



# ILLUSION<sup>2</sup>



## USER MANUAL

Version 1.0 Stand 09.2022



## Contents

MAC PARA COMMUNITY .....	2
GENERAL .....	3
WARNING .....	3
OVERALL PLAN .....	5
TECHNICAL DESCRIPTION .....	6
PREPARATION .....	7
FLYING THE ILLUSION 2 .....	10
RANGE OF USE .....	17
EXTREME FLYING MANOEUVRES .....	18
LOOKING AFTER YOUR PARAGLIDER .....	22
OVERALL LINE LENGTHS ILLUSION 2 .....	28
RISER .....	29
LINE PLANS .....	30
LINE PLAN ILLUSION 2 .....	31
ADJUSTING BRAKE LINES .....	32
TREATING NATURE WITH RESPECT .....	32
MATERIALS .....	33
CHECKS .....	34
TEST FLIGHT CERTIFICATE .....	35
TECHNICAL DATA .....	35

## MAC PARA COMMUNITY

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[MACPARA.com](http://MACPARA.com)



[OfficialMacPara](https://www.youtube.com/OfficialMacPara)



[fb.com/MACPARA](https://fb.com/MACPARA)



[flymacpara](https://www.instagram.com/flymacpara)



## GENERAL

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### Dear MAC PARA pilot

We congratulate you on your purchase of a MAC PARA paraglider. Extensive development work and numerous tests make the Illusion 2 a high performance paraglider with maximum possible safety. The Illusion 2 is constructed for thermal and cross-country flying, and will enable pilots to get maximum enjoyment. The Illusion 2 offers very easy inflation and simple ground-handling characteristics by take-off, excellent handling in flight and easy landing. Please read this manual carefully before you start, this way you will get the most out of your glider.

## WARNING

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### Please read this manual carefully and note following details

Paragliding is a sport, which demands, besides the optimum equipment, a high degree of attentiveness, good judgement, and theoretical knowledge. Paragliding can be a dangerous sport, which may lead to injury and death. Flying a paraglider is undertaken with the full knowledge that paragliding involves such risks. This paraglider meets at the time of delivery requirements of the EN (European Norm) 926 or LTF (German Certificate of Airworthiness). Any alternations to the paraglider will render its certification invalid! The use of this paraglider is solely at the user's own risk! Manufacturer and distributor do not accept any liability.

These operating instructions must be fully read and understood before the first flight. As the user of this paraglider you take the responsibility for all risks associated with its use. Inappropriate use and or abuse of your equipment will increase these risks.

Be ready to practice as much as you can. The ground handling with your paraglider is the most important part of training. Make sure you always complete a pre-flight inspection of all of your equipment. Never attempt flying with unsuitable or damaged equipment. Always wear a helmet, gloves and boots. Make sure that you are physically and mentally healthy before flying. Pay special attention to the terrain you will be flying and the weather conditions before you launch. If you are unsure do not fly, and always add a large safety margin to all your decisions.

Keep this manual for reference, and please pass it on to the new owner if you ever re-sell your paraglider.

If, after carefully reading this handbook, you still have questions, suggestions or criticism regarding this product do not hesitate to contact your dealer or us. We will be glad to help and advice.

**MAC PARA wish you nice flights with your Illusion 2.**

Version 1.0 Stand 09.2022



## Operating limits

The Illusion 2 has been tested by PARA-TEST certification laboratory to EN B and LTF category. The Illusion 2 is certified for solo flight. The Illusion 2 has been load and shock-tested and passed with a load corresponding to 8G of the maximum weight in flight. Its flying tests have shown that the glider remains stable and controllable over a wide range of normal and abnormal flight conditions. Nevertheless, turbulence and gusting winds can lead to a partial or complete collapse of the canopy. Therefore never fly in such conditions.

The Illusion 2 must not be used outside the certified weight range.

The Illusion 2 must not be used during rain or snow-fall.

The Illusion 2 must not be used in high or gusty winds.

The Illusion 2 must not be used in cloud and fog.

The Illusion 2 must not be used by pilots without sufficient knowledge or experience.

The Illusion 2 must not be used for aerobatics/extreme flying or flight manoeuvres at an angle greater than 90°.

The Illusion 2 must not be used when the canopy is wet.

The Illusion 2 has been certified for a defined weight range. We strongly recommend that you respect these weight ranges. If you want better speed, precise handling, and generally fly in strong conditions, or in competition you should chose to fly in the middle to top part of the weight range. Remember, you can always add ballast when conditions are stronger.

The EN 926-2:2013 describes the weight measurement with: "All weights are subject to an acceptable tolerance of  $\pm 2$  kg". Therefore a slight overload of the wing would be within EN tolerances. However, flying over the maximum weight further increases the dynamic flight behaviour.

Before delivery, as well as during production, each paraglider goes through a strict visual inspection, and is test-flown by your dealer. Stamps on the placard, together with a completed test-flight certificate, confirm this. Check that the paraglider has been test-flown before your first take-off. If it has not, consult your dealer.

## Liability

Use of the paraglider is at the pilot's own risk! Pilot is responsible for his own safety and his paraglider airworthiness. The paraglider carries no warranty! The manufacturer cannot be held liable for any personal injury or material damage which arises in connection with this paraglider.

The certification and warranty shall be rendered invalid if there are changes of paraglider construction, or changes to the brake lines beyond the permissible tolerance levels, or incorrect repairs to the glider, or if any inspections are missed (annual and 2-yearly check).



Pilots are responsible for their own safety and must ensure that the airworthiness of the glider is checked prior to every flight. The pilot should launch only if the paraglider is airworthy.

All pilots should have the appropriate level of license for their respective country and third party insurance.

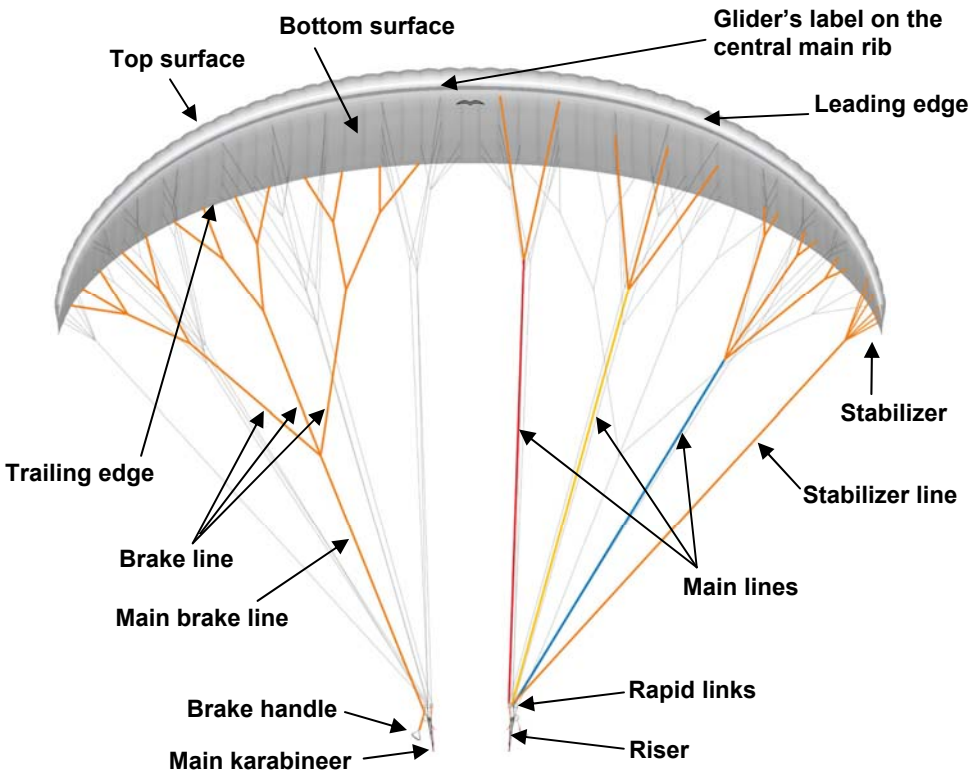
Any changes made to this paraglider invalidate the certificate of airworthiness. There shall be no liability on the part of third parties, in particular the manufacturer and the dealer.

### Before the first flight

NOTE! Your instructor, dealer or a specialist must test-fly and inspect the paraglider before your first flight. The test-flight must be recorded on the paraglider information label. Any changes or improper repairs to this paraglider shall render invalid the certification and warranty.

## OVERALL PLAN

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## TECHNICAL DESCRIPTION

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### Construction of the canopy

The canopy of the Illusion 2 consists of 52 cells over the wingspan. The Illusion 2 is “three and half line system” paraglider. Every main rib is attached to the 3 or 4 suspension lines. Between these main suspension ribs, intermediate ribs are suspended by “bridge” diagonal ribs system. These diagonal ribs lead to 80% of height of ribs. This construction ensures a smooth top surface and precise airfoil reproduction.

The internal reinforcements maintain the precise form of the canopy and provide stability. The cell openings on the under-surface of the profile's nose provide airflow into the glider. Stretch resistant flares, integrated with diagonal ribs at the suspension points, ensure an even distribution of load throughout the canopy.

A stretch resistant Mylar-reinforcements combined with nitinol rods help to keep airfoils in right shape and this guarantees a high level of stability. Large cross spots allow effective airflow inside the canopy, providing good re-inflation without reducing the profile accuracy.

The Illusion 2 is a blend of proven Nylon fabrics from Porcher Sport - Skytex 38, Skytex 32 and Skytex 27. Like any synthetic material, this can deteriorate through excessive exposure to UV. Various forms of nitinol rods are used in the Illusion 2 (rigid construction), which help maintain the shape of the leading edge and the stability of the canopy.

### Rigging system

The lines of the Illusion 2 are made of proven strong and stretch resistant Aramid/Kevlar lines. The entire rigging system comprises individual suspension lines looped and stitched at each end. The lines have strengths from 70 kg up to 230 kg. The steering lines of the Illusion 2 are made of proven strong and stretch resistant covered Dyneema lines.

The suspension lines are comprised of “cascaded top lines” (attached to the under-surface), “cascaded middle lines” (cascade 1 and 2), and “main lines”. Main lines lead to the “quick link” (a small carabiner which connects lines and risers).

The two central A-lines are attached to the main A-riser. The outermost A-line are attached to the A1-riser. The 3 B-main lines and the stabilizer line per side are attached to the B-riser. The 3 C-main lines per side are attached to the C-riser.

The main brake lines leads through the pulleys on the C-riser. The line connections are made to triangular quick links (karabiners) fitted with a rubber “O-ring” in the form of a “figure eight” which prevents any slipping of the lines on the quick link.



## Brake Lines

The steering lines are not load carrying suspension lines. They lead from the trailing edge of the canopy to the main brake lines and run through the pulleys on the C-risers to the brake handles. A mark on the main brake line indicates the position of the brake handle. This adjustment, on the one hand, allows sufficient brake to be applied during extreme flying situations and when landing, while on the other hand, this ensures that brakes are not permanently applied to the canopy (especially when fully accelerated).

We are convinced it is better to have slightly long brake lines and to fly with a wrap (one turn of line around the hand) to maximize performance of your glider. The brake line lengths have been set carefully. This trimming should not be altered.

## Risers

The Illusion 2 is equipped with 4 risers per side. The A-riser is covered with coloured webbing, to allow for easy identification. The main suspension loop, on the bottom of the riser, is covered red. This is where the main karabiner should be hooked in, which then in turn connects the risers to the harness.

The risers are equipped with a stirrup operated speed-system, which returns automatically to normal position when the stirrup is released. The speed system affects the A and B risers and changes the angle of attack.

In normal flight all risers have an overall length of 50 cm without quick links. When the stirrup is pushed out at maximum all A-risers are shortened till the A/B limiter strap and the B - risers are shortened till the B/C limiter strap. The C-risers retain their original length. Exact lengths of A and B riser shortenings vary according to the size of the paraglider. Have a look in the chapter "Riser Lengths Illusion 2" on the page 29. These measurements influence the certification!

An incorrectly fitted speed system causes loss of certification! The risers do not feature trimmers.

# PREPARATION

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## Preparing for take-off

As for any aircraft a thorough pre-flight check must be made prior to each flight on the Illusion 2! Before every launch check lines, risers and canopy for damage! Do not launch with even the slightest damage!

Also check the quick links connecting the lines and the risers. They have to be closed tight. Put on the harness with maximum care and check the handle of the safety system and that all the flaps of the outer container are fastened securely and correctly. The main karabiner must also be checked carefully. Replace it if any damage is visible, or generally after 300 flying hours. Finally connect the risers to your harness with the main karabiners.

Check carefully that they are properly closed. Attention! Never fly with an open main karabiner! Do not take off if you find any damage on your equipment!



## Harness

For flight comfort and safety it is very important that you fly with a suitable, properly adjusted harness. It is important to set up your harness correctly before flying the glider. Make sure to spend time adjusting your harness's different settings until your sitting position is completely comfortable. The Illusion 2 is certified for use with all harnesses with variable cross-bracing (GH type). Practically all modern harnesses are GH type harnesses. Older harnesses with fixed cross-bracing (GX type) are not certified and should not be used.

It's important for your comfort and safety to fly with a suitable harness that is properly adjusted. When choosing a harness, remember that the height of the attachment points (i.e. distance from the carabiners to the seat plate) affects the sensitivity of the glider and the relative brake travel. The lower position of the carabiners, the more sensitive the glider is to weight-shift.

The adjustment of the chest strap change the distance between carabiners and affects the stability of the glider and its handling. Excessive tightening of the chest strap increases stability but also the risk of riser twists following glider collapses. It also increases the tendency of getting collapses due to poor feedback from the glider. The risk of twisting is also strongly influenced by the seating position of the pilot. Flying in a laid back (reclined) position makes it much more difficult to react in time to prevent riser twisting. With the chest strap in a more closed position the glider also has more tendency to maintain a stable spiral. With the chest strap in a more open position, feedback from the glider increase but stability decrease.

EN certification test flights are carried out with the horizontal distance between the harness attachments points (measured between connector centrelines) set depending on the total weight in flight as follows:

Total weight in flight	<80 kg	80 to 100 kg	> 100 kg
Width	40 ± 2 cm	44 ± 2 cm	48 ± 2 cm

We recommend adjusting the distance of the chest strap according to the table and, if necessary, to adapt easily. Take care your leg and shoulder straps are not adjusted too tightly. If you do, you may have difficulty sitting back into your harness after take-off.

If any problems or disturbances are encountered when flying with a reclined harness, the pilot must immediately assume an upright seating position. Extreme flight manoeuvres flown in a reclined position drastically increase the risk of twist. In addition, pilots often underestimate the reduction in control travel caused by flying an extreme flight manoeuvre.

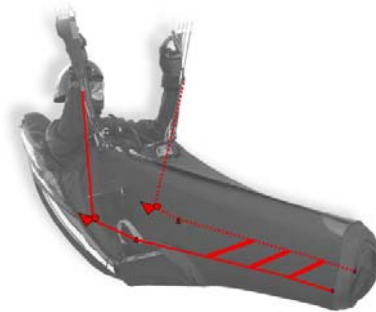




## Fitting the speed-system

The Illusion 2 speed system, including Brummel-hooks supplied, must be assembled as per instructions. Make sure that speed system lines lead correctly through the all of the pulleys of your harness. (Check your harness manual for instructions). Attach the speed system lines to the accelerator system on the risers with the Brummel hooks. Adjust the lengths of the lines so that the main bar sits just beneath your seat. You should be able to hook your heel in to the lower loop of the accelerator. There must be enough slack in the speed bar to ensure the front risers are not pulled down in normal trim speed flight, but not so long that it is impossible to use the full speed range of the glider.

The full range is reached when the limiting straps between A, B, C risers are tightened.



## Rescue System

We recommend that you always fly your Illusion 2 with at least one reserve parachute suitable for your maximum all up flying weight. It is a mandatory requirement to carry an approved reserve for use in emergency situations where the paraglider fails and recovery is not possible. The reserve is fitted according to the manufacturer's instructions.

Note: Carry out your first flights only during stable weather, and in a familiar area or on a training slope. You should steer gently and carefully to begin with so that you can become accustomed to the reactions of the glider without stress.



## FLYING THE ILLUSION 2

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### Pre-flight check

Brand-new gliders must be flown first in calm conditions. It is recommended to fly light spirals in both directions so that the handshake connections between the lines become tight up.

Follow a consistent routine every time you fly. This is very important for safety. Having unpacked and laid out the paraglider in a slight horseshoe pattern the following checks must be made:

- canopy without any damage
- risers without damage
- maillons (quick links) closed tight
- are the brake lines freely and firmly connected to the handle?
- are the lines free from knots, tangles or other damage?
- all main lines run free from the riser to the canopy, brake lines are free
- stitching of the main lines near the risers is o.k.

Putting on the harness:

- rescue handle and deployment pins secure
- buckles (leg- ,front riser) closed
- main karabiners

Before take-off:

- is your personal equipment in order (harness, carabiners, reserve, helmet)
- speed-system mounted and connected properly
- risers not twisted
- brake handle in hands, brake lines free
- pilot's position relative to the wing (centred: all lines same tension)
- wind direction
- obstacles on the ground
- free airspace

Note: If there are obvious creases in the glider as a result of tight packing or long term storage, carry out some practice inflations before your first launch and smooth out the trailing edge a little. This ensures that the flow profile is correct during launch. This is particularly important in low temperatures.

When laying out the glider, the wind direction should be observed. The canopy should be deployed into the wind so both halves of it are loaded symmetrically. The paraglider should be arranged in a semicircle against the wind. This ensures that the A-lines in the centre section of the canopy will tension before the ones at the wing tips. Thus the canopy inflates evenly and an easy launch in the desired direction is guaranteed.

All lines and risers should be carefully untangled and arranged in a way that they do not catch on anything. It is equally important to untangle the brake lines so that they are clear and cannot catch on anything during launch. The brake lines should run freely through the pulleys to the trailing edge of the canopy.



Make sure the risers are not twisted; this can prevent the brake lines from running freely through their pulleys. It is often impossible to untangle lines during flight.

It is important that no lines are looped around the canopy. Also called a “line-over”, this may have disastrous consequences during take-off.

Finally connect the risers with your harness by using the main karabiners. Check carefully that they are closed properly.

## Launching

Your Illusion 2 will launch with either the forward or reverse technique. The wing should be laid out in a pronounced arc, with the centre of the wing higher than the tips.

### Forward Launch - Nil wind

When gently holding the A-risers move forward positively, your lines should become tight within one or two steps and the Illusion 2 will immediately start to inflate. You should maintain a constant pressure on the risers until the wing is overhead. It is important to guide the A-risers smoothly upwards in an arc, keeping your elbows bent and hands at the level of the shoulders. Do not pull down or push the risers forward excessively, or the leading edge will deform and possibly collapse making taking-off more difficult and potentially dangerous. Once the wing comes overhead, it may require a brake input from stopping it overflying you. Once the Illusion 2 is inflated correctly, accelerate smoothly off the launch.

### Reverse Launch - Light to Strong Winds

This method of launch makes it easier for the pilot to control the rising of the canopy and is therefore recommended. The reverse launch technique is generally recommended for the Illusion 2. Take the brakes and turn around to face the wing. Pass one set of risers over your head as you turn. Make sure the lines are free from knots or tangles. Check that the airspace and visibility are clear. Gently pull up the glider in an arc with the A-risers. When the glider is overhead, brake it gently if necessary, turn around and launch. In stronger winds, be prepared to take a few steps towards the glider whilst braking as it inflates. This will take some of the energy out of the glider and it will be less likely to overfly you or inadvertently pull you off the ground. The reverse-launch technique can be used in surprisingly light winds too.

Warning! Make sure that the steering lines are not wrapped around the main lines during the reverse launch. In this case, any faster pull on steering line can damage the sheath on the main lines.

### Tips for the take-off

- Practice ground-handling regularly to improve your take-off skills!
- If the glider comes up slightly off-centre, make small corrections by moving towards the lower side.
- In stronger winds, take only central A-main line per side over rapid links in one hand and the outermost C-main line per side in other hand while you hold brake toggles in your hands. Pull on A-lines and control the speed of rise with the C-lines. Be prepared



to take a couple of steps towards the canopy. By a good procedure the wing tips cannot rise earlier than the centre of the canopy.

- The pilot must work actively to keep the glider on the ground in higher winds (wind speeds from approximately 6 m/s), otherwise the glider may rise above the pilot unintentionally.
- During reverse launch and ground handling, care should be taken that the brake lines do not rub over the riser. This may cause damage to the riser or lines.

## Flying it

The glider is delivered with a standard set-up and its trim speed can reach 37 - 39 km/h depending on the weight of the pilot. Trim speed (brakes fully released) is the best glide speed in calm air. The brake lines are used to adjust the speed according to the flight situation in order to ensure optimum performance and safety. Minimum sink speed on the Illusion 2 is achieved by light braking. During your first few flights, familiarize yourself with your glider's speed range and corresponding brake positions and pressures.

NOTE! Always fly with sufficient clearance from the terrain and always keep the brake handles in your hands!

NOTE! Flying too slowly close to stall speed increases the risk of an unintentional asymmetric stall or full stall. This speed range should therefore be avoided and used only on landing during the final stage of the flare.

## Accelerated Flight

The Illusion 2 is very stable in accelerated flight. C riser control is very effective up to 60 % of speed bar range. By more than 60% the effectivity decreases. When flying fast than that, we recommend to control the pitch of the wing actively using a combination of the speed bar and C riser input. If you feel the nose of the wing start to collapse the first action should be to release the speed bar impulsively and then make any necessary C riser input. Release the speed bar first before making any C inputs. Using the combined active speed bar/C riser control technique you will be able to maximise your speed and glide efficiency whilst minimising the likelihood of collapses.

Attention: Do not apply brakes when fully accelerated! Braking increases lift near the trailing edge. The main lift point moves backwards. Due to this the wing can lose stability for a short time!

## Steering - turning

The Illusion 2 is a responsive paraglider and reacts directly and instantly to any steering input. The Illusion 2 performs best in turns when it is flown with sufficient speed and weight-shifting. Enter a turn with good airspeed, weight-shift and then apply the brake. Once established in the turn, regulate your speed and turn radius with weight-shift and the outer brake. Make your first turns gradual and progressive. Too much braking increases the sink rate. Any weight-shift has a greater effect the more loosely the chest-strap is fastened. If the brakes are applied more, the bank attitude increases and the glider will fly a fast turn increasing in steepness, which will eventually become a spiral dive.



## Active Flying

The Illusion 2 has good pitch stability. Nonetheless, in turbulence or during manoeuvres, the glider may pitch. If the glider pitches in front of you, apply brake to slow it down. If the glider drops behind you, ease off the brakes to allow it to speed up. The objective is to reduce the pendulum effect by adjusting the angle of attack and speed of your glider so that glider and pilot are travelling at the same speed. When the conditions are turbulent, be more active and anticipate the movements of the wing. Practice active flying to eliminate collapses in all conditions. Try to keep tension on the brakes approximately equal to the weight of your arms. This allows you to stay relaxed and sensitively feel the internal pressure in the wing through the brakes. If you feel a loss of pressure in one or both sides of the wing, quickly apply the appropriate brake(s) to regain pressure. Release the brake promptly as soon as normal pressure is resumed. If you miss the above timing and get a collapse, be sure to first raise your hands and release the brakes before considering any other corrective actions.

## C-riser control

Even the Illusion 2 doesn't feature special C-riser AOA control system it responds very nicely to C-riser control. When gliding at trim speed or up to 60% accelerated flight the pilot can control the wing with the C risers. This gives an improved feel and control over the wing enabling you to fly actively without using the brakes (which causes drag and pitch movements). The objective is to control pitch so that the wing does not collapse and stays above the pilot. By pulling the C risers down or rearwards you increase the angle of attack and return the wing to trim speed. When pushing the bar, if the air becomes slightly turbulent apply some pressure to the C risers, when the air becomes less turbulent again you can reduce (or release) pressure on the C risers for extra speed. Flying fast and efficiently in normal air requires constant attention to the wing, it is necessary to combine C riser inputs and speed bar adjustments to keep the wing open and pressured.

C-riser control can also be used for steering. Following lifting lines using the C-risers can make a huge difference to flight performance. To fly with the C risers, keep hold of your brake toggles (remove any wraps) and either rest your hands on or take hold of the sticks located on the C risers. The control movement should be subtle and fluid - only small movements are required. It is good practice to glide with gentle tension applied to the C-risers (pulling them backwards about 4 to 7 cm) so that you can feel the inputs from the wing. Those inputs warn you when turbulence is coming, but also allow you to feel the lifty side of the wing - when the tension on the C-riser on one side increases, pull down on that side to turn slightly towards the lifting air. This control method is suitable for gliding in good 'normal' air without huge levels of turbulence, it does not replace proper active flying with the brakes in strong turbulent conditions. If you are unsure about the air return the glider to trim speed, release the C risers and fly the glider actively with the brakes.



## Rapid descent techniques

Many flying situations call for a very rapid descent to avoid a dangerous situation, e.g. the escape from a cumulus cloud or approaching rain. All rapid descent methods should be practised in calm conditions and at sufficient altitude so that a pilot is then able to employ them effectively if extreme conditions arise.

Spiral dives and “Big ears“ are generally the most common methods of descent for paragliders. Spiral dives attain higher descent rates, but the g-forces can be significant and the manoeuvre is more physically demanding. Big ears can achieve a moderate rate of descent with the advantage of forward speed and manoeuvrability. Always try to avoid the need to use these descent techniques. Thoroughly check the conditions before launch, and pay close attention to how the day develops.

### Spiral dive

The spiral dive is the most effective method for making a rapid descent, and can allow sink rates of up to 20 m/s to be reached. It is suitable where there is a high ascent rate and little wind.

The Illusion 2 fulfils the EN spiral dive requirements and has no tendency to remain in a stable spiral dive under normal conditions. Note! The certification test flights are carried out with a defined carabiner distance. Deviations from this defined setting, unapproved harnesses or spiral with excessive sink can change the manoeuvre considerably; pilot action may be required. In such cases, exit the spiral by weight-shifting to the outside and progressively applying the outside brake.

Before entering a spiral, make sure you have adequate height for recovery. To initiate a spiral, look in to the direction you want to turn, weight shift and smoothly pull down on the inside until the glider enters the spiral. Once in the spiral you should re-centre your weight shift and apply a little outside brake to keep the outer wing tip pressured and inflated. Spirals with descent rates above 10 m/s are not recommended. Very high decent spiral dives with high speeds and G-forces can be very disorientating and could lead to a loss of vision and even black out. Always pay particular attention to your altitude. Always maintain ground clearance of 150 – 200 m. The manoeuvre must be exited at this height above ground.

To exit the spiral, check your weight is centred (or slightly towards the outside) and progressively release the inside brake. As the glider starts to exit the spiral, you may also choose to reduce the pendulum moment by briefly re-applying the inside brake.

Attention! Due to energy retention, the glider will climb a lot after a deep spiral-dive release. If you apply inner brake and decelerate the glider for two or three turns, big pendulum effects can be avoided.

**WARNING!!** Practise spiralling with caution and lower sink-rates to get a feel for the gliders behaviour. A pilot who is dehydrated or not accustomed to spiralling can lose consciousness in a steep spiral dive!



## Spiral dive with tucked ear (asymmetric side collapse)

The disadvantage of a spiral dive is the high G-force. To avoid these G-forces, you can fly a spiral dive with one ear collapsed on the outside and achieve almost the same sink rates with a greatly reduced G-force. However, the material stress is high. The manoeuvre is initiated by pulling the A1-riser down and holding it in the hand. A part of the wing remains collapsed. With the other hand you carefully initiate a steep spiral. Your seating position remains neutral. Recovering is done simply by slowly releasing the inside brake. Higher sink rates are achieved when 50% of the leading edge is collapsed.

## Big ears

Big ears are the simplest method for rapid descent. The advantage is that the horizontal speed is higher than the sink rate (3-5 m/s), unlike a spiral dive or a B-line stall. This rapid descent technique is used to quickly and horizontally exit a dangerous area in the desired direction. It is even possible to land using big ears (for example top-landing).

In order to collapse the outermost part of the wing, pull the A1-risers down. The Illusion 2 easily tucks the wingtips and enters a stable descent mode. The pilot keeps hold of the brake handles along with the A1-risers in his hands. By braking on one side and weight-shifting, the canopy remains steerable. In order to increase the sink rate as well as the horizontal speed, this manoeuvre should be done together with use of the speed system. Apply the speed system after big ears are induced (step into the speed-bar before you grab the outer A1-risers). Big ears substantially reduce the risk of canopy stability problems in turbulent air. To exit big ears release the A1-risers. The canopy does very slowly self-recover. To quicken the recovery, the pilot can dynamically pull down and immediately release the brakes of the glider.

**WARNING!** Never do big ears in spirals, as this may drastically reduce the number of lines taking the already high loads, causing structural failure.

## B-line stall

The B-stall is a stall descent technique where the canopy's aerofoils are deformed by pulling the row of B lines down. The paraglider sinks vertically with a sink rate of approx. 7-8 m/s.

To induce a B-line stall symmetrically pull down slowly on both B-risers, until the canopy folds (parallel to its long axis). The airflow over the top surface is almost fully detached and the canopy enters a vertical descent flight mode without forward movement. Further pulling of the B-risers reduces the surface area more and increases the sink rate. Be careful, pulling too far or too rapidly may cause a frontal horseshoe to form. To exit from this flight mode release the B-risers at first rapidly but then gently (1 sec). The canopy surges forward re-attaching the airflow over the top surface and resumes normal flight. When the B-risers are released, the brakes should not be activated. This will give the canopy the chance to gain speed and resume normal flight. On exit from a B-line stall on no account just release the B-risers, as this can cause overloading. If canopy does not recover apply both brakes gently to recover or pull the A-risers, until the canopy regains forward speed.



Attention! The canopy surges forward after B-risers have been released until the airflow reattached. To prolong lifetime of your glider we don't recommend B-Stall as a usual descent technique.

Attention! All rapid descent techniques should first be practised in calm air and with sufficient height so the pilot can use them in emergency situations! By far the best technique is to fly correctly and safely, so you never have to descend rapidly!

## Approach and Landing

To avoid excessively demanding situations on the approach to landing, it is important to initiate the process at an adequate altitude. This leaves you enough time to observe and appropriately deal with wind direction and any other gliders in your vicinity.

The Illusion 2 is easy to land. The final leg of the landing approach must be into the wind. Adopt an upright position in your harness by sliding your legs forward, ready to make contact with the ground. During this final glide the paraglider should be decelerated slowly and at approximately one meter above the ground, according to conditions, the pilot should flare the canopy. The glider may climb again, gaining height, if too much brake is used too early. Higher wing loading results in a higher ground speed. Make sure you always land into the wind.

In nil wind situations, be prepared to run fast. In stronger winds, use only the minimum amount of flare necessary to sufficiently minimize your vertical and horizontal speed. If you flare too hard in strong winds, the glider will climb rapidly upwards and backwards, and you may get injured. In strong winds, turn to face your wing as soon as your feet touch the ground. Immediately stall the glider as rapidly as possible with the brakes or rear risers. Be prepared to run towards your wing.

Attention! Do not allow the canopy to fall onto the leading edge with energy. This can destroy the material and affects the life of the ribs at the leading edge!

Ground handling on rough surfaces will accelerate the ageing process of your wing.





## RANGE OF USE

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### Towing

The Illusion 2 may be tow-launched. It is the pilot's responsibility to use suitable harness attachments and release mechanisms and to ensure that they are correctly trained on the equipment and system employed. All tow pilots should be qualified to tow, use a qualified tow operator with proper, certified equipment, and make sure all towing regulations are observed. When towing you must be certain that the paraglider is completely over your head before you start. In each case, the maximum tow force needs to correspond to the all up weight of the pilot.

**WARNING!!** Please always ensure that the brake lines are adjusted to the lengths recommended here. Setting them shorter could lead to a tendency to stall during towed flight. Apart from this, there are no special procedures.

### Aerobatics

The Illusion 2 was not developed or tested to be used for aerobatics (acro). By engaging in such an activity, you voluntarily assume an increased risk of injury or death. Any type of acrobatic manoeuvre at all on the Illusion 2 is contrary to law and illegal. The pilot would be putting his/her life at risk. Aerobatics involves a risk of unpredictable flight attitudes, which could lead to damage to material and structural failure.

### Tandem paragliding

The Illusion 2 is not intended for tandem paragliding.

### Paramotoring

The Illusion 2 is not intended for powered flying with line types described at end of this user manual. Powered version of Illusion 2 is equipped with different types of lines warranting higher loads. DGAC documentation is in process.

**Warning! The Illusion 2 must never be used for jumps from an aircraft.**



## EXTREME FLYING MANOEUVRES

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### Dangerous situations

Any pilot who flies in turbulent conditions or who makes an error in handling the glider is at risk of getting into an extreme situation. Extreme wind conditions or turbulence which goes unnoticed by the pilot for too long may leave the wing in an unusual flying position, requiring special reaction and skills on the part of the pilot. The best way to learn how to react calmly and correctly in a serious situation is to attend safety training, where you will learn how to manage extreme situations under the guidance of a professional.

All of the extreme flight figures and flight attitudes described here are dangerous if they are carried out with inadequate knowledge, without the right safety altitude or without training. Always keep within the recommended limits. Avoid aerobatics and extreme loading such as spirals with big ears. This will prevent accidents and avoid overloading the glider.

In turbulent conditions, always keep enough distance from rock faces and other obstacles. Time and sufficient altitude are needed to recover from extreme situations.

Note! Deploy your reserve if the corrective manoeuvres described in the following sections do not return the glider to a controllable flying position or if there is not enough altitude for correction.

### SIV / Safety training

The Illusion 2 features an advanced design therefore collapses incorrectly induced by the pilot may have more significant consequences than collapses which may occur in the course of normal flight (due to turbulence etc.). Taking part in safety training is advisable in order to familiarise yourself with your glider and the correct reactions in extreme situations.

During a safety training course, avoid subjecting the materials of your paraglider to excessive stress. Uncontrolled flight positions may occur which are outside the manufacturer limits of the paraglider. This may cause premature ageing, or even structural failure. Stretching of the lines and/or canopy material after safety training can lead to a general deterioration in flight characteristics.

Damage as a result of safety training is not covered by the warranty. Be sure to perform any simulated collapses correctly. In particular, full speed asymmetric collapses performed incorrectly may result in unpredictable collapse behaviour and impulsive re-opening. This behaviour may require considerable pilot skill to manage safely.

### Deflations

Due to the flexible form of a paraglider, turbulence may cause a portion of the wing unexpectedly to collapse. If you get a collapse, the first thing to do is to control your direction. You should fly away from the ground or obstacles and other pilots.



## Asymmetric collapse

Use active flying techniques to virtually eliminate collapses in normal flying conditions. Nevertheless, if you do get a collapse, stabilize your weight in your harness and do not allow yourself to fall to the collapsed side.

Basically when asymmetric collapse is induced the Illusion 2 will re-open spontaneously from closures of up to 70% with a change of direction from 90° of up to 180°. The time this takes, and the associated height loss, can however be noticeably reduced by appropriate action by the pilot. Control your course with weight-shift and a little outside brake. The deflation should re-inflate spontaneously.

If you react immediately, 30% brake on the open side should suffice to hold the canopy on a straight course. In the event of a big collapse, this braking should be applied very carefully to avoid stalling the remaining inflated wing. The pilot's correction for direction can be aided by a pumping out the deflation; a slow, long pumping action of the brake of the deflated side of the wing helps the canopy to re-inflate. If the glider does not self-recover and the pilot does not correct the canopy can enter a stable spiral dive!

Attention!! The Illusion 2 is a paraglider with shark nose aerofoils and with more backwards positioned A-suspension points. These aerofoils and position of A-suspension points give more inherent stability and offers more resistance against collapses. It wasn't necessary to feature the Illusion 2 with special folding lines to perform the manoeuvre. But nevertheless the accelerated asymmetric collapse must be performed correctly in a proper way and this preferably by safety trainings.

It is important to take the outermost A1-riser together with A-main riser firmly in one hand. At the beginning of pulling the move (in the direction of pilot's body) must be slow and after the move of approx. 5cm, it can only be strongly pulled down. In case the A1-riser is not properly held along with the main A-riser, it may happen that the wing tip opens faster. The opening is then distinctive with the risk of a cravat.

## “Cravat” / Line-over

A cravat occurs when a wing tip becomes stuck between the glider lines, for example, following a bad take-off preparation. On the Illusion 2 a cravat is unlikely to occur. If you do get a cravat, first control your direction. Do this by using weight-shift and enough counter-brake to stop the turn, but not too much to risk a stall of the opposite side.

A cravat can generally be opened by a short, fast pull on the brake line of the cravat side. If not, on the Illusion 2, there is a separate stabilizer main line that goes down to the A riser. This line usually becomes slack in the event of a cravat. Pull this line down completely until it becomes tight and the cravat normally comes out.

Note! Counter-steering too strongly on the inflated side of the glider can result in a stall and to further uncontrolled flight manoeuvres.

Always remain aware of other aircrafts and terrain when dealing with a problem on your wing. Do not hesitate to throw your reserve parachute if the rotation in a cravat is increasing uncontrollably, especially if you are at low altitude.



## Symmetric collapse (Front stall)

A negative angle of attack can also cause central part or all of the leading edge of the glider to collapse. Symmetric (frontal) collapses will normally re-open without pilot input. The paraglider will pitch forward and then regain speed. Assist this process if necessary with a symmetric application of the brakes. Take care not to apply too much brake for too long as this may stall the wing.

In the case of extreme front stalls across the entire wing chord, the wing tips may move forward making the glider form a U-shape. Again, recovery is by light symmetrical braking on both sides. Take care that both wingtips return to normal flight evenly.

If you get a collapse while in accelerated flight, release the speed bar immediately. Then apply the normal procedure for unaccelerated asymmetric collapse.

Attention! As already described the Illusion 2 is a paraglider with shark nose aerofoils and with more backwards positioned A-suspension points. These aerofoils and position of A-suspension points give more inherent stability and offers more resistance against collapse. It wasn't necessary to feature the Illusion 2 with special folding lines to perform the manoeuvre. But nevertheless the accelerated symmetric collapse must be performed correctly in a proper way and this preferably by safety trainings. It is important to take the two outermost A-lines together (approx. 10cm above the quick links) firmly in your hands. Do not use the central A-lines! At the beginning of pulling the move (in the direction of pilot's body) must be slow and after the move of approx. 5 cm, it can only be strongly pulled down. By this way the leading edge collapse properly over its span. In case you use all A-risers for this manoeuvre and you do it without initial pulling it may happen that the leading edge collapses over all depth in the centre of the wing. The result may be an asymmetric opening and the risk of a big cravat increases!

## Parachutal stall (deep stall)

Paragliders can go into a deep stall for some reasons: brake lines too short (no slack), altered trim/line length and changes to profile characteristics caused by moisture (e.g. flying in rain). Paragliders have a particular tendency to stall if the wing-loading is too low. An out-of-trim glider, caused by changes in line lengths due to prolonged use, may also have a higher deep stall tendency.

In a deep stall, the airflow from the front reduces and the glider goes into a stable flight attitude without forward momentum. The paraglider sinks almost vertically at 4-5 m/s and there is noticeably less flight noise.

The Illusion 2 has no tendency to get into a deep stall. Should this nevertheless occur, make sure your brakes are fully released, the glider will then normally recover on its own immediately. If the glider still doesn't recover either put your hands on the A risers and push forward or use the speed bar to accelerate to get the wing into a normal flying position. After you have landed, the glider and the length of the lines must be checked.

Flying in strong turbulence or exiting a deflation with too much brake applied can cause this situation. A wet glider also has a higher deep stall tendency, and you should do everything you can to avoid flying in the rain. If you do pass through some rain never make big ears! Apply speed bar until you are confident that the wing has dried out.

Never apply the brakes, including any wraps taken, in a deep stall.



## Full-stall

The full stall happens when the maximum possible angle of attack is exceeded. The most common cause is going below the minimum speed or flying near the minimum speed combined with the effects of turbulence. In full stall, the paraglider loses its forwards travel, surges backwards and deflates. If the brakes are held down, the canopy comes up over the pilot again. The result is an almost vertical descent with a sink rate of approx. 8m/s.

To induce a full stall, apply full brake on both sides. The glider slows down steadily until it stalls completely. The canopy suddenly surges backwards a long way. In spite of this uncomfortable reaction of the canopy, both brake lines must be consequently held down with all your strength until the canopy is stabilized (directly overhead). This usually takes 3-6 seconds. The Illusion 2 generally flies backwards during a full stall but doesn't always form a front rosette. A frontal rosette can be formed by entering the full stall slowly. When entering (braking) fast, the canopy will not always form the desired front rosette.

To recover from a full stall, smoothly release symmetrically both brakes until 90% of leading edge reopens. After that, the brakes are completely released when the glider canopy is filled and in front of the pilot. This prevents the canopy from pitching too far forward. As this is done, the canopy accelerates forwards dynamically and picks up speed.

Note! If the canopy has gone back during the full stall, the brakes must be held down, otherwise the canopy may surge forward and, in an extreme case, end up underneath the pilot. Hold the brakes down until the canopy is above you again.

**WARNING!!** If the brakes are released rapidly and asymmetrically, the glider may surge almost 90° and suffer an extensive asymmetric collapse.

## Spin (or negative spin)

The spin is a stable flight manoeuvre, in which one side of the canopy stalls, while the other side continues to fly forward. Pulling brake on one side too fast or too hard can result in a negative spin. During a spin the canopy turns relatively fast around the centre section of the canopy while the inner wing flies backwards (hence the term negative).

There are two usual reasons for an unintentional spin:

- One brake line is being pulled down too far and too fast (e.g. when inducing a spiral dive)
- When flying at low speed one side is being braked too hard (e.g. when thermaling).

If a spin occurs, just release the brakes and wait for the glider to surge forward, checking it with the brakes if it surges too far. Never release the spin if the glider is far back behind you, always try to release it when the glider is above or in front of you! Depending on the type of release and the dynamics of the rotary movement, the canopy may surge forward on one side and collapse asymmetrically. In the case of a longer spin, the pilot may release the brakes only at the moment when the glider is in its rotary motion above or in front of the pilot. If the spin does not stop, check whether you have released the brakes fully (including wraps)!

**WARNING!!** If you are LOW and are in an unintentional spin, or if the canopy is caught in a cravat **USE YOUR RESERVE**.



## Wingover

To induce a wingover the pilot flies consecutive alternating turns to gradually steepen the angle of bank. During wingovers with a high bank angle, the outside wing begins to unload. Further increase of the angle of bank must be avoided, because any possible resulting collapse may be quite dynamic!

**WARNING!! Full-stall, spin and wingover (over 90 degree angle of bank) are prohibited aerobatic manoeuvres and may not be performed during normal flying. Incorrect recovery procedures or overreacting of the pilot may have dangerous consequences! Attention! The Illusion 2 is not designed to be used for aerobatics.**

### Alternative (emergency) steering

If for some reason it becomes impossible to control the Illusion 2 with the brake lines the outermost C-lines may be used to steer and land the canopy. Attention! Of course the range is much shorter (5-10 cm) than with the brakes. It is also possible to control the direction of the flight by pulling on a stabilizer line or by weight-shifting.

## LOOKING AFTER YOUR PARAGLIDER

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Looking after your canopy correctly will prolong the life of your paraglider.

### Packing the paraglider

To prolong the life of your wing and to keep the nitinol reinforcements in the best possible condition it is very important to pack the wing carefully. It is therefore recommended to use the Certina bag packing method exactly as shown so that all of the cells rest alongside each other and the nitinol reinforcements are not unnecessarily bent.

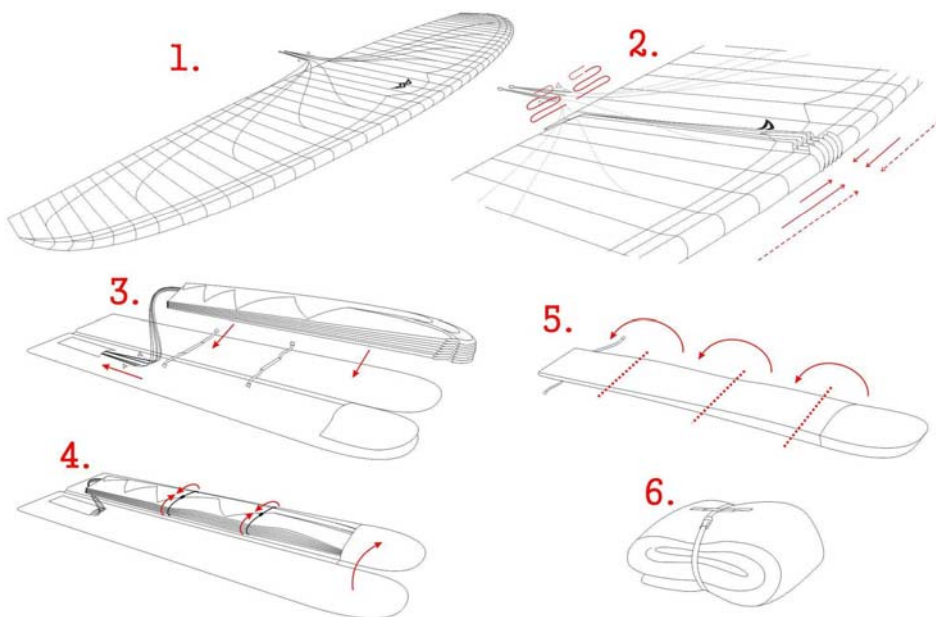
The leading edge reinforcements (Mylar and Rigifoil system) on the front edge are placed on top of each other to avoid bending or misshaping them. This method of packing ensures that the leading edge is treated carefully, which will increase the glider's life, performance and launch behaviour.

If the reinforcements have been bent or misshapen, they distort more easily during flight, creating an altered air inflow which can lead to a loss in performance and changes in flight behaviour. The leading edge reinforcements also perform an important function on launch. Therefore, the less they have been bent, the more easily the glider will inflate and launch.

1. Place the Certina bag underneath the glider which should be folded together. Lay the mushroomed wing on the Certina bag. It is best to start from the mushroomed position as this reduces the dragging of the leading edge across the ground.
2. Start from the centre to stack the profiles of each side of the wing on top of each other. Proceed like this until the wing tip. All the ribs on one side are placed one on top of one another, so that the leading edges are not bent. Then continue as in the second step, placing the leading edges of the other side on top of the next until you reach the tip of the glider.



3. The glider is now folded up “accordion wise” along its length, and the leading edges are on top of each other without having being bent. Close the pocket of Certina bag and fasten the straps near the leading edges, so that they do not slip, and the straps in the middle and at the end of the glider.
4. Close the zip, making sure that none of the lines or fabric is caught in the zip.
5. Fold up the glider along its length, with the first fold below the leading edge reinforcements. Pay particular care not to bend any of the rigid reinforcements!
6. Fold the glider again around second inflatable cylinder. Then fasten the compression strap around the glider and fasten it by pulling gently. Make sure that the glider is only loosely folded and is not bent or compressed excessively.



### Storing and transporting the glider

Even if your paraglider was completely dry and was nicely packed up after the flight, for longer-term storage you should if possible take it out of the backpack and spread out flat in the Certina bag. This is the best care for the nitinol reinforcements.

Store the paraglider in a dry space at ambient temperature away from chemicals and UV light. It should be stored at a temperature between 10° and 25° C and in relative humidity between 50 and 75%. Never pack or store the glider wet. This shortens the life of the cloth always dry glider thoroughly before any packing or storage. Make sure too that the paraglider is not stored in a place where animals such as mice, dogs or cats could use it as a place to sleep.



Do not store the paraglider near any chemicals. Petrol, for example, causes the material to disintegrate and can cause considerable damage to your paraglider. When your equipment is in the garage, keep it as far away as possible from any spare petrol cans or oil containers.

The glider should not be exposed to extreme heat (e.g. in the boot of the car during summer). Do not store your paraglider near radiators or other heat sources. Always transport your glider in the special Certina bag and use the backpack provided for the rest of the equipment.

When sending your wing as a parcel, take extra care with packing.

## Care

Care is essential to ensure that the fabric and glider remain durable and retain their qualities. The glider should therefore be protected from unnecessary UV light.

Do not unpack your glider until immediately before flight and pack it up straight after landing. Modern paraglider fabrics have better protection against the sun, but UV rays in particular are still one of the decisive factors in how the fabric ages. The colours will fade first and then the coating and fibres will begin to age.

When choosing a place to launch, try to find somewhere which is smooth and free of stones and sharp objects. Do not stand on the glider. This weakens the fabric, especially if it is on a hard or stony surface.

Pay attention to the behaviour of spectators at the launch site, especially children: do not hesitate to draw their attention to the sensitive nature of the fabric.

When you are packing up your glider, make sure that there are no insects trapped inside. Many insects produce acids when they decompose, which can cause holes in the fabric.

Grasshoppers make holes by biting through the fabric and also excrete a dark liquid which stains. Keep animals away when you are packing up. Insects are not attracted by any particular colours, contrary to what is commonly believed.

Various diameters of nitinol rods are used in the Illusion 2 (rigid construction), which help maintain the shape of the leading edge and the stability of the canopy. To ensure that the nitinol rods keep their shape, it is important that you pack the glider correctly as described in the section "Packing the paraglider".

The nitinol rods on the Illusion 2 can all be replaced through small pockets. If you notice that a nitinol rod has been damaged or misshapen because of incorrect use, this can be replaced by MAC PARA or authorised workshops.

Ensure that the lines are not folded tightly. It's extremely important to avoid any sharp bending of the lines, especially the main lines. Pay careful attention to the lines to avoid damaging them. Any over stretching of lines apart from the strain imposed during normal flight, should be avoided as over stretching is irreversible.

Be careful, not to allow snow, sand or stones to enter inside the canopy's cells: the weight can change the angle of attack, or even stall the glider; additionally the sharp edges can destroy the cloth!





Check main line lengths inclusive risers and quick links after 50 flight hours or after tree or water landings. Lines can stretch or shrink.

Never drag the wing over rough ground! This will damage the cloth on the wear points. When preparing the wing on a take-off with rough ground, don't pull the wing over it (i.e. by pulling the brakes). Please try to pack the wing on soft ground.

Uncontrolled strong wind take-offs or landings can result in the leading edge of the canopy hitting the ground at high speed which may cause rips in the profile and damage the rib material. Any repairs on paragliders are very expensive.

Clean the paraglider with fresh water after contact with salt water. Salt water crystal can reduce line strength, even after rinsing in fresh water. Replace lines immediately after contact with salt water. Also check canopy material after water landings, as waves can place uneven forces and cause cloth to distort in specific areas. Always remove gliders from the water by holding only the trailing edge.

Clean the paraglider with water and a soft sponge. Do not use any chemicals or spirits for cleaning, as these can permanently damage the cloth.

Do not pack your glider too tightly after use and, even though it is very comfortable, never sit on the backpack with the glider inside.

## Maintenance

### Identification label

MAC PARA gliders have an identification label on central rib. It is helpful to provide the type designation of the paraglider if you are contacting your MAC PARA dealer with any queries or ordering replacement parts or accessories, to ensure accurate identification.

### Regular inspections

Risers and quick-links, lines and fabric must be inspected regularly for damage, abrasion and correct operation.

### Tissue and Canopy check

A full visual check should be carried out: All the components of the wing (stitching, ribs, diagonals, lines, tabs, etc.) should be checked for signs of deterioration.

The tearing resistance of the cloth - A non-destructive test following the TS-108 standard which specifies minimum tear strength for sky diving canopies should be made using a Bettsometer. (B.M.A.A. Approved Patent No. GB 2270768 Clive Betts Sails).

### Risers

Visual inspection for signs of wear or abrasion. Differences to manual lengths should not exceed +/-5mm.



## Lines

Measuring the length of the lines is part of the regular paraglider inspection. The overall length (riser lines + mid lines + upper lines) has to be checked under 5kg of tension, in order to ensure reproducible results for a comparison with the lengths in the check sheets.

The lines have a considerable influence on flight behaviour. Correct line length and symmetry are also important for performance and handling. Therefore we recommend a geometry inspection every 100 hours or once a year.

Strength of the lines - An upper, middle and lower A line, along with a lower B line should be tested for strength. Each line is tested to breaking point and the value recorded. The minimum value is 14 G for all A+B lines, calculated from the maximum certified flying weight of the glider. The added minimum strength for the middle lines and for the top lines should be the same. If the breaking strength is too close to the minimum value calculated, the professional should give a period after which you will have to test the strength of the lines again.

Lengths of the lines - The difference between the measured length and the original length should not exceed +/- 10mm. The changes that could appear are a slight shrink on the B's and/or a slight stretch on the A's. The consequences of these changes can include a slower trim speed, difficult inflation etc.

The overall length measurement may deviate from the manufacturer's specifications within limit of +/- 40 mm. The basis for the trimming is only the official length information in this manual as a reference. I.e., the differences in the lengths of the lines (A, B, C, D) on each rib must correspond to the differences given in this manual.

Environmental conditions such as high temperatures or moisture can affect lines lengths. Check the line lengths regularly, particularly if you notice any change in launch or flight behaviour. The lines lengths should be checked if you have landed in water or if the lines have got wet through. Lines age and lose strength even if the paraglider is used infrequently or not at all. This can affect the safety and function of your paraglider.

Signs of wear are slight bumps or changes in flying characteristics. The lines must then be replaced immediately. Use only inspected and approved lines, which can be obtained through MAC PARA.

Do not under any circumstances use knots to shorten the lines. Any knot will weaken the line considerably and may cause the line to break in case of high load. The overhand knot and bowline knots described are permitted only for connecting the main brake lines/brake handle.

Finally, a flight test to confirm that the wing behaves normally should be carried out by a professional.

## Inspection periods

Failure to observe the inspection periods shall render invalid the certification and warranty. A properly completed logbook with details of all flying and training will help you to comply with these periods. A trim check should be performed after 100 flight hours or during the first 12 months by an authorized workshop.



A qualified professional should perform a full maintenance inspection no later than 24 months or after 100 hours (including ground handling), whichever is sooner. Subsequent full inspections should be made annually or after 100 hours.

A full inspection will give you peace of mind and extend your glider's lifetime. Additional inspections should be performed by a qualified person following a crash or violent landing on the leading edge, or if you note a deterioration of performance or behaviour.

Ground handling time must be at least doubled when calculating the total hours of use because of the increased wear and tear on the glider. It is your responsibility as a pilot to ensure that your wing is airworthy at all times. We recommend replacing the line set at least every 150 hours.

## Validity of inspection

The documentation and the result of the inspection must be clearly identifiable (date and place / name of the inspector) and be entered near the glider information/certification sticker.

## Repairs

Tears in the canopy must be professionally sewn. Adhesive patches are only adequate for very minor damage.

Repairs should only be carried out by the manufacturer, distributor or authorized workshops. Only original spare parts may be used!

Any changes to the canopy lines or risers, except those approved by the manufacturer, will void the certificate of airworthiness.

## Disposal

The synthetic materials used in a paraglider need professional disposal. Please send disused canopies back to us: we will dismantle and dispose of it.

## In Conclusion

The Illusion 2 is a modern paraglider. You will enjoy many safe years of flying with your Illusion 2 if you look after it correctly and adopt a mature and responsible approach to the demands and dangers flying can pose. It must be clearly understood that all air sports are potentially dangerous and that your safety is ultimately dependent upon you.

We strongly urge you to fly safely. This includes your choice of flying conditions as well as safety margins during flying manoeuvres. We recommend once more that you only fly with a certified harness, reserve parachute, and helmet. Also the certification placard must be present on the glider.

Every pilot should be suitably qualified, have a valid license and 3rd party insurance. The Illusion 2 is delivered with Certina bag, repair kit and user manual.



## OVERALL LINE LENGTHS ILLUSION 2

All overall lengths are measured from riser's main attachment point up to the tissue of canopy on attachment points. Brake lines are measured from the Swivel on brake handle up to the trailing edge.

\* - these lines are measured inclusive bunching system line

### Illusion 2 22 (XS)

Center	A	B	C	D	Brakes
1	6847	6730	6849	6970	7159
2	6786	6673	6790	6911	6950
3	6803	6694	6809	6926	6807
4	6769	6669	6780	6893	6743
5	6728	6631	6743	6845	6672
6	6747	6658	6758	6855	6533
7	6673	6610	6678	6755	6484
8	6576	6537	6597	6666	6506
9	6524	6493	6544	6590	6447 *
10	6489	6467	6505	6541	6384 *
11	6245	6202	6266		6313 *
12	6174				6289 *
13	6120	6095	6105	6132	6306 *

### Illusion 2 24 (S)

Center	A	B	C	D	Brakes
1	7133	7014	7139	7266	7473
2	7068	6951	7076	7202	7248
3	7086	6970	7095	7217	7108
4	7051	6950	7065	7184	7038
5	7011	6910	7020	7133	6956
6	7027	6932	7037	7138	6811
7	6956	6891	6961	7040	6772
8	6853	6809	6880	6948	6785
9	6796	6761	6820	6869	6730 *
10	6760	6731	6777	6806	6664 *
11	6505	6462	6531		6585 *
12	6432				6562 *
13	6374	6349	6360	6390	6576 *

### Illusion 2 26 (M)

Center	A	B	C	D	Brakes
1	7428	7298	7429	7560	7792
2	7358	7233	7362	7496	7561
3	7379	7258	7381	7508	7414
4	7345	7231	7352	7473	7345
5	7297	7187	7305	7419	7263
6	7316	7213	7324	7428	7107
7	7234	7162	7239	7323	7057
8	7125	7082	7153	7228	7076
9	7071	7032	7095	7146	7015 *
10	7032	7000	7049	7089	6952 *
11	6765	6717	6788		6870 *
12	6690				6842 *
13	6642	6615	6623	6653	6864 *

### Illusion 2 26 (M)

Center	A	B	C	D	Brakes
1	7428	7298	7429	7560	7792
2	7358	7233	7362	7496	7561
3	7379	7258	7381	7508	7414
4	7345	7231	7352	7473	7345
5	7297	7187	7305	7419	7263
6	7316	7213	7324	7428	7107
7	7234	7162	7239	7323	7057
8	7125	7082	7153	7228	7076
9	7071	7032	7095	7146	7015 *
10	7032	7000	7049	7089	6952 *
11	6765	6717	6788		6870 *
12	6690				6842 *
13	6642	6615	6623	6653	6864 *

### Illusion 2 30 (XL)

Center	A	B	C	D	Brakes
1	8029	7897	8037	8178	8465
2	7958	7824	7966	8108	8215
3	7977	7851	7987	8124	8055
4	7940	7822	7951	8083	7975
5	7891	7777	7901	8025	7885
6	7911	7806	7921	8034	7720
7	7824	7751	7830	7919	7670
8	7709	7664	7735	7815	7690
9	7648	7609	7667	7721	7640 *
10	7605	7575	7620	7662	7560 *
11	7321	7267	7346		7475 *
12	7237				7445 *
13	7168	7139	7156	7187	7465 *

### Illusion 2 33 (XXL)

Center	A	B	C	D	Brakes
1	8391	8252	8402	8550	8881
2	8314	8177	8324	8476	8615
3	8335	8202	8347	8489	8444
4	8298	8173	8314	8453	8364
5	8244	8125	8258	8392	8268
6	8264	8155	8282	8399	8092
7	8177	8101	8188	8280	8039
8	8055	8010	8084	8173	8058
9	7989	7950	8017	8076	7996 *
10	7945	7916	7964	8013	7925 *
11	7644	7590	7671		7842 *
12	7555				7809 *
13	7486	7457	7470	7503	7829 *



# RISER

## Riser lengths Illusion 2 - 22, - 24

	A	A1	B	C
Trim-position	525	525	525	525
Accelerated	405	420	455	525

## Riser lengths Illusion 2 - 26

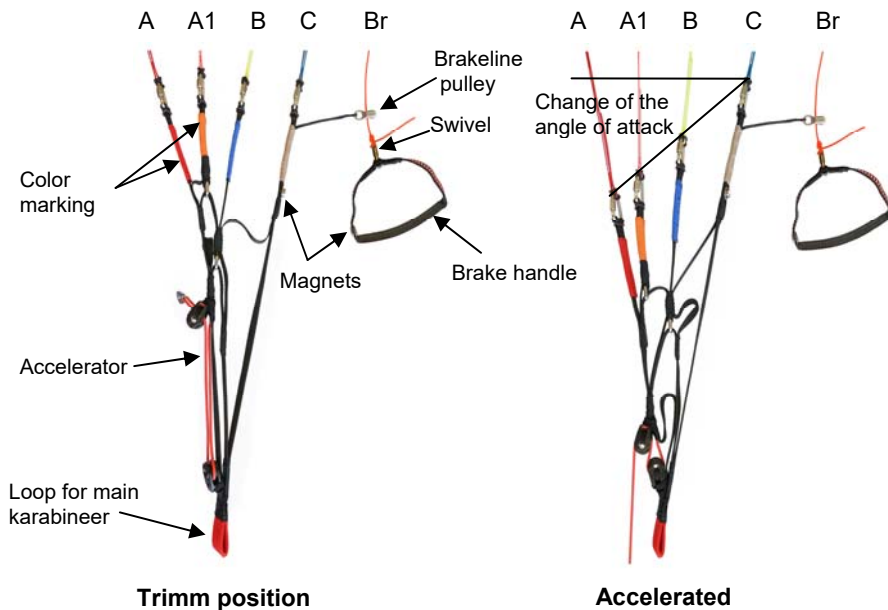
	A	A1	B	C
Trim-position	525	525	525	525
Accelerated	380	395	445	525

## Riser lengths Illusion 2 -28, - 30, -33

	A	A1	B	C
Trim-position	525	525	525	525
Accelerated	375	390	440	525

The lengths are measured from the main attachment point to the lower edge of rapid links.

## Riser





## LINE PLANS

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### Line descriptions

The following printed line plans show the line configurations.

### Line types in colors

**Aramid/Polyester A-8000U-070**

**Aramid/Polyester A-7343-075**

**Aramid/Polyester A-7343-090**

**Aramid/Polyester A-7343-140**

**Aramid/Polyester A-7343-190**

**Aramid/Polyester A-7343-230**

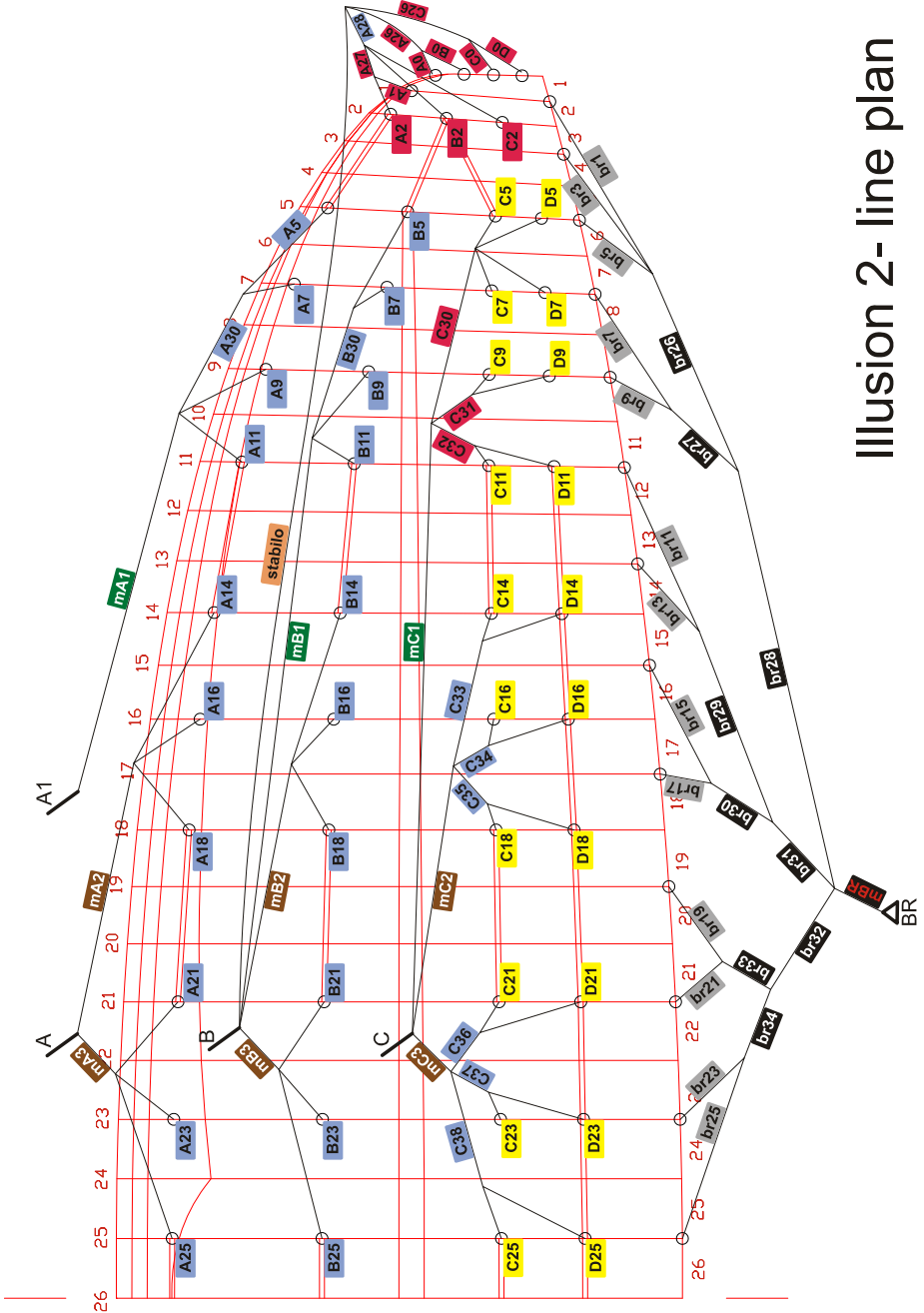
**Dynema/Polyester A-7850-080**

**Dynema/Polyester A-7850-100**

**Dynema/Polyester A-7950-200**



# LINE PLAN ILLUSION 2



Illusion 2- line plan



## ADJUSTING BRAKE LINES

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The brake lines lead from the trailing edge of the canopy to the main brake lines which then run through pulleys on the C-risers to the brake handles. A mark on the main brake line indicates the position of the brake handle.

The glider is delivered with a standard set-up and its speed can reach 38 - 40 km/h depending on the weight of the pilot. The brake-lines should always be adjusted so that the first brake-lines just come under tension when the brake handles have been pulled 5-10 cm. The test results relate to this brake-line adjustment.

This adjustment, on the one hand, allows sufficient brake to be applied during extreme flying situations and when landing, while on the other hand, it ensures that the canopy is not permanently braked (especially when fully accelerated). This trim should not be altered. In extreme situations any other settings may lead to the glider reacting differently to versions which have been tested.

**NOTE!!** If in doubt about the brake-line adjustment, it is preferable to leave them too long, as any necessary shortening can easily be achieved by wrapping them round your hand.

The length of the control lines measured from the first cascade line is and the available brake travel before stalling the wing depends on the size and loading.

Illusion 2	22	24	26	28	30	33
Main brake length	238 cm	250 cm	260 cm	270 cm	282 cm	295 cm
Brake range by max. loading app.	60 cm	65 cm	68 cm	73 cm	75 cm	80 cm

(The publication of the brake travel is claimed by the EN 926.)

## TREATING NATURE WITH RESPECT

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Finally the call to practise our sport with respect for nature and wildlife! Don't walk outside marked routes, don't leave any waste, don't make needless noise and respect the sensitive biological balance in the mountain eco system: especially in the take-off area!





## MATERIALS

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### Canopy Fabric

#### PORCHER SPORT

Upper surface leading edge - SKYTEX 38 Universal  
Upper surface trailing edge - SKYTEX 32 Universal  
Bottom surface leading edge - SKYTEX 38 Universal  
Bottom surface trailing edge - SKYTEX 27 Classic II  
Main ribs, Diagonals - SKYTEX 32 HARD

### Lines

#### EDELRID

Upper Galery C,D - Aramid 8000/U-070, Breaking Load 70 kg  
Middle Galery C, Upper Galery Stabiser - Aramid / Polyester 7343-075, Breaking Load 75 kg  
Upper Galery A, B, Middle Galery C - Aramid / Polyester 7343-090, Breaking Load 90 kg  
Stabilser line - Aramid / Polyester 7343-140 , Breaking Load 140 kg  
Main lines mA1, mB1, mC1- Aramid / Polyester 7343-190, Breaking Load 190 kg  
Main lines mA2, mA3, mB2, mB3, mC2, mC3 - Aramid / Polyester 7343-230, Breaking Load 230 kg  
Upper Galery Brake lines - Dyneema/Polyester A-7850-80 , Breaking Load 80 kg  
Middle Galery Brake lines - Dyneema/Polyester A-7850-100 , Breaking Load 100 kg  
Main Brake lines - Dyneema/Polyester A-7950-200 , Breaking Load 200 kg

### Attachment straps (Canopy)

STAP-POLYESTERBRIDLE 13 mm, Breaking Load 70 kg

### Risers

#### Cousin Trestec

Aramid-Polyester 3455 12 mm

### Threads

SERAFIL 60, SYNTON 20

### Quick links

NIRO TRIANGLE 200

### Rigifoils

Rigifoils - Nitinol 0,6 mm



## CHECKS

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Name	Company	Date	Signature & Stamp



## TEST FLIGHT CERTIFICATE

Paraglider type:

Serial number:

Test flown on:

\_\_\_\_\_

by

**MAC PARA TECHNOLOGY**

Confirmation by dealer: \_\_\_\_\_

### TECHNICAL DATA

Intermediate Performance EN-B Size		Illusion 2 22 (XS)	Illusion 2 24 (S)	Illusion 2 26 (M)	Illusion 2 28 (L)	Illusion 2 30 (XL)	Illusion 2 33 (XXL)
Zoom flat	[%]	88	92	96	100	104,5	1,095
Area flat	[m <sup>2</sup> ]	21,68	23,70	25,80	28,00	30,58	33,57
Area projected	[m <sup>2</sup> ]	19,10	20,87	22,71	24,66	26,93	29,57
Span flat	[m]	10,67	11,16	11,64	12,13	12,68	13,28
Aspect ratio flat	-	5,25	5,25	5,25	5,25	5,25	5,25
Root cord	[m]	2,53	2,65	2,76	2,88	3,01	3,15
Cells	-	52	52	52	52	52	52
Weight	[kg]	3,95	4,20	4,45	4,80	5,05	5,40
<b>Weight range*</b>	<b>[kg]</b>	<b>55-77</b>	<b>70-90</b>	<b>80-100</b>	<b>89-110</b>	<b>105-130</b>	<b>115-145</b>
Weight range*	[lbs]	121-170	154-198	176-220	196-243	231-287	254-320
Min. speed	[km/h]	23-25	23-25	23-25	23-25	23-25	23-25
Max. speed	[km/h]	37-39	37-39	37-39	37-39	37-39	37-39
Top speed (accelerator)	[km/h]	48-49	48-49	48-49	48-49	48-49	48-49
Glide ratio	-	+10	+10	+10	+10	+10	+10
Min. Sink rate	[m/s]	1,05	1,05	1,05	1,05	1,05	1,05

\*pilot equipped = weight naked + cca. 15-20 Kg (33-44 lbs)



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