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Congratulations, for choosing to fly a RR ACROWNGS ROLLING. You have got a glider, to experience exiting and safe flights for many years.

This manual contains important information and instructions to use your glider. Please read the following pages carefully before your first flight. For questions and suggestions please contact us: raul@rracrowings.com

To find further information about this or other products please visit our website: www.rracrowings.com

Now we wish you many nice ours in the air and a safe landing at the end of every flight.

Your NOVA and RR-ACROWINGS Team

RR Acrowings

RR Acro Wings is the product of Raul Rodríguez's 22 year flying career combined with NOVA, one of the most advanced and experienced wing manufacturers.

Raul is a true paragliding pioneer of our times. Thanks to his adventurous spirit, his initiative and his extraordinary instinct, he has managed to make a new and enormous leap in the area acro flying.

Raul has mastered, overcome and reinterpreted several limits of free flying and has one by one opened many doors, that exist in the world of paragliding today.

The manoeuvres that Raul has discovered and invented, each of the new techniques that he has developed, every advancement that he has made, have always been shared in great detail with any pilot wanting to learn them, in the generous spirit that continues to characterise Raul's attitude.

Here all Raul Rodriguez's experience that has extended the imaginable limits of paragliding, comes together with the quality and confidence that NOVA offers as a paragliding manufacturer to bring you this exclusive line of new wings: RR Acro Wings.

RR Acro Wings by Nova. A unique combination.

The ROLLING

The Rolling is a certified freestyle glider, which was developed for pilots who are new to the world of acro flying, as well as for more experienced acro pilots, who want a very versatile wing: The Rolling is capable of almost all acro manoeuvres and impresses with an outstanding glide performance for a freestyle glider, which allows efficient thermalling as well as XC flights.

So the Rolling is even an interesting glider for pilots without acro ambitions, who are looking for an agile wing with a great performance, which is trimmed and fine tuned by no one less than Raul Rodriguez.

Short technical description

The ROLLING has 53 cells. Six of those cells are closed stabilo cells on each side.

There are four layers of lines. The first layer, the A-lines are red. B, C and D lines are yellow. The brake layer, which is not one of the four line layers, is orange. (the stabilo lines are orange as well.)

The risers consist of 4 belts. On the first belt, the A stem lines are attached. Furthermore the speed system is fixed on the first A belt. On the next three belts the B, C, and D stem lines are attached.

Safety

The very predictable stall behaviour and the gentle reactions to collapses are perfect for pilots who want to advance in the field of freestyle flying, or who want to get in touch with this

Handling Characteristics

The ROLLING offers a very precise and sensitive handling characteristics. No matter if flying in strong thermals, or in a parachutal stall. The ROLLING provides perfect feedback for the pilot. Raul used all his experience to reach a perfect behaviour for all the basic acro manoeuvres like SAT, helico and for the dynamic manoeuvres like wingovers and loops.

All together, the ROLLING is perfect to enjoy thermal and freestyle flying with one and the same glider

Performance

The design of the ROLLING is based on the MENTOR which is well known for its very good glide performance. The ROLLING has inherited the MENTORs performance, which is unique in the segment of freestyle gliders. This makes the ROLLING a very versatile glider, which can be even perfectly used for XC-flying.

Target Group

The ROLLING aims to appeal all pilots who want to learn or refine the art of acro and freestyle flying. Due to the high trim speed, the very agile handling characteristic and the high safety potential the wing is an interesting choice for pilots who are not particularly interested in acro flying and who just want to enjoy a glider with great performance and sensitive feedback.

Pilots requirements:

We recommend the ROLLING for pilots who are already capable of certain techniques, like controlling a glider in turbulent conditions: The pilot should be able to prevent unwanted pitch or roll movement in bumpy air. If the pilot enters a strong thermal, he should intuitively release the brakes to stop the glider from pitching backwards. When flying into sinking air, the pilot should apply more brakes.

The ROLLING pilot should also be able to easily fly steep turns without unwanted pendulum movement. We think, that a pilot, who is not capable of those basic techniques will not be able to use the potential of the ROLLING in a safe way.

We recommend to permanently work on your flying skills, by attending a SIV course, by training take-offs an a training hill or by ground handling the glider. All this will help you, to get a better understanding of your glider and to become a better pilot.

Every pilot, who flies on their own has to be able to decide if their skills and equipment is adequate for the respective conditions. The ROLLING offers a high level of safety, but misjudgements may still have serious consequences.

The best way to avoid misjudgements is a defensive approach to the sport. Some times it makes sense to pass on a flight, instead of getting yourself into conditions you cannot handle. Regular training improves your skills and enables you to enjoy your flights, even in more difficult conditions.

Please consider these thoughts!

General information bevor implementing

First flight

Every RR-ACROWINGS glider has to be flown and checked through a RR ACROWINGS dealer. This flight (date and pilot) has to be entered on the stabilo of the wing.

Registration

To get all warranty and service features, you have to register your glider on our Homepage. Please choose “LOGIN” and follow the advice for registration

Scope of delivery

The ROLLING is shipped with a rucksack, an inner pack sack, a riserbag, the speed system, a windsock, the manual and a patch.

Modifications on the glider

Any modification (e.g. change of line lengths, changes on the speed system) causes a loss of certification. We recommend that you contact NOVA before performing any kind of change.

Suited harnesses

The ROLLING is approved for any harness of the class “GH” (without diagonal bracing). This means almost every harness which is currently available.

The choice of the harness has a big influence on the flight characteristics of the ROLLING. There are harnesses which allow very effective weight shifting on

the one hand, but which tip to the side in turbulences quite undamped on the other hand.

Other harnesses don't allow extreme weight shifting, but they will give the pilot a calmer feel in turbulent conditions. There are several harnesses on the market, which are especially designed for acro flying and which offer the possibility for two reserves.

A good flying school can help on this topic with individual advice.

Weight range

Each size of the ROLLING is certified for a certain weight range. The weight refers to the "overall take off weight". This means the weight of the pilot, the glider, the harness and all other equipment.

If you fly the ROLLING on the lower half of the weight range, the agility decreases and the glider will be more damped. In strong turbulences the wing tends to deform and to collapse more than with a higher wing loading.

If you fly the ROLLING on the upper half of the weight range, the agility and the stability in turbulences will increase. Also the speed will increase slightly. The self damping will decrease in turns, as well as after collapses. For Acro Flying, we recommend the upper half of the weight range. Especially dynamic manoeuvres like wingovers and loops are easier to perform with a high wing loading.

Flying the ROLLING

We suggest performing your first flights with a new wing in calm conditions to get used to the flight behaviour without any stress. We also recommend to do some take-offs on a training hill or some ground handling to get a good feeling for your glider from the very beginning.

Launch

Before every take off the pilot has to ensure that the equipment is in a proper condition, especially the glider, the harness and the reserve system.

Just before launch we recommend a check routine, which should be performed carefully. (Many accidents at take off could be avoided by a proper check!)

We recommend the following routine:

- 1.) Strapped up (Leg strap and chest strap on the harness and helmet strap all done up)
- 2.) Clipped in (Risers untwisted and connected to the karabiners, speed system attached and karabiners properly closed)
- 3.) Lines (A lines on top, all lines sorted, brake line unlooped between brake handle and pulley)
- 4.) Glider (glider lies arched with opened cell openings at take off.)
- 5.) Wind and airspace (wind suitable for launch and airspace in front of take off free of other gliders)

The ROLLING has a very well balanced and easy take off behaviour. Corrections are easy to perform at any time and no special advice is needed for forward or reverse launches.

A proper take off technique can only be learnt by intensive training. That's why we recommend to spend some time on a training hill every once in a while. Also some ground handling will improve your take off skills. The best thing is to have an experienced pilot with you who can help with some advice.

Like this, you will soon be able to launch your glider confidently, even in difficult conditions. This will add a lot of safety to your flying and it allows you to enjoy your flights from the very beginning.

Normal flight

If you release both brakes (“Hands up”) the ROLLING glides at the so called “trim speed”. At this speed, the glide ratio reaches its maximum.

If you fly into a headwind or through sinking air, you should use the accelerator to maximise your glide ratio. If you use the accelerator in turbulent conditions, you have to consider more demanding reactions in the case of a collapse. So you should keep more distance from the ground if you fly accelerated.

If you fly in strong turbulences we recommend applying both brakes slightly. This increases the stability and you get good feedback through the brakes, which is necessary to fly your wing actively.

Flying actively means permanent control and correction of the angle of attack in turbulent air. If you fly from lift into an area of sinking air, the angle of attack will decrease and the wing will pitch down. A good pilot will realise this even before the wing pitches down, by a reduced brake pressure. The right reaction would be to apply the brakes more and thereby increase brake pressure to prevent the wing from pitching down or even from collapsing in turbulent conditions.

Flying from sinking air into lift is just the opposite: Without any pilot action, the angle of attack would increase and the wing would pitch up. The pilot can feel this, by an increased brake pressure. In this situation, the pilot should release the brakes to reduce the pitch movement.

To generalize:

If the brake pressure decreases and if the wing pitches down, the pilot should apply more brakes. If the brake pressure increases and if the wing pitches up, the brakes should be released.

With proper active flight control, the pilot can avoid most of the collapses and keep control in every moment. The best way to learn this is of course flying, but ground handling definitely helps to improve the feeling for the glider. A good training exercise is to stabilise the wing above your head with the brakes, without looking at it. This helps as well for improving the forward launch.

Turning

A smooth turn is an interaction of inner brake, outer brake and weight shifting. The difficulty is finding the right amount, which is important if you want to climb efficiently in thermals.

The ROLLING turns quite sensitively, so only small inputs are needed for performing precise turns. Tight and quick turns or fast changes of turning direction without unwanted pendulum movement are quite complex and take some training. It should be the goal of every pilot to master these skills perfectly.

Attention:

If you can't use the brakes for steering the glider you can use the D-risers instead. (This might be necessary for example, if the brake lines tangled up due to a bad pre-launch check or less likely, if the main brake line tears).

The ROLLING can be turned quite well with the D-risers combined with weight shifting. You can also land the glider nice and smooth just with the D-risers. Don't pull the D-risers too much, to avoid a deep stall!

Landing

Landing the ROLLING is very easy. In turbulent conditions we recommend applying brakes (approximately 20% of the available brake travel) during the whole approach. This will increase the stability of the glider and the feeling of the wing.

Just before touch down you should apply more brake. Many times it makes sense to induce a stall.

Attention:

A deep stall in just 2 meters height can cause a quite violent touch down. Make sure to not fully apply the brakes until you are close enough to the ground.

Manoeuvres for fast decent

Big ears

For initiating Big ears, pull the outer A lower lines. Keep the brake handles (without extra wraps) in your hands.

As long as you keep both outer A-lines pulled, the wingtips will be folded and the sink speed will increase. We recommend to additionally push the speed bar to increase the sink speed further and to also increase forward speed. The drag of the folded wingtips increases the angle of attack. By pushing the speed bar, this effect is compensated.

To end the manoeuvre, release the A-lines. If the wingtips don't open automatically, you can inflate them by applying the brakes with a short impulse movement.

B-Stall

You can enter a B-Stall by symmetrically pulling both B-risers approximately 15cm. The force is quite high at the beginning, but decreases when you pull down further. To get a good hold of the risers, it makes sense to grab them on top at the shackles.

As you pull the risers down, the glider stops its forward motion and after a pendulum swinging motion, the ROLLING enters a very stable stall state. The sink rate depends on the wing loading and on how much the pilot pulls the B-risers. The maximum sink rate is about 9m/s.

If you pull too far, the glider starts to rotate about the yaw axis. In this case, release the risers, until the rotation stops. (Please note, that such a rotation can also be induced by an asymmetric pulling of both risers)

To exit the B-stall, raise up both hands speedily.

Keep the brake handles (without extra wraps) in your hands during the manoeuvre. Make sure to not apply brakes during the exit!

Deep spiral

The deep spiral is the most demanding of the three manoeuvres. (Ears, B-Stall and Deep Spiral) You should only practise it with a lot of altitude. The best way is to learn it under professional guidance.

Entering a deep spiral can be divided into two phases:

First, you fly a turn by applying one brake and by shifting your weight to the same side, the glider will bank up and increase its turning speed. This phase ends at a sink rate of roughly 8m/s – 10m/s. (depending on the wing loading)

Then at the beginning of the second phase the g-forces increase rapidly and the leading edge will lean towards the ground. In a fully developed deep spiral, the leading edge is almost parallel to the ground. The maximum sink rate with the ROLLING can get up to 25m/s and more.

The first attempts to fly a deep spiral should be stopped clearly before reaching the second phase to get used to the quick rotation and to practice the exit without pendulum swinging. The exit should be performed by simply releasing

the inner brake with a neutral weight-shift. The ROLLING will then decrease its bank angle and go back to normal flight. To avoid a pendulum movement, the inner brake has to be pulled in the moment the wing wants to reduce its bank rapidly.

By applying the inner brake again, you force the glider to exit the spiral movement not rapidly but during two or three rotations. It is very important to master this exercise before continuing to the second phase of the deep spiral.

The pilot will feel the entering of this phase by the suddenly increased g-force. In this moment, the pilot is being pushed to the outer side of the harness. It is important to not counteract. So the pilot should lean to the outer side to avoid a stable spiral. (See below)

If the pilot weight shifts to the outer side, the spiral movement will get slower as soon as the pilot releases the inner brake. The rest of the exit works as explained above for the first phase of the deep spiral.

If the pilot shifts his weight clearly to the inner side, the ROLLING might stay in a deep spiral, even when releasing both brakes. In this case, it helps to apply the outer brake, or both brakes and of course to shift the weight to the outer side.

Please don't underestimate the difficulty of learning the deep spiral. The sink rates are a lot higher than what you are used to from other manoeuvres and the fast rotation might lead to disorientation. The high g-loads of up to 3g make the manoeuvre even more demanding as you might have problems like the so called "black out", where you temporarily lose your vision due to the g-load. It is very important to get a feeling for the reactions of your body to this manoeuvre.

If you practice it well, it is a fun manoeuvre that enables you to loose height faster than with any other manoeuvre.

C-Stall

This manoeuvre can be found sporadically in some paragliding literature. We don't recommend it, because entering and exiting the C-stall can be very demanding and dangerous for many pilots.

Collapses

Asymmetric collapse

If you fly in strong turbulences, one side of the glider might collapse. This happens if one side of the wing doesn't produce lift anymore, due to a low angle of attack. If there is no lift, the lines get loose and the wing deforms or collapses.

Most of these collapses are rather small – they only affect a small part of the wingspan. In such a case, the ROLLING continues to fly almost unaffected. If the collapse affects 50% of the wingspan or more, the wing will react considerably:

Due to the increased drag of the collapsed wing, the glider will turn to the collapsed side. Furthermore, the glider will pitch down because of the increased wing loading. (The glider has to increase its speed because of the reduced area – that's what causes the pitching down.)

The pilot can prevent the glider from pitching and turning, by applying the brake on the non collapsed side of the wing. If a collapse occurs close to the ground it is essential to react properly. The proper reaction should be taught at high altitude, ideally under professional guidance.

As explained above, most of the collapses can be prevented, if you fly actively!

Front tuck

A front tuck occurs, if the angle of attack gets too low on the whole wingspan, then the whole leading edge will collapse. After the asymmetric tuck, the ROLLING will go back to normal flight automatically. The pilot can expedite the opening process by slightly applying both brakes.

Stall manoeuvres

Spin

If you pull one brake too much, you might induce a so called spin. The centre of rotation is no longer far outside the wing (like during a normal turn), but it moves inside the wing. Furthermore the rotation speed increases. The ROLLING will go back to normal flight, if the pilot releases both brakes. The

ROLLING's spin behaviour is easily manageable: It takes a lot of brake travel to induce the spin, and then the pilot has quite some time to react and release both brakes.

Fullstall

If you pull both brakes too far, the wing will perform a so called full stall. The wing suddenly stops its forward motion, but the pilot is still moving forward. So from the pilots view, the glider will tilt backwards. It is very important to not release the brakes in this moment. Otherwise the glider might surge forward below the pilot.

The Full Stall is a complex manoeuvre and the perfect execution can not be explained in this manual. If you want to learn a proper full stall, it makes sense to do this under professional guidance.

The available brake travel before stalling the wing depends on the size. It is approximately 55cm for the ROLLING 22 and 60 cm for the ROLLING 24. Those numbers are just a rough indication. (The publication of the brake travel is claimed by the EN 926.)

It would be dangerous to use the brake travel according to those numbers, because it is not practicable to measure the brake travel during flight, and in turbulences the stall might occur with less brake travel. If you want to use the whole brake travel of your glider safely, it is necessary do many intended spins and full stalls to get a feeling for the stall behaviour.

Deep/Parachutal stall

The Deep Stall, or Parachutal Stall is kind of the pre stage to a Full Stall. The wing has no forward motion and a high sink speed, but it is almost fully inflated. The pilot can enter the Deep Stall by applying both brakes. It is very difficult to keep the wing in a Deep Stall: If you pull the brakes a little too much, the glider will enter a Full Stall. If you release the brakes too much, the glider will go back to normal flight. To practice a Deep Stall, it is necessary to master the Full Stall first.

A very old or worn out glider with a porous cloth or with a changed trim (due to many winch launches, or deep spirals) might stay in a deep stall even after releasing both brakes. Do not apply the brakes in such a situation, because the wing would then enter a full stall ! You can exit the deep stall by pushing the

speed bar, or by simply pushing the A-risers forward. If you fly through rain, the risk of a deep stall is higher. We strongly advice against flying in rainy conditions. If it happens, that you get into rainfall, we recommend not performing a B-stall or Big Ears. Our recommendation is to leave the rain as soon as possible and to fly with both brakes released, or even accelerated, as this reduces the risk of a deep stall.

Cravates

After a big collapse or after a badly executed Full Stall, a part of the wing might be tangled up in the lines, and won't reopen automatically. This is what you call a cravate. During our extensive test flights with the ROLLING we never experienced a cravate but this situation can not be eliminated with any paraglider.

In case of a cravate we recommend the following actions:

- 1.) Counter steer: Probably the wing wants to turn to the side of the cravate. In some cases, the turning happens quickly and will end in a stable deep spiral without the pilot's action. So it is important to react quickly by counter steering.
- 2.) Opening the cravate by applying the brake with an impulse movement: Some cravats can be opened with this method. It is important to keep the wing in straight flight by pulling the other brake all the time.
- 3.) Pulling the stabilo line: Some cravats can be opened by strongly pulling the stabilo line. (It is the orange line on the B-riser. Have a look at it or grab it every once in a while and you will be able to react quicker in a moment of danger.)
- 4.) Inducing a collapse on the side with the cravate: Induce a collapse by pulling the outer A lines. If it doesn't solve the problem, you can try to induce a bigger collapse by pulling the A riser.
- 5.) Full stall: Many cravats can be opened by using the Full Stall. But of course you have to have solid experience with this manoeuvre to be able to use it properly.

- 6.) Reserve: If you loose control or if you are not absolutely sure that you have enough height for further attempts to recover, immediately use your reserve!

Many pilots wait way too long before using their reserve. Some don't use the reserve at all if they lose control of their glider. We strongly recommend to at least mentally practice the use of the reserve from time to time: Grab the handle of the reserve in flight, like you would do it in case of emergency. Many clubs or schools offer to throw the rescue for example in a gym. The most realistic way of training is to use the reserve in real flight. Many SIV Clinics offer that as part of their training.

Please use these possibilities: There are already too many pilots, who almost forgot that they have a reserve they could use, which is a very bad precondition to use it without hesitating in a dangerous moment.

Winch launch

The ROLLING is very easy to launch on the winch. You should start to climb at a flat angle.

We recommend the use of a towing device which accelerates the glider during the winch launch.

Speed system

Mounting the speed system

Most harnesses have two pulleys on each side. Some light harnesses have simple rings instead. Guide the accelerator ropes (included in the delivery) from top to bottom through these pulleys. Then fix the speed bar on the bottom of the ropes.

It is important to adjust the length correctly. If you set it too short, the glider might fly accelerated all the time, which definitely has to be avoided. If you set it too long, you might not be able to use the full accelerator travel.

We suggest adjusting the length quite long and then try to estimate the free travel in flight to shorten it after the flight.

Using the accelerator in flight

If you push the speed travel all the way, the ROLLING will gain approximately 14km/h speed. (Compared to “hands off” speed) It makes sense to use the accelerator when flying into a headwind or through sinking air – or simply to move forward faster.

Attention:

It doesn't make sense to apply the brakes during accelerated flight. This will reduce the glide performance considerably, and it will make the wing more unstable. (Unlike in non accelerated flight!)

To turn, simply shift weight, or push the speed bar asymmetrically. (If you push the right side further, the wing will perform a left turn.)

You can also use the accelerator for pitch control: If the glider pitches up, push the speed bar more, if it pitches down, release the speed bar.

Measurements of the speed systems (publication required by EN 926)

If you use all the available accelerator travel, the A riser will get 14cm shorter. (compared to the D-riser)

Service and maintenance

General advice

To keep your glider in good condition for many years, please consider the following advice:

- Don't expose your glider to unnecessary UV radiation – for example by leaving it on the landing site unpacked.
- Don't fold the Mylar reinforcements at the cell openings too hard.
- If you pack the glider when it is wet or just damp, it has to be dried later. Don't leave it packed in a wet condition!
- When you practice ground handling, avoid crashing the glider hard on the ground with the leading edge, as this might lead to damage.

- Avoid unnecessary dirt or sharp stones touching the lines and the cloth. Don't step on the lines if they are laying on a stony surface!
- Humidity combined with dirt can lead to shrinking of the lines and thereby to the wrong trim on your glider. Saltwater (sweat) may damage the lines in the long run.
- To store your glider for a longer time, avoid a humid or a very hot environment. (Like in a car during hot summer days)

Cleaning

To clean the wing, only use water and a cleaning cloth. Never use any solvents. If there is sand, dirt or small stones inside the canopy, you should remove them because they will damage the coating of the cloth and the seams in the long run.

Repair

Repairs may only be performed by authorised service centres or by NOVA.

You can repair small holes or tears in the cloth (smaller than 5cm) yourself with a special self adhesive repair tape. (You can order it at NOVA or in any service centre.) If you are not sure about the damage, or if the damage affects parts of a seam, please contact NOVA. (info@nova-wings.com)

Check

We suggest a trim inspection (Nova Trim Tuning NTT) in the first year after the date of purchase. In the case that the NTT is done, the next full check (NFS: NOVA full service) has to be done 3 years after purchase. In the case that the NTT is not done, the wing needs a full check after 2 years. The check expert can define the next check interval on the basis of the wing's condition. In areas where conditions are harsh on the material (i.e. by salty air next to the coast), an annual complete check (NFS) is strongly recommended! The check has to be confirmed with the check-stamp on the stabilo. All necessary documents for the inspection can be found on the NOVA homepage (<http://www.nova-wings.com>): Downloads: Check.

More information about our check system:
http://www.nova-wings.com/english/info_zone/ntt.html

Environment friendly behaviour:

Apart from self-evident things, like not leaving your rubbish behind, we would like to appeal for a thoughtful behaviour towards animals, like birds of prey or game animals. If you notice, that your fly by affects those animals (like causing a shortening reaction) please increase your distance.

Disposal:

Disused paragliders need a proper disposal. If you are not sure about the correct removal, please send your glider to NOVA.

Technical data

Size		22	24	26
Zoom factor		0.88	0.93	0.97
No. of cells		53		
Span proj.	m	8.61	9.06	9.48
Area proj.	m ²	18.6	20.59	22.59
Aspect ratio proj.		3.98	3.98	3.98
Span	m	10.86	11.42	11.96
Area	m ²	21.68	24	26.33
Aspect ratio		5.43	5.43	5.43
Line diameter	mm	0.6/1.2/1.4		
Line length	m	6.62	6.97	7.3
Line consumption	m	310	326	342
max. profile depth	m	2.49	2.6	2.72
min. profile depth	m	0.62	0.65	0.68
Weight	kg	5.2	5.4	5.9
Take-off weight LTF/EN ¹	kg	65-100	70-110	80-120
Places		1	1	1
Certification LTF		C	C	
Certification EN		C	C	

¹ Pilot + total equipment

Overview risers



- 1 A-Riser
- 2 B-Riser (B-Stall)
- 3 C-Riser
- 4 D-Riser
- 5 Shackle
- 6 ACRO-handle
- 7 ACRO-handle
- 8 Speed clips
- 9 Main suspension loop
- 10



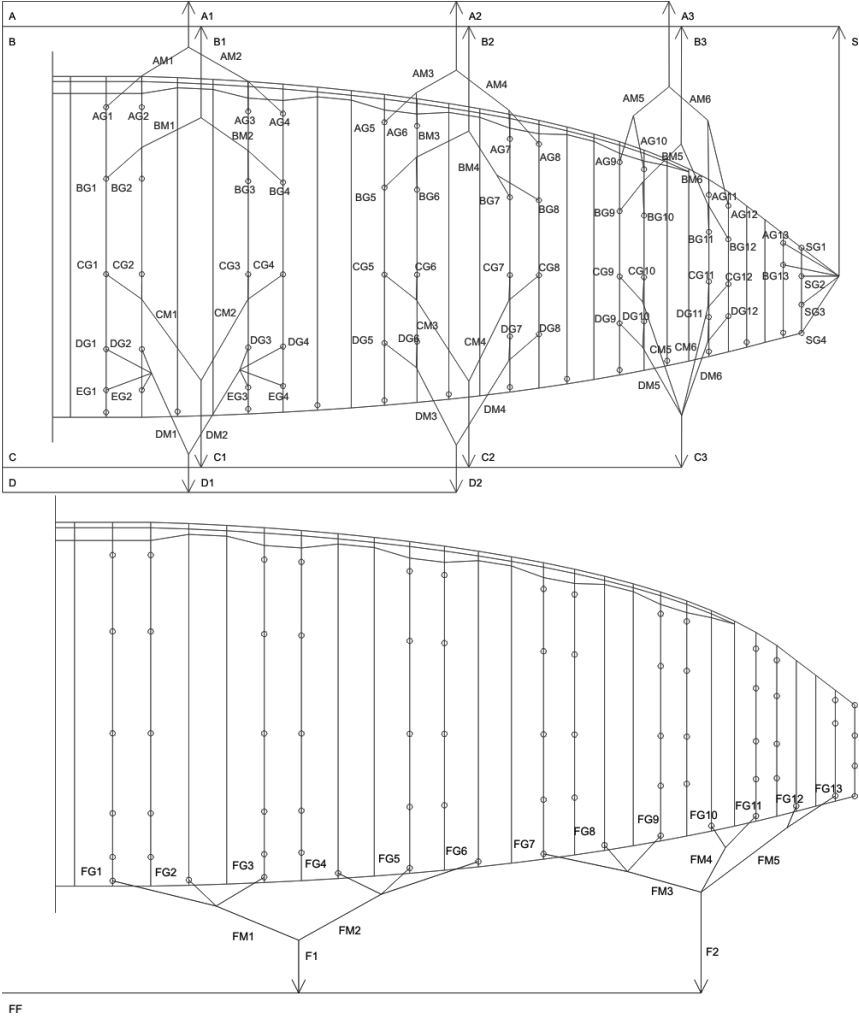
Overview Glider



- 1 Stem Lines
- 2 Middle lines
- 3 Top Lines
- 4 Bottom sail
- 5 Cell Openings

- 6 Top sail
- 7 Trailing edge
- 8 Nameplate

Line plans



Line lengths:

	Rolling				Leinentyp
	22	Σ	24	Σ	
A1	291.6		306.9		Liros TSL 380 red
A2	308.4		325.2		Liros TSL 380 red
A3	436.5		460.5		Liros TSL 280 red
AM1	318.6		335.2		Liros TSL 220 red
AM2	314.6		331.3		Liros TSL 220 red
AM3	295.0		310.4		Liros TSL 220 red
AM4	292.8		308.4		Liros TSL 220 red
AM5	158.5		166.8		Liros TSL 140 red
AM6	145.3		153		Liros TSL 140 red
AG1	44.7	650.8	46.9	684.9	Liros PPSL 120 red
AG2	41.8	647.9	44.1	682.1	Liros PPSL 120 red
AG3	42.0	644.1	44.1	678.2	Liros PPSL 120 red
AG4	42.4	644.5	44.7	678.8	Liros PPSL 120 red
AG5	41.1	640.4	43.2	674.7	Liros PPSL 120 red
AG6	38.9	638.2	41	672.5	Liros PPSL 120 red
AG7	36.2	633.3	38	667.5	Liros PPSL 120 red
AG8	35.5	632.6	37.3	666.8	Liros PPSL 120 red
AG9	32.8	624.3	34.4	658.2	Liros DSL 70 red
AG10	27.7	619.2	29.1	652.9	Liros DSL 70 red
AG11	27.6	605.9	29	639	Liros DSL 70 red
AG12	24.6	602.9	26	636	Liros DSL 70 red
AG13	135.4	573.9	142.5	605.5	Liros DSL 70 orange
B1	288.3		303.4		Liros TSL 380 yellow
B2	305.3		322		Liros TSL 380 yellow
B3	434.1		457.9		Liros TSL 280 yellow
BM1	318.5		335.1		Liros TSL 220 yellow
BM2	314.6		331.4		Liros TSL 220 yellow
BM3	295		310.4		Liros TSL 220 yellow
BM4	292.7		308.3		Liros TSL 220 yellow
BM5	157.7		165.9		Liros TSL 190 yellow
BM6	145.3		153		Liros TSL 190 yellow
BG1	44.7	647.4	46.9	681.3	Liros PPSL 120 yellow

BG2	41.8	644.5	44.1	678.5	Liros PPSL 120 yellow
BG3	42	640.8	44.1	674.8	Liros PPSL 120 yellow
BG4	42.4	641.2	44.7	675.4	Liros PPSL 120 yellow
BG5	41.2	637.4	43.3	671.6	Liros PPSL 120 yellow
BG6	38.9	635.1	41	669.3	Liros PPSL 120 yellow
BG7	36.1	630	38	664.2	Liros PPSL 120 yellow
BG8	35.4	629.3	37.3	663.5	Liros PPSL 120 yellow
BG9	32.7	621	34.4	654.7	Liros DSL 70 yellow
BG10	27.8	616.1	29.3	649.6	Liros DSL 70 yellow
BG11	27.5	603.4	28.9	636.3	Liros DSL 70 yellow
BG12	24.7	600.6	26	633.4	Liros DSL 70 yellow
BG13	134.6	573.1	141.6	604.6	Liros DSL 70 orange
C1	293.8		309.3		Liros TSL 280 yellow
C2	309.8		326.8		Liros TSL 280 yellow
C3	436.8		460.9		Liros TSL 280 yellow
CM1	318.9		335.3		Liros TSL 140 yellow
CM2	314.7		331.3		Liros TSL 140 yellow
CM3	295.7		310.9		Liros TSL 140 yellow
CM4	292.6		307.9		Liros TSL 140 yellow
CM5	157.7		165.8		Liros TSL 140 yellow
CM6	143.8		151.4		Liros TSL 140 yellow
CG1	44.7	653.9	47	688.1	Liros DSL 70 yellow
CG2	41.9	651.1	44.1	685.2	Liros DSL 70 yellow
CG3	42	647	44.2	681.3	Liros DSL 70 yellow
CG4	42.4	647.4	44.6	681.7	Liros DSL 70 yellow
CG5	41.1	643.1	43.2	677.4	Liros DSL 70 yellow
CG6	38.7	640.7	40.8	675	Liros DSL 70 yellow
CG7	36.1	635	38	669.2	Liros DSL 70 yellow
CG8	35.2	634.1	37.1	668.3	Liros DSL 70 yellow
CG9	32.7	623.4	34.4	657.3	Liros DSL 70 yellow
CG10	27.4	618.1	28.9	651.8	Liros DSL 70 yellow
CG11	27.6	604.4	29	637.5	Liros DSL 70 yellow
CG12	24.4	601.2	25.7	634.2	Liros DSL 70 yellow
D1	306.3		322.5		Liros TSL 190 yellow
D2	318.4		335.9		Liros TSL 190 yellow
DM1	298.9		314.2		Liros TSL 140 yellow

DM2	293		308.4		Liros	TSL 140 yellow
DM3	297.0		312.3		Liros	TSL 140 yellow
DM4	292.0		307.3		Liros	TSL 140 yellow
DM5	164.7		173.2		Liros	TSL 140 yellow
DM6	148.8		156.6		Liros	TSL 140 yellow
DG1	63.4	665	66.7	699.8	Liros	DSL 70 yellow
DG2	60.4	662	63.6	696.7	Liros	DSL 70 yellow
DG3	61.8	657.5	65	692.3	Liros	DSL 70 yellow
DG4	62	657.7	65.3	692.6	Liros	DSL 70 yellow
DG5	41	653	43.1	687.9	Liros	DSL 70 yellow
DG6	38.2	650.2	40.2	685	Liros	DSL 70 yellow
DG7	36	643	37.9	677.7	Liros	DSL 70 yellow
DG8	34.7	641.7	36.5	676.3	Liros	DSL 70 yellow
DG9	31	628.7	32.7	663	Liros	DSL 70 yellow
DG10	25.2	622.9	26.6	656.9	Liros	DSL 70 yellow
DG11	25.9	607.7	27.3	641	Liros	DSL 70 yellow
DG12	22.4	604.2	23.7	637.4	Liros	DSL 70 yellow
EG1	75.9	677.5	79.8	712.9	Liros	DSL 70 yellow
EG2	73.4	675	77.3	710.4	Liros	DSL 70 yellow
EG3	74.2	669.9	78	705.3	Liros	DSL 70 yellow
EG4	73.9	669.6	77.8	705.1	Liros	DSL 70 yellow
S	440.9		465.4		Liros	TSL 190 red
SG1	127.8	566.4	134.5	597.6	Liros	DSL 70 orange
SG2	129.1	567.7	135.9	599	Liros	DSL 70 orange
SG3	133.5	572.1	140.4	603.5	Liros	DSL 70 orange
SG4	140.4	579	147.8	610.9	Liros	DSL 70 orange
FF	180		180		Edelrid	7850-360 orange
F1	227.9		240.1		Liros	DSL 70 orange
F2	275.2		290.7		Liros	DSL 70 orange
FM1	216		227.1		Liros	DSL 70 orange
FM2	202		212.7		Liros	DSL 70 orange
FM3	145.8		153.2		Liros	DSL 70 orange
FM4	141.4		148.9		Liros	DSL 70 orange
FM5	132.5		139.7		Liros	DSL 70 orange
FG1	114.8	735.8	121.4	770.7	Liros	DSL 70 orange
FG2	86.8	707.8	91.99	741.3	Liros	DSL 70 orange

FG3	80.5	701.5	85.23	734.5	Liros DSL 70 orange
FG4	81.7	688.7	85.96	720.9	Liros DSL 70 orange
FG5	64.5	671.5	67.9	702.8	Liros DSL 70 orange
FG6	78.6	685.6	82.8	717.7	Liros DSL 70 orange
FG7	79	677.1	83.26	709.3	Liros DSL 70 orange
FG8	58.6	656.7	61.85	687.9	Liros DSL 70 orange
FG9	60	658.1	63.35	689.3	Liros DSL 70 orange
FG10	47.9	641.7	50.64	670.4	Liros DSL 70 orange
FG11	44.2	638	46.87	667.7	Liros DSL 70 orange
FG12	51.7	636.6	54.85	667.4	Liros DSL 70 orange
FG13	51.2	636.1	54.45	667.1	Liros DSL 70 orange



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