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# ECHO MOTOR Owner's Manual

## POWERED PARAGLIDER EN / LTF B + DGAC

### Welcome to Bruce Goldsmith Design

BGD is a world leader in the design and production of paragliders. For many years Bruce Goldsmith and his team have been developing products with world-beating performance for pilots who want the best. We apply our competitive knowledge to design top quality products that combine the highest performance with the safe handling our customers value and respect. BGD pilots appreciate our quality and reliability. BGD's world-class status is based on the skills and expertise we have developed in combining aerodynamic design with cloth and materials technology. All BGD products are developed and made with the same skill and attention to good design that are synonymous with the ultimate performance and precision required by paragliders.

### Congratulations on your purchase of the BGD ECHO MOTOR

The ECHO MOTOR is a lightweight and versatile PPG wing. It is designed to a high standard of safety and stability, but it will only retain these characteristics if it is properly looked after.

This manual has been prepared to give you information and advice about your paraglider. If you ever need any replacement parts or further information, please do not hesitate to contact your nearest BGD dealer or contact BGD directly.

Please read this manual carefully from the first to the last chapter to ensure you get the best out of your new wing.

# 1. Introduction

The ECHO MOTOR is a powered paraglider suitable for intermediate pilots offering a high level of passive safety combined with speed and good performance which make this wing a real pleasure to fly. It is certified for both free-flight and paramotor use with two riser sets available – one for free-flight and one for powered flight.

Ensure that you have the correct riser set installed for your intended purpose, free-flight or PPG.

The use of this glider is limited to non-aerobatic manoeuvres.

This paraglider must not:

1. Be flown outside the certified weight range
2. Have its trim speed adjusted by changing the length of risers or lines
3. Be flown in rain or snow
4. Be towed with a tow-line tension in excess of 200kg

## Test Flight

It is your dealer's responsibility to test fly your paraglider before you receive it. The test flight record of this can be found towards the end of this manual. Please be sure that this has been completed by your dealer. Failure to test fly a new paraglider may invalidate any warranty.

## **Brake Line Adjustments for PPG**

When using the PPG risers, the brake line lengths should be adjusted to suit the hangpoints (high, low or trike).

### **Modifications**

When using the PPG riser set, only the brake line lengths should be adjusted. No other changes or modifications should be performed without first consulting your BGD dealer, as they may invalidate the warranty or certification.

### **Warranty**

In order to enjoy full benefits of the BGD warranty, you are required to complete the warranty form on the website. For further information about the BGD warranty, please refer to the corresponding page on our website.

## 2. Preparation

### General

Select a suitable take-off area determined by wind and terrain, clear of any obstacles that may catch in the lines or damage the canopy.

1. If your paraglider has been correctly packed, you should take it to the top of the take-off area, and allow the rolled canopy to unroll itself down the hill (if on a slope). This should leave the paraglider with the bottom surface facing upwards, the openings at the downwind end of the take-off area, and the harness at the trailing edge at the upwind side.
2. Unroll the canopy to each side so that the leading edge openings form a semicircular shape, with the trailing edge drawn together at the centre of the arc. The harness should be drawn away from the canopy until the suspension lines are just tight.

### PPG

3. Prepare your paramotor according to the manufacturer's instructions.
4. Connect the wing to the paramotor (or to the tandem spreaders), making sure there are no twists in the risers, and that the maillons or karabiners are correctly closed.
5. Take care to protect yourself and other people from the propeller, ensuring you start your motor up at a safe distance from other people. The blades can pick up and fire out debris which could injure people several metres away. Remember there are inherent risks with petrol, oil and volatile or flammable materials.

## 3. Pre-flight Inspection

Your paraglider is designed to be as simple as possible to inspect and maintain but a thorough pre-flight procedure is mandatory on all aircraft. The following pre-flight inspection procedure should be carried out before each flight.

1. Whilst opening out the paraglider check the outside of the canopy for any tears where it may have been caught on a sharp object or even have been damaged whilst in its bag.
2. Check that the lines are not twisted or knotted. Divide the suspension lines into six groups, each group coming from one riser. By starting from the harness and running towards the canopy remove any tangles or twists in the lines. Partially inflating the canopy in the wind will help to sort out the lines.
3. It is particularly important that the brakes are clear and free to move. Check the knot which attaches the brake handles to the brake lines. Both brakes should be the same length and this can be checked by asking an assistant to hold the upper end of the brake lines together whilst the pilot holds the brake handles. The brake lines should be just slack with the wing inflated when the brakes are not applied. After checking the brake lines lay them on the ground.
4. Always check the riser maillons and the attachment points to the paramotor frame or buggy. It is strongly recommended to use a safety strap. Before getting into the harness you should be wearing a good crash helmet. Put on the harness ensuring all the buckles are secure and properly adjusted for comfort.
5. Check that the trimmers are closed and maillons at the same height – the position recommended for take-off.

Your powered paraglider is now ready for flight.

## 4. Flight Characteristics

This manual is not intended as an instruction book on how to fly your powered paraglider. You should be a qualified pilot or under suitable supervision, but the following comments describe how to get the best from your wing.

### Weight range

Each size is certified for a certain weight range. The weight refers to the 'overall take-off weight'.

The 'In-flight weight range for free-flight' is for the pilot, paraglider, harness and other equipment carried when free-flying. The paraglider is EN/LTF certified for this weight range.

The 'extended weight range for PPG' allows for all of the above, plus the paramotor and a full tank of fuel. It is the weight range approved by DGAC for flying under power.

We recommend pilots fly their wing in the middle of the weight range.

If you fly in the lower half of the weight range, the turning agility decreases and the glider will be more damped. In strong turbulence the wing tends to deform and to collapse slightly more than with a higher wing loading. Only fly your wing lightly loaded if you fly in aerologically stable conditions, such as in the morning or evening.

If you fly in the upper half of the weight range, the agility and the stability in turbulence will increase. Also the speed will increase slightly. The self-damping will decrease in turns, as well as after collapses.

## Active Piloting

Even though your paraglider is designed to be easy to fly, 'active piloting' is a tool that will help you fly with greater safety and enjoyment. Active piloting is flying in empathy with your paraglider. This means not only guiding the glider through the air but also being aware of feedback from the wing, especially in thermals and turbulence. If the air is smooth the feedback can be minimal but in turbulence feedback is continuous and needs to be constantly assessed by the pilot. Such reactions become instinctive in good pilots.

In order to get the best performance from the wing, the pilot should try to control it through small brake inputs and weight-shift, rather than constantly being present on the brakes. A small movement early is more efficient than a big brake movement later to control the wing. The more you let the glider fly at trim speed, the better performance you will get out of it. The objective of active piloting is to get the glider to fly smoothly through the air with a stable position above the head, and controlled angle of incidence. The paraglider is highly resistant to collapse without any pilot action at all, but learning how to fly actively will increase this safety margin even further.

## Speed System

Your powered paraglider is equipped with risers that have both trimmers and an accelerator system.

Launching and general flying is normally done without using the accelerator. The accelerator bar should be used when higher speed is important.

To fly at full-bar the speed stirrup should be applied gradually until the two pulleys on each A-riser touch. Do not go beyond this point by using excessive force to attempt to make the glider go faster as this may result in the glider collapsing.

**IMPORTANT:**

1. Practise using the speed system in normal flying.
2. Be careful flying fast in rough or turbulent conditions as deflations are more likely to occur at speed. The speed increase is achieved by reducing the angle of attack, so the canopy has slightly more collapse tendency.
3. Remember that your glide deteriorates at higher speeds. Best glides are achieved when the risers are level and the brakes are off.

Check the component parts of the speed system regularly for wear and tear, and ensure it always works smoothly.

Using the speed system can require some effort and the pilot's balance in the harness can be affected. It may be necessary to make some adjustments to the harness. We recommend you only fly in conditions where you can penetrate into wind with the risers level, ie no speed-stirrup applied, so that you have the extra airspeed should you need it.

**Trimmers**

The PPG risers have trimmers to allow easy fast cruising. The standard trimmer setting is fully closed, which is the slowest position.

**EN certification is only valid with the PPG riser-set when flown within the 'In flight weight range for free flight', and with the trimmers set to their fully closed (slow) position.**

The paraglider is DGAC certified for the 'extended weight range for PPG', with the trimmers in any position.

**We do not recommend pilots to fly with full speed-bar applied and trimmers open at the same time.**

## Take-off

Your paraglider is easy to inflate in light or stronger winds and will quickly rise overhead to the flying position. The best inflation technique is to hold one A-riser in each hand. The easiest take-off is usually obtained with the trimmers fully closed, maillons level. We recommend the trimmers are partially released for launching in strong-wind (more than 10km/h) conditions.

Never try to launch if the wing is not fully inflated and above your head, and if you do not have full control of pitch and / or roll.

## Initial climb

Once in the air, you should continue to face into the wind while you gain altitude. Leave the trimmers in the take-off (closed) position to attain the best climb rate. Do not attempt to increase your climb rate by braking, as using the brakes combined with the engine's thrust can increase the angle of attack to the point where the wing can stall. In addition, this high angle of attack can result in a big dive if the motor suddenly dies, which could be dangerous if you are near the ground.

Do not initiate a turn until you have sufficient height and speed to do so.

In certain circumstances, a pilot can induce unintended oscillations. This can be due to a combination of the engine/propeller and pilot's weightshift and / or action on the brakes. To stop these oscillations you should reduce the power, ensure that you are seated centrally and not accidentally applying weightshift, and that you are not acting on the brakes. Once the oscillations have stabilised you can gently reapply power.

## Straight flight and trimmers

After take-off, once you have gained a safe altitude, if you want to increase your speed you can open up the trimmers

completely, keeping your hands up.

To reduce fuel consumption or to fly in thermals, the trimmers should be closed, pulled down to their maximum. It is important to regularly check the wear on the trimmers and that the system is functioning cleanly with no sticking points. If they are showing signs of wear, the trimmers should be replaced by the pilot.

You should never fly a paramotor in strong turbulence or violent winds.

## Turning

The first turns should be gradual and progressive. The first action to change direction should be the movement of your weight in the harness towards the side of the intended turn. Then gently relax the pressure on the outer brake, and gently apply pressure to the inner brake until you attain the desired bank angle. To adjust your speed and turning-circle size, coordinate your weightshift with pressure on the outer brake.

Remember that to violently apply pressure on the brakes is dangerous and should be avoided. Never initiate a turn if you are flying slowly, as you risk the glider entering a spin.

## Landing

Set the trimmers to the closed position and set up your approach downwind of the landing field. When your height above the field is around 40m, switch the engine off\* and make your final approach, keeping your hands up to keep plenty of energy in the wing until you are about a metre above the ground. Flare, braking slowly and gradually to slow down the wing until you are close to the stall-point and able to land on your feet.

\*If you land with the engine running there is a considerable risk of rotational propeller damage, (lines passing through the propeller, or even injury)

## Rapid Descent Techniques

### Big Ears

The 'baby A-riser' allows the wing tips of the paraglider to be folded in simply and easily to increase its sink rate. This big ear facility does not mean you should fly in stronger winds, but allows you to descend quickly without substantially reducing the forward speed of the canopy (B-lining substantially reduces the canopy's forward speed). To engage big ears, lean forward in the harness and grasp the baby A-risers (one in each hand) at the maillons, keeping hold of both brake handles if possible. Pull the risers out and down at least 30cm so as to collapse the tips of the glider. It is very important that the other A-lines are not affected when you do this, as this could cause the leading edge to collapse. Steering is possible by weightshifting with big ears in. If the big ears do not come out quickly on their own, a gentle pump on the brakes will speed things up.

Before using the big ears facility in earnest it is essential to practise beforehand with plenty of ground clearance in case a leading edge collapse occurs. Always keep hold of both brakes in order to retain control. Putting your hands through the brake handles so they remain on your wrists is a good method of doing this.

### B-Line Stall

This fast descent method is a useful emergency procedure. With both hands through the brake handles, take hold of the top of the B-risers, one in each hand, and pull them down by around 50 cm. This will stall the canopy and forward speed will drop to zero. Make sure you have plenty of ground clearance because the descent rate can be over 10 m/sec. To increase the descent rate pull harder on the B-risers. When you release the B-risers the canopy will automatically start flying again, normally within two seconds. Sometimes the canopy will turn gently when it exits from the B-line stall. It is normally better to release the B-risers fairly quickly rather than slowly, as doing so slowly may result in the canopy entering deep stall. Always release the risers symmetrically, as an asymmetric release from a B-line stall may result in the glider entering a spin.

This manoeuvre is useful if you need to lose a lot of height quickly, perhaps when escaping from a thunderstorm. It should not be performed with less than 100m of ground clearance (see also Chapter 5).

## Spiral Dive

A normal turn can be converted into a strong spiral dive by continuing to apply one brake. The bank angle and speed of the turn will increase as the downward spiral is continued. Be careful to enter the spiral gradually as too quick a brake application can cause a spin or an over-the-nose spiral.

BGD gliders are designed and tested to recover from normal spirals with a descent rate inferior to 16 m/s, automatically without pilot input. If the pilot increases the descent rate of the spiral to over 16 m/s or initiates what is known as an over-the-nose spiral, the glider may require pilot input to recover. In this case all the pilot needs to do is to apply some outside brake and steer the glider out of the turn.

The over-the-nose spiral is a special type of spiral dive where the glider points almost directly at the ground. It will enter this if you make a sudden brake application during the spiral entry so that the glider yaws around. The nose of the glider ends up pointing at the ground, after which it picks up speed very quickly. This technique is very similar to SAT entry technique, and like the SAT it is an aerobatic manoeuvre, which is outside the normal safe flight envelope. Please do not practise these manoeuvres as they can be dangerous. Care should be taken when exiting from any spiral dive. To pull out of a steep spiral dive, release the applied brake gradually or apply opposite brake gradually. A sharp release of the brake can cause the glider to surge and dive as the wing converts speed to lift. Always be ready to damp out any potential dive with the brakes. Also be ready to encounter turbulence when you exit from a spiral because you may fly through your own wake turbulence, which can cause a collapse.

**CAUTION: SPIRAL DIVES CAN CAUSE LOSS OF ORIENTATION (black out) AND SOME TIME IS NEEDED TO EXIT THIS MANOEUVRE. THIS MANOEUVRE MUST BE EXITED IN TIME AND WITH SUFFICIENT HEIGHT!**

# 5. Recovery Techniques

## Stalls

Stalls are dangerous and should not be practised in the course of normal flying. Stalls are caused through flying too slowly. Airspeed is lost as brake pressure increases and as the canopy approaches the stall point it will start to descend vertically and finally begin to collapse. Should this occur it is important that the pilot releases the brakes at the correct moment. The brakes should never be released when the wing has fallen behind the pilot; the brakes should be released fairly slowly, to prevent the forward dive of the canopy from being too strong. A pre-release of the brake and the reconstruction of the full span is recommended to avoid the tips getting cravatted during the recovery. Pilots are advised never to attempt this manoeuvre unless under SIV instruction. This manual is not intended to give instruction in this or any other area.

### **Deep Stall (or Parachutal Stall)**

Your paraglider has been designed so that it will not easily remain in a deep stall. However, if it is incorrectly rigged or its flying characteristics have been adversely affected by some other cause, it is possible that it could enter this situation. In the interests of safety all pilots should be aware of this problem, and know how to recover from it. The most common way to enter deep stall is from a flying too slowly, from a B-line stall or even from big ears.

When in deep stall the pilot will notice the following:

1. Very low airspeed.
2. Almost-vertical descent (like a round canopy), typically around 5m/s.
3. The paraglider appears quite well inflated but does not have full internal pressure. It looks and feels a bit limp.

Recovery from deep stall is quite simple: The normal method is to simply initiate a mild turn. As the canopy starts to turn it will automatically change to normal flight, but it is very important not to turn too fast as this could induce a spin. The second method is to pull gently on the A-risers. This helps the airflow to re-attach to the leading edge, but be careful not to pull down too hard as this will induce a front collapse.

If the deep stall is particularly stubborn and the previous methods do not work then a full stall will solve the problem. To do this apply both brakes again fairly quickly, as if to do a strong stall, then immediately release both brakes and damp out the forward surge in the normal way. The canopy will swing behind you then automatically reinflate and surge forward in front of you before returning to normal flight. It is the surge forward that exits the canopy from deep stall.

## Spins

Spins are dangerous and should not be practised in the course of normal flying. Spins occur when the pilot tries to turn too fast. In a spin the pilot, lines and canopy basically stay vertical and rotate around a vertical axis. Your paraglider will resist spinning, but if a spin is inadvertently induced the pilot should release the brake pressure but always be ready to damp out any dive as the glider exits the spin. If the pilot does not damp the dive on exiting the spin the glider may have an asymmetric deflation.

## Symmetric Front Collapse

It is possible that turbulence can cause the front of the wing to symmetrically collapse, though active piloting can largely prevent this from occurring accidentally. A pilot can reproduce the effect by taking hold of both the A-risers and pulling down sharply on them. The wing will automatically recover on its own from this situation in around 3 seconds. During this recovery period it is advisable not to apply the brakes as this could stall the wing.

## Asymmetric Front Collapse

Your paraglider is very resistant to deflations; however if the canopy collapses on one side due to turbulence,

you should first of all control the direction of flight by countering on the opposite brake. Most normal collapses will immediately reinflate on their own and you will hardly have time to react before the wing reinflates automatically. The act of controlling the direction will tend to reinflate the wing. However, with more persistent collapses it may be necessary to pump the brake on the collapsed wing using a long, strong, smooth and firm action. Normally one or two pumps of around 80 cm will be sufficient. Each pump should be applied in about one second and smoothly released. In severe cases it can be more effective to pump both brakes together to get the canopy to reinflate. Be careful not to stall the wing completely if this technique is used.

## Releasing a trapped tip (cravat)

It should be difficult to trap the tip so that it will not come out quickly, but following a very severe deflation any canopy could become tied up in its own lines. If this occurs then first of all use the standard method of recovery from a tip deflation as described in Asymmetric Front Collapse above. If the canopy still does not recover then pull the rear risers to help the canopy to reinflate. Pulling the stabilo line is also a good way to remove cravats, but remember to control your flight direction as your number-one priority. If you are very low then it is much more important to steer the canopy into a safe landing place or even throw your reserve.

NOTE: Test pilots have tested your paraglider well beyond the normal flight envelope, but such tests are carried out in a very precise manner by trained test pilots with a back-up parachute, and over water. Stalls and spins on any paragliders are dangerous manoeuvres and are not recommended.

## Loss of brakes

In the unlikely event of a brake line snapping in flight, or a handle becoming detached, the glider can be flown by gently pulling the rear risers for directional control.

## 6. Storage and Servicing

### Storage & Care

If you have to pack your canopy away wet, do not leave it for more than a few hours in that condition. As soon as possible dry it out or it can become affected by mould. Do not use direct heat sources to dry the canopy as it is inflammable. Using a dehumidifier is strongly recommended if several damp gliders are stored together frequently.

Always store the canopy in a dry, warm place. Ideally this should be in the temperature range of 5 to 25 degrees centigrade.

Never let your canopy freeze, particularly if it is damp.

The canopy is made from high quality nylon, which is treated against weakening from ultra violet radiation. However it is always wise to minimise the exposure to UV radiation as this weakens the fabric of the canopy, and long exposure to harsh sunlight can severely compromise the safety of your canopy. Once you have finished flying, put your canopy away. Do not leave it laying in strong sunshine unnecessarily. If you are concerned about any aspect of the integrity of your paraglider please contact your nearest BGD dealer or talk to BGD directly.

Never drag or slide the top surface of the glider over concrete or other hard surface as this can cause abrasion damage to the sail.

Do not treat your canopy with chemical cleaners or solvents. If you must wash the fabric, use warm water and a little soap. If your canopy gets wet in sea water, wash it with warm water and carefully dry it.

Small tears in the top or bottom surface (not normally the ribs) of a canopy can be repaired with a patch of self-adhesive ripstop nylon. Tears no longer than 100 mm can be repaired in this way providing they are not in a high-stress area. If you have any doubt about the airworthiness of your canopy please contact your dealer or BGD directly.

## Servicing / Inspection

It is important to have your glider regularly serviced. It should have a thorough check / inspection every 24 months or every 150 flight hours, whichever occurs first. This check must be made by the manufacturer, importer, distributor or other authorised persons. The checking must be proven by a stamp on the certification sticker on the glider as well in the service book. BGD will offer an inspection service every winter. This is a comprehensive service which checks line lengths and strength, fabric porosity and tear strength and a variety of other tests and we strongly advise all pilots to take advantage of this.

Please print out the service pages from this manual, fill in the number of flights and hours flown in the Service Record, and send together with your glider when it goes for inspection or servicing. The manufacturer will only accept responsibility for paraglider lines and repairs which we have produced and fitted or repaired ourselves.

## Environmental protection and recycling

Our sport takes place in the natural environment, and we should do everything to preserve our environment. A glider is basically made of nylon, synthetic fibres and metal. At the end of your paraglider's life span, please remove all metal parts and put the different materials in an appropriate waste/recycling plant.

## 7. Technical data

### Materials

The ECHO MOTOR is made from the following quality materials:

Top surface:	Dominico D20
Bottom surface:	Porcher Skytex 27g
TE mini ribs :	Porcher Skytex 32g
LE mini ribs:	Porcher Skytex 32g
All ribs:	Porcher Skytex 32g hard white
Risers:	12 mm black nylon webbing
Top lines:	Liros DC
Middle lines:	Edelrid 8000U PPSL200
Lower lines:	Edelrid 8000U PPSL200
Brakes:	Liros DSL

Spare parts can be obtained directly from BGD or through our network of registered BGD repair shops.

For a full list check [www.flybgd.com](http://www.flybgd.com)

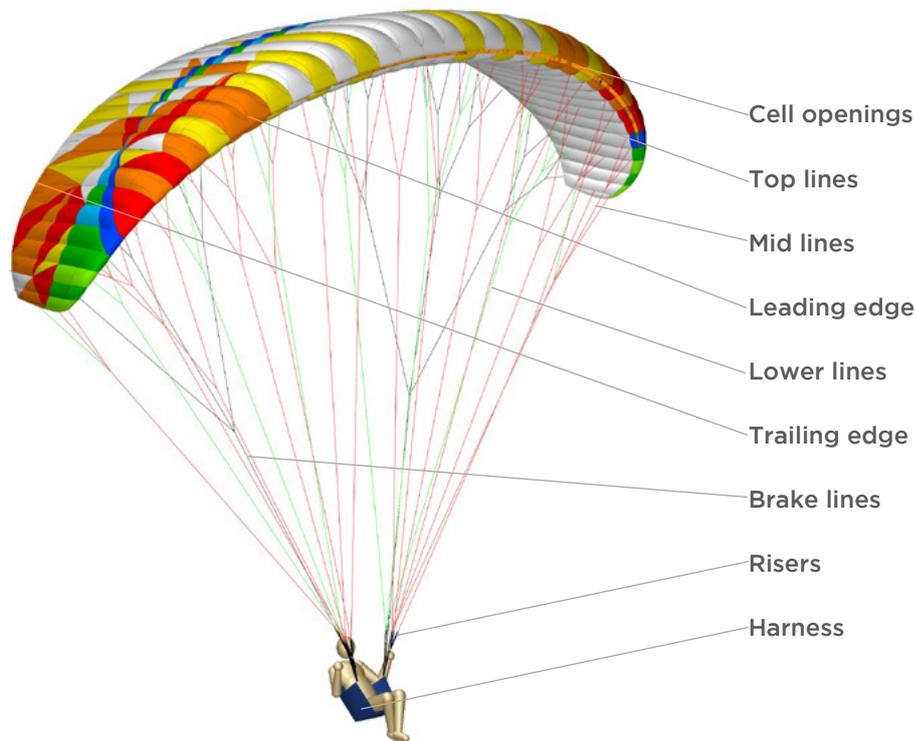
## Specifications

	XS	S	M	ML	L	
Linear scaling factor	0.96	1	1.04	1.08	1.12	
Projected area	17.86	19.56	21.24	22.81	24.54	m <sup>2</sup>
Flat area	21.00	23.00	24.97	26.83	28.85	m <sup>2</sup>
Glider weight	3.7	3.9	4.2	4.4	4.7	kg
Total line length	210	230	250	268	289	m
Height	6.7	6.979	7.3	7.5	7.8	m
Number of main lines A/B/C	3/4/3	3/4/3	3/4/3	3/4/3	3/4/3	
Cells	42/80	42/80	42/80	42/80	42/80	
Flat aspect ratio	5.01	5.01	5.01	5.01	5.01	
Projected aspect ratio	3.602	3.602	3.602	3.602	3.602	
Root chord	2.58	2.70	2.81	2.91	3.02	m
Flat span	10.26	10.73	11.18	11.59	12.02	m
Projected span	8.02	8.39	8.75	9.07	9.40	m
In-flight weight range free-flight	50 - 65	60-80	75-95	90-110	105-125	kg
Extended weight range for PPG*	50 - 85	60-100	75-115	90-135	105-150	kg
Trim speed**	40	40	40	40	40	km/h
Trimmers-open speed**	45	45	45	45	45	km/h
Accelerator speed**	50	50	50	50	50	km/h
Min sink	1	1	1	1	1	m/s
Best glide	9	9	9	9	9	
Certification	DGAC/EN B					

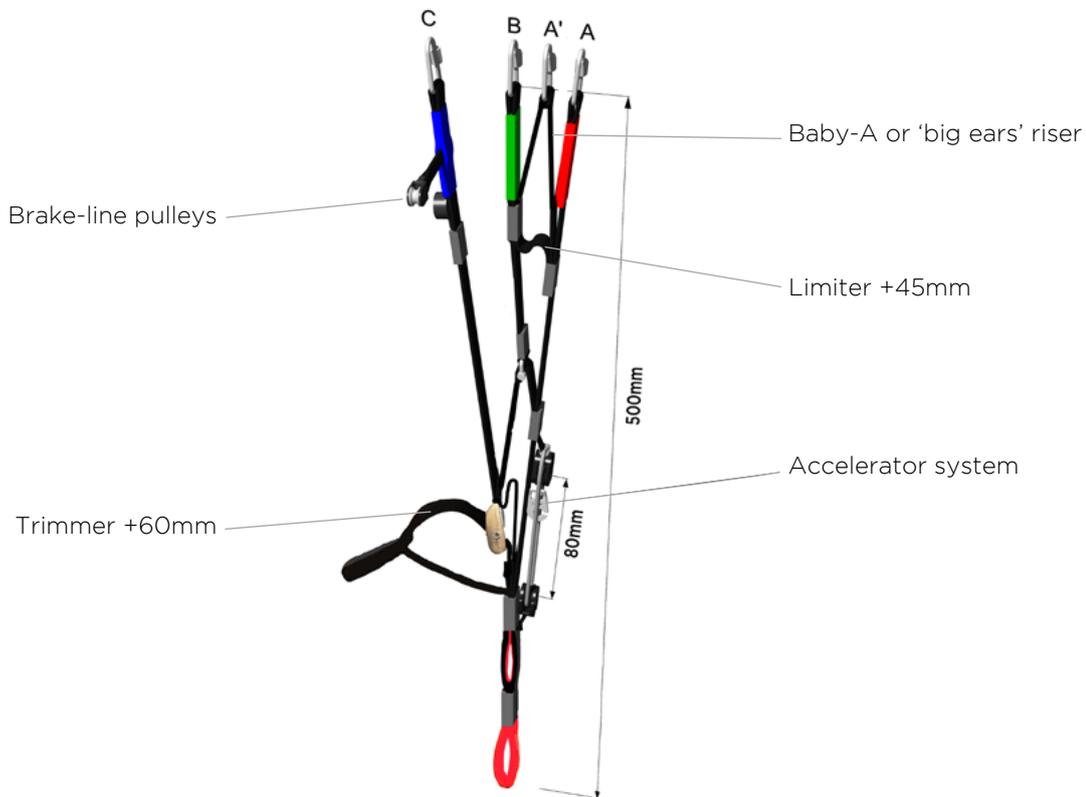
\* DGAC certified only

\*\* Values for straight and level flight under power

## Overview of glider parts



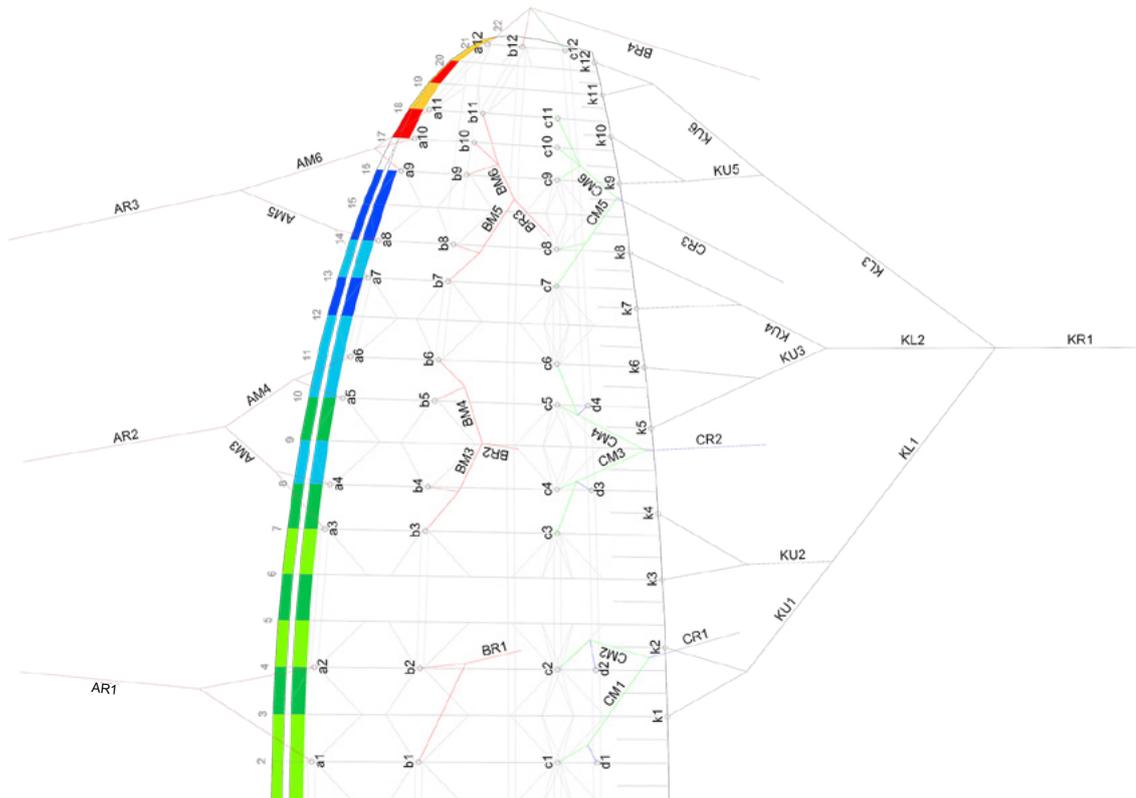
### PPG Risers



## Brake and speedbar travel

<b>Size</b>	<b>Accelerator range</b>	<b>Brake range</b> Min weight	<b>Brake range</b> Max weight
XS	12cm	> 55cm	> 55cm
S	14cm	> 55cm	> 60cm
M	14cm	> 55cm	> 60cm
ML	14cm	> 60cm	> 65cm
L	14cm	> 65cm	> 65cm

# Line Plan



## Line length checks

### Size XS

### Size S

### Size M

	A	B	C	D	K	A	B	C	D	K	A	B	C	D	K
1	6604	6534	6646	6713	6747	6942	6862	6982	7054	7038	7207	7119	7260	7330	7357
2	6572	6501	6615	6679	6616	6910	6829	6951	7021	6902	7174	7085	7229	7296	7217
3	6581	6515	6627	6653	6526	6921	6848	6956	6988	6810	7189	7108	7238	7265	7122
4	6549	6481	6585	6639	6516	6887	6813	6916	6973	6801	7154	7071	7193	7251	7114
5	6544	6484	6582		6403	6881	6816	6913		6684	7149	7076	7191		6994
6	6581	6529	6625		6323	6920	6863	6955		6600	7189	7125	7238		6907
7	6453	6447	6555		6298	6785	6766	6885		6575	7049	7024	7163		6881
8	6400	6386	6489		6352	6729	6702	6816		6631	6991	6958	7091		6941
9	6313	6316	6417		6257	6637	6627	6741		6531	6894	6880	7013		6835
10	6235	6268	6389		6216	6555	6576	6711		6487	6809	6827	6982		6789
11	6232	6277	6394		6152	6550	6586	6717		6419	6804	6837	6988		6719
12	5905	5908	5987		6100	6200	6205	6291		6364	6440	6439	6522		6661

### Size ML

### Size L

	A	B	C	D	K	A	B	C	D	K
1	7473	7388	7528	7604	7600	7225	7140	7280	7355	7901
2	7440	7354	7497	7570	7456	7191	7106	7248	7321	7754
3	7457	7384	7516	7546	7359	7209	7133	7261	7290	7655
4	7421	7347	7469	7532	7352	7172	7095	7213	7277	7649
5	7417	7352	7468		7229	7168	7101	7212		7522
6	7460	7403	7516		7139	7212	7154	7263		7428
7	7317	7308	7438		7112	7063	7047	7182		7402
8	7257	7240	7363		7174	7000	6975	7105		7466
9	7159	7160	7282		7065	6897	6892	7021		7351
10	7072	7106	7250		7017	6806	6835	6988		7301
11	7068	7117	7256		6943	6800	6846	6994		7225
12	6726	6729	6818		6883	6418	6418	6506		7162

All measures are in mm, with 50N line tension, this tension being slowly and gradually applied before taking the measurement.

The lengths are measured from the lower surface of the canopy and include the risers.

## Bridle lengths

### Size XS

Rib	A-lines			B-lines			C-lines			D-lines		Rib	Brakes				
2	1355		4723	1344		4667	678	759	<b>4702</b>	747		r 3	898	1151			
4	1322			1310			659	747		725		r 4.5	767				
7	562		4295	555		4370	672		<b>4262</b>	699	653	r 6	719	1109	2000		
8	529	1200		521	1070		630	1186				r 7.5	709				
10	483		3502	472		4326	594		<b>4597</b>			r 9.5	707		2159	2699	
11	521	1241		517	1122		637	1219		r 11	626	839					
13	542			535			543					r 12.5	587				
14	489	1889		474	1066		477	909				r 14	641	853			
16	594		3502	573		4326	581		<b>4597</b>			r 16	462	656	2440		
17	517	1697		526	896		553	732		r 17.5	421						
18	513			535			558					r 19	321	692			
21	1109			1112	<b>4286</b>		1191					r 20.5	269				

**red** = loop on maillon

# Bridle lengths

## Size S

Rib	A-lines			B-lines			C-lines			D-lines		Rib	Brakes			
2	1419		4980	1406	4917		707	800	<b>4953</b>	781	r 3	940	1204			
4	1387			1373			687	789		759	r 4.5	804				
7	589			581			700				r 6	752	1164	2116		
8	555	1257	4532	546	1120	4608	660	1278	<b>4456</b>	734	r 7.5	743				
10	506			494			623			685	r 9.5	740				
11	545	1300		541	1175		665	1312			r 11	656	878	2288	2778	
13	568			560			567				r 12.5	615				
14	512	1979		496	1116		498	950			r 14	671	894			
16	623		3700	600		4553	608		<b>4846</b>		r 16	484	687			
17	541	1776		549	937		578	765			r 17.5	440				
18	536			559			584				r 19	336	723	2582		
21	1157			1162	<b>4508</b>		1248				r 20.5	281				

red = loop on maillon

## Bridle lengths

### Size M

Rib	A-lines			B-lines			C-lines			D-lines		Rib	Brakes		
2	1478	5201		1464	5131		743	824	<b>5176</b>	815	r 3	979	1253		
4	1445			1430			722	813		792	r 4.5	839			
7	613		4739	605		4813	733				r 6	782	1215	2223	
8	578	1309		569	1165		688	1292	<b>4696</b>		762	r 7.5	774		
10	527		3873	514		4757	649			711	r 9.5	771			
11	568	1355		563	1224		696	1329				r 11	683	914	2408
13	592		3873	583		4757	591				r 12.5	640			
14	534	2061		516	1162		519	989				r 14	699	932	
16	648		3873	625		4757	633		<b>5066</b>		r 16	504	715		
17	563	1850		572	976		602	797				r 17.5	458		
18	558		3873	582		4757	608				r 19	350	753	2713	
21	1216			1215	<b>4714</b>		1298					r 20.5	293		

**red** = loop on maillon

## Bridle lengths

### Size ML

Rib	A-lines			B-lines			C-lines			D-lines		Rib	Brakes			
2	1530	5405		1517	5337		766	856	<b>5389</b>	844	r 3	1015	1298			
4	1497			1483			745	846		820	r 4.5	871				
7	635			627			759				r 6	810	1262	2321		
8	599	1355	4929	590	1208	5015	712	1340	<b>4900</b>	791	r 7.5	803				
10	546			533			672			738	r 9.5	799				
11	589	1404		584	1270		720	1379			r 11	709	947	2517	2966	
13	613			604			614				r 12.5	663				
14	553	2135		536	1205		539	1027			r 14	725	966			
16	671		4036	648		4967	657		<b>5280</b>		r 16	523	742			
17	584	1919		594	1013		625	828			r 17.5	475				
18	580			605			631				r 19	363	780	2834		
21	1254			1257	<b>4942</b>		1346				r 20.5	303				

**red** = loop on maillon

## Bridle lengths

### Size L

Rib	A-lines			B-lines			C-lines			D-lines		Rib	Brakes					
2	1588	5629		1573	556.3		799	885	<b>5589</b>		876	r 3	1052	1345	2424		3100	
4	1554			1539			777	875			851	r 4.5	905					
7	659	5137		650	5227		788	5088		819		r 6	839	1311				
8	621			1406			612					1252	740	1388	r 7.5	833		
10	566	4208		552	5169		698	5487		764		r 9.5	828	2632				
11	610			1457			606					1317	748			1429		r 11
13	636			626			635					r 12.5	688					
14	574	2215			555	1249	558	1063					r 14	752	1002			
16	697			672			680					r 16	542	769	2960			
17	605	1989			615	1049	647	857			r 17.5	492						
18	600			625			654					r 19	377	808				
21	1307			1306	<b>5121</b>			1395					r 20.5	314				

**red** = loop on maillon

## 8. Service Booklet

### Test Flight Record

Model

Size

Serial Number

Colour

Date of test flight

Company signature and stamp

## Service Record

**Service No 1:**

Date :

Stamp - Signature :

No flights :

Type of service :

**Service No 2:**

Date :

Stamp - Signature :

No flights :

Type of service :

**Service No 3:**

Date :

Stamp - Signature :

No flights

Type of service :

## Owner Record

Pilot No 1

First name

Family name

Street

City

Post code

Country

Telephone

Email:

## Owner Record

Pilot No 2

First name

Family name

Street

City

Post code

Country

Telephone

Email:

## 9. Closing Words

Your new paraglider is an advanced, stable glider that promises many hours of safe and enjoyable flying, provided you treat it with care and always respect the potential dangers of aviation.

Please always remember that flying can be dangerous and your safety depends on you. With careful treatment your wing should last for many years. It has been tested under current international airworthiness standards, and these represent the current knowledge concerning the safety of a glider. However, since there are still many unknown issues, for example the effective lifespan of the current generation of gliders and how strong the material aging can be accepted without affecting the airworthiness. There are natural forces that can threaten your safety, regardless of the quality of construction or the condition of your glider. Your security is ultimately your responsibility. We strongly recommend that you fly carefully, adapt to the weather conditions and keep your safety in mind. Flying in a club or a school with experienced pilots is highly recommended. We recommend that you fly with a standard harness with back protection and a reserve parachute. Always use good equipment and an approved helmet.

See you in the sky!

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