

## 1° edition

Installation and User guide for the CHA Cylindron rescue system

CYLINDRON

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## Section 1 - Introduction

The main characteristics taken into account for the Cylindron project are:

- The apparatus of expulsion of the pod containing the parachute, consisting of a cylinder and a quick discharge valve with high characteristics of functional reliability deriving directly from the experience of the launchers Aircone e Cylindricone
  - Cylinder watertight shutter double sealed, charged with air compressed to 150 bar.
  - Launch system lever or pull handle connected via bowden cable. There are safety pins to prevent accidental operation
- 
- Pod in mylar e trilam for a high level protection of the parachute. Thanks to his "bullet" shape and the high amount of kinetic energy, the pod is able to overcome many of the obstacles in its path during launch. , If correctly fixed ,the parachute protected therefore is opened far away from the aircraft structure and any accompanying turbulence.
  - High resistance lightweight alloy launch tube with breech and strengthens. The high resistance of this element makes launching possible even if damaged or imprisoned by aircraft structure as for example in a collision or from inflight structural failure.
  - The possibility to adapt the launcher attachment to the aircraft using customized solutions; This allows, at the time of installation, the maximum flexibility in choosing the direction of launch.
  - High resistance materials used in the construction, commonly used in aeronautical production. All the components are produced with CNC machining.
  - Double coating paint guarantees high resistance to atmospheric and ambient factors
  - The parachute is made from controlled porosity material and through a direct opening pod, provides a very quick deployment. The forces acting on the aircraft can reach as much as 5 g of deceleration. Always make sure the bridle is attached to a solid part of the aircraft structure in case of necessity it is recommended share strain in two or more position. Maximum velocity at the time of deployment should not exceed 130 km/h, (80 mph). The pendulum effect is diminished.
  - The control **bridles** connected to the shroud can be lengthened by a high resistance steel cable protected by a plastic sheath, or with suitable plastic rope with adequate resistance. The full length of the **bridles** should be such that no part of the aircraft comes into contact with the lines. The bridle length of the parachute is 3 meters in length.
  - The bridle is made from synthetic fibres able to withstand a breaking strain of 7000 kg inflight weight.
  - Treated steel carabiners of the Maillon Rapide type with double screw lock having a breaking strain of at least 5500kg.

## **SECTION 2 – Installation**

You are hereby warned that you should at all times scrupulously observe the following instructions with regard to installation, operating conditions, operational limits and maintenance of your Safety System.

**Foreword:**

As the range of aircraft is very broad, it is almost impossible to supply specific data for the correct installation on all types of aircraft. The Comelli srl therefore lists here a few general rules to help you optimize the installation.

**Install your system and check that:**

1

The structural component on which you intend to install the launcher is dimensionally adequate to support the forces due to the weight of the launcher and those applied to the cable during a launch, (flection torsion). To give you an idea, the minimum dimensions for circular tubing should have a minimum diameter of 45 mm and a minimum tube thickness of 2,5 mm.

2

The choice of launch direction must afford the pod a trajectory that is free of obstacles, (e.g. cables, landing gear, rigging, rudder, fuselage etc.).

3

After deployment, the shroud should be free to move toward the rear of the aircraft, (in relation to the relative wind direction).

4

The launcher should not be too close to hot engine parts, (e.g. silencer), and that it is not in the path of hot exhaust gases, even indirectly. It should also be well out of the path of potential leaks such as fuel or vapour, or even sulphuric acid from the battery. This applies to all parts of the system.

**IMPORTANT:** Any contamination, however brief, from these highly aggressive elements, could irreparably compromise the functionality of your emergency system.

5

LEVER PAR



The launch control lever must be fixed to the aircraft structure in the correct manner. To this end, use only the predrilled holes in the control lever which in conjunction with the adaptor block, permit rapid and safe fixture. NB: for installation on flat surface, (square tubing), always use both holes ; for installation on circular tubing, always use the adaptor block which allows installation with a single screw.

**IMPORTANT:** Whichever combination you use, make sure the adaptor block is not deformed and that it cannot move while pulling the launch control lever; this would not allow the pod to be expelled resulting in a failed deployment!

Also, make sure that the area around the lever is sufficient to allow the pilot easy and rapid access to the lever. If you find it necessary to move the lever, DO NOT try to bend it. Instead you should use flat washers with 0,6 mm as spacers

6

The position of the control lever should be positioned in such a manner that it may be easily reached by both the pilot and any passengers.

**IMPORTANT:** The control lever should always be easily accessible by the pilot even if he may be subject to violent acceleration, spinning or other forces, such as structural failure or collision.

Remember that in case of deployment, the lever should be pulled decisively and to the end of its travel, (about 90°). The short arc of movement however requires the pilot to move his arm so the lever should not be positioned near obstacles, (e.g. in tight spaces in small cabins). There is an advantage to be gained from the short arc of travel. We suggest that during installation, you make sure that the lever cannot get hooked in any part of the pilot's clothing or that of the passenger, or in seat belts etc. This could result in accidental deployment. See notes in Section 4.

## HYTREL HANDLE



The Hytrel handle, in line with the cable or provided with a pulley at  $90^\circ$ , can be fixed to the structure by means of 2 m 5 bolts located at a distance of 28 mm. It is provided with a double-plug safety device which, if inserted, makes it impossible to operate, to this safety a colored fabric strip is fixed to highlight its presence. To activate the device, the handle must be gripped and pulled hard. The required effort is on the order of Kg.5, the length for the drive is 10 cm. In any case, to activate the parachute, the handle must be pulled with full force for the entire length available

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The cable housing should be the right length necessary and follow the shortest path possible.

**IMPORTANT:** Before you install the cable housing, make sure that any movement of the aircraft, for example while mounting the main wing, does not put tension on the cable housing or deform its path in any way that could be detrimental to deployment.

Make certain that the cable housing is positioned away from sources of heat and that it does not come into contact with exhaust gases. The Comelli srl can supply cable of different length upon request.

8

The cable and the bridle must be positioned in such a way as to guarantee:

- freedom of deployment of the shroud at the time of launch, well away from any part of the aircraft structure, the pilot or any eventual passenger.
- a slightly nose-down position with respect to the horizon during the descent by parachute opened. **IMPORTANT:** This nose-down position makes the aircraft structure, (mainly the undercarriage), absorb a large part of the energy upon impact with the ground, to the advantage of the aircrew.

To make the aircraft assume a nose down position it is necessary to fix the bridle to a robust part of the airframe just behind the centre of gravity. Remember that the centre of gravity in some aircraft is also dependant on the position of the pilot (and passenger). Excess length should not be coiled as to avoid excessive twists to its deployment instead it should be formed to make an S-shape.

## **SECTION 3 – Operating events**

### Foreword

- With the intent of helping the pilot quickly and safely identify the critical conditions that may require the deployment of the Comelli srl safety parachute, we hereby list a few possible operating conditions:

- **INFLIGHT STRUCTURAL FAILURE** caused by (for example):

Unexpected laceration of the wing surface, aileron failure, wings par failure, hinge failure, rudder failure, stabilizer failure.

- Effect: in each of the above cases, the aircraft assumes uncontrollable and irreversible flight angles, (spins, inverted flight etc).
- Use of the safety system: as soon as you perceive the situation is irreversible, even if at height, deploy the parachute immediately. Eventual indecision will only waste time during which the aircraft will not only increase velocity, (resulting in greater stress on the canopy when it deploys), but could also lead to a situation where it becomes impossible to deploy the parachute.

- **SERIOUS LOSS OF FLIGHT CONTROLS** caused by (for example):

- Cable failure, transmission rod failure, control rod failure, flap/aileron failure or jam, flight control hinge failure, (rudder, flaps, aileron etc).

- **EFFECT:** the aircraft may remain level due to its intrinsic autostability, but often because of the asymmetric action on the affected control(s), (caused by the failure), the aircraft could go into an unrecoverable spin.
- Use of the safety system: if you are flying at a reasonable height and the aircraft remains level, you might want to consider trying to control it. On this basis and in view of the ground below, you might want to consider an emergency landing. If you have any doubt whatsoever, do not wait too long – you might get too low. Obviously if the aircraft should enter a spin, deploy the parachute immediately, (for the same reasons explained in the previous paragraph).
- **INFLIGHT COLLISION:** the damage sustained by your aircraft and/or you, depend on the other type of aircraft, the impact velocity and the angle on impact.

**EFFECT:** Your aircraft, after separation from the other, could return to level flight; this means that damage is limited to non-vital parts; your aircraft, after impact, may assume progressively worse flight attitudes that can lead to in the worst case structural failure or complete loss of control of the aircraft;

Use of the safety system: if you still have enough height and your aircraft remains level, you could see how much control you have. If all works well and you are not far from your usual airfield, try to return to the field. Obviously, if the airfield is not easily reached then you may want to attempt an emergency landing.

If your aircraft, after impact, should assume uncontrollable attitudes, do not lose precious time or height, deploy the parachute immediately.

## TURBULENCE created by the close and rapid passage of a big aircraft

Try to get out of its wake immediately. In case your aircraft should not respond to the controls, and you have sufficient height, wait until the turbulence lessens, (usually within a brief space of time), until you are able to regain control. If you have sustained damage which does not allow you to regain control, check your remaining height and deploy the parachute. **IMPORTANT:** If you have considerable height, wait until the turbulence dissipates before deploying to avoid deploying in turbulent air.

## EMERGENCY TAKEOFF / LANDING..

If you should be forced to make an emergency landing, and the landing ground is insufficient, you can use your CYLINDRON as a parachute brake, taking care not to

deploy too high as the deployment causes a rapid reduction in forward velocity and probably will cause the aircraft to stall. Deploy the parachute therefore just before landing

**PERSONAL PROTECTION.** Even if the rate of descent is not excessive, the angle of impact and eventual oscillation may increase the possibility of violent impact.

**IMPORTANT:** This system is able to solve situations extremely critical, but you must take note that your aircraft can hit the ground on assets such as to cause structural damage. It is therefore a system to be used only in case of real need.

## **SECTION4 – Operational Limits**

The Cylindron safety system has the following operational limitations

- Total inflight weight (aircraft plus aircrew) 340- 410- 475 Kg (depending on the size)
- Maximum airspeed (at deployment) 130 Km/h

These limits must be rigidly adhered to.

Even small variations can lead to dangerous situations both for the crew and the parachute.

**IMPORTANT:** During installation of the safety system, it is essential to have already installed the 4-point attachment harnesses, (shoulder and centre straps), for both the pilot and passengers.



Obviously the anchor points on the aircraft structure must have been chosen to be robust and resistant. Use of this type of harness has particular importance in certain critical flight conditions such as:

- A. Negative acceleration, centrifugal forces that tend to violently throw the pilot up or sideways preventing him from reaching the launch control.
- B. Deployment of the parachute where the weight and velocity of the aircraft are closest to the maximum allowed values. In these conditions, the deceleration may be such that it tends to pull the pilot and/or passenger from their seats.

**IMPORTANT:** Normal safety harness with only central straps (even with a metal buckle) are absolutely inadequate.

## **SECTION 5 - Maintenance**

Foreword:

As with any apparatus, your Cylindron safety system requires a regular checkup and a minimum of maintenance.

### **PREFLIGHT CHECKS.**

The device is equipped with a pressure gauge to check before each flight the value of the pressure of the gas-cylinder. The reading of the pressure gauge must be between 120 and 180 bar, lower readings signify loss of air. Readings that oscillate depending on the environmental temperature also of 20 bar are normal, and indeed testify to the proper functioning of the pressure gauge.

- Shake the launcher, making sure that it cannot twist or move to do this place your hands at the each end of the launcher, if necessary, tighten the supports screws Nuts, bolts and screws are still firmly attached to the aircraft (painting a reference point on the air frame can help identify irregularities).
- Check the integrity of the six screws which secure the pod.
- Check the integrity of the cable ties as well as the cable ties on the screwlock carabiners especially if close to propeller or unloading.
- Check the tightness of the screwlock carabiners, the integrity of the steel cable and the bridle which connect the CYLINDRON system to the aircraft structure.
- Check that the launch control lever is not loose and that the cable housing is not under tension. Also, the safety tie on the control lever should be undamaged

- Check the bridle and steel cable. Cables and their housing should be firmly attached.
- The direction of the pod has not deviated from its original position (due to loosening of the screw) thanks to vibrations
- Finally, remove the safety pin and keep it in a safe place, (e.g. ziplock pocket) so it will not slip out during flight finishing e.g. the propeller disc (pusher propeller)

NB: The safety pin should be removed by the pilot as soon as he enters the aircraft, and must be replaced by the pilot as soon as he parks the aircraft after flight and before exiting.

These precautions are necessary to avoid accidental deployment by aircrew or other personnel.

Accidental deployment on the ground could have dramatic consequences for those who may be in the trajectory of the pod when it is launched.

La Comelli srl invites you to scrupulously follow this checklist.

#### IMPORTANT.

If your aircraft should ever sustain damage even light, check very thoroughly that the Cylindron system has not been affected.

If you should have any doubts whether the CYLINDRON system or the cable housing may have been damaged, please send the complete system to Comelli srl for a full check-up. Please note that undue stress, (even brief), on the cable housing may cause partial or full deployment of the canister, even long after the damage has occurred.

#### Periodic checks.

The preflight checks, if properly done, constitute a continuous monitoring of the efficiency of your Cylindron system, however, some components should be subject to more rigid checks especially if the aircraft is used in critical situations such as near the sea, or for agricultural purposes (crop spraying). In these cases the danger is greater and is composed of corrosive elements which can reduce or impede the functionality of certain components. Check thoroughly therefore (preferably before each flight) the bridle, the steel cable, the carabiners and their ties .

Problems due to engine vibration: in all ultralights these can be a significant problem, especially with 2-stroke engines. The vibrations, after a certain period of time, can loosen screws or nuts, fray housings, or cause failure due to metal fatigue etc.. Any part

of the system that is sandwiched between two metallic parts can be frayed from vibrations. Make sure before flying that this has not and cannot happen.

**IMPORTANT:** In case of repairs or modifications applied to the air frame, carefully check that all of the conditions necessary for correct deployment of the system are met: pod deployment direction free from obstacles, deployment lever easily accessible etc..

Periodic review: the shroud, the shroud lines and the static line are pressed into the container (pod) that protects them from outside elements (pollution, ultraviolet rays, parasites, abrasions etc.). The various components have been designed to do their job for many years, however, for reasons of prudence and safety you should have a full check-up of the system done at least every 36 months.

Check carefully the revision date printed on the identification plate on the launcher – this must be rigorously observed. The revision operations as also the substitution of certain parts of the system must only be done by authorized and qualified Comelli srl personnel, who will also consign written documentation attesting to the operations involved and the new revision date. The Comelli srl may not be liable for infringement of these norms and notices even in part.

The Comelli srl wishes to remind you that they are available for further information and can provide solutions to particular installation problems. Happy and Serene Flying.

## **SECTION 6 - Guarantee**

Comelli srl guarantees this product for three years from the date of production. Under the terms of this guarantee, Comelli srl, at their discretion, may repair or substitute the product except in the conditions described later. Damaged parts will be provided free of charge and the substituted parts will become property of Comelli srl. This guarantee does not cover repairs deriving from accidents, natural disasters, unauthorized use, incorrect installation, unauthorized modifications or repairs, shipping costs, packaging etc.. Furthermore, the guarantee is void if the product is used for applications specifically not covered in this manual. No guarantee tacit or implied will be applied in any case. Comelli srl shall not be liable for damages of any nature, including but not limited to loss of profit deriving from: unsuccessful rescues, accidental damage, damage arising from use of or incompetent use of their product even if the company or authorized reseller has been advised of the possibility of such damage or through complaints from any other parties.

Some states do not allow the exclusion or the limitation of accidental damages or consequential damages for some consumer products; in these cases the above limitations do not apply. Other states do not allow limitations on the period covered by the guarantee; in these cases the above limitations do not apply.

For all controversies the competent Authority is the Forum of Parma (Italy).

## ACCEPTANCE OF RISK

CYLINDRON should only be used in case of emergency. It should not be used for ground or flight tests. These situations are beyond the control of Comelli srl who therefore declines to accept any responsibility deriving from the use of their product.

**DISCLAIMER:** The modification of any part of the CYLINDRON system or parts of such and/or the inability to follow the guidelines, procedures and instructions included in this manual, may lead to failure of the parachute to deploy and personal injury or death of the pilot and/or passenger(s). This manual is a general guide to installation, use and maintenance of the CYLINDRON system. In case of difficulty during installation, please contact Comelli srl for more detailed instructions. Never, ever, point the system towards people or buildings. Treat it as though it were a lethal loaded weapon. Do not tamper with, or try to modify, repair or disassemble any part of the system at any moment.

## ADDITIONAL ADVICE

The CYLINDRON system is sold as a complete unit, all the necessary components are included in the retail price. If your unit should be missing any element, please notify Comelli srl immediately to receive the missing pieces. Never substitute any component with non original parts. Do not acquire any part of the system except from authorized dealers.

## WHAT CYLINDRON CANNOT DO

The CYLINDRON system is not a substitute for incompetent or inexperienced pilots, cannot make you a better pilot .

Even if Comelli srl deems it advisable to fit their emergency system to your aircraft, this does not mean that you are exempt from any air disaster. This is only extra chance, and a small part of a comprehensive air safety program.

The CYLINDRON safety system cannot guarantee you will not be injured during or after deployment nor that your aircraft will not be damaged. It's highly likely that the CYLINDRON system may save your life, but there is no guarantee you, or your passenger will not be injured nor that your aircraft will not be damaged. Only you are responsible for the operations necessary to safeguard you in flight.

Do not experiment with your system nor deploy it on the ground just to see how it works, you could injure people or damage buildings in the vicinity.

La Comelli srl reserve the right to modify this manual in any way it sees fit with a view to improving the safety and/or the functionality of the product.

All modifications will be obligatory for all users, in which case an advertisement will be posted on the web and placed in the relevant magazines.

#### IMPORTANT NOTICE

If you should need to deploy your CYLINDRON system in a real case situation, please contact Comelli srl as soon as possible. The company is highly interested all uses of the emergency systems to know how and why they were used and what were the results. We are always interested in live deployments to find out if we could incorporate any improvements.

Please notify Comelli srl immediately following deployment. In the case you resell your system to others, we recommend you consign this manual to the new owner.

**CYLINDRON CERTIFICATE OF GUARANTEE**

Cylindron serial nbr.		
Size		
Purchase date		
Installation date		
Model aircraft		
Weight		
Speed		
Full Name		
Address		
Telephone		
Mobile		
e-mail address		

Date, stamp and signature of Reseller:

This Certificate of Guarantee must be sent to Comelli srl no later than 30 days after installation along with detailed photographic documentation of all system (launcher, launch control, bridle)

This edition substitutes all previous publications.