

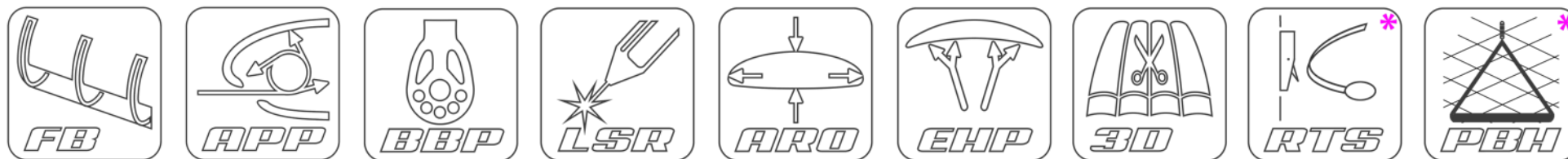
# ***ONE POLAR WAVE***

## ***Manual***



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\* Paramotor version only

## DISCLAIMER OF LIABILITY

Taking into consideration the inherent risk in paragliding or hang gliding, (free flying and motorized), it must be expressly understood that the manufacturer and seller do not assume any responsibility for accidents, losses and direct or indirect damage following the use or misuse of this product.

ONE POLAR is engaged in the manufacture and sale of, paragliding, motorized Para/hang gliding and emergency parachute equipment.

This equipment should be used under proper conditions and after proper instruction from a qualified instructor. ONE POLAR has no control over the use of this equipment and a person using this equipment assumes all risks of damage or injury.

ONE POLAR disclaims any liability or responsibility for injuries or damages resulting from the use of this equipment.

The glider is designed to perform in the frame of the required class as certified.

### WARNING

**This is not a training manual. It is extremely dangerous to yourself and others to attempt to use this product without first completing a course given by a qualified instructor.**

**ONE POLAR'S products are carefully manufactured and inspected by the factory. Please use the product only as described in this manual.**

**Do not make any changes to the product.**



# INTRODUCTION

The ONE POLAR WAVE is designed to meet the latest standards, is the type of wing which takes all the advantages of paragliding and emphasizes those advantages to complete the best flying experience for beginner to intermediate pilots. Designed with the students in mind, using instructors' feedback - it is a super easy glider to fly - simple and straight forward.

A new specially developed **APP** type profile (shark-nose) was used. Our APP profile is instrumental in contributing to the safety of the wing by increasing and retaining internal pressure of the canopy across the entire speed range. It is a big step in passive safety, but an even bigger step in providing the pilot with an exciting flight experience. ONE POLAR WAVE is well balanced, combining excellent handling with outstanding performance and pilot friendly behaviour. Three-line construction that converges into a clean and simple to understand 3 leg riser makes inflation and ground handling a breeze - no messy risers and lines tangled in reverse launch anymore. For students, an accelerated learning curve is guaranteed. Safely getting them into the air and flying sooner than ever before.

**TAKE OFF** – effortless and intuitive. The 3-leg riser dramatically simplifies things for the beginner. Front launch or reverse is always easy with the APP profile (shark nose), The wing will rise slowly and controllably overhead allowing time to glance up and safely take-off.

**LANDING** is a breeze as the **ONE POLAR WAVE** is incredibly stall resistant and flaring will slow you down almost to a standstill.

**THERMALLING** – the glider will bank into a coordinated turn and pull itself into the core almost automatically. This is by far our best thermaling EN A wing ever and this will be evident when students attempt their first cross country flights, encouraging them to progress and evolve in the sport to the next level.

**PERFORMANCE** – Glide at trim speed is among the best in its class, but the real advantage is when applying the speed system. Through its entire acceleration range, **ONE POLAR WAVE** will efficiently cut through the air with minimal sink rate. Adding both performance and another level of safety for EN A wings.

**PILOT FEEDBACK**– simple to understand is how to summarize the **ONE POLAR WAVE**. The wing is both reassuring and precise in its pilot feedback. It is a forgiving wing for beginners, and when directed correctly, it will immediately respond without hesitation.

**CONSTRUCTION** - According to ONE POLAR's legendary tradition for durability - the construction of the wing is bullet proof! Extremely durable cloth combined with proven construction designed to withstand the students abuse for as long as necessary.

**ONE POLAR WAVE** is fun to fly and will excite its pilots long after out of school. It is the best glider for both instructors to teach on and the pilots to progress with.

\*This paraglider was tested without using of folding lines to perform collapses.



## Paramotor Version

**ONE POLAR WAVE** is available in paramotor version too. The wing was designed bearing paramotor pilots in mind and thoroughly tested under power.

The **ONE POLAR WAVE** overall behaviour has pronounced advantages, such as, short take-offs even in nil wind inflations, with high fuel efficiency and exceptional stability.

The **ONE POLAR WAVE** offers the ideal solution for paramotor schools and pilots who choose **APP** profile, non-reflex wing or require EN-A certification for schooling. (Delivered as paramotor version with purpose built paramotor risers on request).

Further details on the use of ONE POLAR WAVE for Paramotor, and the Paramotor version is found on page 28 of this Manual.

\*Non Standard Colours



## TECHNICAL DATA

SIZE	S	M	L
Cells	39	39	39
Area m2	25	27	29
Area (projected) m2	21	22.7	24.36
Span (incl. Stabiliser) m	10.97	11.4	11.81
Span (projected) m	8.46	8.8	9.12
Aspect Ratio	4.8	4.8	4.8
Aspect Ratio (projected)	3.39	3.39	3.39
Weight Range (incl. Wing) kg	70-90	80-100	95-120
Weight kg	4.3	4.6	4.9
Root Cord m	2.79	2.9	3
Tip Cord m	0.65	0.675	0.7
Length of Lines on B m	6.3	6.6	6.8
Total length of lines m	297	309	320
Risers	3+1	3+1	3+1



## Material List

LINES				
Line	Material	Specification	Diameter	Strength
Top ; Brake Top; St Top	Dyneema	Cousin CTL910130	1.1mm	95kg
Mid; St	Super Aramid	Cousin CTL900120	1.2mm	120kg
Bottom A1;B1; C	Super Aramid	Cousin CTL900320	1.9mm	320kg
Bottom A3; A5;B3; B5	Super Aramid	Cousin CTL900230	1.8mm	230kg
Steering Line	Dyneema	Cousin CTL910190	2.0mm	190kg

FABRIC	
Sail Cloth	"Zero Porosity" Ripstop Nylon
Warranty	3 Years / 250 hours





GLIDER PERFORMANCE DATA	
V-min.	23 km/h
V-trim	38 km/h
V-max.	50 km/h
Min Sink (at optimum wing loading)	1.1 m/s
Speed System Travel	120mm

CERTIFICATION DATA – Flight Test Configuration									
SIZE	Harness to riser		Distance between risers		Test Weight Low / High		Brake Range at Max Weight	Certification	
								EN	DGAC
XS	-	-	-	-	-	-	-	-	-
S	43	40	40	44	70	90	>60cm	A	∅
M	43	43	44	46	80	100	>60cm	A	∅
L	44	43	44	46	95	120	>65cm	A	∅



## CONSTRUCTION

The glider is constructed with a top and bottom surface, connected by ribs. One top and bottom panel, together with the connecting ribs is called a cell. Each cell has an opening on the front lower part. The cells fill with air forcing the panels to take the shape dictated by the air-foil (rib) section.

On either side the wing ends in a stabilizer or wing tip, which provides straight-line (Yaw) stability and produces some outward lift to keep the span-wise tension.

The front part of the ribs use ONE POLAR's FLEXON batten system to keep the leading edge shaped at high speeds and in turbulent air. They also improve the performance and the launch characteristics of the glider.

The line hook-up points are made of dyneema and embedded in the bottom surface of the wing for minimal drag and maximum performance.

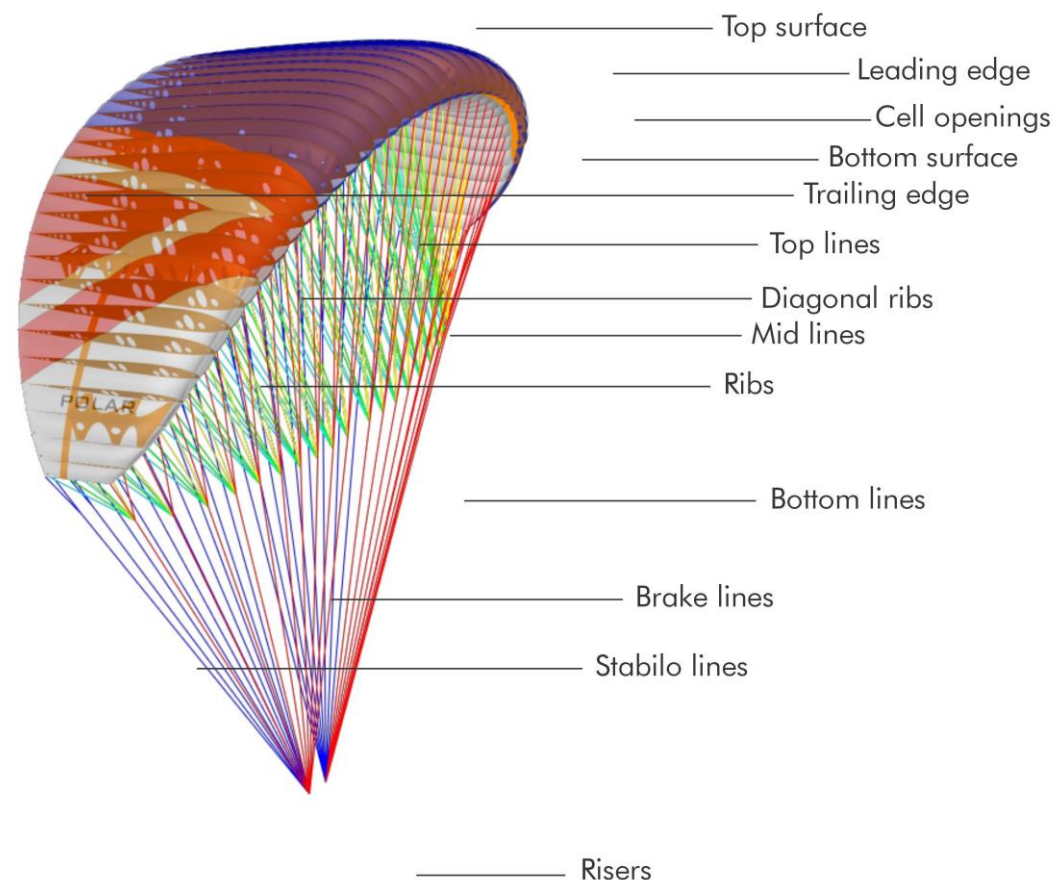
## MATERIALS

The glider is made from tear resistant Ripstop Nylon cloth, which is P.U. coated to zero porosity and then siliconized to give the fabric high resistance to the elements. Different cloth is used for the top, bottom and ribs due to their different functions.

The lines are made of superaramide covered with a polyester sheath for protection against UV, wear and abrasion.

The bottom section of the brake lines is made of polyester because of its better mechanical properties.

The maillon quick links that attach the lines to the risers are made of stainless steel.



## FLEXON® Batten system:

New generation FLEXON ® batten system incorporated (see below) in the leading edge of the ribs, insuring perfect profile shape (instead of traditional Mylar reinforcement). FLEXON ® battens reduce the weight of the glider by an additional 500gr. and unlike Mylar reinforcement will guarantee no deterioration in performance or launch.

Additional advantage of FLEXON batten is that it is practically indestructible, safeguarding the performance and launch over the lifespan of the glider.

## TRIMMING

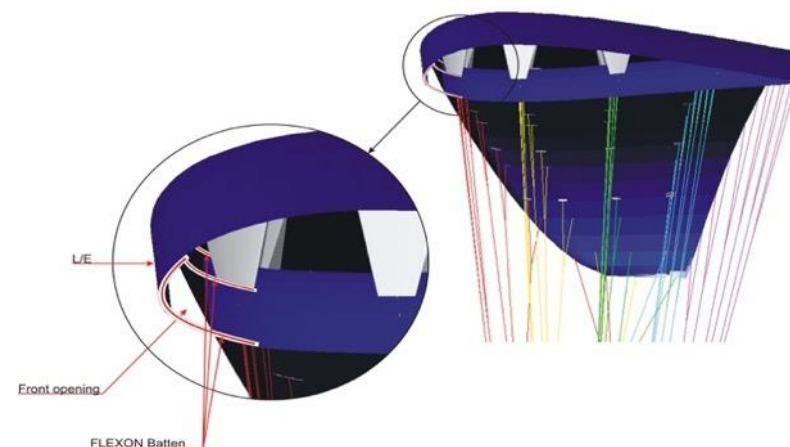
All ONE POLAR gliders are trimmed for optimum performance combined with unsurpassed safety. It is very important not to re-trim or tamper with any of the lines or risers as this may alter the performance and safety. Trimming of the brake line should be done in accordance with this manual and carefully checked before flying.

## HARNESS

### **CAUTION:**

**WE RECOMMEND NOT TO USE CROSS BRACING STRAPS.**

All of ONE POLAR's gliders are developed with the use of ABS (Automatic Bracing System) type harnesses without cross bracing. We recommend the use of an ABS harness with all our gliders. Most certified harnesses may be used with our gliders.



# SPEED SYSTEM

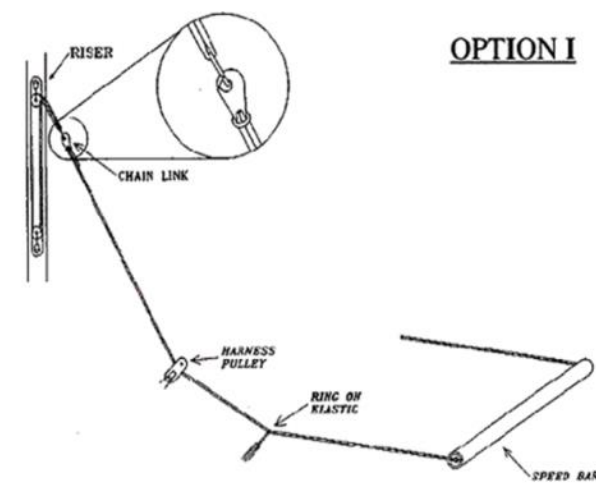
## ASSEMBLY & ADJUSTMENT

ONE POLAR gliders can be ordered with the Wonder-Bar, which makes reaching the speed bar a breeze.

First attach the harness to the glider. Remove the Brummel hooks from the end of the accelerator line attached to the speed bar, then thread it through the elasticized ring on the harness, then through harness pulley and then re-attach it to the Chain link with a larks-head knot. Hook the Chain link onto the Chain Link on the riser of the corresponding side. Sit in the harness and have someone hold the riser up in a flying position for you. Adjust the speed bar line by pulling the end through the speed bar tube and moving the knot. The Bar should be about 10 cm (or closer if you have a second step) away from the front of the harness seat. This allows you to easily reach the bar with your foot, and will allow you to use the full range of the speed bar if you extend your legs fully. Do not adjust the speed system too short, as this will cause it to be activated permanently while flying, and could be dangerous. It is possible to fit a second step to the system, if one has trouble using the full range of the system (supplied separately).

## COMPATIBILITY

ONE POLAR gliders are supplied with a speed system compatible with most harnesses on the market today. Follow your Harness Manual for connecting your speed system. Do a hang test to ensure that the adjustment is correct. Flying with a speed system adjusted too short will cause it to be applied all the time, which can be dangerous.



**SPEED BAR AND TRIMS**

On the WAVE (Paramotor Version), the Speed Bar should **NOT** be used with Trims open, use one or the other, not both together.

**WARNING:**

The use of the speed system in turbulent conditions or close to the ground is dangerous. While flying with the accelerator, the glider has a reduced angle of attack and is therefore more susceptible to turbulence and may collapse or partially deflate. Gliders react faster when accelerated and may turn more. The accelerator should immediately be released in this case.

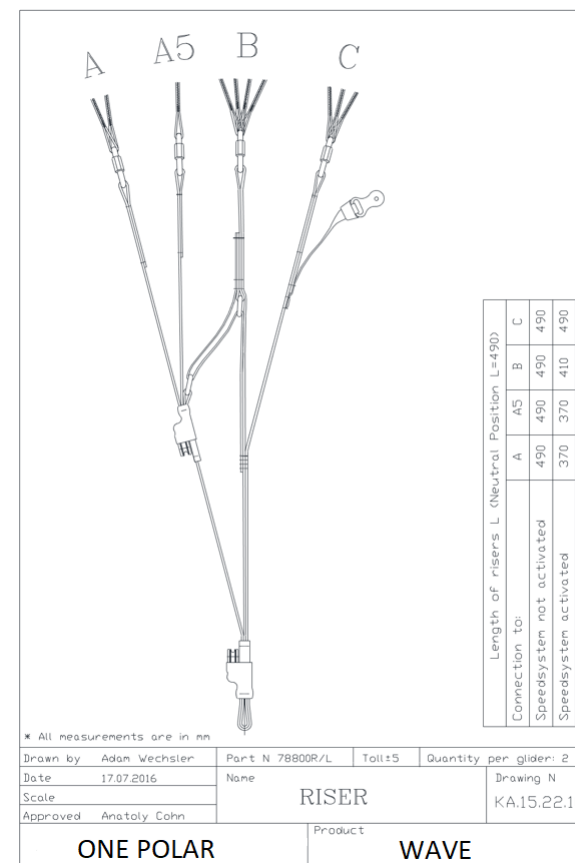
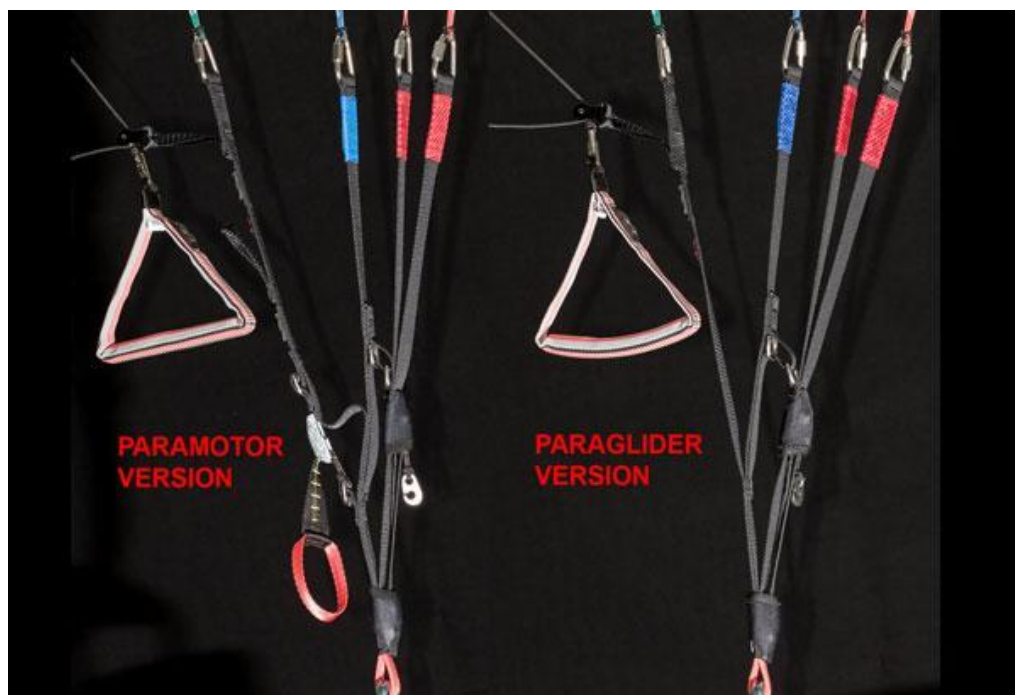


# RISERS

The ONE POLAR WAVE risers is featuring a split A riser. The 1st A-riser attaches to the central two A lines (A1 & A3). The second A-riser is attached to the outermost A line (A5). This is to facilitate Big ears or Tip tucks. At no time should the pilot change the risers or use risers not intended for this specific glider, as this will affect the performance, safety and void the certification of the glider. The fully activated travel is 120mm.

The Paramotor version of the ONE POLAR WAVE is equipped with trimmers – See details in the Paramotor section on page 17 of this Manual.

*\*difference not more than 5mm from the lengths laid down the user's manual*



## TRIMMERS\*

The neutral setting is when the A/B/C risers legs are of equal length in flight (blue mark on the trim webbing)

For Take-off and landing, the trimmers should be in the closed (minimum trim speed) position. They can be set asymmetrically to compensate for torque effect.

The ONE POLAR WAVE Speed Bar should **NOT** be used with Trims open, use one or the other, not both together.



### REPLACEABLE TRIM SYSTEM

The Trim Tabs should be replaced if they begin to show signs of wear, or start slipping. Replacement should be done by a qualified person – consult your dealer.

#### \*Paramotor Version

The riser with trimmers in neutral corresponds to the trimming that One Polar Wave has with standard risers, but the version with trimmers is **not certified by Air Turquoise**.

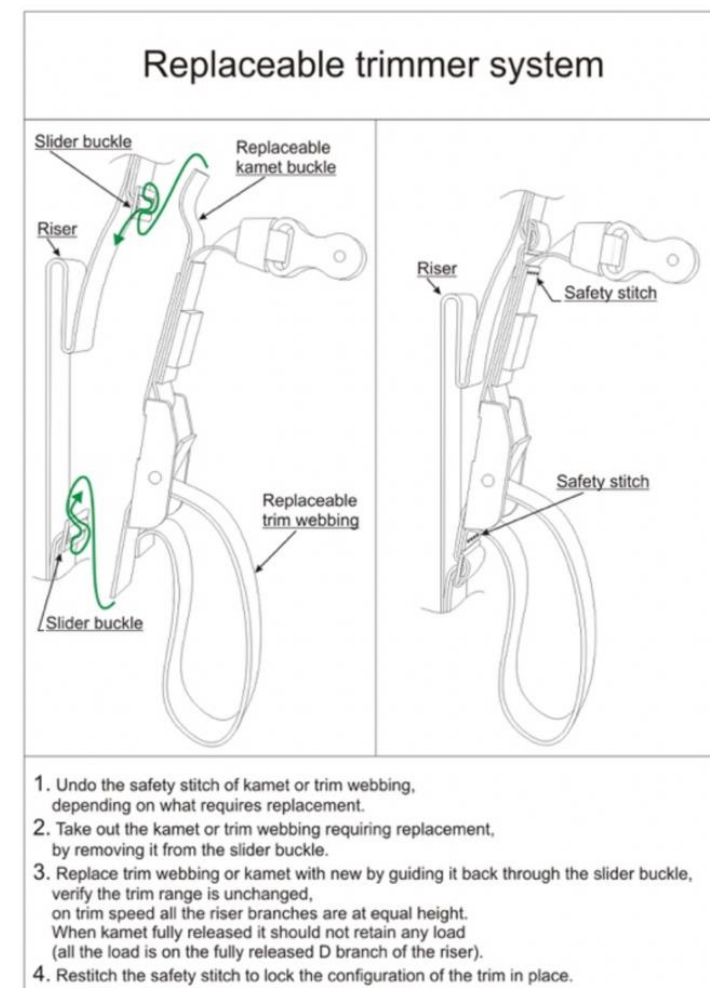
## EMERGENCY PARACHUTE ATTACHMENT

It is recommended to use a certified rescue parachute when flying. Attaching the rescue parachute should be done in accordance with the recommendation of the harness and reserve parachute manufacturer.

## GENERAL INSPECTION

Pilots, please ensure that your glider has been test flown and fully checked by your dealer before taking it into your possession.

Verify that the dealer checked and confirms that the glider is airworthy.



In case of use of the wing in combination with trike:

Due to the very wide assortment of trikes on the market with different set up and design, it is necessary to verify that the specific trike can be successfully coupled with the wing.

Please make sure your dealer performs the following procedures before first flight:

A. It was checked with ONE POLAR that the specific trike can be flown with your new wing.

In case the specific combination is not checked by ONE POLAR – your dealer must take the following necessary steps:

B. Wing to be fully inspected by the dealer as in the paragraph above

C. Wing to be ground handled and visually checked while inflated.

#### **TRIKE ATTACHMENT & INSPECTION**

D. Connection method to a Trike should be done in line with the Trike manufacturers recommendation.

E. Before first take-off perform "taxiing" test on the ground slowly rolling with the wing checking all aspects of the set-up without actually taking off. (including roll/yaw stability, pitch stability, stall tendency, brake response etc.)

F. Only once the wing passes the taxiing test – then the next step is to make the actual test flight. Make sure trike and wing are correctly coupled and the system is airworthy.

G. Take the wing into your possession only after your dealer confirms that wing is airworthy when coupled with your trike.





# ANNUAL / PERIODICAL AIRWORTHINESS INSPECTION

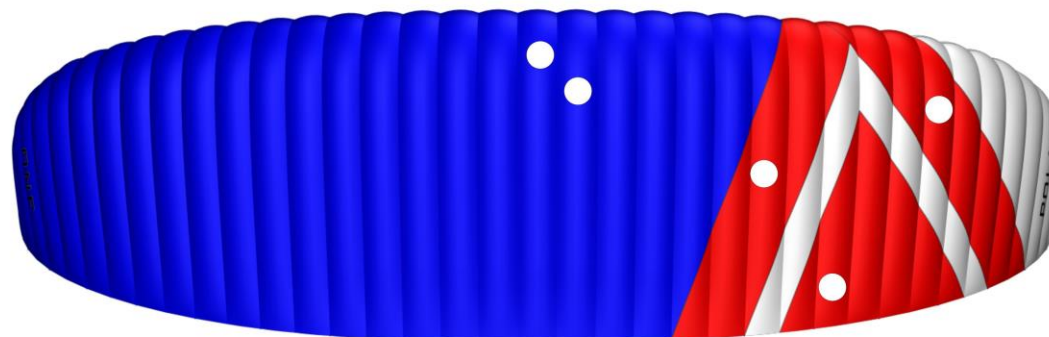
It is highly recommended that your glider (and other equipment), undergo a Periodical Airworthiness Inspection which is to be done by ONE POLAR, or an ONE POLAR approved / appointed service centre.

This is recommended to be done every 24 months or every 100 hours, whichever comes first.

This recommendation is in line with Israeli regulations, binding in Israel. as an alternative, we suggest for you to follow the regulations set by your national authorities.

## POROSITY:

Porosity is measured with a calibrated Porosimeter. It should be measured in at least 5 different places on the upper surface. Below is an example of the sections we test at ONE POLAR. The upper surface, at 20-35% chord (from L/E) is most prone to becoming porous, and is thus the most important section to test. It is also important to test the different cloth types, and different colours used.



## LINE MAINTENANCE

Superaramide lines are known to be sensitive to the influence of the elements. They must be carefully inspected periodically. In his/her own interest, the pilot must observe the following points to ensure maximum performance and safety from the glider. Avoid sharp bending and squeezing of lines. Take care that people do not step on the lines. Do not pull on the lines if they are caught on rocks or vegetation. Avoid getting the lines wet. If they do get wet, dry them as soon as possible at room temperature and never store them wet.

One line of each line group (a, b, c, upper and lower) must be tested for minimum 50% of the rated strength. if the line fails under the load test or does not return to its specified length all the corresponding lines must be replaced. never replace lines with different diameter or type of lines as all gliders were flight and load tested for safety in their original configuration. Changing line diameter/strengths can have dangerous / fatal consequences.

Professional use of gliders: towing, tandem, schooling and competition flying requires more frequent line inspection and replacement of A, B, C, D and brake lines.



## BRAKE ADJUSTMENT

Before the first flight, the pilot/dealer has to take his/her glider and inflate it to check brake length and if needed shorten or lengthen the brake setting to his or her preference. It is important that the brakes are not set too short. If the glider is above your head the brakes should not be pulling the trailing edge down, as that means that the brakes are too short. A good setting is to have about 10 cm of slack in the brake from the brake guide (pulley) on the riser to the activation point of the brakes. (See Diagram below)

## FIRST CHECK AND PREFLIGHT INSPECTION

With every new glider, the following points should be checked:

- Connection points between the glider and the harness.
- Check that there are no lines twisted, tangled or knotted.
- Check that the risers and speed-system are hooked up to the harness correctly.

## REGULAR INSPECTION CHECKS

- Damage to lines, webbing and thread on the stitching of the harness and risers.
- The stainless-steel connection links on the risers are not damaged and are fully closed.
- The pulleys of the speed system are free to move and the lines are not twisted.
- The condition of the brake lines, stainless steel rings and the security of the knot attaching the brake handle to the brake line.
- The sewing, condition of the lines and connection of the lines.
- Damage to hook up points on the glider.
- Internal damage to the ribs and diagonal ribs.
- Damage to the top and bottom panels and seams between panels.



# LINE MAINTENANCE

Several groups of suspension lines and one brake line are attached to each riser. The groups are called A, B, C and brake lines. The stabilizer lines are connected along with the B-lines. Superaramide lines are known to be sensitive to the influence of the elements. They must be carefully inspected periodically. In his/her own interest, the pilot must observe the following points to ensure maximum performance and safety from the glider.

- Avoid sharp bending and squeezing of lines.
- Take care that people do not step on the lines.
- Do not pull or jerk the lines if they are caught on rocks or vegetation.
- Avoid getting the lines wet. If they do get wet, dry them as soon as possible at room temperature and never store them wet. Never fly with wet lines as their tensile strength will be temporarily reduced.

IT IS **STRONGLY RECOMMENDED** TO CHECK THE LINES ON EVERY PARAGLIDER EVERY 24 MONTHS OR EVERY 100 HOURS, WHICH EVER COMES FIRST.

ONE OF EACH A, B, AND C LINE MUST BE TESTED FOR MINIMUM 50% OF THE RATED STRENGTH. IF THE LINE FAILS UNDER THE LOAD TEST OR DOES NOT RETURN TO ITS SPECIFIED LENGTH ALL THE CORRESPONDING LINES MUST BE REPLACED. THIS RECOMMENDATION IS IN LINE WITH ISRAELI REGULATIONS, BINDING IN ISRAEL.

AS AN ALTERNATIVE, WE SUGGEST FOR YOU TO FOLLOW THE REGULATIONS SET BY YOUR NATIONAL AUTHORITIES WITH REGARD TO LINE MAINTENANCE AND REPLACEMENT.

Professional use of gliders: towing, tandem, schooling and competition flying requires more frequent line inspection and replacement of A, B, C and brake lines.

[For replacement lines please refer to our online direct line services.](#)



## TAKE OFF

As this is not a training manual, we will not try to teach you launching techniques. We will only briefly go through the different launch techniques to help you get the most out of your glider.

## LAYOUT

Pre-flight check should be done before every flight.

Spread the glider on the ground. Spread the lines, dividing them into eight groups A, B, C and brake lines left and right. Make sure the lines are free and not twisted or knotted.

Make sure all the lines are on top of the glider and none are caught on vegetation or rocks under the glider. Lay out the glider in a horseshoe shape. This method insures that all the lines are equally tensioned on launch, and results in an even inflation.

- The Flexon rib reinforcements will keep the leading edge open for easy inflation.
- The most common reason for a bad launch is a bad layout!

## ALPINE LAUNCH OR FORWARD LAUNCH

The ONE POLAR WAVE has very good launch behaviour in no wind conditions.

For the best results we recommend the use of the following techniques: Lay out the glider and position yourself in the centre of the wing with the lines almost tight.

With a positive and constant force inflate the wing holding only the A-risers, and smoothly increase your running speed. The wing will quickly inflate and settle above your head without the tendency to stick behind, you may have to pull some brake to stop the wing from overshooting on an aggressive run.

After you leave the A-risers, apply about 15% brakes and the ONE POLAR WAVE will gently lift you off the ground.



## **STRONG WIND AND REVERSE LAUNCH**

The ONE POLAR WAVE has a lot of lifting power and care should be taken in strong wind. It is advisable to have an assistant hold you when attempting a strong wind launch. It also helps if you walk towards the canopy and leave the A-riser just before the glider gets above your head. Then pull a bit of brake to stop the wing from overshooting, but not too much as the glider might pull you off your feet too early. The assistant should let you walk in under the wing on inflation rather than resist the inflation; this reduces the tendency of the glider to lift the pilot prematurely.

## **TOW OR WINCH LAUNCHING**

All ONE POLAR gliders are well suited for winching and have no bad tendencies on the winch. With towing it is important to have the wing above your head on launch and not to try and force a stalled wing into the air. This is especially important if the winch operator is using high tension on the winch. Very little brake if any need be applied on launch and during the tow. Directional changes can be made with weight shift rather than brakes. While on tow, the brake pressure will be higher and more force may be needed to make corrections than in normal flight.



# FLIGHT TECHNIQUES

The ONE POLAR WAVE is pleasant glider to fly, it has excellent performance and was designed for recreational and cross country flying.

## FLYING SPEED

Indicated trim speed is dependent on the amount of brake the pilot is using, wing loading, altitude above sea level and the accuracy and make of speed probe. The speeds recorded in technical data were at optimum wing loading at sea level using a Flytec 6030 thus there could be a slight variation in speed range numbers that pilots records.

Speed readings in the flight reports could differ as this was measured during testing using various instruments and is an indication of the difference between trim, stall and top speed. The speed range will be the same but the actual numbers may differ.

- With 0% brake the ONE POLAR WAVE will fly at 38 km/h with a sink rate of 1.3m/s.
- At 25% brake the glider will fly at 32km/h with minimum sink rate 1.1m/s.
- The best glide angle is achieved with 0% brakes and 10% speed system.

### WARNING:

The use of the speed system in turbulent conditions or close to the ground is dangerous. While flying with the accelerator, the glider has a reduced angle of attack and is therefore more susceptible to turbulence and may collapse or partially deflate. Gliders react faster when accelerated and may turn more. The accelerator should immediately be released in this case.

- With 80% brake the glider will fly at about 25km/h and will be close to the stall point 23km/h.



**CAUTION:**

APART FROM WHEN FLARING AT LANDING THERE SHOULD BE NO REASON TO FLY WITH 70% TO 100% BRAKE. THE SINK RATE OF THE GLIDER WILL BE EXCESSIVE AND THERE WILL BE A POSSIBILITY OF ENTERING A DEEP STALL OR FULL STALL SITUATION. THERE IS ALSO THE RISK OF GOING NEGATIVE OR ENTERING A SPIN WHEN ATTEMPTING TO TURN THE GLIDER NEAR THE STALL SPEED.

## THERMAL FLYING

The ONE POLAR WAVE has excellent thermalling capacity and will be a pleasure even when you are in a big gaggle or just having fun on a long XC flight.

In light lift it is advised to make flat turns to keep the glider from banking too much and avoid increasing the sink rate.

In strong lift conditions it is most effective to make small turns in the core with relatively high bank.

For the best climb rate in ridge lift we recommend using about 15% to 20% brake.

## ASYMMETRIC COLLAPSE

If one side of the glider partially folds or collapses it is important to keep your flying direction by applying weight shift and some brake on the opposite side.

The wing should re-inflate on its own without any input from the pilot.

To help re-inflation it is possible to pull some brake on the collapsed side and release immediately.

In the event of a big deflation, i.e. 70%, it is important to apply brake on the inflated side of the wing, but care must be taken not to pull too much as you could stall the flying side.

The glider is very solid and has a strong tendency to re-inflate after collapse.

## CRAVAT

In case a cravat should occur from an asymmetric collapse or other manoeuvres, it is important to keep your flying direction by applying some brake on the opposite side and then it can usually be opened by pulling down on the stabilo line of the affected side while countering the turn with the opposite brake and weight shift.

It also helps sometimes to pull Big Ears to release the tension on the affected lines, or a combination of the above techniques, i.e. pulling on the stabilo after pulling Big Ears.





## FRONT STALL OR SYMMETRIC COLLAPSE

In the event of a front stall the glider will normally re-inflate on its own immediately without any change of direction. To speed up re-inflation briefly apply 30%-40% brake (to pump open the leading edge). **Do not hold the brakes down** permanently to avoid an unwanted stall.

## B-STALL

The ONE POLAR WAVE has a very clean, stable B stall.

To enter the B stall the pilot has to pull the first 20-cm slowly until the glider loses forward speed and starts to descend vertically.

Then the pilot can pull more on the B until he/she attains a stable 7 to 9 m/s descent rate. The Glider has no tendency to front rosette or become pitch unstable. To exit the B stall the pilot releases the B slowly until the glider has regained its shape and then the **last 15 cm fast** to prevent the glider from entering deep stall.

The ONE POLAR WAVE can be controlled directionally in the B stall by pulling more on one B riser than on the other to create a turn in any direction. The B-stall is a safe controlled way of losing altitude fast without any forward speed.

## BIG EARS

Altitude can be lost in a controlled way by collapsing both tips. To do this, take the outer-most A-line (attached on its own riser) on both sides and pull them down until the tips collapse. Pulling one side at a time may be more comfortable and easier, especially for smaller pilots. This should close about 30% of the wing in total. It is possible to steer with weight shift.

To increase the sink rate the pilot can push the speed system after he/she has collapsed the tips. This can give up to about 7 m/s sink-rate with about 40-km/h forward speed. To exit, release the speed system and then release the tip A-lines. It may sometimes be necessary to apply a little brake to open the tips. If using the brakes to open the tips, it is best to open one tip at a time, this avoids reducing your air-speed.

### **CAUTION:**

DO NOT ATTEMPT ANY EXTREME MANEUVRRES WITH THE TIPS COLLAPSED AS THIS DOUBLES THE LOAD ON THE CENTER LINES AND ATTACHMENT POINTS, WHICH COULD LEAD TO LINE FAILURE.



## DEEP STALL OR PARACHUTAL STALL

Under normal flying conditions the ONE POLAR WAVE will have no tendency to enter deep stall. All gliders can however under certain conditions enter and stay in deep stall configuration (as a result of ageing of materials, improper maintenance or pilot induced).

### SIGNS OF PARACHUTAL STALL

- The pilot has very little or no forward speed and no wind in his face.
- The glider will be fully open but the cells will be bulging in and not out on the bottom surface.
- The glider might have a very slow turning sensation.
- You will have an increased vertical descent.

### EXIT FROM PARACHUTAL STALL

It is important to recognize this situation. Most accidents involving parachutal stall happen because the pilot did not realize that he was in deep stall.

The best way to exit a parachutal stall is to pull all the A risers down to get the wing flying again. The pilot can pull the riser down until the wing starts to fly again. The moment the wing starts to fly the pilot should release the A risers, or the wing might suffer a frontal collapse.

Alternatively the pilot can push the speed bar to lower the angle of attack and get the wing flying again.

By pulling one or both brakes while in deep stall the pilot can accidentally enter a full stall or spin. **(Not recommended)**

### SPIRAL DIVES

The ONE POLAR WAVE has very good behaviour in spiral and has no tendency to stick in the spiral. By progressively applying brake on one side the glider can be put into a spiral dive. Safe high sink rates can be achieved like this. The spiral has to be exited slowly by releasing the brake over one complete turn or the glider may pitch back, and then forward and possibly suffer a collapse.



**CAUTION:**

SOME GLIDERS CAN BE NEUTRAL IN SPIRAL AND MAY NOT EXIT WITHOUT PILOT INPUT. TO EXIT A NEUTRAL SPIRAL THE PILOT HAS TO LEAN HIS/HER WEIGHT TO THE OUTSIDE OF THE TURN OR APPLY BRAKE ON THE OUTSIDE WING. AS SOON AS THE GLIDER STARTS TO SLOW DOWN IN THE SPIRAL THE OUTSIDE BRAKE MUST BE RELEASED.

Care must be taken that the pilot has enough height to exit the spiral safely.

Sink rates in excess of 19m/s can be obtained.

## **STRONG TURBULENCE**

NEVER FLY IN STRONG TURBULENCE!

If you unexpectedly encounter strong turbulence, fly with about 20% brake applied to increase the internal pressure and the angle of attack of the canopy and land as soon as possible. If the air is turbulent on landing approach, land with Big Ears.

Learn to fly actively and to anticipate collapses and prevent them by applying brake when needed before you have unwanted collapses.

## **STEERING NOT FUNCTIONING**

If the pilot cannot reach the brake or steering lines for any reason or if they are not functioning properly, (for example: If they break on a damaged point) the pilot can control the glider by pulling down on the rear risers.

Care must be taken when steering like this, as much less input is needed to turn the wing and the response of the wing is also much slower than when using the brakes.

IF YOU PULL TOO MUCH ON ONE OR BOTH RISERS THE GLIDER WILL SPIN OR STALL.

On the landing flare the pilot should be especially careful not to stall the glider too high, less pull on the risers are needed than what is required when flaring with the brakes.



# LANDING

Before landing, the pilot should determine the wind direction, usually by checking a windsock, flags, smoke or your drift over the ground while doing one or more 360° turns.

- Always land into the wind.
- At a height of about 50 meters your landing setup should begin.

The most commonly used one is to head into the wind and depending on the wind strength the pilot should reach his/her landing point by making s-turns.

- At a height of about 15 meters the final part of your descent should be made at trim speed into the wind.
- At a height between half a meter and one meter you can gently flare the glider by pulling gradually down on the brakes to the stall point.

When top-landing it is sometimes not necessary to flare or a much smaller flare may be required, especially in strong ridge conditions.

## TREE LANDING

If it is not possible to land in an open area, steer into the wind towards an unobstructed tree and do a normal landing approach as if the tree is your landing spot. Flare as for a normal landing. On impact hold your legs together and protect your face with your arms.

After any tree landing it is very important to check all the lines, line measurements, and the canopy for damage.

## WATER LANDING

As you approach landing, release all the buckles (and cross-bracing if present) of the harness except for one leg. Just before landing, release the remaining buckle. It is advisable to enter the water downwind. Let the canopy rotate completely forward until it hits the water with the leading edge openings; the air inside will then be trapped, forming a big air mattress and giving the pilot more time to escape. Less water will enter the canopy this way, making the recovery much easier. **Get away from the glider and lines as soon as possible**, to avoid entanglement. Remember that a ballast bag can be emptied and then inflated with air for a flotation aid.

The canopy should be carefully inspected after a water landing, since it is very easy to cause internal damage to the ribs if the canopy is lifted while containing water. Always lift the canopy by the trailing edge, not by the lines or top or bottom surface fabric.



## LANDING IN TURBULENCE

One of the safest ways to land a glider in turbulent conditions is to use Big Ears. This reduces the chances of getting a collapse while on final approach. Use weight shift to control your approach. It is possible to keep the ears in until you are ready to flare the glider. Simply release the A-risers and flare the glider, starting a little higher than usual. Practice this in normal conditions before you need it in an emergency.

## PACKING

Spread the canopy completely out on the ground. Separate the lines to the left and the right side of the glider. If the risers are removed from the harness, join the two risers together by passing one carabiner loop through the other. This keeps them neatly together and helps to stop line tangles.

Fold the canopy alternately from the right and left sides, working towards the centre, press out the air, working from the rear towards the front. Place the risers at the trailing edge of the folded canopy and use them to finally roll up the canopy.

## PARAMOTOR VERSION OF YOUR ONE POLAR WAVE

The Paramotor version is equipped with trims on the risers. With the Trims in the closed position the the paramotor version conforms to the certification of the PG version. The trim position should be in the closed position for take-off, landing and flight close to the ground or in turbulent conditions. The trims are useful for cruising over longer distances, and for making minor direction adjustments to compensate for torque. It is not recommended to use the trims combined with the speed bar. It is also possible and safe to use the PG version for paramotoring, however, you will not have the advantages of the trimmers. Trim risers can be ordered separately, contact your dealer for details.

## MAINTENANCE & CLEANING

Cleaning should be carried out with water and if necessary, gentle soap. If the glider comes in contact with salt water, clean thoroughly with fresh water. **Do not use solvents of any kind**, as this may remove the protective coatings and destroy the fabric.



## BUTT HOLE II



Your wing is equipped with Butt-hole II, which automatically clears smaller particles such as sand, grass and stones from the wing.



## STORAGE

When the glider is not in use, the glider should be stored in a cool, dry place. A wet glider should first be dried (out of direct sunlight). Protect the glider against sunlight (UV radiation). When on the hill keep the glider covered or in the bag. Never store or transport the glider near paint, petrol or any other chemicals.

**Do not leave your paraglider in the trunk of a car or exposed to the sun.**

Temperatures on a hot summer's day in a closed environment: car, etc. can easily reach over 60°C

At these temperatures Nylon permanently changes its characteristics which may alter the behavior and shape of the wing.

It will cause permanent damage to the paraglider, rendering it non-airworthy. ONE POLAR's warranty will not be applicable.



## DAMAGE

Using spinnaker repair tape (for non-siliconized cloth) can repair tears in the sail (up to 5cm). A professional repairer should repair greater damage, or damage at structurally important points such as line attachment points, tension tapes etc.

## GENERAL ADVICE

A qualified person or agent of the company should check the glider every year or every 150 hours flying time, whichever comes first.

The glider is carefully manufactured and checked by the factory. Never make changes to the canopy or the lines. Changes can introduce dangerous flying characteristics and will not improve flying performance.

Do not put the glider in direct sunlight when not necessary. In order to protect the glider during transportation or waiting time we recommend one of our lightweight storage bags.

Paragliding and Paramotor flying should always be done in a way that has minimum impact on wildlife and the environment. Respect access regulations and the wishes and rights of landowners. Do not litter or start fires, do not smoke near your or other peoples wing and equipment. Do not launch, fly or land in a manner that harasses, disturbs or endangers people, wildlife or property. To summarise - don't be a jerk!

**If you have any doubts about flying conditions - do not fly.**

**If you have any questions, please contact your dealer or us.**

**Lastly, be equipped with a certified emergency parachute and helmet on every flight.**

## RECYCLING

If you need to dispose the wing, do so in an environmentally responsible manner. Recycling of many parts of the wing is possible, and there are some organizations that manufacture reusable shopping bags, windsocks, backpacks and more using old donated wings. Funds raised are often used for charitable donations. Search the web, or contact *The Cloudbase Foundation* for more information or advice. Do not dispose of a retired wing with normal household waste.



# LINE TABLES & DIAGRAMS

*\*difference not more than 10mm from the lengths laid down the user's manual and reality*

	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	St
A	1110	1060	1070	X	X	1080	1060	1170	1150	1200	X	910	870	740	670	670	1540			970
	1450	1440	1450		1440		3340		1440		1150		1250		3860			1540		970
B	1110	1060	1060	1060	X	1090	1060	1170	1150	1190	X	910	870	740	670	670	1490			960
	1450	1440	1450		1440		3250		1440		1150		1270		3780			1490		960
C	1020	960	960	980	X	1000	960	1060	1050	1100	X	830	770	730	670	680	1530			1000
	1270	1250	1250		1350		3590		1250		1010		4030		1020		1530			1000
D	1010	960	960	970	X	1000	960	1060	X	1070	X	830	770	830	740	X			1080	
	1390	1380	1380		1440		1350		1080		1080		830		740		X			1080
Br	2280		2020		1940		1950		1830		1830		1600		1480		1370		2170	

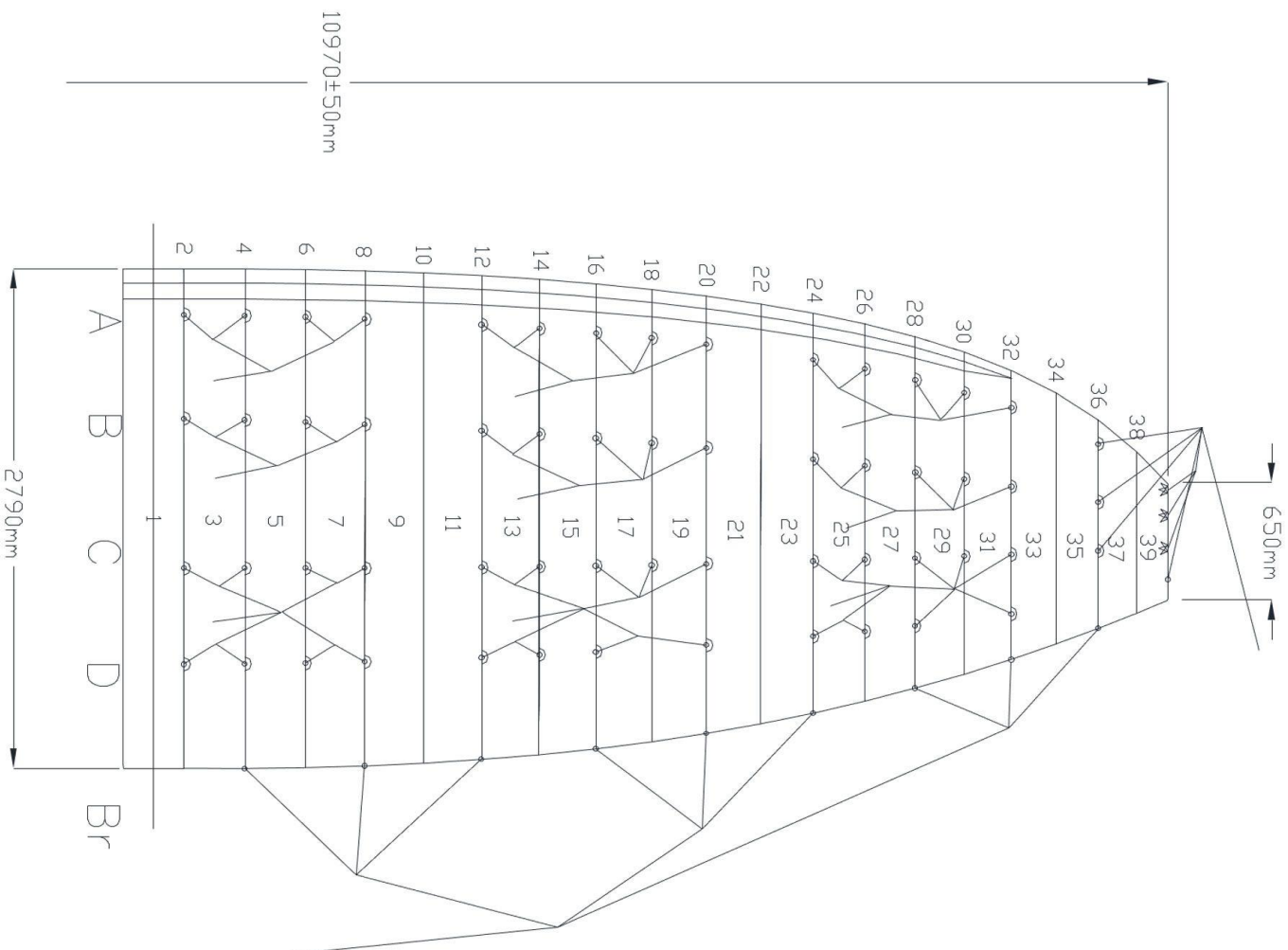
Top, Brake top, St top      Dyneema 1.1 – 95 kg.  
 Mid , St                              Superram 1.2 – 120 kg.  
 Bottom A1,B1,C                      Superram 1.9 – 320 kg.  
 Bottom A3,A5,B3,B5                Superram 1.8 – 230 kg.  
 Brake bottom                        Dyneema 2.0 – 230 kg.

\* Marking point for knot 150 mm shorter than total length.

Drawn by	Adam Wechsler	Part N	Toll±5	Qty per glider
Date	25.01.18	Name	Table of length lines.	
Scale	-	Approved	Jonathan Cohn	Drawing N Rev
Approved	Jonathan Cohn	Product	ONE POLAR	WAVE "S"
				0.1







\* All measurements are in mm

Drawn by Adam Wechsler	Part N	Toll ±10	Drawing N
Date 17.07.16	Name		
Scale	Lines sketch		
Approved Jonathan Cohn	Product		Revision

ONE POLAR

WAVE "S"

0



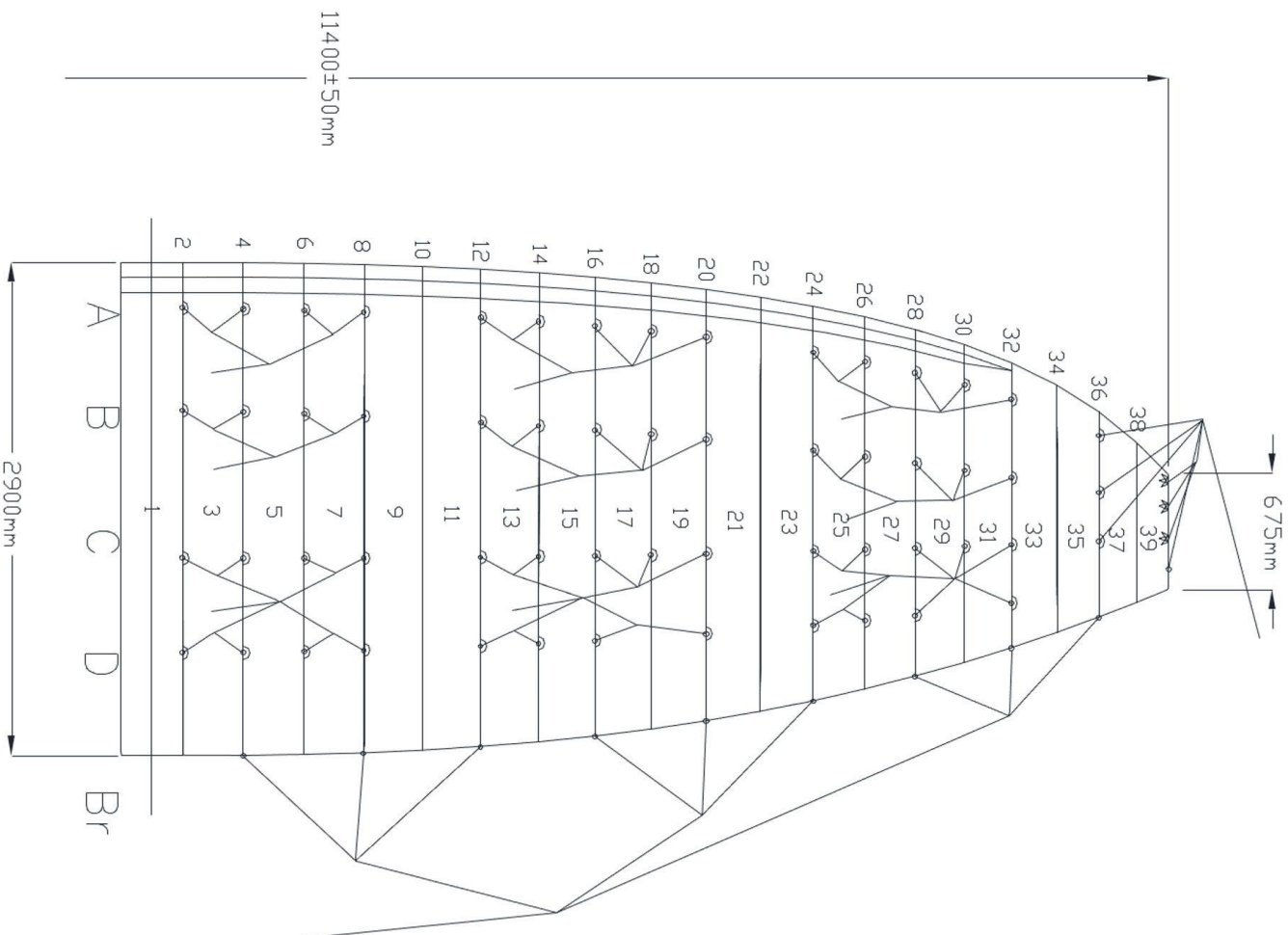
A	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	St
	1510	1100	1100	1110	X	1120	1100	1220	1200	1250	X	950	900	770	700	700	X	X	X	
B	3575			3470			4010			3930			1550			1000			400	
	1510	1500	X	1610	1500	X	1600	1500	X	1200	1500	X	1200	1320	X	X	X	X		X
C	3840			3735			4190			1070			1590			1040			4125	
	1320	1300	X	1400	1300	X	1400	1300	X	1060	1300	X	760	700	710	X	X	X		1040
D	3840			3735			4190			1070			1590			1040			4125	
	1050	1000	1010	1040	1000	1100	1110	860	800	860	800	860	770	X	X	X	X	X		1120
Br	2370			2100			2020			2030			1900			1900			1960	
	2690			2020			2030			1900			1900			1660				1540

Top, Brake top, St top      Dyneema    1.1 – 95    kg.  
 Mid , St                            Superaram    1.2 – 120    kg.  
 Bottom A1,B1,C                Superaram    1.9 – 320    kg.  
 Bottom A3,A5,B3,B5        Superaram    1.8 – 230    kg.  
 Brake bottom                 Dyneema      2.0 – 230    kg.

\* Marking point for knot 150 mm shorter than total length.

Drawn by	<b>Walter Nesper</b>	Part N	Toll±5	Qty per glider
Date	<b>2021 04 07</b>	Name	Table of length lines.	
Scale	-	Product		Drawing N
Approved	Jonathan Cohn	<b>ONE POLAR</b>		Rev
				<b>0.2</b>
		<b>WAVE "M"</b>		





\* All measurements are in mm

Drawn by Adam Wechsler	Part N	Toll ±10	Drawing N
Date 17.07.16	Name	Lines sketch	
Scale	Approved Jonathan Cohn		

ONE POLAR

Product WAVE "M"

Revision 0



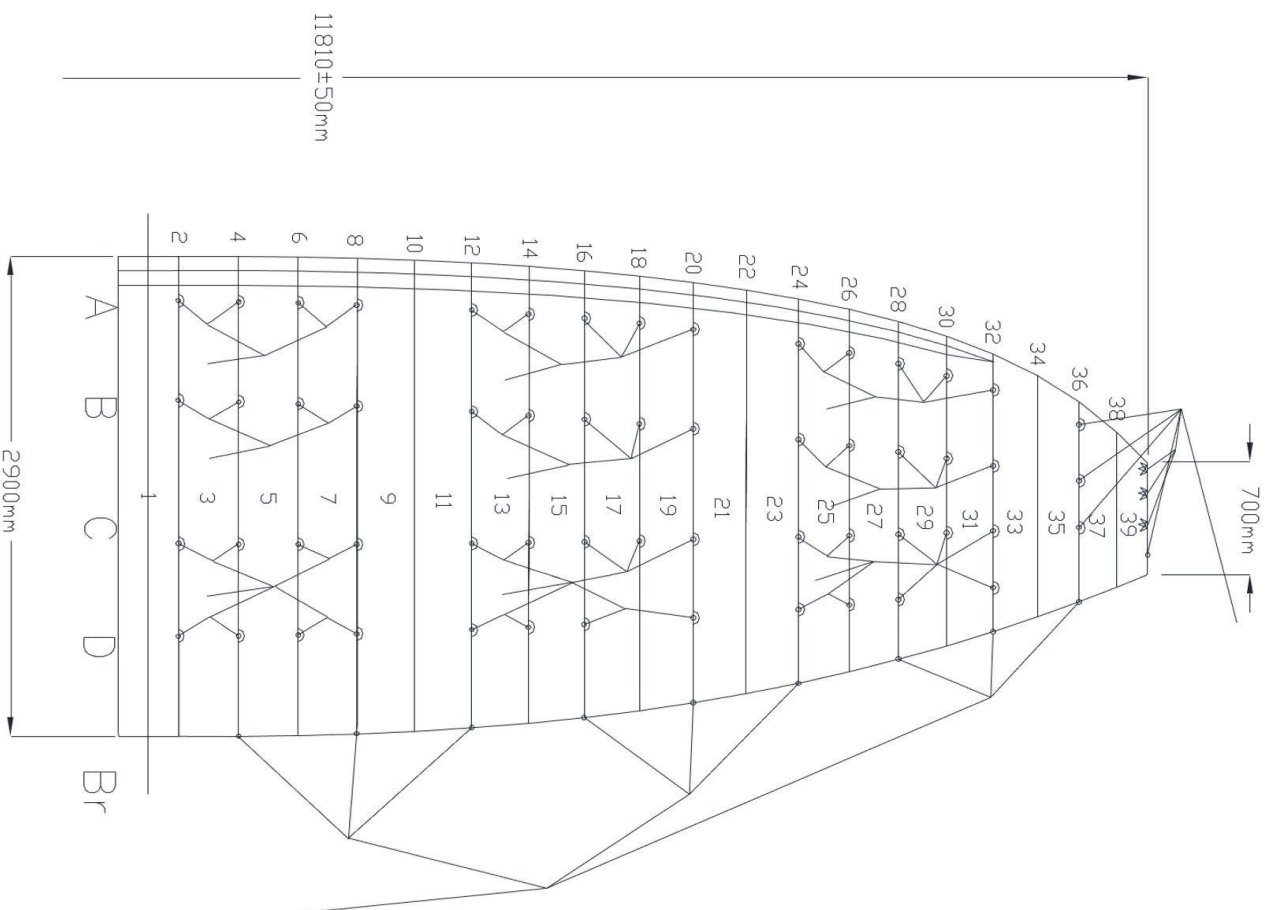
	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	St
A	1190	1140	1140	1150	X	1160	1140	1260	1240	1300	X	980	930	800	730	730	X	1660	1050	
	1560	1550	X	1670	1550	X	1240	1350	X	4160	X	1240	1350	X	1660	X	1660	1050		
	3700	X	3590	X	4160	X	4160	X	4160	X	4160	X	4160	X	4160	X	4160	X	4160	
B	1190	1140	1140	1140	X	1170	1140	1260	1240	1280	X	980	930	800	730	730	X	1610	1040	
	1560	1550	X	1660	1550	X	1240	1370	X	4070	X	1240	1370	X	1610	X	1610	1040		
	3600	X	3500	X	4070	X	4070	X	4070	X	4070	X	4070	X	4070	X	4070	X	4070	
C	1100	1040	1040	1060	X	1080	1040	1140	1130	1180	X	890	830	790	730	740	X	1650	1080	
	1370	1350	X	1450	1350	X	1100	1110	X	4340	X	1100	1110	X	1650	X	1650	1080		
	3980	X	3870	X	4340	X	4340	X	4340	X	4340	X	4340	X	4340	X	4340	X	4340	
D	1090	1040	1040	1050	X	1080	1040	1140	1150	X	890	830	890	800	X	1160	X	1160	1160	
	1500	1480	X	1570	1470	X	1180	1180	X	1180	X	1180	1180	X	1160	X	1160	1160		
	2460	X	2790	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	
Br	2460	X	2180	X	2090	X	2100	X	1970	X	1970	X	1720	X	1600	X	1470	X	X	
	2790	X	2790	X	2660	X	2660	X	2860	X	2860	X	2860	X	2860	X	2860	X	2860	
	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	X	2200	

Top, Brake top, St top      Dyneema    1.1 – 95 kg.  
 Mid , St                              Superaram    1.2 – 120 kg.  
 Bottom A1,B1,C                      Superaram    1.9 – 320 kg.  
 Bottom A3,A5,B3,B5                Superaram    1.8 – 230 kg.  
 Brake bottom                        Dyneema      2.0 – 230 kg.

\* Marking point for knot 150 mm shorter than total length.

Drawn by	Adam Wechsler	Part N	Toll±5	Qty per glider
Date	25.01.18	Name	Table of length lines.	
Scale	-	Approved	Jonathan Cohn	Drawing N Rev
Approved	Jonathan Cohn	Product	ONEPOLAR	0.2
			WAVE "L"	





\* All measurements are in mm

Drawn by Adam Wechsler	Part N	Toll ±10	Drawing N
Date 17.07.16	Name		
Scale	Lines sketch		
Approved Jonathan Cohn			

**ONE POLAR**

Product **WAVE "L"**

Revision  
0



### Line and Riser Measurements of flight test Paraglider <sup>(1)</sup>

Report No. : **PG\_1828.2021** Sample name: **Karisma 2 M** Date measure: **15.12.2020** Place: **Villeneuve**  
 Manufacturer: **Apco Aviation** S/N: **391732** Responsible: **Claude Thurnheer** Linked: **ISO 91.20**

Total line length including risers [mm] Main brake line with diff color than A,B,C main line?  Yes

	A			B			C			D			E			Stab			Brake			+strap
	Manu <sup>(2)</sup>	Sample	Diff	Manu	Sample	Diff	Manu	Sample	Diff	Manu	Sample	Diff	Manu	Sample	Diff	Manu	Sample	Diff	Manu	Sample	Diff	Sample
Center 1	6270	6269	-1	6165	6163	-2	6255	6250	-5	6375	6370	-5			0	5760	5764	4	7150	7151	1	
2	6220	6219	-1	6115	6109	-7	6195	6190	-5	6325	6319	-6			0	5710	5714	4	6880	6878	-2	
3	6210	6211	1	6105	6102	-3	6175	6170	-5	6305	6300	-5			0	5750	5755	5	6800	6799	-1	
4	6220	6221	1	6105	6104	-1	6195	6187	-8	6315	6309	-6			0	5570	5563	-8	6690	6691	1	
5	6235	6239	4	6140	6138	-2	6210	6200	-10	6330	6320	-10			0	5560	5553	-7	6560	6562	2	
6	6215	6215	0	6110	6104	-6	6170	6159	-11	6290	6283	-7			0	5600	5592	-8	6560	6562	2	
7	6225	6227	2	6130	6127	-3	6170	6161	-9	6290	6279	-11			0	5680	5673	-7	6510	6514	4	
8	6205	6207	2	6110	6107	-3	6160	6148	-12	6300	6289	-11			0				6390	6391	1	
9	6255	6256	1	6150	6146	-4	6210	6203	-7	6225	6217	-8			0				6270	6274	4	
10	6195	6192	-3	6115	6108	-8	6145	6137	-8	6165	6159	-6			0						0	
11	6145	6141	-4	6065	6058	-7	6085	6078	-7	6155	6148	-7			0						0	
12	6115	6110	-5	6055	6045	-10	6055	6048	-7	6065	6061	-4			0						0	
Wing tip 13	6045	6037	-8	5985	5974	-11	5995	5988	-7			0			0						0	
14	6045	6040	-5	5985	5974	-11	6005	6000	-5			0			0						0	
15			0			0			0			0			0						0	
16			0			0			0			0			0						0	
17			0			0			0			0			0						0	
18			0			0			0			0			0						0	

Stab line to riser: **B**

Number Cell: **39**

Weight of the glider [kg]: **4.60**

Tolerance [mm] <sup>(4)</sup>: **±15**

Riser measurement - total length (inner edge) [mm] <sup>(3)</sup>					Acc system configuration max travel			Test Atmosphere AGL			
Total length (incl. Carabiner or connect)	Risers	Std	Acc	Trim	Total length (no carabiner or connect)	Risers	Std	Acc		Pressure [hPa]	1003
	A	528	414	n/a		A	498	384		Humidity [%]	38
	A'	527	413	n/a		A'	497	383		Temperature [°C]	21
	B	530	455	n/a		B	500	425		Plausibility check :	
	C	526	526	n/a		C	496	496		[mm] 500	500
Acc	114	*[mm]		Acc	114	*[mm]	[mm] 10000	10003			
Trimmer	n/a	[mm]		Trimmer	n/a	[mm]	Remark:				

Instrument validity date **07.09.2023** Uncertainty of instrument [mm] **3**

Laser distance meter **07.09.2023**

Line measurements system **07.09.2023**

Present inspection's scope only extends to the conformity of a given sample, on a given date and in a given place – as mentioned here above. The validation of this report is given by the signature of the test manager on inspection certificate 91.20

<sup>(1)</sup>Total length measured from the underside of the glider to the inner edge of the risers with a tension of 50 [N]. Measured values do not include the uncertainty/The uncertainty stated is the expanded uncertainty obtained by multiplying the standard uncertainty by the coverage factor k = 2. The measured values lies within the assigned range of values with a probability of 95%. <sup>(2)</sup> Manu=Values from manufacturer, Sample=Measured by inspector.

<sup>(3)</sup> Risers, Std=Trim speed, Acc=Accelerated, AND if trimmer: Open=trimmer open, Closed=trimmer closed, Trim=measured at this position. <sup>(4)</sup>Tolerance line and riser is +/-15 [mm]



**ONE POLAR wishes you many hours of enjoyable flying!**

**Take Air!**

