CHARGER 3



USER MANUAL

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MAC PARA COMMUNITY

MAC PARA

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Dear MAC PARA pilot

We congratulate you and appreciate your purchase of our paramotoring glider the Charger 3. Extensive research and development makes the Charger 3 a state-of-the-art paramotoring glider. Numerous safety tests have been made to allow you to safely enjoy the performance of this glider. The entire MAC PARA team welcomes you and we wish you many pleasant flights. To stay safe you **MUST** read this manual carefully before flying.

Charger 3 Highlights

The Charger 3 is a reflex paramotoring glider. It was designed for wide range of paramotoring pilots looking for an easy to use glider with a wide speed range and responsive handling. Other benefits are easy launch and landing speeds, excellent stability and efficient fuel consumption when paramotoring.

Please note the following details before you fly:

Get Proper Training

The purpose of this manual is to offer you information about the unique design features of the Charger 3 for maximum enjoyment. This Manual is in no way intended to be used as a training manual. Paragliding and paramotoring are sports which demand high degrees of attentiveness, good judgement, and theoretical knowledge. Paramotoring can be a dangerous sport which may lead to injury and death. Get proper instruction before you attempt to fly with a qualified professional and accredited school.

Take Responsibility

The use of this paramotoring glider is solely at the owner's risk! The manufacturer and distributor do not accept any liability. You are responsible for your own safety and the gliders airworthiness. MAC PARA assumes no responsibility. MAC PARA recommends the pilot is in possession of a valid paramotoring licence for the glider's category, insurance, and training etc. for the country in which the glider is flown.

Manufacture Quality Control Checks

Before delivery, as well as during production, each paramotoring glider goes through a strict visual inspection. It should also be test-flown by your dealer. The test-flight certificate confirm this. It is your responsibility to check that your new Charger 3 paramotoring glider has been test-flown before your first flight. If it has not, consult your dealer.

Minimize Your Risks

Any inadequate use or misuse of your Charger 3 increases the risks considerably. On next page is a list of conditions that must be avoided.

DO NOT USE outside the manufacturers recommended weight range.

DO NOT USE during rain or snow-fall.

DO NOT USE in high or gusty wind conditions

DO NOT USE in cloud and fog.

DO NOT USE without sufficient knowledge or experience.

DO NOT USE under the influence of drugs, alcohol or sickness.

DO NOT USE for aerobatics or extreme manuvers.

NOTE: Any changes or modifications made to this paramotoring glider invalidate the certificate of airworthiness. Please check the warranty conditions near the end of this manual.

MAC PARA Wants to Help

If you have read this manual and still have questions, suggestions or criticisms regarding the Charger 3, please do not hesitate to contact your dealer or MAC PARA directly. Our mission is to design quality performance gliders that allow you the freedom of flight while keeping you as safe as possible.

PILOT LEVEL REQUIREMENTS

Charger 3 is an ideal powered glider suitable for a very wide range of pilots. From powered paragliding training, weekend pilots to experienced pilots looking for relaxed flying. With the right choice of glider size, the Charger 3 can be adapted to a wide range of requirements and styles of powered flying.

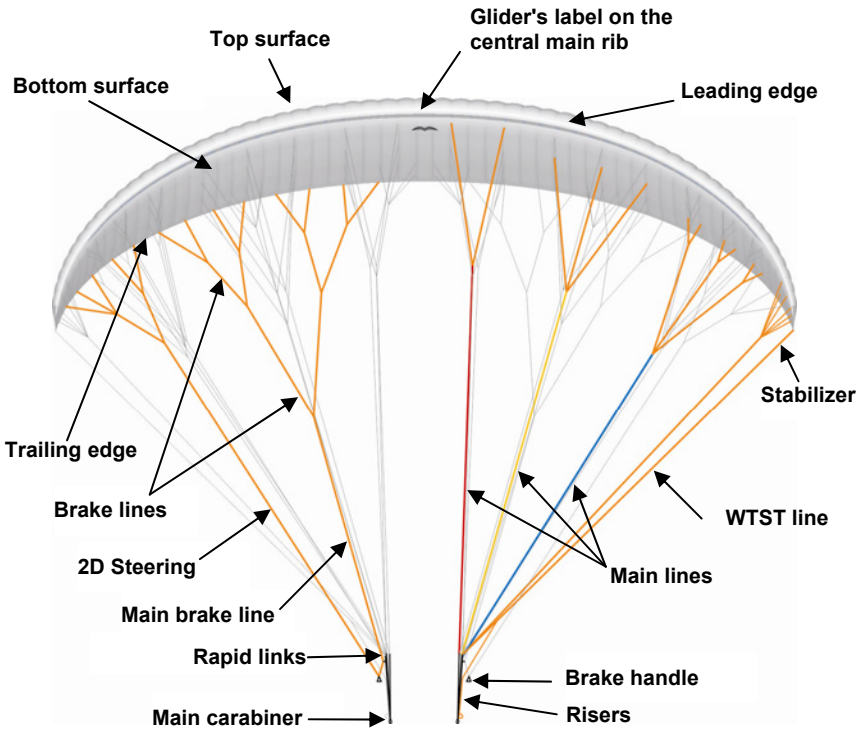
Various Conditions

The Charger 3 can adapt to suit a full range of conditions and types of paramotoring. The exception is acrobatic flying. In strong turbulence and gusting winds a partial or complete collapse of the canopy can result. Never fly in such conditions.

Certification

The Charger 3 is tested in according to DGAC (French Airworthiness Requirements) for powered flying. The Charger 3 was shock and load tested to max. weight of 431 kg.

DESIGN



TECHNICAL DESCRIPTION

Construction of the canopy:

The canopy of the Charger 3 has a wingspan with 50 cells. The wingtips are slightly pulled down to act as a stabilizer. The design of the Charger 3 is a combination of second and third rib diagonal-construction. Every main rib is attached to 4 or 5 suspension lines. Between these main suspension ribs, intermediate ribs are suspended by diagonal segments. As complicated as this sounds, this construction ensures a smooth top surface and precise air foil design increasing performance and safety.

The internal reinforcements maintain the precise form of the canopy and increases stability. The cell openings on the under-surface of the leading edge provide good airflow into the glider. Load bearing support straps with diagonal ribs at the suspension points ensure an even distribution of load throughout the canopy. Stretch resistant Mylar strips on the top and bottom panels of the openings run the length of the trailing edge defining the wingspan.

This ensures optimized sail tension and guarantees high canopy stability. Large cross ports allow effective airflow inside the canopy providing good re-inflation without interrupting the profiles shape.
The Charger 3 is mainly made from proven high quality Nylon fabrics. Polyamid 6.6 RIPSTOP 40, 38 and 32 g/m_2 are the carefully selected materials. Important care must be taken to maximize the life of your glider because like any synthetic material, this can deteriorate through excessive UV exposure.

Rigging system:

The suspension lines are comprised of “cascaded top lines” (attached to the under-surface), and “main lines”. Main lines lead to the “quick links” (a small triangle carabineer which connects lines to the risers). The “stabilizer lines” connect the upper stabilizer lines on the outer suspension points with the quick link. The “brake lines” are not load carrying suspension lines. They lead from the trailing edge of the canopy to the main brake lines and run through the pulleys on the D-risers to the brake handles. Two black marks on the main brake line indicate the two possible positions of the brake handles. This adjustment allows for sufficient brake to be applied during flight and landing safety. It also ensures that brakes are not too short causing permanent applied brakes during flight (especially when fully accelerated). Having your brakes too short is dangerous!

Special attention is required before adjusting your brakes.

For differentiation purposes, the main A-lines are coloured red, the main brake lines are orange, and all remaining main lines are yellow. The main suspension loop on the bottom of the riser is reinforced and covered red. This is where the main carabineer should be hooked in connecting the risers to the harness.

The lines of the Charger 3 are made of strong and stretch resistant HMA Aramid/Kevlar (yellow core) lines and PES/Dynema (white core). The entire rigging system comprises of individual suspension lines looped and stitched at each end. This contributes to the glider being incredibly strong.

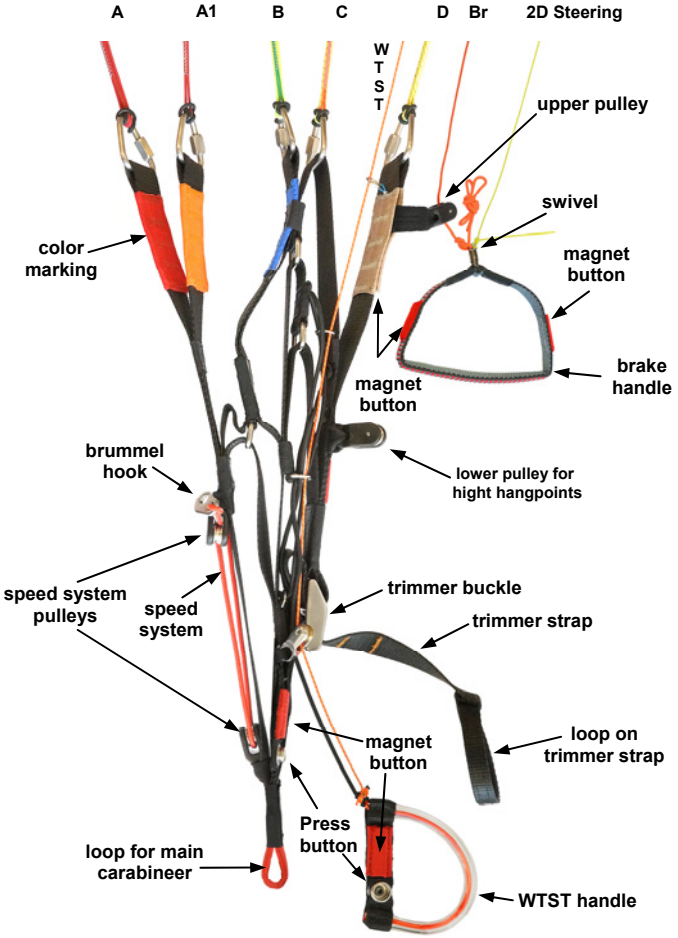
The main Polyester sheathed Dynema and Aramid lines have strengths from 75 kg up to 340 kg. The upper cascade lines have strengths from 75 kg up to 90 kg. The brake lines have strengths from 80 kg up to 100 kg. The main Dynema brake line has strenght 200 kg. Add up the strength of all the lines to understand the design of the Charger 3 provides you with safety and confidence.

RISERS

The Charger 3 is equipped with 5 risers per side (A, A1,B, C, D). The two central A-lines per side are attached to the main A-risers (red in colour) while the outermost A main lines are attached to A1 risers. The 3 B-main lines and the stabilizer lines are attached to the B-riser. The 3 C-main lines and the C stabilizer / WTST line are attached to the C-risers and the 3 D -main lines to the D-risers. The main brake lines lead through the pulleys on the D risers. The higher pulleys are used when flying a lower and classic attachment style paramotor and the lower one for higher attachment style paramotors.

The line connections are made to triangular carabineers (quick links) fitted with a rubber ”o- ring” in the form of a ”figure eight” which prevents any slipping of the lines on the quick link.

Riser`s scheme

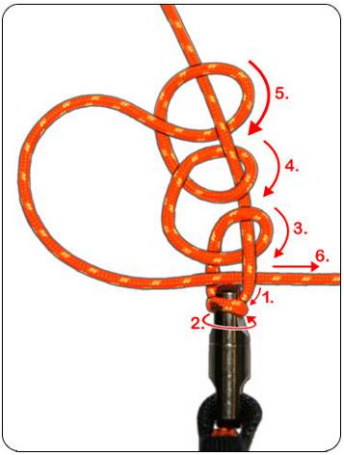


Brake handles:

Special semi rigid brake handles are equipped with swivels and two neodymium magnets. Strong neodyme magnets hold the brake handles perfectly to the D risers. Attaching and releasing the brakes from the risers work very easily and quickly during flight. This minimises the danger of getting them caught in a spinning propeller.



Brake toggle (2D Steering)



Brake line knot

Wingtip Steering (WTST):

This reflex wing offers wide speed range. Usual steering via main brake toggles by open trimmers gets heavier and the risk of a total collapse of the canopy at maximum speed (speed system in combination with released trimmers) increases.

In accelerated flight mode the Charger 3 must be controlled only by Wingtip Steering. The WTST handles have a size for two fingers and are equipped with neodymium magnets and press buttons.

We paid high attention that the WTST brake range are very similar to the main brake handles. The brake forces are a bit lighter then by serial brakes. The position of the WTST handles is very pleasant for use in accelerated flight. Return to the top position is secured with a rubber line and neodymium magnet. If you are not using WTST handles for the steering connect them always additionally by press buttons on risers.

Controlling a Glider with 2D Steering

In comparison with classic steering, 2D steering represents a change in the control of a paraglider, offering a wider range and control possibilities through combinations of various hand movements with the brake handle. It will especially please pilots who prefer playfulness in maneuvering along with very precise dosage of lift in all maneuvers.

What is the main difference between classic and 2D steering? With classic steering, pulling the brake handle pulls down the entire half of the glider's trailing-edge. With 2D steering, the pilot has the ability to independently pull down the inner and outer parts of the trailing-edge on one half of the glider.

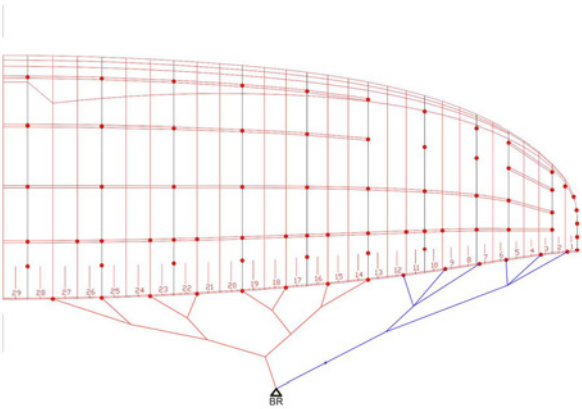
With classic steering, the pilot has only three combinations to control the glider using the brake handles: braking either the entire left wing half, the entire right wing half, or both simultaneously.

With 2D steering, the pilot can independently brake the outer left, inner left, inner right, and outer right sections of the wing, offering up to sixteen combinations for operating the trailing-edge of the glider.

What is the key difference when transitioning from classic steering to 2D steering from the pilot's perspective? Thanks to the brake line routing through a pulley on the D-riser, the pilot's hand movement is primarily transformed into pulling the brake line downward. It makes no difference whether the pilot pulls their hand down toward their body or pushes their hands apart away from the body. The pilot controls the behavior of the glider solely by the length of the brake line pull.

With 2D steering, the direction of travel becomes equally important, as it determines which part of the trailing-edge is activated. Thus, with 2D steering, the pilot controls the glider through both the amount and direction of the handle pull simultaneously. The importance of the handle pull direction along both the X and Y axes led to naming this type of control "2D" — meaning movement in two directional dimensions.





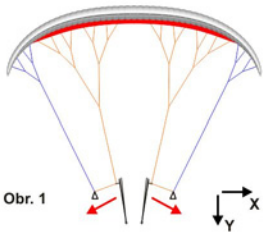
How 2D Steering Works

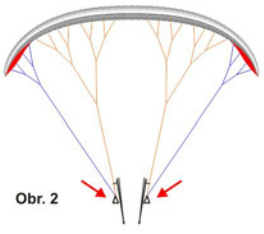
The main brake line (orange) is routed through the pulley on the D-riser and connected to the brake handle. This line controls the inner/central segment of the trailing-edge. The outer 2D steering line (blue) is connected directly to the brake handle; this line controls the outer segment of the trailing-edge (see image and diagram below).

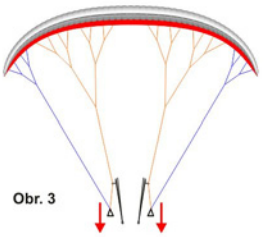
For the main brake line (orange), because it is routed through the pulley, the degree of trailing-edge deflection does not depend on the direction of movement. Conversely, for the outer 2D steering line (blue), the direct attachment bypassing the pulley means that the direction of movement directly dictates the degree to which the outer trailing-edge is pulled down.

This yields three basic control inputs:

- **(Fig. 1) Activating only the central section of the trailing-edge:** By moving the brake handle away from the body's center axis, the central section of the trailing-edge is primarily activated. The outer line (not routed through the pulley) remains slack, keeping the outer trailing-edge unactivated.
- **(Fig. 2) Activating only the outer section of the trailing-edge:** Applying a light pull along the axis of the outer 2D steering line — toward the pilot's body and slightly downward — activates primarily the outer section of the trailing-edge.
- **(Fig. 3) Activating the entire trailing-edge:** Moving the hands classically along the "Y" axis (downward, approximately 20 cm from the pilot's shoulders) activates the full trailing-edge. This input mirrors classic steering behavior.







By dynamically altering the brake handle position, the pilot can effortlessly combine these three inputs to control bank angle, sink rate, lift, and overall control geometry with a precision and fun factor impossible to achieve without 2D steering.

Speed system:

The Charger 3 is equipped with a speed bar operated speed-system which returns automatically to the normal position when released. The speed system affects the A, A1, B and C-risers and changes the angle of attack. In normal flight all risers have an overall length of 50 cm without quick links. When the speed bar is pushed out with your feet, A-risers are shortened by up to a maximum of 14,5 cm and A 1 risers up to of 14,5 cm. The B risers by up to a max. of 9 cm. The C risers by up to a max. of 5 cm, and the D risers retain their original length. To use the speed system you have to attach the brummel hooks found on the front of the risers and connect them to the brummel hooks found on the speed bar. If your paramotor harness did not come with a stirrrup style speed bar contact your local dealer to purchase one. More detailed instructions can be found in the chapter "Setting up the Controls".

Trimmers:

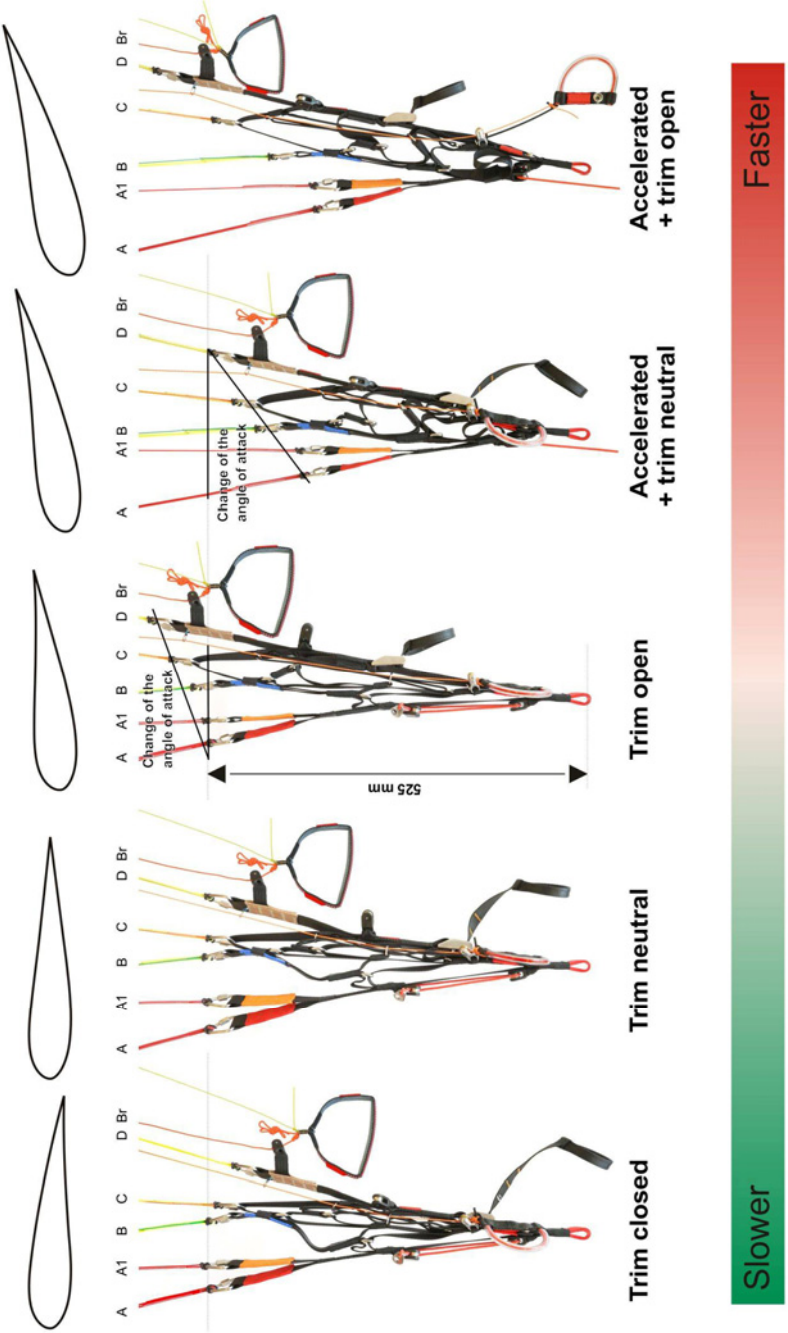
The Charger 3 has a wide in flight speed range due to the range of different trimmer settings. The trimmers have a deceleration range of 3,0 cm and 10 cm of acceleration. On the faster setting (trimmers fully open and extended) the Charger 3's speed increases. The wing is less sensitive to turbulence and the stability improves. On slower trimmer settings (neutral or trimmers pulled all the way down), sink rate improves and the brake pressure becomes lighter. You will feel that the wing is more sensitive flying through bumpy air with trimmers pulled all the way in. To help you identify the neutral position of each trimmer, look for the white stitching. It is important to check and set the trimmers in the same position for each riser before take-off and in flight to avoid unwanted turns.

The speed of the Charger 3 with closed trimmers (trimmers pulled all the way down) is around 37-40 km/h with a relatively low effort of the engine. This position is ideal for economy navigation tasks. With additional brake pressure the cruising speed is around 33-36 km/h. This will give you the best sink rate and requires the least amount of thrust from your engine for level flight.

The neutral trimmer position (marked with a white line) is the position where the risers are level. This is the most useful configuration for navigation and for precision ground tasks. The Charger 3 still turns very well and restores plenty of energy flying around 40-43 km/h. It requires a little more RPM from your engine compared to the closed trimmer position. It is recommended to use this configuration when using the speed system!

With the trimmers fully open the speed is around 48-51 km/h. You will notice the main brakes will become harder to pull. This is normal. With fully released trimmers the canopy is in its semi reflex mode and becomes more solid. To fly at maximum speed with your Charger 3, fully release trimmers and push the speed bar out all the way by pushing on it with your feet. The maximum speed is around 57-60 km/h. Higher fuel consumption will result in this configuration.

WARNING! Do not use the brakes when the Charger 3 is accelerated with trimmers all the way open or speed bar pushed all the way out.


Trim closed
Trim neutral
Trim open
Accelerated + trim neutral
Accelerated + trim open
Slower
Faster
A
A1
B
C
D
Br
Change of the angle of attack
525 mm

MATERIALS

Tissue

(PORCHER SPORT, Rue du Ruisseau B.P. 710,38290 ST. QUENTIN FALLAVIER, FRANCE)

Top Sail - Leading Edge -	Polyamid 6.6 RIPSTOP, 38 g/m^2
Top Sail - Trailing Edge -	Polyamid 6.6 RIPSTOP, 38 g/m^2
Bottom Sail - Leading Edge -	Polyamid 6.6 RIPSTOP, 38 g/m^2
Bottom Sail -Trailing Edge -	Polyamid 6.6 RIPSTOP, 32 g/m^2
Ribs, Diagonals -	Polyamid 6.6 RIPSTOP, 40 g/m^2
Ribs, Diagonals -	Polyamid 6.6 RIPSTOP, 32 g/m^2
Reinforcement Ribs-	W382 Polyester 180 g/m2

Lines

(EDELMAN+RIDDER+CO. Achener Weg 66, D-88316 ISNY IM ALLGEAU, GERMANY)

Upper lines - Aramid/Polyester A-7343-075, Breaking Load 75 kg
Upper lines, Stabilo - Aramid/Polyester A-7343-090, Breaking Load 90 kg
Main lines C1,C2,C3,D1,D2,D3 - Aramid/Polyester A-7343-190, Breaking Load 190 kg
Main lines A1, B1 - Aramid/Polyester A-7343-230, Breaking Load 230 kg
Main lines A2, A3, B2, B3 - Aramid/Polyester A-7343-340, Breaking Load 340 kg
Brake line - Dynema/Polyester A-7950-080, Breaking Load 80 kg
Brake line - Dynema/Polyester A-7950-100, Breaking Load 100 kg
Main brake line - Dynema/Polyester A-7850-200, Breaking Load 200 kg

(ROSENBERGER TAUWERK, GERMANY)

A, B Upper lines - Dynema/Polyester PPSLS 180,Breaking Load 180 kg

Attachment straps

(STUHA a.s., DOBRUSKA, Opočenská 442, 518 01 Dobruška CZECH REPUBLIC)
STAP-POLYESTERBRIDLE 13 mm, Breaking Load 70 kg

Risers

(Mouka Tišnov, Koráb 133, 66601 Tišnov, CZECH REPUBLIC)
Polyester 366 025 025 912 25x1,5 mm Breaking Load 900 kg

Thread

(AMANN SPONIT ltd, Dobronická 635, 148 25 PRAHA 4, CZECH REPUBLIC)
Lines-SERAFIL 60, Canopy- SERAFIL 60, Riser-SYNTON 20

Rapid links

(ELAIR SERVIS, Axmanova 3913/9,767 01 KROMERIZ, CZECH REPUBLIC)
NIRO TRIANGLE 200 - Max. Load 200 kg

Rigifoils

(MERKUR SLOVAKIA s.r.o.,Kamenné pole 4554/6,031 01 Liptovský Mikuláš, SLOVAKIA)

Rigifoils - Bison - Kopolyamid 6/12 2,00 mm/2,7 mm

GLIDER CHECKLIST

Before delivery, as well as during production, each Charger 3 paramotoring glider goes through a strict visual inspection. Additionally, we recommend that you check your new glider in accordance with the following points below. The Charger 3 is a form of aircraft and should be treated as such. We also recommend that you make these checks after flying extreme manoeuvres, tree landings or similar events.

- Inspect the canopy for tears or damage. Pay particular attention to the seams. Look at where the ribs join at the upper and lower surfaces and the areas of the attachment tapes and brake-line connections.
- Inspect the lines for damage and look for damaged stitching. The line lengths must be checked after 50 hours flying time and/or whenever the flight behaviour of the glider changes.
- Inspect the attachment points for damage to the stitches. It is equally important to free brake-lines from tangles before each flight.
- Inspect the risers for overall condition and check for frayed seams. Rapid links must be secured.

Understand that with slight damage the glider could lose its airworthiness! Fly safe by spending extra time to perform regular checks on your gear.

Brake adjustment and brake handles:

We strongly recommend brake adjustments be supervised by a paramotoring instructor or done by a pilot that understands the importance of proper brake line length. Improper brake line adjustment can lead to unsafe reactions of your glider. With a brake line adjusted too short the canopy will lose its easy take off behaviour.

Before flying the Charger 3 please check the setting of the brake lines and adjust them in accordance to your hang points. On the risers diagram you can see there are two brake line pulleys on each riser, higher and lower. The brake lines have two black marks identifying recommended brakes positions.

When flying paramotors with lower or middle hang points (main carabineer 50-70 cm from seat plate) the brake lines should lead through the higher pulley on each riser and the brake handles should be tied to upper black coloured mark position on the brake lines. Your Charger 3 glider comes from the MAC PARA factory with brake lines set to this position.

When flying paramotors with higher hang points (main carabineers higher than 70 cm or trikes) the brake lines should lead through both the upper and lower pulley located on each riser and the brake handles should be adjusted to be tied on the lower black mark of the brake lines.

Once you choose your appropriate brake line length that matches your paramotors hang point style, check the set up by inflating the glider in an open area with a constant breeze with the engine off. When the canopy is stabilised above your head, check that the trailing edge of the wing is not being pulled down. When you gently pull the brakes you should only have 5-10 centimetres of movement before the brakes start to pull down on the trailing edge of the wing. Make sure that the brake length is the same for both sides. It is safer to have brake length a bit longer than too short.

When free flying (paragliding) the brake line should be led through the upper pulley and the brake handle tied onto the upper black mark on the brake line. This makes the brake position perfect for a paragliding harness because of their lower hang points.

Attention!! All new gliders leave the MAC PARA factory set up for “lower-middle” hang points!

Fitting the speed-system:

Most modern paramotoring harnesses have pulleys for speed system fitting. The Charger 3 speed system is supplied with Brummel-hooks and must be assembled as per instructions.

Take your speed bar and make sure it is firmly attached to the foot stirrup (webbing or alloy bar) using a bowline or other non-sliding knot. Take off the Brummel hook on the speed bar cord if you haven't already done so. Hold the free end of the cord and run it through the pulley on each side of your paramotor harness. Next, lead the cord up to meet the Brummel-hooks on the riser of the paraglider. Firmly attach the Brummel hook on the end of the speed bar cord so that Brummel hooks can be attached to each other. Ensure both cords from the speed bar are equal length to avoid putting an unwanted turn in the glider.

The length of the cord leading to the foot bar stirrup should be adjusted so that it is easy to put your feet into the stirrup in flight but still short enough to allow full speed system travel. (The use of 2 stirrups in a ladder fashion can enable you to reach the full range if your legs are not long enough.)

Test your speed system for the correct length on the ground by hanging your paramotor to simulate the real flying position. While you are a few feet off the ground, attach your risers to your harness and have someone hold them while you try pushing the speed system checking for proper length and set up.

The full range of the speed system is reached when the 2 pulleys on the risers join together. Before launch, attach the glider's risers to the harness with the main carabineers first before attaching the speed system. Ensure that the speed system is untangled and operates freely before flying. There should be a spare inch or so before the speed bar activates the speed system. Remember that it is always safer to set the margin of play too big than too small.

FLYING THE CHARGER 3

The following information is NOT under any circumstances a manual for practising paramotoring. We would like to advise you of important information to increase safer flights and security while flying the Charger 3.

Paraglider Preparation

After unpacking and laying out the paramotoring glider in a slight horseshoe pattern, the following checks must be made:

Checklist before every flight:

Checking and inspecting the wing:

- Canopy without any damage?
- Risers without damage?
- Maillons (quick links) closed tight?
- Stitching of the main lines near the risers o.k.?
- All main lines run free from the riser to the canopy? Brake lines free?

Before putting on the harness:

- Warm up your engine and stop the engine before clipping in the risers.
- Rescue/reserve handle and deployment pins secure?
- Buckles (leg- , front riser) closed?
- Main carabineers attached and properly closed?

Before take-off:

- Ensure helmet is on and chin strap fastened.
- Attach speed bar system and connect properly.
- Check that the risers are not twisted.
- Look to see the trimmers are properly set to neutral (white stitching).
- Check the brake handle and brake lines are free and not twisted.
- Confirm nothing will get in propeller's way.
- Centre yourself relative to the wing (all lines same tension).
- Test engine to deliver full power.
- Check wind direction.
- Check for obstacles or tripping hazards on the ground.
- Identify free airspace.
- Look out for obstructions in the direction of desired flight path.

When laying out the glider, the wind direction must be observed for a successful launch. The canopy should be orientated into the wind so both sides are loaded symmetrically. The glider should be arranged in a semicircle (horseshoe) against the wind. This ensures that the A-lines in the centre section of the canopy will be tensioned before the wing tips. Doing this inflates the canopy evenly and allows for an easy launch in the desired direction.

All lines and risers should be carefully checked, untangled and arranged in a way that they do not catch on anything. It is equally important to untangle the brake lines so that they are free and clear so they do not catch on anything during launch. The brake lines should run freely through the pulleys to the trailing edge of the canopy. Make sure the risers are not twisted; this can prevent the brake lines from running freely through their pulleys. It is nearly impossible to untangle lines during flight. It is important that no lines are looped around the canopy. Also called a “line-over”, this may have disastrous consequences during take-off. Finally, connect the risers to your harness by using the main carabineers. Check carefully that they are closed properly.

Preparing for take-off:

As with any aircraft, a thorough pre-flight check must be made prior to each flight.
Before every launch check lines, risers and canopy for damage! Do not launch with even the slightest damage!

Also check the maillons connecting the lines to the risers. They must be closed tight.

Getting ready for Flight

Put on the harness/paramotor with care and check that the handle of the reserve parachute is securely fastened to prevent accidental deployment. Look to see that the flaps of the outer container are fastened securely and correctly. The main carabineers must also be checked carefully. Replace carabineers if any damage is visible or if you have accumulated 300 flying hours. Finally, connect the paraglider risers to your harness with the main self-locking carabineers. Check carefully that they are properly closed.

ATTENTION! Never fly with an open main carabineer!
ATTENTION! Do not take off if you find any damage on your equipment!

Forward Launch Technique

The Charger 3 is very easy to launch. With a very weak or zero wind it requires an appropriate launch technique. Before take-off, recheck the canopy, trimmer setting, wind direction and the air space around you. When you are ready to take off, hold all A-risers and the brake handles in each hand. If there is wind present then just hold the centre A risers in each hand.

The A-lines are identified by red coloured sleeves on the risers. Before take-off, place yourself in the centre of the glider while holding the A risers. Let the B, C and D risers fall into the bend of your arm. Continue holding the A risers with arms outstretched behind you. Pull up the canopy with good forward momentum. (The stronger the headwind the fewer run-ups you need plus less pull on the A’s to inflate your canopy). After the initial inflation you may need to keep applying forward pressure on the A-risers depending on the wind conditions. Do not pull down on the A’s.

1. Paragliding forward technique – Follow the above technique to get the glider overhead. As soon as the glider is above you, stop pulling on the A-risers. A good progressive run ensures your Charger 3 will inflate and come up equally and quickly. If the canopy should surge forward, control it by gently braking. Next, do quick visual checks of the canopy looking upwards to ensure the canopy is completely open (otherwise, abort the take-off). Only then is the final decision to continue the launch. If anything doesn't feel completely safe, the launch should be aborted. If the glider feels solid and evenly inflated continue moving forward until the glider lifts you off. It is easier to take-off in a light headwind by applying the brakes slightly. After the take-off, gently release the brakes to gain forward momentum. Shortly after take off the brakes should be gently reapplied to stabilize the glider during cruising flight and possibly correcting for drift.

2. Paramotoring technique – Layout and start the inflation technique the same as stated above. Once the canopy is inflated up to the angle of about 80° degrees, open up the throttle to full power and lean back. This helps counter the engines thrust allowing it to push you forward rather than leaning forward towards the ground. Continue to run in an upright position. This is important. When you approach take off speed gently apply the brakes (max 30% of the brake range). The faster the trimmer setting is, the more brake input is required for take-off. Set the trimmers to neutral for easy launching. Once you have safely taken off continue heading into the wind. Release the brakes to gain enough altitude to allow you to get into your harness safely.

Experienced paraglider pilots that start paramotoring have a tendency to lean forward with slightly applied brakes. When taking off with a paramotor you need to stand up straight and allow the thrust of the engine to push your body horizontally forward rather than diagonally down.

It is important to not get into the harness as soon as you leave the ground. Right after take-off you are relatively low to the ground. The possible danger is if the engine happens to quit or loose thrust you quickly will be put back on the ground. Not rushing into your seat/harness allows your legs to act as landing gear instead of the bottom of your paramotor.

The recommended technique of getting into your harness is to climb to a safe height into the wind and then gently throttle back before getting into the seat. If you need to use your hand to help you get into your harness, be sure to put the brake toggle on the magnet first to avoid it being sucked into the prop. Also note that properly fastened leg straps makes getting into the harness much easier. Check this before take-off in a simulator or with your paramotor instructor.

WARNING!! Do not jump or lift your legs immediately after or during your take off! This could have disastrous consequences when done with a paramotor if the wing has not reached the proper take off speed to create the necessary lift. Keep running, keep running and keep running until you are running through the air.

WARNING!! Do not attempt to get into the seat while holding the brake handles.

WARNING!! Do not use the forward launch technique in very strong winds. Make sure you don't pull the risers too much towards yourself or downwards as this can cause a frontal collapse or make an asymmetric collapse during take-off.

Reverse launch Technique

The Charger 3 is easy to reverse launch.

The most important skill to perform the reverse launch successfully is to fully understand ground handling. You need to be able to keep the wing directly overhead and into wind while taking off on flat ground. When doing a reverse launch in strong winds the Charger 3 can surge forward quickly or lift off sooner than desired. To avoid this, walk towards the canopy during inflation. We recommend pulling the trimmers down 2-3 cm from the neutral position.

To reverse launch the Charger 3 in wind, get the canopy over your head by using the A and D riser method. Holding onto the D lines stop it from over shooting and guiding the A lines in the opposite hand help it come up. This stops you from applying both brakes and pushing your hands back towards the propeller.

Hold the A lines in the left hand along with the left brake handle and the throttle (if you have it on the left side), and the D lines in the right hand along with the right brake handle (and the throttle if you have it on the right side). Once the canopy is above your head you release the A and D risers then turn 180 degrees into wind while keeping the glider under control. Once you feel equal pressure and a stable canopy above you then you can accelerate. Once you are safely airborne, continue heading into the wind to gain enough height.

Do not try to climb too steeply by applying too much brake. The additional drag caused by brakes decreases actual climbing rate. If there are no obstacles present, it is safer to fly level for a while after take-off and gain some speed before converting it to height. As already mentioned, don`t try to get into the seat immediately after you leave the ground as you are still relatively low. Instead, continue into the wind, climb to a safe height, and then gently throttle back before getting into your harness/seat.

It is better to start to learn this A and D reverse technique without the paramotor. Once you practise a bit you can start trying it with the paramotor. Using this technique allows you to build a wall directly into wind while standing in the centre of the canopy.

When deflating the canopy on the ground in strong winds or aborting a launch, pull down on the C or D risers instead of the brakes. Using the brakes in strong wind will cause more lift. This could lift the pilot up off the ground and dangerously drag him/her back.

Golden rule! For any aircraft the most important thing on take-off is proper amount of speed. High angles of attack and low speeds are more likely to cause a stall.

ATTENTION! You should always be able to land safely in case of engine failure.

Too much brake input during take-off is risky. Depending on the design and power of your paramotor unit, it is possible that you will notice engine torque moments while not sitting properly in your harness. Be ready to counter-steer with a brake input to correct turning tendencies and keep you flying straight. You also can compensate torque moments by adjusting cross bracing if present on your harness or by adjusting Charger 3 torque compensator line on the opposite riser of the torque turn. Different settings of trims on each riser and shifting your weight to the opposite side of the turn tendency will help to keep the glider in a straight direction after take-off.

The reverse launch technique can take some time to master. Turning the wrong way can result in the pilot taking off with twisted risers. Practice the reverse launching technique on a training hill or slight slope first with your instructor to build up your confidence. Again, make sure your engine is off until you have practised enough to prevent the lines from getting sucked into the spinning propeller. If this does happen contact your nearest MAC PARA dealer for replacement lines or glider repair.

Wind	Trim settings	Launching technique & additional settings
under 1 (m/s)	Released for 1-2 cm.	**Forward launch** - start with lines under tension - try to minimize use of the brakes. - correct position of the wing by moving toward in appropriate direction rather than by using brakes - use of full thrust when canopy at 80°
1 - 3 (m/s)	Neutral	**Forward launch** - start with lines under tension - you can use brakes to correct the position of the wing during the run, but moving in the appropriate direction during the run is most effective technique. - use of full thrust when canopy at 80°
over 3 (m/s)	Neutral or closed for 1-2 cm	**Reverse Launch**

Flight

After take-off and applying full power the glider will be at a higher angle of attack. Some paramotoring configurations may have a tendency to roll under full power. The torque and gyro moments produced from different engines can lift you to one side developing a back and forth swinging motion. This happens more often on larger engines with bigger propellers flying with lower wing loadings. The safest way to deal with this is to throttle back and release the brakes. Do not let go of the brakes. Inexperienced paramotoring pilots tend to be especially prone to overreacting.

The Charger 3 can reach speeds of 40-43 km/h on neutral setting depending on the weight of the pilot.

Always fly with sufficient clearance from the terrain.

With power off the Charger 3 best glide rate is with open brakes. Flying the Charger 3 with minimal altitude loss can be reached by lightly applying brakes and having the trimmers closed (pulled all the way in).

We recommend that your first flights with your Charger 3 be done with trimmers set on or just below the neutral setting (the white stitching mark) This is where the Charger 3 will feel more like a conventional paraglider wing. With this trimmer setting, try to fly with a small amount of brake at the point where they just begin to feel heavier.

In turbulent air fly with brakes lightly applied (10-15 cm) to maintain some internal pressure and trimmers set to neutral. This will help avoid canopy collapse. If the canopy pendulums forward correct this by promptly applying the brakes. A pendulum movement of the canopy backwards is corrected by easing up on the brakes to let the canopy move forward. When you have become fully confident in your wing try experimenting with slower and faster trim-settings, weight-shift and speed bar. The more time you spend on your Charger 3 the more likely you will enjoy the extra speed and security it will offer you.

Different trimmer settings

NOTE: Adjusting trimmers in flight requires more pilot attention.

With the trimmers fully open (trimmer buckle over and passed the white line) the wing's speed increases (good for flying long distances). The canopy becomes stiffer and is less sensitive to turbulence and its stability improves. On faster trimmer settings or when flying with a speed bar the brake pressure increases and the handling changes. When the trimmers are fully opened and the speed bar is pushed all the way forward, we recommend steering the glider using the torque compensator lines.

Some pilots with free-flying experience may have a tendency to keep the brakes slightly applied at all times. Such a technique, while quite reasonable on a free-flying wing, is not advisable for reflex gliders. When you apply the brakes with released trimmers and full speed bar the wing will collapse because it loses its reflex characteristic.

Warning!!! On faster trim settings with fully accelerated speed bar do not touch the main brakes! Doing so will result in major collapse! In flight mode use only WTST brakes for steering of the glider.

On the slower settings (trimmer buckle pulled below the white line), sink rate improves and handling becomes lighter, giving you an improved climb rate for thermaling and shorter and slower take-offs and landings. Do not hesitate to use thermals in order to gain some altitude and save fuel.

Note!! If trims are not adjusted the same, the wing will turn. Trimmer setting is an important part of the checklist before every flight!

Accelerated flight (speed bar applied)

When flying with the speed system engaged the angle of attack is lower and the glider increases flight speed. In contrast to most paragliders it does not decrease wing stability; in fact the reflex gliders seem to counter turbulence even better. To use the speed system and accelerate the glider, simply place your feet on the stirrup and push forward in a horizontal plane. If you feel a loss of back pressure while flying with the speed bar engaged, this is a warning that the canopy is probably about to collapse.

Release the speed system immediately by releasing the pressure on the speed bar. Do not use the speed system in very turbulent conditions, close to the ground or near other airspace users. Always fly with sufficient clearance from the ground/obstacles and always keep the brake handles in your hands!

Steering - turns:

The Charger 3 is a very responsive paramotoring glider and reacts directly and instantly to any steering input. Weight shift input quickens turns and ensures minimal height loss. **Attention!** In the event that you lose your brakes lines, it is possible to control the Charger 3 with the WTST brakes or D-risers to steer and land the canopy.
Attention! Pulling brake too fast or too hard can result in the canopy entering a negative spin.

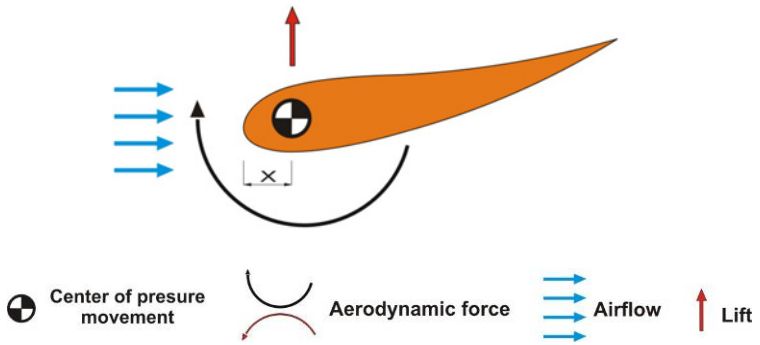
Warning!! As already noted, do not apply brakes when fully accelerated with trimmers fully opened! Braking increases lift near the trailing edge. The main lift point moves backwards causing a loss in stability leading to big frontal or side collapse. Quickly letting off the throttle after being fully accelerated (maximum speed bar and trimmers open) will cause the "pendulum effect". The glider can then surge forward which automatically decrease the angle of attack. This can easily lead to collapse in turbulent air. See drawings on pages that follow.

When flying with maximum speed-bar engaged and fully opened trimmers, we strongly recommend steering with WTST (wing tip steering) handles. At first, learn to fly using the speed system with the trims in neutral position.

Study the following drawings of different trimmer settings and speed-system to see their influence on the wing stability.

Released trimmers without brakes

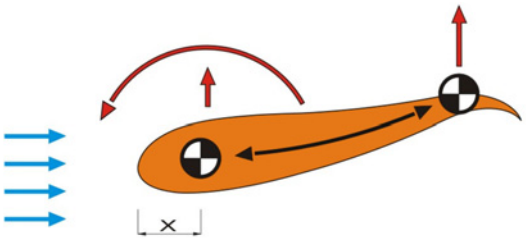
Preferred setting for fast and safe flying. The centre of gravity of the air foil is moved forward, the wing has higher resistance to collapses. Pitching moment decreases.



Released trimmers with brakes applied

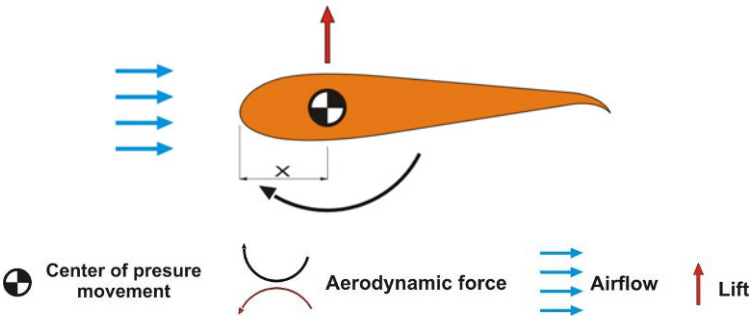
Even slight brake input (especially on full speed bar) produce lift close to the trailing edge. The centre of gravity of the airfoil is moved back and the higher pitching moment significantly decreases the stability.

Warning!! Especially in turbulence this can lead to a collapse on full speed with trimmers released! Therefore we strongly recommend you only steer by pulling on the WTST lines and not touching the main brakes.



Closed trims

Using the trimmers in the pulled closed position with brakes gives you the slowest speed and most sensitive feeling of the Charger 3. The canopy behaviour is similar to that of a classic paraglider.





Approach and Landing:

It is important to start to prepare for landing at an adequate altitude to avoid surprises. This leaves you enough time to observe and appropriately deal with wind direction and any other aircraft in your vicinity.

The Charger 3 is very easy to land. The final leg of the landing approach must be into the wind. There are two methods in landing a paramotor. One without power (this minimises the risk of propeller damage in the event of a fall) and the second with power.

Power off landing

When deciding to land your paraglider check the wind direction and your height. The next step is to power off your engine at about 30 m. Glide toward your landing like a paraglider with trimmers set in the neutral setting with your brakes released. During your final glide just before touch down, you need to decelerate the glider by pulling your brakes converting your excess speed into lift before your feet touch the ground. Proper timing and how fast to pull your brakes depends on conditions. A general rule is to pull down on your brakes when your feet are approximately 0.5m over the ground. If too much brake is pulled too early, the glider may climb gaining height resulting in a sudden drop to the ground. Strong wind landings require correspondingly less brake. Your instructor will assist you to understand how to properly time your brake pull (also called a flare). Every pilot should practice landings without power because one day your engine will fail (run out of gas etc.) and this skill could be useful.

Power on landing

Fly towards your desired landing area at a shallow angle. Start to flare the wing before touch down to loose speed then switch off your engine immediately after touchdown. In no wind conditions, be prepared to run a few steps after touchdown. Then pull the brakes few times dynamically (like a fluttering bird). This stops the canopy over your head and gives you time to turn and put the glider gently on the ground. Do not apply full brakes before you are safely on the ground. Do not turn unless the propeller stops turning.

The advantage of the power on landing is that if you get it wrong you can power up to launch and try again. The disadvantages are the increased risk of expensive propeller/cage damages if you approach too fast or forget to flare in time. Another danger is falling over with the engine running and getting your lines caught in the propeller. Make sure you switch off the engine before the wing deflates on top of you.

Attention! The final glide on approach during the landing should be straight and not done with any steep or alternating turns. This can result in dangerous pendulum movements too close to the ground.

Attention! Do not allow the canopy to come crashing down onto the leading edge. This can destroy the internal structure of your glider and affects the life of the ribs at the leading edge.

If possible, get familiar with the landing field before the approach. Check the wind direction before landing. Landing with power off requires much less space. Practice makes the master. Practice until you feel totally safe.

Getting Started with 2D

Good news for your first encounters with 2D steering! If a pilot has already mastered proper inputs on classic steering, 2D steering will react very similarly. With the hands in a standard position (i.e., handles approximately 20 cm from the shoulders along the "X" axis) followed by a downward pull along the "Y" axis, 2D steering functions almost identically to classic steering. The basic method of controlling the glider is therefore simple and very similar to conventional steering. By changing hand movements, the pilot can now begin to explore the differences in the glider's response.

Notice: For the initial mastering of 2D steering, it is important that the riser trims are set within a limited range from the zero position and that the speed system is not used.

Warning: If a pilot has developed non-standard control habits on classic steering — such as spreading their arms wide into a cross position — these habits must be corrected for 2D steering.

Warning: Before using the 2D system extensively in demanding conditions or at low altitudes, spend time practicing ground handling and flying in calm air to refine your individual control technique.

Warning: A pilot transitioning from classic steering, or one accustomed to another manufacturer's 2D steering, may initially feel that a 2D-steered glider reacts less dynamically. In this case, the cause is an incorrect pull direction for this specific wing. Implementation of 2D steering varies across manufacturers, and the resulting control responses may require slightly different input movements.

Basic Practice Exercises

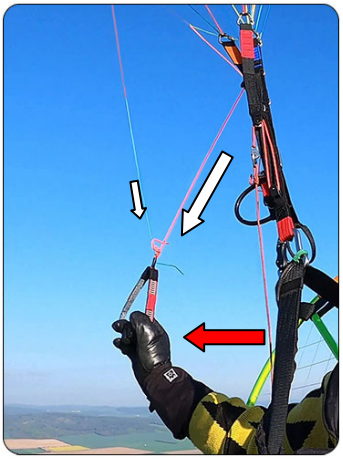
If a pilot is unsure about takeoff and wants to test 2D inputs first, the basic movements can be practiced on the ground in a steady 3–5 m/s wind where the wing remains inflated overhead in flying position.

In flight, basic familiarization should take place in calm conditions at a safe altitude. The pilot repeatedly practices the three basic movements with each hand individually. The starting position is hands hanging loosely in the main brake handles.

- **Turning:** The pilot pulls the brake handle toward themselves along the axis of the outer line and slightly downward. A relatively small movement with light pressure yields a dynamic turn response from the wing. Alternate turns left and right to build muscle memory.
    - *Warning:* Avoid performing 360° turns at the same altitude level, as there is a risk of flying into your own wake turbulence, which can cause a wing collapse.

- **Basic braking:** The pilot pulls the main brake handle slightly outward and downward. Despite higher control pressure, the wing turns very gradually. If performed symmetrically with both handles (outward and downward), the glider generates more lift first and then slows down. This movement is used for pitch corrections.

- **Feeling the transitions:** While holding a light pull on the main brake handle, smoothly move your hand horizontally toward and away from your body, observing how the wing's reaction changes based on handle position.





Recommended Procedures for Selected Situations

- **Takeoff:** After initial wing inflation, brake the wing with a smooth, symmetrical movement downward and slightly away from the body (forming an acute "A" shape). Stronger activation of the inner segments combined with lighter activation of the outer segments provides superior directional stability, less sensitivity to asymmetric inputs, smoother lift build-up, and lower stall risk.

- **Directional correction during takeoff:** If the wing surges significantly off the pilot's center axis, apply a directional correction by bringing the hand inward toward the body in addition to standard braking. For instance, if the wing veers off to the right after inflation, pull the left hand distinctly toward your body alongside normal braking.
    - CAUTION! Correcting a severe off-centre position purely by pulling further downward in the direction of standard braking may not provide sufficient correction.
    - CAUTION! Pilots accustomed to dynamically swinging their hands side-to-side horizontally during the run-up will cause a 2D-steered wing to roll intensely from side to side. This habit must be eliminated!

- **Landing:** In the final flare stage, pull your hands downward and slightly outward (forming an acute "A" shape), making directional corrections using appropriate horizontal hand movements.

- **Steep turns with high bank angle:**
    - CAUTION! Steep turns are advanced piloting techniques involving high dynamic forces. Attempting to practice them at low altitude can result in a crash and severe injury! Do not overestimate your abilities!
    - Initiating a dynamic turn with high bank: In the direction of the turn, initiate by pulling the brake handle diagonally toward your body (activating the outer segment). As the bank angle develops, move your hand slightly downward while pushing the outside hand outward (keeping the inner-outer segment active while additionally engaging both central segments). Exit the turn by smoothly releasing pressure and making a counter-correction with the outer handle toward your body and downward.
    - CAUTION! A steep banked turn should never exceed 360°, as the pilot will quickly fly into their own wake turbulence, which can trigger an unexpected wing collapse!
    - CAUTION! Extreme dynamics and pilot inertia during entry and exit can result in significant, unrecoverable altitude loss if improperly managed. Performing this maneuver close to the ground is extremely hazardous even for experienced pilots.

Individual 2D Steering Setup

- **Factory settings** for the control lines represent a balanced compromise for the specific wing and differ significantly from 2D setups on competitor paramotors. The degree of lift generated during turns via outer trailing-edge activation offers comfortable control while retaining a safety margin against stalls. Adapting to this system takes time if you are used to a competitor's 2D setup.
- **The lengths of both control lines** are preset for standard paramotors with mid-to-low hang points. However, the system is designed to allow custom adjustments to suit your specific needs.
- On paramotors with high hang points, the main brake lines can be routed through both pulleys on the D-riser. **Caution!** In this configuration, all brake lines (both inner and outer) must be lengthened by 15 cm.
- **Personal setup preferences:** The ratio between the main brake lines and outer brake lines can be adjusted to match your power unit geometry and flying style. The maximum adjustment range is 5 cm.
- **Essential safety check:** Ensure that brake lines are long enough so that the trailing-edge does not activate (pull down) when flying at maximum speed (trimmers fully open and full speed-bar engaged).
- **Warning:** To maintain wing stability at higher speeds, use exclusively WTST handles for steering.

WARNING: When flying with the trimmers fully released or the speed bar fully engaged, do not use the main brake handles. Use only the dedicated WTST handles for directional brake.

TOWING, JUMPS FROM AIRCRAFT, AEROBATICS

WARNING!! The Charger 3 is not suitable for towing.

WARNING!! The Charger 3 is not suitable for jumps from aircraft.

WARNING!! The Charger 3 is not designed to be used for aerobatics.

EXTREME FLYING MANOEUVRES

WARNING!! All the critical flight conditions described here require thorough knowledge. They should only be carried out during safety training courses (SIV) under proper guidance and supervision. Under no circumstances can the information below be taken as manual for practising advanced manoeuvres.

This section describes flying conditions which can be deliberately induced or can develop unintentionally due to turbulence. Pilot error can also be responsible for unwanted circumstances. Any pilot who flies through turbulence will face special flight conditions at some point in their flying career. Be aware of these flight manoeuvres and prepare for them by SIV (safety training over water) with proper instruction. We expect you are an advanced paramotoring pilot and you already have the proper experience. Mastering these flying conditions significantly improves your active flight safety. Keep in mind that all disturbances of the canopy can increase the sink rate by 2 - 10 m/sec depending on the degree of disturbance/collapse. Carrying out these manoeuvres wrong may lead to a sudden drop in altitude, a crash or even death.

Asymmetric collapse

A negative angle of attack can cause all or part of the leading-edge of the Charger 3 to collapse (e.g. in very turbulent air). The Charger 3 will re-open spontaneously from closures of up to 50%. The time this takes with the associated height loss can however be drastically reduced by appropriate action by the pilot. Applying opposite brake on the inflated side to stop the turning movement of the canopy will help the canopy regain proper flight. If you react immediately with 30% brake on, the open side should hold the canopy on a straight course.

In the event of a big collapse, this braking should be applied very carefully to avoid stalling the remaining inflated wing. The pilot's correction for maintaining direction can be aided by pumping out the deflation; a slow, long pumping action of the brake of the deflated side of the wing helps the canopy to re-inflate. If the pilot does not take corrective action the canopy can enter a stable spiral dive.



“Cravat” / Line-over:

In the event of some lines becoming tangled during flight (caused by whatever), the following action is recommended:

Stabilize the glider by gently applying the opposite brake. Please be aware that in this condition the brake pressure can be higher and the brake travel shorter.

Without pilot input, a line-over will result in a stable spiral dive.

Here are the various options to untangle a line-over:

- pumping the collapsed side.

-pulling the stabilizer line or a sharp pull on the D riser can sometimes solve the problem.

Attention! If these manoeuvres fail or if in any doubt, the pilot should instantly use their emergency reserve parachute system!

Frontal Collapse:

Frontal collapses provoked at higher speeds can lead to extremely deep collapses. Recovery requires short and equal application of both brakes. When experiencing a very large front tuck, a frontal rosette can occur (the wingtips move forwards: forming a horseshoe shape). Short and gentle braking can avoid this.

A quick recognition of the situation and a quick reaction by braking on both sides helps the recovery and limits the altitude loss.

Parachutal stall (deep stall):

A parachutal stall can be caused by having the glider fly too slowly. The most common cause is from pulling too much brake, however, porous canopies (UV influence) or canopies out of trim (stretched or shrunken lines) are much moresusceptible to a parachutal stall. Gliders in poor condition should not be flown. This is the reason why regular checks should be carried out on your glider. A wet canopy or temperatures below zero centigrade (0°C) may also cause a stable parachutal stall. When releasing the brakes the Charger 3 will spontaneously recover from a parachutal stall within 2-3 seconds. If the canopy remains in a parachutal stall, it is sufficient to release trims or to push the accelerator.

Attention! If brakes are applied while in a parachutal stall, the glider may suddenly enter a full stall!

Full-stall:

A full stall practically never occurs. It happens only as a result of serious neglect or intentional action of the pilot. To avoid a full stall you have to be careful when flying at low speeds until fully familiar with brake operation. The Charger 3 recovers spontaneously in the initial phase of stall, otherwise use standard procedures.

To recover from a full stall, smoothly release both brakes simultaneously until 90% of leading edge reopens, then release brakes rapidly. The glider ends the full stall on its own without surging forward violently.

WARNING!! If the brakes are released rapidly and asymmetrically, the glider may surge almost 90° and suffer an extensive asymmetric collapse.

The danger of overcorrecting and overreacting exists during all extreme flight manoeuvres. Any corrective action must be gentle and controlled. Proper training and experience is required to gain a good feel for the glider! Always receive proper training.

Spin (or negative spin):

Normally it does not occur. You have to be careful when flying at low speeds until fully familiar with brake operation. A negative spin can happen by pulling down the brake on one side too fast or too hard. During a spin the canopy turns relatively fast around the centre section of the canopy while the inner wing flies backwards (hence the term negative).

There are two usual reasons for an unintentional spin:

- One brake line is being pulled down too far and too fast (e.g. when inducing a spiral dive in slow setting)
- When flying at low speed the pilot pulls opposite brake too hard to try to compensate for the engines torque.

To recover from an unintentional spin, the pulled down brake line should be immediately released as soon as a spin is suspected. The canopy will accelerate and return to its normal straight and stable flying position without losing too much height. If the spin is allowed to develop for some time, the glider will surge far forward to one side resulting in a dynamic asymmetric collapse or a cravat. Gently apply the brakes to the side that is shooting forward to avoid the side/central collapse or the possibility of a cravat (one of the tips becoming entangled in the lines).

WARNING!! If you are LOW and are in an unintentional spin, or if the canopy is caught in a cravat - THROW YOUR RESERVE.

Wingover:

To induce a wingover the pilot flies consecutive alternating turns to gradually steepen the angle of bank. During wingovers with a high bank angle, the outside wing begins to unload. Continually increasing the angle of bank must be avoided to avoid dynamic collapses.

WARNING! Full-stall, spin and wingovers (over 90 degree angle of bank) are prohibited aerobatic manoeuvres and may not be performed during normal flying. Incorrect recovery procedures or overreaction of the pilot may have dangerous consequences!

Attention! The Charger 3 is not designed to be used for aerobatics.

Alternative (emergency) steering:

If for some reason it becomes impossible to control the Charger 3 with main brake lines, the WTST handles or D-risers may be used to steer and land the canopy safely.

Attention: When using the D-risers the brake range is much shorter (10-15 cm) then with the brakes. It is also possible to control the direction of the flight by pulling on a stabilizer line or by weight-shifting.

Spiral dive:

Attention! Set trim setting in slow or neutral and turn your paramotor off when executing spiral dive.

A spiral dive is the fastest way to lose altitude; however, the very high G-forces make it difficult to sustain a spiral dive for long. It also places high loads on the pilot and glider. By tensing ones abdominal muscles and a higher body tension you can to some extent resist the high G-forces. Don't forget proper breathing to keep the blood flowing to avoid blacking out. As soon as you feel any slight dizziness or impaired vision the spiral should be exited immediately.

The Charger 3 has a very effective spiral dive. This allows rapid descent without stalling. To enter a spiral dive the pilot should weight-shift to one side while slowly pulling the brake gradually on the same side. During a spiral dive the angle of bank can be controlled by increasing or reducing the amount of inside brake. When spiral diving the Charger 3, it is recommended that the outside brake be lightly applied. This helps stabilize the wing and enables an easier and safer exit from the spiral. To exit, release the inside brake slowly. At higher sink speeds or if the pilot keeps his weight on the inside, the wing can stay in a continued deep spiral and has to be actively exited. This is done by weight shifting to the outside and gently applying brake to the opposite side.

WARNING!! Nearly all gliders will have a tendency to stay in the spiral if the sink-rate exceeds approximately 15-m/s depending on weight-shifting, wing loading and G-force. In fact most gliders need a counter-input to end a turn.

Attention! Due to energy retention, the glider will climb a lot after a deep spiral-dive release. If you apply inner brake and decelerate the glider for two or three turns, big pendulum effects can be avoided.

WARNING!! Practise spiralling with caution and lower sink-rates to get a feel for the gliders behaviour. A pilot who is dehydrated or not accustomed to spiralling can lose consciousness in a steep spiral dive!

WARNING!! Never do big ears in a spiral! This manoeuvre can lead to a smaller number of lines carrying an excessive load multiplied by the centrifugal force. It could lead to damage of the lines and or the paraglider itself.

Big ears:

There is a lot of load on the “A’s” performing big ears especially on the faster trim settings. We do not recommend using big ears as descent technique under power. With a hard pull on the outermost A-lines there is higher risk of collapse. A spiral may be a more efficient way to get down.

When in big-ears without power, the horizontal speed is higher than the sink rate, unlike a spiral dive or a B-line stall. This rapid descent technique is used to quickly and horizontally exit a dangerous area in the desired direction. In order to collapse the outside wing tips called big ears pull down the outer most A-lines.

This will tuck the fabric on the outside part of the wing and start a stable descent. Keep holding the brake handles along with the outside A1-risers in your hands. By braking on one side and weight-shifting, the canopy remains steerable.

In order to increase the sink rate as well as the horizontal speed, this manoeuvre should be done together with use of the speed system. Apply the speed system after big ears are induced (step into the speed-bar before you grab the outer A1-risers). Big-ears substantially reduce the risk of canopy stability problems in turbulent air. To exit Big-ears release the A1-risers. The canopy will recover by it self. If not, or to quicken the recovery, the pilot can gently apply brakes to the glider.

WARNING! Never do big-ears in spirals. This may drastically reduce the number of lines taking the already high loads causing structural failure.

B-line stalls:

As there is a lot of load on the “B’s” we do not recommend using B-Stall as a descent technique under power. Performing B-Line stalls on any glider weakens the fabric by putting unnecessary strain on the lines. It could deform the quality of airfoils and weaken it.

GOLDEN RULES

Summary:

For all extreme manoeuvres and rapid descents please note:

- First practise manoeuvres with an instructor during safety training.
- Before inducing any manoeuvre the pilot must check that there are no other airspace users below him.
- During the manoeuvre you must have the canopy within your view.
- Always carry out full pre-flight checks before launching.
- Never place your paramotor downwind of the glider.
- Check that there is no fuel leakage. Do you have enough fuel for the flight? It is always better to have too much than too little in case of an emergency landing.
- Check for any loose articles that could trail or fall into the propeller while flying and fasten them securely.
- If you spot a problem, no matter how small, land and fix it at once.
- Always put on and secure your helmet before getting into the harness.
- Do not fly over water, between trees or power lines and other places where engine failure will leave you helpless and in danger.
- After landing, control the wing facing the direction of flight to keep the lines out of the propeller. Turn to face your glider to avoid falling backwards in high winds once the engine is turned off.
- Keep in your mind the turbulence caused by other powered gliders, heavy trikes or other aeroplanes.
- Keep in mind the turbulence caused by your own paramotor, especially when flying sharp turns, spiralling or flying low.
- It is unwise to fly hands-off the brakes below 100m because of possible engine malfunction requiring immediate attention.
- Unless it is absolutely necessary (e.g. collision avoidance), do not make tight turns against the torque moments. During steep climbs you easily can enter a stall under power and increase your chances to induce a negative spin.
- Never trust your engine! It can stop at any moment. Always fly being prepared for this especially at low altitudes by looking for safe landing areas.
- Avoid low flying downwind. It drastically reduces your options for safe landings.
- Listen for change in engine performance or noise. A new engine tone or a new vibration may indicate trouble. Do not wait for the problem to grow. Land and check it out.
- Be certain of your navigation
- Not everyone is a friend of your paramotor noise. Keep within the rules and the laws. Care must be taken when flying near livestock and animals.

CARE AND MAINTENANCE

Looking after your canopy correctly will prolong the life of your paramotoring glider and enjoyment.

Deterioration: a few tips!

- The canopy is mainly made of NYLON cloth which like any synthetic material, deteriorates through excessive exposure to UV. Hence, it is recommended that you reduce UV exposure to a minimum by keeping the paramotoring glider packed away when not in use. Even when packed in the bag do not leave it in the sun.
- Keep the canopy and lines as clean as possible. Dirt may penetrate into the fibre and damage the lines or the cloth.
- Ensure that the lines are not folded tightly. It's extremely important to avoid any sharp bending of the lines, especially the main lines. Pay careful attention to the lines to avoid damaging them. Any over stretching of lines apart from the strain imposed during normal flight should be avoided as over stretching is irreversible.
- Be careful not to allow snow, sand or stones to enter inside the canopy's cells. The weight can change the angle of attack or even stall the glider. Additionally, the sharp edges of foreign material can destroy the cloth!
- Check line lengths after tree or water landings. They can stretch or shrink lines.
- Never drag the wing over rough ground! This will damage the cloth on the wear points. When preparing the wing on a take-off with rough ground, don't pull the wing over it (i.e. by pulling the brakes). Try your best to pack the wing on soft ground.
- Uncontrolled strong wind take-offs or landings can result in the leading edge of the canopy hitting the ground at a high speed which may cause rips in the profile and damage the rib material.
- Clean your glider with fresh water after contact with salt water. Salt water crystals can reduce line strength even after rinsing in fresh water. Replace lines immediately after contact with salt water.
- Check canopy fabric after water landings with water currents. Waves can place uneven forces and cause cloth to distort in specific areas. Always remove gliders from the water by holding only the trailing edge.
- Prevent lines from catching on anything as they could be stretched. Do not step on the lines. Although the lines were tested with a bending test they can be damaged if stepped on while on a hard surface or if they come into contact with sharp objects.
- Don’t always fold the canopy symmetrically to the centre cell. This can cause constant stress on the same centre cell over time.
- Clean your paramotoring glider with only water and a soft sponge. Avoid water hoses, pressure washers and mashing machines. It is best cleaned by hand.
- Do not use any chemicals or spirits for cleaning as these can permanently damage the cloth.

Packing:

When a compact package is needed pack your Charger 3 accordion-wise rib on rib, nose wire on nose wire, so that the plastic rods in the ribs at the leading edge lie as flat as possible on one another, all at the same height. This will prolong your paraglider life and keep its fast and excellent filling qualities at takeoff. Only pack and store a dry paraglider, and avoid unnecessary compressing and tight packing. Otherwise store your powered glider loosely in delivered Mac Pack (quickly-bag).

Storage:

- Store the paramotoring glider in a dry space at ambient temperature away from chemicals and UV light.
- Never pack or store the glider wet. This shortens the life of the cloth. Always dry glider thoroughly before any packing or storage.
- Avoid subjecting your wing to high temperatures (e.g. the luggage space of a parked car in the sun)! Take into consideration some materials of your paramotoring glider are temperature sensitive.
- Watch out for bugs. Insects such as grass-hoppers and ants will simply eat their way out if rolled up with the wing. Grazing cattle can literally lick the coatings off the fabric and mice love to make homes in canopies! Hang up your wing in its bag off the ground during long term storage.

When sending your wing in the mail take extra care packaging it.

Repairs and checks:

- Tears in the canopy must be professionally sewn. Adhesive patches are only adequate for very minor damage. Contact your dealer or MAC PARA directly if you are unsure.
- Repairs should only be carried out by the manufacturer, distributor or authorized workshops. Only original spare parts may be used!
- The line geometry must be checked after every 50 hours flying time or whenever the flight behaviour changes.
- Any changes to the canopy lines or risers, except those approved by the manufacturer, will void the certificate of airworthiness and warranty.
- A new MAC PARA paraglider must be given a check every 24 months. With intensive use (> 150 flying hours per year, or excessively demanding use) an annual check is needed, after the first check.

Inspection periods

This MAC PARA glider must be inspected every two years from the purchase date.

The glider must be inspected by a qualified professional after 150 hours of use (including ground handling) if this occurs earlier. Ground handling time must be at least doubled when calculating the total hours of use because of the increased wear and tear on the glider. It is the pilot's responsibility to ensure that the paraglider is always airworthy. A full inspection gives you peace of mind and extends the life of your glider. Additional inspections should be performed by a qualified person after a crash or violent landing on the leading edge, or if you notice a deterioration in performance or in-flight behavior

MAC PARA recommends a trim check of the lines after one year or 50 flight hours. To check the trimming it is sufficient to just check the lengths of the main lines together with the risers. All main lines in the first group (mA1, mB1, mC1) must be of the same length. All main lines in the second group (mA2, mB2, mC2) must be of the same length. All main lines in the third group (mA3, mB3, mC3) must be of the same length. The maximum difference between the individual line lengths is 10mm. If the difference is greater, send your glider to MAC PARA or an authorized workshop for checking and trimming correction.

Failure to observe the inspection periods shall render invalid the certification and warranty. A properly completed logbook with details of all flying and training will help you to comply with these periods.

Disposal:

- The synthetic materials used in a paramotoring glider need professional disposal. Please send disused canopies back to MAC PARA for proper dismantle and disposal.

The Charger 3 is delivered with a stuff-sack, Mac Pack, repair kit and user manual.

What to do if you break a line

Breaking a line or multiple lines on your glider is unfortunate but can be fixed. Most of the time lines can be easily replaced with your glider being restored back to factory settings within a short time. Depending on the extent of the damage, the line repair can be done by you or a qualified professional MAC PARA approved facility. Consult your closest MAC PARA dealer or MAC PARA directly with the type of line you may need.

Identifying which line you require to replace the broken line can be found by laying out your glider outside, looking at where the damage line is and referencing the line plan guide near the end of this manual. The better you know what you need and how many, the faster you will get help with the correct advice. Not all lines are made from the same material or are the same thicknesses.

Damage to the Canopy

Paramotoring involves fast moving parts like a spinning propeller and hot engines. Sometimes those parts come in contact with your glider and can quickly cause damage to your glider. Do not fly your glider that has sustained any damage. Any damage to your glider needs to be professionally repaired before your next flight.

ATTENTION: Do not risk your life by flying a damaged glider.

If the rip, tear or damage is small and you have consulted with your dealer first, then the repair may be performed by yourself with proper adhesive repair cloth. To avoid confusion, it is recommended to send detailed pictures to your MAC PARA dealer or MAC PARA directly. Do not attempt to repair or fix the glider yourself without the proper advice from a qualified professional. Failure to do so will void your warranty and put you at risk.

Warranty:

MAC PARA guarantees free of charge repairs caused by the material or production faults according to the following scheme:

For powered flying the MAC PARA warranty covers 24 months (2 years) or 150 flight hours. With intensive use an annual check is needed, after the first 2 years check.

Warranty does not cover:

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

Warranty is only valid if:

- Every flight is correctly registered in a logbook of the wing.
- Conditions and temperatures of each flight are registered in the logbook
- The paraglider is handled in accordance with this operating manual.
- The purchaser has not carried out any modifications or repairs by him/herself (excluding small minor repairs with self-adhesive patches)
- The paraglider has been inspected according to prescribed timetable described above.

If you have bought your paraglider second-hand, ask the previous owner for a copy of his/her logbook that lists total flying hours since the date of first purchase and details of any safety inspections.

RESPECT NATURE

Practise your sport with respect for nature, wildlife and neighbours. Not everyone is a friend of your paramotor noise. Follow the rules and the laws in the country you fly in. Extra care must be taken when flying near livestock and animals.

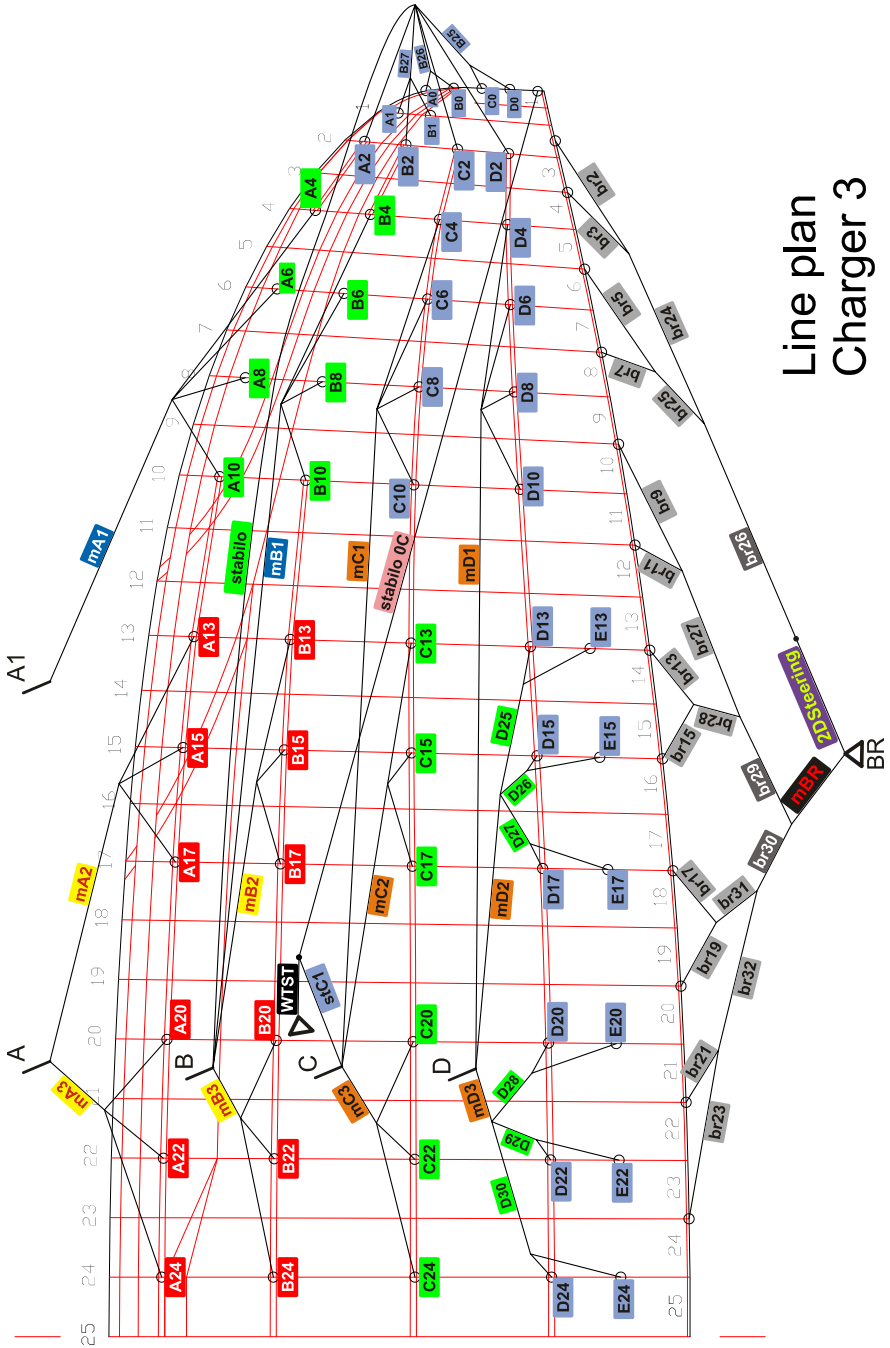
CHARGER 3 LINE PLAN

Line descriptions:

The following printed line plans show the line configurations and line lengths.

Line strengths in colors

Aramid/Polyester A-7343-075
Aramid/Polyester A-7343-090
Aramid/Polyester A-7343-190
PPSLS 180
Aramid/Polyester A-7343-230
Aramid/Polyester A-7343-340
Aramid/Polyester A-8000-090
Dynema/Polyester A-7950-080
Dynema/Polyester A-7950-100
Dynema/Polyester A-7950-130
Dynema/Polyester A-7850-130
Dynema/Polyester A-7950-200


Line plan
Charger 3
A1
A
B
C
D
BR
mA1
mA2
mA3
mB1
mB2
mB3
mC1
mC2
mC3
mD1
mD2
mD3
mBR
stabilo
stabilo 0C
WTST
stC1
2DSteelfig
A2
A4
A6
A8
A10
A13
A15
A17
A20
A22
A24
B2
B4
B6
B8
B10
B13
B15
B17
B20
B22
B24
C2
C4
C6
C8
C10
C13
C15
C17
C20
C22
C24
D2
D4
D6
D8
D10
D13
D15
D17
D20
D22
D24
E13
E15
E17
E20
E22
E24
br2
br3
br5
br7
br24
br25
br9
br11
br27
br13
br28
br15
br29
br17
br30
br31
br19
br32
br21
br23

RISER LENGTHS

The lengths are measured from main attachment point to the lower edge of rapid links.

Riser lengths [mm]	A	A1	B	C	D
Trimmers closed	525	525	520	505	495
Trimmers neutral	525	525	525	525	525
Trimmers fully released	525	525	545	580	625
Trimmers closed + Accelerated	380	380	430	460	495
Trimmers neutral + Accelerated	380	380	435	475	525
Trimmers released + Accelerated *	380	380	435	525	625

* Read more on the page 21.

Brakeline lenghts	Charger 3 18	Charger 3 21	Charger 3 23	Charger 3 25	Charger 3 28	Charger 3 31	Charger 3 34
Low attachment on PPG harness	2,85 m (1,70 m)	3,05 m (1,80 m)	3,20 m (1,90 m)	3,35 m (2,00 m)	3,50 m (2,10 m)	3,70 m (2,20 m)	3,85 m (2,30 m)
High attachment on PPG harness	3,05 m (1,90 m)	3,25 m (2,00 m)	3,40 m (2,10 m)	3,55 m (2,20 m)	3,70 m (2,30 m)	3,90 m (2,40 m)	4,05 m (2,50 m)

FULL LINE LENGTHS

Charger 3 18 (XXS)

Center	A	B	C	D	E	BR
1	6058	5999	6057	6214	6317	6300
2	6002	5942	6000	6159	6262	6150
3	6046	5989	6044	6198	6296	6075
4	6083	6026	6079	6219	6319	6065
5	6067	6014	6063	6194	6285	6045
6	6111	6059	6102	6219	6300	5965
7	6070	6021	6058	6154		5975
8	5965	5924	5956	6037		6030
9	5886	5854	5883	5941		5750
10	5829	5803	5819	5859		5625
11	5614	5588	5614	5687		5495
12	5519	5531				5455
13	5475	5462	5490	5531	5562	

Charger 3 21 (XS)

Center	A	B	C	D	E	BR
1	6446	6383	6445	6613	6724	6745
2	6386	6322	6384	6554	6665	6580
3	6433	6372	6431	6596	6700	6500
4	6473	6412	6468	6618	6725	6490
5	6456	6399	6452	6592	6689	6470
6	6503	6448	6494	6618	6705	6380
7	6459	6407	6446	6548		6395
8	6347	6302	6337	6423		6450
9	6262	6228	6259	6321		6150
10	6201	6174	6190	6234		6020
11	5971	5943	5961	6049		5875
12	5869	5882				5835
13	5832	5818	5847	5892	5922	

Charger 3 23 (S)

Center	A	B	C	D	E	BR
1	6752	6686	6751	6928	7044	7085
2	6689	6622	6687	6866	6982	6915
3	6739	6674	6737	6910	7020	6830
4	6781	6717	6776	6934	7046	6820
5	6763	6703	6759	6905	7008	6800
6	6813	6754	6803	6934	7025	6705
7	6766	6711	6752	6860		6720
8	6648	6601	6638	6728		6780
9	6559	6523	6556	6620		6465
10	6495	6466	6483	6529		6325
11	6252	6223	6242	6335		6175
12	6145	6159				6130
13	6106	6091	6122	6169	6192	

Charger 3 25 (M)

Center	A	B	C	D	E	BR
1	7011	6942	7010	7194	7315	7395
2	6945	6876	6943	7129	7250	7220
3	6997	6930	6995	7175	7289	7130
4	7041	6974	7036	7200	7317	7120
5	7022	6960	7018	7170	7277	7095
6	7074	7013	7063	7200	7295	7000
7	7025	6968	7011	7123		7010
8	6902	6854	6892	6986		7075
9	6810	6773	6806	6874		6725
10	6743	6713	6731	6778		6575
11	6490	6459	6480	6576		6430
12	6378	6393				6380
13	6337	6322	6354	6403	6422	

Charger 3 28 (L)

Center	A	B	C	D	E	BR
1	7331	7259	7330	7523	7650	7745
2	7262	7189	7260	7455	7582	7560
3	7316	7246	7314	7503	7623	7465
4	7362	7292	7357	7529	7652	7455
5	7343	7277	7338	7498	7610	7430
6	7397	7333	7386	7529	7629	7330
7	7346	7286	7331	7449		7345
8	7217	7166	7206	7305		7410
9	7120	7081	7116	7187		7055
10	7050	7018	7037	7087		6900
11	6784	6752	6774	6874		6740
12	6667	6682				6690
13	6623	6607	6641	6692	6712	

Charger 3 31 (XL)

Center	A	B	C	D	E	BR
1	7705	7630	7704	7908	8042	8175
2	7633	7556	7631	7836	7970	7980
3	7690	7616	7688	7887	8013	7880
4	7738	7664	7733	7914	8044	7870
5	7718	7649	7713	7882	8000	7845
6	7775	7708	7764	7914	8020	7735
7	7721	7658	7705	7830		7755
8	7585	7531	7574	7678		7820
9	7483	7442	7479	7554		7440
10	7409	7375	7395	7448		7275
11	7128	7094	7118	7223		7105
12	7005	7021				7050
13	6958	6941	6977	7031	7062	

Charger 3 34 (XXL)

Center	A	B	C	D	E	BR
1	8012	7933	8011	8223	8363	8515
2	7936	7856	7934	8148	8288	8315
3	7995	7918	7993	8201	8333	8210
4	8046	7969	8041	8229	8365	8200
5	8025	7953	8020	8195	8319	8170
6	8085	8014	8072	8229	8339	8060
7	8028	7962	8012	8142		8075
8	7887	7830	7874	7983		8145
9	7780	7737	7775	7854		7750
10	7703	7668	7689	7744		7580
11	7410	7375	7400	7509		7400
12	7281	7298				7345
13	7232	7214	7251	7308	7342	

All lengths are measured from riser's main attachment point up to the tissue of canopy on attachment points. Brake lines are measured from the Swivel on brake handle up to the trailing edge.

CHECKS

Name	Company	Date	Signature & Stamp

PRODUCT REGISTRATION

Register your product for free on our website within 30 days of purchase and receive an extended warranty of 12 months beyond the legal warranty period of your country!

www.macpara.com/registration

PARAGLIDER & SERIAL NUMBER

Paraglider type:

Serial number:

Manufacturing date: .....

Commisioning date: .....

TECHNICAL SPECIFICATIONS

Paraglider for Powered Flying Size		Charger 3 18 (XXS)	Charger 3 21 (XS)	Charger 3 23 (S)	Charger 3 25 (M)	Charger 3 28 (L)	Charger 3 31 (XL)	Charger 3 34 (XXL)
Zoom flat	[%]	81,3	87	91,5	95,3	100	105,5	110
Area flat	[m2]	18,47	21,16	23,40	25,38	27,95	31,11	33,82
Area projected	[m2]	16,44	18,82	20,82	22,59	24,87	27,68	30,09
Span flat	[m]	9,82	10,51	11,05	11,51	12,08	12,74	13,29
Aspect ratio flat	-	5,22	5,22	5,22	5,22	5,22	5,22	5,22
Root cord	[m]	2,32	2,48	2,61	2,72	2,85	3,01	3,14
Cells	-	50	50	50	50	50	50	50
Weight	[kg]	5,0	5,2	5,4	5,5	5,6	5,9	6,5
Weight range powered*	**[kg]**	**75-115**	**85-120**	**95-130**	**102-140**	**110-160**	**130-180**	**140-240**
Weight range powered*	[lbs]	165-254	187-265	209-287	225-309	243-353	287-397	309-529
Recommended weight range for PPG foot launch *	[kg]	75-100	85-105	95-115	102-125	110-145	130-165	140-185
Recommended weight range for PPG foot launch *	[lbs]	165-220	187-231	209-254	225-276	243-320	287-364	309-408
Min. speed	[km/h]	24-27	24-27	24-27	24-27	24-27	24-27	24-27
Speed trimmers closed	[km/h]	37-41	37-41	37-41	37-41	37-41	37-41	37-41
Speed trimmers open	[km/h]	47-51	47-51	47-51	47-51	47-51	47-51	47-51
Top speed (acc.+trim open)	[km/h]	57-61	57-61	57-61	57-61	57-61	57-61	57-61
Glide ratio		9,5	9,5	9,5	9,5	9,5	9,5	9,5
Min. sink rate	[m/s]	1,2	1,2	1,2	1,2	1,2	1,2	1,2

* powered pilot equipped = weight naked + approx. 35-40 kg (-55kg by trikes)

MAC PARA



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