

PILOT'S MANUAL

COMET 4

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 **AXIS**
PARAGLIDERS



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*Thank you for taking the time
to read this booklet*

1. INTRODUCTION



When setting out to design our introduction level cross-country glider we had a clear target: we wanted to create the best paraglider possible for novice performance pilots. Pilots who want top performance and sensitive handling, but who rightly demand ever more security.

The Comet 4 is that glider, keeping the comfortable but precise characteristics of Axis gliders and also its predecessor – Comet 3.

With an internal structure based on the successful Venus SC glider and including our unique differential speed system. This means pilots can achieve a good sink rate at half or one-third speed bar and maintain good stability at maximum speed: in short, it gives the glider excellent usable speed.

The Comet 4 is an intermediate glider (EN-B) and is meant for novice pilots who hold a full paragliding pilot license. It is designed as an ideal beginner cross-country glider, suitable also for experienced pilots who fly regularly and who will enjoy a performance glider with greater safety characteristics. Comet 4 is not recommended for less experienced pilots – complete novice pilots!

This manual provides information about the glider, which will help you to fly safely and keep your wing in good condition. If after reading this manual you have any further questions, please don't hesitate to contact us or any authorized Axis dealer.

SAFETY NOTICE

By the purchase of this equipment, you are responsible for being a certified paraglider pilot and you accept all risks inherent with paragliding activities including injury and death. Improper use or misuse of paragliding equipment greatly increases these risks. Neither Axis nor the seller of Axis equipment shall be held liable for personal or third party injuries or damages under any circumstances.

***Thank you for choosing Comet 4 from Axis.
www.axispara.cz***

2. PRE-FLIGHT



Pre-delivery inspection

The Comet 4 is delivered with a rucksack, an inner bag & a compression strap, or a sausage bag, and this manual. The dealer or your instructor should have made test inflation and test flight before delivery to you.

Trimmers

Comet 4 is delivered without trimmers.

Brake-line length

When you receive your new Comet 4, the brake-line length is set the same as the Axis test glider. This length has been finely tuned by Axis test pilots and it should not be necessary to adjust it.

If you feel it is necessary to adjust the brake-line length to suit physical build, the height of harness hang points, or style of flying we recommend you test-fly the glider after every 20mm of adjustment.

There should always be free brake travel when the glider is flown hands-up. This means when you look at your brake lines in flight with your hands up, there should be a slight bow, or arc, to the line – the brake lines should not be tight. This is to prevent the brakes from being applied when the speed system is used.

Brake lines that are too short:

- May lead to fatigue from flying with your hands in an unnatural position
- May impede recovery from certain maneuvers
- Will certainly reduce your glider's speed range.

Brake lines that are too long will:

- Reduce pilot control during launch
- Reduce control in extreme flying situations
- Make it difficult to execute a good flare when landing.

Each brake line should be tied securely to its control handle with a suitable knot. Break line travel at maximum weight in flight:

	max. weight in flight	max. weight in flight	max. weight in flight
	up to 80 kg	80 to 100 kg	greater than 100 kg
approximately constant	greater than 55 cm	greater than 60 cm	greater than 65 cm

Other adjustments or changes to your Comet 4 lead to a loss of guarantee, airworthiness and validity of EN certification, and may endanger both yourself and others.



If you have any suggestions on improvements let us know and our test pilots will try out your ideas in a controlled situation.

Weight range

The Comet 4 must be flown within the certified weight range given in the reference section of this manual. The weight range is quoted as the total weight in flight, i.e. the weight of the pilot, glider, harness, and accessories. The easiest way to check your total weight is to stand on weighing scales with all your equipment packed into your rucksack

Pre-flight safety

Before flying this glider, you should:

- Have the appropriate practical and theoretical training
- Have the required license and insurance
- Be fit to fly and unaffected by stress or drugs
- Wear a suitable helmet
- Use a suitable harness and emergency parachute
- Make a thorough pre-flight check.

3. FLYING THE COMET 4

We recommend you practice inflating your glider before flying it and make your first flights in gentle conditions on a familiar flying site.

A. Normal flight

Pre-flight check

A proper pre-flight check is essential for safe flying.

Before launch lay the glider out into a slight arc and check that:

- Cell openings are free of obstructions
- Lines are free of tangles or knots
- No twigs, grass, or other objects are tangled in the lines
- Risers are correctly connected
- Brake lines run freely through the pulleys
- Knots on brake handles are secure
- Carabiners on risers are closed and/or tightened



Launch

A key to a successful launching is to practice ground-handling on flat ground as often as possible. The Comet 4 inflates easily and steadily using forward or reverse launch techniques. There is no tendency to overshoot the pilot. To forward (alpine) launch in light or nil wind there is no need to pull the risers hard. Allow the glider to stabilize overhead and run positively forward checking the canopy is fully inflated and clear of any knots or tangles. Reverse launching is recommended in strong wind.

Flight

The best glide speed in calm air is achieved in the hands-up position. The best sink rate is produced with both brake lines drawn down equally to about 20% of their range.

Turning

The handling characteristics of the Comet 4 require no special or non-standard procedures. Brake pressure is progressive. This gives a responsive and sporty feel to the handling. In an emergency (e.g. a broken brake line – main controls failure) the Comet 4 can be maneuvered by steering carefully with the rear risers or by weight shift.

Using the speed system

The speed system on the Comet 4 comes supplied with Brummel hooks ready to attach to your own speed bar of choice. When you have done this, check the speed system runs smoothly by hanging in your harness before flying. In particular, check that the speed system won't be engaged when in a normal flight. Unnecessary knots and loops in a speed system are not recommended.

Maximum useable speed is one of the strong points of Axis paragliders and the Comet 4 is no exception. However, in spite of this exceptional stability, any collapse at full speed will be more severe than the same event experienced at trim speed. Always keep both hands on the controls when flying fast and be ready to release the speed system immediately at the first sign of a collapse. Use the speed system carefully when flying close to the ground or the terrain. The glider is not equipped with trim risers.

Landing

On your first flights you may be surprised at how well the Comet 4 glides. Take account of this when making your landing approach and give yourself the opportunity for S-turns or a longer approach than you might be used to.

For a normal, into-wind landing evenly pull the brakes all the way down when you are about one meter from the ground. Under nil-wind conditions, or if you are forced to make an emergency downwind landing, a wrap on each brake will allow you to make a stronger flare.



B. Losing altitude

Most pilots will, at some time, want to lose height. This may be because of a change in the weather, you are at cloud base and don't want to go any higher, or simply because you want to finish your flight quickly.

Ideally, the best way to lose height is to find an area of the sink and stay in it. This way you can fly normally to the ground. However, if there is no sink, or if you are in a strong lift and want to go down, a rapid descent method may be needed.

There are three main rapid descent methods:

- Big ears
- B-line stall
- Spiral dive

Each of these descent methods places extra, different stresses on gliders and should be avoided if you want to extend the life of the glider.

It is important these maneuvers are initially practiced under qualified supervision and preferably during a safety training course.

Big ears

This is the easiest and safest technique for descent while maintaining forward speed. Depending on how much of the wingtip you deflate, 3m/s to 6m/s sink rate can be achieved. While in big ears your forward speed can be increased by using the speed system.

The Comet 4 can be steered with big ears in by weight-shift alone.

Initiation: Reach up as high as possible and take hold of the outer A-line on each side of the glider. Pull one in first, maintain direction, and then pull in the second. Hold them in firmly. Make sure the lines are pulled down equally on each side and your big ears are even.

Recovery: Under normal circumstances, the ears will come out on their own when the lines are released. An opening may be accelerated by slightly pumping the brakes.

B-line stall

This is an effective way of making a rapid descent, but doesn't allow any forward speed.



Initiation: Take hold of the B-risers just below the maillons and smoothly pull them down, twisting your hands until the canopy shows a span-wise crease at the B-line attachment points. It is difficult to pull at first but becomes easier as the aerofoil creases. Your sink rate will increase while your forward speed will reduce to practically zero. Don't release the lines immediately - the glider should be left to settle before releasing.

Recovery: Let go of the risers smoothly but determinedly and symmetrically. The Comet automatically returns to normal flight without any deep stall tendencies but may dive slightly forward. If the risers are released slowly and very unevenly the glider could start to spin.

Warning: do not pull B-risers excessively down (once the canopy is stalled) since then you would be engaging AA3 wing-tip line and such could slightly destabilize the already stalled canopy.

Spiral dive

The spiral dive is the most effective way of making a fast descent. During the spiral dive, the pilot and glider will experience strong centrifugal forces which strain the glider. As such it should be considered an extreme maneuver.

Initiation: Weight shift and smoothly pull on one brake so the glider goes from a normal 360-degree turn into a steep turn and from there into a spiral dive. Once established in the spiral the descent rate and bank angle can be controlled with weight shift and the outer brake.

Recovery: The Comet 4 recovers from a spiral spontaneously as soon as the brakes are released, and the weight shift returns to neutral. To exit allow the spiral to slow for a turn or two by applying outer brake and weight shift then release smoothly. Always finish a spiral dive at a safe altitude.

C. Flying in turbulent conditions

Deflations can occur when flying in turbulence but in most situations, the Comet 4 will stabilize without pilot input. Flying with a little brake applied equally will help to prevent deflations and allow you to experience more direct feedback.

Active flying will help avoid deflations. The aim is to keep the glider above your head in all situations by responding correctly to the glider's movements by using the brakes and weight shift.

It is important these maneuvers are initially practiced under qualified supervision and preferably during a safety training course.

Asymmetric collapse

The Comet 4 will normally re-inflate after an asymmetric collapse without input from the pilot, but the wing will turn towards the collapsed side. You should always maintain course and direction by weight-shifting away from the collapsed side.

This can be reinforced by applying a small amount of brake on the opposite side to the deflation. If the collapse stays in, the collapsed side can be re-inflated by pumping the brake on the collapsed side in a firm and smooth manner.

If you experience a big collapse while accelerated the canopy will fall behind, due to the difference in inertia between you and the canopy. You must wait until you are back under the canopy before dealing with the deflation. Reacting too early can risk stalling the glider completely. Release the speed bar immediately if you have a big collapse during accelerated flight and, while keeping the weight shift neutral, apply a slight brake to the open side. Let the glider enter a turn if space allows in order to avoid a spin or stall.

Symmetric collapse

The symmetric collapse, or frontal collapse will normally reopen without any pilot input. The Comet 4 will regain airspeed with a small surge. Be careful not to brake while the glider is behind you as this could induce a stall.

Deep stall

The Comet 4 has no tendency to either get into or stay in a deep stall. If the glider does enter a deep stall, accelerate the glider out of the deep stall by either pushing on the A-risers or by using the speed bar. Never try to steer out of a deep stall. A wet glider has a higher tendency to deep stall, so if you pass through rain accelerate a little and avoid using big ears until the glider is dry.

Full stall

This is an extreme maneuver that should rarely if ever be required. To induce a full stall, take one or two wraps of the brake lines and pull both of them down smoothly. Hold them down, locking your arms under your seat until the canopy falls behind you and deforms into a characteristic crescent shape. In a stable full stall, the canopy will oscillate back and forth. Be careful not to release the brakes prematurely or asymmetrically.

The Comet 4 recovers from a full stall automatically after the brakes are released. During correct recovery, where the brakes are let up a little to allow air to enter the glider prior to being released when the glider is in front of you, the Comet 4 shows no tendency to surge strongly in front of the pilot.

If the brakes are released prematurely or too quickly there is a possible tendency for the glider to surge. This can be corrected by simultaneous equal braking on both sides. Be careful not to release the brakes asymmetrically as this can cause a large asymmetric collapse followed by a tendency to enter a spin.





Negative spin

Should a spin occur the Comet 4 is capable of recovering automatically when the brakes are released. As the glider surges forward slow it down with the brakes to avoid the possibility of a front collapse or an asymmetric collapse which could cause a crash. Always wait for the glider to be in front of you or above you - never brake while it is behind you as this can risk a stall.

Safety notice: The Comet 4 has excellent passive safety as shown by the certification tests. However, be aware that the Comet 4 can surge forward when a negative spin is released too quickly. Avoid releasing from a spin too quickly or while the glider is behind the pilot.

Remember: A wrong maneuver at the wrong time may change a straightforward situation into a dangerous problem. Extreme maneuvers also expose your glider to forces that may damage it. Practice these techniques under adequate supervision preferably during a safety training course.

There are no special flying procedures or configurations needed for this glider. **Comet 4 is designed for solo flying and should not be used for tandem flying!**

4. CARE, MAINTENANCE AND REPAIRS



The materials used to construct your Comet 4 have been carefully chosen for maximum durability. If you treat your glider carefully and follow these guidelines it will last you a long time. Excessive wear can occur by bad ground handling, careless packing, unnecessary exposure to UV light, exposure to chemicals, heat and moisture.

Ground handling

- Choose a suitable area to launch your glider. Lines caught on roots or rocks lead to unnecessary strain on the attachment tabs during inflation. Snagging lines may rip the canopy fabric or damage the lines.
- When landing, never let the canopy fall on its leading edge. The sudden pressure increase can severely damage the air-resistant coating of the canopy as well as weaken the ribs and seams.
- Dragging the glider over grass, soil, sand or rocks, will significantly reduce its lifetime and increase its porosity.
- When preparing for launch or when ground handling, be sure not to step on any of the lines or the canopy fabric.
- Don't tie any knots in the lines.

UV damage

Protect your canopy and lines from unnecessary exposure to sunlight.

Storage

- Avoid packing your glider when it is wet. If there's no other way, then dry it as soon as possible away from direct sunlight. Be careful to avoid storing your canopy when damp or wet: this is the most common reason for canopy degradation.
- Don't let your glider come into contact with seawater. If it does, rinse the lines, canopy, and risers with fresh water and dry the glider away from direct sunlight before storing.
- After a flight or when storing, always use the inner protection sack.
- When storing or during transport make sure your glider isn't exposed to temperatures higher than 50°C.
- Never let the glider come into contact with chemicals. Clean the glider with clean lukewarm water only. Never clean using abrasives.
- For long-term storage don't pack the glider too tightly. Leave the rucksack zip open when possible to allow any moisture to evaporate.



Repairs

- Small holes in the canopy can be repaired using adhesive tape.
- Larger repairs or cell replacement should only be carried out by the manufacturer's authorized agent.
- Damaged lines should be replaced by your Axis dealer. When a new line has been fitted always check its length against its counterpart on the opposite side of the wing. After replacing a line always inflate the glider on flat ground to check that everything is in order before flying.
- After tree or water landings always examine the glider carefully. If you suspect the glider may be damaged in any way contact your nearest authorized Axis supplier.
- After 100 hours of flying or two years, whichever is sooner, your Comet 4 must be checked and tested by the manufacturer's authorized agent.
- Comet 4 should be kept in the best possible conditions to prevent any failures and/or non-standard flying modes/reactions to actual air conditions. It's your responsibility as a pilot to ensure that your wing is airworthy at all times.

5. TECHNICAL DETAILS

Based on the highly successful Venus SC, Comet 4 has a slightly changed profile with improved shaping of the wingtips to reduce drag and give better performance.

The aspect ratio of 6, the high number of cells (57), and the reduced total line length give the Comet 4 even higher performance than its predecessor Comet 3.

The inner structure is a direct development from Axis's Venus SC sport class glider. The changes in the internal structure mean higher passive safety. The canopy is reinforced by tapes that connect attachment points inside the cells – this prevents distortion and helps the canopy keep its form.

A new line system helps to reduce the length of the main lines. The brake attachments have been moved to the trailing edge to create more precise handling and feedback.

All the stitching is on the inside of the canopy for greater protection.

Testing and certification

The Comet 4 has passed certification EN-B. The certification of each canopy and its serial number is found on a label inside of a central glider cell. Certification is valid for all harnesses of ABS type. This type of harness allows a certain degree of adjustment to be made to the length of the waist strap. The recommended distance between the carabiners is 42cm.



In common with all other paragliders, when cross-bracing is looser than the recommended 42cm, weight-shift control increases, and the glider feels more sensitive. However, automatic recovery from a collapse when using slack cross-bracing can be slower and more unpredictable. When cross-bracing is tighter, the pilot feels more stable, but the effectiveness of weight-shift is less effective.

EN 926-2:2013 (E)

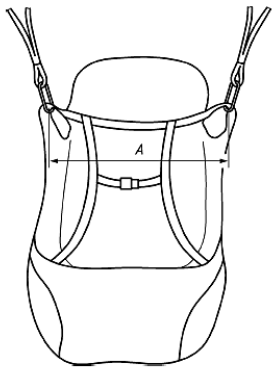


Figure 5 - Width of harness attachment points

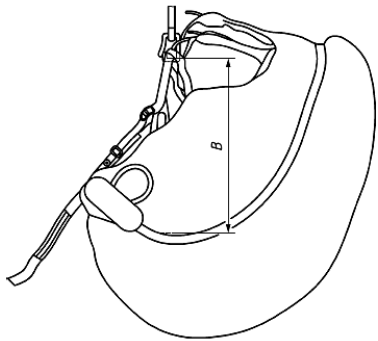


Figure 6 - Height of harness attachment points

Table 49 - Total weight in flight

TWF (total weight in flight)	< 80kg	80kg - 100kg	> 100kg
Width (measurement A on Figure 5)	(40 ± 2) cm	(40 ± 2) cm	(40 ± 2) cm



There are no other adjustable or removable or variable devices other than speed-system Brummel hooks and standard brake handles (for adjustment, please check page 4).

Test sample glider for each size was checked by a testing laboratory after the test flights in accordance with the data in this manual – all suspension lines, control lines, and risers. For overall line lengths was used tolerance of +/- 5 mm.

The dimensions given in the User's Manual were checked by the testing laboratory – Air Turquoise SA.

Disposal and environmental information

Environmental protection plays an important role in the selection of materials and the manufacture of an AXIS product. We are privileged to fly in areas of outstanding natural beauty. Respect and preserve nature by minimizing your impact on the environment. When visiting an area, contact the local club for details of environmentally sensitive areas and local restrictions.

We use only non-hazardous materials that are subjected to continuous quality and environmental impact assessments. When your paraglider reaches the end of its useful life in a number of years' time, please remove all metal parts and dispose of the lines, canopy, and risers in a waste incineration plant or recycling center and/or dispose of it with consideration and follow any local regulations.

bottom surface

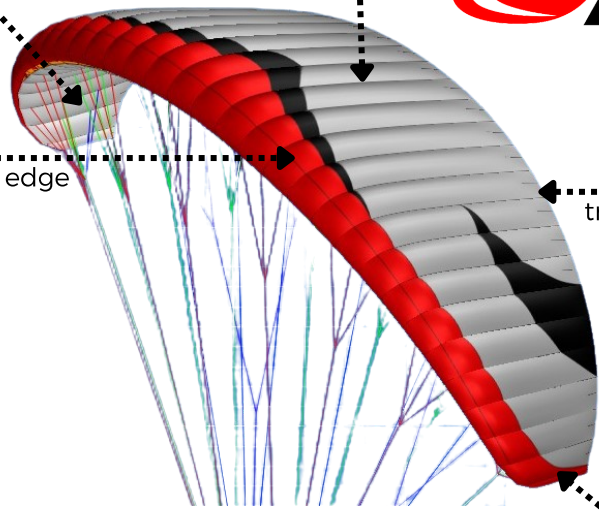
upper surface



leading edge

trailing edge

wing tip



Size	XS	S	M	L	XL
Zoom	92	96	100	103	107,5
Max Wing Chord	236,60	244,10	257,2	264,90	276,50
Area	21,81	23,20	25,76	27,33	29,77
Span	11,52	11,88	12,52	12,89	13,45
Aspect Ratio			6,08		
Projected Area	18,43	20,08	21,77	23,09	25,16
Projected Span	8,83	9,03	9,59	9,88	10,31
Projected A/R			4,23		
Number of Cells			57		
lines consumption	237,36	247,68	258	265,74	277,35
Take Off Weight	55-75	60-85	75-100	90-115	105-135
Min. Speed	25	25	25	25	25
Trimm Speed	39	39	39	39	39
Acc. Speed	53-55	53-55	53-55	53-55	53-55
Min. Sink Rate	0,95	0,95	0,95	0,95	0,95
Gliding Ratio	10,5+	10,5+	10,5+	10,5+	10,5+
Homologation		EN-B	EN-B	EN-B	

LINES LENGTHS



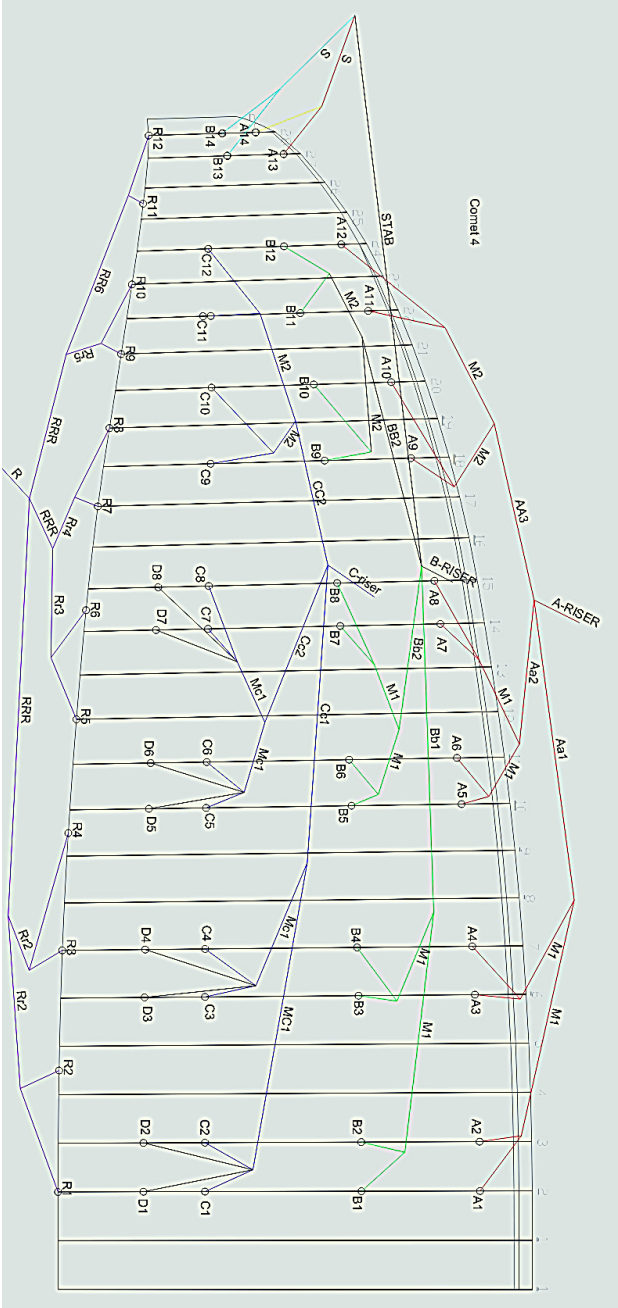
Notes:

- length of lines up to wing canopy, including risers and maillons
- All measurements are done under a gradual tension of 50N.
- Line tolerance is +/- 10 mm

Comet 4 M (75-100 kg)

A1 7192	B1 7118	C1 7171	D1 7287	A13 6470	F1 7775
A2 7148	B2 7072	C2 7125	D2 7247	B13 6503	F2 7510
A3 7118	B3 7045	C3 7103	D3 7218	SA 6396	F3 7317
A4 7147	B4 7075	C4 7133	D4 7247	SB 6425	F4 7261
A5 7108	B5 7042	C5 7104	D5 7208		F5 7072
A6 7075	B6 7012	C6 7068	D6 7176		F6 6942
A7 7050	B7 6996	C7 7056	D7 7152		F7 6915
A8 7072	B8 7025	C8 7082	D8 7165		F8 6975
A9 6995	B9 6941	C9 6955	D9		F9 6855
A10 6920	B10 6875	C10 6879	D10		F10 6795
A11 6849	B11 6799	C11 6819	D11		F11 6720
A12 6801	B12 6777	C12 6764	D12		F12 6683

LINES SCHEME

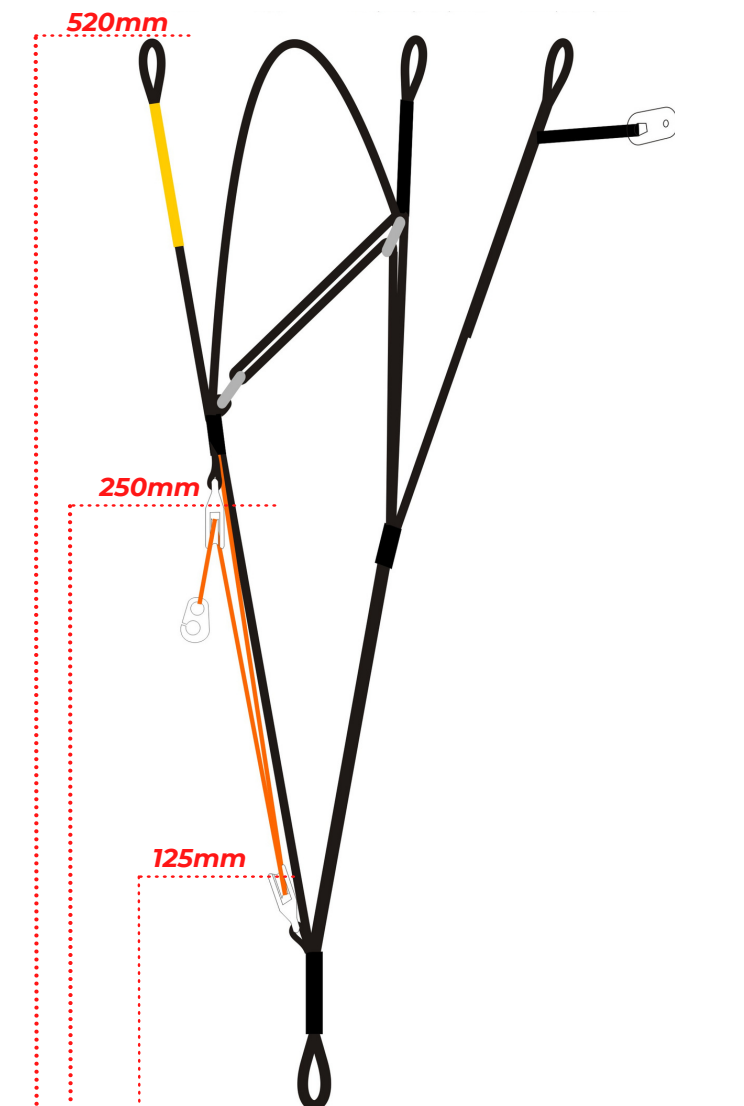


RISERS CONFIGURATION

- **Accelerator travel:** 125 mm
- **Riser length:** 520 mm
- **Riser length tolerance:** 5 mm



AA1 AA2 AA3 BB1 BB2 BB3 STAB CC1 CC2 CC3



MATERIALS



Upper surface: Porcher Sport: Skytex 9017 E25A, universal, 38 g/m²
Lower surface: Porcher Sport: Skytex S70000 E3H, classic 2, 27g/m²

Ribs: Porcher Sport: Skytex 9017 E29A, hard finish, 40 g/m²
Porcher Sport Skytex 70000 E91, hard finish, 27g/m²

Reinforcement: Porcher Sport: SR Scrim-2420, plastic rod

Thread: Bonded nylon D60,

Suspension system

Lines

LIROS: Dyneema DC 120/ comp line, 0.6mm, minimum strength 60 daN

LIROS: Dyneema DC 160/ comp line, 0.85mm, minimum strength 120 daN

LIROS: Dyneema PPSL 200/ PES cover, 1.42mm, minimum strength 200 daN

LIROS: Dyneema PPSL 160/ PES cover, 1.40mm, minimum strength 160 daN

LIROS: Dyneema DFLS 200/ PES cover, 1.42mm, minimum strength 200 daN

Cousin Trestec: Vectraline 12100/ comp line, 0.6mm, minimum strength 50 daN

Cousin Trestec: Vectraline 16140/ comp line, 0.7mm, minimum strength 70 daN

Cousin Trestec: Vectraline 12240/ comp line, 0.9mm, minimum strength 115 daN

Cousin Trestec: Vectraline 16330/ comp line, 1.0mm, minimum strength 145 daN

Risers:

Mouka Tišnov: PES Pre-stretched polyester, minimum strength 2000 daN

Maillons:

Elair Servis: Niro triangle 4/200, minimum strength 200daN

Speed system pulleys:

Riley Fittings Australia, RM 302

Harken USA, Ball Bearing Pulley 467

All spare parts could be obtained from Axis paragliding at

www.axispara.cz or our local dealer in your country.



Type :

Serial number :

Manufacturing date :

Local dealer contact :

7. ABOUT AXIS



Axis started to design and make paragliders in 2001. Success swiftly followed and now many of the world's best competition pilots choose to fly Axis. They have won podium places at competitions around the world, including recent World Cup events and the World Championships. The lessons learned from these thousands of hours of competition success have been used to develop the Pluto 4, a new generation of gliders.

We welcome feedback from you about your new Pluto 4. Send it to us:

 **info@axispara.cz**

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Please note:

We have made every effort to ensure that the information in this manual is correct but please remember it is for guidance only. It is not a training manual. It must not be used as a substitute for proper training under the direction of an approved body.

The manual is subject to change without prior notice. Check the websites for updates and the latest information regarding Axis products.



www.axispara.cz/products/paragliders/comet

ENJOY YOUR COMET 4



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Contact your local dealer

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