USER'S MANUAL
R-BUS

R-BUS

The great traveller

WELCOME

We wish to welcome you to our team and thank you for your confidence in our glider product line.

We would like to share the enthusiasm with which we created this wing and the importance and care we took in the design and manufacture of this new model in order to offer maximum pleasure on every flight with a Niviuk glider.

The R-BUS is the first Niviuk PPG tandem paraglider. The R-BUS has the capacity to carry loads up to 500 kg and it is eager to discover new areas and flying experiences. Amazing strength translates into stability and comfort for both pilot and passenger.
Like all Niviuk wings, the R-BUS is characterised by performance, quality and great flight behaviour.

Experience and share all the benefits of this new wing concept. A great traveller ready for great journeys.

This is the user manual and we recommend you read it carefully.

The **NIVIUK** Team.

USER'S MANUAL

NIVIUK GLIDERS R-BUS

This manual provides you with the necessary information on the main characteristics of your new paraglider.

Whilst it provides information on the wing, it cannot be viewed as an instructional handbook and does not offer the training required to fly this type of paraglider.

Training can only be obtained at a certified paragliding school and each country has its own system of licensing. Only the aeronautical authorities of respective countries can determine pilot competence.

The information in this manual is provided in order to warn you against adverse flying situations and potential dangers.

Equally, we would like to remind you that it is important to carefully read all the contents of your new R-BUS manual.

Misuse of this equipment could lead to severe injuries or death. The manufacturers and dealers cannot be held responsible for misuse of the paraglider. It is the responsibility of the pilot to ensure the equipment is used correctly.

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SUMMARY

1. CHARACTERISTICS

1.1 WHO IS IT DESIGNED FOR?

This wing is designed for tandem paramotor flights, both trike or foot-launched. The R-BUS is targeted at professional and recreational tandem pilots.
It is a wing designed to provide the pilot with complete control and allow the passenger to fully enjoy the flight.

40 m²
The 40 m² size is designed for heavier loads.

37 m²
The 37 m² is designed for light-weight trikes and foot-launched paramotors.

Paramotoring is a relatively new discipline and it is continuously evolving. To get the most out of the wing, it is essential that the motor set-up, propeller, harness and pilot experience are compatible.

Only the aeronautical authorities of respective countries can determine pilot competence.

1.2 CERTIFICATION

TThe R-BUS has passed the requirements stipulated by the Dirección General Aviación Civil (DGAC).

The certification tests were performed by the FFVL test centre Aerotest.

Shock test to 2.625 kg.
Load test to 8 G 328 kg.
Load test to 5.25 G (DGAC) 500 kg.
Certification number: 2016/012

It has passed the Dirección General Aviación Civil (DGAC) certification as ULM class 1. It also has the manufacturer's certification.

Any modification of the paraglider invalidates the certification.

It is important to note that different sized wings will react differently during manoeuvres. Even within the same size, at maximum or minimum load, the behaviour and reactions of the wing may vary.

1.3 IN-FLIGHT BEHAVIOUR

Niviuk developed this wing by adopting very specific goals: to create a tandem wing for powered flight, which is able to meet the current needs of most professional or recreational dual pilots, who use heavy trikes or foot-launched paramotors.

Pilots want a wing which is easy and enjoyable to fly and which has real advantages - capable of carrying up to 500 kg, easy to launch and land, low engine demand, high speed and with a good glide performance. All challenges for our R & D team.

The wing inflates steadily but gently, without the tendency to overshoot.

Acceleration is as effective as it is progressive. Obviously, depending on the wing-loading, the pilot will know the level of power required.

The R-BUS provides feedback in a very understandable and user-friendly way, helping the pilot to fly smoothly and provide an enjoyable flight for their passengers.

In all aspects of flight, the wing is very solid and stable. From lighter loads to the maximum wing-loading, the wing remains solid without unpleasant, unnecessary movements. It responds to the pilot's inputs effectively and even in turbulent conditions it remains stable and solid.

Piloting the wing is smooth and accurate. The wing turns efficiently without requiring major effort and without affecting the sink rate. Even at maximum load, the wing keeps its Niviuk DNA and turns easily.

Depending on the pilot's needs and requirements, the trimmers ensure that a proper cruising speed can be maintained.

During the landing, the R-BUS shows its full potential and retains its speed like a real cruise liner of the air. These are not just empty words, we know this wing will land as you have always wanted to when flying with a passenger. Easy, well and safe!

PLEASE NOTE!

It is very important to become familiar with the correct use of the main steering elements: the trimmers, High Speed Tip and the main brakes. We recommend paying particular attention and concentration when using the different steering elements.

1.4 ASSEMBLY, MATERIALS

The R-BUS has all the technological innovations used on other Niviuk gliders. It is built with the most careful selection of current materials, technology and accessories available, to improve pilot comfort whilst increasing safety and performance.

The RAM Air Intake system (RAM).- Is characterised by the arrangement of the air inlets, to ensure optimal internal pressure is maintained. Thanks to this design, we were able to reduce their size, while maintaining the same air flow at all angles to improve laminar flow. Having greater internal pressure means better tolerance of turbulence, greater consistency of the profile shape across the speed range; excellent handling at low speed is achieved by allowing the pilot to extend the braking limit, there is a lower risk of collapse and consequently, greater control and stability.

Titanium Technology (TNT).– A revolutionary technique using titanium. Using Nitinol for the internal wing construction offers great advantages: on the one hand it reduces the overall wing weight, which reduces the inertia and improves the manoeuvrability and launch inflation.
On the other hand, the leading edge is more rigid and the wing surface remains perfectly taut, without creases or parasitic drag. This optimises glide in all phases of the flight.
Because the flexible rods always return to their original shape, the integrity of the profile is never affected.
Nitinol provides the highest level of protection against deformation, heat or breaks.

Structured Leading Edge (SLE).- The use of the SLE considerably reduces the amount of Mylar which was used in previous Niviuk wings and this also reduces the weight of the leading edge. Therefore it is easier to inflate this wing than a paraglider without this system.

3D Pattern Cut Optimisation (3DP).– The latest generation of wings require a new fabric panel pattern and cutting system. Creating separate panels for each of the sections at the front of the wing means the sail fabric is more taut and crease-free. During the cutting, the optimal orientation of the fabric section is selected, depending on its final location. If the fabric pattern is properly aligned with the axes of load, it suffers less deformation after repeated use, to the long-term benefit of the leading edge.

3D Leading Edge (3DL).- Adding an extra seam to the longitudinal axis of the glider helps, on the one hand, give more consistency and volume to the profile (a more efficient 3D contour) and on the other, joins and shapes the leading edge panels. The fabric is guided by the panel position to ensure fewer creases and better load distribution. The result is a cleaner profile, which benefits the wing in terms of performance and durability.

Reflex System Profile (RSP).- The reflex profile of the R-BUS is

designed to provide sufficient stability without penalising glide or speed. The design of the profile is optimised to offer the perfect combination of control/performance.
With the RSP (Reflex System Profile) the engine does not need much power to achieve greater thrust, resulting in less consumption, more autonomy, less need for power, better durability, mechanical efficiency and increased performance. The RSP was designed as an intelligent and efficient profile. In comparison to less efficient profiles, this wing knows how to use favourable inertia and all this with minimum pilot effort.

The use of these technologies is a big technological leap forward in building wings and a big improvement in flight comfort.

The R-BUS has a reinforced internal structure. More diagonal ribs, lines, attachment points and strong seams make a very solid wing able to carry loads up to 500kg.

From Olivier Nef's computer to fabric cutting, the operation does not allow for even a millimetre of error. The cutting of each wing component is performed by a rigorous, extremely meticulous automated computer laser-cutting robotic arm. This program also paints the guideline markers and numbers on each individual fabric piece, thus avoiding errors during this delicate process.

The jigsaw puzzle assembly is made easier using this method and optimises the operation while making the quality control more efficient. All Niviuk gliders go through an extremely thorough and detailed final inspection. The canopy is cut and assembled under strict quality control conditions facilitated by the automation of this process.

Every wing is individually checked with a final visual inspection.

The fabric used to manufacture the glider is light, resistant and durable. The fabric will not experience fading and is covered by our warranty. All lines are made from Technora with a polyester sheathing.

The line diameter has been calculated depending on the workload and aims to achieve the required best performance with the least drag. The sheath protects the line cores from UV rays and abrasions.

The lines are semi-automatically cut to length and all the sewing is completed under the supervision of our specialists.

Every line is checked and measured once the final assembly is concluded.

Each glider is packed following specific maintenance instructions as recommended by the fabric manufacturer.

Niviuk gliders are made of premium materials that meet the requirements of performance, durability and certification that the current market demands.

Information about the various materials used to manufacture the wing can be viewed in the final pages of this manual.

1.5 ELEMENTS, COMPONENTS

The R-BUS is delivered with a series of accessories that, although not fundamental, are important in the use, transport and storage of the paraglider.

- A Kargo bag. This bag is large enough to hold all equipment comfortably and with plenty of space.
- An inner bag to protect the wing from any possible damage during storage.
- An adjustable folding strap to make the wing as compact as possible.
- A small fabric repair kit with self-adhesive Ripstop nylon.
- In the case of a trike designed to have elevated hang points, the R-BUS accessories include extra brake lines and the High Speed Tip is one meter longer. The pilot should exchange and adjust these as required.

2. UNPACKING AND ASSEMBLY

2.1 CHOOSING THE RIGHT LOCATION

We recommend unpacking and assembling the wing on a training hill or a flat clear area without too much wind and free of obstacles. It will help you to carry out all the recommended steps required to check and inflate the R-BUS.

We recommend that a qualified instructor is present to supervise the entire procedure, as only they can address any doubts in a safe and professional way.

2.2 PROCEDURE

Take the paraglider out of the rucksack, open and unfold it on the ground with the lines positioned on the undersurface, oriented in the direction of inflation. Check the condition of the fabric and the lines for defects. Pay attention to the maillons connecting the lines to the risers to make sure they are fully closed and tightened. Identify, and if necessary untangle, the A, B, C and D-lines, the brake lines and corresponding risers. Make sure that there are no knots.
Check that the trimmers are in the correct position and are adjusted symmetrically.

2.3 CONNECTING THE TRIKE / PARAMOTOR

Correctly connect the risers to the trike/paramotor attachment points so that the risers and lines are correctly ordered and free of twists. Check that the carabiners are properly fastened and securely locked.

Check the engine manufacturer's specification on attachment points.

PLEASE NOTE!

Check that all the connections used (maillons, carabiners, quick-outs, etc.) are appropriate and certified to carry the all-up load.

2.4 HARNESS TYPE

This will be determined by the trike manufacturer.
For foot-launched paramotors, the R-BUS is suitable for all current harness models.

PLEASE NOTE!

The R-BUS is delivered as standard without the necessary accessories to undertake foot-launched tandem flights. These accessories (roll bar, separators, extension bars, etc.) are specific to each paramotor.

It is the responsibility of the tandem pilot to ensure that the required accessories are approved by the manufacturer and the weight is well balanced before takeoff.

We recommend testing the complete system when hanging in a frame first - most schools have such equipment.

2.5 INSPECTION AND WING INFLATION ON THE GROUND – A-ASSIST

After your gear has been thoroughly checked and the weather conditions deemed favourable for flying, inflate your R-BUS as many times as necessary to familiarise yourself with its behaviour.

The R-BUS is a solid wing, but it is agile during inflation. The take off phase is surprisingly short and easy. The line distribution has been designed for an easy inflation, so that it climbs above the pilot's head quickly and precisely without a tendency to overshoot.

Foot-launch: the R-BUS inflates easily and smoothly. Excessive energy is not necessary and the wing will inflate with a little pressure from the

body when you move forward. This may be assisted by using the A-lines. Do not pull on them; just accompany the natural rising movement of the wing.

Trike: the pilot can choose to perform a classic inflation, by pulling the A-risers (as you would when foot-launching) or by utilising the A-Assist system.

The system allows the pilot to link the A-risers through A-Assist 'pulling risers' which are connected to the trike. With this system the pilot's hands are free to manipulate the brakes and the throttle and control the take off perfectly.

PLEASE NOTE!

The A-Assist system must be installed and adjusted by the pilot.
As standard, no additional carabineer is provided to attach the riser. This additional connector performs the same function without taking the load of the suspension lines in normal flight.

PLEASE NOTE!

Once the launch sequence has been completed, the A-Assist must be free of any load or tension and with enough slack to allow normal pitching of the wing and the pendulum movement of the trike.

We recommend the whole installation procedure is supervised by a qualified professional instructor or official dealer. Only they can address any doubts in a safe and professional way.

2.6 ADJUSTING THE BRAKES

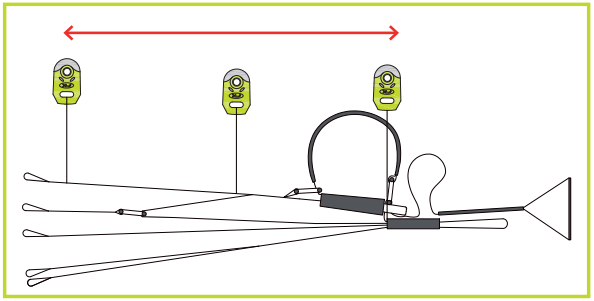
The length of the main brake lines and the High Speed Tip are adjusted at the factory. However, they can be changed to suit the pilot's flying style or lengthened to accommodate the hang-points of the trike. In any case, we recommend flying for a while using the default factory set line length before making any adjustment. It will enable you to become more familiar with the R-BUS and its unique flying characteristics. If you then decide to change the length of the brake lines, untie the knot, slide the line through the brake link to the desired length, and re-tie the knot so that it is tight. Only qualified personnel should carry out this adjustment. You must ensure that the modification does not affect the trailing edge and slow the glider down without pilot input. Both brake lines should be symmetrical and of the same length. We recommend using a clove hitch or bowline knot.

When changing the brake length, it is necessary to check that they do not engage when the trimmer is used. When we open the trimmers, the glider rotates over the C-riser and the trailing edge elevates. It is important to check that the brake is adjusted to take into consideration this extra distance during acceleration. With this profile deformation there is a risk of generating turbulence and causing a frontal or asymmetric collapse.

2.7 ADJUSTING THE BRAKE PULLEY

Depending on the position of the pilot during the flight or the height of the trike hang points, the R-BUS has the possibility of moving the brake pulleys to a variety of positions to ensure pilot comfort.

The pulley is fastened to the riser using Velcro and can be adjusted easily. The riser has 5 possible fixing points (distributed along the entire riser) to accommodate the pulley.
2 positions for lower hang-points on the higher part of the D-riser,
3 positions for higher hang-points on the lower part of the A-riser.



2.8 USING THE TRIMMERS

The R-BUS does not have a speed-bar, although that does not prevent it reaching a high cruising speed.

The use of Computational Fluid Dynamics (CFD) in the development of RSP Reflex System Profile allows us to have the right trimmer settings to maximise the useful part of the polar curve.

The R-BUS is also equipped with a high efficiency profile, offering excellent top and cruising speeds.
Neutral position - trimmers closed, all maillons are at the same height.

This is trim speed, better for gliding and less fuel consumption.

Accelerated position- as the trimmer is released, the travel of the C and D-risers increases progressively and therefore the angle of attack changes. This way the wing will attain more speed in exchange for more acceleration, consumption and increased sink.

The R-BUS trimmers have been redesigned and no longer have the classic metal cleats which made it difficult to make small adjustments to the trimmers.
This new ergonomic trimmer system allows more progressive adjustment and the pilot can accurately control the speed at all times.

To put the trimmers in the neutral position, pull the small handle down. To release the trimmers there are two options: use the handle and pull down hard to allow the tape to move to the desired position; or pull the handle up with small movements, allowing the tape to move slowly.

3. THE FIRST FLIGHT

3.1 CHOOSE THE RIGHT LOCATION

For the first flight we recommend going to your usual flying area and that a qualified instructor is present and supervising the entire procedure.

3.2 PREPARATION

Repeat the procedures detailed in chapter 2 UNPACKING AND ASSEMBLY to prepare your equipment.

3.3 FLIGHT PLAN

Planning a flight before taking off to avoid possible problems later is

always a good idea.

3.4 PRE-FLIGHT CHECK LIST

Once ready, but before taking off, conduct another equipment inspection. Conduct a thorough visual check of your gear with the wing fully open, the lines untangled and properly laid out on the ground to ensure that all is in working order. Be certain the weather conditions are suited to your flying skill level.

3.5 WING INFLATION, CONTROL AND TAKE-OFF

Smoothly and progressively inflate the wing. The R-BUS comes up easily, without requiring additional energy, and does not overfly the pilot. It is a straight forward exercise leaving enough time for the pilot to decide whether to accelerate and take off or not.

Correctly setting up the wing on the ground before take off is especially important. Choose an appropriate location facing the wind. Position the paraglider in a crescent configuration to facilitate inflation. A clean wing layout will ensure a trouble-free take off.

3.6 LANDING

The R-BUS lands excellently, it converts the wing speed into lift at the pilot's demand, allowing an enormous margin of error. Wrapping the brake lines around your hand to get greater braking efficiency is not necessary.

3.7 FOLDING INSTRUCTIONS

The R-BUS has a complex leading edge, manufactured using a variety of different materials and it must be packed carefully. A correct folding method is very important to extend the useful life of your paraglider.

It should be concertina-packed, with the leading edge reinforcements flat and the flexible rods stacked one on top of the other. This method will keep the profile in its original shape and protect the integrity of the wing over time. Make sure the reinforcements are not bent or folded. It should not be folded too tightly to avoid damage to the cloth and/or lines.

The Niviuk Koli Bag is designed for ultra-fast packing and can easily be carried as a backpack.
It allows you to unpack the wing quickly and easily. Just place the wing inside the Koli Bag and secure it with the compression straps.
Perfect for short walks or to transport the wing in the car without the risk of damage.

It has two adjustable straps and a small inner pocket to avoid the risers getting tangled with the lines.

4. IN FLIGHT

Note that glider behaviour can vary, depending on size or wing-loading for the same size. Even within the same size, at maximum or minimum load, the behaviour and reactions of the wing may vary.

The performance and speed of the R-BUS depend on the engine power and wing-loading.

With the **RSP (Reflex System Profile)** the engine does not need much power to achieve greater thrust, resulting in less consumption, more autonomy, less need for power, better durability, mechanical efficiency and increased performance.

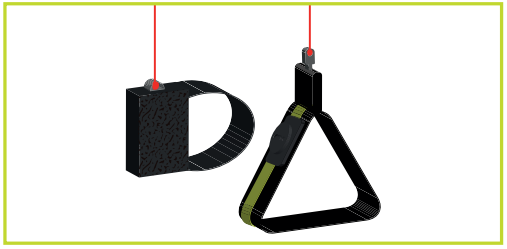
However, in order to get the maximum power out of this wing, we will need an engine that is able to push a highly loaded wing. Without the right wing-loading and without the required power, the wing will not operate to its full potential.

Please remember! The R-BUS is a tandem wing with the capacity for great flights, but it must be handled correctly or it may cause serious problems for the pilot and passenger.

We recommend learning to fly this wing under the guidance of a qualified instructor.

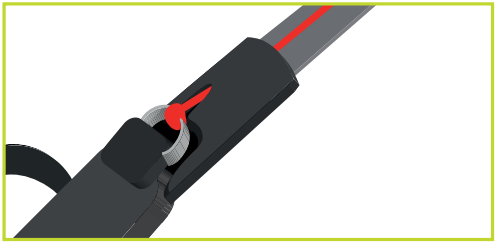
4.1 DOUBLE STEERING SYSTEM

Double Steering System
The R-BUS has two brake lines: the main brake (conventional brake) and the High Speed Tip (fixed to a separate handle on the riser). The High Speed Tip gives the pilot the ability to turn without pulling the brakes, thus avoiding deforming the profile and therefore preventing a decrease in performance and speed.



High Speed Tip
The High Speed Tip on the R-BUS consists of a line with three attachment points located at the wingtip. It enables the pilot to correct the direction easily and accurately without using the main brake controls and therefore, the performance of the wing is not affected.

Torque Compensator
The Torque Compensator is a very efficient tool to compensate for the natural equal and opposite effect caused by engine inertia or torque. This line can be adjusted or set according to the needs of the pilot.



4.2 FLYING IN TURBULENCE

The R-BUS has an excellent profile and is very robust and solid in these situations. It is very stable in all conditions and has excellent passive flight reactions, which makes it very safe in turbulent conditions.

All paragliders must be piloted for the prevailing conditions and the pilot is the ultimate safety factor.
We recommend active flying in turbulent conditions, always taking

measures to maintain control of the wing, preventing it from collapsing and restoring the speed required by the wing after each correction.

Do not correct the glider (braking) for too long in case this provokes a stall. If you have to take corrective action, make the input then re-establish the correct flying speed.

4.3 POSSIBLE CONFIGURATIONS

To become familiar with the manoeuvres described below, we recommend practising within the environment of a competent training outfit. The pilot must adapt their use of the brakes depending on the wing-loading and avoiding over-steering.

It is important to note that the type of reaction to a manoeuvre can vary from one size of wing to another and even within the same size the behaviour and reactions may be different depending on the wing-loading.

Asymmetric collapse
In spite of the R-BUS' profile stability, strong turbulent air may cause the wing to collapse asymmetrically in very strong turbulence, especially if the pilot is unable to fly actively and prevent the collapse. In this case the glider conveys a loss of pressure through the brake lines and the harness. To prevent the collapse from happening, pull the brake handle corresponding to the affected side of the wing. It will increase the incidence of the wing (angle of attack). If the collapse does happen, the R-BUS will not react violently, the turning tendency is gradual and easily controlled. Weight-shift toward the open, flying side (the opposite side of the collapse) to keep the wing flying straight, while applying light brake pressure to that side if necessary. Normally, the collapsed side of the wing should then recover and reopen by itself. If it does not, then pull the brake handle on the collapsed side decisively and quickly all the way (100%) down. You may have to repeat this pumping action to provoke the re-opening of the deflated glider side. Do not over-brake or slow down the flying side of the wing (control the turn). Once the collapsed side is open make sure you return to the default flying speed.

Frontal collapse
Due to the R-BUS' design, in normal flying conditions frontal collapses are unlikely to take place. The wing's profile has great buffering abilities when dealing with extreme incidence changes. A frontal collapse may occur in strong turbulent conditions, entering or exiting powerful thermals or when lacking experience using the trimmer without adapting to the prevailing conditions. Frontal collapses usually re-inflate without the glider turning, but a symmetrically applied quick braking action with a quick deep pump of both brakes will accelerate the re-inflation if necessary. Release the brake lines immediately to return to default glider air speed.

Negative spin
A negative spin does not conform to the R-BUS' normal flight behaviour. Certain circumstances however, may provoke a negative spin (such as trying to turn when flying at very low air speed whilst applying a lot of brake). It is not easy to give any specific recommendation about this situation other than quickly restoring the wing's default air speed and angle of attack by progressively reducing the tension on the brake lines. The normal wing reaction will be to have a lateral surge on the re-accelerated side with a rotation not greater than 360° before returning to default air speed and a straight flight path trajectory.

Parachutal stall
The possibility of entering or remaining in a parachutal stall have been eliminated from the R-BUS.
A parachutal stall is virtually impossible with this wing. If it did enter into a parachutal stall, the wing loses forward motion, becomes unstable and there is a lack of pressure on the brake lines, although the canopy appears to be fully inflated. To regain normal air speed, release brake line tension symmetrically and manually push on the A-lines or weight-shift your body to any side WITHOUT PULLING ON THE BRAKE LINES.

Deep Stall

The possibility of the R-BUS stalling during normal flight is very unlikely. It could only happen if you are flying at a very low air speed, whilst over-steering or performing dangerous manoeuvres in turbulent air.

To provoke a deep stall, the wing has to be slowed down to its minimum air speed by symmetrically pulling the brake lines all the way (100%) down until the stall point is reached and held there. The glider will first pitch rearward and then reposition itself overhead, rocking slightly, depending on how the manoeuvre was done. When entering a stall, remain clear-headed and ease off the brake lines until reaching the half-way point of the total the brake travel. The wing will then surge violently forward and could reach a point below the pilot. It is most important to maintain brake pressure until the glider has returned to its default overhead flying position.

To resume normal flight conditions, progressively and symmetrically release the brake line tension to regain air speed. When the wing reaches the overhead position, the brakes must be fully released. The wing will then surge forward to regain full air speed. Do not brake excessively at this moment as the wing needs to accelerate to pull away from the stall configuration. If you have to control a possible frontal collapse, briefly pull both brake handles down to bring the wing back up and release them immediately while the glider is still in transition to reposition itself overhead.

Cravat
A cravat may happen after an asymmetric collapse, when the end of the wing is trapped between the lines. Depending on the nature of the tangle, this situation could rapidly cause the wing to spin. The corrective manoeuvres to use are the same as those applied in case of an asymmetric collapse: control the turn/spin by applying tension on the opposite brake and weight shift opposite to the turn. Then locate the stabilo line (attached to the wing tip) trapped between the other lines. This line has a different colour and is located on the outside position of the B-riser. Pull on this line until it is taught, as it should help undo the cravat. If ineffective, fly down to the nearest possible landing spot, controlling the direction with both weight shift and the use of the brake opposite to the tangled side. Be cautious when attempting to undo a tangle while flying near terrain or other paragliders; it may not be possible to continue on the intended flight path.

Over-controlling
Most flying problems are caused by wrong pilot input, which then escalates into a cascade of unwanted and unpredicted incidents. We should note that the wrong inputs can lead to loss of control of the glider. The R-BUS was designed to recover by itself in most cases. Do not try to over-correct it!

Generally speaking, the reactions of the wing, which are caused by too much input, are due to the length of time the pilot continues to over–control the wing. You have to allow the glider to re-establish normal flying speed and attitude after any type of incident.

4.4 FLYING WITHOUT BRAKE LINES

If, for any reason at all, the R-BUS' brake lines become disabled in flight, it will become necessary to pilot the wing with the D-risers and weight shifting until landing. The D-lines steer easily because they are not under much tension, however you will need to be careful and not handle them too heavily in case this causes a stall or negative spin. The wing must be flown at full speed during the landing approach, and the D-risers will have to be pulled symmetrically all the way down shortly before contact with the ground. This braking method is not as effective as using the brake lines, and hence the wing will land with a higher ground speed.

4.5 LINE KNOT(S) IN FLIGHT

The best way to avoid knots and tangles is to thoroughly inspect the lines as part of a systematic pre-flight check. If a knot is spotted during the take off phase, immediately abort the launch sequence and stop.

If inadvertently taking off with a knotted line, the glider drift will need to

be compensated by weight-shifting to the opposite side of the wing and applying a slight brake pull to that side. Gently pull the brake line to see if the knot can be undone or try to locate the problem line. Try pulling it to see if the knot can be undone. Beware of trying to clear a knotted line or untangle a line in flight when close to the terrain. If the knot is too tight and cannot be undone, carefully and safely fly to the nearest landing zone. Be careful: do not pull too hard on the brake handles because there will be an increased risk of stalling the wing or entering a negative spin. Before attempting to clear a knot, make sure there are no other pilots flying in the vicinity.

5. LOSING ALTITUDE

Knowledge of different descent techniques could become vital in certain situations. The most suitable descent method will depend on the particular situation.

To become familiar with the manoeuvres described below, we recommend practising within the environment of a competent training outfit.

5.1 EARS

Big ears is a moderate descent technique, able to increase the sink rate to –3 or –4 m/s and reduces the ground speed by 3 to 5 km/h. The angle of attack and effective wing-loading will also increase due to the smaller surface area of the wing.

To re-establish forward speed and the correct angle of attack, the pilot must accelerate once the ears are pulled.
Big ears can be applied until landing but should be released at the moment of braking.

To activate the ‘Big ears’ manoeuvre, take the outer ‘3 A 4’ line on each A-riser and simultaneously, smoothly pull them outward and downward. The wingtips will fold in. Let go of the risers to re-inflate them automatically. If they do not re-inflate, gently pull on one of the brake lines and then on the opposite one. We recommend inflating the wing tips asymmetrically, without major change to the angle of attack, especially when flying near the ground or flying in turbulence.

The split A’ line, which is where the ‘3 A 4’ line originates, is specially designed for the big ears manoeuvre so that it can be performed easily and without errors.

5.2 SPIRAL DIVE

This is a more effective way to rapidly lose altitude. Beware that the wing will experience and be subjected to a tremendous amount of descending and rotating speed (G-force), which can cause a loss of orientation and consciousness (blackout). This manoeuvre must therefore be done gradually to increase one’s capacity to resist the G-force exerted on the body. With practise, a pilot will fully appreciate and understand it. Only practise this manoeuvre at high altitude and with enough ground clearance.

To start the manoeuvre, first weight shift and pull the brake handle located on the inner side of the turn. The intensity of the turn can be controlled by braking slightly using the outer brake handle.

A paraglider flying at its maximum rotating speed can reach –20 m/s, or the equivalent of a 70 km/h vertical descent, and will stabilise in a spiral dive from 15 m/s onwards.

Good enough reasons to familiarise yourself with the manoeuvre and understand how to exit it.

To exit this manoeuvre, the inner brake handle (down side of the turn) must progressively be relaxed while momentarily applying tension to the outer brake handle opposite to the turn. The pilot must also weight shift

and lean towards the opposite side of the turn at the same time.
The exit should be performed gradually and smoothly so that the changes in pressure and speed can be noted.
When exiting the spiral, the glider will briefly experience an asymmetrical acceleration and dive, depending on how the manoeuvre was carried out.

Practise these manoeuvres at sufficient altitude and with moderation.

5.3 SLOW DESCENT TECHNIQUE

This technique allows descent without straining the wing or taxing the pilot. Glide normally while searching for descending air and begin to turn as if climbing in a thermal, but with the intention to sink.

Common sense has to be used to avoid dangerous areas of rotor when looking for descending air. Safety comes first!

6. SPECIAL METHODS

6.1 TOWING

The R-BUS does not experience any problem whilst being towed. Only qualified winch personnel should handle the certified equipment to carry out this operation. The wing must be inflated similarly as during a normal takeoff.

It is important to use the brakes to correct the flight path alignment, especially if the glider begins to turn. Since the wing is subject to a slow airspeed and with a high positive angle of attack, we must make any corrections with a high degree of feel and delicacy, in order to avoid a stall.

6.2 ACROBATIC FLIGHT

Although the R-BUS was tested by expert acrobatic pilots in extreme situations, it was not designed for it. We do not recommend using this glider for acrobatic flying!!!

Acrobatics is still a relatively new discipline in paragliding. We consider acrobatic flights to be any form of piloting different than standard flights. Learning acrobatic manoeuvres should be conducted under the supervision of qualified instructors within a school environment and over water with all safety/rescue elements in place. Centrifugal forces as high as 4 to 5 G can be exerted on the body and wing during extreme manoeuvres.

7. CARE AND MAINTENANCE

7.1 MAINTENANCE

Niviuk we are firmly committed to make technology accessible to all pilots. Therefore our wings are equipped with the latest technological advances gained from the experience of our R&D team.

Careful maintenance of your equipment will ensure continued top performance. Apart from the general checks, we recommend actively maintaining your equipment.

A pre-flight check is obligatory before each flight.
If there is any damage to the equipment, you should inspect it and act accordingly.

All incidents involving the leading edge should be reviewed. A hard impact can damage the sail cloth.

Thanks to TNT and the RAM system, the wing has more safety and performance, but this means being more careful with the material. If any Nitinol rod is damaged, they are easily replaceable.
The fabric and the lines do not need to be washed. If they become

dirty, clean them with a soft damp cloth, using only water. Do not use detergents or other chemicals.

If your wing is wet from contact with water, place it in a dry area, air it and keep it away from direct sunlight.

Direct sunlight may damage the wing's materials and cause premature aging. After landing, do not leave the wing exposed to the sun. Pack it properly and stow it away in its backpack.

If flying in a sandy environment, and sand has accumulated inside the wing, remove it before packing it away. The apertures at the wingtips facilitate easy removal of objects from the trailing edge.

If your wing is wet from contact with salt water, immerse it in fresh water and dry it away from direct sunlight.

7.2 STORAGE

It is important for the wing to be correctly folded when stored. Keep it in the in a cool, dry place away from solvents, fuels, oils.

Do not leave the gear inside a car boot, as cars left in the sun can become very hot. A rucksack can reach temperatures up to 60ºC.

Weight should not be laid on top of the equipment.

It is very important to pack the wing correctly before storage.

It is essential that the wing is properly folded and packed. In case of long-term storage it is advisable, if possible, that the wing is not compressed and it should be stored loosely without direct contact with the ground. Humidity and heating can have an adverse effect on the equipment.

7.3 CHECKS AND CONTROLS

A complete inspection must be scheduled every 100 flying hours or every 24 months, whichever comes first.

We strongly recommend that any repairs should be done in a specialist repair shop by qualified personnel. A thorough pre-flight check must be performed before every flight.

7.4 REPAIRS

If the wing is damaged, you can temporarily repair it by using the Ripstop tape included in the repair kit, as long as no stitching is required to mend the fabric. Any repair should be done in a specialist repair shop by qualified personnel. Do not attempt home repairs.

Damaged lines must be repaired or exchanged immediately. Please refer to the line plan at the end of this manual.

Any repair should be done in a specialist repair shop by qualified personnel. Niviuk cannot be held responsible for any damage caused by incorrect repairs.

8. SAFETY AND RESPONSIBILITY

It is well known that free-flying with a paramotor or trike is considered a high-risk sport, where safety depends on the person who is practicing it.

Wrong use of this equipment may cause severe, life-changing injuries to the pilot, or even death. Manufacturers and dealers cannot be held responsible for your decisions, actions or accidents that may result from participating in this sport.

You must not use this equipment if you have not been properly trained to use it. Do not take advice or accept any informal training from anyone who is not properly qualified as a flight instructor.

9. GUARANTEE

The equipment and components are covered by a 2-year warranty against any manufacturing defect.

The warranty does not cover misuse of the equipment.

DISCLAIMER:
Paragliding is an activity requiring concentration, specific knowledge and sound judgment. Beware! Learn your skills under the supervision and guidance of a certified school. Take out personal insurance and become a licensed pilot. Be realistic when evaluating your knowledge in respect to weather assessment before deciding whether or not to fly. Niviuk's liability coverage is for its product line only. Niviuk cannot be held responsible for your actions. Fly at your own risk!

10. TECHNICAL DATA

10.1 TECHNICAL DATA

R-BUS			31	34	37	40
CELLS	NUMBER		55	55	55	55
	CLOSED		8	8	8	8
	BOX		35	35	35	35
FLAT	AREA	M2	31	34	37	40
	SPAN	M	12,94	13,55	14,14	14,7
	ASPECT RATIO		5,4	5,4	5,4	5,4
PROJECTED	AREA	M2	26,97	29,58	32,19	34,8
	SPAN		10,56	11,06	11,54	12
	ASPECT RATIO		4,14	4,14	4,14	4,14
FLATTENING		%	15	15	15	15
CORD	MAXIMUM	M	2,97	3,11	3,24	3,37
	MINIMUM		0,65	0,68	0,71	0,74
	AVERAGE		2,40	2,51	2,62	2,72
LINES	TOTAL METERS	M	398	417	426	444
	HEIGHT	M	7,7	8,06	8,41	8,75
	NUMBER		288	288	288	288
	MAIN		3+1/5/3/2	3+1/5/3/2	3+1/5/3/2	3+1/5/3/2
RISERS	NUMBER	4	A+A'/B/C/D	A+A'/B/C/D	A+A'/B/C/D	A+A'/B/C/D
	TRIMS	m/m	105	105	105	105
	ACCELERATOR	m/m	NO	NO	NO	NO
	COURSE CORRECTION		YES	YES	YES	YES
TOP SPEED (350KG)		km/h	74 ± 2	73 ± 2	72 ± 2	71 ± 2
MIN SINK (350 KG)		m/s	1,6	1,6	1,6	1,6
TOTAL WEIGHT	MINIMUM	KG	100	120	150	210
IN FLIGHT	MAXIMUM	KG	410	440	470	500
MAX. WEIGHT IN FLIGHT		KG	500	500	500	500
GLIDER WEIGHT		KG	6,6	7,1	7,6	8,1
CERTIFICATION	8G MAXIMUM 328 KG		EN 926-1	EN 926-1	EN 926-1	EN 926-1
	5,25G MAXIMUM 500 KG		DGAC	DGAC	DGAC	DGAC

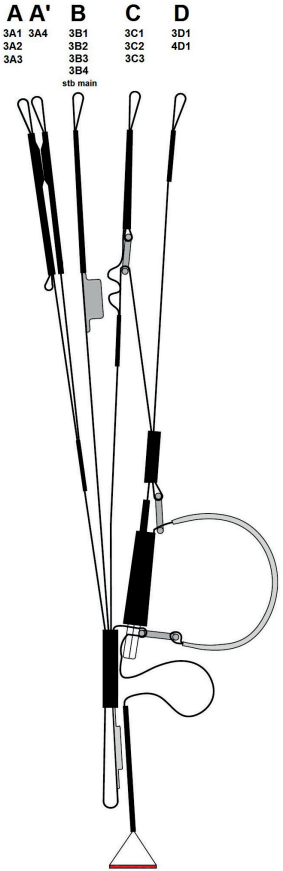
10.2 MATERIALS DESCRIPTION

CANOPY	FABRIC CODE	SUPPLIER
UPPER SURFACE	N20 DMF	DOMINICO TEX CO
BOTTOM SURFACE	N 20 DMF	DOMINICO TEX CO
RIBS	30 DFM	DOMINICO TEX CO
DIAGONALS	30 DFM	DOMINICO TEX CO
LOOPS	LKI - 10	KOLON IND. (KOREA)
REINFORCEMENT LOOPS	W-420	D-P (GERMANY)
TRAILING EDGE REINFORCEMENT	MYLAR	D-P (GERMANY)
RIB REINFORCEMENT	LTN-0.8 STICK	SPORTWARE CO. (CHINA)
THREAD	SERAFIL 60	AMAN (GERMANY)

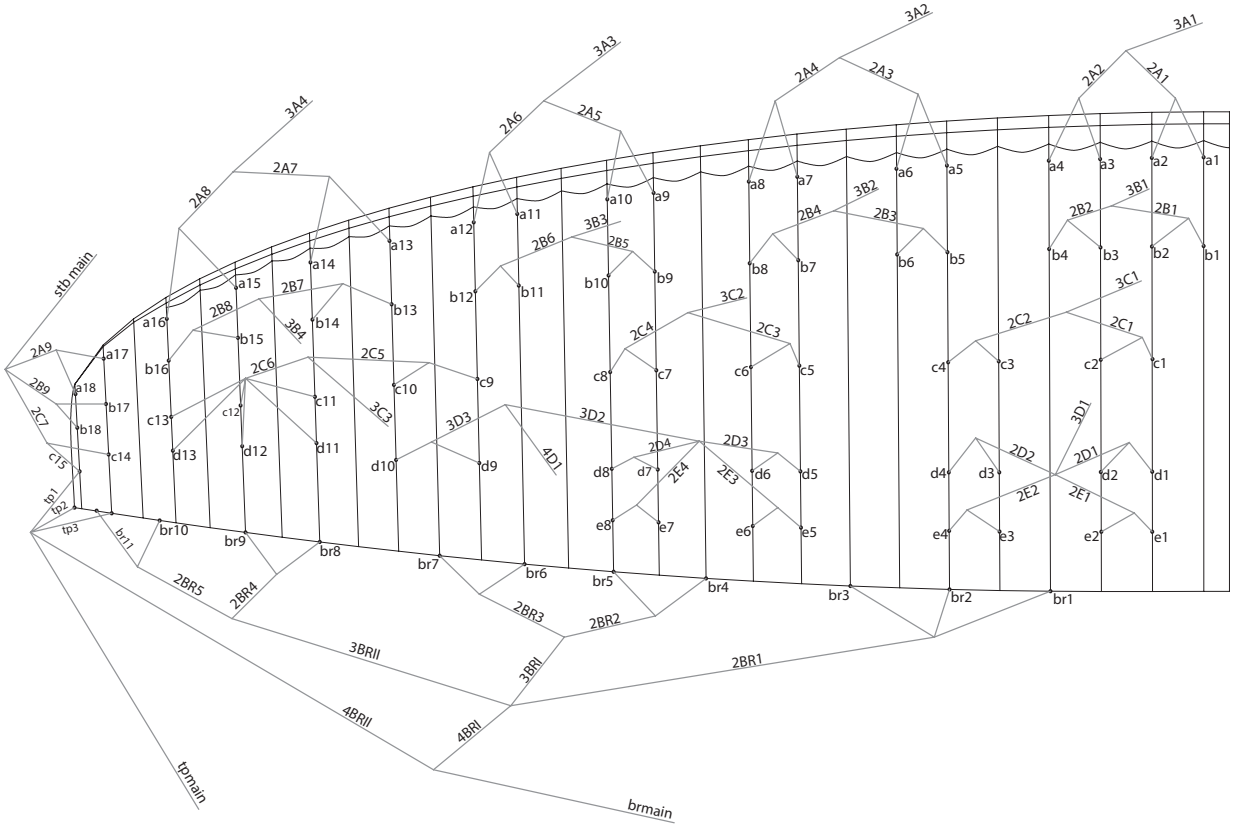
SUSPENSION LINES	FABRIC CODE	SUPPLIER
UPPER CASCADES	PPSL - 120	LIROS GMHB (GERMANY)
MIDDLE CASCADES	PPSL - 120	LIROS GMHB (GERMANY)
MIDDLE CASCADES	PPSL - 200	LIROS GMHB (GERMANY)
MIDDLE CASCADES	TNL - 80	TEIJIM LIMITED (JAPAN)
MIDDLE CASCADES	TNL - 140	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 140	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 220	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 280	TEIJIM LIMITED (JAPAN)
MAIN	TNL - 400	TEIJIM LIMITED (JAPAN)
MAIN BREAK	TNL - 400	TEIJIM LIMITED (JAPAN)
THREAD	SERAFIL 60	AMAN (GERMANY)

RISERS	FABRIC CODE	SUPPLIER
MATERIAL	G-R 22	TECNI SANGLES (FRANCE)
COLOUR INDICATOR	PAD	TECNI SANGLES (FRANCE)
THREAD	V138	COATS (UK)
MAILLONS	MRI4	ANSUNG PRECISION (KOREA)
PULLEYS	RF25109	RONSTAN (AUSTRALIA)

10.3 RISERS LAYOUT



10.4 LINE PLAN



10.5 LENGTHS R-BUS 31

LINES HEIGHT m/m

	A	B	C	D	E	br Tip	br
1	7320	7229	7257	7372	7507	7016	8667
2	7259	7167	7187	7295	7436	6896	8332
3	7246	7154	7174	7283	7424	7013	8184
4	7283	7194	7233	7351	7484		8024
5	7288	7205	7224	7402	7528		7916
6	7229	7146	7175	7324	7451		7892
7	7225	7147	7188	7280	7401		7950
8	7265	7191	7249	7322	7434		7843
9	7255	7158	7258	7326			7768
10	7218	7149	7118	7378			7643
11	7204	7137	7062	7136			7611
12	7230	7141	7004	7080			
13	7162	7123	7077	7144			
14	7047	7016	6751				
15	6960	6940	6744				
16	6925	6918					
17	6716	6686					
18	6657	6660					

RISERS LENGTH m/m

	A	A'	B	C	D	
	350	350	350	350	350	STANDARD
	350	350	350	402	455	TRIMMER OPENED

10.6 LENGTHS R-BUS 34

LINES HEIGHT m/m

	A	B	C	D	E	br Tip	br
1	7683	7587	7618	7739	7881	7274	8955
2	7621	7523	7546	7659	7807	7159	8606
3	7607	7511	7533	7649	7796	7304	8453
4	7646	7554	7595	7720	7859		8287
5	7653	7565	7588	7776	7906		8176
6	7592	7504	7537	7694	7827		8150
7	7589	7507	7552	7648	7775		8211
8	7631	7554	7616	7692	7810		8100
9	7621	7520	7627	7698			8024
10	7583	7511	7481	7754			7894
11	7569	7499	7423	7501			7861
12	7598	7504	7363	7442			
13	7527	7487	7439	7510			
14	7407	7375	7098				
15	7316	7296	7090				
16	7281	7273					
17	7062	7030					
18	7000	7003					

RISERS LENGTH m/m

	A	A'	B	C	D	
	350	350	350	350	350	STANDARD
	350	350	350	402	455	TRIMMER OPENED

10.7 LENGTHS R-BUS 37

LINES HEIGHT m/m

	A	B	C	D	E	br Tip	br
1	8031	7930	7963	8075	8222	7552	9251
2	7966	7864	7888	7992	8146	7471	8889
3	7953	7852	7877	7982	8135	7621	8731
4	7995	7898	7943	8057	8202		8560
5	8003	7911	7937	8117	8254		8445
6	7939	7847	7885	8031	8171		8418
7	7938	7852	7901	7985	8118		8482
8	7983	7901	7967	8032	8155		8366
9	7974	7867	7981	8038			8288
10	7935	7858	7829	8097			8152
11	7920	7847	7768	7850			8118
12	7950	7851	7706	7789			
13	7876	7833	7786	7859			
14	7751	7718	7430				
15	7657	7636	7421				
16	7620	7612					
17	7392	7359					
18	7328	7331					

RISERS LENGTH m/m

	A	A'	B	C	D	
	350	350	350	350	350	STANDARD
	350	350	350	402	455	TRIMMER OPENED

10.8 LENGTHS R-BUS 40

LINES HEIGHT m/m

	A	B	C	D	E	br Tip	br
1	8364	8261	8294	8412	8565	7957	9559
2	8298	8193	8217	8326	8487	7817	9183
3	8285	8180	8207	8317	8477	7972	9019
4	8329	8228	8275	8396	8547		8843
5	8339	8243	8272	8460	8602		8725
6	8273	8178	8218	8371	8517		8696
7	8272	8184	8235	8324	8462		8763
8	8319	8236	8304	8373	8500		8642
9	8311	8201	8321	8380			8562
10	8270	8192	8163	8442			8421
11	8257	8180	8100	8185			8386
12	8288	8186	8035	8122			
13	8212	8168	8119	8195			
14	8082	8048	7748				
15	7985	7964	7739				
16	7947	7939					
17	7708	7674					
18	7641	7645					

RISERS LENGTH m/m

	A	A'	B	C	D	
	350	350	350	350	350	STANDARD
	350	350	350	402	455	TRIMMER OPENED

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