Automatic spring tensioning device
TENSOREX® C+
TENSOREX® spring tensioning device systems

Type C+

- Spring device based on Spiral springs
- Very good solution for Rail and Tramway lines outdoor as in tunnel
- In service from 2008s
- Approved from the most important European Rail Authorities
- Sold about 4000 units

RFI Latina (Rome) – Italy -
TENSOREX® C+ : NEW SPIRAL SPRING TENSIONING DEVICE
TENSOREX® C+ working principle

\[ F_{OCL} = f(T/R) \]

Diagram showing the working principle:
- Rotation axis
- Variable pulley
- Spiral spring
- Fix spring part
- T[Nm] vs. shaft rotation [rad]
- OCL movement vs. \( F_{OCL} \)
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ADVANTAGES
TENSOREX® C+
ADVANTAGES

- **Installation**
  - Tensorex – 1 Supervisor, 1 Engineer, 3 men for 2 hours, 1 MEWP (mobile elevating work platform), 1 block and tackle
  - Balance Weight – 1 Supervisor, 1 Engineer, 7 men for 5 hours, 2 MEWP (mobile elevating work platform), 1 RRV (rail-road vehicle) crane

- **Safety**
  - Tensorex – Remains mounted on the pole after a wire failure
  - Balance Weight – Does not remain on the pole after a wire failure

- **Down Time**
  - Tensorex – Tension the overhead wires, reconnect the wires
  - Balance Weight – Lift into place, replace damaged components (guide, pulleys, etc), tension the overhead wires, reconnect pulley system and yoke plate to the wires

- **Maintenance**
  - Tensorex – No scheduled maintenance required, read tension scale and compare to temperature
  - Balance Weight – Grease pulley bearings, measure height & compare to temperature

- **Handling**
  - Tensorex 200-750 lbs
  - Balance Weight 1500-3000 lbs

- **Design & Aesthetics**
  - Tensorex – Small, compact design; Pole design flexibility (size and weight total is less)
  - Balance Weight – Large, visible from ground level; larger poles required for load and nesting of the weight
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back fitting details

1
Type A
Pin 2xØ19 L=60

2
Type B
Pin Ø24 L=500

3
Pin Ø16
Fork L=19mm
How to use the Tensorex selection diagrams

First example
Span length = 500 meters
Temperature variation $\Delta T \,[^{\circ}C] = 50^\circ C$ ($-10^\circ C$ $+$ $40^\circ C$)
Crossing point between curves 400 and 450, so:
Tensorex type 450 or higher

Second example
Span length = 700 meters
Temperature variation $\Delta T \,[^{\circ}C] = 60^\circ C$ ($-10^\circ C$ $+$ $50^\circ C$)
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type tests

- Fatigue test
  26.03.2010 - Politecnico of Milan. 120 years of life has been simulated

- Ultimate tensile strength
  05.07.2010 - Politecnico of Milan. Breaking load 72 KN (ropes breaks)

- Release tests
  19.05.2010 – TRC+ 750/2000, in Netherland (Rotterdam). OCL length 60 meters
  09.08.2010 – TRC+ 750/1000, in Germany (Lübbenau). OCL length 250 meters, including 3 cantilevers

- Efficiency tests
  21.01.2011 – Politecnico of Milan, TRC+ 750/2000, result error within ±5%
  30.06.2011 – Politecnico of Milan, TRC+1100/1000, result error within ±3%
  16.12.2011 - Politecnico of Milan, TRC+8401800, result error within ±3%

Salt spray test
  19-12-2011- Politecnico of Milan, TRC+750/1000. 500 hours test in according to EN ISO 9227
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markets
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