



ADVANCE SIGMA<sup>8</sup>

User manual



ADVANCE

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# Thank you for flying ADVANCE

Congratulations on your choice of SIGMA 8 - a quality product from ADVANCE. We are sure that you will spend many rewarding hours in the air with it.

The user manual is an important part of the glider. Here you will find instructions and important information about safety, care of the glider and maintenance, and that's why we recommend that you read this document carefully before your first flight.

The latest version of this manual as well as further updated information can be found at [www.advance.ch](http://www.advance.ch). Any new safety-related information will also be published on the website. If you have any further questions or problems please contact your dealer or get in touch directly with ADVANCE.

We wish you a lot of enjoyment with your SIGMA 8, and always «happy landings».

Team ADVANCE

# About ADVANCE

ADVANCE, based in Switzerland, is one of the world's leading paraglider manufacturers. Since it was founded in 1988, the company has consistently pursued its own directions and concepts, both in development and production. The results are quality products with distinctive characteristics.

At the heart of the ADVANCE brand is a team of specialists who share the passion of the customers who place their trust in the company's products. With their thorough understanding of flying they contribute their valuable personal experience and dedication to the working processes.

For many years ADVANCE has drawn on the competition scene for its technical expertise. Its small team of test and competition pilots regularly notches up remarkable sporting successes with ADVANCE prototypes, winning numerous important international titles.

Total control of the production process and supervision of the working practices at the ADVANCE factory in Vietnam ensure a high standard of workmanship. Long term relationships with fabric and line manufacturers means that ADVANCE knowledge and expertise also finds its way directly into the development of new materials.

ADVANCE attaches great importance to after-sales customer support, and has built up a worldwide service network for this purpose. An on-going interaction with its customers brings in a steady flow of new knowledge that finds its way into ADVANCE products, thus completing the «Circle of Service».

# The SIGMA 8

## **Discover free riding**

As a top-performance intermediate with a high fun-factor the SIGMA 8 is the definitive Cross Country Free Rider: sportiness and dynamic handling paired with performance, enriched with the latest technology, reduced to minimum weight. This wing is just waiting to take you on new flying adventures, to leave your well-worn paths and investigate some fresh countryside.

## **Outstanding features**

### **Uncompromising 3-Liner**

The SIGMA 8 is a true three liner with much less drag and the best possible compromise of performance/handling and aspect ratio. The noticeable balanced pitching quality allows the glider to operate at a glide ratio of 10 and a top speed of 55 km/h even in turbulent air. The reduction to 3 line levels also means that the SIGMA 8 can be more easily and efficiently accelerated.

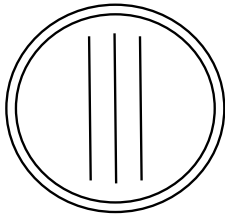
### **High fun factor**

The origin of the lively-sporty handling lies in ideal lift distribution combined with the specially selected new profile. This also makes the

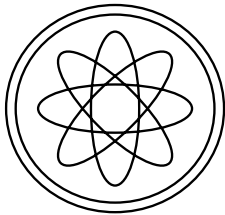
SIGMA 8 behave more quietly in pitch and roll as well as providing nicer turning and improved circling. The result is more direct and precise manoeuvring in all dimensions.

## **New technology inside**

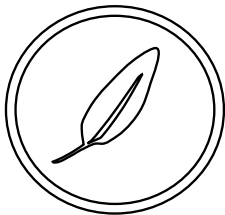
The inside of the SIGMA 8 is evolutionary: an analysis of the structure with a focus on weight reduction and the inclusion of the latest technology such as Nylon wires make the SIGMA 8 to one of the lightest of its class. The end result is knock-on benefits - less canopy inertia, therefore even better pitch control and ultimately more passive safety.



## **PERFORMING**



## **SPORTY**



## **EVOLUTIONARY**

### **Other important details**

#### **Efficient and smooth 2-phase speed system with SPI**

Thanks to its 3 line levels and the choice of profile the SIGMA 8 can be very efficiently accelerated with little effort. In addition the SIGMA 8 has a variable ratio speed system. This means that the speed bar travel and pressure can be changed to suit the user's anatomy: smooth, 3:1 ratio when the legs are bent, and efficient, more direct 2:1 with outstretched legs. During accelerated flight the Speed-Performance-Indicator (SPI) always shows the ideal against the currently selected accelerate setting.

#### **Hybrid lines**

A mixed line system makes the SIGMA 8 robust and gives it good flying performance. The lower A and B lines are covered to withstand the exposure to wear in this area. The uncovered lower C lines and those of the middle and upper galleries reduce aerodynamic drag, and therefore contribute to more performance. They are specially coated to provide high resistance to UV radiation and abrasion. At line junctions the line loops are thickened, resulting in reduced surface pressure. A well-tried Dyneema/Aramid combination for the brake lines provides a high degree of length stability.

## ADVANCE Standards

ADVANCE pays a lot of attention to small details. Sewn-in tension straps improve the wing's stability, and the distinctive winglets reduce induced drag (vortex-effect). The Smart Sail System aligns the material at the leading edge in the best direction to match the loads in this area, and a strong, specially impregnated fabric is used here to improve the life of the wing. Velcro closures at the wingtips make it easy to remove debris like sand and snow from the glider. Like all ADVANCE models the SIGMA 8 has line swivels and magnets on the brake handles, which come in two sizes, depending on the glider size.



# Pilot requirements

The SIGMA 8 is a high performance intermediate that suits the experienced thermal pilot who has, at least, already made his first cross country flights, and who possesses a good feeling for a glider. He has an active flying style, can recognise and prevent the onset of trouble, and has no problem with fast descent techniques. If these conditions are met the performance potential of this glider can be realised, and the pilot cover the countryside feeling safe and relaxed.

## **General information on paragliding**

Flying a paraglider calls for appropriate training and a sound knowledge of the subject, as well as, of course, the necessary insurance cover and licence. A pilot must be able to correctly assess the weather conditions before taking off. His or her capabilities must be adequate for the actual paraglider.

Wearing an adequate helmet, suitable boots and clothing, and carrying an emergency parachute are essential. Before every flight all items of equipment should be checked for damage and airworthiness. A proper pre-takeoff check must also be carried out.

Every pilot bears sole responsibility for all risks including injury or even death when carrying out paraglider sports. Neither the man-

ufacturer nor the seller of a paraglider can guarantee or be held responsible for the pilot's safety.

# Using the paraglider

## **Delivery**

Before delivery every ADVANCE paraglider has to be flown by the dealer and checked for correct settings and trim. When this has been done the dealer enters the date of the first flight on the label attached to a centre rib. This entry, together with a completed warranty form, will ensure that defects in the product attributable to manufacturing faults are covered by the ADVANCE warranty. See Warranty in the section «Service».

The SIGMA 8 comes with a backpack, an inner bag, a compression strap, a repair kit, speed bar with lines, a mini windsock in the canopy colours and a booklet called 'Getting started'.

## **Basic settings**

The basic SIGMA 8 set-up at delivery is the original trim setting that the ADVANCE test team have found to be best; and the glider was certified in this condition. Any personal alteration or modification to the paraglider - for example, changing the line lengths or fitting different risers or quick links by the owner - will result in invalidation of the certification. See section «Certification».

## **Adjusting the brake lines**

The length of the brake lines is set at the factory so that the trailing edge is not braked (is crease-free) when brakes are fully released in fully accelerated flight. This setting should be kept as a matter of principle.

If the length of the brake lines has to be readjusted there must be 8 cm of slack (free travel) between the brakes free position and the first effect of brake on the trailing edge in unaccelerated flight. We recommend that the brake handles are secured with a bowline knot. See the attached illustration, page 35.

## **Speed system with SPI**

The SIGMA 8 is a cross country glider designed for accelerated flight in bumpy air. Accelerated flight plays an ever more important role for the recreational pilot, and a high average speed is a decisive factor in the success of long flights. This requires an ongoing review of the choice of speed to fly between thermals, based on the current headwind, expected next climb quality and the effect of sinking air – and the right decision will achieve the best possible glide, or the shortest time to cloudbase. The SPI is a very important feature of the SIGMA 8.

The SIGMA 8 has a speed system with a Speed-Performance-Indicator (SPI), which reads off against 2 positions on the backs of the C risers (30% and 80% positions). The red markers on the speed system enable a precise speed bar position to be set to suit the in-flight situation. Thanks to its well-behaved pitching qualities the SIGMA 8 can also be accelerated without problem in light turbulence. Because of its high performance in accelerated flight the choice of speed-to-fly plays a very important part in obtaining the best gliding performance.

Each of the SIGMA 8 SPI positions has a value for headwind, expected climb and sink rate. These indicated positions are effective for only one of their three values, taken in isolation - considered by itself. This means that either the headwind, or the expected rate of climb, or the sink rate applies to that position. The SPI principle is based on the simple (using headwind and sink) and the extended (including expected climb rate) McReady Speed-To-Fly theory.



## SPI values

The following table gives the theoretical values for two (30% and 80%) accelerate positions on the SPI. Notice that each SIGMA 8 size has a slightly different polar curve.

Practical examples for best glide with SIGMA 8 25

- With no headwind (or with a tailwind), little or no expected thermal, and the glider's normal sink rate (ca. 1 m/s vario) fly with no speed bar.
- With a headwind of 10.5 km/h or an expected next climb (vario) of 0.4 m/s or a sink rate (vario) of 1.4 m/s set the 30% position. If two or more of these values apply at the same time you can already use the 80% position.
- With a headwind of 22.5 km/h or an expected climb rate (vario) of 1.3 m/s or a vario sink rate of 2.3 m/s choose the 80% position.

SIGMA 8	23	25	27	29
<b>30% Position</b>				
Headwind in km/h	*	10.5	*	*
Expected climb in m/s (Vario value)	*	0.4	*	*
Sink rate in m/s (Vario sink)	*	1.4	*	*
<b>80% Position</b>				
Headwind in km/h	*	22.5	*	*
Expected climb in m/s (Vario value)	*	1.3	*	*
Sink rate in m/s (Vario sink)	*	2.3	*	*

\* At present the data for these sizes are not yet available

Example:  
SIGMA 8/25

Neutral position

Position 30%

Position 80%



Caution: Even though the SIGMA 8 has a high degree of stability in accelerated flight you should only use as much speedbar as you feel comfortable with.

Info: According to the table for best glide you should fly to an expected 0.4 m/s climb with 30% accelerate, and to a 1.3 m/s one with 80%. This only applies if you can actually get all the way to the next thermal in the accelerated condition.

Info: Although flying into a headwind (15-20 km/h) gives you the feeling that your gliding performance is being badly affected, bear in mind that strong sink (more than 2 m/s) has a relatively stronger adverse affect.

### Adjusting the speed system

We recommend that the SIGMA 8's speed system is correctly adjusted before the first flight. The SIGMA 8's riser system should be connected to the harness speed lines by means of Brummel hooks.

The SIGMA 8 speed system can, with the help of the SPI, be adjusted so that the whole speed system travel can be used. The system is correctly set when pushing the first speed step gives you the 30% position, and pushing the second achieves 80% accelerate. If set up

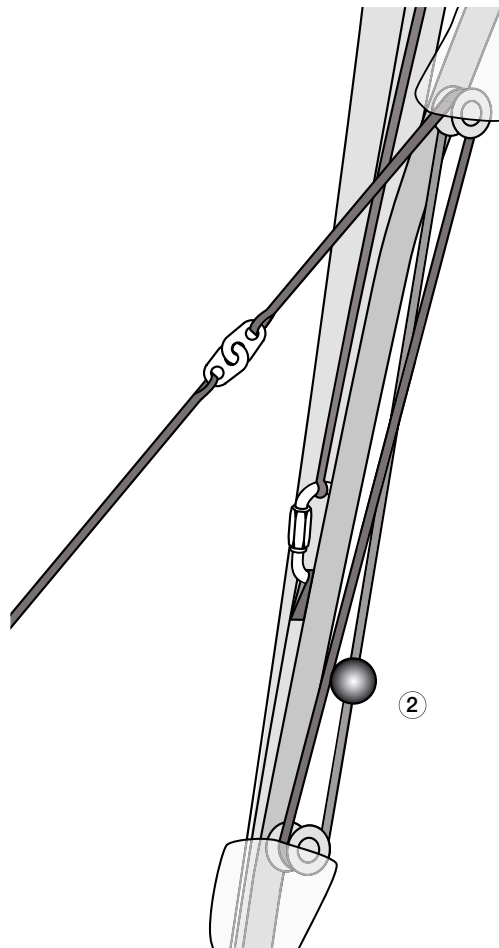
like this you can achieve 100% (pulley to pulley) accelerate by pressing the second step with outstretched toes, or adding your second foot to the speed loop in your speedbag.

After initial adjustment of the speed bar for leg length and harness, fine adjustment is carried out by altering the 2-phase speed system on the risers: by moving the knots which locate the gear change balls (see ball ② in the illustration) the speed bar travel and load can be adjusted.

Example: If the knots are moved downwards the change from 3:1 to 2:1 occurs earlier, then raising the loading but shortening the total travel. Conversely, moving the knots upwards delays the gear change, eases and lengthens the total travel of the speed bar.

Optimum adjustment of the 2-phase system enables a smooth triple transfer with bent legs and an efficient double transfer with outstretched legs.

The SIGMA 8 speed system is arranged so that the profile shape is fully retained over the angle-of-attack range of the speed system. This keeps the good qualities of the profile at high speeds.





Caution: The speed system is correctly adjusted when you can apply the whole accelerate travel of the glider. Be careful not to adjust the speed lines so short that the wing would be accelerated in flight all the time.

### **Suitable harnesses**

The SIGMA 8 is certified for harnesses in group GH (without rigid cross-bracing - see the «Certification» section). The suspension points of the chosen harness should ideally have a distance of approx. 45 cm as well as a height of 40 to 48 cm.

The SIGMA 8 is neither suitable nor approved for harnesses in the GX group (with active cross-bracing). The use of this type of harness may have a detrimental effect on the handling and extreme flight characteristics.

The SIGMA 8 was specially trimmed for use with a streamlined harness. For this reason we recommend a harness with speedbag in order to get the best out of the SIGMA 8's great performance. The ADVANCE IMPRESS or LIGHTNESS harness is particularly suitable since the SIGMA 8 was designed and tested with it in mind.

Info: Experience has shown that you can significantly improve your glide angle by using an aerodynamically streamlined harness.

### **Weight range**

The weight ranges for the different wing sizes are listed in the «Technical Data» section. The figures given there refer to total take-off weight. This includes the pilot's body weight including clothing, as well as the weight of all the equipment (paraglider, harness, instruments, etc. – everything that's going to fly).

Flying at the lower or upper limits of the weight range can affect the flying characteristics of the wing, without, however, compromising your safety. The SIGMA 8's performance remains the same whether flying in its lower or upper weight region.

# Flight characteristics

We recommend that first flights with the new paraglider be undertaken in calm conditions at a familiar place. A few pull-ups on gentle terrain will increase your confidence in the SIGMA 8's handling, from the very beginning.

## Launch

Before every takeoff carry out the following pre-takeoff checks:

1. Harness and helmet done up, reserve OK?
2. Lines free?
3. Canopy open?
4. Wind direction and strength assessed?
5. Airspace and field-of-view clear?

Thanks to its easy-rising profile the SIGMA 8 takeoff behaviour is very smooth and easy for both forward and reverse takeoffs. The canopy inflates quickly and rises progressively, without hanging or shooting in front. The canopy should be laid out in a slightly curved shape so that it fills cleanly from the middle out.

Tip: To get the wing in the right shape for takeoff pull the brake lines in until they are all under tension while you are sorting the lines. This will produce the best curve.

## Forward launch

The SIGMA 8 only needs a moderate pull-up impulse even in a light wind. It is not necessary to step back and 'run into' the lines. Lead the glider up with pronounced forward leaning, but without too much pull on the A-risers, until the wing has risen cleanly above you. Any corrections during the inflation phase should only be made by pilot movement under the glider - without using brake. After corrections and a visual check, a few quick steps with a pronounced forward lean are all that are required to launch, even in light wind.

## Reverse launch

Reverse launch is particularly recommended in stronger breezes, but it is also easy in light wind. On account of the long lines the pilot should walk or run towards the SIGMA 8 as necessary while pulling up, so as to control the tug and rising rate of the paraglider, and so prevent any tendency for it to overshoot the overhead position. During a reverse launch, corrections during pull up should ideally only be carried out by pilot movement under the wing. Stabilising the wing in the overhead position, turning and taking off will then be easy.

Tip: Playing with the glider on flat ground in a light wind de-

velops a good feeling for the wing. The ADVANCE test team have a motto: an hour on the ground is worth ten flights.

### **Normal flight**

In calm air the SIGMA 8 best glide is achieved with fully released brakes. Light braking brings the glider to its minimum sink condition. When flying into a headwind, through descending air, or when proceeding to the next thermal, glide performance will be distinctly improved by appropriate use of the speed system. The SPI is there to help you do this. See also section «Speed-Performance-Indicator (SPI)».

Despite the wing's high stability an active flying style is recommended - collapses can be almost completely avoided. 'Active flying' means keeping the lightly-braked glider directly above you, in other words, countering roll and pitch disturbances.

Info: Make sure that you always take note of your weight and the type of harness for comparison flights. The exceptional performance of the SIGMA 8 becomes evident above all in accelerated condition into a headwind and – because of its well-behaved pitching behaviour – in turbulent air.

### **Turns**

The SIGMA 8 has short and soft, but also very precise braking and steering travel. It responds very directly and progressively to increasing brake inputs. Control of the paraglider is easily assisted by active weight shifting. The SIGMA 8 holds your chosen turn radius with a steady steering application – without needing large corrections from you. You can always increase or reduce your angle of bank by pressure on the brake lines.

The SIGMA 8 makes a very agreeable companion in thermals. You do not have to correct for large pitching movements, and this improves your climbing behaviour – and therefore your performance – significantly. When thermalling, choose the desired angle of bank and corresponding radius, and try to let the glider turn steadily in this attitude. Outside brake should be used to steady the wing tip and, in particular, control the rate of turn. Anything stronger will slow the wingtip down and lose the glider's good steering qualities.

A harness specifically designed to match the flying characteristics of the SIGMA 8 helps you to initialise and stabilise turns of this type, which should be as even as possible. See also section «Suitable harnesses».



Caution: When circling your SIGMA 8 in thermals make sure you always have enough airspeed to give you good manoeuvrability – don't hold too much outside brake.

Tip: If a brake line should break you can control your SIGMA 8 with the rear risers (C-risers).

### **Accelerated flight**

The SIGMA 8 has a low drag line system and wing design, a high aspect ratio and exceptionally well-behaved pitching qualities in turbulent air. These all help to give it a very good glide performance with only moderately increasing sink rates, even in accelerated flight. In addition the 3 line levels and the choice of profile mean that the SIGMA 8 can be very efficiently accelerated with little effort.

The SIGMA 8 wing remains extremely stable even in accelerated flight. However, paragliders operate at a lower angle of attack while flying at their higher speeds, and the degree of stability is generally reduced. The higher aerodynamic forces involved at higher airspeeds mean that a collapse can be more dynamic (see also section «Collapses»).

When flying fast into very turbulent air, first release the speed bar

completely before you give the necessary control inputs with the brakes for stabilising the wing. The SIGMA 8's high stability allows for flying through moderately turbulent air in accelerated mode. Here, however, active accelerating should be carried out, which means controlling the angle of attack with the speed bar instead of the brakes:

- when the angle of attack increases (e.g. wing pitches back when entering lift), the speed bar is briefly pressed harder
- when the angle of attack decreases (e.g. wing pitches forward), the speed bar is released

As a result, pitching disturbances will be reduced to a minimum and optimum glide performance achieved. See also the section «Speed system» on the topic of «Accelerated flight».

Info: The SIGMA 8 has only 3 line levels, which makes for exceptionally easy accelerating, and enables high speeds to be reached with only modest speed bar travel. Use the speed bar with care and sensitivity.

Tip: Make sure that brake is not applied at the same time as speed bar, otherwise you will find yourself in the worst possible gliding situation, without gaining any advantage.

## **Collapses**

### **Asymmetric collapsing of the canopy**

The SIGMA 8 features a very taut and stable canopy. With an active flying technique in normal flying conditions, collapses can be almost completely prevented. The wing gives very precise canopy feedback and makes it possible to sense an impending collapse early on, thus helping timely pilot reaction. Should a collapse occur the wing will fold in a predictable and progressive manner from wing tip towards the centre.

If the glider does, however, suffer a side collapse at trim speed, it will respond to collapses of 50% or more with a slight turning tendency, allowing heading to be easily held with light counter-steering. Normally, the wing will reopen without pilot action.

Due to higher aerodynamic forces during accelerated flight the glider will respond to a side collapse a little more impulsively. The severity of the collapse in accelerated flight is softened because the wing collapses from the wingtip towards the centre. The turning tendency in fully accelerated flight will be more dynamic, but is still well controllable.

As a general rule, after an asymmetric collapse, the wing's direction must be maintained by controlled counter-braking and internal wing pressure increased by pumping on the closed side. This speeds up canopy reopening. Control inputs on the open side should be carried out carefully in order to prevent this wing stalling.

Poorly executed wingovers may make the wing tips roll in from the side, often creating cravats. Due to the high drag they produce cravats may lead to strong spiralling. In this case, first prevent a rapid increase in rotational speed by carefully controlled counter-steering. Then open the hooked-up wing tip by pulling on the red marked stabilo line.



Caution: If you want to make an accelerated collapse during safety training we recommend that you lead up to it slowly – starting with unaccelerated and then partially accelerated attempts.

### **Symmetric collapsing (front collapse)**

Following a spontaneous or deliberate front collapse the airflow will break away from the wing, which will pitch back, followed by the pilot. Wait, without applying any brake, until the wing is overhead again, give it time to start flying, and then you can stabilise it using the

brakes. Reopening should not be forced with excessive control responses, because of the risk of a total airflow breakdown.

### **Rapid descent**

To descend quickly and efficiently the ADVANCE test team recommends a rapid descent with a spiral dive or big ears (the latter with or without speed bar), depending on the situation. You should sometimes practise rapid descents in calm air so that they will not become an emergency when needed.

Tip: To effectively lose height and get away from a hazardous place you can use both of the SIGMA 8 outer A lines for big ears (3A3 and 3A2), always with the speed system.

### **Symmetrical collapsing of the wingtips (big ears)**

To do this manoeuvre pull the red marked outer A-line of each A-riser simultaneously and briskly downwards. This causes the wing tips to fold inwards and you can then hold them in this position. To reopen let the A-lines go, and they will open by themselves after a short delay. If necessary you can speed up the reopening with a brief tug on the brake lines.

The sink rate can be increased by applying speed bar. Depending on the situation the glider can be steered using weight shift.



Caution: Do not fly spiral dives or abrupt changes of direction with big ears; the increased strain on a smaller number of lines may result in structural damage.



Caution: Remember that flying with big ears increases the chance of stalling. Be cautious with the use of brake when the ears are folded and avoid this rapid descent technique when the glider is wet. See also section «Flying with a wet paraglider».

Tip: You can use both SIGMA 8 outer A lines (3A3 und 3A2) for big ears without problem. The increased angle of attack and raised form drag puts you nearer the point of stall, and speedbar must always be applied in this configuration.

Tip: In general we recommend that the speed bar is always used with big ears. This raises the descent rate and minimises the risk of deep stall as well.

## Spiral dive

For the most comfortable way of doing this we recommend a neutral sitting position without active weight shift, and a shoulder-width carabiner distance (approx 45 cm).

Enter the spiral by progressively pulling one brake. Your head and field of view should be directed in the turn direction. As the angle of bank increases so will the rate of turn and centrifugal force.

The behaviour of the spiralling paraglider can be separated into two phases: in the beginning the glider begins with a normal turn which progressively tightens, with increasing angle of bank. In the second phase the paraglider engages its spiral mode. This means that the wing dives forward with an increase of acceleration. During this phase of the manoeuvre try to keep a neutral sitting position and give way to the centrifugal force – your body will be pushed to the outside.

Recovery from the manoeuvre is achieved by progressively releasing the inside brake. The body weight should be slightly displaced to the outside of the turn. While coming out of a spiral dive with high vertical and rotational speeds it is essential to release the brake carefully, and/or reapply a little inside brake if necessary, so that you can prevent the wing pitching back excessively, and then diving in front.

Make sure that you start the recovery with plenty of height remaining above the ground. Generally speaking you should allow the same amount of time to recover as it took to enter the manoeuvre, but remember that the sink rate will be higher.



Caution: The SIGMA 8 only comes out of a spiral dive by itself if the pilot is in a neutral sitting position. From a steep spiral with a high sink rate – more than 14 m/s – recovery requires active outside brake with weight shift to the outside at the same time.



Caution: Weight shifting to the inside of the turn results in increased acceleration and stable continued rotation. In this case, active counter-braking with simultaneous weight transfer to the outside of the turn is required to end the manoeuvre (push your body outwards).



Caution: The SIGMA 8 is approved for harnesses in group GH (without rigid cross-bracing). Harnesses in group GX (with cross-bracing) or those with very low suspension points (carabiners) may drastically change the flying characteristics in a spiral. See the section «Suitable harnesses».



Caution: Do not fly spiral dives or aggressive changes of direction with big ears applied: the raised wing loading carried by fewer lines can damage the glider.

## **B-Stall**

The B Stall puts high stresses on the material and the profile shape of the glider. We recommend that you do not fly B stalls regularly, even this manoeuvre does not present special difficulties to the SIGMA 8.

## **Stalling**

### **One-sided stall (spin)**

The SIGMA 8 warns you of an impending spin by an increasing pressure from the brake in a turn. If you maintain the brake differential on the paraglider, you will then notice a marked reduction in brake pressure on the inside of the turn. In this situation, you must fully release the brake line immediately, enabling the SIGMA 8 to return to normal flight of its own accord.

If you were to fully stall a wing the glider will fall into a spin/negative rotation. Depending on the situation from which you let it fly again, it can then shoot forward and collapse. While it is shooting forward the

canopy can be stabilised by careful braking. Normal flight may then be resumed without further collapse.

Flying a spin is not recommended although this manoeuvre does not present any particular difficulties with the SIGMA 8.

Tip: Basically you should immediately release both brakes completely in all out-of-control flight situations, but especially at the onset of spinning behaviour.

### **Full stall**

The initiation of a full stall is effected by progressive symmetrical pulling of both brakes. This reduces the forward speed. The airflow and wind noise decrease. On reaching the stalling speed, the paraglider initially goes into a brief deep-stall phase. Further pulling on the brakes will cause the airflow to break away completely and the paraglider then tips backwards into a full stall. When recovering from this manoeuvre, the canopy must be «preinflated» over its complete wingspan. To achieve this, the brake lines should be released slowly at first, and then only released fully after preinflation.

The SIGMA 8 canopy turns out to be very manageable while stalling, as well as during full stall recovery. If, however, a wingtip does cravat,

keep the SIGMA 8 going straight by using carefully applied brake, and free the cravat by pulling down the relevant red marked stabilo line. Opening a cravat can also be speeded up by pumping the brake. To do this pull down the cravat side brake line as far as 75% brake travel within two seconds, then release it immediately.

The SIGMA 8 possesses minimal tendency to shoot forward. It has not been possible to establish a stable deep stall. See also section «Flying with a wet paraglider» about this topic.

### Deep stall

The SIGMA 8 has not shown a desire to go into stable deep stall by itself. The glider can, however, be brought into deep stall by means of the brakes, and kept there. Be aware that the transition into deep stall is gentle and can happen almost imperceptibly. The glider will recover by itself as soon as the brake lines are fully released.

Like any paraglider the SIGMA 8 will be more prone to deep stall if it gets wet or flies in rain. If the wet wing does go into parachutal stall only use the speed system to recover. See also section “Flying with a wet paraglider”.

### Landing

Always make a proper landing circuit with a defined final approach. As the ground approaches progressively increase brake to level the flight path, before continuing to full brake to completely arrest the forward speed.



Caution: Steep turn reversals lead to strong swinging of the pilot, and should not be done near the ground.



Caution: Braking will reduce your speed and increase your sink, but it will certainly seriously restrict your ability to manoeuvre.



Caution: Getting below minimum speed leads to stalling: this should unquestionably be avoided when top landing, and on final approach.



Caution: Never let your glider fall to the ground on its leading edge. The overpressure so caused inside the wing can rip the cell walls and damage the leading edge.

## **Flying with a wet paraglider**

Flying with a wet glider creates a risk of deep stall. Deep stall is often the result of a combination of factors. The weight of the wet canopy goes up, and this increased weight increases the angle of attack, which always puts the glider nearer the deep stall limit. Added to this, water drops on the top surface have a detrimental effect on the laminar flow of the boundary layer near the leading edge, which distinctly reduces the maximum lift coefficient. If the wet glider is also being flown at its lower weight limit there is a further small effect in increasing the angle of attack, as well as there being a lower airspeed because of the reduced wing loading.

In order to avoid the risk of deep stall with a wet glider the wing should be braked as little as possible, and big ears not employed at all. As a further preventative measure apply moderate (25-40%) speed bar. All these measures have a small effect on reducing the angle of attack.

Should the wet glider get into deep stall, recovery can only be achieved using the speed bar. See also section «Deep stall».

## **Winching**

The SIGMA 8 is suitable for winch launching. When taking off in windless conditions, ensure that the paraglider is laid out in an arched or even wedge shape (risk of the glider rosetting):

Winch launch is only permitted if:

- the pilot has completed a tow training course (only Germany/DHV);
- the winch system is certified for use with paragliders;
- the winch operator has been fully trained in how to winch paragliders.

## **Aerobatics**

The SIGMA 8 was developed as a cross country and thermaling paraglider with a high fun-factor. With suitable pilot skill and the right equipment, the SIGMA 8 lends itself to flying manoeuvres such as wingovers, asymmetric spiral, reversal and SAT. The wing has been tested to the usual 8G load factor, but is not specially strengthened.

Please be aware that dynamic manoeuvres put larger stress on the material and can shorten the glider's life. If you do go down this road

regular checks of the glider are imperative (see section «Check»). You should also be aware of the regulations which apply in your country.

### **Paramotoring**

The SIGMA 8 is not certified for motorised flight.

# Maintenance, repairs and service intervals

## **Packing**

The paraglider must be folded cell to cell so that the plastic wires in the cell walls at the leading edge lie flat on each other and don't get bent. This will give your SIGMA 8 a long life, and retain its fast, easy-inflating takeoff qualities. When folding change the position of the main L/R fold on a regular basis so that the same lane isn't always on the outside. Don't squash or pack the glider too tightly.

## **Care and maintenance**

Ultraviolet light, heat, humidity, sea water, aggressive cleaning agents, unsuitable storing and physical abuse (dragging across the ground) speed up the ageing process. The life of a paraglider can be extended significantly by observing the following advice:

- Allow a wet or damp glider to dry by leaving it completely unpacked at room temperature, or outside in the shade.
- If the glider gets wet with salt water rinse it thoroughly with fresh water.
- Only clean the glider with fresh water, and a little neutral soap if necessary. Do not use solvents under any circumstances.
- If the glider has been subjected to increased stress (such as a tree landing) have it examined by an expert.

- Regularly remove sand, leaves, stones and snow from the cells. Openings with Velcro closures are provided at the wing tips for this purpose.
- Do not leave the glider out in the sun unnecessarily before and after flight (UV light).
- Do not subject the packed glider to excessive temperature fluctuations, and do ensure adequate air circulation to prevent condensation forming.
- Do not drag the glider across the ground.
- When landing, make sure that the canopy does not fall on its leading edge.

## **Lines**

The SIGMA 8 A and B bottom lines are covered, so are well protected from the higher degree of wear and tear in this area. The middle and upper galleries are uncovered as well as the lower C lines. Their lower drag noticeably improves the glider's performance, and the special coating improves their resistance to UV radiation and abrasion. Nevertheless, uncovered lines call for greater attention and care. Regular checks of the glider are imperative. See section «Check».



Caution: Uncovered lines call for greater attention and care. It is essential to have them checked at the requisite intervals.

### **Check**

A new ADVANCE paraglider must be given a check every 24 months (2 years). With intensive use (> 150 flying hours per year, or excessively demanding use) an annual check is needed, after the first check. When a check is carried out the condition of all materials is assessed in accordance with strict guidelines, and tested with great care. Finally the overall condition of the glider is rated and recorded in a test report. You can find additional information about the check in this manual in the section «Service», or at [www.advance.ch](http://www.advance.ch).

### **Repairs**

As a general rule you should not attempt to repair a paraglider yourself. The various seams and lines are made with great precision, and, for this reason, only the manufacturer or an authorised service centre may fit identical replacement parts or replace entire cells. Exceptions to this rule are the replacement of lines and the repair of small tears (up to 5 cm) or holes in the fabric that may be glued with the self-adhesive ripstop included in the repair kit. After a repair, or the replace-

ment of a line, the glider must always be opened out and checked on the ground before the next flight.

### **Disposal**

Environmental protection plays an important role in the selection of materials and the manufacture of an ADVANCE product. We use only non-toxic materials that are subjected to continuous quality and environmental impact assessments. When your paraglider reaches the end of its useful life in a number of years' time, please remove all metal parts and dispose of the lines, canopy and risers in a waste incineration plant.

# Technical details

<b>SIGMA 8</b>		<b>23</b>	<b>25</b>	<b>27</b>	<b>29</b>
Flat surface	m <sup>2</sup>	22.50	25.00	27.00	29.00
Projected surface	m <sup>2</sup>	18.92	21.03	22.71	24.39
Span	m	11.63	12.25	12.75	13.21
Projected span	m	9.03	9.49	9.90	10.26
Aspect ratio				6.0	
Projected aspect ratio				4.3	
Max chord	m	2.414	2.544	2.644	2.740
Min chord	m	0.543	0.573	0.595	0.617
Take off weight <sup>2</sup>	kg	65 - 85	75 - 95	85 - 110	100 - 130
Glider weight	kg	5.3	5.6	5.9	6.3
Number of cells				61	
Number of risers				3	
Riser length	cm	46	48	50	52
Max length of the lines with the risers	cm	707.0	745.0	774.0	802.0
Min speed <sup>1</sup>	km/h			23 +/- 1	
Trim speed <sup>1</sup>	km/h			39 +/- 1	
Max speed <sup>1</sup>	km/h			55 +/- 2	
Min sink rate <sup>1</sup>	m/s			1.1 +/- 0.1	
Best glide <sup>1</sup>				10 +/- 0.2	
Certification				EN / LTF	

<sup>1</sup> Values depending on wing loading, harness/pilot and glider size

<sup>2</sup> Pilot, wing, equipment

## Materials used

We routinely inspect and test our materials many times over. Like all ADVANCE products the SIGMA 8 is designed and produced as a result of the latest developments and knowledge. We have chosen all the materials very carefully, under conditions of the strictest quality control.

Leading edge:

New Skytex 6.6 Evolution water-repellent, 9092 E117 / 44 g/m<sup>2</sup>

Upper and lower surface:

New Skytex 6.6 water-repellent, 9017 E77A / 40 g/m<sup>2</sup>

Ribs:

New Skytex 6.6 hard, 9017 E29 / 40 g/m<sup>2</sup>

Internal partitions:

New Skytex 6.6 hard, 70000 E91 / 27 g/m<sup>2</sup>

Leading and trailing edge reinforcements:

Polyester laminated, 20mm

Lower leading edge reinforcements:

Polyamid, 16 mm

Lines:

- Edelrid Technora (Aramid), 6843 200 / 160, covered, 1,9 / 1,5 mm (main lines)
- Liros Technora (Aramid), LTC 200, uncovered UV coated, 1,3 mm (C main lines)
- Edelrid Technora (Aramid), 8000U 130 / 90, uncovered UV coated, 1,0 / 0,8 mm (2nd level)
- Edelrid Technora (Aramid), 8000U 70 / 50, uncovered UV coated, 0,7 / 0,5 mm (1st level)
- Edelrid Technora (Aramid), 8000U 70 / 50, uncovered UV coated, 0,7 / 0,5 mm (brake lines)
- DFLP 232, Dyneema/Polyester + Liros Technora (Aramid), LTC 160, 1,6 / 1,1 mm (steering line)

Risers:

Polyester / Technora (Aramid), 13mm – 1000kg

Quick links:

Maillon Rapide, Inox stainless, 3.5 mm - 750 kg

## **Certification**

The SIGMA 8 has been awarded LTF and EN. The certification reports can be downloaded from [www.advance.ch](http://www.advance.ch).

Certification ratings can only provide limited information about a paraglider's flying behaviour in thermally active and turbulent air. The certification grading is based primarily on provoked extreme flight manoeuvres in calm air.

During the development of an ADVANCE paraglider, the emphasis is first and foremost on flying behaviour and handling and not exclusively on the certification test. The result is a well-rounded product with the familiar ADVANCE handling. Nevertheless, the certification rating occupies a significant proportion of the specifications that have to be met.



# Service

## **ADVANCE Service Centres**

ADVANCE operates two company-owned service centres that carry out checks and repairs of all types. The workshops based in Switzerland and France are official maintenance operations, certified by the German Hanggliding and Paragliding Federation (DHV), which has many years' experience and in-depth product-specific expertise. The ADVANCE worldwide service network includes other authorised service centres that provide the same services. All service facilities use original ADVANCE materials exclusively. You can find all information on checks and repairs and the relevant addresses at [www.advance.ch](http://www.advance.ch).

## **The ADVANCE website**

At [www.advance.ch](http://www.advance.ch) you will find detailed information about ADVANCE and its products as well as useful addresses, which you can contact if you have any questions.

Among the things you will be able to do on the website are:

- complete the warranty card online up to 10 days after purchase of the glider, enabling you to enjoy the full benefits of the ADVANCE warranty

- find out about new safety-related knowledge and advice concerning ADVANCE products
- download an application form in PDF format which you can use when sending your glider in for a check at ADVANCE
- find an answer to a burning question among the FAQs (Frequently Asked Questions)
- subscribe to the ADVANCE Newsletter so that you will be regularly informed by e-mail about news and products.

It is well worth visiting the ADVANCE website regularly because the range of services offered is continuously being expanded.

## **Warranty**

In order to enjoy the full benefits of the ADVANCE warranty, you are requested to complete the relevant form on the website in the «Warranty» section within 10 days of purchase.

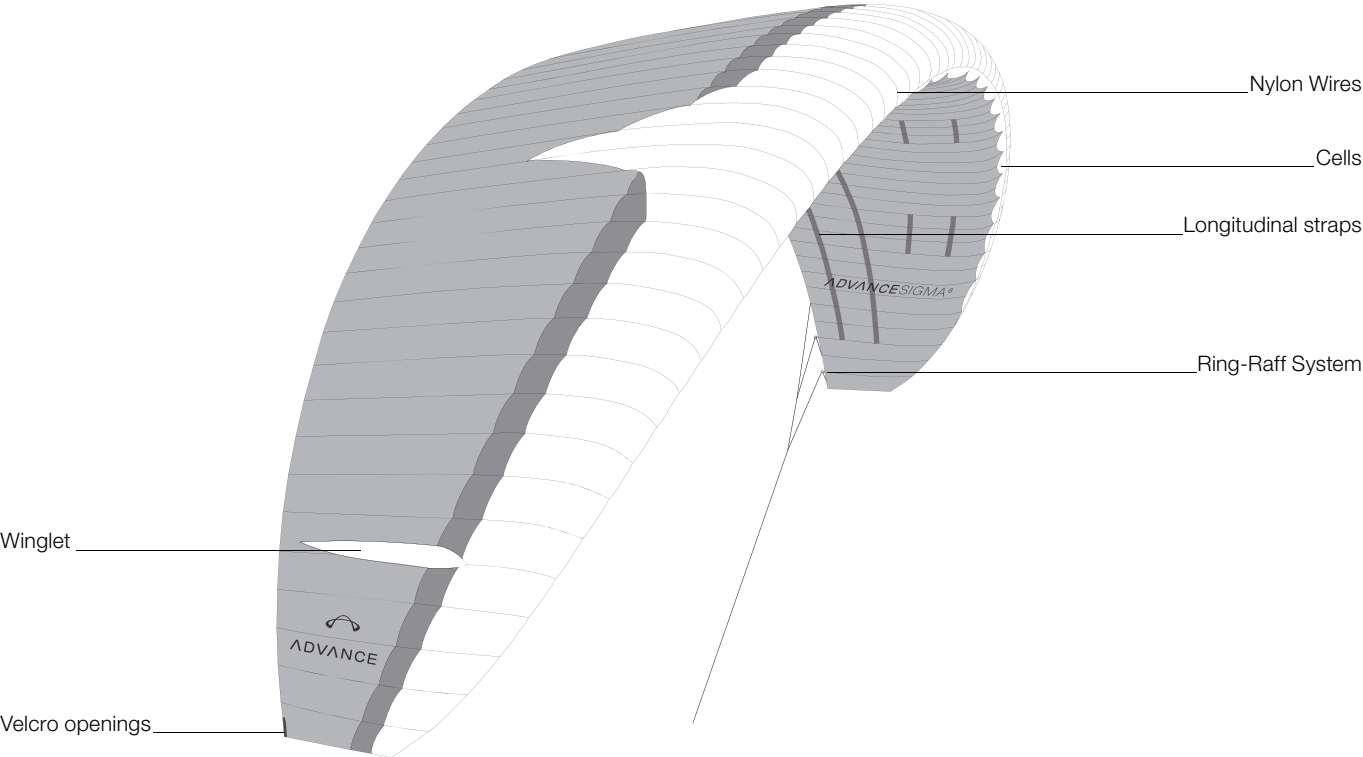
As part of the ADVANCE warranty, we undertake to rectify any defects in our products that are attributable to manufacturing faults. In order for a warranty claim to be made, ADVANCE must be notified immediately on discovery of a defect and the defective product sent in for inspection. The manufacturer will then decide how a possible manufacturing fault is to be rectified (repair, replacement of parts

or replacement of the product). This warranty is valid for three years from the date of purchase of the product.

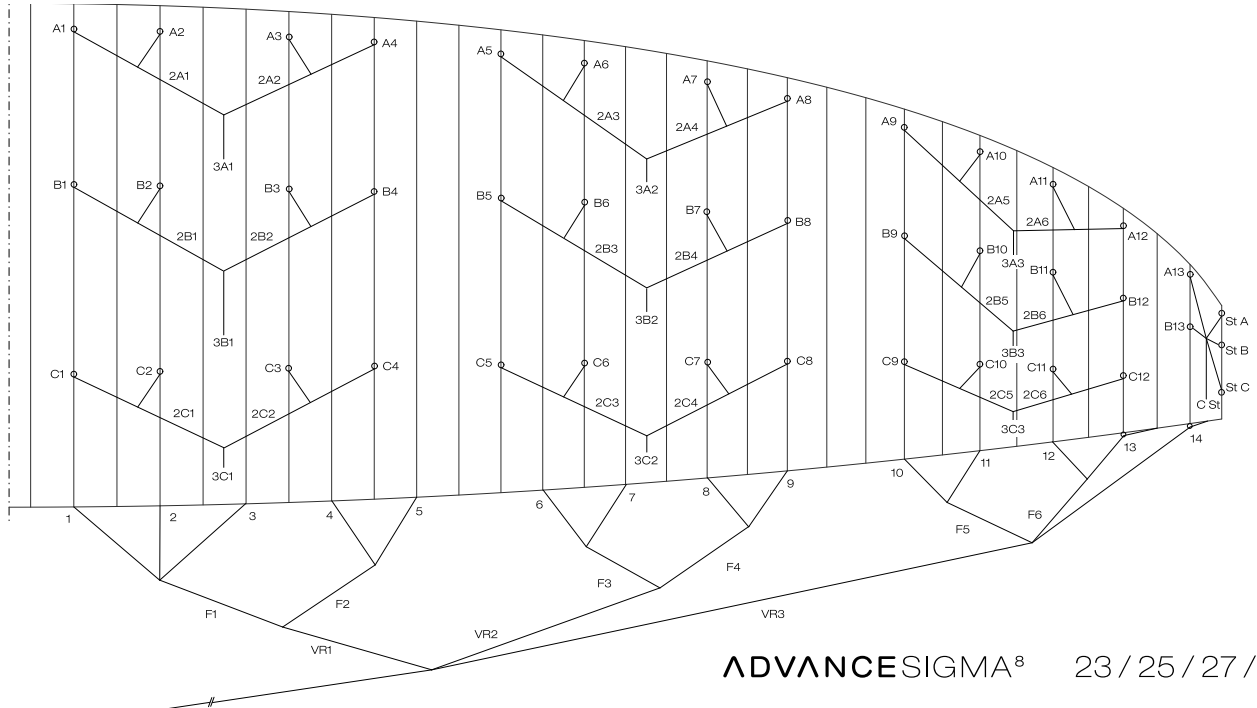
The ADVANCE warranty does not cover any claim other than those listed above. Claims in respect of damage resulting from careless or incorrect use of the product (e.g. inadequate maintenance, unsuitable storage, overloading, exposure to extreme temperatures, etc.) are expressly excluded. The same applies to damage attributable to an accident or normal wear and tear.



# Parts



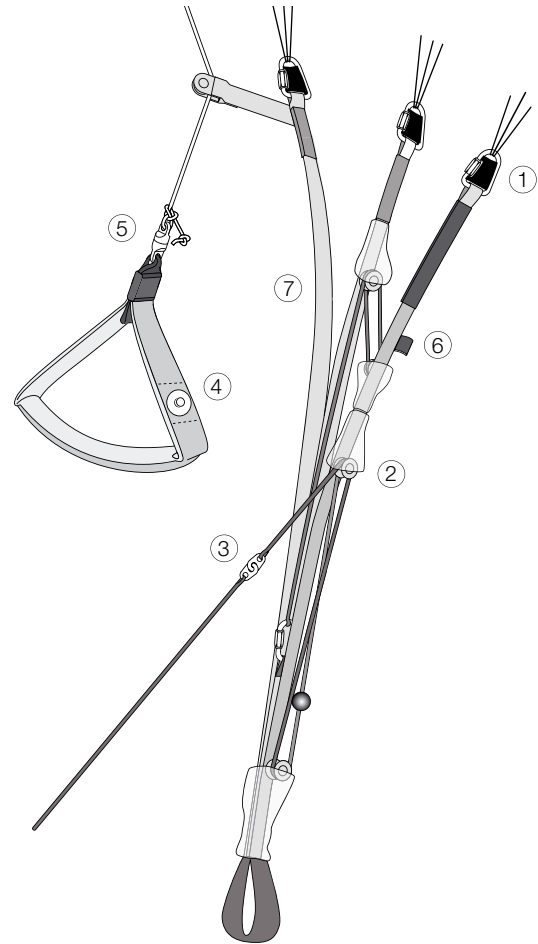
# Lineplan



ADVANCESIGMA<sup>8</sup> 23/25/27/29

# Risers

- ① Riser quicklinks and clips
- ② Speed system pulley
- ③ Brummel hooks
- ④ Magnetic clips
- ⑤ Swivel
- ⑥ Speed-Performance-Indicator (SPI)
- ⑦ SPI scale (back of the C-risers)



# Bowline knot

Step 1



Step 2



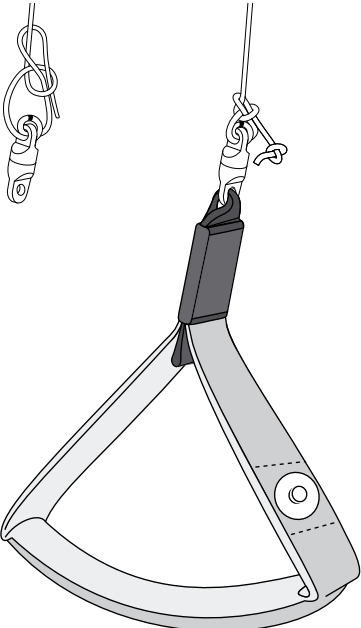
Step 3



Step 4



Step 5







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