



*PARAGLIDER*

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***TWIN RS 2***

Manual [EN]



## INFORMATION



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](http://www.SWING.de)**

There you will find additional information relating to your paraglider 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.

Express written consent from SWING Flugsportgeräte GmbH is required for any duplication of this Manual, in whole or in part (with the exception of short quotations in specialist articles), and in any form or by any means, whether it be electronic or mechanical.

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 TWIN RS 2 pilot

THANK YOU FOR PURCHASING A SWING PRODUCT!

This Instruction Manual is an important part of your paragliding equipment. It contains instructions, important advice on safety and paraglider care and maintenance, along with tips on flying technique and general information about the sport of paragliding.

It is essential that you read this Manual thoroughly before your first flight.

We hope that flying the TWIN RS 2 will bring you many years of enjoyment. The innovative design, first-rate materials and high quality workmanship of your paraglider set it apart from others. Your SWING paraglider was developed to comply with all of the current safety and certification requirements in Germany.

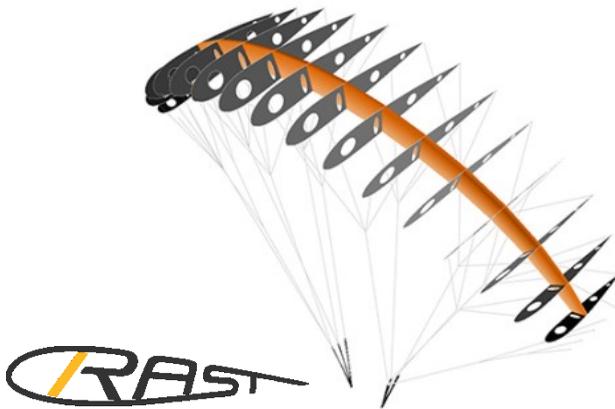
To enhance your flying enjoyment further, we recommend that you familiarise yourself with the information and instructions contained in this Manual regarding safety, equipment and service.

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

We hope that you have a great time flying the TWIN RS 2 - and "happy landings"!

SWING Team

This glider is equipped with SWING Ram Air Section Technology (RAST)



## WARNING

**Read this Manual before using your paraglider!**

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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 subjects 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.

The Manual complies with the airworthiness requirements in LTF NFL II 91/09 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. 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

### 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 exclusively, to the instructions in the sections on Safety, Flying your paraglider, Types of Use, and Dangerous Situations and Extreme Flying.

### 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 the Manual for lists.

Example:

- risers
- lines

## Paraglider Manual on the Internet



Additional information about your paraglider and any updates to the Manual can be found on our website at [www.SWING.de](http://www.SWING.de).

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

## SWING Flugsportgeräte and the environment

Protection of the environment, safety and quality are the three core values of SWING 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 our sport 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!

Smokers – please do not leave any cigarette butts, matches etc. at flying sites.

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 paragliders, the final stage of which is recycling in an environmentally-friendly manner. The synthetic materials used in a paraglider must be disposed of properly. If you are not able to arrange appropriate disposal, SWING will be happy to recycle the paraglider for you. Send the glider with a short note to this effect to the address given in the Appendix.

## O2 Safety



### 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 TWIN RS 2, Types of Use and Dangerous Situations and Extreme Flying.

### 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. Most serious paraglider accidents are caused by pilots misjudging the weather 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 harness, reserve parachute, harness, 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.

The Manual must be passed on to any new owner if the paraglider is sold. It is part of the certification and belongs with the paraglider.

The TWIN RS 2 was developed and tested solely for use as a paraglider for foot-launch and winch-towing. 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 SWING products.



### 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. 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 relating to paragliding (refer to Appendix for addresses).

Services such as RSS are also available which allow internet users to follow various websites and changes to them without having to access them individually. This allows much more information to be followed than was previously the case.



- the glider is used for winch-launching with a winch which has not been inspected or by non-licensed pilots and/or winch operators

## Operating limits



### WARNING

The operating limits must be observed throughout the entire flight.

When planning your flight, pay attention to current and forecasted weather conditions and temperature. Bear in mind too that the temperature will drop as the altitude increases.

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
- the glider is used by more than one person
- 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 on launch higher than 2/3 of the maximum flyable airspeed of the glider (based on take-off weight)
- the air temperature is below -30°C or above 50°C
- the glider is used for aerobatics/extreme flying or flight manoeuvres at an angle greater than 90°
- there have been modifications to the canopy, lines or risers which have not been approved

## Disclaimer and exclusion of liability

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

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

The glider may only be used if the pilot has a licence which is valid 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.

### Intended use

The TWIN RS 2 has solely to be used as "light aerial sports equipment" with an empty weight of less than 120 kg, category paraglider.

## Disclaimer and exclusion of liability

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

- the inspection period has expired, or the inspection has been carried out by an unauthorised inspector
- pilot has insufficient experience or training
- the pilot has incorrect or inadequate equipment (reserve, protection, helmet etc.)

## Glider categories and guidelines



### WARNING

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

The classification is merely a description of the reactions to these standard tests.

The complexity of the system paraglider - harness means that it is not possible to give any more than 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.

The German Hanggliding and Paragliding Association (DHV) and its safety division have developed guidelines which are based on many years of analysing paraglider accidents and on the experience of flying schools, flying instructors and safety officers. These guidelines should help pilots to select the appropriate glider classification for their particular level of flying ability. The information below relates to the classification in EN/LTF certification. There is also further information on the website of the relevant licensing body.

## EN/LTF certification

The TWIN RS 2 received B classification in the final classification by the licensing body.

### Description of flight characteristics

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

### Description of pilot skills required

For pilots who fly "actively" and regularly and who are able to stabilise the glider overhead even in turbulent conditions.

### Target group and recommended flying experience

The TWIN RS 2 was developed for professional tandem pilots.

With its well balanced, uncomplicated inflation behaviour, the playful and fatigue-free handling as well as the excellent flair behaviour even in nil wind, it is a reliable tool, but it is also very convenient for private flying fun for two.

It offers absolute flying pleasure at the highest level of safety and performance.

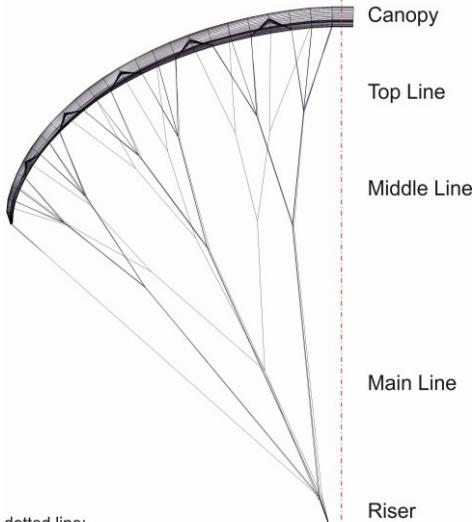
### Suitability for training

The TWIN RS 2 is suitable for use as a training glider.

Please respect the national requirements.

### 03 Technical Description

#### General layout illustration



dotted line:  
brake line, same distribution as rigging lines,  
two „middle“ levels

Fig. 1 CAD drawing of TWIN RS 2

#### TWIN RS 2 – passionate about tandem flying

The TWIN RS 2 was developed by a team of experienced professional tandem pilots. The goal: To create a fully reliable tool for daily use that you can rely on 100% from take-off to landing.

Thanks to RAST, the take-off behavior is very harmonious and forgiving, so that there is no stress even in unfavorable conditions and/or with a hesitant take-off run of the passenger.

The easier take-off behavior through RAST is most noticeable with nil or tail wind.

Once in the air, the TWIN RS 2 convinces with a playful and fatigue-free handling as well as sensational climbing performance even in weak conditions. In turbulent conditions, RAST ensures extremely high canopy stability and increased safety.

The flair characteristics of the TWIN RS 2 are outstanding and make the soft landing a breeze even in nil wind.

All these features make the TWIN RS 2 a reliable partner for relaxed passenger flights.

#### RAST



The TWIN RS 2 features Swing's unique Ram Air Section Technology, known as 'RAST' for short.

This system divides the interior of the paraglider into several chambers crossways to the flight direction.

Defined openings regulate the inflowing and outflowing air in such a way that they can influence the way the canopy fills (when launching) and also how it empties (in the event of canopy stability problems).

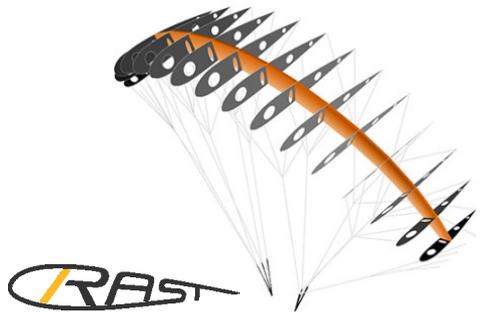


Fig. 2 Sketch RAST

#### Inflation behaviour

RAST slows down the inflowing air when the paraglider is inflating. The front part of the profile which is relevant for flow thus takes shape much more quickly and the glider immediately begins to rise up from the ground. The back part of the canopy is filled with air only slowly during the subsequent stage of inflation, which results in very harmonious and smooth launch behaviour without any tendency to overshoot or launch the pilot unintentionally.

#### Flight behaviour

It is in turbulent air that RAST really puts its strengths into play, effectively stabilising the canopy and gently calming turbulent air.

This makes the TWIN RS 2 extremely stable and forgiving, which results in noticeably improved precision and comfort during flight,

and consequently also more control and better performance for the pilot.

### Collapse behaviour

If there are any stability problems, RAST prevents the canopy from suddenly and/or completely emptying because the air is not able to escape as quickly from the rear section.

However, it allows a sufficiently large area of the glider to collapse to dampen and dissipate energy. With RAST technology, collapses more than 50% of the wing depth can only be simulated with great difficulty and to date have not been experienced in practice even in very thermic and turbulent conditions.

A paraglider equipped with the RAST system empties more slowly, has less tendency to turn and opens more quickly.

This means that there is much less loss of height than for the same design without RAST.

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



### WARNING

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



### TIP

Do not be tempted by the increased safety offered by RAST into taking greater risks. Instead, you should use RAST as your personal crumple zone if there is ever a situation where you have misjudged conditions.

## Line system

The TWIN RS 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, middle and top lines. The individual line levels are connected with one another using the "handshake knot".

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

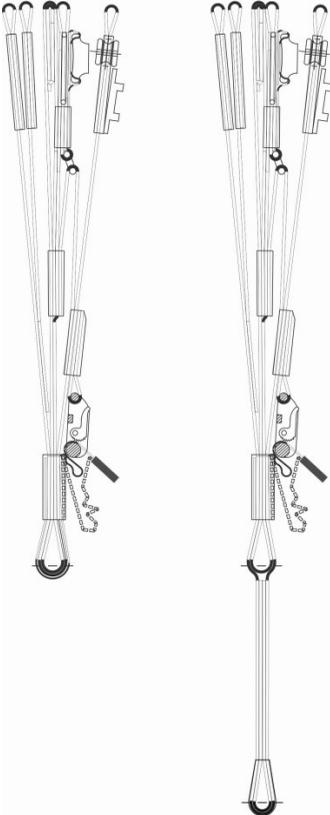
With the brake lines, the individual levels are bundled at the end with the main brake line. This runs through the brake pulley on the riser and is knotted at the brake swivel of the control handle. There is a mark on the main brake line which allows the control handle to be correctly positioned.

## Risers

The 20mm wide risers, specially developed for the TWIN RS 2 allow the pilot to adjust the speed of the glider using a trimmer system to suit his/her individual preference.

The riser also has a "big ears" support feature.

For use as solo glider or for combined use there is Vario riser with an additional lower hang point available.



**Fig. 3** TWIN RS 2 riser

There is more information on using the trimmer system in the section "Flying the TWIN RS 2".

## Technical Data

TWIN RS 2	39	41
Class	B	B
Number of seats (min - max)	1 - 2	2
Recommended take off weight (min - max) [kg]	120 - 180	150 - 220
Certified take off weight (min - max) [kg]	110 - 190	130 - 225
Wing area projected [m <sup>2</sup> ]	34,7	37,3
Wing span [m]	14,7	15,3
Number of cells	49	49
Number of riser	5	5
Maximum symmetrical control travel at maximum take off weight [cm]	>60	>60
Maximum trimmer travel [mm]	150	150
Maximum speed system travel [mm]	No speed system	No speed system
Trimmingspeed [km/h]	38±2	38±2

*The Service book has extensive technical information*

## 04 Setting up the TWIN RS 2 and first-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 glider information label.

During production, the TWIN RS 2 goes through several quality control checks before finally undergoing an exact type certification test. Conformity with the reference specimen 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.



#### WARNING

Any changes or improper repairs to this paraglider render invalid the certification and warranty.

### Recommended weight range

The TWIN RS 2 must be flown within the permitted weight range.

The weight ranges given in this Manual generally refer to take-off weight (pilot and passenger weight including clothing, glider, harness and equipment). Determine your take-off weight by weighing yourself with all of your equipment and your backpack. Don't forget to weight also your passenger. Find out your passenger's weight as well.

In addition to the permitted weight range, Swing gives a recommended weight range for the TWIN RS 2. The flight characteristics of the TWIN RS 2 are particularly well-balanced in this range.

Swing offers the TWIN RS 2 in different sizes. In order to choose the right size, you should consider your weight and the intended use of your paraglider.

If the weight range is sufficient and you prefer a very dynamic, responsive and direct handling, you should choose a high wing load and thus the smaller glider model.

If you prefer to cover a very large weight range of your passengers, you should choose the larger model.

Within the recommended weight range, the TWIN RS 2 reacts to weight changes only with a slight increase or slowdown of the trim speed, with hardly any influence on the glide performance. Therefore, you can choose the size according to your personal requirements.

### Ballast

If ballast is used to alter take-off weight, make sure that it is correctly positioned.

The ballast should preferably be stored in harness pockets specifically for this purpose. If your harness does not have special ballast pockets, then attach the ballast symmetrically as close as possible to the centre of gravity or under the seat board.

Do not attach any additional ballast to the main hang point of the harness.



#### WARNING

Additional ballast can affect the pilot's centre of gravity and the paraglider's behaviour during flight.

In particular, extreme flying and behaviour in spirals can become much more demanding if ballast is not positioned correctly.

### Adjusting the main brake lines

The TWIN RS 2 is delivered ex factory with a brake adjustment complying with that of the test sample. This position is marked on the steering line.

This adjustment will allow you to steer and land the paraglider with almost no time lag.

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

The length of the break line must not be altered.

Factory settings

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.

The factory setting for the TWIN RS 2 is intended to allow optimum handling. It is therefore generally not necessary to make any adjustment to the length.

However, if required, the brake setting can be altered according to your particular preferences.

It can on occasions be worthwhile to make the brakes longer compared to the factory setting, particularly for teaching, launching on the flat or winch launching.

If you do adjust the brakes, under no circumstances should you go above or below the tolerance levels for the TWIN RS 2 given in the Maintenance and Service book.

Incorrect adjustment



**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

Environmental conditions can also lead to the brake lines shortening.

You should therefore check brake line length regularly, particularly if there is any change in launch or flight behaviour.

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.

Brake knots



**WARNING**

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

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

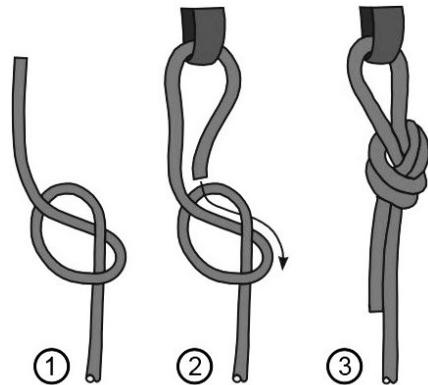


Fig. 4 Overhand knot

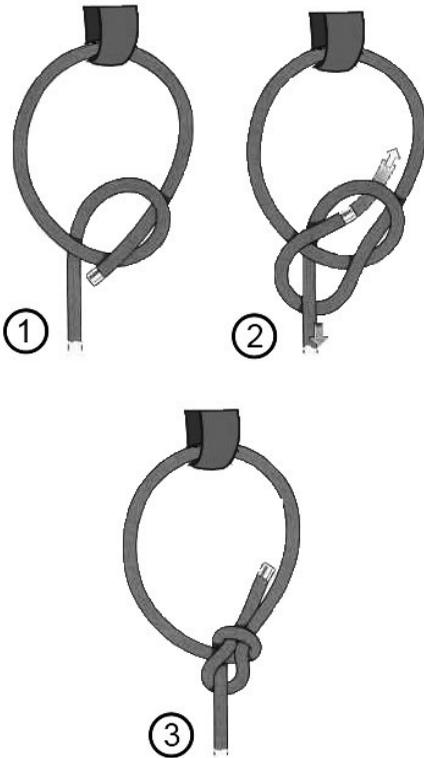


Fig. 5 Bowline knot

### Adjusting the brake handles

The TWIN RS is fitted with Swing'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 altered 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:

- 1 Firm stiffening (bar)
- 2 Soft stiffening (tube)
- 3 Multigrip brake handle without stiffening
- 4 Brake swivel
- 5 Main brake line

Fig. 6 Picture series Removing the stiffening from the Swing Multigrip brake handle and replacing it.

Follow the same procedure 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 4 where the brake lines/brake handles connect to prevent the brake lines from twisting.

### Speed system (Trimmer)

The TWIN RS already has a high basic trim speed, but this can be increased considerably 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 B, C- and D-risers can be altered in length using the trimmer. This decreases the canopy's original angle of attack and the glider's speed increases.



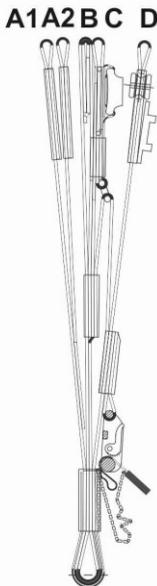
### WARNING

Problems (such as collapses or tucks) have a more drastic effect with increased speed than in unaccelerated flight. It is generally strongly 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.

### Other features

The TWIN RS 2 does not have a speed bar or any other adjustable, detachable or variable features in addition to the trimmer.

Normalflug  
(Trimmer geschlossen)  
standard flight (trimmer closed)



Beschleunigt (Trimmer offen)  
accelerated (trimmer open)

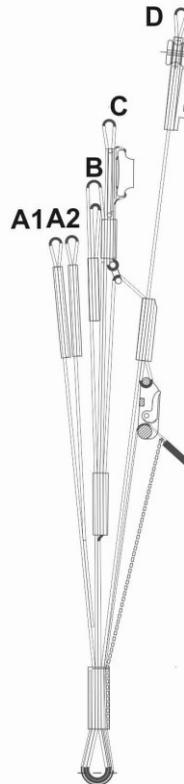


Fig. 7 How the TWIN RS 2 trimmers work

## Tandem spreader bar

SWING offers suitable spreader bar TWIN RS. They are offering various hangpoint options to allow for height and/or weight differences between the pilot and passenger. These are shown in figure below.

Differences in height are offset by attaching the passenger's carabiners in the upper or lower loops on the front of the spreader bar.

If you intend to use a different spreader bar, follow the instructions in the spreader bars manual.

When using and adjusting the spreader bar, make sure that the pilot can always reach the risers, trimmers and brake handles.

We recommend that you use a steel carabiner with adequate breaking strength as the carabiner for the main hangpoint. Please familiarise yourself with your country's national regulations

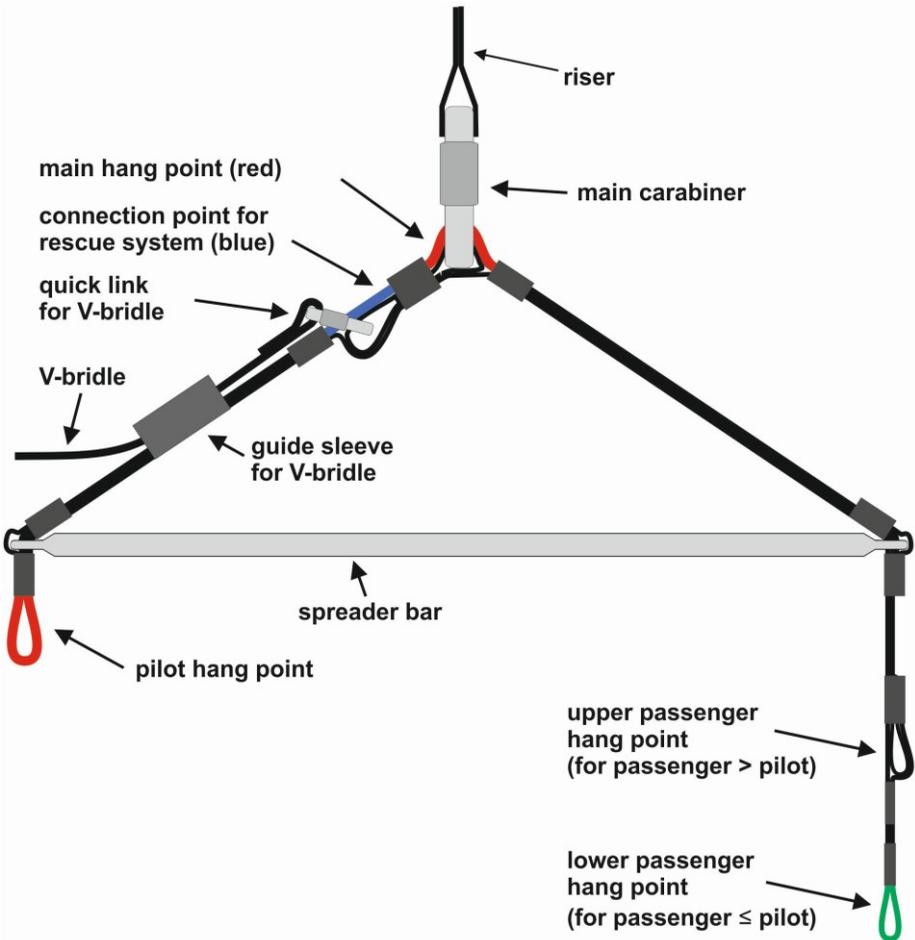


Fig. 8 Tandem spreader bar

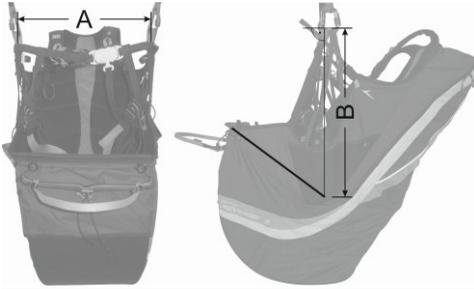
## Suitable Harnesses

For solo flight, the TWIN RS can in principle be used with harnesses which have "GH" classification.

For passengers, in principle all certified harnesses which have "GH" classification are suitable.

Make sure that the two harnesses are compatible and have adequate back protection.

Harnesses with the following measurements were used for the type-test certification:



Total weight in flight	Width [A]	Height [B]
< 80 kg	[40±2] cm	[40±1] cm
80- 100 kg	[44±2] cm	[42±1] cm
> 100 kg	[48±2] cm	[44±1] cm

Width [A]: horizontal distance between the riser attachment points (measured from carabiner centre lines).

Height [B]: normal distance from the riser attachment points (measured from carabiner centre lines) to the top of the seat board.

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.

This means that the flight behaviour in the particular paraglider-harness combination selected by the pilot can differ significantly from that documented in the certification test report.

Please contact SWING or your SWING dealer if you have any questions about using your harness with the TWIN RS 2.

## 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.

The permissible weight for which the rescue system is certified must be at least the same as the takeoff weight on the tandem glider.

For tandem flights, the rescue system lines must be attached to the carabiners between the riser and the spreader bar hangpoint, so that, if there is an emergency landing, the pilot and the passenger land at approximately the same time.

Unlike with tandem flying, for solo use, the rescue system lines must be attached to the special attachment points on the pilot's harness.

The connecting links between the reserve and the hangpoint (carabiner or additional screw-lock link) must have a minimum breaking strength of 24kN each.

It must be possible for the pilot to deploy the reserve from any flying position. It is a requirement in Germany that it is not possible for the passenger to deploy the reserve. Please familiarise yourself with the relevant laws and regulations in other countries before you fly.

## 05 Flying the TWIN RS 2

### First flight

Before the first flight the paraglider must be checked and flown by an expert. This first flight must be noted at the typeshield.

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



#### WARNING

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

### Pre flight check and launch

#### Laying out the paraglider and pre-flight check



#### 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.

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?

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.



#### WARNING

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 leading edge a little. This ensures that the flow profile is correct during launch. It is particularly important in low temperatures that the leading edge is smoothed out.

#### 7-point check

The 7- 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 7 points are:

1. Is the personal equipment of both pilot and passenger 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?
6. Is the [tandem set-up] functioning properly, and are the passenger and pilot correctly clipped in?
7. Is the reserve system properly installed?

#### 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 TWIN RS 2 and/or to start running with slack lines.

Launch the TWIN RS 2 with closed trimmers.

While the glider is rising, guide both inner A-risers (without the "big ears" risers) upwards in an even arc motion, without shortening them. Avoid pulling hard on the risers. The TWIN RS 2 launches very easily and is easy to control.

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

The TWIN RS 2 is suitable for reverse-launching from wind speeds of 3 m/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 TWIN RS 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 TWIN RS 2 is achieved with the brakes fully open. In calm conditions, the TWIN RS 2 reaches minimum sink even when not braked. If the brakes are pulled more, the sink does not reduce any further, the control pressures increase noticeably and the pilot reaches minimum speed. If you fly with the brakes in the half-wrap usual among pros, minimum speed is reached just under the main carabiners.



### 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.

## Turns

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

The TWIN RS 2 has very 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").

## 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 TWIN RS 2 can also be steered and landed using the back risers.

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

## Rapid descent methods



### 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.

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



### 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:

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 safely gauge the sink rates.

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

Always maintain **ground clearance of 150 – 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.

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 TWIN RS 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. The G-forces with the TWIN RS 2 can be much higher than 5G, depending on the angle of bank, if the spiral is not controlled using the outside brake.

### 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 to “Turns” also).

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

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. 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.



### 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.

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. 10 m/s. The TWIN RS 2 remains stable and achieves high sink rates, making it well-suited for the B-Stall.

### 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 TWIN RS 2 has a big ears support feature to make the big ears manoeuvre more comfortable. This allows the pilot to fasten the shortened outer A-lines to the riser so that it is not necessary to keep on holding them down.

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.



### 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.

### 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.

The most comfortable way to do this is to pull down the outer A-lines by the handle to their limit and then to attach the lines by the knot into the fastener.

The ears are thus held at the ideal level.

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.

### Recovery

For recovery 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.

## 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.

## 06 Types of use

The TWIN RS 2 was developed and tested for use solely as a paraglider for foot launch and for winch launch. Any use other than as intended is prohibited.

### 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.



### WARNING

If a webbing release system is used, there is an increased risk of lockout, which can be detected by the fact that the apparatus 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, because the towing rope hangpoint located well in front of the pilot encourages the glider to turn towards the pilot, and this may not be detected.

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.

In general, Swing recommends winch launching with a slightly accelerated glider so as to increase further the safety reserves for towing.

The trimmers should therefore be half-open on a winch launch.

After release, return the trimmers to a position which suits the conditions.



### 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.

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 (which includes tandem flights).
- The winch and release must have a certificate of compliance which covers the towing of (tandem) paragliders.
- The winch operator must have undertaken training which includes the towing of (tandem) paragliders.
- The TWIN RS may not be towed with more than the permissible towline tension.



### 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.

### 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. The ideal attachment point on a paraglider is level with the harness hang point or directly on the risers.

For tandem use, the optimal attachment point is the passenger's harness hangpoint.

Make sure that the passenger is not able to undo the release accidentally and make sure

that the pilot is able to undo the release from any position.



### 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).

### Motorised flight

In Germany, use of paragliders for motorised flight requires additional certification.

The TWIN RS 2 is not intended to be certified for motorised flight at the point of printing.

### Solo paragliding

The TWIN RS 2 is designed for solo paragliding.

### Tandem paragliding

The TWIN RS 2 is designed for tandem paragliding.

### Aerobatics

In Germany, it is prohibited to perform aerobatics using a paraglider, which under German law is included under 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 TWIN RS 2 was not developed or tested for aerobatic use.



### WARNING

Any type of acrobatic manoeuvre at all on the TWIN RS 2 is contrary to law and illegal. The pilot would be putting his/her life at risk. Aerobatics involves a risk of unpredictable flight attitudes, which could lead to damage to material and structural failure.

## 07 Dangerous situations and extreme flying

### Dangerous situations



#### WARNING

Always keep within the recommended limits. Avoid aerobatics and extreme loading such as spirals and 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.

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 method of familiarising 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 if a harness different from the one used for the type-test certification is used, flight behaviour may vary from that described in this Manual.

### Safety training



#### 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.

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 TWIN RS 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.

### Safety training and RAST

Most manoeuvres can be practised with the TWIN RS 2 during safety training in the same way as with a glider without RAST.

Only those manoeuvres for which the glider must be actively collapsed (asymmetric collapse, front collapse) require higher forces to enter as a rule than would be necessary with a glider without RAST.



#### WARNING

Refrain from doing wingovers with the glider to make a more large-scale collapse possible.

A provoked collapse from a roll or pitch movement can lead to uncontrolled flight positions. Such collapses are unrealistic and have no training benefit.

## Collapsing the paraglider

### 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. Our tests have shown that the TWIN RS 2 continues in level flight surprisingly well, even with major cravats, by counter-braking and weight-shifting on the open side. Most cravats can be reopened by pulling firmly on the 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 TWIN RS 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 the full stall, the brakes must be held down, otherwise the canopy may surge forward and, in an extreme case, end up underneath the pilot. Hold the brakes down until the canopy is above you again.

## 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!

## Other tips for dangerous situations

### Stalling in rain



## WARNING

Flying in extremely humid weather or in rain is outside of 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
- avoid 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)

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

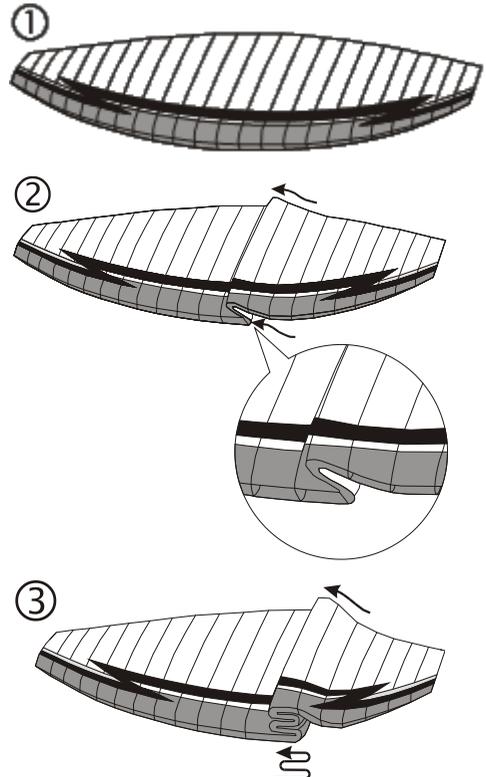
## 08 Storing and looking after the paraglider

### Packing the paraglider

Pack the TWIN RS as shown in Figs. 1-4. 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.



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.

### 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 process of the structure and should therefore be avoided.

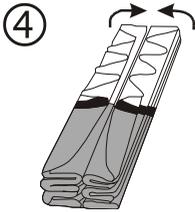
The glider must be inspected earlier than is usually the case if it has been put under more than the usual degree of strain.

### Temperature range

Extreme temperatures can affect air density and thus the glider's flight behaviour. Be aware of this particularly in low temperatures and observe the corresponding instructions for the various manoeuvres.

As a general rule, operating temperatures below  $-10^{\circ}\text{C}$  should be avoided.

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.

**Fig. 9** Steps 1 - 4 show the correct and careful way in which to fold up the TWIN RS

### 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 back pack 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 TWIN RS 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

The life of any paraglider depends to a large extent on how you treat it.

Follow the care instructions and handle it carefully to ensure that you have many years of enjoyment from your TWIN RS 2.



#### PLEASE NOTE

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

### Fabric

SWING uses a specially developed polyamide fabric for the TWIN RS 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 TWIN RS 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.

**Lines**

The TWIN RS 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.

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.

**i 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

**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 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.

**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.

**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.

**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.

**i PLEASE NOTE**

Do not 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.

Do not under any circumstances put the glider in 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.

# 09 Repairs, Inspections and Warranty

## Type designation

SWING paragliders have an exact identification 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 SWING dealer with any queries or ordering replacement parts or accessories, to ensure accurate identification.

## Repairs

### SWING workshops

All repairs and servicing should be carried out by a SWING authorised 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.

### 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. Single replacement lines for the TWIN RS 2 can be ordered direct from us at:

[info@swing.de](mailto:info@swing.de)

The replacement of complete groups of lines must be carried out by a SWING authorised workshop.

## 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 TWIN RS 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. Use only inspected and approved lines, which can be obtained through SWING.



### 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 or approved parts from the manufacturer.



### 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.



#### 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.

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 and
2. Maintenance and Service book.

These can be downloaded from our website at:

<http://www.swing.de/Helios-rs-en.html>



#### PLEASE NOTE

The owner is responsible for the airworthiness of the paraglider. This includes complying with the inspection periods.

### Inspection periods

SWING gliders must be inspected as follows (check the situation in your country):

- All Gliders 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 first.

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 SWING
- 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.

The liability and warranty of SWING Flugsportgeräte GmbH will lapse if the inspection is carried out by the pilot or a not authorised person.

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

### Warranty

SWING's warranty is a comprehensive service package, which fulfils high standards for customer service and customer care. The terms of the warranty are written on the website.

Go to the SWING website:

[www.SWING.de](http://www.SWING.de) → Service → Guarantee  
<http://www.swing.de/guarantee.html>

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 SWING product must be sent to SWING Flugsportgeräte GmbH for inspection.

# 10 SWING on the World Wide Web

## SWING website



SWING has a comprehensive website, which provides additional information about the TWIN RS 2 and many other issues related to paragliding. SWING's website is the first port of call for SWING's

worldwide following:

[www.SWING.de](http://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 TWIN RS 2.

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

- Service
- Accessories
- Facebook, Twitter & youtube

These websites and their content are provided for your use. The content of SWING's websites has been made available 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.

## SWING Technology



There is more information about RAST and other innovative SWING developments on our SWING technology page:

<http://technology.swing.de>

## 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 SWING products.

## 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/UCVituXPWODYREVJrlsFbfbA>

## 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 like technical data, manuals and service instructions directly to your smartphone or tablet.

Now we wish you

**A lot of fun and many inspiring flights with your TWIN RS 2**

*SWING* 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](mailto:info@SWING.de)  
[www.SWING.de](http://www.SWING.de)

#### **Paraglider recycling**

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

#### **DHV**

Am Hoffeld 4  
Postfach 88  
83701 Gmund am Tegernsee  
Germany  
Tel.: +49 (0) 8022 9675 - 0  
Fax: +49 (0) 8022 9675 - 99  
Email: [dhv@dhv.de](mailto:dhv@dhv.de)  
[www.dhv.de](http://www.dhv.de)

#### **AIR Turquoise**

Route du Pré-au-Comte 8  
1844 Villeneuve  
Switzerland  
Tel.: +41 (0)21 965 65 65  
<https://para-test.com>

#### **DULV**

Deutscher Ultraleichtflugverband e.V.  
Mühlweg 9  
71577 Großerlach-Morbach  
Germany  
Tel.: +49 (0) 7192 93014 - 0  
e-mail: [info@dulv.de](mailto:info@dulv.de)  
[www.dulv.de](http://www.dulv.de)

#### **Versions**

Version: 1.1  
Date: 18.11.2019  
First version of the Instruction Manual

### Glider details

<b>Model:</b>	<b>Size:</b>	<b>Colour:</b>	<b>Serial number:</b>
TWIN RS 2			___/___ - ___/___/___ - ___/___/___/___/___

Check flight (date):	___/___ - ___/___/20__
Mark and signature:	_____

### Pilot details / Proof of ownership

Name:	
Address:	
Telephone:	
Email:	

### Inspection and repairs carried out:

Date:	Work carried out:	General condition on delivery:	Completed by (Name):	Stamp and signature



**SWING** Flugsportgeräte GmbH  
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