and attached to delta quick links, which are connected to the risers. The quick links have special line collectors to prevent lines slipping, and are secured using a strong thread-locking compound (Loctite©), to prevent unintentional opening. After maintenance work the delta quick links should be re-Loctited!

Risers

The lines are grouped into four risers and one control line on each side. The riser ends are colour coded for easy identification at take off as well as in flight for B Stall.

The UP Makalu 2 has a divided A riser (see illustration) to facilitate 'big ears'.

During normal flight all risers are 520mm in length (480mm for the Small and Extra small). As the accelerator is activated it shortens the effective length of, at first, just the A riser. After 30mm of travel the A and B risers are then shortened together by further application of the accelerator, and the C riser by half this amount.

The largest change in the angle of attack is reached when the speed system pulleys are pulled together.

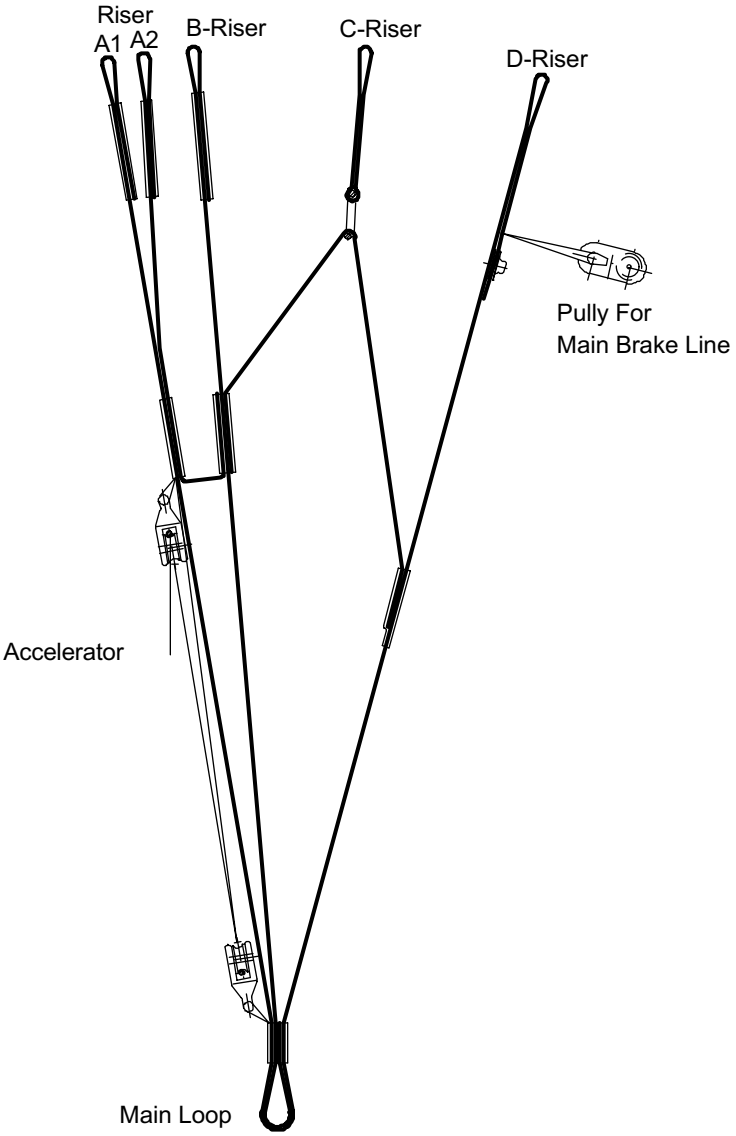


Illustration 2: UP Makalu 2 Riser

UP Backpack

At UP our Research and Development reaches beyond just the paraglider and encompasses all parts of the flying experience. Your UP Makalu 2 comes with a high volume backpack designed especially for ease of use and comfort.

We have built in an anatomical carrying system that allows an optimized load distribution for maximum comfort. The S shaped shoulder straps allow full adjustment and the detachable chest strap prevents the shoulder straps from slipping off the shoulders.

The load control straps attached to the shoulder straps can be set either loose, to aid ventilation, or tight, for extra stability. They should rise from your collarbone at about a 45° angle.

A hip belt is also incorporated to assist overall comfort. If the hip belt is tightened then the shoulder straps can be released slightly to transfer the load away from the shoulders. The hip belt is fitted with stabilization straps, which can be tightened to help stability, or loosened for extra freedom of movement. The hip belt is removable for when packing size is critical, or the pack is being transported by air.

It is important, especially when there is a long trek involved, that the backpack is adjusted for maximum comfort. The following advice should be considered when packing.

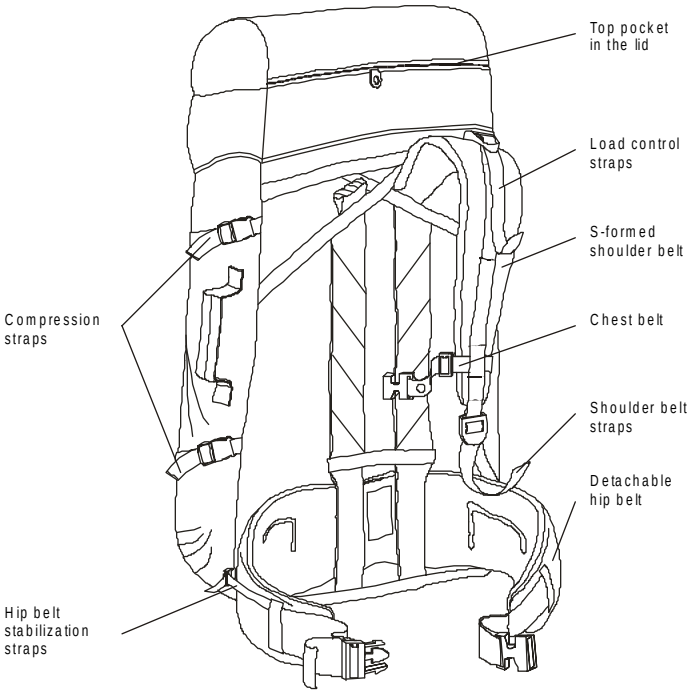


Illustration 3: UP Backpack

Adjustment of the backpack

When fully loaded, all compression straps should be tightened to secure the load in the pack. All carrying straps should be set fully loose and the pack then put on your back. The hip belt should be fastened and tightened to rest approximately in the middle of the hip. Any slack should be taken out of the shoulder straps, and the chest strap should be done up. The load control straps at the shoulders and hips can now be tightened to achieve the desired stability.

Packing suggestion

The load should be arranged in accordance with the diagram below, with the heaviest weight closest to the shoulders. Try to avoid having heavy objects either too low in the pack, or too far behind the shoulders. Medium weight items should be packed high, and only light items in the base and outside pockets.

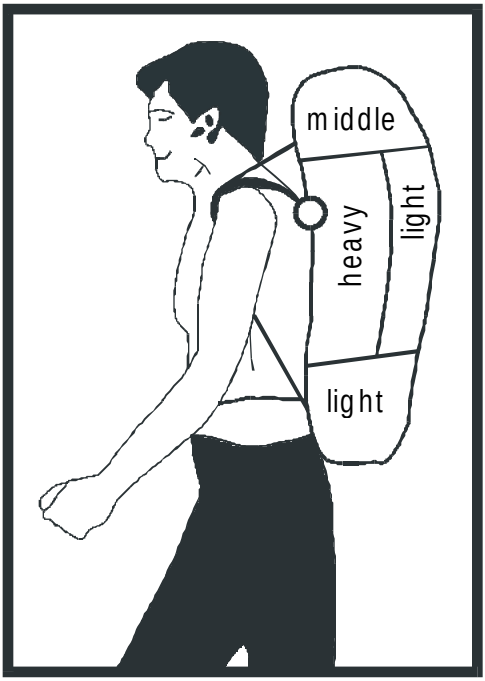


Illustration 4: Best distribution of the load for the UP Backpack

Before the first flight

Adjustments

The UP Makalu 2 has undergone an extensive development program and series of flight tests to ensure that the production model exhibits the optimum characteristics with regard to safety, handling and flight performance.

As with all products from UP Europe, the UP Makalu 2 is manufactured to the highest quality and precision. The line lengths of each glider are individually checked and recorded before dispatch.

Under no circumstances should the lengths of the lines or risers of the UP Makalu 2 be altered in any way.

Notice! Any changes to line lengths or riser configuration will invalidate certification!

The only change allowed is to the length of the lower brake line. This should only be done by an experienced person.

Position of the brakes

The UP Makalu 2 is delivered from the factory with what we feel is the best brake position for most pilots. But tall or short pilots, or those with a harness with non-standard attachment points might feel it necessary to change the position of the brake handles.

If the brakes are to be shortened, it is extremely important to avoid the adjustment affecting the glider's trim speed. There must always be some slack in the

brakes when they are fully released. This can be checked with the glider inflated above the pilot's head. There should be a noticeable bow in the brake lines, and the brakes should be having no effect on the shape of the trailing edge.

If the brake lines are to be lengthened, it is important to ensure that the pilot can still stall the canopy (i.e. during extreme manoeuvres or landing) without the need to take wraps.

If you do feel the need to change the brake line lengths, only change them by a little (3-4cm) at a time, and preferably at an easy training slope. Check especially that both lines are the same length, as any asymmetry will lead to tiring and possible dangerous flying characteristics.

If you have any questions or concerns with reference to the brake line lengths then seek advice from either your UP dealer or directly from UP Europe.

To tie the brake line onto the brake handle use one of the following knots: The simple fisherman's knot or the Bowline as shown in illustration 5 and 6. These knots guarantee the least amount of line weakening.

Notice! Loose or incorrect brake knots can cause serious accidents through loss of the steering of the glider!

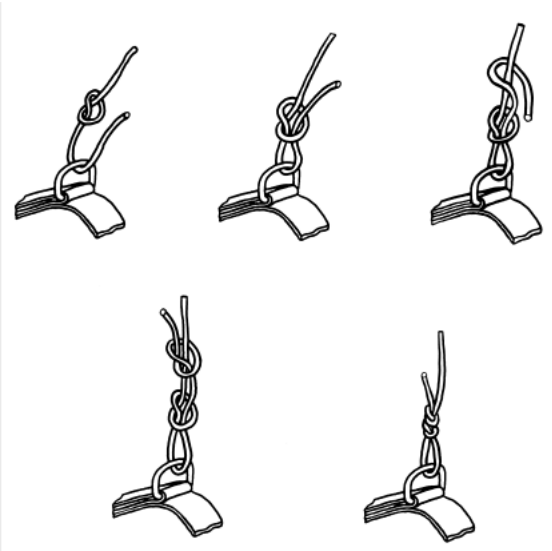


Illustration 5: Brake knot – the simple fisherman's knot

Illustration 6: Bowline

Speed System

It is important that the speed system is connected correctly, and the length checked, to ensure smooth operation in flight.

The link between the foot stirrup and the risers consists of two cords and two brummel hooks. The accelerator stirrup itself is composed of a foot bar and webbing with loops sewn on either end to attach the cords. These cords should be run up through the eyelets and pulleys on the harness to connect with the pulley system on the front of the risers (see Illustration 7). This illustration refers to the UP harness, but many harnesses are similar. If in any doubt, please ask the harness dealer/manufacturer.

The length of the cords should be set so that, at full leg extension, the pulleys on the risers are just touching each other. Any shorter and the stirrup will be difficult to reach; longer and the whole speed range will be unavailable.

During take off it is advisable to fix the accelerator stirrup underneath the harness to avoid any danger of tripping over it. UP harnesses have two elastic loops or a Velcro webbing to facilitate this.

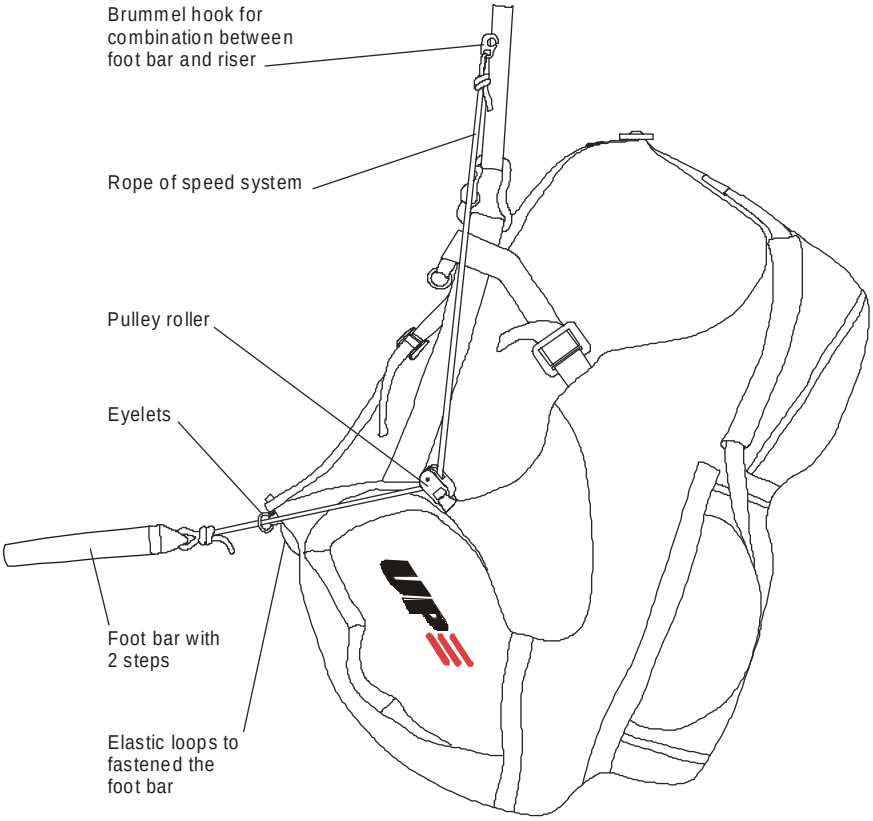


Illustration 7: Components of the foot accelerator and the cord course

Suitable harnesses

Any harness with hang points near chest height is suitable for use with the UP Makalu 2. The lower the hang point of the harness, the better the pilot can steer by weight shift. A DHV or ACPUL certified harness is recommended.

The harness design should also guarantee that it's possible to accelerate the UP Makalu 2 up to the maximum speed.

Note that the height of the hang point also affects the brake line length. If you have a question about your UP harness, contact your dealer or UP Europe.

Rescue system

It is strongly recommended that you have a rescue system (reserve parachute) fitted at all times. In some countries it is mandatory, so check if you plan to travel. Make sure that the reserve system you have is the correct size, and that you are fully conversant with it's use.

For fitting the reserve system, follow the instructions of the harness manufacturer.

Use of the UP Makalu 2

The UP Makalu 2 has been developed and tested solely for foot launched and winch launched paragliding flights. It is not allowed and potentially dangerous to use the glider for any other purpose.

Aerobatics

The UP Makalu 2 has not been developed, constructed and/or tested for aerobatics use.

Notice! The glider has not been certified for aerobatics. Performing aerobatics with the UP Makalu 2 or any other paraglider can be very dangerous. Doing aerobatics can induce flying configurations well beyond the tested flight envelope, and can lead to total loss of control. Aerobatics can also overload your glider and break it in flight.

Motorised Paragliding

The UP Makalu 2 has not been tested for use with any kind of engine.

If you wish to fly your UP Makalu 2 with a motor please get in touch with the manufacturer of the engine unit, with UP Europe GmbH and with the governing body for ultralight flying in your area, to check on certification of this configuration.

Flying the UP Makalu 2

Pre-flight check

Make sure whenever you get your UP Makalu 2 back from somebody else to check the glider very carefully if you are not the only pilot flying it. Ask if there was anything that could have damaged any part of the glider, if the pilot has found any part that needs to be replaced or if they noticed any strange flight behaviour. Make sure you do the same when you lend your glider to somebody else.

A thorough pre-flight inspection should be performed prior to each flight.

A careful pre-flight check is a must for any and all airplanes – also the UP Makalu 2. Please apply the same care and attention before EVERY flight!

Before every launch you should carry out the standard 5-point checking procedure. It is a good idea to do the checks following the same sequence every time to minimize the risk of omitting something.

1. Unpack and arrange your glider in a semi-circular manner. This shape ensures that the center cells inflate before the tips. When unfolding your glider, observe the wind direction and arrange your glider so that it is pointed directly into the wind.

2. The lines must be arranged so that there are no tangles and the A-lines are uppermost. Once the lines are free and untangled, check to make sure that they all go directly from the riser to the glider without going over the top of the wing. Launching with a line over the wing is extremely dangerous! It

is also important that the brake lines are free and not tangled.

3. Next check that you have put the harness on correctly, and ensure that both leg straps and the chest strap are closed and adjusted. Also check the rescue system pins and deployment handle.

4. & 5. Right before the launch you should, once again, check the wind direction. Then check the air space for other paragliders

Launching

The take-off characteristics of the UP Makalu 2 are extremely straightforward. Only a gentle forward pressure on the A risers is necessary and the glider will inflate evenly and climb above your head. The glider has no tendency to hang back behind you or to overshoot over your head.

With the A risers and the brakes in your hands, have another look at your unfolded glider. By stronger wind the start can be facilitated if the UP Makalu 2 is inflated solely with both the internal A-risers (front A-riser). Make sure that you are centrally positioned in the middle of the wing, and that the wing is facing into wind. The middle of the canopy is marked by the UP Makalu 2 logo at the leading edge.

Inflate the glider with a steady run and remember to position your arms so that they are a continuation of the A risers. As the glider comes above your head, you should glance up to see that the entire canopy is inflated and flying. The UP Makalu 2 has a low surge tendency, so there is usually no necessity to brake to stop the glider from over-flying you.

Directional control should only be attempted when the glider is above your head. Excessive braking will cause the wing to drop back.

Only after checking that the wing is properly inflated do you apply slight brake pressure and accelerate rapidly down the hill. After a few steps you will reach flying speed and become airborne.

Speed control

Using the brakes

The UP Makalu 2 has a wide useable speed range, coupled with excellent stability at all speeds. The speed can be set with the brakes to optimize performance in any situation.

Maximum glide speed is achieved with the brakes released completely, whereas minimum sink speed is with approximately 15 to 20 cm of brake applied. Further braking will not improve the sink rate, but the brake pressure increases noticeably as the glider reaches minimum speed.

Notice! Flying close to the stall point is very dangerous and should be avoided. At speeds below minimum sink the danger of entering an unintentional stall or spin is increased dramatically.

Using the Speed System

The UP Makalu 2 is supplied with a speed system, which is activated by a foot stirrup. Full application increases the speed by approximately 10-12 km/h. In certain circumstances the use of the speed system is extremely effective, and it should be an integral part of your flying.

The speed system should be used when you are flying through sinking air, when trying to achieve best glide in a headwind, or trying to cover the ground as quickly as possible. But it is important to remember that the glider will be more susceptible to collapses at high speed, so the speed system should not be used in extreme turbulence. If, with the speed system applied, a collapse occurs then it should be released immediately. Some warning of an imminent collapse is afforded by the tension felt in the speed system; should the tension suddenly reduce then the stirrup should be released and the glider returned to normal trim speed.

Notice! All extreme flight situations, such as collapses, happen more dramatically at increased speed. Therefore the speed system should not be operated near the ground or in noticeable turbulence.

Turning

The brakes of UP Makalu 2 has been developed to meet the demands of low airtime and inexperienced pilots. The brakes have been designed so that the first 15-20 cm of travel will cause only gentle turning, whereas larger movements will give the glider an agile and nimble feel.

Brake input and amount of weight shift induced will define the radius and bank angle on the UP Makalu 2, and will allow it to be controlled with ease. Using weight shift in combination with brake input will result in flat turns with minimum height loss and is in fact always the most efficient control method. The radius of the turn is then controlled with the brake line whereas the bank is controlled through weight shift.

If needed the UP Makalu 2 will turn very tight. To do this, apply some brake input on both sides, then release the outside brake whilst applying further brake on the inside – this will reduce turning radius to a minimum.

When brake input is increased beyond app. 50% on one side, the UP Makalu 2 begins a fast and steep turn, which can be made into a steep spiral (refer to chapter heading "steep spiral")

Landing

The UP Makalu 2 is easy to land. While pointing into the wind, the pilot should fly the wing fast until approximately 1m above the ground, and then apply both brakes completely. When landing in stronger wind, less brake is required. Landing from steep turns should be avoided due to the risk of an uncontrolled pendulum reaction.

Winch towing

The UP Makalu 2 tows easily. There are no special techniques that need to be employed, but consideration should be given to the following points:

- Especially when you are towing at an unknown field, make sure that you are fully aware of any local conditions and peculiarities. Ask the local pilots if you are at all unsure.

- During the launch, ensure that the glider is completely inflated and over your head before giving the 'start towing' signal. If the glider is not central over your head do not continue with the tow. Any corrections attempted through the brakes during this critical phase may result in the canopy deflating again, or in the tow progressing with a

non-flying wing; if tow tension is applied when the glider is not correctly positioned then a 'lock out' or a stall could occur.

- Try to avoid large brake inputs until you are reasonably high. Emphasize weight shift if any course correction is necessary close to the ground.

- Do not try to climb steeply during the first part of the tow. Good airspeed is essential.

- Do not use a towline tension greater than 90 daN at any time during the tow.

- All persons involved with the towing operation should be suitably qualified and experienced. All equipment used should, where necessary, be certified, and a tow permit should be valid for the field being used.

Flight safety

The development of high performance paragliders from square parachutes has meant vast improvements in speed, sink rate and handling. But, at the same time, it has also led to a requirement on behalf of the pilot for accurate, sensitive control and an acute anticipation of possible flying conditions. Any glider, whether beginner or competition, can collapse in turbulent conditions, and you must be able to react accordingly.

Today you have a wide choice between different gliders in the UP range. The main difference between the gliders is in the stability that each class offers. Beginner wings react to turbulence less dramatically and are more forgiving when compared to top performance gliders, which have more sensitive, but less forgiving handling. Making the correct decision when choosing a new glider is most important; you should critically examine your flying and your level of knowledge.

A safe and efficient way to get used to your new paraglider is by practicing your ground handling skills. We suggest finding a suitable area, like a playing field, and with light to medium wind it is quite easy to practice inflating the glider and feel the reaction to brake input, b-line stall, collapses etc.

Before taking off and whilst flying it is very important to anticipate any likely turbulence, and fly accordingly. Look well ahead, and as well as looking for areas of likely lift, try and predict, and avoid, areas of sink and rough air. If you do find yourself in turbulence then look for the cause, and adjust your flight plan to avoid other similar places.

Thermals and Turbulence

In turbulent air, the UP Makalu 2 should be flown with a little brake to increase the angle of attack and provide greater stability. While flying in strong or broken thermals, it is important that you concentrate on keeping the wing centrally above your head. Do this by allowing the glider to fly faster while entering a thermal, and by braking the surge of the canopy while exiting the thermal.

Flying fast is useful for getting through sink or when flying into a headwind. The UP Makalu 2 possesses an inherent high stability due to its construction and design, however an active flying style in turbulence will help increase safety by preventing unnecessary collapses and deformation of the canopy.

Getting down fast

All rapid descent manoeuvres should be practiced initially in smooth conditions with plenty of height, before you need to use them 'for real'. It is important to distinguish between the three techniques, and to know the merits of each. You should inform your passenger before the flight about all planned manoeuvres.

Notice: All other manoeuvres, such as full stalls and spins, should be avoided as fast descent techniques. They are not very efficient, and incorrect recovery can have dangerous consequences (as with any paraglider)!

Steep Spiral Dive

A maximum sink rate of over 15 m/s can be achieved in a steep spiral dive, but it is advisable to build up

gradually to these sink rates when you first practice spiraling.

Getting the UP Makalu 2 into a spiral dive is very simple and has already been described in the chapter regarding turning. When entering the spiral it is essential to induce the turn gradually; if you apply the brake too quickly you may enter a spin. If this happens, release the brake immediately and let the glider recover before trying again. Keep a steady tension on the inside brake and observe the increased angle of bank and sink rate. A little brake on the outer wing will help stabilize the glider at a high sink rate.

To recover from a spiral, simply release the inside brake. Do this gradually to prevent an uncontrolled steep climb caused by the excess energy built up during the dive. Be prepared for the glider to climb a little and to damp out the subsequent dive. Be warned that steep spiral dives are equal to high G loading on both you and your glider!

Notice: Never pull Big Ears in a spiral dive, as it's relatively easy to overload of paraglider, pilot and equipment.

B-Line Stalls

To induce a B-line stall, start from normal, un-accelerated flight. Reach up and take hold of both B risers, still with your hands in the brake loops, and pull down simultaneously by app. 15 to 20 cm. The first few centimeters of travel will be quite hard, but as the glider settles into the stall so the effort becomes less. The glider will drop back a little as it stalls, and then centralize over your head. With 20 cm or so of pull a sink rate of up to 6 m/s can be achieved. With less pull you will get a decrease in sink rate. Pulling down more

than 20 cm is not recommended, as the paraglider may become unstable.

To recover from a B-line stall, let up both B risers simultaneously and quickly. The UP Makalu 2 will dive forwards slightly as it regains forward speed, so be ready to dampen this out. If you release the B risers slowly there is a danger that the glider might enter a deep stall. The glider will almost always recover with no pilot input from a deep stall, but refer to the 'Deep Stall' section for correct recovery.

Big Ears

The Big Ears are induced by simultaneously pulling down app. 40 cm on the two outer A-risers.. We suggest keeping the brake toggles in your hands while inducing Big Ears. The glider will remain fully steerable through weight shifting during the maneuver. The sink rates will be around 2-3 m/s, a little more if you release the trimmers completely. Releasing the two A-line handles will normally have the tips reinflating on their own, otherwise light braking will assist the reinflation.

Notice! Do not perform other manoeuvres whilst using Big Ears, as the canopy could become overloaded.

Inducing large Big Ears on the UP Makalu 2 when flying near its lower weight limit requires great caution on the amount of brake input used, as it may deep stall in extreme cases. Should this happen use the recovery technique described in the ‘Deep Stall’ section.

Flying outside the normal flight envelope

Behaviour in extreme situations

The UP Makalu 2 is designed to be very aerodynamically stable. However as with all paragliders extreme turbulence or piloting error may induce unwanted behaviour from the canopy. To ensure that you are able to handle these situations correctly we strongly recommend that you attend a safety-training clinic, where you can learn to master your wing outside the normal flying envelope under professional guidance.

Safety training manoeuvres should only be practiced in calm air with sufficient altitude, and under the instruction of qualified instructors. We would like to use this occasion to once again remind you to never fly without a reserve parachute!

The manoeuvres and possible flight configurations described in the following may occur following a conscious effort on the part of the pilot, through turbulence or through pilot input error. Any pilot flying in turbulent air or making piloting mistakes may end up experiencing these flight configurations and therefore find themselves in danger, particularly if they are not adequately trained to master them.

Notice! Mistakes during the execution of the following manoeuvres may seriously compromise the safety of pilot and passenger.

Collapsing the paraglider

As with all paragliders extreme turbulence may lead to the canopy partly or fully collapsing. This is normally not critical. The UP Makalu 2 will reinflate quickly and reliably and is easy to control during the incident.

Asymmetric collapse

The UP Makalu 2 belongs to a new generation of paragliders that possess a high level of passive safety when in an asymmetric collapse. The canopy will only turn very slowly, allowing the pilot plenty of time to control the situation.

Should an asymmetric collapse occur, the pilot should counter the turn through careful counter steering. Even without countering the turn the UP Makalu 2 will normally only turn very little before stabilizing on its own. The reinflation will also generally happen automatically but can be assisted through counter steering on the opposite side and applying light brake pressure on the collapsed side (no hectic “pumping”!).

With large asymmetric collapses it is important to counter steer carefully to avoid stalling the open side.

Full frontal collapse

A negative angle of attack occurring through turbulence or from simultaneously pulling down both A-risers results in a full frontal collapse of the leading edge of the canopy. The UP Makalu 2 will normally reinflate quickly on its own, but can be assisted through the application of a light double-sided symmetrical brake input.

The stalls

When a paraglider flies through the air a laminar and a turbulent airflow forms around the surface of the wing. When the laminar airflow along the top surface is interrupted, dangerous flight configurations follow – we say that the wing *stalls*. This is most often the consequence of attempting to fly with too much angle of attack.

In more detail we differ between three different forms of stall.

Notice! Spin and full stall are both dangerous and somewhat unpredictable manoeuvres. Do not stall or spin your paraglider on purpose. However it is very important to learn how to recognize the symptoms of a glider about to stall or spin so that you can take correct action to avoid it happening.

Deep stall

The UP Makalu 2 has no inherent tendency towards deep stall. It will recover from a deep stall brought about by over braking, by pulling on the rear risers, or by releasing the B-risers too slowly after a B-stall, on its own without any pilot input as soon as the brakes or the risers are released.

Should you however find yourself in a deep stall (as described above this could happen through flying too light on the wing and pulling big ears) the situation can be rectified by simultaneously pushing both A-risers forward until the glider resumes normal flight. Avoid applying brake to one side if you think that you are in a deep stall as this could lead to a spin.

Always remember that practicing manoeuvres where you fly close to minimum airspeed must only be

carried out under professional supervision and with plenty of height.

Full stall

Full stalling the glider is only really sensible and useful during the landing. When landing the pilot consciously stalls the wing by applying both brakes 100% just before touching down. The canopy falls behind the pilot and empties itself.

When the glider is tested before the release it is put through the same motions, but at greater altitude. First it is slowed down to minimum airspeed, then the airflow along the top of the wing breaks away and the wing falls back, pulling the pilot with it. It is important to not release the brakes again at this moment, as this will have the canopy violently shooting forwards and diving down in front of the pilot. In extreme cases it can dive below the pilot, who then could fall into the sail.

After dropping back into full stall the canopy will form a horseshoe where the tips flutter about quite violently. These movements are transferred to the pilot's arms through the brake lines. Holding the wing in a full stall requires considerable strength!

Before releasing the brakes and allowing the wing to resume level flight it is important to stabilize the stalled wing. This is done by releasing the brakes slowly until the entire wing is almost completely reinflated. In this phase the wing will be pitching somewhat over the cross axis. The pilot waits until the wing is in front of him and releases the remaining part of the brake travel. When timed correctly the wing will then resume level flight by surging slightly forward whilst accelerating to normal trim speed. However you must be prepared to dampen the surge and deal with any

subsequent collapses occurring because the wing surges too far or doesn't come out of the full stall completely symmetrically.

Test pilots also carry out tests where they release one brake before the other while in full stall. This maneuver only serves to test the wings behaviour and should not be flown purposely as this is a situation where all paragliders react very dynamically. It is often followed by very large, dynamic asymmetric collapses that must be dealt with correctly to avoid dangerous situations.

Spin

The negative spin occurs when one side of the wing is stalled whilst the other is still flying. This can happen when, if flying very slowly, one brake is pulled quickly to below the seat. When the glider starts to spin, it will turn quickly around the vertical axis, with the stalled side flying backwards. To recover from a spin, simply release the brake on the stalled side. The glider will immediately speed up and, most likely, suffer an asymmetric collapse. Recover as described above.

If you suspect that a spin is imminent then immediately release the inside brake. The glider will accelerate smoothly and resume normal flight with little altitude loss.

Wing Overs

Wing overs are performed by flying alternating turns; each time letting the pendulum effect increase the bank angle.

Notice! The UP Makalu 2 is a very agile glider, and it is quite easy to get to an excessively high angle of bank in just a few turns. Practice wing overs gently at

first, as there is a chance of quite large collapses at high bank angles.
Also notice that a wing over flown with more than 90 degrees bank angle is classified as illegal aerobatics!

Emergency Steering

If for some reason the UP Makalu 2 cannot be controlled with the brakes, for example if the brake handle has come off the main brake line, it can be steered and landed with the rear risers. Be aware that, when rear riser steering, the glider is a great deal more responsive to pilot input, and the stall happens very suddenly.

Further references

Attaching heavy adhesive logos made out of unsuited material to the wing may result in the revocation of the glider certification. Always make sure that your intended logo will not in any way influence the glider behaviour. If in doubt we suggest avoiding the attachment of advertising logos on the wing. UP cannot be held responsible for any mishaps caused by intentional after-sales changes done to the wing.

UP cannot take any responsibility if the glider is changed in any way.

Avoid flying in extremely humid weather or when it rains. When wet the wing may show radical changes to its flight behaviour, for example by suddenly developing a deep-stall tendency or by being difficult to reinflate after an asymmetric collapse.
Should you nevertheless happen to fly into a rain shower please observe the following:

- Deep stall and stall may happen much earlier, i.e. with considerably less brake input than you are used to with a dry wing
- Avoid all manoeuvres involving long brake travel
- Do not use Big Ears. Do not B-stall the wing
- Stay out of turbulence to avoid collapses
- When landing keep the glider flying fast; no min. speed approach!

If you do most of your flying near the sea, where the air is humid and salty, the wing may age faster. In this case we suggest you have it more often than prescribed in this manual.

When folding your wing please make sure that there are no insects caught inside. Many insect species contain acids that could damage the cloth.

Maintenance and cleaning

Taking care of your paraglider

The wear and tear that your paraglider suffers depends on a number of factors; how frequently it's flown, whereabouts in the world you fly it, how much UV it gets and how well you look after it. Bear in mind the following maintenance points:

We use a top grade polyamide cloth to build our paragliders, which has a special protective coating against UV radiation and air permeability. The cloth will suffer, though, if it's exposed to large amounts of UV (i.e. bright sunlight)/ Do not leave your glider lying in the sun for any longer than is absolutely necessary. Also, if it gets wet, then dry it as soon as possible, but not in direct sunlight!

When choosing an area to lay out the glider before launching, try to find somewhere that is relatively free of stones and sharp rocks. Pay particular attention to the top surface, where it lies on the ground. Pack the glider in a slightly different way every time, so that it's not always the same bit of material that gets the maximum exposure.

The lines used on the UP Makalu 2 are high grade Technora® Aramid lines. Keep the following points in mind:

- The lines should be checked regularly for damage.
- The lines should not be knotted or bent unnecessarily.
- The main brake line at the handle should not have too many knots. Each knot weakens the line.

- After any line over-stressing (tree landings, water landings and other extreme situations) all lines must be checked for condition and length and should be replaced where necessary.
- If any change in flying characteristics is noticed then the lines should be checked and replaced, if necessary.

Cleaning

If you feel it necessary to clean your UP Makalu 2 at any time then use lots of lukewarm water and a soft sponge. More stubborn stains can be cleaned with a weak soap solution, and rinsed thoroughly. Never use chemical cleaning agents on the material, as these destroy the coating and affect the strength of the cloth.

The best place to store your paraglider is in a dry, dark and well-ventilated room. Do not store it where is could become contaminated by chemicals of any sort.

Examination and repairs

Paragliding is a wonderful sport; flying as free as a bird in the air, enjoying the peace and tranquillity. But the air is an alien environment that commands respect and a responsible attitude from the pilot. At UP we don't just put our knowledge and experience into the development of paragliders, but also into their maintenance, service and repairs to ensure you can fly safely.

Our service team are all professional pilots with a wealth of experience examining and repairing paragliders. You can be sure that they will look after your equipment in a conscientious manner and the quality of work done will be second to none.

Bi-annual Check for all UP gliders

In Germany and Austria it is mandatory to have your paraglider examined and serviced every two years, or 150 hours, whichever comes first. We suggest that you adhere to these rules even if you live outside these countries, as they have been set up by an independent body in the best interest of the pilots. The manufacturer or an Authorised Service Centre should carry out this service. We will happily service the glider more often, if you feel that it is necessary.

At UP Europe we have the special equipment and the wealth of experience necessary to carry out the 2 Year Check. We will check the canopy both inside and outside, as well as using a special "hang" device for checking the lines for damage. We will also test the cloth with a porosity gauge; an extremely important test, as high porosity can result in dangerous changes in the flying characteristics of the wing (deep stall, changed angle of attack etc.). If we feel it necessary

we will remove and destructively test the inner A, B, C and D main lines, and all the lines will be measured for both length and symmetry. A record is kept of all these tests and any tendencies noted.

As well as measuring and checking the complete glider, the examiner will make a final judgement, from personal experience, as to the airworthiness of the glider. If he feels it necessary, the glider will be flown by a UP test pilot to check on its flight behaviour. This way, we can guarantee that the glider is still within certification limits, and safe to fly for another two years.

Always get your glider checked by a UP Europe Authorised Service Centre.

Our experience for your safety!

It is also recommended that only an Authorised Service Centre carry out repairs on your glider. Contact UP Europe for your closest Centre

Packing and checking of the rescue system

Only by regularly having your rescue parachute repacked can you guarantee it's flawless operation! As with the glider, the rescue parachute should be examined every 2 years by either the manufacturer or an Authorised Service Centre. We offer a certified service for re-packing, checking and installing the parachute into your harness. We will also carry out any repairs necessary, all fully guaranteed.

Sending the UP glider and other UP products

The best way to send your paraglider, rescue parachute, harness etc. to our service team is in a box via post or UPS. Enclose a note of what requires doing (2 Year Check, repair, repack etc.) and also your daytime contact details. We will return your equipment either by post or UPS. Please indicate preferred method of payment (either bank cheque or C o d)/

Should you require any further information about the services we offer, please contact us at the address and phone number below. We are also able to give you information about your nearest Authorised Service Centre, as well as other manufacturers who are authorised to check and repair UP gliders and equipment.

UP Europe GmbH
-Abteilung Service-
Altjoch 19A
82431 Kochel am See
Germany

Email: service@up-europe.com
Service Phone: +49 (0) 88 51-92 92 40
Fax: +49 (0) 88 51-92 92 60

UP Homepage

The UP Homepage gives you information about the latest news and products from UP. You will find any technical information and accessories for your UP Makalu 2, as well as many useful things that are necessary for flying.

Beside paragliders, harnesses and flying equipment you will also find the new “Skywear” collection with the latest flying garments and the “News” section, which will keep you updated with all activities around UP.

www.up-europe.com

Some final words

With paragliding a fundamental new air sport has emerged; one that makes independent flight possible for almost everybody. The technical simplicity, the mobility of the wing and the ease of learning the basic flight techniques have made paragliding appear simple and straightforward.

As long as you fly with the necessary respect for the demands and dangers, then these ideals of paragliding will be fulfilled. You should decide for yourself whether conditions are suitable before you proceed with the flight. You should always be aware that any kind of air sport is potentially dangerous if you overstep the natural and physical laws, whether from ignorance or unreasonableness.

“Probably there are only a few sports where success requires, besides physical fitness, understanding the processes in nature to such a high degree - a fact which distinguishes paragliding as sport especially.”* The charm of flying lies in “understanding the processes in nature”, because you have to try again and again to fathom the logic and fly with regard to the decisions you make.

If you want to realise the dream of flying, the dream of free movement in the air, fly not to impress others - fly for the sheer joy of it.

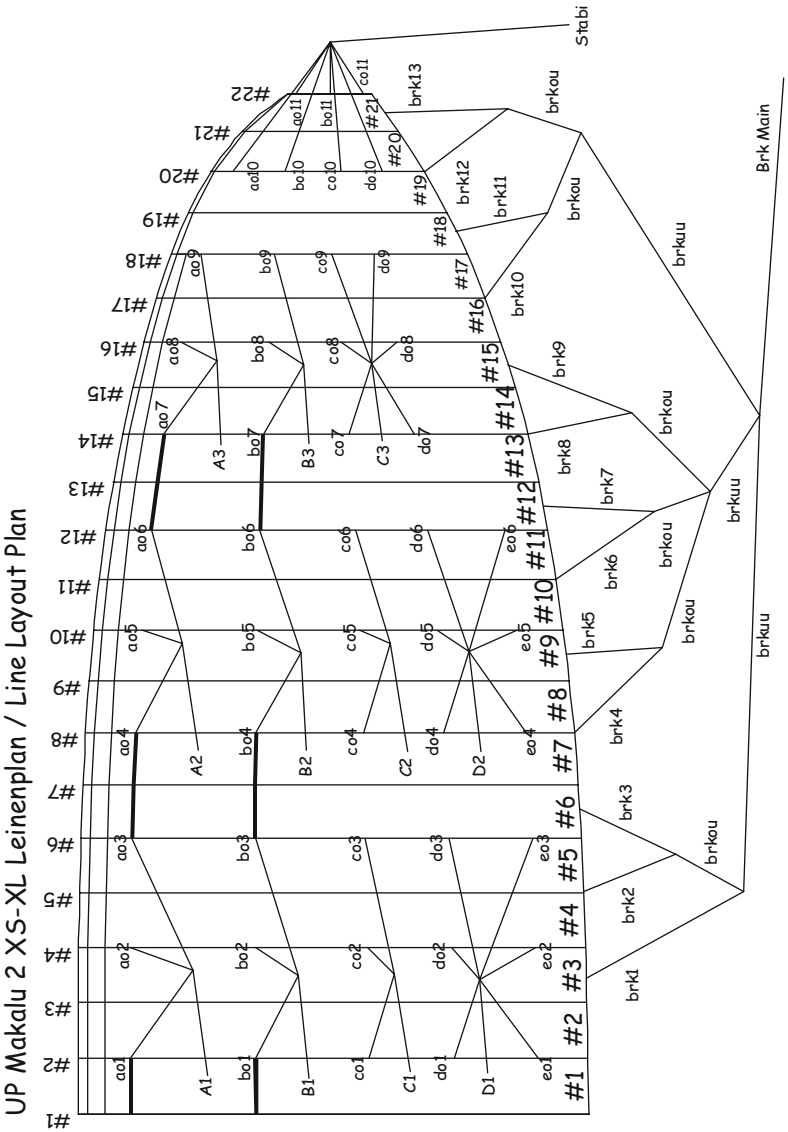
We at UP wish you delightful, beautiful and accident free flying with your UP Makalu 2

SEE YOU UP IN THE SKY - Your UP Europe Team

* from Helmut Reichmann from the book "Streckensegelflug"

Attachments

Line Layout Plan



Reply card

Detach card along the perforation and send it to UP Europe!

Surname:_____

First name: _____

Address: _____

_____

_____

Phone:_____

Fax: _____

Email: _____

UP Makalu 2 serial number:_____

bought at: _____

My current flying qualification: _____

hours: _____

Paragliding learnt at:_____

Ultralite Products Europe GmbH
Altjoch 19 A

D-82431 Kochel am See

Standard Einweisungskontrollblatt für neu gekaufte UP Gleitschirme

Käufer Name/Vorname: _____

Adresse: _____

Befähigungsnachweis Nr. : _____ neuer Gleitschirm, Typ:_____

Bisherige Anzahl Flüge:_____ Seriennummer des Schirms: _____

Folgende Übungen sollten am Übungshang unter Aufsicht absolviert werden:

Auslegen und Sortieren der Leinen	☐	Durchführen mehrerer Starts	☐
Aufziehtechnik vorwärts und rückwärts	☐	Laufen mit gebremstem Schirm	☐
Aufziehen mit schlecht ausgelegtem Schirm	☐	Slalomlaufen	☐

Das Beherrschen der oben angeführten Manöver ist die Grundlage, um die Reaktionen des neuen Gleitschirmes kennenzulernen. Zugleich werden wichtige Reflexe eintrainiert, um den Schirm in turbulenter Luft angemessen handhaben zu können. Ungewollte Klapper und andere extreme Flugzustände können dadurch reduziert bzw. wesentlich besser beherrscht werden.

Folgende Manöver sollten während Höhenflügen unter Aufsicht mit Funk mit dem neuen Gleitschirm absolviert werden:

Übungen:		**Einweisungen:**	
Schnelle Kurvenwechsel	☐	Einweisung in das Beschleunigungssystem	☐
Enge Vollkreise in beide Richtungen	☐	Seitliches Einklappen mit Kurs halten	☐
Steilspirale	☐	Eventuellen Sackflug richtig ausleiten	☐
B-Leinen Stall	☐		
Ohren anlegen	☐		

Diese Übungen dürfen nur mit einem Rettungsgerät erfolgen. In Thermik und Turbulenzen können alle diese Flugzustände plötzlich auftreten und es dient der eigenen Sicherheit, diese mit jedem Schirm neu zu erfliegen.

Diese Übungen ersetzen nicht ein Sicherheitstraining, dessen Besuch wir jedem Piloten im Interesse seiner eigenen Sicherheit empfehlen. Deine Flugschule kann Dir dies sicher bestätigen.

Wir bestätigen, daß oben genannter Gleitschirm von uns testgeflogen wurde, und die aufgeführten Manöver vom Käufer beherrscht werden:

Unterschrift Fluglehrer: _____

Unterschrift Käufer: _____

Ort / Datum: _____

UP EUROPE GmbH Altjoch 19 A
82431 Kochel a. S. / Germany
Tel. +49 (0) 88 51-92 92-0
Fax: +49 (0) 88 51-92 92-60
E-mail: info@up-europe.com
www.up-europe.com