



user manual

# Nucleon 4

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### **Congratulations!**

We are pleased to welcome you among the growing number of DUDEK PARAGLIDERS pilots. You've become a proud owner of a sport paraglider, designed according to recent trends among paramotor canopies.

Extensive development, application of the modern production 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.

### **Please read this manual carefully and note following details:**

- The purpose of this manual is to offer guidelines to the pilot using the

paraglider. By no means it is 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.
- 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 liabilities involved.
- 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 certification

invalid.

- Other documents concerning this paraglider can be found on attached pendrive or on our website [www.dudek.eu](http://www.dudek.eu).

**Note:** Dudek Paragliders warns that due to the constant process of development the actual paraglider may differ slightly from the one described in the manual. However, those differences cannot affect the basic design parameters: technical data, flight characteristics or strength. In case of any doubts contact us please.

The Nucleon 4 is a classic paramotor wing. It is characterized by a solid reflex, very easy launch, pleasant steering, good economy and maneuverability ideally suited to the line of recreational, cruise and sports wings.

### **Design and purpose**

Nucleon 4 derives directly from the first reflex constructions that appeared in the world - Traper, Action, then ReAction. This pedigree was continued in several incarnations of the Nucleon, up to the current - fourth generation. We focused in particular on combining the Nucleon WRC's lateral stability with the agility and pleasant handling of the Nucleon XX. We also added the uncompromising stability of Reportair. Moreover, we managed to increase speed, load capacity, and make

the Nucleon 4 lighter than all its predecessors.

Nucleon 4 was designed for intermediate pilots who have already solidly mastered the art of reflex wing flying and are familiar with their specific features. One of them is unique resistance to turbulence, and the only requirement for this legendary reflex safety is to 'speed up', meaning the release of trimmers and brakes with an optional pressing the speedbar, which can be used in any trimmer configuration.

A very easy launch, comfortable steering and a pleasant flare at landing are standard in our designs, but in the Nucleon 4 it has been even increased. We improved the flight economy as well.

The spectrum of operation is wide, from recreational and cross-country flying to classic paramotor competitions.

### **Design**

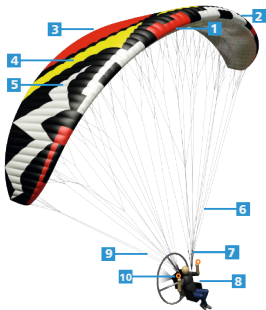
In the Nucleon 4 we used a new aerodynamic profile. The structure includes Flexi Edge (FET) technology, which ensures better aerodynamics and stiffness of the leading edge. Additionally, we use double reinforcements (LE2R) between the cells. Stiffening cores and other reinforcements together with the specific shape of the leading edge (shark nose) make sure that high pressure inside the wing is maintained over the full speed range.

Improved risers mechanisms make them intuitive to use, allow you to use the speed system in the entire range of trimmers, comfortably correct the flight direction with the 2D / TST system and compensate the spinning effect with the automatic TEA system.



Properly selected progression of the alternative 2D control system allows you to steer the wing reliably and effortlessly, which is especially important at higher flight speeds.

Nucleon 4 does not have a Power Attack system, nor is it possible to mount it.



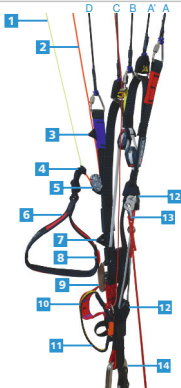
- 1 Inlets
- 2 Leading edge
- 3 Trailing edge
- 4 Cell
- 5 Ribs
- 6 Suspension lines
- 7 Risers
- 8 Harness
- 9 Steering line
- 10 Brake handle

The Nucleon 4 is produced in new technology, utilizing capabilities of precise laser cutter. All stages of the production process take place as our Polish plant under close supervision of the designer himself thus ensuring highest European quality.

Careful selection of modern fabrics and design solutions brings about great strength and durability of the canopy.

All materials used come from marked production batches, and each production step can be verified down to identification of individual worker and controller.

- 1 Steering line 2D outer
- 2 Steering line 2D inner
- 3 Pulley loop (1)
- 4 Covered swivel
- 5 Pulley loop (2)
- 6 Brake handle
- 7 Pulley loop (3)
- 8 Easy Keeper magnets
- 9 Trimmer buckle
- 10 Trimmer strap
- 11 TST handle



- 12 Speed system pulleys
- 13 Speed system hook
- 14 Carabiner



For the Nucleon 4 we have chosen four-way risers equipped with:

- ELR (Easy Launch Riser) system. It is a specially marked A riser (with red cover).
- Speed System affecting A, B and C risers when engaged, featuring ball-bearing pulleys and a dedicated line.
- Trimmers of red band marked with appropriate scale and locking magnet on its end.
- Different levels of the pulleys, to be used depending on the hangpoint level.
- TEA (Torque Effect Adjuster) - eliminates the engine torque effect, shifting paraglider contrary to propeller turn direction. The TEA system is on when TEA line is placed

on proper side.

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

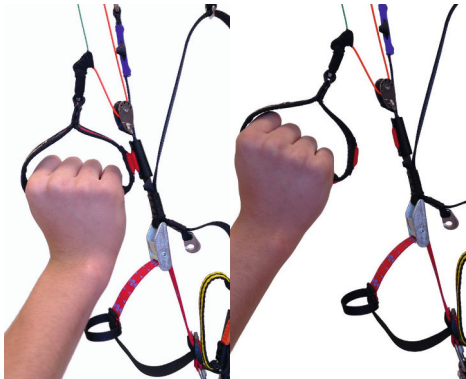
- **A** - red (used for launching),
- **A'** - neoprene black (used for big ears),
- **B** - yellow (used for B-stall),
- **C** - neoprene black,
- **D** - blue (needed to keep the glider down in strong wind – aborted launch).

**EK**

Easy Keeper

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 the danger of getting into running propeller.

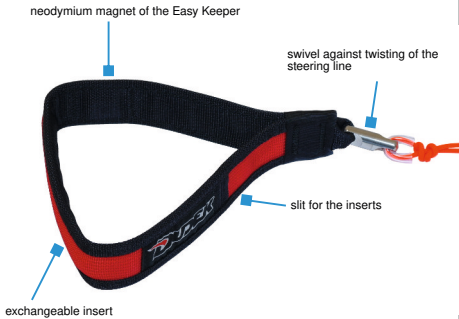


**TCT**  
Triple Comfort Toggles

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.



The soft handle is obtained when no insert is used



## Operation

Correct matching of the canopy and the paramotor belongs to the pilot.

Dudek Paragliders cannot take responsibility for all possible combinations, but if you contact us we are always ready to help.

## Weight range

Each size of the canopy is certified for specific weight range, meaning total take-off weight including the pilot, harness, paramotor, equipment and the canopy itself.

Exceeding maximum take-off weight described in technical data of the paraglider ("Pilot's weight incl. equipment") increases risk of an accident in case of pilot's error. The smaller canopy area as

compared to take-off weight, the greater the risk.

Paragliders considerably change their character due to increased load and each experienced pilot should perfectly understand that.

The biggest danger induced by overloading the canopy is its hyperreactivity.

**Caution:** Check your real take-off weight! Some pilots calculate their take-off weight by just summing up catalogue numbers, e.g.: paramotor 29 kg + canopy 6 kg + pilot 87 kg = ca. 120 kg. In fact your actual take-off weight can be umpteen kilograms bigger. Most often we forget the clothing, electronics, backpacks, sometimes even such basic things like fuel or rescue chute weight are omitted!

## Steering system

Steering system comprises following subsystems:

- 2D - multifunction steering system (basic brakes).
- TEA (Torque Effect Adjuster) - in this case it's an additional red line with metal link attached. This system works automatically after fixing the TEA line on appropriate side (depending on direction of the turning moment).
- Classic trimmer.
- Classic speed system.

**Caution:** Before first use of the paraglider check if the steering lines and their pulleys are fixed for the upper or lower paramotor

hangpoints and adjust them to your needs when necessary.

Adjustment of the steering handles, the pulley and the speed system.

As much as three positions for the steering line pulley are available (picture on the next page). Factory setting is in the middle loop. On the main brake line there are two points marked, higher and lower, for the brake handle at the middle position of the pulley. Depending on the pulley placement you have to adjust the steering lines' length accordingly.

In practice moving the pulley from the middle loop (2) to the highest one (1) will not require readjusting the steering lines. The lower loop (3) will definitively require increasing that length by a distance between the middle (2) and the lowest (3) pulley loop.

It's also possible to readjust the Easy Keeper magnets position on the risers. At the highest pulley setting the magnet is also at its highest position, while at lower setting the magnets are also placed lower, as shown on the picture.

The steering lines' length should be adjusted so that in max speed mode (released trimmers and fully engaged speed system) the steering lines are not affecting the trailing edge.

Steering lines progression - that is the difference in length between the central line led through the pulley and the outer (yellow) line - is set at the factory and basically should not be adjusted. As an exception the progression can be altered to suit individual preferences, but no more than +/- 3cm and keeping to the rules described above.

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 ask someone to pull the risers up. 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 lines too. The speedbar when not in use must not pull the lines nor risers. Neither should it be too loose, for it could then get into rotating propeller.

An additional way to check the whole configuration out is to visit a take-off site in steady winds of ca. 3 m/s. With the engine off, inflate the wing and take it up over your head. When it stabilizes, check that the brakes are completely loose and do not



affect 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.

**Caution:** Ill-adjusted steering lines can be a reason for wrong assessment of the canopy state, and/or can cause dangerous deflations on high speeds when too short.

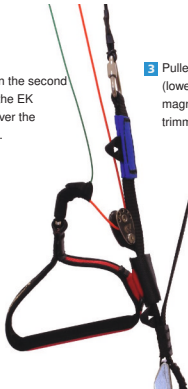
### **Other systems**

This paraglider has no other systems which can be adjusted, exchanged or removed.



- 1** Pulley placed in the first (highest) loop; the EK magnet fixed over the second pulley loop.

- 2** Pulley placed in the second (middle) loop; the EK magnet fixed over the trimmer buckle.



- 3** Pulley placed in the third (lowest) loop; the EK magnet fixed over the trimmer buckle.





### First flights

In order to get familiar with your wing we recommend at first flying with the trimmers in slow positions (trims closed or slightly opened 2-3 cm), since in this configuration the Nucleon 4 behaves as a classic wing.

Once you feel confident with your wing, you can start experimenting with faster trim settings and speed system. Use all additional speed and vigor of the Nucleon 4.

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

### 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 steep crossing of the wind gradient is greatly reduced then). Special attention must be paid to trees, power lines and other obstacles, including the possibility of emerging rotors.

### Preparing the canopy

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. Trimmers should be closed or slightly opened 2-3 cm (trimmer scale is marked every three cm). In strong 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 run the pre-launch checklist.

### See if:

- the helmet is on and locked,
- the trimmers are properly set,
- 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,
- the take off area is clear of obstacles and free to use.



When you are sure everything is OK, you can clip the risers in the paramotor's harness.

Applying steady and equal pressure on both A risers move forward.

The wing practically does not overshoot, so the front collapses that otherwise happen quite often during launches are rarely seen with Nucleon 4. Instead it kind of waits for you to catch up.

From now on you should steer the paraglider facing forward, without looking back over your shoulders. When the canopy lies low behind you and you will try to turn, some lines can get in the propeller. On the other hand, 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 that the strain on both risers to be equal, 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 observing starting direction. If the wind lulls, give a stronger pull on the risers.

If the paraglider drops to one side or back too far to rise again, kill the engine, interrupt launch and assess 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 in full and

the lines are not tangled, but do so neither stopping nor looking back over your shoulder. 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 colliding with the propeller. Before giving it full power, see that the cage did 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 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.
- The lower the hangpoints of your power unit are, the easier is the launch.

### **Reverse launch in strong wind**

Reverse launch can be executed while 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 to launch. In weaker wind it is better to prepare a classic launch, as running backwards with a paramotor on your back is not the easiest thing to do. It

is reasonable not to pull the wing up until you are really determined to launch, especially when it's already 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 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 (with the canopy lying still).

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 inflate the canopy. The Nucleon 4 comes up easily and sometimes may require a dab on the brakes to stop it over your head.

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.

**Caution:** 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, as due to additional drag the actual rate of climb will worsen and with the throttle fully opened even a stall can occur.

In powered flight the Nucleon 4 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 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 the Nucleon

4 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 counteract with a brake. Nucleon 4 is equipped with an automatically operating TEA line (Torque Effect Adjuster). Unsymmetrical TEA assembly is an efficient countermeasure against the turning moment.

When climbing steeply with slow trim settings and high power output keep in mind the risk of stalling!

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,
- use the TEA system by fixing the line on the side opposite to the torque direction and/or,
- shift yourself to the other side of the harness.

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 pilot reactions are often too late or wrong, increasing the problem instead of solving it. In this case a simple 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.

TEA line (Torque Effect Adjuster) works automatically after fixing the TEA on appropriate side (depending on your paramotor's torque direction).

First flights should be absolved without the TEA assembled yet, in order to assess if

the torque of your paramotor indeed requires installing this system.

Correct assembly of the TEA line is pictured on the next page.

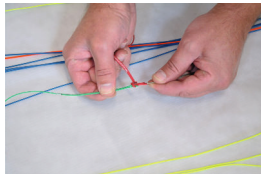
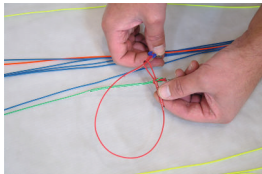
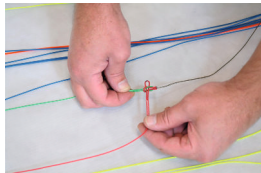
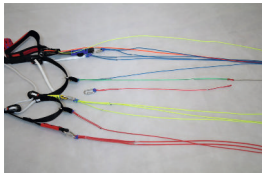
### Level flight

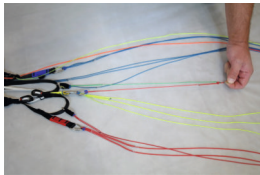
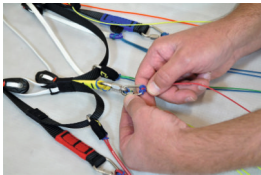
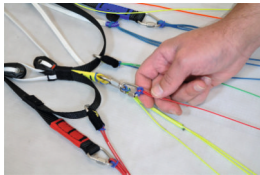
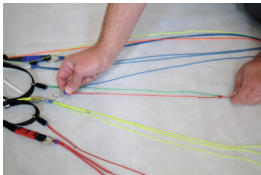
Once you have gained safe height after take-off and wish to go for a route, you can turn on the right direction, fully open the trimmers and let off the brakes. If the conditions are turbulent, it can look foolhardy, but this is the essential feature of the reflex profile - the faster you fly, the safer your Nucleon 4. That's why it's actually possible to release the brakes and enjoy your flight.

**Caution:** Some pilots with previous free-flying paragliders experience may have a well-grounded habit of keeping the brakes

slightly taut 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 for reflex paragliders. When you pull the brakes, the Nucleon 4 profile loses its reflex characteristics.

Good knowledge of weather conditions (e.g. wind at different altitudes) and smart use of thermals, convergence and other kinds of lift is another way of greatly reducing fuel consumption and increasing your flight range.





### Trimmers and speed-system operation

The reflex airfoil of the Nucleon 4 means safe operation of the trimmers and speed-system in a wide range. You are free to experiment with all possible settings, as long as you are on safe altitude. The trimmers belong to basic steering instruments. Their use should be widely understood, nevertheless we would like to underline some basic rules concerning safety.

**Caution:** The trimmers must always be released (activated) symmetrically. Full release of just one trimmer will cause the paraglider to enter a turn, and extreme cases can lead even to a spiral. A canopy reacts to unsymmetrical trimmers depending on its model and current take-off weight (the bigger weight, the more

dramatic reaction). The only exception from the symmetric trimmer operation rule are slight differences in settings necessary for course adjustments.

When you intend to release the trimmers, follow this procedure:

- grab the trimmer buckles,
- press the locks of both buckles with your thumbs,
- once you feel both locks to let go, allow the trimmer tapes to slowly slip out,
- in this way you will be able to release the trimmers as much as you intended to, in a controlled action.

**Caution:** Closing the trimmers should be symmetrical too, pulling both tapes simultaneously.

### In case of unsymmetrical trimmer release:

- correct flight direction with a brake,
- release the other trimmer (when altitude allows), or close the previously released trimmer.

**Caution:** Trimmers must be activated on a safe altitude, with enough margin for error.

**Caution:** Fast releasing the trims results not only in rapid acceleration, but also increase of the sink speed! This can be a nasty surprise for less-experienced pilots flying at low altitudes. Fast releasing the trims results not only in rapid acceleration, but also increase of the sink speed! This can be a nasty surprise for less-experienced pilots flying at low altitudes.

### Trimmers and reflex profile

Trimmers in the Nucleon 4 affect geometry of the airfoil. At closed trimmers the airfoil features generates more lift with decreased reflex character (similarly as in Snake XX). The more trimmer is released, the more reflex there is.

Always when you are flying at high speed, be it with released trimmers, additionally engaged speed system, your steering inputs must be smooth, with no rapid movements. When accelerated, the reflex wing canopy is often lacking support of the rear line rows – they are loose. Rough yanking of steering handle changes the pressure distribution and trimming of an airfoil. The airfoil can rapidly increase pitch and aggressive tuck will follow.

Slow trimmer settings decrease sink and steering forces, so it is possible to

efficiently use the thermals.

Study drawings of trimmers and speed-system adjustment and setting, as well as their influence on the wing shape.

#### Remember:

- Trimmer setting is another part of the pre-start check list!
- If it will be asymmetric, the wing will be constantly turning.

### Speed system

Works in the Nucleon 4 exactly in the same way and in the same range as releasing the trimmers. Both systems can be used alternatively in various proportions as needed (observing the rules described below as for steering requirements in different speed modes).

**Caution:** In calm air, Speed system can be used at any trimmer position! The increase of wind speed and turbulence must be assessed by the pilot who should consider the safety limits of the conditions before making any decision.



**Three basic speed modes can be distinguished (as for trimmer setting and speed system action):**

- **Slow mode** (trimmers closed) - pilot is using brakes for steering,
- **Accelerated mode** (released trimmers or speedsystem applied),
- **Fast mode** (released trimmers and fully engaged speed system).

**Flight – trimmers closed (slow mode):**

Steering is done with main brake handles. You can pull them straight down along your body or sideways, away from your body, thus differentiating the progression and the bank angle.

- Straight down along your body - bigger progression, sharper turns.
- Away from your body - lesser

progression, less banking in turns.

- Combined technique - "inner" hand along the body, "outer" hand moves away to keep central part of the canopy solid and stay ready for necessary corrections.

**Flight – trimmers released or speed system engaged (accelerated mode)**

In a cross-country flight, it is strongly advised to correct your direction with the TST handles. In this way you are steering with the wingtip only, that is by the outer part of steering system like in TCL design (Tip Control Line). Such steering affects the reflex profile the least, so that the safety remains guaranteed while steering is effective. Sometimes little collapses of wingtips can occur. This is not dangerous, does not even alter the flight direction, as

long as the pilot does not keep the steering line pulled for long and does not allow the collapse to grow. When necessary you can decrease your speed some by pulling the trimmer or releasing speedbar a bit.

Steering is also possible with just the toggle doing short move along the body (more progression). Abrupt pulling the handle is not advisable and in no case should you affect the inner (orange) line of the 2D steering.

**Slow mode**

Trimmers completely closed (0)  
Speed inactive

- slowest speed
- minimum sink
- thermalling

Risers' length\*:

- A- 525
- A'- 507
- B- 489
- C- 472
- D- 455

\* lengths of the risers incl. quicklinks,  
length tolerance +/- 5mm.



**Fast mode**

Trimmers completely closed (0)

- increased speed
- speed system

Risers' length\*

- A- 350
- A'- 360
- B- 370
- C- 413
- D- 455

\* lengths of the risers incl. quicklinks,  
length tolerance +/- 5mm.



**Accelerated mode**

Trimmers fully released

- Speed inactive
- increased speed

Risers' length\*:

- A- 525
- A'- 530
- B- 535
- C- 565
- D- 595

\* lengths of the risers incl. quicklinks,  
length tolerance +/- 5mm.



**Max speed mode**

Trimmers fully opened

- Speed activated
- maximum speed

Risers' length\*:

- A- 350
- A'- 383
- B- 416
- C- 506
- D- 595

\* lengths of the risers incl. quicklinks,  
length tolerance +/- 5mm.



**Flying at maximum speed – trimmers open and speed system engaged (fast mode):**

Only the TST handle should be used to steer at full speed. They do not distort the reflex profile, guaranteeing safety and efficiency of operation.

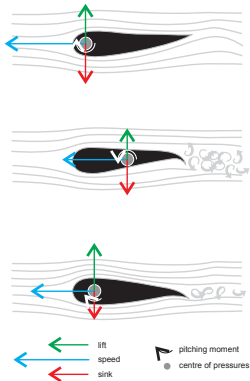
**Caution:** The safest way of directional control at high speeds is to use the TST handle. Whenever you fly at high speed - be it on open trimmers or speedbar - smooth steering inputs are recommended. Any yanking or rapid deep pulling of the brakes can dynamically disturb the pressure distribution over the airfoil and therefore its actions.

**Influence of brake operation on the reflex profile.**

Pilots used to flying classic paragliders tend to „active“ piloting with their brakes always under tension. Flying a reflex wing like that is not only ineffective, but can be dangerous too.

The basic rule of flying reflex paragliders says: **The more turbulent is the air encountered, the more trims should be released and use of regular brakes avoided (especially with speedsystem engaged).**

Steering the paraglider in such configuration is most effectively done with systems like TST, designed specifically with that use in mind. The problem is shown on the pictures on the next page.



**Released trimmers without using brakes**

Typical configuration for fast and safe flying. Center of pressures of the aerofoil moves forward, practically excluding frontal collapses. Pitching moment increases the attack angle.

**Released trimmers with brakes applied**

Even slight brake operation (especially when fully accelerated) will move the centre of pressures backwards, and the pitching moment will decrease the angle of attack. Additionally, the airflow is considerably disturbed. In particular cases this can cause a collapse. Steering can be necessary for heading corrections, nevertheless you should keep your brakes fully released when flying straight – otherwise the reflex feature will not work.

**Closed trimmers**

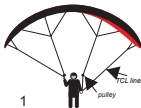
Using the brakes is a typical steering mode in this configuration and does not cause any danger. This setting is used during thermalling.

The canopy behaves much as classic profile paraglider, with slightly increased tuck resistance.

Beside you can see basic steering modes with 2D system. Demonstrated examples are by far not a complete catalogue – there is a lot of interim configurations and only the pilot will choose which steering mode he finds best in specific situations.

2D steering is considerably different than the classic steering system. The possibilities it offers are of special value for competition pilots. On one hand the 2D system offers much more precise control of the canopy, but on the other it requires learning new (different) reflexes and reactions.

Pilot must spend some time exploring the system and perfecting his own technique before flying 2D in demanding environment of the competitions.



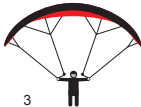
1

Classic turn – pull the brake handle down.



2

Classic braking - pull both brakes down.



3

Hard braking the central part - push both brakes aside.



4

Extreme braking the central part - pull the inner lines down.



5

Tight turn – pull the outer TCL line down.



6

Deep turn – pull the inner brake handle down, and push the outer brake handle a bit aside.



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

### **Power off landing**

At an altitude of ca. 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 – it has to be done right!

Trimmers must be fully closed (0) or slightly released (2 to 3 cm), depending on individual preferences and weight of the pilot.

Since wing loading of the Nucleon 4 will usually be higher than of our other paramotor wings, landing with slowed-down canopy with little speed should be definitely avoided. In contrast, a full-speed

(released brakes) landing with flare is recommended. Nucleon 4 is very efficient at converting airspeed for lift, so you can glide a long way slowing down with gradual increase on the brakes. Finally the level flight is stopped and soft touch-down ensues.

### **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 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.



### Free flying

Although the Nucleon 4 according to its design book is a fast paramotor wing, it behaves surprisingly well as a classic paraglider too and can be used as such without any modifications.

The essential difference between the Nucleon 4 and classic paragliders means that due to its increased tuck-resistance (both during start and flight) and greater speed range it can be safely flown in strong conditions too. Generally speaking the faster you fly, the safer is your flight.

The launch, flight and landing procedures of powered flying are not much different than those of the free flying, so we will not describe them in minute details here.

**Caution:** During launch always take care to properly pull the canopy up and forward.

The reflex profile used in the Nucleon 4 has an inherent tendency of increasing the angle of attack. Therefore if the canopy is not pulled enough, it can stay behind the pilot, rendering launch difficult and/or dangerous.

### Winching

Nucleon 4 is not designed for winching. As mentioned before, reflex profile used has an inherent tendency to increase the angle of attack. While in normal flight such a disposition makes it safer, it can be dangerous during winching. Nevertheless, a lot of successful winches on Nucleon 4 have been made.

**Caution:** Winching can be done, but proper attention must be paid.

**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's always better to take 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, since 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 etc., 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. 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.

## Big Ears

In order to get the big ears you have to pull down the outer lines of the A' risers (neoprene cover) by ca. 20-50 cm. While inducing big ears you should never let the brakes out of your hands. After tucking the tips in, the Nucleon 4 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, until the tips will unfold.

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. Executing big ears with opened trimmers is very difficult due to reflex profile stability.

**Caution:** Never try to pull big ears during powered climb, as the increased drag of the ears can cause excessive angle of attack and a parachutal stall. Besides, pulling the ears while climbing is pointless anyway.

## B-Stall

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

To enter a B-stall, simultaneously pull down both B-risers (yellow cover) by ca. 10-15 cm. The canopy will collapse across the entire span along its B-row, the airflow over top surface will break and projected canopy surface will be decreased. Forward movement will be almost completely stopped.

Further pulling B-risers is not advised, as testes have shown it to increase wing

instability. If the canopy forms a horseshoe, gently pull 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. The surge forward is minimal due to stability of thre reflex profile, so braking is not necessary.



### Spiral dive

Nucleon 4 is an agile paraglider, so it enters spiral dive very quickly and can surprise the less experienced pilot.

A spiral is characterised by reaching the highest sink rates possible.

Significant G-forces, however, make it difficult to sustain a spiral dive for a long time, as it can 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.

**Caution:** Never execute manoeuvres generating high G-forces (spiral dive, dynamic wingovers etc.) on released trimmers, as this is very dangerous!

Releasing the trimmers shifts the loading centre of the canopy forward, toward leading edge. This rule affects all paragliders, but the more reflex is present in the airfoil, the more aggressive is that effect

A typical reflex paraglider on released trimmers shows following load distribution according to line rows: A=60%, B=30%, C=5%, D=5%.

Taking over as much of the load by the A and B rows of the reflex canopies (90% in total) brings about their praised stability.

However, in connection with a dynamic manoeuvre which a spiral dive is, it can

shift the load dangerously close to its maximum value.

Similar situation occurs when executing spirals or wingovers with big ears pulled. That's another example of concentrating whole load on reduced wing area, which - combined with high G manoeuvres - shifts the peak loads unnecessarily close to their maximum values.

### Wing over

You make a wingover by performing a series of consecutive, alternating turns with growing bank angle. Too aggressive banking with insufficient control can result with a massive collapse.

### **Aerobatics**

Nucleon 4 was not designed to do any aerobatics.

**Caution:** All rapid descent techniques should be practiced in smooth air and only with sufficient extreme manoeuvres altitude margin! Full stalls and spins are to be avoided as they are not recommended techniques of clearing dangerous situations. Irrespective of paraglider type they may have dangerous consequences.

**Caution:** By far the best technique is safe and correct flying, so that you will never need to descend rapidly

**Caution:** Due to high resistance of the Nucleon 4 against both side and front collapses, we strongly recommend not to provoke such situations at all, even during safety trainings. Inducing collapses in standard way can be very hard to impossible, while unconventional attempts can result in extremely violent and dynamic behaviour.

**Caution:** Extreme flying manoeuvres should only be carried out during safety training courses (instability training) under proper guidance!

### **One sided collapse**

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 Nucleon 4 on course or at least decrease a swing of the canopy toward collapsed side. Under normal conditions with collapses up to 50% of the wingspan, the wing will reinflate instantly and spontaneously. If not, you should aid this process by application of a brake on the collapsed side.

When the collapse occurred with trimmers in open position or additionally with speed system engaged:

- release the speedbar at once,
- control the direction with steering handles,
- try to close the trimmers ASAP.

### **Frontal collapse**

The reflex profile of the Nucleon 4 makes it

practically impossible, especially at higher speeds. Any forced attempts can lead to extremely deep collapses, so recovery will require decisive pilot action (short and equal application of both brakes). When the trimmers are activated follow the side collapse procedure, but this time symmetrically.

### **Full stall and negative spin**

May happen only as a result of serious neglect or intentional action of the pilot. You have to be careful when flying at very low speeds until fully familiar with brake operation.

The canopy recovers spontaneously in initial phase of stall, otherwise use standard procedures.



### Deep stall

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

- After B-stall, release the risers quickly and evenly. Don't be afraid – the wing 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 effective aerodynamic brake with significant loss of speed.

Nevertheless, if such a parachutal stall happens, simply apply some pressure on speed bar and/or push the A risers forward.

### Line over and cravatte

Nucleon 4 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.

**Caution:** In case of any doubts you should seriously consider throwing the rescue chute.

### Emergency steering

In case of any malfunction that renders normal steering impossible, you can safely steer and land Nucleon 4 using the D-risers (blue cover) or stabilo lines.



### Packing and storage

Nucleon 4 design incorporates modern technologies, including nylon lines in the leading edge. That's why the paraglider should be carefully packed, with proper conditions ensured for transport and storage.

### Basic rules to be followed when folding the canopy:

Fold it accordion-wise rib to rib (cell by cell). Do not fold it by halves, placing the stabilizers at the centerline.

When a compact package is created on the longest chord do not roll it, but fold three to four times (depending on the chord length) from trailing edge towards the leading one.

The leading edge remains on top of folded canopy.

Never pack you paraglider too tightly.

Optionally pack the wing into a dedicated WingShell.

If you have completely prepared your gear but have to wait for launch, a good idea is to use a quickpack, to protect your wing against moisture and UV rays.

Never pack or store the glider when wet, as it significantly shortens life of the fabric. Remember that the wing becomes damp even while lying on green grass in direct sunlight, as the grass transpires.

**Caution:** Locking a wet paraglider in a car exposed to sun is absolutely unacceptable! Hot car interior acts like an oven and tests have shown that color bleeding/transfer can happen even at 50 Celsius degree. The warranty does not cover such damages!

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

Store the paraglider in a dry place, away from chemicals and UV exposure. Ideal storage temperature for the paragliders is 5 to 25 Celsius.



### **Cleaning**

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

### **Deterioration - a few tips**

The paraglider 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.

Suspension lines in this paraglider consist of Technora inner core and polyester

sheath.

Submitting them to excessive bending and loading in flight should be avoided, as it can cause irreversible damage.

Please note that with frequent kiting on a field or a small hill your paraglider will deteriorate more quickly due to its repeated rising, falling and being dragged around.

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 cloth (including coating 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,

while sharp edges can damage the cloth.

Prevent lines from catching anything, as they can overstretch or tear. Never step on the lines.

Knots can chafe suspension and/or brake lines.

Check the length of your lines after tree or water landing, as they can stretch or shrink. The lines can be measured at the manufacturer or an authorised workshop.

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. 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.

Frequent flying near oceans and seas accelerates deterioration of the paraglider, as salt present in the sea breeze can make the lines stiffen and even break.

### Repairs

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

### Inspections

Full Inspection is recommended every 24 months or every 150 hours whatever comes first, if not advised otherwise by the

inspecting person due to paraglider's condition.

In case of paragliders used commercially (e.g. in schools or tandem flying) a Full Inspection is recommended every 12 months after first 24 months from purchase date or every 100 hours airtime (whatever comes first).

A paraglider can be officially inspected only by the manufacturer or a dealer (authorised to do so).

We are aware that purchase of a new paraglider is a big expense for every pilot. That's why we guarantee quality of our products, as well as optionally we are offering a security system that will allow you to insure your paraglider against possible damage and repair costs with an AeroCasco insurance.

#### Warranty:

Dudek Paragliders guarantees free of charge repairs in case of damages caused by the material or production flaws:

- For the free-flying paragliders warranty covers 36 months (3 years) or 300 flight hours, whatever comes first. If the free-flying paraglider is used for powered flights, every hour flown is counted double (not concerning PPG paragliders).

- For the paramotor canopies (PPG) warranty covers 24 months (2 years) or 200 flight hours (whatever comes first).
- For the mountain wings (MPG), speedflying, schools or professional users warranty covers 18 months 1,5 year) or 150 flight hours (whatever comes first).

#### Warranty does not cover any of the following:

- canopy colour fading as well as bleeding caused by improper storage/transport,
- damage caused by chemicals or salt water,
- damage caused by improper use,
- damage caused in emergency

situations,

- damage resulting from accidents (airborne or otherwise),
- consumables (e.g. trimmer tape).

#### Warranty is only valid if:

- flight hours can be identified basing on properly kept logbook of the owner (and his possible predecessors) with marked PPG hours,
- the paraglider is used in accordance with the operating manual,
- the owner did not make any repairs by him/herself (excl. minor repairs with self-adhesive patches),
- the owner did not make any modifications,
- the paraglider can be unmistakably

identified by data sheet/sticker,

- the paraglider has been properly inspected at all times.

**Caution:** In case of damages caused by the material or production flaws please contact the dealer that sold you the gear. The dealer will determine further actions.

If you have bought the paraglider second-hand, ask previous owner for a copy of his logbook (covering entire use of the paraglider from the day of original purchase).

### **AeroCasco**

Standard warranty does not cover repair costs of damages caused by the user or a third party. Since costs of such repairs can be considerable, Dudek Paragliding offers an AeroCasco insurance. It offers a one

time repair of any mechanical damage, no matter how big and who caused them.

The only expenses you will be facing are shipping costs and the share-of-cost amount.

AeroCasco can be purchased for a brand new paragliders only (at the purchase).

**Caution:** AeroCasco is not available for all paragliders (check before purchase). It can be purchased only for privately used paragliders.

AeroCasco covers only damages occurring while taking-off, flying 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. AeroCasco is valid for one repair only during covered time.

There is a possibility of extending AeroCasco for one further year. To do this you have to send your paraglider for inspection to the manufacturer not later than a year after the date of purchase. Remember to include the AeroCasco confirmation when you send the paraglider for inspection.

AeroCasco does not cover any of the following: theft, canopy discoloration, damages caused by incorrect storage damage of transport, damages caused by chemicals, salt water or force majeure.

**Environmental care**

Paragliding is an outdoor sport.

We believe that our clients share our environmental awareness. Exercising paragliding you can easily contribute to environment preservation by following some simple rules. Make sure you are not harming nature in places where we can fly. Keep to marked paths, do not make excessive noise, do not leave any garbage and respect fragile balance of the nature.

**Recycling of used gear**

A paraglider is made out of synthetic materials, which need to be properly disposed of when worn out.

If you are not able to dispose of the paraglider properly, DUDEK Paragliders will do that for you. Just send your

paraglider to the address given at the end of the manual, accompanied by a short note.



**The Dudek paraglider you bought should include following items:**

- DewBag
- Transport bag (with your canopy inside)
- The paraglider itself (canopy, lines and risers)
- Compression strap to keep the canopy together
- Wind indicator (windsock or a strap)
- Pocket with paper work and repair wallet including:
  - 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 are to be repaired by an authorised service only.
- Looped and stitched suspension line (the longest of all lines in the paraglider) to be used as a temporary replacement. Do not cut it if you have to temporarily replace a shorter one, just tie it at the length needed.
- Paraglider passport with entered date of purchase and valid technical inspection (please check the serial number with the sticker on wing tip).
- USB drive with this manual.
- Small gifts



<b>Nucleon 4</b>	<b>18</b>	<b>20</b>	<b>22</b>	<b>24</b>	<b>26</b>	<b>28</b>
Approval - ULM identification	yes	yes	yes	yes	yes	yes
Number of cells	60	60	60	60	60	60
Surface area (flat) [m <sup>2</sup> ]	18,00	20,00	22,00	24,00	26,00	28,00
Surface area (projected) [m <sup>2</sup> ]	15,29	16,99	18,68	20,38	22,08	23,78
Span (flat) [m]	10,04	10,58	11,10	11,59	12,07	12,52
Span (projected) [m]	7,93	8,36	8,77	9,15	9,53	9,89
Aspect Ratio (flat)	5,60					
Aspect Ratio (projected)	4,11					
Speed [km/h]	min = 28; trim = 42 – 53; max = 67 + - 3					
Max. chord [mm]	2210,00	2330,00	2443,00	2552,00	2656,00	2756,00
Min. chord [mm]	552,00	581,00	610,00	637,00	663,00	688,00
Distance pilot to wing [m]	6,02	6,35	6,66	6,96	7,24	7,52
Total line length [m]	272,90	288,30	302,95	316,95	330,37	343,29
Total take-off weight [kg]	70 – 100	80 – 110	90 - 120	100 - 130	105 – 140	115 – 150
Max take-off weight - for experienced [kg]	110*	125*	135*	150*	160*	175*
Distance between risers [cm]	45,00	45,00	45,00	45,00	45,00	45,00
Weight [kg]	4,82	5,25	5,51	5,88	6,24	6,63

Lines	A-8000U: 050; 090 / Technora: 90; 140; 190; 280; 340 / Dyneema: 350
Fabric	Porcher Classic 38 g/m <sup>2</sup>
	Dominico tex 34 g/m <sup>2</sup>
	Porcher Hard 40 g/m <sup>2</sup>
	SR Scrim, SR Laminate 180 g/m <sup>2</sup>
Risers	PASAMON - Bydgoszcz, Polska

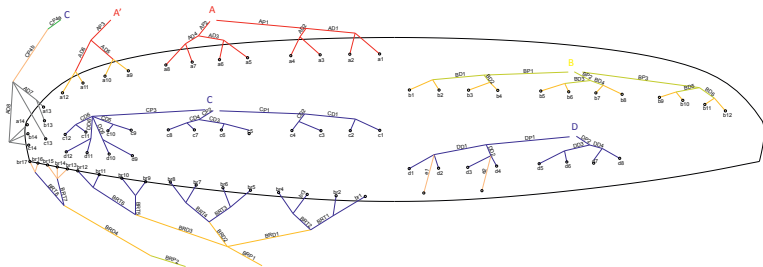
\* Detailed list of materials used for the manufacture can be found in service documents file on the page of a wing, available on our website [www.dudek.eu](http://www.dudek.eu)

The rigging scheme itself is published on the next page, while tables of line lengths you will find in attachments to this manual.

Lengths are measured with a specialised, computer-operated device. All the lines before measurement are stretched with a steady 5 kg load. Thanks to abovementioned device and proper procedures, final tolerance of line lengths does not exceed +/- 10mm.

**Caution:** 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, with at least 15 cm margin for fastening brake handle (this means for

this line extra 25 cm than in the table is needed).



By purchasing our gear you've become an important part of Dudek Paragliders family!

Share your experiences with the entire community and stay current with new offers by joining our fanpages:



### **Movies and pictures**

If you have interesting photos and films of your flying by all means send them to us, and we will share them with our entire community:

**media@dudek.eu**

Do not forget to label everything you publish in social media with #dudekparagliders!



### Need any help?

- Do you want to fly with us, but are not sure which paraglider should you choose?
- Are you already our pilot, but would like to know more details concerning your wing?
- Or maybe you seek advice in honing your skills?

Write us! Send an email to:

**[support@dudek.eu](mailto:support@dudek.eu)**

and our specialists will answer all your questions!



If you respect the rules of safe flying and proper glider care, you will enjoy many years of pleasant airtime on your Nucleon 4. 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 choicesafety margin during all manoeuvres.

**Caution:** Flying the paragliders is always your own responsibility!



Dudek Paragliders

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