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STING 2

Instruction Manual (EN)



INFORMATION

POWERPLAY is the brand name for SWING Flugsportgeräte GmbH's range of paramotor gliders.

Swing Flugsportgeräte GmbH reserves the right to alter or add to the contents of this Manual at any time. You should therefore regularly visit our website:

www.swing.de

where you will find additional information relating to your glider and any changes to the Manual. There is further information about the Swing website in the section "Swing on the World Wide Web"

The date and version number of this Manual are given on the front page.

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The information and data found in this Manual may be altered at any time without notice. The fact that this Manual has been made available does not confer any claim to the product descriptions, common or trade names or other intellectual property.

DEAR STING 2 OWNER

THANK YOU FOR PURCHASING A POWERPLAY GLIDER.

We hope that flying a Powerplay glider will bring you many years of enjoyment. The innovative design, first-rate materials and high quality workmanship of your glider set it apart from others. Your Powerplay glider was developed to comply with all of the current safety and certification requirements in Germany.

One of those requirements is that you familiarise yourself with the information and instructions contained in this Manual regarding safety, equipment and service before using your new glider.

If you have any questions which are not answered in this Manual, please do not hesitate to contact Powerplay directly or your Powerplay dealer. Our contact details are in the Appendix.

The Powerplay Team



WARNING

Read this Manual before using your glider!

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01 Introduction

Manual

SWING requires you to familiarise yourself with your new paraglider by reading this Manual before your first flight. This will allow you to acquaint yourself with its new functions and learn the best way to fly the paraglider in various situations. It will also explain how to get the most out of your paraglider.

Information in this Manual on design of the paraglider, technical data and illustrations are subject to change. We reserve the right to make changes without prior notification.

Special text giving safety information is identified in this Manual in accordance with the ANSI Z535.6 standard.

This Manual complies with the current version of the LTF guidelines at the time of certification and forms part of the certification.

There are a total of three parts to the Manual, which give the following information:

1. Manual (this document):
Instructions on getting started and using the paraglider
2. Maintenance and Service Book (PDF/Download):
Technical data and inspection information specific to the particular glider
3. Inspection Information (PDF/Download):
General instructions and guidance on carrying out the regular inspection of paragliders

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Special text



DANGER

Sections of text headed “Danger” indicate a situation where there is **imminent** danger, which in all probability **will lead to death or serious injury**, if the instructions given are not followed.



WARNING

Sections of text headed “Warning” indicate a potentially dangerous situation, which **may lead to death or serious injury**, if the instructions are not followed.



CAUTION

Sections of text headed “Caution” indicate a potentially dangerous situation, which may lead to **minor or slight injury**, if the instructions are not followed.



PLEASE NOTE

Sections of text headed “Please note” indicate possible **damage to property**, which may occur if the instructions are not followed.



TIP

Sections of text headed “Tip” give advice or tips which will make it easier to use your paraglider.

Series of instructions

In this Manual, instructions which must be followed in a certain order are numbered consecutively.

- < Where there is a series of pictures with step-by-step instructions, each step has the same number as the corresponding picture.
- d Letters are used where there is a series of pictures but the order is not relevant.

Lists of parts

- ♦ Numbers circled in red refer to various parts of the item pictured. A list of the numbers and the name of the part labelled follows the picture.

Bullet points

Bullet points are used in this Manual for lists.

Example:

- risers
- lines

Manual on the internet

Additional information about your glider and any updates to the Manual can be found on our website at www.swing.de.

This Manual was current at the time of going to print. It can be downloaded from Swing's website prior to print.

Flugsportgeräte GmbH and they have implications for everything we do. We also believe that our customers share our environmental awareness.

Respect for nature and the environment

You can easily play a part in protecting the environment by practising the sport of paragliding in such a way that there is no damage to nature and the areas in which we fly.

Keep to marked trails, take your rubbish away with you, refrain from making unnecessary noise and respect the sensitive biological equilibrium of nature.

Consideration for nature is required even at the launch site!

If you are a smoker, please do not leave cigarette butts behind.

Paragliding is, of course, an outdoor sport – protect and preserve our planet's resources.

Environmentally-friendly recycling

Swing gives consideration to the entire life cycle of its gliders, the final stage of which is recycling in an environmentally-friendly manner. The synthetic materials used in our gliders must be disposed of properly. If you are not able to arrange appropriate disposal, Swing will be happy to recycle the glider for you. Send the glider with a short note to this effect to the address given in the Appendix.

SWING and the environment

Protection of the environment, safety and quality are the three core values of Swing

02 Safety



WARNING

The safety advice given below must be followed in all circumstances. Failure to do so renders invalid the certification and/or results in loss of insurance cover, and could lead to serious injuries or even death.

Safety advice

All forms of aerial sport involve certain risks. When compared with other types of aerial sport, paragliding has the lowest number of fatal accidents measured according to the number of licensed pilots.

However, few other sports demand such a high level of individual responsibility as paragliding. Prudence and risk-awareness are basic requirements for the safe practice of the sport, for the very reason that it is so easy to learn and practically anyone can do so. Carelessness and overestimating one's own abilities can quickly lead to critical situations. A reliable assessment of conditions for flying is particularly important. Paragliders are not designed to be flown in turbulent weather. Most serious paraglider accidents are caused by pilots misjudging the weather conditions for flying.

Paragliders themselves are extremely safe. In the type certification tests, all component parts of a paraglider must withstand eight times the load of normal flight. There is a three-fold safety margin compared to the maximum extreme load occurring in flight. This is higher than the two-fold margin usual in aviation. Accidents caused by material failure are therefore practically unheard of in paragliding.

In Germany, paragliders are subject to the guidelines for air sports equipment and must not under any circumstances be flown without a valid certification. Independent

experimentation is strictly prohibited. This Manual does not replace the need to attend training at a paragliding school.

A specialist must test-fly and inspect the paraglider before your first flight. The test-flight must be recorded on the paraglider information label.

Carry out your first flight with the paraglider on a training slope. For this flight and for all other flights, you must wear an approved helmet, gloves, firm shoes with ankle-support and suitable clothing. Only fly if the wind direction, wind speed and current and forecasted weather conditions guarantee a safe flight.

This Manual must be passed on to any new owner of the glider. It forms part of the certification and belongs with the glider.

The Sting 2 was developed and tested for use both as a paraglider for foot-launch and winch-towing and also as a powered paraglider. Any use other than as intended is not permitted. Do not under any circumstances use the paraglider as a parachute. Acrobatics are not permitted.

Observe the other specific safety advice in the various sections of this Manual.

Safety notices

Safety notices are issued when defects arise during use of a paraglider which could possibly also affect other gliders of the same model.

The notices contain instructions on how to inspect the gliders concerned for possible faults and the steps required to rectify any faults.

Swing publishes on its website any technical safety notices and airworthiness instructions which are issued in respect of Powerplay products. We will also send you safety notices directly by email if you have registered your product (refer to "Product Registration" in the section "Swing on the World Wide Web").



WARNING

The paraglider owner is responsible for carrying out the action required by the safety notice.

Safety notices are released by the certification agencies and are also published on the relevant websites. Services such as



RSS are also available which allow internet users to follow various websites and any changes made to them without having to access them individually. This allows much more information to

be followed than was previously the case. You should therefore visit the safety pages of the certification agencies on a regular basis and keep up-to-date with new safety notices which cover any products connected with paragliding (refer to Appendix for addresses).

Disclaimer and exclusion of liability,

Operating limits

Use of the paraglider is at the pilot's own risk!

The manufacturer cannot be held liable for any personal injury or material damage which arises in connection with Powerplay gliders. The certification and warranty shall be rendered invalid if there are changes of any kind (incl. glider design, brake line changes beyond the permissible tolerance), or incorrect repairs to this glider, or if any inspections are missed (annual and two-yearly check).

Pilots are responsible for their own safety and must ensure that the airworthiness of the equipment is checked prior to every flight. The pilot should launch only if the paragliding equipment is airworthy. In addition, when flying outside of Germany, pilots must observe the relevant regulations in each country.

The paraglider may only be used if the pilot has a valid licence for the area or is flying under the supervision of an approved flying instructor. There is no liability on the part of third parties, in particular the manufacturer and the dealer.

Disclaimer and exclusion of liability

In terms of the warranty and guarantee conditions, the paraglider may not be used if any of the following situations exists:

- the inspection period has expired, or the inspection has been carried out by unauthorised agencies or people
- the pilot has insufficient experience or training
- the pilot has incorrect or inadequate equipment (paraglider, protection and helmet)

- the glider is used for winch-launching with a winch which has not been inspected or by non-licensed pilots and/or winch operators
- the glider is used in combination with a propulsion unit which has not been certified as compatible



WARNING

It is imperative that the instructions contained in this Manual are followed at all times.

Failure to do so renders invalid the glider's certification and/or results in loss of insurance cover. Furthermore, it could lead to serious injuries or even death.

This applies in particular, but not only, to the instructions given in the sections Safety, Flying the Sting 2, Types of Use and Dangerous Situations and Extreme Flying.

- there have been modifications to the canopy, lines or risers which have not been approved



WARNING

It is imperative that you observe the service intervals given in the Maintenance and Service book. They must be complied with.

Inspect the lines if there has been any possibility of contact with the propeller.

Lines with a diameter of less than 1mm have been used on the Sting 2. There is a risk of the lines breaking if they are not handled correctly or if service intervals are missed

Glider categories and guidelines

The approved testing bodies have worked in conjunction with the manufacturers and the appropriate associations to develop directives for certification which are based on many years of analysing paraglider accidents and on the experience of flying schools, flying instructors and safety officers. These directives are intended to ensure that the only paragliders used are those whose flying characteristics were tested by independent bodies and which offer a minimum level of safety.

This should help pilots to select the glider which is appropriate for their particular level of flying ability.

There is also further information on the website of the relevant licensing body.

Operating limits

The paraglider may only be used within the operating limits. These have been exceeded if any of the following situations exists:

- the take-off weight is not within the permissible weight range or the glider is used with more people than given on the glider information and certification sticker
- the glider is flown in rain or drizzle, cloud, fog and / or snow
- the canopy is wet
- there are turbulent weather conditions and/or wind speeds higher than 2/3 of the maximum flyable airspeed of the glider
- the air temperature is below -10°C or above 50°C
- the glider is used for aerobatics/extreme flying or flight manoeuvres at an angle greater than 90°



WARNING

The descriptions of flight characteristics contained in this Manual are all based on test flights, which were carried out under standardised conditions.

The classification gives merely a description of the glider's reactions to these standardised tests, generally without any intervention by the pilot.

The complexity of the paraglider system means that the standardised tests can give only a partial description of the glider's flight behaviour and reactions to disturbances. Even a small alteration in individual parameters can result in flight behaviour which is markedly modified and different from the description given.

DGAC

The Sting 2 is registered with the DGAC as ULM Class 1.

EN/LTF certification

The Sting 2 was tested by the European Para Academy (EAPR) in accordance with the current LTF directives for paragliders and powered paragliders. Type certification was granted.

In the testing body's final classification, the Sting 2 was put into the following classes according to accelerator travel:

130mm accelerator travel: **Class A**

165mm accelerator travel: **Class B**

Description of flight characteristics

Class A:

Paragliders with maximum passive safety and extremely forgiving flying characteristics. Gliders with good resistance to departures from normal flight.

Class B:

Paragliders with good passive safety and forgiving flying characteristics. Gliders with some resistance to departures from normal flight.

Target group and recommended flying experience

The target group for the Sting 2 ranges from the beginner to the safety-conscious cross-country pilot. Its excellent launch features, high level of passive safety, simple and direct handling are impressive, when used with a motor and also in free flight.

The Sting 2 is a glider for paramotor pilots who also fly in the mountains or on winch but do not want to get a second paraglider.

It offers absolute flying enjoyment with a high level of performance and safety.

Description of pilot skills required

Designed for all pilots including pilots at all levels of training.

Suitability for training

The Sting 2 is suitable for use as a training glider.

Accelerator travel must be restricted to 130mm for training without a motor (Class A).

03 Technical description

General layout illustration

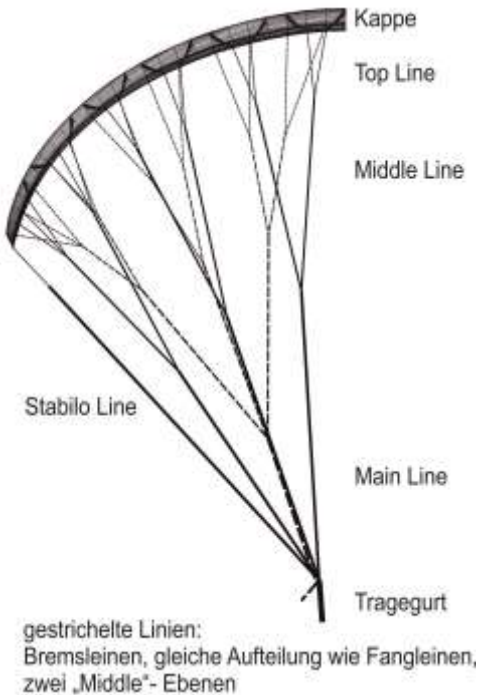


Fig. 1: Sting 2 CAD-design

Sting 2 – the All-rounder

The Sting 2 is in a class of its own.

Our development team's goal was to design a paramotor glider which also has top thermal features. They wanted it to be suitable for training but at the same time to have performance data which would appeal to already qualified pilots. This goal was achieved by a modern canopy design combined with a unique riser system which allows the pilot to choose between two different speed bar travels. The Sting 2 can thereby be adjusted according to the pilot's

ability. As a classic combination paraglider, the Sting 2 is certified both as a powered paraglider and as a paraglider subject to complying with the respective weight limits (see Technical Data) and riser configurations.

This flexible overall concept makes the Sting 2 the ideal glider for anyone who has great plans for their flying!

Line system

The Sting 2 has A, B, C and D line levels, which fork twice from the bottom (riser) to the top (canopy) and which are divided into main, intermediate and top lines. The individual line levels are connected with one another using the "handshake knot" (loop to loop knot).

The Maintenance and Service book has a detailed line connection plan, showing the individual levels, connections and line descriptions.

With the brake lines, the individual levels are bundled at the end with the main brake line. This runs through the easily controlled brake pulley on the D-riser and is knotted at the brake swivel of the control handle. There is a mark on the main brake line which allows the control handle to be correctly positioned.

The main lines are all attached to the risers' Maillon quick links. They are fed through special elastic rings and attached to prevent the lines from slipping and to ensure that they stay in the correct position.

04 Setting up the Sting 2 and test-flying

Before the first flight



WARNING

A specialist must test-fly and inspect the glider before your first flight. The test-flight must be recorded on the paraglider information label.

During production, the Sting 2 goes through several quality control checks before finally undergoing a detailed type certification test. Conformity with the certified reference model is checked and certified before the glider is delivered to the customer. Extreme care is taken in the manufacture of all patterns, lines and riser lengths. They show a high level of precision and should not be altered under any circumstances.

Despite the highest level of care in production, the line set still “settles in” a little during flight because of the loading. This is taken into consideration during production, but it may mean that the ideal trim is reached only after a few flights.



WARNING

Any changes which have not been approved or improper repairs to this paraglider render invalid the certification and warranty.

Adjusting the main brake lines

The Sting 2 is delivered ex factory with a brake adjustment which is set up for optimum handling.

This adjustment will allow you to steer and land the glider almost without delay.

The main brake lines are checked by the specialist before the test flight, and must be fastened so that the mark is visible about 5mm above the knot.

The brake line length must not be shortened.

Factory setting

Correctly installed brake lines have about 10cm of feed. This is how far you must pull down the brakes before the trailing edge of the paraglider starts to move downwards and begins to brake. Note that the brake cascades already cause drag by their aerodynamic resistance.

With this adjustment, the maximum symmetrical control travel at maximum take-off weight is 80cm without thrust from the motor.

You are able to lengthen the brake setting if necessary.

This can be helpful for training in particular, to give more dampened handling.

If the brake adjustment is altered, under no circumstances should it exceed or fall below the tolerance levels given in the Maintenance and Service Book for the Sting 2.

Variable brake pulley

The height of the brake pulley can be adjusted to suit the needs of the pilot (see the section “Risers”).

If doing this, make sure that the brake line length is aligned to the top position. If the brake line pulley is pushed down, the main brake lines should be lengthened by the same distance.

Incorrect adjustment

If the brake lines are too long, the paraglider reacts slowly and is difficult to land. The brake lines can be adjusted during flight by wrapping them around your hands which will improve the flight characteristics. Adjust the brake lines to the correct length after you have landed. Changes to the braking distance should always be made in small

increments of no more than 2 to 3cm and must be tested on a training slope. The left and right brakes must be adjusted symmetrically.

If the brakes are shortened, care must be taken that the paraglider is not slowed down in trim and accelerated flight because of the brake lines being too short. Safety issues may arise and performance and launch behaviour may deteriorate if the brake lines are shortened too much.

Loose, unsuitable or incorrectly tied brake line knots can cause the main brake line to loosen and then lead to loss of control of the glider.

Ensure that only double overhand or bowline knots are used and that they are tied correctly.



WARNING

If the brake lines are too short, the following risks could arise:

- there could be an early stall
- the paraglider does not launch well and there is a risk of deep stall
- the paraglider exhibits dangerous behaviour in extreme flying
- the trailing edge of the paraglider is braked in accelerated flight which, in an extreme case, could cause a frontal collapse



TIP

Environmental conditions can also cause the brake lines to shorten.

Brake line length should therefore be checked regularly, particularly if there is any change in launch or flight characteristics.



WARNING

Brake knots

The overhand knot and bowline knot shown below are the most suitable for connecting the brake line to the brake handle.

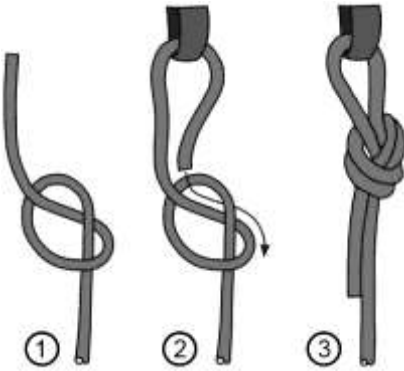


Fig. 2: Overhand knot

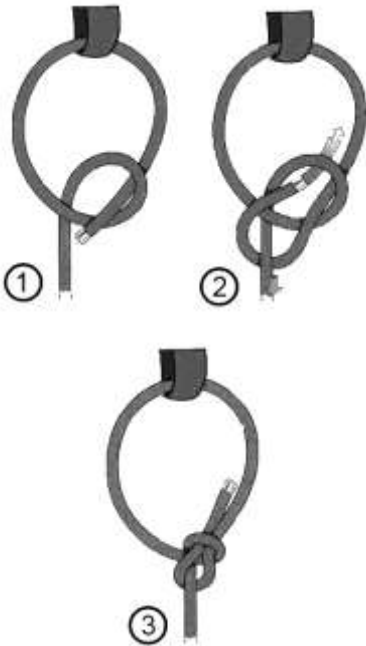


Fig. 3: Bowline knot

Adjusting the brake handles

The Sting 2 is fitted with Powerplay's Multigrip brake handles, which allows the stiffness of the grip area to be adjusted. The various options for stiffening the brake handles allow them to be adjusted to suit the pilot's particular preferences. There are 4 levels of stiffness possible using various combinations of the stiffening options. The pilot is able to choose the appropriate degree of stiffness by simply taking out or inserting the various parts.



Multigrip brake handle on delivery with both stiffeners



To remove the stiffeners, turn the Multigrip brake handle inside out and push the two small rods out through the opening



Multigrip brake handle after removing both stiffening rods. These are the various parts:

- ❶ Firm stiffening (bar)
- ❷ Soft stiffening (tube)
- ❸ Multigrip brake handle without stiffening
- ❹ Brake swivel
- ❺ Main brake line

Fig. 4: Removing the stiffening from the Swing Multigrip brake handle and replacing it

The procedure is the same to insert the stiffeners: turn the Multigrip brake handle inside out and push the stiffening bar/tube into the handle again through the opening.

There is also a swivel ❹ where the brake lines/brake handles connect to prevent the brake lines from twisting.

Risers

The 20mm wide risers specially developed for the Sting 2 are grouped into five and allow a variety of uses for the Sting 2.



WARNING

The paraglider is delivered ex factory with the Maillon quick links secured using Loctite® (a strong thread-locking compound) to prevent unintentional opening. After service work, any quick links which have been opened must be secured again against unintentional opening.

For free flight, it is fitted with a speed system which is activated using a speed bar.

This is a two-stage speed system. In the first stage (accelerator travel 130mm by putting the speed bar lines through the D-ring) the Sting 2 meets the requirements for class A, making it suitable for use as a training glider.

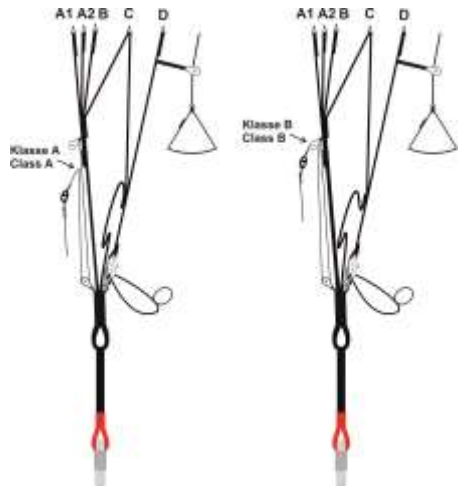


Fig. 5: Where to put the speed bar lines

In the second stage (accelerator travel 5mm by putting the speed bar lines through a

pulley) the Sting 2 meets the requirements for a class B glider.

The riser has a trimmer which allows the pilot to increase the cruising speed in motorised flight and to counter the torque effect.

There is also a choice of two riser hangpoints to allow the best set-up for the Sting 2 for the particular motor system used.

unterer Aufhängepunkt HP 1 lower hangpoint HP 1 oberer Aufhängepunkt HP 2 upper hangpoint HP 2

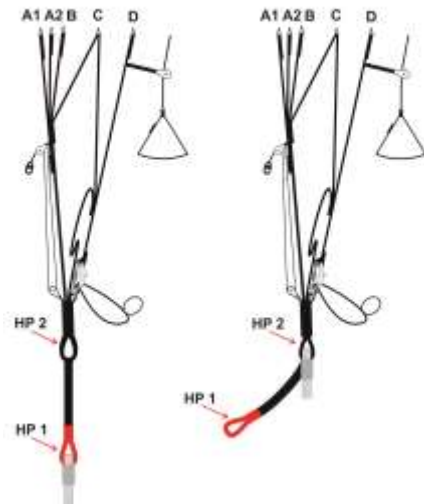


Fig. 6: Hangpoint



WARNING

If using the upper hang point, make sure that the carabiner is attached in the loop and not between the risers.

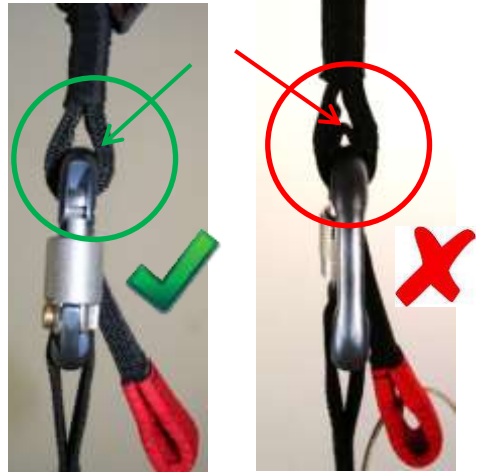


Fig. 7: Carabiner position for upper hang point

The brake pulley can be moved so it can also be adjusted to the ideal position for this.

Speed system

The Sting 2 already has a high basic trim speed, but this can be increased considerably when flying without a motor by using the additional speed system. It is particularly useful if there is a strong headwind, for valley crossings or to leave a dangerous area quickly, provided conditions allow it to be used safely.

The A-, B- and C-risers can be shortened using the speed bar. This decreases the canopy's original angle of attack and the glider's speed increases.

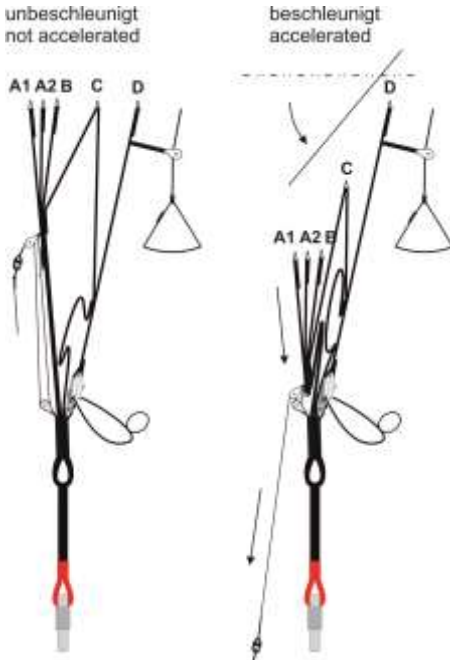


Fig. 8: how the speed bar works

You will not be able to use the full potential of the paraglider if the speed system is too long.

Before launch, secure the speed bar to the harness to avoid tripping over it when preparing to launch or when taking off.



WARNING

The speed bar is used only when flying without a motor.

Do not make the speed system too short. The glider must under no circumstances be pre-accelerated as a result of the adjustment being too short.

Problems (such as collapses or tucks) have a more drastic effect with increased speed than in unaccelerated flight. It is generally recommended that you do not use the speed system in turbulent areas and when flying close to the ground, because of the increased risk of collapse.

Do not brake the glider symmetrically in accelerated flight. Pulling the brakes down firmly on both sides can deform the profile and, in an extreme case, cause a frontal collapse.

Trimmer

The trimmer allows the pilot to increase cruising speed in motorised flight and to counter the torque effect.

We recommend that you always have the trimmers closed when launching or landing.

It is important that the speed system is correctly installed and adjusted to ensure that it can be used smoothly during flight. Before first launch, therefore, the length should be adjusted according to the individual pilot and the line guide should be checked.

Special Brummel-hooks are used for the connection between speed bar and riser.

Adjust the line length of the speed bar so that the pilot's legs are fully stretched when flying at maximum acceleration (D-Ring and pulley or the two riser pulleys together). If this is not done, fatigue can be caused if used for a long period of time. When you have applied the speed system fully, you should still be able to take up a comfortable seating position.

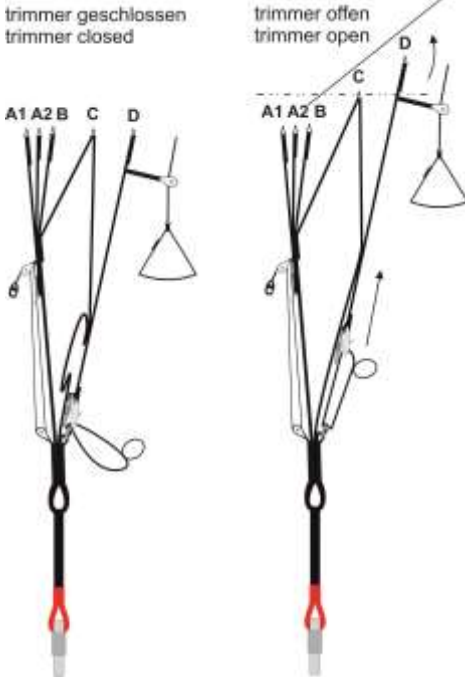


Fig. 9: how the trimmers work



locked trimmer free trimmer

Fig. 10: Locking off the trimmer



WARNING

Use the trimmer only in motorised flight. We generally recommend that you do not use the trimmer to increase speed in turbulent areas or near the ground because of the increased risk of collapse. Do not brake the glider symmetrically in accelerated flight. Pulling both brakes down firmly can deform the profile and, in an extreme case, cause a frontal collapse. The trimmer must be locked off using the screw-lock link in non-motorised flight.



DANGER

Under no circumstances should the grip loop for the trimmer lock be put into the main hangpoint. This shortens the D-riser considerably, and this effect is increased by opening the trimmer when it is like this.



Fig. 11: Trimmer loop in the main carabiner

DANGER!

Variable brake pulley

The brake pulley can be moved freely on the riser.

If the brake handle is still hard to reach despite selecting the correct hang point on the riser (e.g. with trimmers open), the brake pulley can be pushed down. If this is done, the main brake line must be lengthened by the same amount, otherwise the glider will be braked even if the brakes are fully open.

In free flight, the brake pulley must always be in the upper position and the length of the brake lines must be adjusted to this (factory setting for the brakes).

Bremsslider obere Position
Brakelineslider upper position



Bremsslider untere Position
Brakelineslider bottom position



Fig. 12: Brake position



WARNING

If the brake line pulley on the riser is pushed down, then the main brake line must be lengthened by the same amount, otherwise the glider will be braked even if the brakes are fully open.

Other devices

The Sting 2 does not have any other adjustable, detachable or variable devices.

Suitable harnesses

For free flight, the Sting 2 can in principle be used with harnesses with seat board which have "GH" or race classification.

Tests have shown that the harness, harness adjustment and the pilot's position in the harness have a noticeable effect on a glider's flight behaviour, particularly the height of the attachment points and their separation distance. The general rule is that the lower the attachment point, the more agile the paraglider.

Use of harnesses without seat board can result in flight behaviour which differs from the behaviour observed during flight testing.

Please be aware of this when selecting a harness. The harness should also ensure that you can apply the maximum acceleration distance using the pulleys.

Be aware too that the relative braking distance can also alter with the height of the attachment point. Please contact Swing or your Powerplay dealer if you have any questions or concerns about using your harness with the Sting 2.

There is more information about harnesses on the websites of the licensing bodies (see Appendix).

For motorised flight, the motor unit, harness, reserve and supporting framework must be inspected individually to determine whether they are compatible.

The compatibility of a motor unit with other components must be inspected and certified if necessary. Contact the manufacturer of your paramotor unit if you have any questions.

Reserve

It is a mandatory requirement to carry an approved reserve for use in emergency situations where the paraglider fails and recovery is not possible, for example after colliding with another sports aircraft.

In choosing a reserve, you should be careful that you remain within the specified take-off weight.

Swing recommends the use of a reserve for free flight and for motorised flight.

The reserve is fitted according to the manufacturer's instructions.

Recommended weight range

The Sting 2 must be flown within the permitted weight range, which differs according to free flight and motorised flight.

The weight refers to take-off weight: pilot, incl. clothing, glider, harness, motor (if used) and equipment. Work out your take-off weight by weighing yourself with all of your equipment and your backpack.

Swing offers the Sting 2 various sizes. If you are choosing between two sizes, your personal flying preferences will determine which glider to choose.

If you prefer very dynamic flight behaviour with fast reactions and without hesitation, you should choose a high wing-loading, i.e. the smaller model.

The dynamics reduce in the medium and lower weight range. Flight behaviour becomes more straightforward and many pilots select this weight range because they find it easier to centre in thermals. If these features appeal to you, you should fly with less wing-loading and choose the larger model.

The Sting 2 reacts to weight changes only by slightly increasing or reducing trim speed, with little noticeable influence on glide performance. You can therefore choose the size completely according to your own flying style.

05 Flying the Sting 2

There are many similarities between flying the Sting 2 without a motor and flying it with a motor, so they are described together. If there are any differences or special features, these are referred to directly or by describing the particular mode of operation.

First flight

A specialist must test-fly and inspect the paraglider before your first flight. The test-flight must be recorded on the paraglider information label.

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 being under any stress.



WARNING

Do not overestimate your own abilities. Do not allow the glider's classification or the behaviour of other pilots to make you careless.

Laying out the paraglider and pre-flight check

Place the paraglider with its upper surface against the ground and spread it out so that the leading edge is slightly curved.

Carefully sort out all the rigging lines and make sure that there are no lines underneath the canopy, tangled or caught up in any way.

Before launching, always check the following:

- Are there any tears in the glider or other damage?
- Are there any knots or tangles in the lines?
- Are the brake lines clear and attached firmly to the handle?

- Are the brake lines adjusted to the correct length?
- Are the quick links to the lines and risers closed and secured?
- Is the canopy dry?
- Are the risers and seams in good condition?
- Is the harness in good condition?
- Is the handle for the reserve chute secure?
- Has there been a pre-flight inspection of the motor unit?



WARNING

A careful pre-flight check is required for any type of aircraft. Make sure that you exercise the same level of care each time carry out the check. If there are obvious folds in the glider because it has been tightly packed or stored away for a long time, then the pilot should carry out some practice inflations before first launch and smooth out the trailing edge a little. This ensures that the flow profile is correct during launch. It is particularly important in low temperatures that the trailing edge is smoothed out.

Motorised flight

Swing cannot guarantee that the behaviour described below always applies one hundred per cent to all conceivable combinations of motor and glider. The compatibility of a new combination must therefore be confirmed by a test flight by an accredited compatibility test pilot.

An application for a compatibility test can be made to a type-testing body either by the manufacturer of the motor or by a pilot (as an individual type-test certification).

Launch Check

The launch point check is carried out immediately before launch to check once again the most important safety points. It should always be carried out in the same sequence so that nothing is overlooked. These points are:

1. Is the canopy arranged in a half-moon shape and are all the air-entrances open?
2. Are all the lines untangled and free of knots or twists?
 - are there any lines under the canopy?
 - are any lines caught in the trimmer clamp, risers or throttle?
 - do all the lines run cleanly past the cage?
3. Has the trimmer position been correctly chosen?
4. Do you have the correct personal equipment (motor unit, harness, carabiners, reserve, helmet). Are the leg straps done up?
5. Does the weather, in particular wind direction and strength, allow a safe flight?
6. Is the propeller clear?
7. Is the motor running properly?
8. Are the airspace and launch area clear?

Launch

Forwards launch

We recommend a forwards launch if there is little wind. Pull up the glider with the lines stretched. It is not necessary to use any momentum to launch the Sting 2 and/or to start running with slack lines.

While the glider is rising, guide the A-risers evenly upwards in an arc, without shortening them. Avoid pulling hard on the risers. The Sting 2 launches very easily and is easy to

control. Launching is even easier if the canopy is arranged in a half-moon shape.

Avoid moving your upper body sideways when the glider is rising, as this could cause lines to get caught in the propeller. If the glider is not centred when it rises, correct it using the risers rather than the brakes. This will stop one side of the glider tipping away. It is important during the take-off phase to remain under the glider and to hold your launch direction. When there is equal tension on both risers and the glider is above the pilot, check that the canopy is fully inflated and that no lines are twisted or caught up. Do not stand still when doing this, but do not turn your upper body.



CAUTION

If the glider goes too far to the side or falls down again, then stop the motor and begin the launch procedure again.

After carrying out the visual inspection, use full throttle. Leaning back slightly helps launch, as the full engine power is used. Release the risers and accelerate until the Sting 2 takes off.

Take note of the following points during a forwards launch:

- if the cage for the motor is not firmly in place, the risers can shift it during take-off and press it against the propeller - make sure this has not happened before you fly at maximum power.
- during launch, use of the brakes should be smooth and moderate
- lightly brake the Sting 2 when the canopy reaches its apex
- do not launch until the glider is above you - accelerating too quickly can cause dangerous pendulum motions
- do not get into your harness until you are a couple of meters in the air

- lower hang point with back motors generally allow an easier launch

Reverse launch

The Sting 2 is suitable for reverse- launching from wind speeds of 3m/s. The pilot turns around to face the glider with the updraft coming from behind. This method of launch makes it easier for the pilot to control the rising of the canopy and to carry out fine-tuning, so is therefore recommended in strong winds.

If you wish, you can first clip in to the glider as in a forwards launch and then turn around while the motor is switched off. Guide the lines over the cage and check that none of the lines is caught up.

In very strong winds, we recommend that you attach yourself to the glider when facing backwards. The risers must be set out and attached in such a way that you are in the correct position after you turn around and are not twisted.

By pulling on the front A-lines, the canopy begins to rise above the pilot as in a forwards launch. When the canopy reaches its apex, the pilot must turn around into the direction of flight and can run into the wind and take off. As with a forwards launch, the correct combination of brake and throttle is important to achieve the best speed and climb.



WARNING

The pilot must work actively to keep the glider on the ground in higher wind speeds (from approx. 6 m/s), otherwise the glider may rise above the pilot unintentionally which can lead to the pilot being lifted off, turned and dragged away.

With the reverse launch, you should observe the following special features in addition to the points given under “Forwards launch”:

- the correct technique for clipping in, inflation, and turning around is very important for the reverse launch. The pilot must master these before points before attempting them with the motor running
- always turn around steadily and briskly into the right direction
- when clipping in with risers crossed, always check that they are not swapped over or twisted in the carabiners

Climbing

Once you are airborne, you may notice the counter-torque i.e. the glider wants to turn against the direction in which the propeller is turning. Focus on a fixed point in the distance and maintain your direction by counter-steering.

After launch, first fly into the wind and let the Sting 2 pick up speed.

Do not climb with too great an angle of attack. Select the rev speed and brake line use so that there is enough speed to keep sufficient reserve before stall point.

If the angle of attack is too high when you are climbing, the glider could stall if there is any further increase in the angle of attack e.g. a vertical gust. A further reason for keeping the climb gentle is if there were motor failure at low altitude. If this happened, you should always be in a position where you are able to land safely.

manoeuvres.

Counter-torque oscillation

Certain combinations of take-off weight, thrust from the motor and propeller size can cause pendulum motions. If this happens, the pilot can be pushed to one side during flight because of the counter-torque and the gyroscope effect. The pilot then swings back into his original position because of his weight, only to then swing up even further.

The pilot can do the following to counter the pendulum motion:

- alter the throttle setting
- counter the pendulum effect by pulling slightly on the brakes
- weight-shift in the harness and/or adjust the harness position if it has suitable adjustment options (cross-strap)

Pendulum motions generally occur at high revs and if the propeller has a large diameter. Attempts to steer by the pilot can increase the pendulum motion if they are over-exaggerated and not synchronised. If there are uncontrolled pendulum motions, the pilot should simply reduce speed and not steer at all.

Cruising

Level flight

When the brakes are open the Sting 2's flight is level and inherently stable. The brake lines can be used to adjust the speed according to the flight situation, so as to ensure the optimum level of performance and safety.



DANGER

Braking strongly on both sides with the main brake with the trimmers open creates an unstable profile and there is a risk of front stall or other extreme flight

In calm conditions, the best glide speed is achieved on the Sting 2 with the brakes fully open. Minimum sink is reached by pulling the brake lines approx. 10cm on both sides. If the brakes are pulled further, the sink does not reduce any more, the control pressures increase noticeably and the pilot reaches minimum speed.

Turns using the main brake

With the Sting 2, Powerplay has developed a glider which reacts to steering input in a balanced and harmonious way and which has long control travel.

Turns against the counter-torque require more brake line input than turns into the counter-torque.

The Sting 2 has extremely low negative tendency so it can also be turned in a tight area by carefully pulling the inside brake line.

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 (further information on this is in the section "Spiral Dive").



WARNING

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

Countering the torque effect

The Sting 2 has best cruising speed with trimmers open. A trimmer can be closed again as much as needed to counter the torque effect of the motor.

Landing

Bear in mind the following points whenever you are landing, both with the motor running and without the motor running:

- before you launch, have a good look at the landing area / airfield
- before landing, check the wind direction and speed
- practise landing approaches as often as possible so that you become familiar with the Sting 2
- less space is needed to land without the motor running
- The brakes should be applied in a more regulated manner if there is a strong headwind. After you have landed, turn to face the glider if there is a risk of being pulled back by the glider and falling over
- avoid landing out of a steep turn or making a rapid change of direction before landing because of the pendulum effect caused.

Landing with stationary propeller

Landing with stationary propeller reduces the risk of damaging the propeller and lines during landing. However, you then do not have the option of correcting the approach or making a “touch-and-go” if the landing approach is bad.

For a landing with stationary propeller, switch off the motor 30-50m above the ground. The Sting 2’s angle of attack reduces because there is no thrust from the motor, and the glider picks up speed noticeably. Because of the relatively high surface-loading, the Sting 2 should not be braked too strongly before landing. We recommend that you completely release the brakes in the final approach and then, when you are approx. 1-2m above the ground, gradually apply them until they are 100% on (flare).

Note that the length of the brake lines was set to the optimum level for your motor before the first flight so that there would be sufficient braking distance for landing.

Landing with motor running

Prepare for a landing with the motor running by making a straight final approach into the wind and allow the Sting 2 to level out with the motor running. One meter above the ground, pull down the brakes as far as they will go, so that the glider is fully braked shortly before touching the ground. Switch off the motor immediately after touching down.



WARNING

Always fly with sufficient speed when you are near the ground (well above stall speed) to avoid an unintentional stall.

Further tips on paramotoring

Please observe the following points when flying the Sting 2:

- never start the motor downwind from the glider
- check the seals on all fuel lines
- check whether you have enough fuel for the flight you have planned
- check your personal equipment and harness for any loose parts which could get caught in the propeller
- go carefully through each of the points in the pre-flight check before every flight
- turn off the motor as soon as you have landed, to avoid line and propeller damage
- avoid flying over water and electricity lines, never fly between trees and in general avoid areas which have no landing options if the motor fails
- if the noise of the motor changes or if there is increased vibration, you should land immediately and attend to the problem
- bear in mind that the noise of a motor can be irritating, and avoid making flights low over residential areas

Non-motorised flight

5-point check

The 5-point check is carried out immediately before launch to check once again the most important safety points. It should always be carried out in the same sequence so that nothing is overlooked. The 5 points are:

1. Is personal equipment correct (harness, carabiners, reserve, helmet) and are all straps done up?
2. Is the canopy arranged in a half-moon shape and are all the air-entrances open?
3. Are all the lines untangled and are any lines under the canopy? Are the risers free from twists?
4. Does the weather, in particular wind direction and strength, allow a safe flight?
5. Are the airspace and launch area clear?

Launch

We recommend a forwards launch if there is little wind. Pull up the glider with the lines stretched. It is not necessary to use any momentum to launch the Sting 2 and/or to start running with slack lines.

While the glider is rising, guide the A-risers evenly upwards in an arc, without shortening them. Avoid pulling hard on the risers. The Sting 2 launches very easily and is easy to control. Launching is even easier if the canopy is arranged in a half-moon shape.

The Sting 2 is suitable for reverse-launching from wind speeds of 3m/s. The pilot turns around to face the glider with the updraft coming from behind. Pulling on the front lines makes the canopy start to rise above the pilot, as in a forwards launch. The pilot should turn around into the direction of flight when the canopy reaches its highest point, and can then begin to run and take off.

This method of launch makes it easier for the pilot to control the rising of the canopy and to carry out fine-tuning, so is therefore recommended in strong winds.



WARNING

The pilot must work actively to keep the glider on the ground in higher wind speeds (from approx. 6 m/s), otherwise the glider may rise above the pilot unintentionally.



PLEASE NOTE

When reverse launching or when ground-handling, be careful not to loop the brake lines through the risers because this can damage the risers.

Level flight

When the brakes are open, the Sting 2's flight is stable and level. The brake lines can be used to adjust the speed according to the flight situation, to ensure the optimum level of performance and safety.

The best glide speed in calm air on the Sting 2 is achieved with the brakes fully open. Minimum sink is reached by pulling approx. 10 cm of brake. If the brakes are pulled more, the sink does not reduce any further, the control pressures increase noticeably and the pilot reaches minimum speed.

**WARNING**

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

**WARNING**

Any rapid descent methods other than those described in this section have not been tested by SWING.

SWING advises against using any rapid descent methods other than those described in this section. In an extreme situation, they could result in uncontrollable flight positions.

With all rapid descent methods in motorised flight, the trimmers should be completely closed and the rpm's reduced to zero

Special attention is required with manoeuvres without flow over the profile (e.g. B-Stall). Do NOT accelerate because there is a risk of twisting caused by the counter torque of the motor.

All of the manoeuvres are more dynamic than if flying without a motor because of the increased take-off weight with the motor.

Turns

With the Sting 2, Swing has developed a glider which reacts immediately to steering input and is extremely responsive. The Sting 2 performs best in turns when it is flown with sufficient speed and weight-shifting. Too much braking increases the sink rate.

The Sting 2 has extremely low negative tendency, so it can also be turned in a tight area by carefully pulling the inside brake line.

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 (further information on this is in the section "Spiral Dive").

Rapid descent methods

Many flying situations call for a very rapid descent to avoid a dangerous situation, e.g. the upcurrent from a cumulus cloud, an approaching cold front or a storm front.

Rapid descent methods should all be practised in calm conditions and at sufficient altitude so that a pilot is then able to employ them effectively if extreme conditions arise. The rapid descents are divided into three different manoeuvres which increase the sink rate in a safe and controllable manner.

Spiral dives

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 certification tests differentiate between sink rates over and under 14 m/s. The Sting 2 automatically recovers from the spiral dive within one turn up to 14 m/s. Above 14 m/s, it may be necessary to break the outside half of the wing and/or weight- shift to the outside to recover from the spiral. With a sink rate up to 20 m/s and a neutral position of the pilot, the spiral does not tighten automatically.

Exiting the manoeuvre at high sink rates can take several turns.

Given the complexity and the possible risks of the spiral dive, SWING recommends that this manoeuvre be learnt under qualified instruction.



WARNING

In the spiral dive, very high turn speeds can be reached with an increase in acceleration due to gravity (up to over 6g), so exercise care when attempting this manoeuvre. Take note of the following:

Carry out your first attempts at spiral dives under professional instruction as part of a safety training course.

Do not enter the spiral dive by way of a wingover. High sink rates can be reached very quickly by doing this. It is not possible to gauge the sink rates safely.

Do not continue the spiral dive for too long: it could cause a loss of consciousness.

Always maintain **ground clearance of 200m**. The manoeuvre must be exited at this height above ground.

Spiral dives with “big ears” lead to extreme loading of the open section of the canopy. This move is prohibited in Germany.

Starting the manoeuvre

Begin the spiral dive whilst flying at full speed by flying a turn which becomes tighter and tighter and by using weight-shifting to the inside (refer here also to the section “Turns”).

The bank angle and sink rate are controlled by carefully applying or releasing the inside brake.

Look down before and during the spiral dive to maintain a constant check on your distance from the ground.



TIP

The outer wing tip may collapse during the spiral dive although this is no cause for concern. It can be avoided by lightly braking on the outside. Release the brakes carefully.

Recovery

Recover from the spiral dive slowly and steadily over several turns, keeping your body weight in a neutral position. The inside brakes are gradually released. If the brakes are released too quickly, the increased speed can cause the wing to climb, become unsettled or partly collapse.

Recovery can be assisted by braking lightly on the outside.

If the glider does not stop turning, this can be stopped by weight-shifting to the outside of the turn.



DANGER

At a high sink rate (above 14 m/s) it may be necessary to brake the outside half of the wing and/or to use weight-shifting to recover from the spiral.

Furthermore, for exiting the manoeuvre, several turns with a corresponding loss of altitude may be required.



DANGER

You must **immediately** deploy your reserve if you lose control of the glider and the sink rate and find yourself in a stable spiral.

The spiral may lead to loads and/or disturbance to consciousness which prevent later deployment of your reserve.

B-Stall

In the B-stall, a stall is provoked and the paraglider sinks vertically with a sink rate of approx. 8 m/s. The B-stall is suitable when there is an average ascent rate and little wind.

Starting the manoeuvre

Grasp both of the B-risers on the mallions at the coloured mark. Pull both B-risers evenly down until the airflow is broken and the wing goes completely into vertical descent flight mode. The B-risers should then be held in this position to ensure a gentle descent.



TIP

Pull down the B-risers only until there is no airflow. If they are pulled down any further, the glider could go into a horseshoe.

Check before and during the B-stall that the airspace beneath you is clear.

Recovery

Return the B-risers quickly and evenly into their normal position. The glider may go into a deep stall if they are released too slowly or into a negative spin if not released symmetrically. If this happens, the speed must be increased using the speed system or by pulling the A-risers forward.



WARNING

The canopy speeds up after the B-risers have been released until the airflow returns. Under no circumstances should the brakes be applied at this time.

This manoeuvre should be avoided at low temperatures. Pilots should be aware that this considerably increases the tendency to deep stall.

Big Ears

Big ears are the simplest method for rapid descent and have a sink rate of 3-5m/s. The advantage of big ears is that the glider continues to fly straight, meaning that a danger area can be avoided. It is even possible to land using big ears, for example on a top-landing to compensate for the updraft.

The wing-loading increases by the reduction in the wing's surface area, the wing becomes more stable against collapses in turbulence. Nevertheless, the air resistance of the wing also increases, and it flies more slowly and closer to the stall limit. To counter this and to increase the effectiveness of the sink, the speed bar is generally also used in combination with big ears.

Starting the manoeuvre

Start the "Big Ears" manoeuvre by pulling both outer A-lines downwards. This should start the manoeuvre by folding down a sufficiently large part of the wing tips so that the pilot does not then have to counteract the tendency to reopen. If the surface area which tucks under is too small ("ears" flapping, high holding forces) re-open the ears and then pull down and hold the A-lines a little more firmly.

To make the manoeuvre more stable and more effective, slightly accelerate the wing after pulling in the ears.

The brake lines are held steady and the pilot uses weight-shifting to steer the paraglider. You can now descend safely on the stable middle part of the wing. The brakes must not be shortened during the manoeuvre, e.g. by wrapping the brake lines



TIP

For "big ears" take the A2 riser marked grey above the quick link and pull down firmly.

Recovery

To recover, release the speed bar, wait until the wing has slowed down and let go of both A-risers. Assist the opening process by a short, impulsive pumping motion with the brakes if the ears do not open automatically.



WARNING

The technique of big ears causes a higher load for the line groups which are still weight-bearing. Therefore, do not fly any extreme manoeuvres with big ears.

This manoeuvre should be avoided in low temperatures. Pilots should be aware that this increases the tendency to deep stall.

Landing

There are no specific characteristics to observe during landing. Prepare for landing by making a straight approach flight into the wind and allow the glider to decelerate at trim speed. At 1m above the ground, the brake lines are pulled down as far as they will go, so that the paraglider has been fully braked just before the ground is reached.

The brakes should be applied in a more regulated manner if there is a strong headwind. Landing out of a steep turn or a rapid change of direction before landing should be avoided because of the pendulum effect caused.



WARNING

Always fly with sufficient speed when you are near the ground (well above stall speed) to avoid an unintentional stall.

Winch launch

The procedure for a winch launch is similar in its initial stages to a forwards launch. After the canopy has been pulled up to its highest point, the pilot rises from the ground by the tension of the tow line. Under no circumstances should the “start” command be given before the glider is completely under control. Major changes to direction should be avoided during the launch phase and before reaching a safe altitude. After having left the ground, the pilot will be slowly towed in a flat angle up to the safe altitude of 50m. During this phase, the pilot must remain ready to run and must not sit back in the harness, so that it is possible to land safely in the event that the winch or tow rope fails. Ensure that the glider is flown with open brakes so that the angle of attack is not increased further by the brakes.

On a winch launch, the glider should if possible be steered only by weight-shifting. Brisk, forceful steering input with the brakes can be used to help correct direction, without braking the glider too much and stalling it.



WARNING

The most common cause of stall on winch is releasing the A-risers too early while the glider is rising. The pilot should ensure that the canopy is above him before the “start” command is given.

Any changes to direction using the brakes should not be carried out until the canopy is already above the pilot, as too much brake can cause the glider to fall down again or be towed in a non-flyable condition.

**WARNING**

There is an increased risk of lockout if a webbing release system is used. This means that the glider does not fly towards the winch and control pressure by the pilot is not sufficient to correct this. You should therefore check regularly the position and alignment of the glider to the pilot during towing, as the towing rope hangpoint located well in front of the pilot encourages the glider to turn, and this may not be detected.

**TIP**

For a winch launch too, laying out the canopy in a half-moon shape will help to ensure that it fills and rises evenly on launch.

This considerably reduces the need to make corrections during launch, allowing a controlled and safe launch.

Winch-towing requires special training and special regulations must be observed. These are:

- The pilot must have completed the appropriate training and hold a licence.
- The winch and release must have a certificate of compliance which covers the towing of paragliders.
- The winch operator must have undertaken training which includes the towing of paragliders.
- The Sting 2 may not be towed with a towline tension of more than 90 daN.

The paraglider must not under any circumstances be towed by motor vehicle or motor boat etc. if you do not have the appropriate towing equipment and a suitable winch operator.

Attaching the towline release system

The optimal attachment point for the towline release should be as close as possible to the system's centre of gravity. On a paraglider the ideal attachment point is level with the harness attachment point or directly on the risers.

It is not essential to use a suitable tow adaptor, but it is recommended and provides the pilot with greater safety during the towing phase

Swing offers the option of the adjustable tow adaptor "Pro-Tow", which facilitates the tow procedure during launch and slightly pre-accelerates the canopy during this stage.

**WARNING**

When using rigid tow releases, the release/shackle distance should be extended sufficiently (cord or webbing strap) and the release must be secured with a retaining cord so that it does not fly back (in the event of towline failure).

When using the release system attachment, ensure that the distance between the risers is not reduced (risk of twist).

**WARNING**

If you are using a front-mounted reserve system, it is important to ensure before first launch that it can be deployed without any obstruction. If this is not the case, then only a webbing release system should be used.

**PLEASE NOTE**

Swing recommends that pilots use an appropriate tow adaptor, which gives greater safety margins during towing.

06 Types of use

The Sting 2 was developed and tested solely for use as a paramotor wing for foot launch and for winch launch and as a paramotor wing. Any use other than as intended is prohibited.

Tandem use

The Sting 2 is not certified for tandem use.

Aerobatics

In Germany, it is prohibited to perform aerobatics using a paraglider, which under German law is included in the term "aerial sports equipment" - *Luftsportgerät*.

Aerobatics is defined as flight manoeuvres at an angle greater than 135° along the longitudinal (roll) axis or lateral (pitch) axis.

The Sting 2 was not developed or tested for aerobatic use.



WARNING

Any type of acrobatic manoeuvre on the Sting 2 is illegal. This would put the pilot's life at risk. Acrobatics involves a risk of unpredictable flight attitudes which could lead to material damage and structural failure.

07 Dangerous situations and extreme flying



PLEASE NOTE

Extreme flight manoeuvres with a motor under full load are extremely dangerous and therefore cannot be tested.

In this section we describe how to correct extreme situations in the event that one should ever occur. The manoeuvres below relate to the take-off weight without motor and should help to understand the behaviour of the glider.

Dangerous situations

Pilot error, extreme wind conditions or turbulence which the pilot does not notice quickly enough may put 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.

Ground-training is another safe and effective way to familiarise yourself with your glider's reactions. Launch can be practised, as can small flying manoeuvres, such as stall, asymmetric collapse, front stall etc.

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. 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.

Please note that all of the manoeuvres described in this Manual were carried out for the purposes of the type-test certification with a GH harness with a carabiner distance (centre to centre) of 42 cm.

Flight behaviour may vary from that described in this Manual if a different harness is used.



WARNING

These instructions are not a substitute for the need for safety training. We therefore recommend that you take part in special safety training which will teach you how to handle extreme situations.



WARNING

Always keep within the recommended operating limits. Do not perform aerobatics and avoid extreme loading such as spirals with big ears. This will prevent accidents and avoid over-loading 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.

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.

Safety training

Taking part in safety training is in principle advisable in order to familiarise yourself with your glider and the correct reactions in extreme situations. However, safety training also subjects your equipment to extreme loads.

Material stress and damage

Swing advises against subjecting the materials of the Sting 2 to excessive stress during a safety training (SIV) course.

Uncontrolled flight positions can occur during safety training, which are outside the manufacturer's limits for the paraglider and which can put the glider under excessive stress.

Trimming the line lengths and 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.

Collapsing the glider

Asymmetric collapse

Asymmetric collapses are caused by the stagnation point moving to the trailing edge of the glider. A negative angle of attack makes part of the canopy collapse and tuck under, and the glider may plunge down, turn away or spin.

Recovery

Should an asymmetric collapse occur, counter-brake slightly on the side of the glider that is still inflated to stop it turning away and to stabilise it, until the glider flies straight ahead again. With large asymmetric collapses, it is important to counter-steer carefully so that the glider does not stall completely and go into a full stall.

The part of the glider which has collapsed generally re-inflates automatically but this can be assisted by applying light brake pressure on the collapsed side (but not hectic "pumping") while counter-steering on the opposite side. Make use of the full braking distance.

Following a very large collapse of more than 70%, the wing-tip of the collapsed side may become trapped in the glider lines. Here too counter-braking and weight-shifting must be used to stop the glider from turning away. The trapped end can generally be opened by a short, fast pull on the brake lines or by pulling on the separate stabilo lines.



WARNING

Counter-steering too strongly on the inflated side of the glider can result in a stall and to further uncontrolled flight manoeuvres (cascade of events).

Front stall

A negative angle of attack can also cause part or all of the leading edge of the glider to collapse.

Recovery

The Sting 2 will normally recover quickly and automatically from a front stall, but re-inflation can be assisted by light symmetrical brake input. 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, but care must be taken that both wing ends return to normal flight evenly.

Types of stall

When a paraglider flies through the air, a laminar and turbulent boundary layer is created. Extremely dangerous flight configurations can result if the laminar boundary layer is interrupted, with practically the entire airflow along the top surface braking away. This happens in particular when the angle of attack is too great.

There are three different types of stall in paragliding.



WARNING

Full stall and spin are manoeuvres which can be fatal if recovery is not correct. These manoeuvres should therefore be avoided. However, it is important to learn how to recognise the indications that a glider is about to stall so that you can take immediate action to prevent it.

Deep stall

Paragliders can go into a deep stall for a variety of reasons: brake lines too short (no slack), old or damaged glider material which therefore has increased level of permeability, 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.

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 4-5m/s and there is noticeably less flight noise.

Recovery

Remain in an upright position and push the A- and B-risers in the direction you are flying, so as to shorten them by 5-10cm.

If you have a speed system, you can also use it to accelerate, so that the glider goes into a normal flying position from the deep stall.

After you have landed, the glider and the length of the lines must be checked.

Full stall

With a full stall, the lift-generating airflow over the glider breaks away completely or nearly completely.

It is triggered 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.

Recovery

Fully release the brakes within 3 seconds (count 21, 22, 23). If the brakes are released too slowly, the paraglider may spin. The spin stops automatically when the brakes are released completely.



WARNING

If the canopy has gone back during a 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.

Spin

The spin is a stable flight attitude, in which one side of the canopy stalls, while the other side continues to fly forward. The glider turns around the stalled side of the wing.

Recovery

To recover from the spin, the pilot must quickly release the brakes. The stalled side of the wing will then speed up again. Depending on recovery and the dynamic of the circular motion, one side of the canopy may shoot forwards and suffer an asymmetric collapse.

If the pilot suspects that the glider has unintentionally been put into a spin, the brake which has been pulled down too far must be released immediately.



WARNING

If the spin does not stop, check whether you have released the brakes fully!

Emergency steering

If for some reason the brake lines are not working, e.g. if the knot on the brake handle has come undone or a brake line is defective, the Sting 2 can also be steered and landed using the rear risers.

In this case, stall happens more quickly and the pilot must compensate for the changed flight behaviour by pulling carefully on the risers.

Other tips for dangerous situations

Stalling in rain

In general, there are two reasons why a paraglider may go into deep stall in rain:

1. The first risk lies in the fact that the canopy weight increases if a glider is flown in rain for any length of time. The centre of gravity and angle of attack then shift, which can result in airflow separation/stall. It is relevant here that if a glider absorbs more water (as older gliders do because they lose their water-repellent coating over time) and is closer to the deep stall limit because of its design and age, less water absorption and thus weight increase will put the glider into deep stall.

2. When there is rain, there can be so many water droplets on the top surface of a glider that almost the entire upper surface is affected but, even so, the drops “bead” so the surface is not wet through. This makes the top surface so “rough” in texture from the drop formation that the airflow over the top of the wing separates from the surface. This phenomenon has been known for some time from hang-gliding and gliding. With new gliders, the droplets are absorbed less quickly by the fabric. Thus, the newer a glider is, the greater the number of droplets caught on the top surface and the bigger those droplets are, the greater the risk that there could be airflow separation. We were able to recreate these conditions by practical tests and computer simulations, but they occur very rarely.

It is the case in both of the above situations that the control travel and braking distance first reduce and then the deep stall is caused, mostly by alteration of the brake travel or angle of attack, e.g. by a gust or thermal.



WARNING

Flying in extremely humid weather or in rain is outside the operating limits of the glider. If you are not able to avoid flying in rain, please observe the following:

- It is advisable to fly with slight acceleration during and after the rain (min. 30% or more)
- Use no brake input or as little as possible
- Do not use big ears
- Control travel reduces
- Void tight turns, especially in the final approach. If conditions allow, you should also fly slightly accelerated in this phase
- Avoid large angles of attack and the possible early stall near the ground (release the speed bar only slowly)

process of the structure and should therefore be avoided.

The glider must be inspected earlier than is usually the case if it has been put under more than the usual degree of strain.

Sand and salt air

In many cases, sand and salt air cause the lines and fabric to age much more rapidly.

If you often fly near the sea, the glider should be inspected more frequently than normally required.

Temperature range

Temperatures below $-10\text{ }^{\circ}\text{C}$ and above $+50\text{ }^{\circ}\text{C}$ can make the paraglider unfit to fly. The manufacturer's warranty will lapse if the glider is used outside of this temperature range.

Advertising and adhesives

Always make sure before attaching advertising to the glider that the adhesive planned will not alter the glider's flight behaviour. If you are in doubt, we recommend that you do not attach the adhesive.



PLEASE NOTE

Attaching adhesives to the glider which are large, heavy, or made of unsuitable material may result in revocation of the certification.

Overloading

The glider structure is put under high levels of strain in particular on extreme flight manoeuvres, rapid descent methods (spiral dives) or prohibited aerobatic manoeuvres. They considerably accelerate the aging

08 Storing and looking after the paraglider

Storing the paraglider

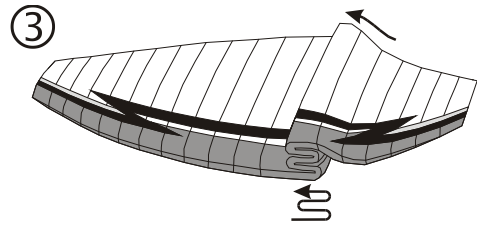
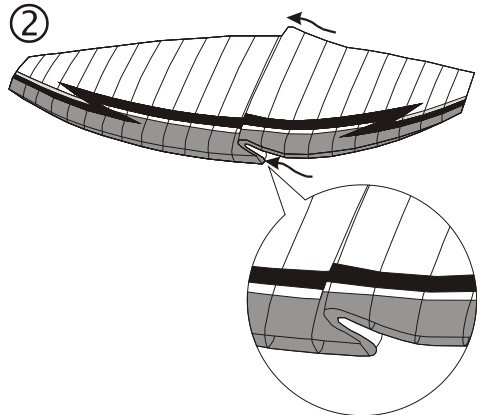
Packing the paraglider

The Sting 2 has flexible, bend-resistant reinforcement in the leading edge and can be packed using any normal packing method. However, we recommend packing the Sting 2 “cell on cell” as shown in Figs. 1-4. It is a good idea to have a second person helping if you use this method.

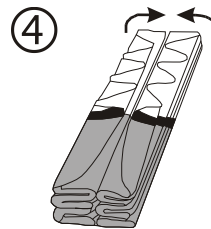
The leading edge reinforcements on the front edge are placed on top of each other to avoid bending or misshaping them. This method of packing ensures that the leading edge is treated carefully, which will increase the glider’s life, performance and launch behaviour. The reinforcements distort more easily during flight if they have been bent or misshapen, 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.

Fig. 13: Steps 1 - 4 show the correct and careful way in which to fold up the Sting 2



Vary slightly the final step of packing up ④ so that it is not always the middle cell which is bent. Use the neighbouring cells as well from time to time to increase the life of the fabric, particularly in the middle part.



When you are completing the final part of packing, we recommend that you put the internal protection bag under the glider to minimise abrasion on the ground.

**PLEASE NOTE**

Make sure that the profile reinforcement lies flat and that it is not bent by holding it too firmly.

Check once again after you have finished packing the glider that the leading edge reinforcement is flat and is not bent when you make the final folds.

**PLEASE NOTE**

Do not drag your glider across rough surfaces such as stones or asphalt, as this could damage the seams or surface coating.

Storing and transporting the glider

Even if your paraglider was completely dry when it was packed up after the final flight of the season, for long-term storage you should if possible take it out of the backpack and spread out the canopy a little in a clean, dry place away from direct light. If you do not have the space to do this, then open the backpack, internal bag and belt as much as possible and avoid compressing it. It must be stored at a temperature between 10° and 25° C and in relative humidity between 50 and 75%. Make sure too that the paraglider is not stored in a place where animals such as mice 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 car boot, keep it as far away as possible from any spare petrol cans or oil containers.

The Sting 2 should not be exposed to extreme heat (e.g. in the boot of the car during summer). The heat may cause any moisture present to be pressed through the fabric, thereby damaging the coating. High

temperatures accelerate the process of hydrolysis, particularly when combined with moisture, which damages fibres and coating. Do not store your paraglider near radiators or other heat sources.

Always transport your glider in the special inner bag and use the backpack provided for the rest of the equipment.

Looking after the paraglider**Fabric**

Swing uses a specially developed polyamide fabric for the Sting 2 which has a high-quality coating for improved UV resistance, colour fastness and air permeability. This fabric undergoes rigorous laboratory tests and was tested for several months under extreme conditions and heavy use in flight.

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 the Sting 2 is manufactured, the side of the fabric with the coating is kept to the inside. This provides relatively good protection from damage for the coating which is of key importance to the fabric's features. 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.

If the glider gets wet or damp, it should be dried as soon as possible in a well-ventilated room (but out of the sun). It may take several days before the canopy has dried completely because the fibres absorb water. Mould may form if the paraglider is stored wet and the fibres may rot, particularly when it is warm. This can make the paraglider unsuitable for flying within a short time.

A brand-new glider will often be compressed when delivered. This is solely for the initial delivery and the glider should not be compressed in such a way again. 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.

If salt water gets on the glider, it should be rinsed immediately in fresh water (refer to the section "Cleaning").

Lines

The Sting 2 has various different high-quality and accurately manufactured lines which have been selected according to the load and area of use. You should also protect the lines from unnecessary UV light because, as with the fabric, UV light in particular will weaken the lines.



PLEASE NOTE

Dyneema lines, which are used in the area of the main brake lines, for example, are very temperature-sensitive and can be permanently damaged at temperatures above 75° C. Therefore your glider should never be stored in a hot car especially during summer.

Be careful that there is no abrasion caused to the coating on the lines by rubbing, particularly when ground-training with crossed risers.

Do not walk on the lines after the glider has been spread out and watch out for spectators or skiers who may inadvertently go over the lines.

When you are packing up the glider, be careful to avoid putting any unnecessary kinks in the lines and use only the overhand knot or bowline knots described for the brake lines.

Cleaning

If you do have to clean the glider, use only lukewarm fresh water and a soft sponge. Use a weak soap solution for stubborn stains, and then rinse it out carefully and thoroughly. Leave the glider to dry in a place which is well-ventilated and in the shade.



PLEASE NOTE

Do not under any circumstances use chemicals, brushes, rough cloths, high-pressure cleaners or steamers to clean the glider, as these can damage the fabric coating and weaken it. The glider becomes porous and loses braking strength.

Under no circumstances should the glider be put into the washing machine. Even if washing powder is not used, the glider would be badly damaged by the

mechanical action of the machine. Do not put the canopy into a swimming pool - chlorine will damage the fabric. If you have no choice but to rinse the glider, e.g. following a landing in the sea, gently wash it down inside and out with fresh water. Frequent rinsing accelerates the aging process.

Dampness / Humidity

If the glider gets wet or damp, it should be dried as soon as possible in a well-ventilated room (but out of the sun). It may take several days before the canopy has dried completely because water may collect inside the canopy.

Mould may form if the paraglider is stored wet and the fibres may rot, particularly when it is warm. This can make the paraglider unsuitable for flying within a short time.

Contact with salt water

If salt water gets on the glider, before being dried, it should immediately be thoroughly rinsed in fresh water. It should then be dried in a well-ventilated room (but out of the sun).

If the glider is not thoroughly rinsed, there may be permanent damage to the material.

09 Repairs, Inspections and Warranty

Type designation

Swing paragliders have an exact identification on the underside of the stabilo lines or on the centre rib, which is obligatory for all paragliders. The information required is set out in the airworthiness requirements.

It is helpful to provide the type designation of the paraglider if you are contacting your Powerplay dealer with any queries or ordering replacement parts or accessories, to ensure accurate identification.

Replacement parts

As a general rule, only original replacement parts should be used for servicing and repairs.

Replacement parts such as lines, risers and related components, brake handles and self-adhesive repair material can be obtained either directly from Swing or from your Powerplay dealer.

Material for repairs, particularly for work to the canopy can be obtained solely for Swing workshops from Swing.

Repairs

Small repairs to the glider

You can repair small tears in the wing yourself using self-adhesive sail material, provided that the tears are in places which do not bear heavy loads, are not at the seams and are no bigger than 3cm. Replacement lines for the Sting 2 can be ordered direct from us online at:

www.swing.de → Service → Leinenservice

Line groups should be replaced only by a Swing workshop.

Check the trim of your Sting 2 whenever lines have been replaced.

Swing workshops

All repairs and servicing should be carried out by a Swing-authorized workshop or directly by Swing. Swing workshops have trained staff, original Swing parts and the necessary know-how, all of which will ensure top quality.

Regular inspections

The following parts and materials must be inspected regularly for damage, abrasion and correct operation, e.g. after landing:

- risers and quick links
- lines
- fabric

Lines

Measuring the length of the lines is part of the regular paraglider inspection. The lines must be measured with a load of 5kg, in order to ensure reproducible results for a comparison with the lengths in the check sheets. The line lengths for the Sting 2 are listed in the Maintenance and Service book.

The lines have a considerable influence on flight behaviour. Correct line length and symmetry are also important for performance and handling. Swing therefore recommends an inspection every 50 to 100 hours or once a year.



PLEASE NOTE

Environmental conditions such as high temperatures or moisture can affect line length.

Check the line length regularly, particularly if you notice any change in launch or flight behaviour.

The line length 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.



WARNING

A damaged line can result in loss of control of the glider. Always replace lines which are damaged.

If you need to replace damaged or worn-out parts, use only original parts.



WARNING

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.

Inspection

General

Swing's service programme as set out in the Maintenance and Service book should be followed so that the same high level of flight safety, operational safety and reliability is ensured for your glider in the future as well.

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.

There is additional information on inspections in two separate booklets, both of which form part of this Manual:

1. Inspection information (required only in Germany and Austria), and
2. Maintenance and Service book (one booklet for each size and model).

These can be downloaded from our website at:

www.swing.de → Products → Sting 2



PLEASE NOTE

Read the Maintenance and Service book and follow the terms therein to ensure the validity of Swing's warranty, the glider's certification and insurance cover.

Inspection periods

The Sting 2 must be inspected as follows (check the situation in your country):

- Gliders used by schools must be inspected (the same as the 2-yearly check) every 12 months from the purchase date.
- Gliders for personal use must be inspected every two years from the purchase date.
- The glider must be inspected after 150 hours of use (including ground handling) if this occurs prior to the periods given above.

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.

Validity of inspection

It is very important that your glider is serviced at the required intervals throughout its entire life.

Please be aware here of the specific requirements set out in the maintenance instructions.

In order to benefit from Swing's warranty:

- you must have your paraglider inspected by Swing or an inspection agent authorised by Powerplay
- 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.

Inspection by the pilot

Under § 14 para. 5 of the German Aeronautical Products Investigation Order (LuftGerPV), pilots in Germany are able to carry out the inspections themselves or appoint a third party to do so (e.g. manufacturer/importer), provided that the requirements are all fulfilled. However, if inspection is carried out by a pilot, the liability and warranty of Swing Flugsportgeräte GmbH will lapse.

The DHV recommends that inspection is carried out by the manufacturer/importer or by an authorised inspection agent.

Warranty

The Powerplay warranty is a comprehensive service package, which fulfils high standards for customer service and customer care. The terms of the warranty are on our website in the section

Service → Guarantee:

<http://www.swing.de/garantee.html> .

You must register your paraglider or other Powerplay product in order to be able to rely on the warranty. You are able to register quickly and easily online on our website:

Service → Online-Guarantee

<http://www.swing.de/online-garantie.html>

You will receive a confirmation email.

If you do not have an email address, enter 'info@swing.de' in the mandatory field. Registrations without a personal email address will be recorded by Swing but will not receive confirmation. We therefore recommend that you register online with an email address.

The manufacturer must be notified immediately of any defects in the product, variations or changes in flight behaviour and any warranty claims. If necessary, the glider or other Powerplay product must be sent to Swing Flugsportgeräte GmbH for inspection.

By registering your product, you will automatically receive by email safety notices and information messages.

10 Swing on the World Wide Web

SWING Website

Swing has a comprehensive website, which provides additional information about the Sting 2 and many other issues related to paragliding. Swing's website is the first port of call for Powerplay's worldwide following:

www.swing.de

On Swing's website, you will find an extensive range of accessories for your paraglider, useful products for pilots, as well as additional information and accessories for your Sting 2.

You will also find links there to other services and websites:

- Product registration
- Facebook, Twitter & youtube

These websites and their content are made available for your use. The content of Swing's websites has been provided for your use on an "as is" and "as available" basis. Swing reserves the right to alter the websites at any time or to block access to them.

Product registration

Registration of Powerplay paragliders is easy and gives you many advantages. In addition to important safety notices, you will receive advance information about, e.g. new products, upgrades, events and special offers.

Registration is a prerequisite for a valid warranty (refer here also to the section "Warranty"). In addition, Swing sends any safety notices and information for the registered product immediately to the email address submitted. Your email address will not be provided to any third parties.

Facebook, Twitter & youtube



Swing is very active with the new media of Facebook, Twitter and youtube and has various websites which are updated daily on various topics related to aviation and Powerplay products.

Paragliding

www.facebook.com/pages/Swing.Paragliders

<http://twitter.com/swingparaglider>

Speedgliding

www.facebook.com/SwingSpeedflyingTeam

<http://twitter.com/SSTSpitfire>

Swing TV



On Swing TV, Swing puts official video footage and footage by pilots, under these categories:

- Paragliding
- Speedflying
- Accessories
- Video footage by pilots

<https://vimeo.com/Swingparagliders>

<https://www.youtube.com/channel/UCVituxPWODYREVJrIsFbfbA>

Swing App



We recommend that you use our Smartphone App so that you can keep up-to-date at all times.

This brings the latest news, photos and videos, as well as information on our products directly to your smartphone or tablet.

As well as general product information, it also allows you access to technical data, manuals and service instructions.

We hope you enjoy yourself and have many great flights on your Sting 2!

The

POWERPLAY Team

Appendix

Addresses

Swing Flugsportgeräte GmbH

An der Leiten 4
82290 Landsberied
Germany

Tel.: +49 (0) 8141 3277 - 888
Fax: +49 (0) 8141 3277 - 870

Email: info@Swing.de
www.swing.de

Paragliders recycling

Swing Flugsportgeräte GmbH
- Recycling Service -
An der Leiten 4
82290 Landsberied
Germany

DHV

Deutscher Hängegleiterverband e.V.
Miesbacher Str. 2 (street address)
Postfach 88 (postal address)
83701 Gmund am Tegernsee
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DULV

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Email: info@dulv.de
www.dulv.de

Versions

Version: 1.0

Date: 08.08.2014

First version of the instruction manual

Glider details

| | | | |
|---------------|--------------|----------------|------------------------------|
| Model: | Size: | Colour: | Serial number: |
| Sting 2 | | | Sg2 __/__/ - __/__/ - __/__/ |

| | |
|-------------------------------|-----------------------|
| Check flight (date): | __/__/ - __/__/ 201__ |
| Dealer's stamp and signature: | _____ |

Pilot details / Proof of ownership

| Owner 1: | |
|-----------------|--|
| Name: | |
| Address: | |
| Tel.: | |
| Email: | |
| Owner 2: | |
| Name: | |
| Address: | |
| Tel.: | |
| Email: | |
| Owner 3: | |
| Name: | |
| Address: | |
| Tel.: | |
| Email: | |

Inspection and repairs carried out:

| Date: | Work carried out: | General condition on delivery: | Completed by (Name): | Stamp and signature |
|-------|-------------------|--------------------------------|----------------------|---------------------|
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**Swing Flugsportgeräte GmbH**

An der Leiten 4

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Germany

