

user
manual

 **Universal**



DUDEK
paragliders

www.dudek.eu

NOTE!

Please read this manual carefully before your first flight

Very important!

Before use it is vital to check in which configuration the steering lines and pulleys are currently set (lower or upper hangpoints) and adjust them to your preferences if necessary.

The risers have three points to fix the pulleys on – lengthened upper, lower, and middle one (see risers on page 35). On each main steering line there are three points marked, lower, upper and middle one, to fix the steering handle according to position of the pulley.

Steering lines must not push down the trailing edge when not operated – this must be observed in all possible configurations of trimmers and speed-system. Steering lines must have a couple of centimeters play before they engage affect the canopy (see section 3.1 on the proper adjustment). For sake of safety it is always recommended to set the brakes rather too loose than too tight. Make sure they are set symmetrically, too.

Ill-adjusted steering lines may cause you to misinterpret the canopy's behaviour in flight, and in case of encountering turbulence in accelerated flight dangerous collapses may occur (see page 20).

When flying at full speed (trimmers opened / trimmers opened and speedbar pushed), especially in uneasy air, it is highly recommended to steer the paraglider using alternative steering methods like TEA or ALC+ only.

With increasing speed an effect of „inverting“ the profile when trailing edge is being pulled down emerges (pulling the brakes, see page 20). That effect can cause dynamic collapses, especially at full speed.

The safest way to change your course at high speeds is to use the TEA lines, or (in the order of safety) the ALC+ handles. Any steering inputs should be smooth and easy, without sharp and/or deep movements. Such actions can dynamically change pressure distribution over the airfoil, leading to collapses.

These warnings affect every paraglider and Universal is no exception!

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1. INTRODUCTION

CONGRATULATIONS

We are pleased to welcome you among the growing number of DUDEK PARAGLIDERS pilots. You've become a proud owner of recreational state-of-the-art paraglider, built according to recent trends in both free-flying and paramotor wings.

Extensive development, application of the most modern methods and thorough testing resulted in a friendly behaving paraglider, offering the pilot a lot of fun combined with great performance.

We wish you many enjoyable and safe flying hours.

DISCLAIMER

Please read this Manual carefully and note following details:

- The purpose of this Manual is to offer guidelines to the pilot using the paraglider and it is by no means intended to be used as a training manual for this or any other paraglider.
- You may only fly a paraglider when qualified to do so or when undergoing training at an accredited School or with an Instructor.
- Pilots are personally responsible for their own safety and their paraglider's airworthiness.
- The use of this paraglider is solely at the user's own risk! Neither the manufacturer nor dealer do accept any liability connected with this activity.
- This paraglider on delivery meets all the requirements of the EN 926-1 and 926-2 regulations or has an airworthiness certificate issued by the manufacturer. Any alterations to the paraglider will render its certificates invalid.

NOTE

Dudek Paragliders warns that due to constant process of development the actual paraglider may differ slightly from the one described in the manual.

2. THE WING

For whom Universal?

Universal is the first paraglider ever to smoothly and efficiently merge two aspects:

- nicely handling free-flying paraglider (with EN/B certificate),
- full-blood paramotor canopy (conforming to DGAC standard).

Universal is dedicated for beginner and recreational pilots who fly:

- exclusively free (but want to benefit from moderate reflex ability)
- mostly free, sometimes with paramotor
- both free and paramotor
- mostly with paramotor, sometimes free
- exclusively paramotor (but appreciate better economy, easier launch and nicer handling than in standard paramotor wing, like Synthesis2)

Universal is a great free-flying recreational paraglider, including cross-country. Beginner XC pilots will surely appreciate exceptional comfort in uneasy thermals, resulting from considerable amount of reflex traits present in the design.

On activating the trimmers and setting up the ALC+ steering, Universal becomes a full reflex paramotor wing, good for both leisure and cruise flying, thermalling, last but not least for initial paramotor training.

No matter what kind of flying you choose, the Universal has a perfect launch, rigid canopy, is pretty agile, nicely handling and safe.

Important for instructors: Universal is perfect for initial PPG training

2.1 DESIGN

Exceptional versatility of the Universal is a result of its genesis. The wing was born as a byproduct of the Synthesis2 development process. One of the paths we've been following was creation of a relatively simple paramotor wing, featuring better economy, agility, easy launch and low power demand. Some of the prototypes did not stand up to legendary stability of the original Synthesis, but demonstrated many other valuable traits we did not like to drop. So, we've explored that path, employing both our long-time experience, and state-of-the-art technologies.

Universal was built according to a new idea. That idea alleges bigger increase in speed realized mainly with the trimmers, adapting their travel to individual pilot's skills and experience, as well as limited reflex capability in lower part of operation so that the airfoil acquires shapes similar to those used in our modern, highly efficient free-flying paraglider types. That idea is augmented by many recent solutions, such as FET technology keeping the desired shape of the leading edge during launch and flight, resulting in Universal's excellent launch performance even in no wind.

Another novelty is the ALC+ (new version of the ALC steering system), allowing safe and effective steering at fast trimmer settings without using main brakes. Additional improvement is possibility to fix the system to the risers with magnetic clips, so that it will not get tangled. Ideally the system should be installed only when the pilot graduates to use the other (faster) half of the trimmers.

Our factory-installed TEA system allows for controlling the flight direction at any time, with any speed – so far this is the safest way to preserve or change the flight direction at high speeds.

Even as the Universal was designed in order to keep all features of the classic paraglider, application of the reflex aerofoil adds more beneficiary traits. First of all, using that profile means that the wing stability does not depend exclusively on the pilot. It maintains a stable pitch attitude, rising and falling through thermals while remaining stable above your head, without need for so much pilot input. Generally speaking the reflex profile is a special kind of aerofoil section. The specific static pressure distribution creates a situation where at low attack angles, only the wing fore part (some 60% of the chord) is producing lift, while the rear 40% of the chord creates an effective stabiliser against excessive decrease of the attack angle. The trimmer system allows for considerable raising the rear part of the airfoil, thus effectively reducing its projected chord and surface area by some 30%, giving the paraglider a higher wing loading and increasing its speed. The centre of pressure also moves forward, adding enhanced pitch stability. Such a shift of loading gives the Universal an exceptional tuck-resistance and increases its projected aspect ratio, resulting in much better performance, especially at high speeds. When greater lift is needed, you close the trimmers, thus modifying canopy to get airfoil operating on its entire chord.

The result of our work is a 100% reflex paramotor paraglider with perfect performance, exemplary safety, and steering characteristics of classic paragliders. We proudly present you with the exceptional Universal paraglider, suitable for the beginner and recreational pilots, whether free of paramotor flying.

2.2 STRUCTURE

The Universal 3D body was designed in our **CSG** (Canopy Shape Guard) system, comprising many elements resulting in exceptional coherence and stability of the shape. Below you will find a short description of CSG subsystems.



Universal has an elliptical planform with slightly rearward swept tips. The cells are divided with ribs additionally supported by diagonal **VSS** (V-shaped supports) system. Such arrangement ensures a smooth top surface, exact aerofoil reproduction across the entire wingspan and yet more importantly, minimal number of suspension points.

The lower surface has a **RSS** (Reinforcing Strap System) applied in the wing's interior. RSS is an ballooning-independent reinforcements system, made entirely of paragliding fabric, stiffening and stabilizing entire canopy structure.

Universal' aerofoil is another product of our **DRA** (Dudek Reflex Airfoil) technology. It was calculated with our previous experiences in mind and thoroughly tested with numerical methods.



Properties of a reflex airfoil were described above. The suspension points areas are additionally reinforced with laminated fabric so that loads are equally distributed on three planes: vertically (through the ribs), diagonally through VSS system and level through the RSS.

All crossports have been prepared using **OCD** (Optimised Crossports Design) technology. Carefully designed shapes of the openings and their optimal placement between stress lines guarantee very efficient pressure distribution in the canopy and its quick inflation. These openings are scaled together with the ribs, so that their replicability is flawless and they do not disturb the aerofoil in any way. The Universal leading edge is closed to airflow, and its precise shape is guarded by reinforcements of laminated fabric.

Another feature of the Universal is the Flexi-Edge technology. The leading edge is closed to the airflow, and its precise shape is kept with laminated cloth reinforcements, incorporating synthetic rods. The rods make the leading edge stiffer and smoother, bringing improvements in many areas - from easier inflation, through stiffening the canopy in flight to improved general airflow.



Cell openings are positioned on the undersurface in the vicinity of the leading edge. Their exact placement was very carefully selected, so that they got maximum ram effect in as many flight situations as possible.

On the wingtips we placed the **ACS** (Auto Cleaning Slots) - dedicated slots automatically removing dirt from inside the wing.



Careful selection of modern fabrics and design solutions brings about great strength and durability of the Universal. All materials used come from marked production batches, and each production step can be verified down to identification of specific worker and controller.

Universal is manufactured under new technology, utilizing precision of the laser cutter. All stages of production process take place in Poland under strict supervision of the designer himself, thus ensuring highest European quality.



Fabric

The upper surface is made of 41-gram Dominico Tex cloth. Lower surface is made of 34-gram Dominico Tex cloth, contributing to low weight of the canopy. The ribs must be as rigid and stretch-resistant as possible. We found these qualities in Dominico 41 Hard cloth.

All suspension points and leading edge reinforcements are made of Porcher SR-Scrim fabric.



Rigging system

All of the Universal suspension lines are sheathed by a coloured polyester layer which is covering a brownish Technora core. Low number of lines required such composition, featuring high strength and stretch-resistance of the lines.

Technora.

The rigging system consists of individual lines looped and stitched at each end. The upper level lines start at the attachment points. Cascade-wise they are joined by twos or threes to middle layer lines. These in turn connect by twos or threes to main suspension lines, which are attached to the risers with triangular quick links (maillons). To prevent their slipping off, the lines are kept together with a rubber 'O ring'.

All the maillons are made of corrosion resistant, polished stainless steel, ensuring excellent strength and durability. We use only the best quality, certified maillons by Peguet.



Stabilo lines run from the outer suspension points to the maillons through consecutive cascades as well. The same story goes for the steering lines. They run from the trailing edge through several layers to the main steering lines, which are lead through the pulleys connected to the rear risers and then fixed to the brake handles. Steering lines do not carry any load.

Some of the steering lines of the upper level are additionally led through rings sewn into the trailing edge, shortening it when the brake is applied, so that steering becomes lighter and more effective.

All the lines are distinguished by colours depending on their strength:

- 2,3 mm; strength: 420 daN; colour: celadon (willow green),
- 1,8 mm; strength: 280 daN; colour: red and orange (the latter for pulling big ears),
- 1,5 mm; strength: 190 daN; colour: violet,
- 1,3 mm; strength: 140 daN; colour: green,
- 1,2 mm; strength: 90 daN; colour: blue.

(given colours are subject to slight changes).

THE RISERS

For the Universal we have chosen four-way risers equipped with:

- **ELR** (Easy Launch Riser) system. This is an specially marked A riser (yellow ribbon),
- speed-system affecting A, B and C risers when engaged, featuring ball-bearing pulleys and special line;
- trimmers of red tape with right scale, designed for quick and easy replacement in case of deterioration;
- various levels of the pulleys, to be used depending on the hangpoint level;
- **ALC+** allows for effective turns even at high speed, without distorting reflex profile too much. Steering is done with dedicated handle with red balls, fixed on the risers with a magnetic clip (prior to the start).
- **TEA** -Torque Effect Adjuster – allowing for eliminating the effect of engine torque, tending to turn the paraglider in the direction opposite to the propeller's rotation. The system can be adjusted to match your specific combination of paramotor/propeller.



For quick and easy recognition in emergency, some of the risers are distinguished with coloured band as follows:

- A - yellow (used for launching)
- A' - blue (used for big ears)
- B - red (used for B-stall)
- D - grey (needed to keep the glider down in strong wind – aborted launch).

Main A row suspension lines connect to an A riser (yellow) and A' (blue). B row and stabiliser lines go to B riser (red), C lines go to C riser (black neoprene) and D lines to D riser (grey), as well as steering lines (through their pulleys).

Brake handles are attached to the steering lines at optimal point, guaranteeing safe and effective operation. On the main brake line there are three points marked, high, low and middle, to be used depending on the harness hangpoint level.

On adjusting the steering lines see chapter 3.1.

Our newest brake handle used in Universal besides its attractive, light design, features:

- a swivel – preventing possible twisting of the steering line,
- TCT (Triple Comfort Toggle) system,
- EK (Easy Keeper) system – see further pages



3. FLIGHT OPERATION

3.1 STEERING LINES AND SPEED SYSTEM ADJUSTMENT

We strongly advise following actions to be supported by an instructor or at least an experienced pilot.

The Universal risers are shorter than in most paragliders, thus alleviating potential problem with different hangpoints. There are three places to fix the steering lines pulley – lengthened upper, lower, and middle (see risers diagram on p. 36). On the main steering line there are three points marked as well – higher, lower and middle one, indicating where to fix steering handle depending on pulley placement.

CAUTION! Before first use check whether steering lines and pulleys are set for higher or lower hangpoint, and adjust them to your preferences if necessary.

For free flying you should fix the pulley on the end of the extending loop, placed at the upper hangpoints, and the steering handles on upper positions marked on the steering lines (so that steering lines are effectively shortened). This is the factory setting of the paraglider (unless ordered otherwise). See adjusting the pulley and steering line marks according to the hangpoints on p. 36.

Generally speaking, upper hangpoints require longer steering lines, while the lower hangpoints – shorter lines.

Before you will take on powered flight it is recommended to try the setup out. Hang up the entire PPG unit with ropes, sit in the harness and have someone pull up the risers. You must make sure that in flight you will always be able to reach the brake handles, even if the airflow blows them away. Being suspended in this way you have a perfect opportunity to adjust the speed system too. The speedbar should not be pulling pull its lines nor risers when not applied. Neither should it be too loose, for it could catch the propeller. An additional way to check the whole configuration out is to visit the take-off site in steady winds of 3-4 m/s. With the engine off, inflate the wing and take it up over your head. When it stabilises, check that the brakes are loose and do not pull the trailing edge. There should be a spare inch or so before they activate.

Remember that it is always safer to set the margin of play too big than too small. And, most importantly, the setting must always be symmetrical.

3.2 FREE FLYING

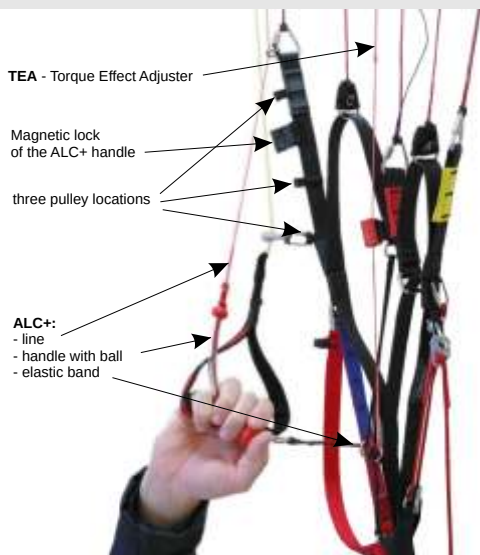
The main difference between the Universal and other paragliders is that due to its increased tuck-resistance (both during launch and flight) and greater speed range (when using the trimmers) it can be safely flown in strong conditions too.



ALC+ allows for aggressive turns even on full speed, without modifications of the reflex profile.

This is of special importance when flying in turbulences with open trimmer and speed system engaged. Additionally it is important for bigger canopy sizes, without special solutions demonstrating problems associated with big steering forces and low agility.

The steering handle here is the red ball, easily adjusted to match personal preferences.

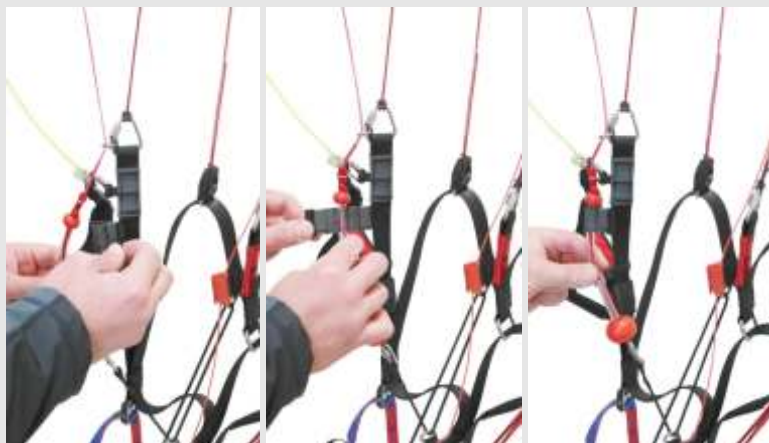


Two examples how to handle ALC+





Using the magnetic lock of the ALC+ handle



Easy Catch



"Easy Catch" speedbar is a godsend for those who have problems catching the bar after taking off. The speedbar is designed to stay always in front of the speedsystem lines. Its finish is very robust, so long-term service is guaranteed.

Triple Comfort Toggle



Neodymium magnet of the Easy Keeper

Swivel protects the steering line against twisting

half-rigid PVC tube

rigid plastic rod

slit of the rod

exchangeable insert

The most soft handle is obtained when no insertion is used.

Addressing different needs of our clients we have created a TCT system - Triple Comfort Toggle, making it possible to have your brake handles in rigid, half-rigid or soft configuration without need to purchase additional handles.

Easy Keeper



Main Steering Handle (TCT)
- swivel
- Easy Keeper
- TCT

Easy Keeper is our indigenous way to hold the brake handles at the risers by using strong neodymium magnets. It keeps the handles firmly at the risers, while both attaching and releasing goes smoothly and easily. The system allows for easy placing the brake handles on risers during flight, when they are not used, thus minimizing danger of getting them into running propeller.

Especially in turbulent air use only the ALC+ system (usage of the main brakes considerably increases possibility of collapses).

WHICH HARNESS?

You can use any certified harness with hang point between 35 cm and 49 cm from the seat (the safest distance being 40 cm).

Width between carabiners should be somewhere between 37 cm and 45 cm, still in this case the best option is 40 cm too.

Please note that any modification of seat/hang point distance changes the position of the brakes in relation to the pilot's body. You must remember that in each harness your typical steering range will be different.

PRE-FLIGHT CHECK

A thorough pre-flight check is essential for any aircraft and the Universal is no exception.

Having unpacked and laid out the paraglider (in a horseshoe directed against the wind) following checks must be made:

- canopy, lines and risers condition. Do not launch if the slightest damage is noticed,
- the paraglider should be arranged so that the centre section A-lines (yellow risers) will strain earlier than the outer ones (A' - blue risers). This ensures easy and symmetrical launch,
- cells of the center section must be handled with special care, so that leading edge stays taut and even,
- all lines and risers should be separated. Make sure they are not tangled and pay special attention to the A-lines, which should run free from the A (yellow band) and A' risers (blue band) to the canopy,
- it is equally important to untangle the brake lines so that they will not catch anything on the ground during launch. They must be firmly attached to the brake handles and run freely through the pulleys to the trailing edge,
- make sure the risers are not twisted,
- it is very important to check that no lines are looped around the canopy. The so-called "line-over" may have disastrous consequences during take off.

Always put on and fasten your helmet before clipping in to the harness. Check quick links (maillons). Sometimes they can unscrew, especially when the wing is new.

Check main carabiners. They must be properly mounted, closed and locked.

3.2.1 LAUNCH

Classic (forward) launch (should be used with little or no wind).

Facing the wind place the risers over your shoulders (A riser must lay on top). Clip it into carabiners and lock them. Grip the brake handles and A-risers (marked with yellow band), holding them at the stitching, just under the quick-links. Spread out your slightly bent hands, keeping them down and back. All risers but the A should be placed near your elbow joints.

Apply some tension to check if the A risers stay on top and the lines are not tangled. Take a step back, bow down a little and run forward. After the initial inflation smoothly move the hands with the risers up and over your head until the wing will be directly above you. Check the wing and let the A risers loose. Pump out possible faults and keep an eye on position of the paraglider.

Side drift is corrected best by moving yourself always under center of the canopy (launch space permitting). In order to keep wing in the air the suspension lines must stay taut all the time, so in light winds you will have to run forward. With stronger winds you can control the wing while standing still. When leaving the ground apply some brakes, then release it after gaining some distance from the ground. Keep your hands relaxed.

Reverse launch

To be used when wind speed exceeds 3 m/s. After clipping the risers into carabiners as for the forward launch, turn back to face the wing, moving one riser group over your head. As a consequence, you will have the risers crossed.

Unclip the brake handles from rear risers and grip it outside of the risers without crossing your arms. In this way you steer the right side with you left hand and left side with your right hand. Now take corresponding A risers on both sides (still keeping brake handles in your hands).

Make sure that the wing inflates symmetrically and the lines are not tangled. Building up tension with a few steps back and simultaneously lifting the A risers (do not pull them towards you) will make the paraglider rise. When it arrives over your head, stabilize it with the brakes, check again if all lines are clear and the cells inflated.

When turning into wind, remember to turn the right way (hint: always do it the same direction) and to keep the lines taut (loaded) at all times. The turn itself should be quick and smooth. After turning check if the canopy is correctly inflated, lines and brakes are free & there is free space to launch - off you go, running into wind with light braking when taking off.

CAUTION: when deflating the canopy in strong winds (e. g. aborting a launch), use the D risers, not the brakes. Using the brakes in strong wind can lift the pilot up and drag him/her back.

3.2.2 FLIGHT

The increased speed range of Universal (in case of trimmers operation) may demand some attention in flight. Nevertheless, once you have mastered these additional assets, flying will become pure fun. Good handling will let you make best use of thermals, and increased speed on transitions means that your presence in sinking air will be shorter. To avoid stalls when braking with closed trimmers, their movement is restricted by the tape sewing (Note: it is possible to push the sewn tape through the buckle with both hands to replace it, but normal operation range is restricted by said place!).

TURNS

Universal is an agile wing, with smooth reactions to the steering inputs. Handling is actually easy and forces grow proportionally to position of the brakes. Adding some weight shift will make the paraglider turn really quick and tight.

The combined technique (weight shifting and brake input) is by far the most efficient method.

Turn radius is determined by the amount of inside brake used and weight shift. Additional application a little outside brake after initiating the turn with maximum weight shift increases turn efficiency and the outboard wing's resistance to collapse (in turbulence, the edge of a thermal etc).

In case of necessary turning in confined area at slow speed (e.g. slope soaring), it is recommended to steer the decelerated canopy by loosening the brake at the outside of the turn while applying just a little more brake on the inside.

NOTE: when entering a turbulent area you should brake a little to put up the tension. It will allow you to react instantly in case of a problem.

CAUTION: Too hard or too quick pulling of one brake can cause the wing to enter a spin.

THERMALLING AND SOARING

When flying the Universal **minimum sink is reached with slight brake pressure applied** (10 to 15 cm, depending on pilot's weight).

In turbulent conditions the canopy should be flown with a small amount of brake applied. This improves overall stability by increasing the angle of attack of the canopy. The canopy should neither rock back nor surge forwards, but always stay above the pilot. In order to achieve it, the pilot should accelerate the canopy by letting off the brakes when entering a thermal (according to its strength) and brake it on exiting. This is part of basic active flying that can spare you many potential collapses.

When soaring the slope, minimum height of 50 m above the ground is recommended for safety reasons. It is important to comply with air traffic rules, especially when many pilots share airspace close to the hill. The avoidance manoeuvres often happen to be impossible in such conditions.

FLYING WITH SPEED SYSTEM ENGAGED

When flying into head wind or through sink it is advisable (for the sake of best glide angle) to increase speed, as long as conditions are not too turbulent.

Full application of the speed system increases flight speed by some 30%. In contrast to most paragliders it does not decrease wing stability, in fact the Universal seems to counter the turbulences even better.

Still, if you meet some serious trouble, it is advisable to release the speedbar. With application of the speed system the brake forces increase, and brake effectiveness decreases.

At maximum speedbar and fully opened trims we strongly recommend steering with ALC system (or TEA lines). Turns executed in this way will be slightly wider, but strength needed to initiate the turn will be smaller and there will be no decrease in speed.

3.2.3 LANDING

The Universal is easy to land. Just make sure that last turn into the wind is done with sufficient altitude, since prior to touch down you should build up speed, fully releasing the brakes. Then flare out at 1 meters over ground by gently braking. The glider may climb again for a while gaining some height, if too much brake is used.

When landing in strong wind you can partly release the trimmers, in order to have better forward speed.

Strong wind landings hardly require braking, if any at all! Use D-risers (coloured grey) to deflate the canopy after landing. Using the brakes will probably result in pilot being lifted and dragged backwards.

The final glide of the landing approach should be straight and smooth. Steep or alternating turns can result in a dangerous pendulum effect near the ground.

3.2.4 WINCHING

A lot of successful winches on Universal have been made. Experience shows that it can be done, but proper attention must be paid.

CAUTION

During start, especially winched or with a motor, always remember to bring the wing directly over your head. The aerofoil and its angle of attack were arranged so as to give maximum lift coefficient with relatively high safety

level. As a result it can stay behind a pilot, if he neglects bringing it directly over head during launch.

3.3 POWERED FLIGHTS

NOTE: Before each start it is necessary to have a thorough check of the paraglider, harness and power unit.

In powered flight most of the wing characteristics remain as described above (chapter 3.2). Still there is additional information needed, concerning power output, proper matching of the wing/engine/propeller etc. Dudek Paragliders cannot take responsibility for all possible combinations, but if you contact us we are always ready to help.

First flights

In order to get familiar with your wing we recommend flying with closed trimmers first, because in this configuration Universal behaves like a classic paraglider. Flying like that try pulling the brakes some until you feel resistance, usually it will be at about 1/4 of the brake travel. Once you feel confident with your wing, you can start experimenting with faster trim settings and speed system. Learn to use all of the additional speed and safety of the Universal.

3.3.1 TAKE-OFF

Classic launch with no wind

Even when it seems that there is no wind at all, it is rarely so. Therefore always be careful in determining the conditions, since in PPG flying it is most important that the launch and initial climb are performed with a head wind (the danger of losing your airspeed while crossing the the wind gradient is greatly reduced). Special attention must be paid to trees, power lines and other obstacles, including the possibility of emerging rotors.

Paraglider preparation

Lay out the paraglider downwind of the power unit, with all suspension lines taut and pointing toward center of the power unit. The risers are to be laid on the ground. Set the trimmers completely closed. In conditions faster settings can be advised. Make sure that you warm up the engine while standing windward of the wing. Stop the engine before clipping in the risers.

Now have a quick check if:

- the helmet is on and locked,
- the risers are clipped in the carabiners,
- the trimmers are properly set,
- the ALC+ handles are fitted to the risers by magnetic lock
- nothing will get in propeller's way,
- speed system is running without problems,

- steering lines and handles are free and not twisted,
- the engine delivers full power,
- take off area is clear of obstacles and free to use.

When you are sure everything is OK, you can clip in the wing and execute launch as described in paragraph 3.2.1.a.

From now on you should steer the paraglider facing forward, without looking back over your shoulder (when the wing is low behind you, turning can cause some lines to get in the propeller). Still, possible fall on your back and damaging the propeller is dangerous (and costly!) so it should be avoided at any price, even that of some damaged lines!

During take-off, when you feel the strain on both risers to be equal, make sure the canopy is overhead, open up full power and lean back to counter the engine thrust, so that it can push you forward rather than towards the ground. The best option is not to use the brakes, allowing the paraglider to rise as it was laid out. If it starts to swerve from its course, just pull the opposite riser and run under the centre of the wing while preserving starting direction. If the wind suddenly drops, give a stronger pull on the risers. If the paraglider falls to one side or back too far to be lifted again - kill the engine, interrupt launch and check the conditions once again.

As the wing rises, the forces grow lighter and it should stabilise above your head without overshooting. This is the best moment to check if it is inflated well and the lines are not tangled, but do so neither stopping nor turning. Once you feel the forces on the risers decrease, run faster and let go of the risers. See if there is already any opposition on the brakes and, if necessary, use them to correct direction or to increase lift at take-off.

Remember:

- If the cage of your power unit is not stiff enough, the risers strained during launch can deform it to the extent of collision with the propeller. Before giving it full power, see that the cage does not catch any lines.
- Any brake operation (or steering inputs in general) should be smooth and gentle.
- Do not try to take off until you have your wing overhead. Hitting power before that can cause dangerous oscillations.
- Do not sit in the harness until you are sure you are flying!
- The faster the trim setting is, the more brake input is required to take off.
- The lower the hangpoints of your power unit are, the easier is the launch.

Reverse launch in strong wind

Reverse launch can be executed holding in one hand both A risers and one brake, with throttle and the second brake in the other hand. With a decent

wind it is by far the best way. In weaker wind it is better to prepare a classic launch, as running backwards with an engine on your back is not an easy thing to do.

It is reasonable not to pull the wing up until you are really determined to launch, especially when it is clipped in.

Lay down the rolled paraglider with its trailing edge against the wind. Unfold the wing enough to find the risers and check that no lines are looped over the leading edge. Stretch the risers against the wind, separating the right and left one.

We suggest that you lay the risers in the same way as you will be turning during reverse launch, and place one riser over the other, with rear risers upmost. It should be done this way because once you clip in, the cage of your power unit will make turning on your own practically impossible. Now run the pre-launch checklist.

After warming up the engine put the power unit on, turn to face the wing, go to the risers and clip them in the appropriate carabiners. Pulling on the front and rear risers open the cells. It is a good idea to pull up the wing briefly in order to check that the lines are not tangled. Holding the risers, brakes and throttle as described above, pull the front risers and raise the canopy over your head.

On most occasions you won't have to brake it, especially if the trimmers are partly released. Perhaps it does not agree with your experience, but in this trimmer setting Universal's reflex profile stabilizes the wing and does not allow it to surge forward. Once you have it overhead, turn around, open the throttle and take off.

As with the classic launch, in this case too you have to find such combination of trimmers, brakes and throttle settings that will give you the best speed and rate of climb.

Remember:

- You are launching with your hands crossed. You have to really master this technique before trying it with a running engine on your back.
- Any brake operation (or steering inputs in general) should be smooth and gentle.
- Do not try to take off until you have your wing overhead. Hitting the gas pedal before that can cause dangerous oscillations.
- Do not sit in the harness until you are sure you are flying!
- The faster the trim setting is, the more brake input is required to take off.

When clipping in the crossed risers, you can find proper connection of the speed system particularly hard. Be careful not to confuse the risers!

Climbing

Once you took off safely, continue heading against the wind, using brakes to correct rate of climb. Do not try to climb too steeply - attempts to increase climb rate by pulling the brakes will have an adverse effect - due to the additional drag actual rate of climb will worsen, and with the throttle fully opened even a stall can happen. In powered flight the Universal behaves more like an aeroplane than a paraglider, and it is good idea to regard it as such. If there are no obstacles present, it is by far safer (and more impressive for the spectators) to fly level for a while after take-off and gain some speed before converting it to height with a brief pull on the brakes. Another reason not to try climbing too steeply is the risk connected with engine failure at low altitude. Even as Universal in a steep climb does not stay behind as much as conventional paragliders do, the low speed is more likely to cause a stall. Besides, you should always be able to land safely in case of engine malfunction, so it's better not to take unnecessary chances and always fly with a safe margin of speed. Depending on the power unit geometry, it is possible that after take-off you will notice a propeller torque (turning moment). It will try to turn you around, so be counter-steer it with a brake or harness cross-bracing. In Universal there is our TEA system present, making possible to counter the torque in case there is no cross-bracing. To make TEA work properly you should assembly the line on proper side (as of propeller direction) and adjust the blocking knot accordingly to torque force. When climbing steeply with slow trim settings and high power output beware of the possibility of stall. Due to typical PPG feature - considerable vertical distance between thrust axis and wing chord - the range of safe power operation is closely connected to your skills and equipment.

Power-unit induced oscillations

Certain configurations of engine weight, output and propeller diameter can cause serious oscillations, during which the pilot is being lifted to one side by the torque effect, swings down due to his weight, then is lifted again and so on.

To avoid this you can:

- change the throttle setting and/or
- adjust the cross bracing to counteract the torque, if there is one present and/or
- use the TEA, pulling down the knot through the tube, simultaneously blocking it in the slit and/or
- shift yourself to the other side of the harness and/or
- change the trimmer setting.

The best method is to fasten opposite cross-bracing, or apply some weight-shift. Such oscillations usually occur at full power - the greater the engine output and propeller diameter, the bigger the swings. In addition there are often

too late or wrong pilot reactions, increasing the problem instead of solving it. In this case the safest way to deal with this question is to close the throttle and release the brakes.

Especially less-experienced pilots tend to overreact. This is called a pilot-induced oscillation, and proven solution is to leave the brakes alone.

3.3.2 LEVEL FLIGHT

Once you have gained safe height after take-off and wish to go for a route, you can turn onto the right direction, fully open the trimmers and let off the brakes. If the conditions are turbulent, it can look foolhardy, but this is the essential feature of the reflex profile - the faster you fly, the the safer your wing is. That's why it's truly possible to release the brakes and enjoy your flight.

CAUTION: Some pilots with previous free-flying experience may have a well-grounded habit of keeping the brakes slightly applied at all times. Such a technique, while quite reasonable on a free-flying wings as it allows for quick pilot reactions and decreases sink, is not advisable on reflex-profile paragliders. When you pull the brakes, the Universal profile loses its reflex characteristics (see next page).

If you have a variometer or altimeter aboard – watch it. In level flight it is very easy to start climbing unintentionally. The instruments will help you optimise speed and fuel economy.

Of course each flight will depend on current configuration of your gear, but due to its ability to fly safe without constant piloting the Universal will let you adjust everything to the best effect. Good knowledge of weather conditions (e.g. wind at different altitudes and smart use of thermals or dynamic lift will help you greatly reduce fuel consumption and increase flight range. Of course the engine is always there to bring you in the right place.

Do not hesitate to lead the Universal into tight thermalling in order to win some altitude and spare fuel. In order to make the best of the thermal, completely close the trimmers.

Trimmers and speed-system operation

The reflex wing airfoil enables the Universal pilot to use a wide range of trimmers and speed-system action. You are free to experiment with all possible settings, as long as you are on safe altitude. Fully opened trimmers increase the speed and stability of the wing, and with it also its ability to cope with turbulences and overall penetration. As forces on the brakes grow at high speeds, the weightshifting or steering with ALC+ system becomes increasingly effective.

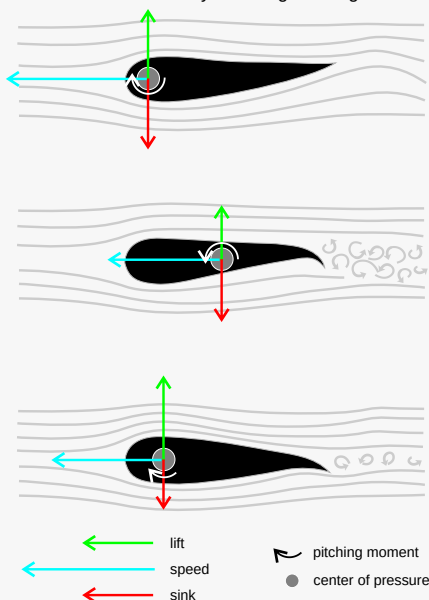
ALC+ system can be used in all trimmers and speed system settings, also in combination with main steering handles when trimmer is closed. At maximum speedbar and/or fully opened trims we strongly recommend steering with ALC+ system or TEA system, especially in rough air.

Influence of classic steering on the reflex profile

Pilots used to classic paragliders tend to fly "active" style, with their brakes constantly tensioned. Flying a reflex wing like that is ineffective and can possibly be dangerous.

Basic rule of reflex paramotoring says: **the more turbulent it is, the more trims should be released and classic steering should be limited, especially with speed system engaged.** In such moments paraglider is much more effectively steered by TST or ALC+ systems, designed specifically for that reason.

Problem is illustrated by following drawings:



Released trims without brakes

Typical setting for fast and safe flying. Center of pressure of the aerofoil moves forward, practically excluding collapses. Pitching moment induced by the reflex aerofoil increases angle of attack.

Released trims with brakes applied

Even slight brakes application (especially on full speed bar) shifts the center of pressure back, and due to lack of reflex on trailing edge, pitching moment now decreases angle of attack. Additionally turbulence behind the wing occurs. In some circumstances this can lead to a collapse. Using the brakes can be sometimes necessary for heading corrections, still you should keep your brakes free when flying ahead, otherwise the reflex feature doesn't work.

Closed trims

In this configuration brakes are the normal and prescribed steering system. Slow trim is used for launching in nil wind and thermalling. The canopy behaves similar to classic profile paragliders, with slightly increased tuck resistance.

Turns executed in this way will be slightly wider, but strength needed to initiate the turn will be smaller and there will be no decrease in speed.

Please note the wide operational speed envelope of the Universal achieved by trimmers only. Due to such wide range we've decided to introduce capability of restricting that range (before the launch) by the pilot according to his skills and preferences. Even when the trimmer range is restricted by half, applying the speedbar in urgent needs allows for almost maximum speed. Restricting the trimmer range is shown in „Adjusting the trimmers" appendix in this manual.

At slower trimmer settings both the sink and steering forces decrease, so it is possible to efficiently use the thermals. Study drawings of trimmers and speed-system adjusting and setting, as well as their influence on the wing shape.

When flying in slow configuration turns can be much tightened and more effective by means of differential brake operation. Slight use of the outer brake (with considerable amount of the inner one) will diminish the loss of lift in turn. Turns can be much improved by additional use of throttle, speed-system etc.

Once with growing experience you will master these techniques, you will be able to execute fully coordinated and effective turns, bringing to mind the aeroplane handling.

REMEMBER:

- Trimmer setting is another part of the pre-start check list!
- If it will be asymmetric, the wing will be turning all the time. And if you will inadvertently set them off, the reflex profile of the Universal will keep the wing level, so after opening the throttle you'll start to descend with increased speed instead of climbing.

3.3.3 LANDING

In PPG flying there are two kinds of landing: with and without power.

Power off landing

At an altitude of 50 metres switch the engine off and glide as you would on a conventional paraglider. It reduces the chances of damaging the propeller on landing, but on the other hand there is only one attempt possible - so it has to be done right! With or without power Universal better copes with turbulence on partly open trimmers (i.e. some 6 cm, position '6'). So, if the conditions are rough, better make an approach with greater speed, plan a lot of free space (as for a hangglider) and wear that speed off before touching down. Universal preserves the energy well, so there is a long float necessary, exchanging the abundant speed for lift with your brakes.

If the landing field is not big enough and you have to land on the spot, we advise you to set the trimmers in slower settings. It will increase lift coefficient of the wing, effectively decreasing its sink rate and speed. Such an action is especially important when flying with high surface loading.

Powered landing

Make a flat approach with the engine idling, then level out and lose the speed before final flare. Immediately after touchdown switch off the engine. The main advantage of this procedure is of course the possibility of a repeated approach if anything goes wrong. Still, if you forget to switch off the ignition before the wing falls down, there is a considerable risk of damaging propeller, catching lines in it or even suffering injuries connected with falling on your running engine.

Remember:

- Whenever possible, get to know the landing field before taking off.

- Check the wind direction before planning the approach.
- Landing with power off requires much less space.
- In case of any doubt, practice the landing until you feel totally safe.

3.3.4 GOLDEN RULES!

- Never place the power unit downwind of the paraglider.
- Check, double check and then check once again if there is no fuel leakage.
- Do you have enough fuel for the flight? It is always better to have too much than too little!
- Check if there is nothing loose in the harness, that could possibly contact the propeller in flight.
- Whenever you encounter a problem, fix it **AT ONCE** however small it is!
- Always put on and lock the helmet before getting in the harness.
- Before each launch run a full pre-flight inspection.
- After landing, control the wing facing the direction of flight, as on turning you always risk getting lines in the propeller. Turn only if there is danger of falling on your back.
- Do not ask for trouble - do not fly over water, between trees or power lines and other places where engine failure will leave you helpless.
- Mind the turbulence caused by other gliders or even by yourself, especially when flying low.
- It is not reasonable to let go of the brakes below 100 meters, because a possible power unit malfunction may require immediate attention.
- In general never trust your engine, as it can stop at any moment. Always fly as if it's exactly what it's going to do.
- Unless it is absolutely necessary (e.g. collision avoidance), do not execute tight turns against the torque direction. Especially when climbing you can easily enter a stall and consequent negative spin.
- Do not fly with tail wind at low altitudes, as it pretty much narrows your options !
- Do not wait for the problem to grow - any change of engine sound or a vibration can indicate troubles. You'll never know until you land and check it out!
- Be certain of your navigation
- Remember that not everyone is fond of your engine noise. Do not scare the animals.

3.4 QUICK DESCENT METHODS

3.4.1 BIG EARS

In order to get the big ears you have to pull down the outer lines of the A' risers (distinguished by blue sheath) by some 20-50 cm. While inducing big ears you should never let the brakes out of your hands.

After tucking the tips in, Universal will continue to fly straight with increased sink rate (up to 5 m/s). You can steer the wing pretty efficiently by weight-shifting. After releasing lines, the paraglider will usually open up on its own or you can assist it with a long stroke of the brakes. For the sake of safety (the possibility of a parachutal stall) it is reasonable to engage speed system after pulling big ears in order to lessen the angle of attack of the wing centre. Executing big ears with opened trimmers is very difficult due to reflex profile stabilisation.

CAUTION: See the PARACHUTAL STALL chapter.

Never try to pull big ears during powered climb, as the increased drag can lead to increase of the angle of attack and a parachutal stall.

Besides, pulling the ears while climbing is pointless anyway.

3.4.2 SPIRAL DIVE

Universal is a very agile paraglider, so entering spiral dive happens very quickly and can be surprising for the less experienced pilot. A spiral dive is characterised by reaching the highest sink rates possible. Significant G-forces, however, make it difficult to sustain a spiral dive for long, as will place high loads on both pilot and glider to degree of losing consciousness by the pilot. Never do this manoeuvre in turbulence or at too high bank angles. Control the dive and do not exceed 16 m/s sink. If the dive is not stopping after releasing the brake, assist the glider with the outer one.

NEVER DO BIG EARS IN A SPIRAL! In this manoeuvre smaller number of lines is carrying an excessive load multiplied by the centrifugal force, what can lead to damage of the lines or even the paraglider itself (load of a single line can be much higher than passed in certification trials (i.e. 8 G)).

3.4.3 B-STALL

B-stall can be executed only with fully closed trimmers (i.e. pos. '0').

To enter a B-stall, simultaneously pull down both B-risers (red tape) by 10 – 15 cm. The canopy will collapse across the entire span along its B-row, the airflow over top surface will break and canopy surface will be decreased. Forward movement will be almost completely stopped. Further pulling B-risers is not advised, as tests have shown it to increase wing instability. If the canopy forms a horseshoe with both wingtips in front of the pilot, gently apply both brakes to recover.

To exit a B-stall, the risers should be released in a smooth and decisive manner. On quick and symmetrical releasing B-lines the airflow will be reinstated and the wing will surge forward, returning to normal flight. In contrast to standard paragliders, in case of Universal there is no need to counter this surge with brakes - yet another asset of the reflex profile!

CAUTION: See the PARACHUTAL STALL chapter. All rapid descent techniques should be practiced in smooth air and only with sufficient altitude only ! Full stalls and spins are to be avoided as recovery procedures, of the extreme manoeuvres, since irrespective of paraglider type they may have dangerous consequences!

BY FAR THE BEST TECHNIQUE IS SAFE AND CORRECT FLYING, SO THAT YOU WILL NEVER NEED TO DESCEND RAPIDLY!

3.5 AEROBATICS

Universal was not designed to do any aerobatics.

3.5.1 WING OVER

You make a wingover by performing a series of consecutive, alternating turns with growing bank angle. Too much banking connected with some flaws in co-ordination and execution can evoke pretty dynamic collapse.

CAUTION: Steep turn with bank angle over 60 degrees is a prohibited aerobatic manoeuvre!

3.6 EXTREME MANOEUVRES

CAUTION! EXTREME FLYING MANOEUVRES SHOULD ONLY BE CARRIED OUT DURING SAFETY TRAINING COURSES (SIV, INSTABILITY TRAINING) UNDER PROPER GUIDANCE! WHILE PROVOKING OR EXITING REAL SITUATIONS THERE IS DANGER THAT YOUR ACTIONS WILL PROVE TOO QUICK OR TOO STRONG, SO YOU SHOULD ALWAYS EMPLOY GOOD JUDGMENT, STAY CALM AND TAKE MEASURED ACTIONS.

Since all actions required to exit or prevent dangerous situations on Universal are typical and pilots flying this wing should already have proper experience, we are going to describe only the characteristic features of the Universal. Description of standard methods dealing with extreme situations can be found in textbooks.

3.6.1 ONE SIDED COLLAPSE

Even when the trimmers are fully opened or the speed system is engaged, collapses practically do not occur and can be induced only by a very strong turbulence. Still, if it happens, a little counter-steering is enough to keep the Universal on course. Under normal conditions with collapses up to 50% of the

wingspan, Universal will reinflate instantly and spontaneously. If it will not happen, you should aid this process by application of brake on the collapsed side.

3.6.2 FRONTAL COLLAPSE

The reflex profile of the Universal makes it practically impossible, especially at higher speeds. During tests we succeeded in creating this situation only with fully closed trimmers and using special measures. Such forced collapses can lead to extremely deep collapses, so recovery will require decisive pilot action (short and equal application of both brakes).

3.6.3 FULL STALL AND NEGATIVE SPIN

Practically do not occur, may happen only as a result of serious neglect or intentional action of the pilot. You have to be careful when flying at low speeds until fully familiar with brake operation. Wing recovers spontaneously in initial phase of stall, otherwise use standard procedures.

3.6.4 DEEP STALL

Under normal conditions does not occur. If you want to prevent it happen at all, simply stick to a couple of rules:

- after B-stall, release the risers quickly and evenly. Don't be afraid - Universal does not jump forward excessively.
- after big ears execution, engage the speed system. This will increase both the sink rate and safety margin, as big ears constitute an aerodynamic brake with significant loss speed.

Nevertheless, if such a parachutal stall happens e.g. due to strong turbulence, simply apply some pressure on speed bar and/or push the A risers forward. You can release the trims too.

3.6.5 LINE OVER AND CRAVATTE

Universal is a modern wing which, in order to decrease drag, has fewer suspension lines and greater distances between them. Therefore it's always possible that after a tuck one of the stabilisers may tangle in the lines. Usually a couple of pulls with a brake settles the matter.

If it's not enough, try to untangle it with big ears or a stronger pull on the risers. In case of any doubts you should seriously consider a rescue chute. It is there as a normal equipment part, not just an ornament.

3.6.6 EMERGENCY STEERING

In case of any malfunction that renders normal steering impossible, you can safely steer and land Universal using the D-risers (grey marking) or stabilo lines.

4. PARAGLIDER CARE

Proper looking after your paraglider will prolong life of your Universal.

4.1 FOLDING AND STORAGE

Universal features a number of recent technologies, like tensioning the leading edge with a plastic string. That's why the paraglider should be folded with care in order to keep it healthy during transport and storage.

Basic rules to be observed when folding:

1. We fold the canopy together on rib-to-rib, cell-to-cell basis (like a harmonium). We don't break the wing in halves, taking the stabilizers towards centre.
2. After creating a package along the maximum chord, we don't roll it, but fold two to three times (depending on the chord length) from trailing to the leading edge.
3. Leadin edge stays on top of the folded canopy.

Store the paraglider in a dry place, away from chemicals and UV exposure. Never pack or store the glider when wet.

Remember that the wing becomes damp also while lying on green grass in direct sunlight.

A good precaution to avoid dampness and/or UV when you have to wait in a start queue is to use quick-pack after rigging up.

Always dry the glider thoroughly before packing and/or storage. Never pack you paraglider too tightly.

While drying, never expose your paraglider to direct sunlight operation.

Please note that with frequent kiting/groundhandling exercises your paraglider will deteriorate faster due to its repeated rising, falling and being dragged on the ground.

4.2 CLEANING

Clean the paraglider with water and a soft sponge. Do not use any chemicals or alcohol, as these can permanently damage the fabric.

4.3 REPAIRS

Repairs should only be carried out by the manufacturer, authorised distributor or authorised workshop. It is acceptable to fix minor cloth damage with the self-adhesive patches included in the package.

4.4 DETERIORATION: A FEW TIPS!

The Dudek Universal is made mainly of nylon - a fabric which, like any other synthetic material, deteriorates through excessive exposure to UV rays that come with the sunlight. Hence it is recommended to reduce UV exposure to a minimum by keeping the paraglider packed away when not in use. Even when packed in a bag, it should not remain in the sun for long.

Universal' suspension lines consist of Technora inner core and polyester sheath. Submitting them to excessive loads in flight should be avoided, as it can cause irreversible damage.

Keep the paraglider clean, since getting dust in the lines and fabric will reduce their durability.

Be careful to keep snow, sand or stones from entering the cell openings: their weight can slow or even stall the glider, and sharp edges can damage the cloth.

Prevent lines from catching anything, as they can overstretch or tear. Do not step on the lines.

Uncontrolled strong wind takeoffs or landings can result in the leading edge of the canopy hitting the ground hard, which may seriously damage the ribs, sewing and surface material.

Knots can chafe suspension and/or brake lines.

Check line lengths after tree or water landings, as they can stretch or shrink.

A line plan is included in this manual or may be obtained from the dealer when needed. After landing in water you should check the wing fabric as well, since the wave forces can cause the fabric to distort in some areas. When taking the wing out of the water, always do this by trailing edge, so that water can flow out freely. After a sea landing, rinse the paraglider with fresh water. Since salt crystals can weaken the suspension lines even after rinsing in fresh water, you should replace the lines with new ones immediately after contact with salt water.

Every second year Universal should undergo technical inspection by the manufacturer or authorised distributor.

5. TECHNICAL DATA

Universal	23	25,5	28	31
Certification EN	-	-	B	B
Number of cells	50	50	50	50
Surface area (flat) [m²]	23,00	25,50	28,00	31,00
Surface area (projected) [m²]	19,83	21,98	24,14	26,72
Span (flat) [m]	10,83	11,40	11,95	12,57
Span (projected) [m]	8,71	9,17	9,61	10,11
Aspect Ratio (flat)	5,10			
Aspect Ratio (projected)	3,83			
Sink rate [m/s]	min = 1,1; trim = 1,3 - 2,2; max = 3,0			
Speed [km/h]	min = 23; trim = 37 - 52; max = 57			
Max. cord [cm]	261,20	275,10	288,20	303,30
Min. cord [cm]	60,10	63,30	66,30	69,80
Distance pilot to wing [m]	6,82	7,18	7,53	7,92
Total line lenght [m]	344,01	362,82	380,74	401,20
Weight range EN [kg]	55-75	70-95	90-115	110-140
Weight range DGAC [kg]	55-90	70-115	90-140	110-170
Weight [kg]	6,1	6,6	6,9	7,5
Lines	Technora: 1,2 & 1,3 & 1,5 & 1,8 & 2,3			
Fabric	Dominico tex 34 & 41 g/m2			
	Dominico Tex Hard 41 g/m²			
	SR Scrim, SR Laminate 180 g/m²			
	PASAMON - Bydgoszcz, Polska			
Risers				

6. WARRANTY AND AEROCASCO

Purchase of a new paraglider is a serious expense for any pilot. That is why we cover our paragliders with extensive warranties and additionally offer an AeroCasco insurance against damage and repair costs.

WARRANTY

Dudek Paragliders guarantees free of charge repairs caused by the material or production faults along following scheme:

For the free-flying paragliders warranty covers



36 months (3 years) or 300 flight hours (depending on what comes first). If the paraglider is used for powered flights, every hour spent in the air should be counted as two (does not apply to dedicated PPG canopies).



For the PPG paragliders warranty covers **24 months** (2 years)/200 flight hours (depending on what comes first).



For the mountaineering (MPG) and speedflying wings as well as school and profit users warranty covers **18 months** (1.5 year)/150 flight hours (depending on what comes first).

WARRANTY DOES NOT COVER:

- canopy colour fading
- damage caused by chemicals or salt water
- damage caused by incorrect use
- damage caused by emergency situations
- damage resulting from accidents (airborne or not)

WARRANTY IS ONLY VALID IF:

- flight hours are correctly registered in the logbook of the owner (and possible earlier owners), distinctly marking PPG flights,
- the paraglider is handled in accordance with the operating manual,
- the purchaser has not carried out any repair by him/herself (excl. minor repairs with self-adhesive patches),
- carried out any modifications,
- the paraglider can be unmistakably identified
- the paraglider was being inspected according to prescribed timetable.

If you have bought your paraglider second-hand, ask its previous owner of the paraglider for a logbooks copy (total of flying hours since the date of first purchase).

AEROCASCO

Normal warranty does not cover repairs of damages caused by the user or a third party. As costs of such repairs can be considerable, Dudek Paragliders offer an AeroCasco insurance. It covers a one-off repair of any mechanical damage, no matter how big and whoever inflicted them. The only expenses the purchaser has to pay are shipping costs and so-called share-of-cost amount.



AeroCasco can be purchased only for a brand new paraglider (at the paraglider purchase). Its cost is 50 euro.

NOTE: AeroCasco is not available for all paragliders (check this before purchase). It can be obtained for privately used wings only.

AeroCasco applies only to damages that took place during take-off, flight or landing. Obviously, all faults in the material and manufacturing flaws are covered by normal warranty.

When handing the paraglider for the repair you have to present a card confirming its AeroCasco status. After the repair you will have to cover only the share-of-cost value of 50 euro.

AeroCasco is valid for one repair only. There is a possibility to extend AeroCasco for one more year. To do this you have to send your paraglider for inspection not later than a year after the date of purchase. Extension fee is 75 euro (incl. inspection).

Remember to attach the AeroCasco confirmation on expedition.

AeroCasco does not apply to any of the following: theft, colour fading, damage caused by incorrect storage or transport, damage caused by chemicals, salt water and force majeure.

7. WHAT HAVE YOU BOUGHT

The Dudek paraglider that you bought should have the following items:

- the paraglider itself (canopy, lines and risers)
- transport bag (with compression strap)
- Duralight - backpack
- FastBag (quick-pack)
- a speed system with Easy Catch bar
- a windsock
- a pocket with paper work and repair wallet including:
 - A piece of self-adhesive fabric (10 cm x 37.5 cm) for small repairs. Note that even small tears located in the vicinity of stitches have to be repaired by an authorised service
 - A looped and stitched suspension line longer than the longest line used in the paraglider that is to be used as a temporary replacement. Do not cut it if you have to replace a shorter line, just tie it at the length needed
 - A paraglider passport with entered date of purchase and valid technical inspection (please check the serial number with the sticker on the wing tip)
 - The User Manual you are reading
- Small gifts.

SUMMARY

If you respect the rules of safe flying and proper glider care, you will enjoy many years of pleasant airtime. Still, you must be aware of possible dangers and face them wisely. You must accept the fact that all air sports are potentially dangerous and your actual safety depends solely on you.

We insist that you fly safely, and this concerns both the weather choice and safety margin during all manoeuvres.

**FLYING THE PARAGLIDER IS ALWAYS YOUR OWN RESPONSIBILITY.
SEE YOU IN THE AIR!**

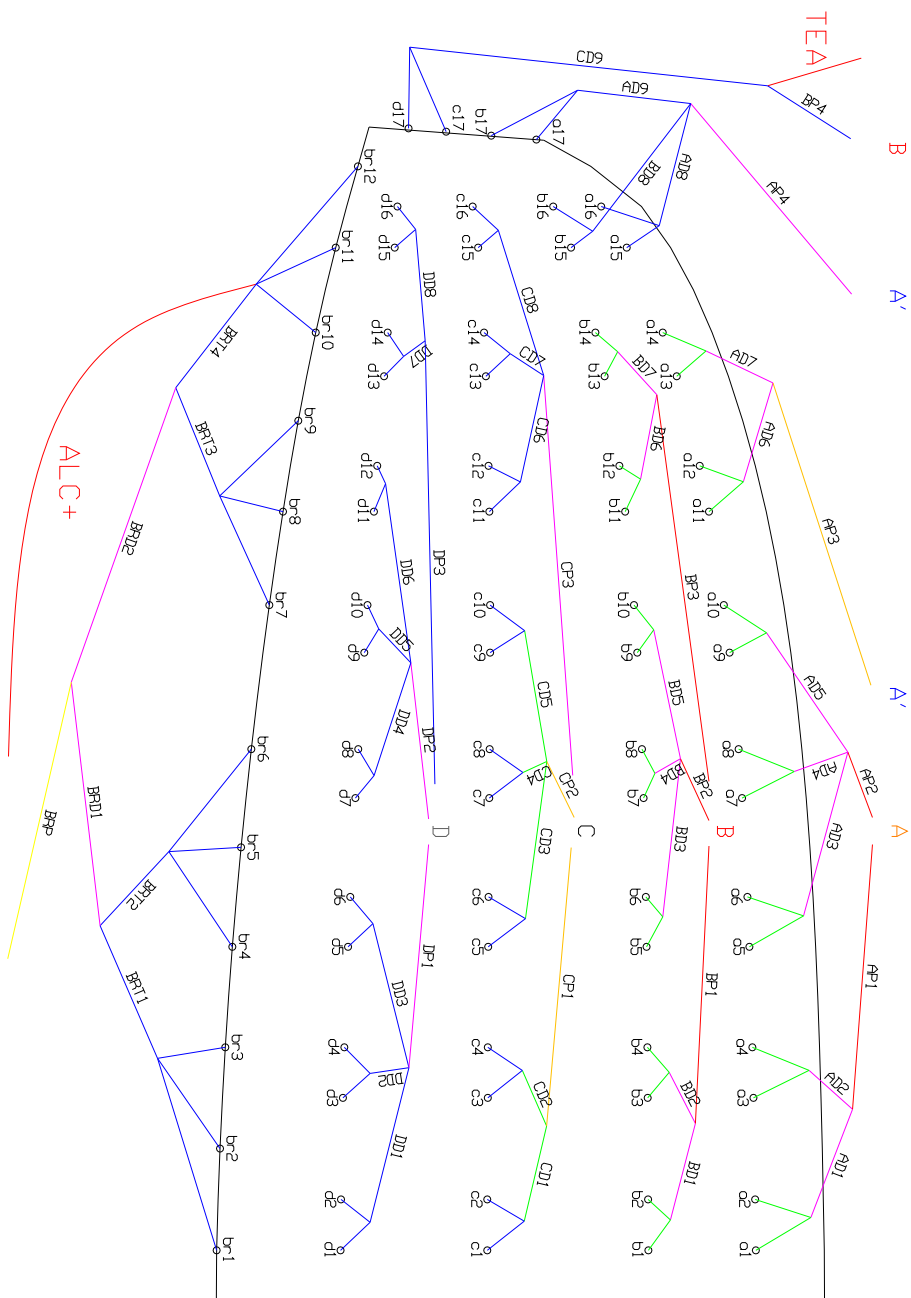
8. RIGGING TABLES AND SCHEME

The rigging scheme itself is published on the next page, while tables of line lengths you will find on our website **www.dudek.eu**

Lengths are measured with a specialised, computer-operated device. All lines are stretched with a 5 kg load before cutting. Thanks to the abovementioned device and proper procedures, final tolerance of line lengths does not exceed 0.15%.

NOTE: Distances given below are to be understood as distances between connection points. When cutting a line for repair, 20 cm extra must be added, as at each end a 10 cm stitch is required to fix the loop. The only exception is the main steering line (BRP), which is looped only at the upper end, while there is 60 cm left on the lower end for fastening brake handle (this means for this line extra 70 cm is needed).

Length of the steering line is given as for low hangpoints (shorter steering lines). For upper hangpoints the line is longer by ca. 30 cm (with lower placing of the handle).



9. RISERS: DESIGN AND ACCESSORIES

Figure 1 Risers in lower hangpoint configuration (steering line is led through one pulley only).

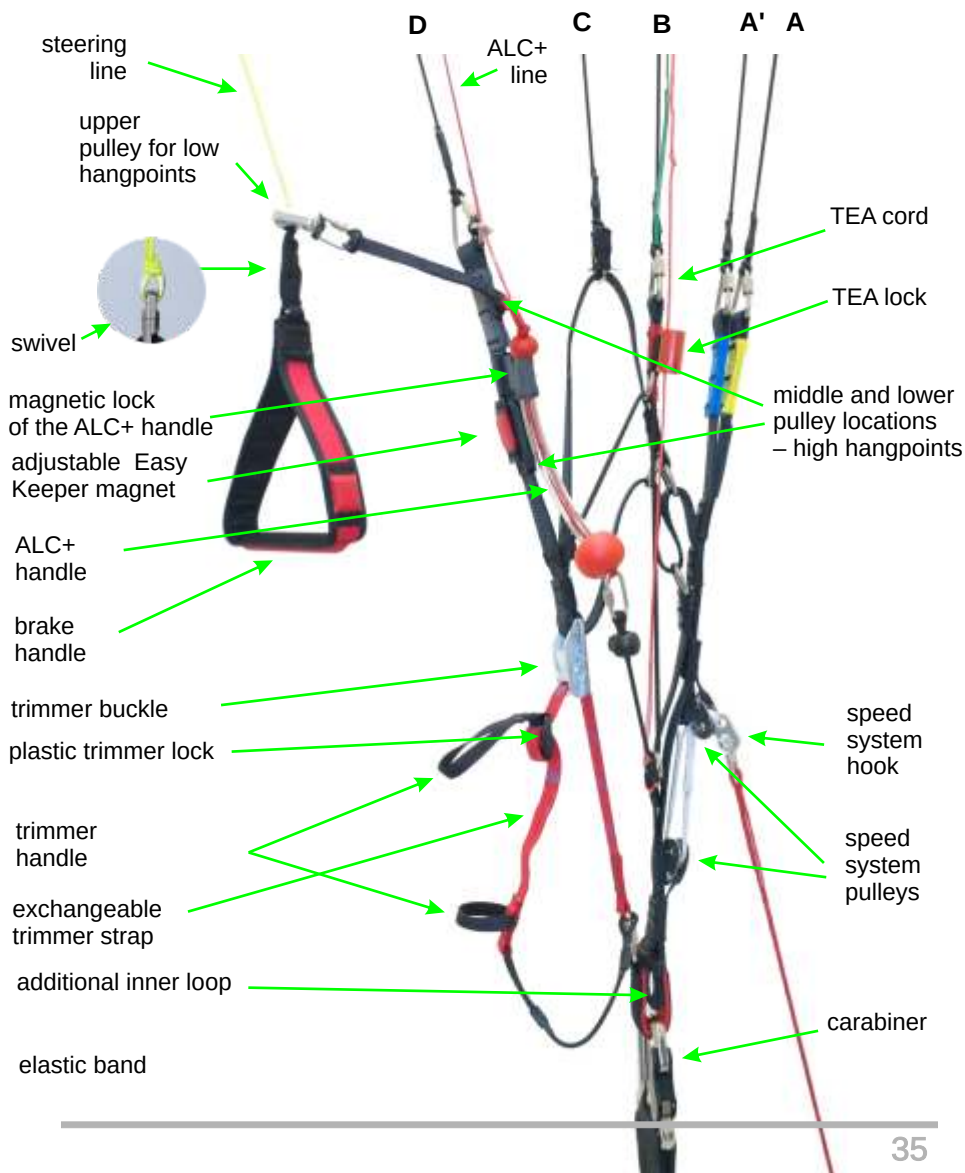


Figure 2

Low hangpoint (steering line is led through a pulley in upper position).
Magnetic clip is also placed high.



Figure 3

High hangpoint (steering line is led through a pulley in lower position).
Magnetic clip is also placed low.

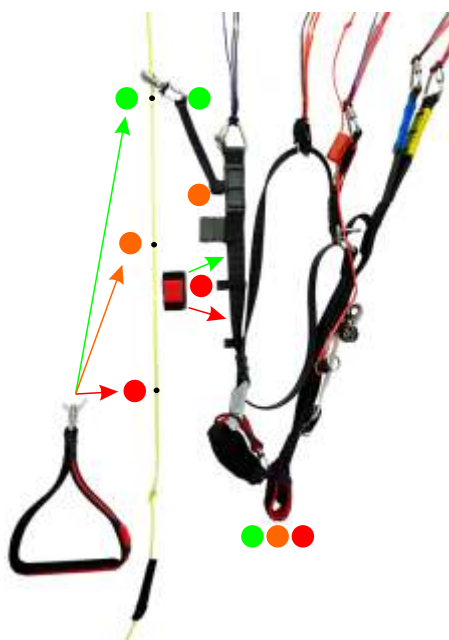


Figure 4 TEA cord inactive (a) and engaged (b)

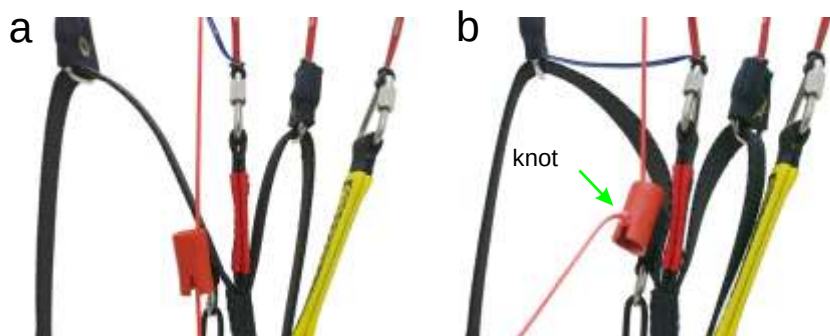


Figure 5

You can reduce drift of the paraglider (contrary to propeller rotation) with TEA or the additional inner loop in the risers hangpoint, visible nearby. Bear in mind though, that with TEA you can set a knot exactly where it's needed to compensate torque accurately, while simple loop does not have any adjustment.



Figure 6
Steering systems
scheme

Here is a simple guide
to find your way in a
maze of risers and
their various handles.

Classic brakes
operate along entire
trailing edge, ALC+
system is active on
the outer parts of the
trailing edge, and the
TEA affects stabilizer
only.

With this arrangement
the pilot has full range
of steering systems at
his disposal and can
freely choose between
them, according to his
needs and current
situation.

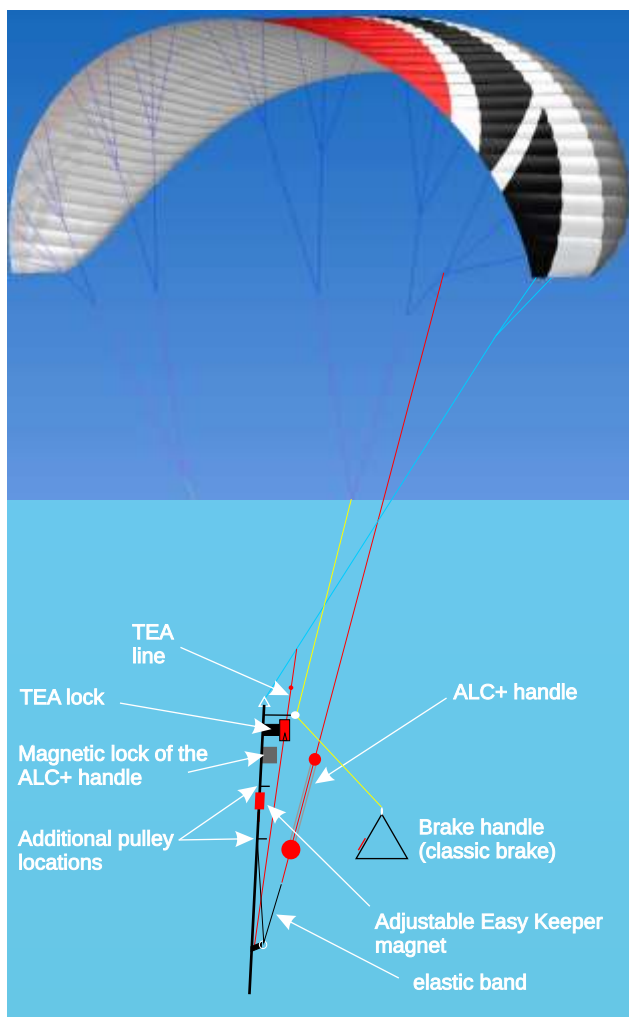


Figure 7 Trimmers influence on the wing profile

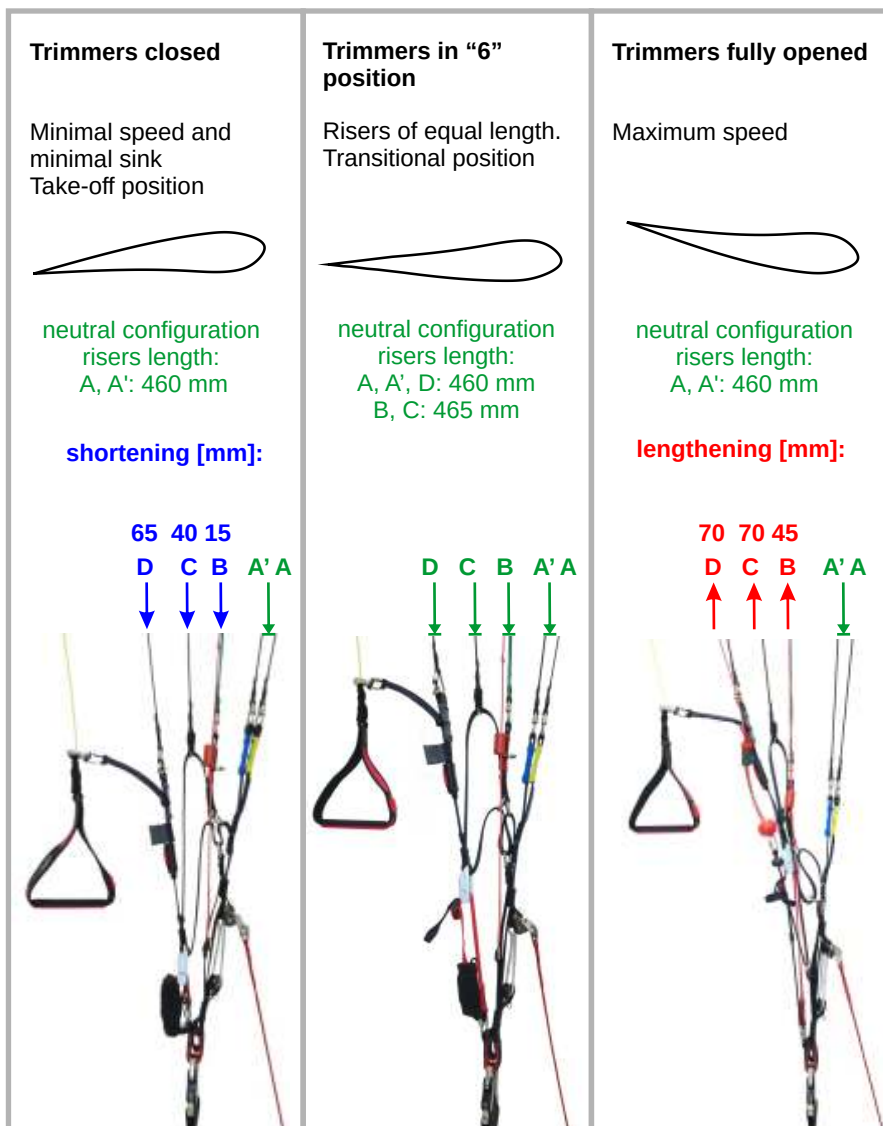


Figure 8 Trimmer settings influence on speed-system action

Lengthening and shortening values are given in respect to neutral risers length: 460 mm

Full acceleration with closed trimmers:
good speed, easy steering, decreased stability. Classic speed-system action.

Full acceleration with opened trimmers:
small angle of attack, maximum speed.
Great stability and hard steering.
Advised use of ALC+ system or TEA.

shortening [mm]

65 70 75 80

D C B A' A



lengthening [mm] shortening [mm]

130 50 30 80

D C B A' A



Trimmer operation tips



Torque effect adjuster can be used for correcting flight direction in fast configurations too (trimmers/speed system). It works the same way as the TST used in our older paragliders..

Main brakes and the ALC can be used both simultaneously and/or alternatively. The brakes will be more effective at slow settings, while the ALC at faster ones.

Thermalling is most effective at closed trimmers. In case of strong turbulence it is advisable to partly open the trims, thus increasing overall stability.

In nil wind conditions the launch is easiest at completely closed trims. The stronger the wind, the more you can open the trimmers. Nevertheless, launch on fast trim settings will be hard or outright impossible (depending on wind speed).

Leading
edge

Trailing edge

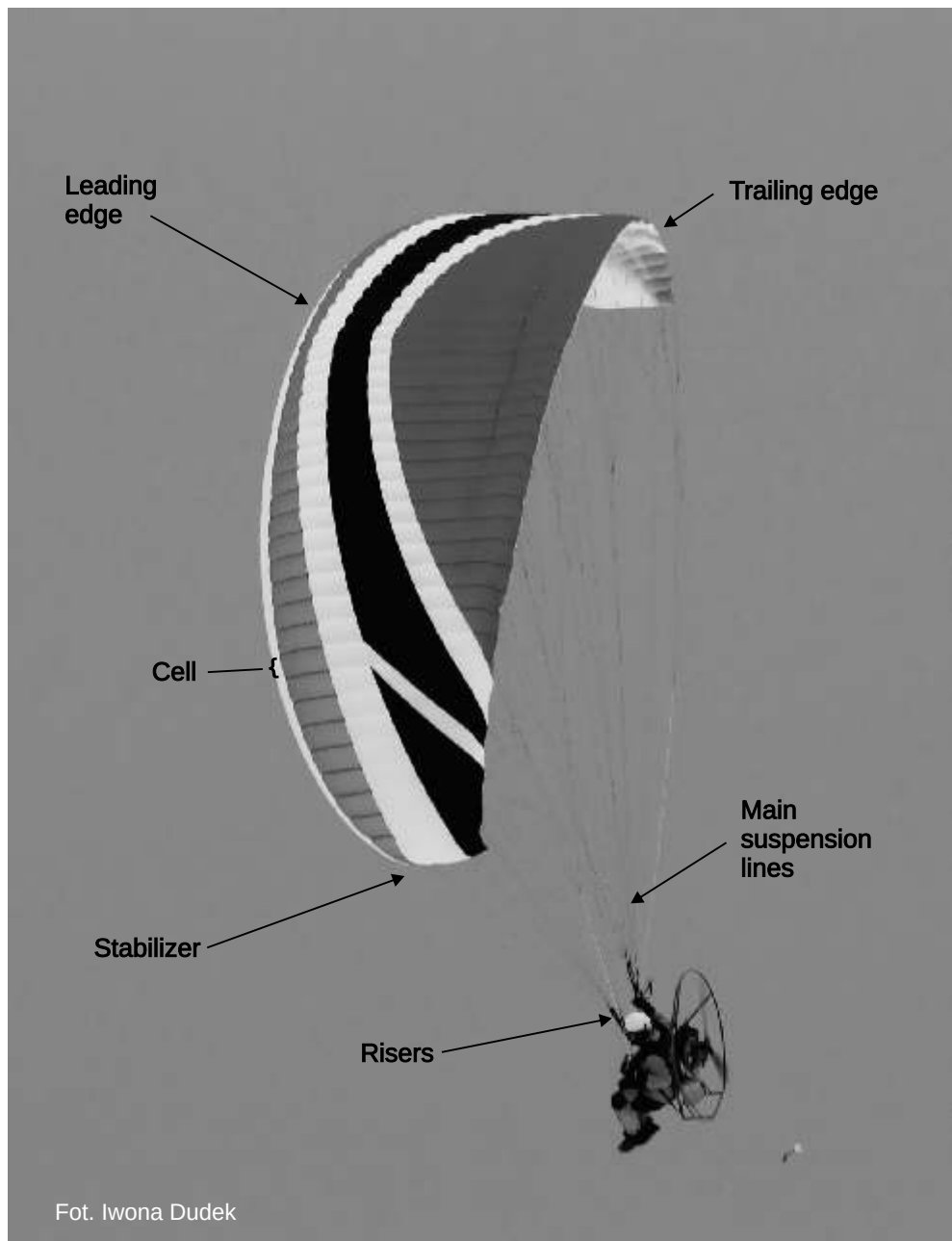
Cell

Main
suspension
lines

Stabilizer

Risers

Fot. Iwona Dudek





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