

Operating and Packing Instructions

CONAR

hanggliding rescue parachute



metamorfosi Conar

HANGLIDING EMERGENCY PARACHUTE

Model	Gores [n°]	Weight [kg]	Area [m ²]
Conar HG16	16	1,68	22,36
Conar HG18	18	2,02	28,38
Conar HG20	20	2.58	35,11
Conar HG22	22	3.12	42,54

Congratulations for choosing an outstanding product. The name '**Conar**' comes from '**Cono Apicale Rientrante**' the Italian for 'Reverse Apex Cone'; this patented design gives extraordinary performance to this rescue parachute.

We are pleased to include some *metamorfosi* stickers and a T-shirt; welcome to the club!



IDENTIFICATION

The *metamorfosi hangglider Conar* has a black eye at the end of the bridle, next to the manufacturing information (date, model, size).

INTRODUCTION

The *metamorfosi hangglider Conar* rescue parachute is only suitable for hanggliding; its design makes it unsuitable for any other purpose including Para Gliding, Free Fall and Base Jumping.

In our opinion hangglider reserves need to be designed to open very quickly, even at low descent speed, for two main reasons: pilots often fly close to the ground and ridge rotor turbulence is a major cause of tumbling. Moreover, even if the accident happens with some altitude, hangglider pilots may lose time trying to throw the rescue with a broken hangglider.

FAST OPENING: to obtain fast opening times at low speeds while maintaining a low sink rate, we used these design criteria:

a - Reduced Surface: under the same conditions a smaller parachute has a faster opening time.

b - Low Weight: the throw is easier and the lines unfold faster; the reduced inertia also helps the canopy to open quickly even at very low airspeeds.

c - Pulled Down Apex: increases the lift coefficient to compensate the reduced surface and reduces the opening time.

d - Reverse Apex Cone: - **Conar** patent – it increases stability, further reduces sink-rate by 20%, impact energy by 40% and, on average, opening time by almost 10%.

The fabric cone inside the Conar Apex forces airflow alongside the cone and then through a narrow slot. The airflow is accelerated over the upper surface creating a “Venturi Effect” which makes lift.



e - Packing system: the Conar has a very fast and reliable deployment. The opening sequence is controlled by the packing (which is why the Conar *must* be packed according to this owner manual). To avoid malfunctions the canopy deploys in a strict order: first the central wind channel opens quickly and the folded canopy corners open next. This is so efficient that once the lines are extended, the canopy opens completely in just a few meters travel.

RELIABILITY: the fast and reliable opening of the Conar relies on the correct opening sequence of “bridle-lines-canopy”. To reduce the risk of lines tangling or releasing prematurely they are contained in a separate compartments of the deployment bag with a light nylon sock holding the lower lines (which slides down or splits on deployment). To reduce the chance of a line getting tangled there needs to be a long bridle while to get a better sink-rate and stability there needs to be long line, but to have a fast opening the sum of line plus bridle should be short. The “line-bridle” resolves this problem by increasing the length of the bridle only when is needed both reducing the chance of a line getting tangled and allowing a faster opening time. The Conar bridle is made of braided Nylon[®] HT to better withstand opening shock and possible damages due to the glider wreckages during opening.

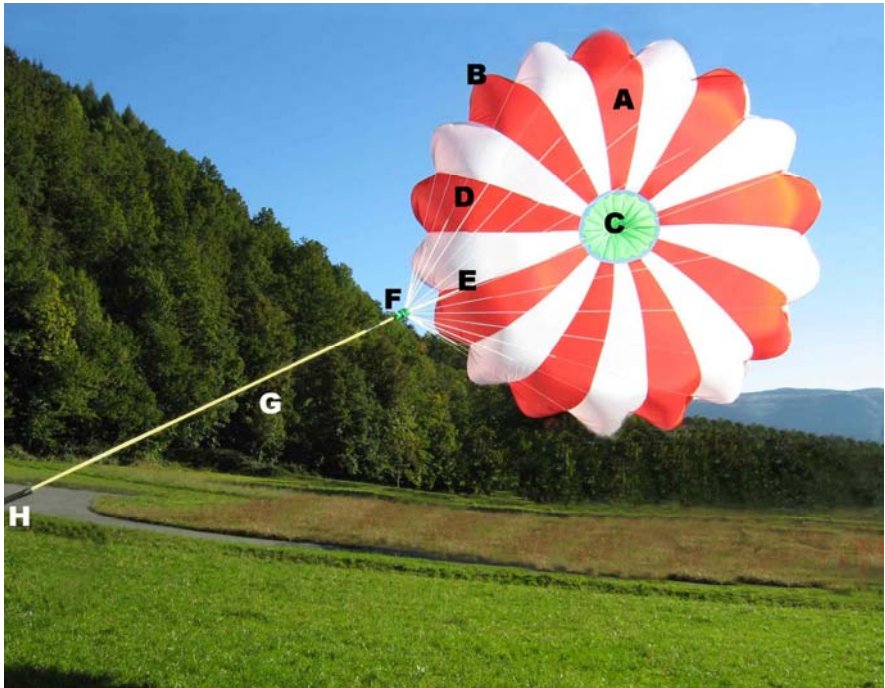
STRUCTURAL RESISTANCE: the Conar is a very strong, light parachute system designed specifically for hanggliders. The Conar uses many sophisticated materials including High Tenacity, low porosity parachute grade fabric, Kevlar[®]29 seam reinforcements and Nylon[®] HT lines and bridle for better energy absorption. However, the **Conar** emergency parachute **is not suitable for free fall terminal speed** (an unlikely situation while hanggliding if using proper hang straps). Free fall parachutes operate at very high vertical speeds so the opening sequence is delayed to reduce the opening shock. If the Conar were optimised for free fall use it would not operate satisfactorily in hanggliding emergencies.

EXTRACTION: although the *metamorfofi* Conar emergency parachute will fit a standard harness container, the optional *metamorfofi* container is available: it retains and protects safely the parachute and has no Velcro tape to ensure a safe and consistent release.

AGEING: synthetic materials deteriorate with age, particularly after exposure to sun and moisture. The Conar has been designed with UV protection by making the protective bridle sheath and the optional outer containers from black-coated fabric; also, the parachute is covered with an aluminium UV protection sheet. However total UV protection is impossible and we recommend that the parachute be inspected by the manufacturer periodically for premature ageing.

-- CAUTION --

A parachute has a maximum lifespan even if it is carefully maintained. The materials age invisibly and after 10 years it will not be completely reliable and should be replaced.



A – Canopy
B – Leading Edge
C – Reverse Apex Cone
D – Suspension Lines

E – Pull down apex lines
F – Suspension lines sock
G – Bridle
H – Sheath bridle

OPERATING INSTRUCTIONS

Mount your **Conar** parachute into your harness according to the instructions of the harness manufacturer. If possible use the original *metamorfosi* handle. If you have to use the handle that comes with the harness, attach it to the small loop in the deployment bag. Remember that a long handle makes throwing difficult and the risk of tangling increases.

The handle must not have Velcro hooks sewn on because they could stick to the lines and prevent the deployment bag from opening.

It is important to ensure the handle can be seen during flight, and be very easy to grasp, with your thumb, in any situation.

After each repack it is mandatory to check the extraction while hanging in your harness: it is no use having a good parachute if you cannot get it out!

SINK RATE CALCULATION

Use this formula to calculate the height of a jump equivalent to your sink rate under canopy.

- valid for **Conar** parachutes only -
meters = $4 \times \text{weight} / \text{gores}^2$

Example: 80 kg hook in weight (if using a rigid wing add half of the wing weight) and using a Conar PG16

Eq. height = $4 \times 80 / (16 \times 16) = 1.25 \text{ m}$

For this pilot, landing under a Conar HG16 parachute will be the same as jumping down from 1.25 m (approximately 5 m/s).

It's important to choose the correct compromise between opening time and sink rate:

- a smaller parachute will open faster but its sink rate may be too high and you may hurt yourself.
- if your parachute is too big the landing will be smoother but, if you are too low, the parachute might not open in time

With the **Conar** there is no need to trade sink rate for opening time: the best compromise is equivalent to a jump from 1.30 m, a sink rate that is perfectly acceptable for the average pilot. The maximum "equivalent height" for a fit athletic pilot is about 1.80 m and, excluding special cases, we suggest not to go below 1.00 m.

Choose the equivalent height which is acceptable for you considering your age and fitness conditions.

DEPLOYMENT PROCEDURE

The decision to deploy your rescue parachute depends on the height you are flying. If you are high and the glider is not badly broken perhaps you can try to regain control of your wing, or you can wait a few seconds for a more favourable moment with the bag in your hand. However, if you are low, every second is precious! Beware of a severe spin: the centrifugal force could make you faint.

When you decide to go for the parachute, keep a cool head and execute quickly.

The way to achieve this is to practice regularly so all actions are instinctive.

The sequence is the following:

- Look at the handle.
- Grab the handle with your thumb and then grasp firmly.
- Force open the container by pushing the handle to open the container and pull out the inner bag.
- Throw the parachute forcefully towards clear space.
- Get your feet out of your harness
- Stabilise your wing by controlling eventual oscillations
- Firmly hang onto the wing and prepare for touch down

1) - Look at the handle to be sure to grasp it first time, a second attempt could cost very precious altitude.

2) - Grab the handle with your thumb because this is the only sure way, particularly when flying with gloves. During each flight train by rehearsing these two first operations, being extremely careful to avoid accidental deployments!

3) - Force open the container by pushing the handle, this enables you to open the container progressively and completely with little effort.

4) - Throw the deployment bag forcefully into clear space extending the lines quickly and minimising the chance of tangles. If, for any reason, the parachute doesn't open immediately shake hard the bridle to help it out. In case the glider is still flying predominantly straight, it is better to throw backwards. If a wing is broken you will probably go into a spin: throw the reserve in the direction of the spin and towards the outside; the centrifugal force will help your throw. If you get tangled in the glider, it is essential to look for clear space before throwing. If tumbling throw forcefully laterally outwards, along the axis of rotation.

5) - Get your feet out of your harness to better absorb the landing impact.

6) - Stabilise the wing if you have time. After deployment of your parachute you might end up in the rear of your wing and you will likely encounter a violent spin you must stop by getting your weight closer to the nose of the hang glider.

7) - Hang on tight to your wing. If possible climb on the control bar, or the keel if inverted. Prepare yourself for landing but do not shield yourself from the impact with your hands. If your wing is not too badly broken up, try reducing your sink rate by pushing the control bar forward with your feet. Be leery of harnesses with dorsal plates that reduce the ability of your spine to flex absorbing the impact: land with your body slightly sideway. Remember that you will not be able to control your direction and you cannot choose where to touch down.

rescue parachutes are a possible chance of safety, not a guarantee...

FLY SAFELY!

PACKING DIRECTIONS

The *metamorfofi hanggliding Conar* parachute has a very easy packing technique, which is slightly different from traditional methods.

As a quick and correct opening sequence depends on careful packing, you are recommended to get an experienced rigger to pack it **as described in this manual, using the original metamorfofi deployment bag**

Incorrect packing would probably cause malfunctions.

If you have to pack your **Conar** yourself, follow these directions
VERY CAREFULLY

The parachute should be packed every three months.

As rough surfaces or jewellery could damage the lines or canopy, take off all rings, watches and bracelets. You will need two people, a long length of string and an area that is clean, dry and smooth such as a floor, large table or sheet.



<< 1

The stretched line in the photo is attached to the pull down apex (it is made up of three or four parallel lines depending on parachute size). It keeps the apex down and holds down the vertex of the reverse apex cone.

Be careful: the apex lines must be inside the canopy, as shown in the picture on the left.

2 >>

Thread the "long string" through all the loops that are approximately at the middle of the Kevlar seam reinforcements at the top of the canopy.

Take care to do it consecutively counting gore by gore to avoid missing one.



<< 3

Make a knot to hold all the loops together.

4 >>

Position the apex inside the canopy by gently pulling the apex line while your assistant is helping from the top.



<< 5

Pull the light sock right down towards the bridle knot to free the lines.

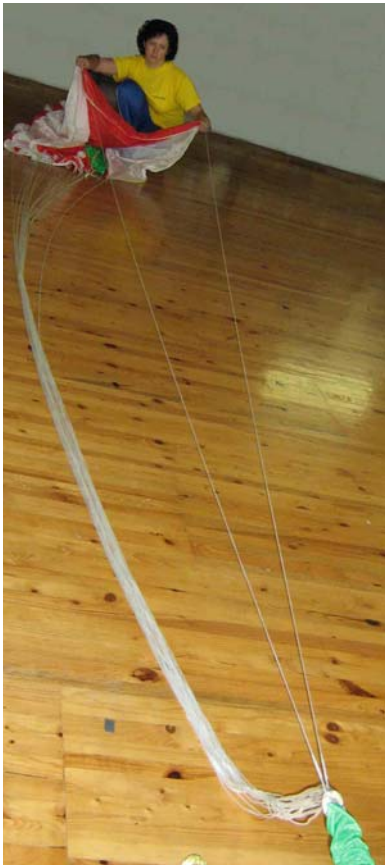


<< 6

Take two consecutive lines on the canopy and be sure they are free for the entire length.
- If two consecutive lines are free, all the others will be too.
- If they are not free the bridle went through the suspension lines and you will have to untangle them: pull two consecutive lines sideways to guess where the bridle is tangled.

7 >>

Stretch back the nylon sock; lay the canopy out and keep the two ends (bridle knot and string) under light tension.



8 >>

Grasp all the suspension lines with one hand and check if all the knots are at the same height.



<< 9

Open the canopy by flaking the gores consecutively while counting them one by one. At the same time your assistant should place one hand well inside each gore and neatly lay out the upper part of the canopy from the inside.



10 >>

Repeat number 9 to get it perfect. After flaking all the gores, the canopy should be as shown. Count the number of gores.



<< 11

Flake half of the gores to the other side as shown.

Check that the number of gores per side are the same.

12 >>

Take one of the top gores (left or right doesn't matter) and open it to make the wind channel, as shown in the picture.



<< 13

After this operation the canopy looks like the picture.

14 >>

To increase reliability fold the sides at 45°.

This will slightly delay the opening of the corners, thus forcing the inflation through the wind channel.

The leading edge fold should be in line with the wind channel but not overlapped.



<< 15

Fold the outside edges onto the wind channel as shown, but do not overlap them otherwise you will increase the bulk.



<< 16

Fold the canopy in half along the central axis and open the mouth of the wind channel.

To do this properly you have to fold the canopy and open the mouth at the same time.

17 >>

After this operation the canopy looks as in this picture. Note the leading edge of the wind channel is in line with the side of the canopy.



<< 18

Get the air out by pushing it towards the leading edge (on the other end there is no way out).

19 >>>

Undo the knot and **remove the string** from the loops.

It's very important to use a long string so it's never forgotten.





<< 20

Fold over the top 20 cm (8") of the canopy as shown in the picture.

21 >>
Carefully fold it again so that the fabric remains evenly arranged inside the fold as shown in the picture.



<< 22

Make the first "S" fold (make another one for the **Conar 20** and 22)

23 >>
Make another "S" fold getting the forward edges in line with the leading edge and all the back edges aligned to make a rectangle.

If it is not perfect, repeat the operation from number 20 by unfolding and beginning again at the top of the canopy.



24 >>

Lay the five flap inner bag on the floor with the handle on the opposite side of the lines.

Check the condition of the four rubber bands attached to the deployment bag and replace if necessary.

Do not connect the bag to the canopy with a string: it could get tangled during a deployment!



<< 25

Place the canopy onto the bag and thread the elastic string through the eyelet on the opposite fifth flap - like the picture.



26 >>

Pull the elastic string through the two side flap eyelets.



<< 27

Pass the suspension lines through the elastic string making a loop of about 3 cm (1 ¹/₄ inches) as shown in the picture. (a small finger should be able to go inside the loop).

To avoid any chance of the lines getting tangled, the loop should face you as shown in the picture.

28 >>

For the **16 and 18** gore **Conar** parachutes, take **half** the length of the lines from the edge of the deployment bag to the nylon tube (for the **20 and 22** gore models take **one third** of the length) and fold the lines in a figure of eight. Take care not to twist the lines.



<< 29

Secure the first half (first 1/3 for the **Conar** 20 and 22) of the suspension lines with the two lower rubber bands through the figure of eight loops as shown in the picture.

30 >>
Repeat the operation with the rest of the suspension lines up to and including the lines sock. Secure the loops with the next two rubber bands.

As the **Conar** 20 and 22 have longer lines there are three pairs of rubber bands so you have to repeat the operation once more to get to the sock.



<< 31

Take the elastic string again from the first loop on the suspension lines and pull it through the fourth flap eyelet.

32 >>

Secure the elastic string with a 3cm (1 1/4 inches) loop of bridle, after folding it as shown in the picture (one finger test again).

To avoid possible tangling, place the new loop away from you (in the opposite direction of the first loop).



<< 33

Arrange the package so that the canopy is completely protected by the deployment bag.



34 >>

Fold the bridle a figure 8 and secure one end using the side rubber band. (replace it, if necessary).

The deployment bag is now ready to be fitted into the harness, according to the manufacturer directions.

MANDATORY WARNINGS

1

Once you have the parachute into the harness it's mandatory to check you can easily extract the deployment bag from the harness.

Hang in your harness and check the extraction!

2

The deployment bag is extremely important for parachute reliability:
use the original *metamorfosi* deployment bag

3

Beware: if your ***metamorfosi Conar*** has a maillon rapide fixed at the end of the bridle it is a paragliding rescue parachute, not a hanggliding one.

MAINTENANCE

To keep your parachute in optimal condition, a minimum level of attention and maintenance is necessary by carefully unpacking, checking and repacking the parachute **every 90 days**.

Repack your parachute immediately if damp!

Regular repacking every 90 days is the best way to become familiar with the packing procedure and keep the parachute fully operational. In this manual we tried to give you as much information as possible but cannot replace experience: we still recommend that the manufacturer or an approved rigger pack the parachute.

During normal use it's important to follow some rules:

- Nylon is very sensitive to UV rays, so it's very important not to expose the parachute unnecessarily to sunlight. Be careful: a one week exposure to strong sunlight may reduce the fabric strength by approximately 25%.
- Keep the parachute in a dry and cool place to avoid mould developing.
- When packing the canopy take particular care not to enclose any leaves, twigs, insects or any kind of object that could damage the materials.
- Cleaning could be more harmful than the stain! Always handle the fabric carefully and treat the smallest area possible. Most stains can be avoided by immediately wiping the area with an absorbent cloth. Use clean lukewarm water and sponge gently. If necessary, you can use a mild neutral detergent; let it sit on the stain 3-5 minutes, sponge gently and then firmer if needed. **Never use full strength detergent.** Rinse carefully to remove any remains of detergent. **Do NOT use bleach** or any products containing bleach, as it will affect the fabric strength! **Do NOT use any solvent**, such as gasoline, acetone, trichloroethylene, mineral spirits, paint thinner, petrol, etc... as they may damage the parachute.
- If the parachute gets wet or damp **it must be repacked.** Hang it up in a dark room and let it drip dry and air completely before repacking.
- **WARNING:** if the parachute shows any sign of wear, fraying, or a cut, scratch or tear, do not use the parachute and get it checked by an expert.
- Any repair must be made by the Manufacturer.
- **Do not replace any parts with non-factory ones** (especially the deployment bag) because the correct working of the parachute system depends upon the balance between strength, dimensions, elasticity and aerodynamic characteristics of all of its parts.
- Should any problem arise, please write or call us: we are at your service.

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DISCLAIMER OF WARRANTY

It must be understood that the use of this emergency parachute is a possible chance of safety, not a *guarantee* of safety.

Taking into consideration the inherent risk in flying hanggliders, it must be expressly understood that the Manufacturer and the Seller do not assume any responsibility for accidents, losses, direct or indirect damages following the use or misuse of the product. This parachute is provided "as is" without a warranty of any kind. All express or implied representations and warranties are hereby excluded.

It must be clearly understood that this is an emergency system designed exclusively to be used as a last chance to reduce the hangglider and pilot's sink-rate after an accident during flight. It is not suitable for any other purpose and, in particular, it is not suitable for paragliding, free fall or base jumping. It must only be used by pilots who completely understand the characteristics and the limits of the hangglider, harness and the emergency parachute in a hanggliding system.

Read this manual carefully but do not consider it exhaustive: it can't be!

We do not guarantee results and assumes no obligation or liability whatsoever in connection with the information given in this manual.

The Conar parachute is delicate and can be easily damaged or rendered ineffective by accidents, alterations, modifications, mistakes, shocks, corrosion, improper or excessive use, insufficient or improper maintenance and ageing, all of which potentially cause malfunctions for which the Manufacturer and the Seller cannot be considered responsible.

Any parachute may have a malfunction, fail to open in time or rupture at excessive speeds. Even if it opens correctly the emergency parachute may cause death or serious injuries to the pilot and other people as well as damage to property. Remember that once the parachute deploys, you will not be able to steer to control your direction.

To get a fast and reliable deployment it is extremely important to *repack the parachute every 90 days, according to this manual and using the original metamorfosi deployment bag.*

Because of normal ageing any emergency parachute has to be periodically checked by the manufacturer or an authorized rigger and, although carefully maintained, it has to be replaced every ten years.

The liability of the Seller is limited to replacement of parts found upon examination by the Manufacturer to be defective in material or workmanship, within two years from the date of manufacture and which have not been caused by accidents, tampering, ageing, alterations or misuse.

In any case, possible damages suffered by the Buyer and User shall be settled by the cost of the above mentioned replacement.

The Manufacturer and the Seller cannot in any way be considered responsible for deaths, injuries, material damage, or any kind of consequent damage.

With the purchase and/or use of the product, the Buyer and the User subscribe to the above mentioned without recourse. Any dispute or controversy falls within the jurisdiction of the Milan Court of Law in Italy.

Packing List

date	signature	date	signature	date	signature



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