



TRIM SPEED OPTIMIZER (patent-protected) TSO



[WWW.ICARO - PARASLIDERS.COM](http://WWW.ICARO-PARASLIDERS.COM)

Trim Speed Optimizer

Modern gliders like MAVERICK 2.2, WILDCAT TE and CYBER TE are very sensitive to the change of line length and wing load.

With TSO the pilot can adjust C/D-risers accurate to the very last millimetre at any time. TSO offers the fantastic possibility to boost trim speed depending on take off weight, age and ambient temperature. And additionally to maximize handling & in-flight feeling.

Get finally rid of the prejudice that your wing flies slower if you fly it at the lower weight limit!

Target group:

For pilots who are flying at the lower up to the middle weight range of modern ICARO paragliders.

For pilots who want to adjust their paraglider back to factory setting on aging and cold temperatures.


Increasing the trim speed (proportional to take off weight, age of the glider and temperature) not only implicates a plus of performance but also higher safety. Because an appropriate flying speed is also an advantage in safety.



*„A 3 km/h faster trim speed
makes a really big difference
in in-flight feeling.“*



EXT GENERATION

A photograph of a paraglider's wing and harness against a sunset sky. The wing is white with a black logo that says "WILDCAT". The harness is black with yellow and red straps. The sky is a gradient of blue and orange. The sun is visible as a bright orange glow at the bottom center.

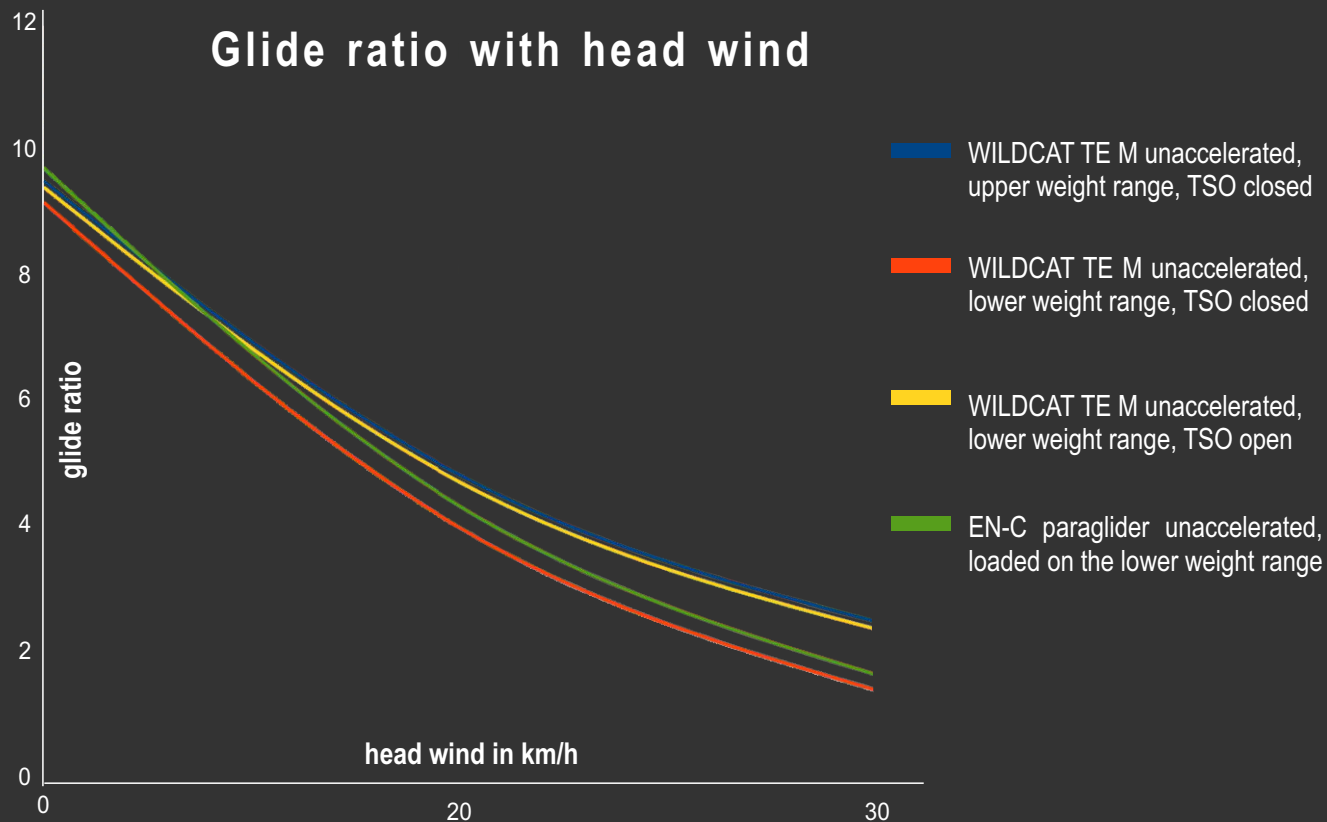
It's all about speed!

When you fly further as paraglider pilot? With a paraglider that features a higher glide ratio? Or with a paraglider that features a higher flying speed?

Our designer Michael Nesler has showed arrestingly in an article in the DHV Info magazine, that given sufficient head wind even a speed rider wing with a glide ratio of 4 flies further than a glider of class EN C with an assumed glide ratio of 10.

So extremely we don't want to be on the move at all. But even the estimated 3 km/h higher trim speed that a pilot achieves if he flies at the lower weight range and opens the TSO, becomes already clearly noticeable in a better glide performance. See more in the table to the right.





How does TSO work?

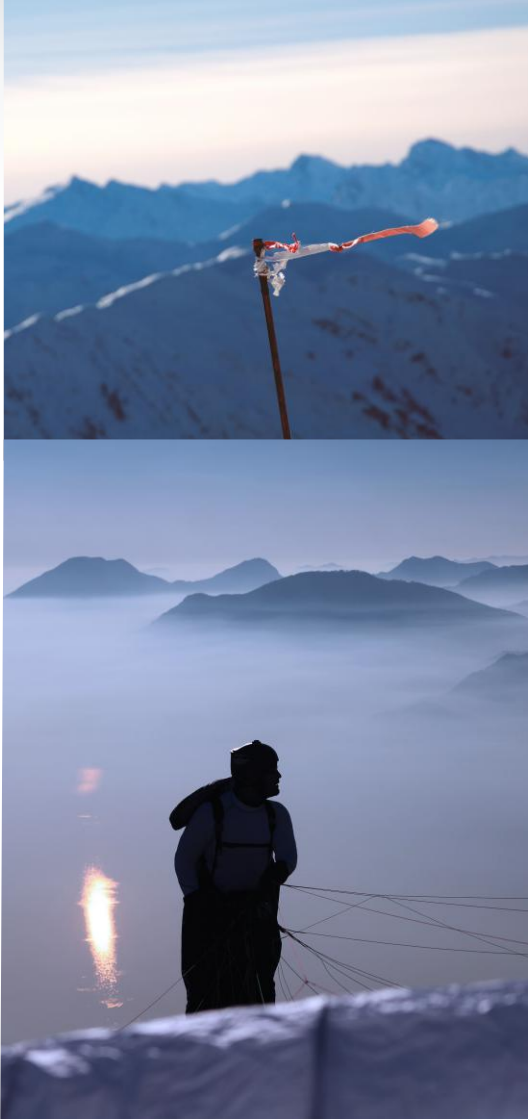
TSO is a device on the rear risers which permits a specific lengthening of those.

It is sheltered beneath a neoprene covering.

For adjusting put back the neoprene covering.

After detailed instruction TSO is setted exactly on ground once and remains unchanged in air.





A paraglider flies best with
maximum load! ... this is history ...

ts

trim speed optimizer.
From 2013 on all
ICARO paragliders.



How to set up TSO correctly

instructions I

Wing load

Depending on whether a glider is flown at the upper or lower weight limit, the trim speed changes up to 3 km/h. (to be clear: the trim speed of a glider which is flown at the lower weight limit is 3 km/h slower than when flown at the upper limit). At the maximum attainable speed with the speed system fully applied differences are possible even up to 5 km/h. With ICARO TSO setted correctly also the pilot who flies at the lower up to the middle weight range of the wing, achieves the optimal & maximum speed..

In addition to the adaptation of the speed a correct setting of TSO counteracts also the shortening of the tax way in the lower weight range. Thereby the light-weight pilot comes to

enjoy precise, direct handling and long, more forgiving tax ways.

Recommended settings for the TSO:

lower weight limit: + 1.5 cm



middle weight range: + 0.5 - + 1.0 cm



upper weight limit: + 0 cm , TSO closed



Aging

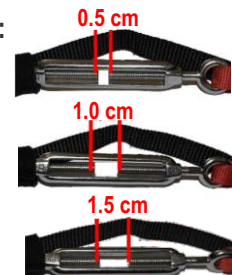
With increasing age, the A- and B-lines stretch in proportion to the C/D-level a bit more. With TSO, the pilot can adjust his ICARO paraglider at all times accurately to the original trim.

Recommended settings for the TSO:

after app. 100 flight hours: + 0.5 cm

after app. 200 flight hours: + 1.0 cm

after app. 300 flight hours: + 1.5 cm



Sub-zero temperatures

Even with temperature changes the trim speed and extreme flight behaviour of modern gliders. At very low temperatures it is advisable to adjust the trim speed using TSO to reduce the risk of unintentional deep stall.

Recommended settings for the TSO:

0° Celsius (+/- 2°C): + 0.5 cm

< -5° Celsius: +1.0 cm



How to set up TSO correctly

instructions II

Combinations

The settings of the TSO can be combined. Add to the correction for the wing load also the corrections for aging and temperature.

Total value of the TSO correction is 2.5 cm maximal. Beyond that the riser is fully tensioned and any further opening of the TSO is without effect.

maximal opening of the TSO: + 2.5 cm



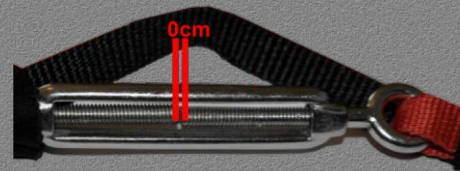
If total value of all three correction values adds up to more than 2.5 cm ...

The TSO can be opened maximum 2.5 cm. A combination of:

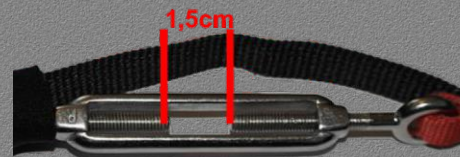
- pilot flies on the lower weight limit → TSO + 1.5 cm
- and the wing has more than 200 flight hours → TSO + 1.0 cm
- and ambient air temperature is $< -5^{\circ}$ Celsius → TSO + 1.0 cm

... would require a total adjustment of 3.5 cm, which is not available with the TSO.

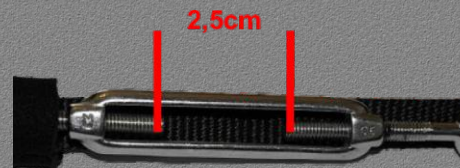
We recommend in this case, to let execute the correction for aging by an authorised check service or by ICARO paragliders. And regulate only the remaining correction of 2.5 cm with the TSO.



TSO closed, factory setting.



TSO opened 1.5 cm.



TSO opened to its maximum of 2.5 cm, the rear riser is fully tensioned and cannot be lengthened any further.

Warning

The TSO serves the compensation of line elongation and loss of flying speed in case of low wing load and very cold ambient air temperatures.

The maximum allowed tolerance of line length compared to factory setting and homologated trim is + 1.5 cm. Any more elongation of new lines will revoke homologation!

For example:

+ 1.0 cm aging correction + 1.0 cm wing load correction
+ 0.5 cm temperature correction = + 2.5 cm in total.

The + 1.0 cm for aging correction restore the original line trim of the glider, the + 1.0 cm wing load correction and

the + 0.5 cm temperature correction extend the main lines to the permitted + 1.5 cm.

It is important for your safety that you never change recommended settings for the TSO to obtain a higher speed without any adjustment would be necessary!

Attention: a new paraglider with a correction of more than + 1.5 cm has no declaration of conformity!

Attention: both sides must always be set to the same length!



TSO - make the most of your glider



SPEED



HANDLING

Why the TSO is better than trimmer!

Why not simply trimmer? Who has ever flown with trimmer know their disadvantages:

Trimmer relocate themselves easily, when packing the glider or handling with the risers.

Trimmer relocate themselves in air, especially when high G-forces appear or the risers are wet.

You can hurt yourself easily on trimmer when groundhandling, their edges are sharp.

Trimmer must be setted and controlled before each launch and in air.

Trimmer have no distinct, stable position.

With the TSO the pilot or his flight instructor adjust his wing once for his take off weight and must never care for it any more.





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If you have questions please contact us!