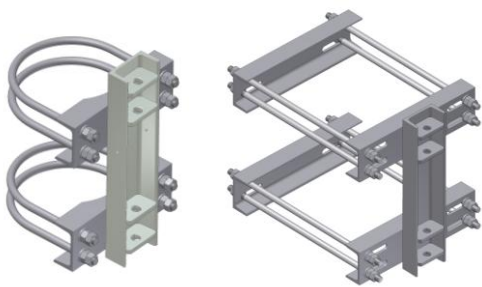
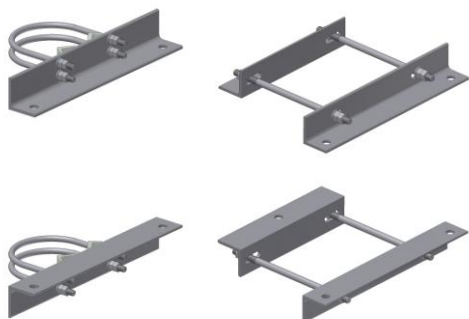
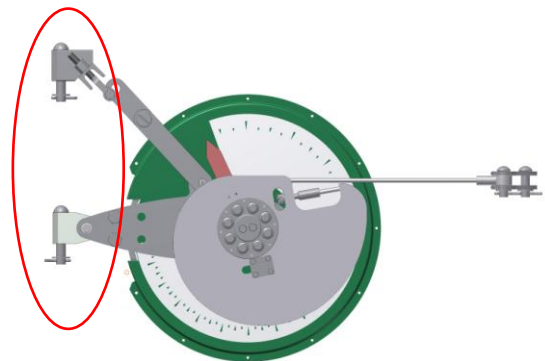


## Installation instruction TENSOREX<sup>®</sup> C+

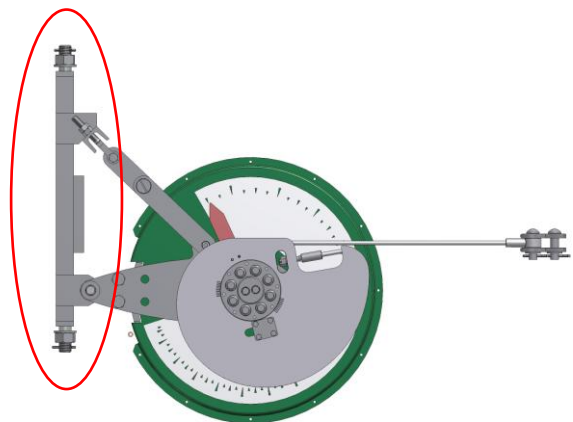
TENSOREX C+ is a new spring automatic tensioning device for tramway, light and heavy railways Overhead Contact Lines ( OCL ). TENSOREX Products are only by **PFISTERER**



Fixing bracket **TYPE A** for O and H poles



Fixing bracket **TYPE B** for O and H poles



Are available different fixing brackets, for special poles or walls. Also it's possible to install TENSOREX C+ horizontally. Please ask direct information to Pfisterer srl.

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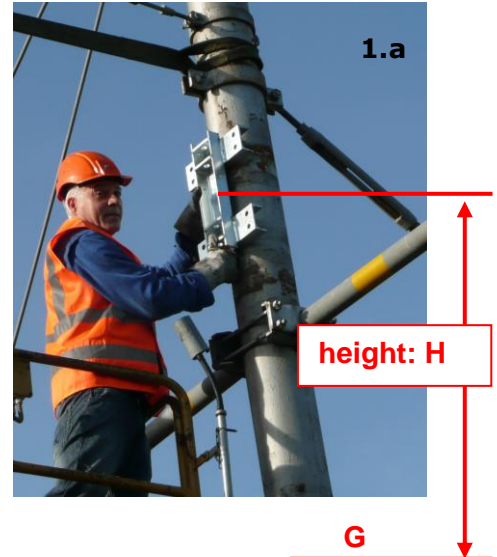
Installation tools	Package checking	Important information
<ul style="list-style-type: none"> <li>- 1 water level</li> <li>- 1 Flat steel rod min 500mm long or in alternative long water level</li> <li>- 1 thermometer</li> <li>- 1 of 2 pulling devices</li> <li>- 1 of 2 come-along clamp</li> <li>- 1 Dynamometer (optional)</li> </ul>	Verify that the package contains: <ul style="list-style-type: none"> <li>- Tensorex C+ (TRC+)</li> </ul> Compensating length and pull force are correct <ul style="list-style-type: none"> <li>- Fixing bracket</li> </ul> Fit to the pole <ul style="list-style-type: none"> <li>- Installation instruction</li> </ul>	<ul style="list-style-type: none"> <li>- Before to proceed, you have to know the length of the line between TENSOREX C+ and middle point</li> <li>- Installers must be good trained and to know how the device works</li> </ul>

## 1.a) Fixing bracket type A

Fix the bracket to the mast, to the line direction, at the height prescribed by the rail administrator, from the top of rail (G) . In the fixing bracket there is a reference hole, circa in the middle, see **photo 1.a**.

It must be level mounted.

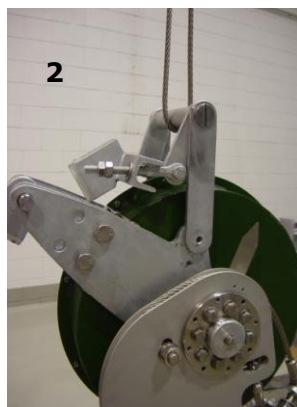
Round masts and beams have different fixing bracket, and they are supplied from Pfisterer in according to the customer requirements.



## 1.b) For Type B

Fix both L profiles keeping the distance between the upper and lower L profile 500 mm, tolerance: -0 / +5 mm.

The two holes  $\varnothing 26$  must be vertically aligned. It's helpful to insert the rod M24 and check all parts by water level ( see **photo 1.b** ).



2.a) Hang TRC+ like **photo 2**, and lift up it by crane or hoist-tackle, out from the wood box (**photo 3 and 4**).

In case, the hoist chain must be min 15 meters long.

2.b) Take out the two pins  $\varnothing 19$  and fit TRC+ in the fixing bracket.

Before the bottom fitting, then the upper one (**photos 5 and 6**).

Look it by set pins upward and splits under.



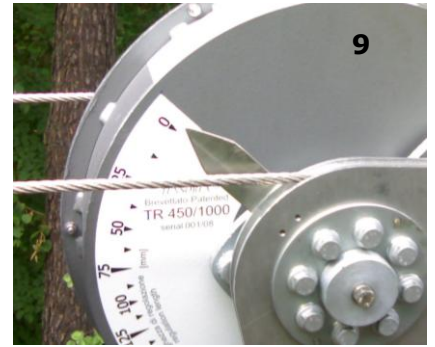
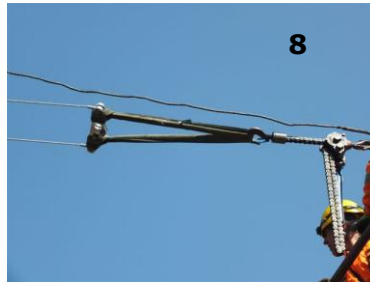
Now TRC+ can be pulled.

Before, please make sure that two stainless steel tension wires are in the pulley races down!  
Also wind them two times (**photos 5,6 and 7**)

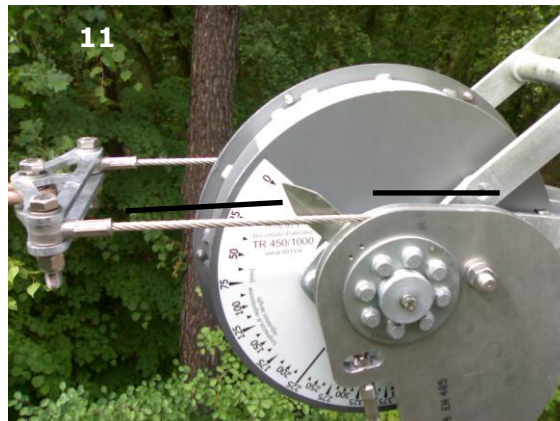


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3) Tie two belts to the front balance (**photo 8**) and acting by pulling device take the solid arrow on the 0-point of the scale (**photo 9**). Now TRC+ is applying to the line approximately the nominal force.



**Warning:** we suggest to fit in advance to front balance all hardware you need ( insulators, turnbuckles,..) , so to make easy to joint later TRC+ to OCL.



4) Acting on two nuts at the top (see red circles in **photo 10**) to align TRC+ to the OCL slope. Do it laying a flat steel rod circa 500mm long on flat side of the pulley. TRC+ is aligned when it's approximately in line with the tensioned wire, see **photo 11**.

At the end, verify that the M14 rods are out equals lengths.

5) Now, TRC+ must be further set taking in account tension length and temperature. See **photo 12**.

### Example of TRC+ setting

TRC+ type.....450/XXXX kg  
Tension length.....500 meters (1)  
Ambient Temperature.....25 °C

**(1) distance between TRC+ and middle point**

Calculate the setting number crossing the above value in the **table 1**.

In this case is **140mm**

Then pull TRC+ until the arrow reach the number ( see **photo 12** ).

It's recommended to mount a compensating element as turnbuckle between TRC+ and OCL.

Joint TRC+ to OCL and release it. A fine-tuning is possible acting on compensating element.



6) Finally, activate the "stoppers", using a screwdriver to press on both sides of the device, photo 13.

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6) Finally, activate the "stoppers", by a screwdriver to push on both sides of the device, **photo 13**.



## IMPORTANT NOTE

Stoppers work preserving the functionality of the TRC+ in case of anomalous OCL contraction (very low temperature) or the device is out of setting.

When stoppers are working, TRC+ becomes as a rigid body, so OCL becomes from compensated to fix end.

**Tab 1 ( TRC+ Type 450/... kg and center temperature 15°C )**

		lunghezza linea - line length [m]									
temperatura [°C] temperature		100	200	300	400	500	600	700	800	900	1000
	-20	284	344	403							
	-15	276	327	378	429						
	-10	267	310	352	395	437					
	-5	259	293	327	361	395	429				
	0	250	276	301	327	352	378	403	429		
	5	242	259	276	293	310	327	344	361	378	395
	10	233	242	250	259	267	276	284	293	301	310
	15	225	225	225	225	225	225	225	225	225	225
temperatura [°C] temperature	15	225	225	225	225	225	225	225	225	225	225
	20	216	208	199	191	182	174	165	157	148	140
	25	208	191	174	157	140	123	106	89	72	55
	30	199	174	148	123	97	72	46	21		
	35	191	157	123	89	55	21				
	40	182	140	97	55	12					
	45	174	123	72	21						
	50	165	106	46							
		100	200	300	400	500	600	700	800	900	1000
		lunghezza linea - line length [m]									

E.g. for the Netherlands/Germany is based on a nominal (center) temperature of 10 ° C, the radial black line on the scale diagram shows it as being half the maximum length variation to regulate. In the photo 12 is the type TRC+ is 450/ ... so this is 225 mm.

**Warning: setting table above is just an example. Always check the setting tab fixed on the top of Tensorex C+ or attached to this manual, ANNEX 1**

## TENSOREX C+ control after installation

After a certain period from the installation, it's well to verify and eventually compensate the anomalous extension-contraction of the contact wires pulled by TENSOREX C+. Do it following the same procedure as at step 5.

Recover OCL by the pulling devices until the index of TENSOREX C+ is in the correct position, taking into account the ambient temperature during this operation (**step 5, photo 12**).

The same procedure must be done even in case of other controls, in consequence to changes or replacement of fittings, middle point,....

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## In case of OCL collapse

In case of OCL collapse consequent de-wirement, proceed as follows:

a) Verify the stoppers (see **step 6, photo 13**). If they are deformed or broken mean that a load > 40KN has been applied to TRC+.

In this case TRC+ must be substitute by another one.

b) If, after de-wirement, the stoppers are not damaged and work properly (check free rotation) TENSOREX C+ can be used again.

Before to set it again, make a visual inspection and control carefully the state of stainless steel cables. They must not present any bending section or single wire broken. If singles wires are broken, replace the ropes. For TRC+ setting, repeat step 4, 5 and 6 in the manual.

### Note

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