

# DEVICES & SOLUTIONS FOR TRAMWAY AND TROLLEYBUS INFRASTRUCTURE



INTELLIGENT AUTOMATION  
SYSTEMS

OVERHEAD  
CONTACT  
SYSTEMS

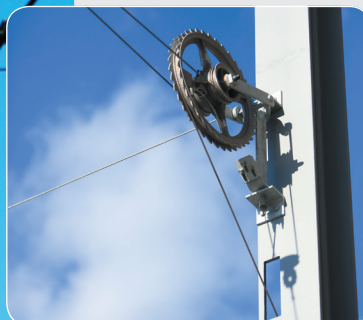
SIGNALING  
SYSTEMS



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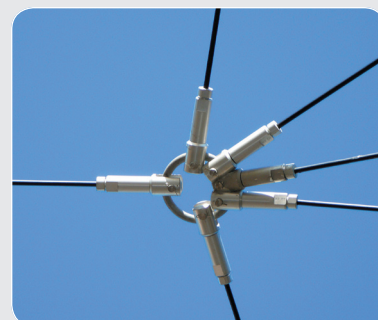


# TRAM OCL SYSTEMS • TRAM DEPOT CONTROL • SIGNALING SYSTEMS



## TENSIONING MECHANISM

Weights for compensation of thermal expansion of conductors are concealed inside the poles. A modern solution together with HEB type poles enables a simultaneous anchoring of the trolley wire and carrier rope on one pole.



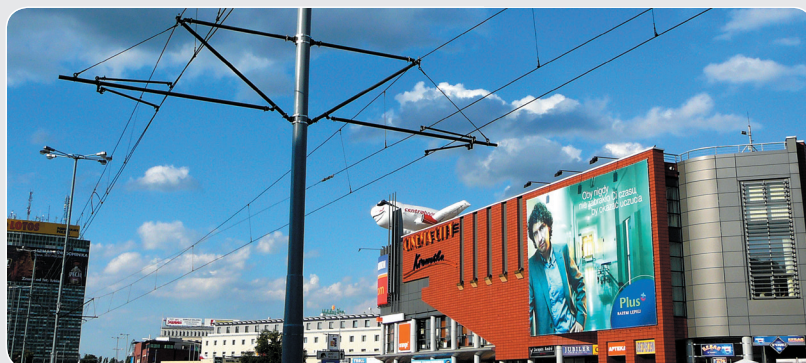
## SUPPORTING & TENSIONING EQUIPMENT

Our designers continuously develop new and better solutions of supporting and tensioning equipment.



## CATENARY SYSTEM

Catenary system is usually used on the tracks where higher operating speed of vehicles (over 90 km/h) is required.



Significant advantage of the catenary system is its long pole distance - up to 60 meters.



## COMPONENTS FOR CANTILEVERS

A modular system enables to solve various atypical situations. Our experts will help you to find the best solution for your city.



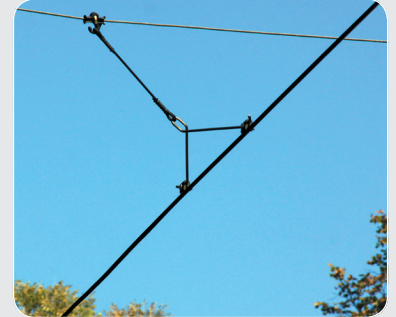
## ADDITIONAL WIRE SYSTEM (DELTA SYSTEM)

The overhead contact line with suspension of DELTA type in combination with temperature compensation represents a modern type of overhead contact system. This type of contact line satisfies high requirements imposed on the tram operation.



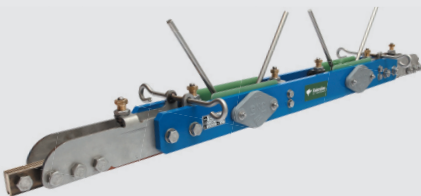
## SIMPLE WIRE SYSTEM

The type of overhead contact line gets chosen also with regards to the aesthetical point of view. For city centres we prefer simple system suspended by means of DELTA suspension or simple wire system. This option offers an aesthetical and silent solution maintaining the elasticity, high operation speed, and low number of poles.



## DISCONNECTOR & FEEDING

We offer several types of disconnectors. Usage of any type depends mainly on the load current and track characteristics.



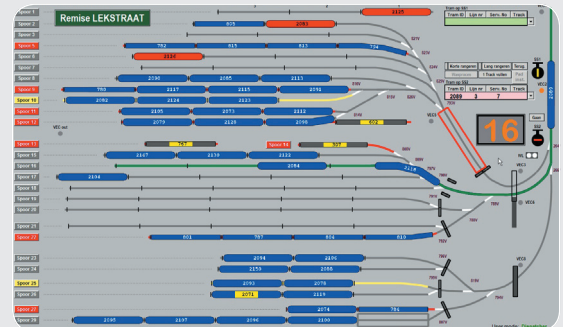
## SECTION INSULATORS

A special construction of our section insulators allows a silent and fast passage of the pantograph. They are designed in such a way to safely interrupt both common equalizing currents and contingent short-circuit currents.



## TRAM DEPOT CONTROL SYSTEMS

Intelligent automation systems for tram and trolleybus depots, markedly speeding-up and organizing depot operations and enabling automation of the vehicles parking process. Depot information systems are custom-made for every client.



## AUTOMATIC SWITCH CONTROL SYSTEM TSC

TSC system for automatic operation of tramway switch point enables fully automatic operation of switch points within your tramway network. It also enables automatic heating of the switches, including possibility of remote control.

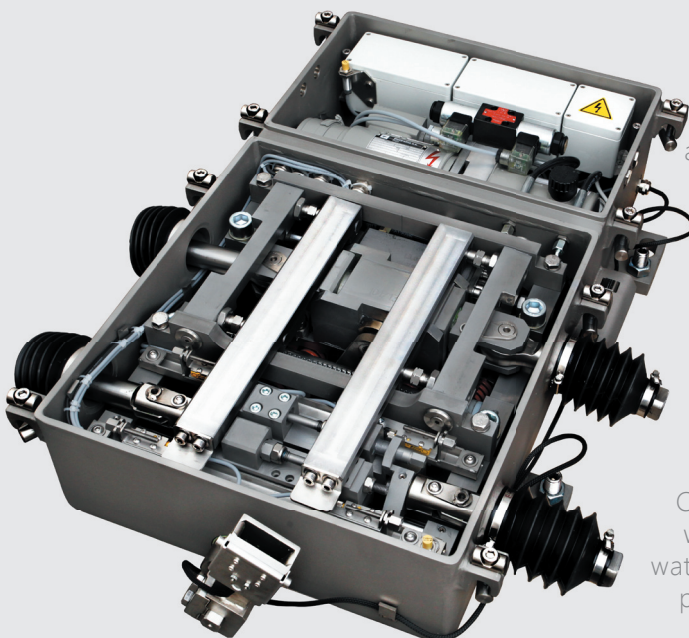


## POINT MACHINES

Elektroline point machines are an excellent choice for safe, reliable, and maintenance-free operation of tramway switch points.

The point machines are assessed for up to SIL 3 safety level and are equipped with permanently checked mechanical locking mechanism.

Completely watertight casing with extra protection against water makes the point machine practically maintenance-free.





# ELEKTROLINE WORLDWIDE

Chosen project around the world. 37 countries and more than 110 cities.

## CALGARY

2014: Design for TRAM tunnel, Supplies of OCL material

## POZNAN

2012-2014: Automation of New Poznan TRAM Depot

## AMSTERDAM

2012: Automation of the Lekstraat TRAM depot, 2nd Largest in Amsterdam

## BLACKPOOL

2010: Signaling Systems for the Complete TRAM Network Refurbishment

## BRUSSELS

2014: Elektroline Chosen as Supplier of Point Machines and Track Circuits for the Upcoming 4 Years

## LYON

One of the first cities equipped with our automatic system VETRA

## DAYTON

Supplies and Supervision of TBUS switches

## PORTLAND

2014: First Elektroline Stainless-Steel Point Machines

## SAN FRANCISCO

Delivery of control systems for trolleybus switches





**MOSCOW, ST. PETERSBURG,  
VOLOGDA, MURMANSK**

Design and material delivery  
for TBUS and TRAM lines.

**GAZIANTEP**

2013: Both  
Gaziantep TRAM  
Depots Equipped  
with Elektroline  
Signaling Systems

**VIDIN**

2007: Complete Realization of  
Modern Railway Overhead Contact  
Line System (ARCAS)

**PRAGUE**

1994-2015: Critical  
Technologies for  
one of the Largest  
Networks in the  
World

**ATHENS**

2007: Complete  
realization of  
modern tram track

**BEIJING**

2015: Electro-Hydraulic  
Point Machines for  
Catenary-Less Tramway

**GOLD COAST**

2013: Complete material  
delivery for OCL of TRAM line  
(over 13 km)

**ADELAIDE**

Complete material  
delivery for OCL of  
TRAM line (over 13 km)

**MELBOURNE**

2015: Intelligent Yard  
Automation System  
for the Largest TRAM  
Network in the World



**Elektroline**



# TBUS OCL SYSTEMS • TBUS DEPOT CONTROL • SIGNALING SYSTEMS



## VETRA SYSTEM

Switches are automatically set by VETRA system. Driver is only informed about actual status of the switch.

## VETRA SYSTEM

Driver just sets the destination code on the keyboard unit.



## VETRA SYSTEM

2.4 GHz VETRA system is a reliable data transmission system developed for high vehicle's operation speed.

## VETRA SYSTEM

Data sent by the vehicle are detected by the control unit. Whole process of switch setting runs fully automatically.



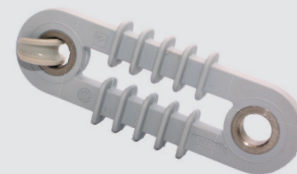
## VETRA SYSTEM

Light signalling informs driver of actual status of switches - direction, blocking and possible incorrect throw over.



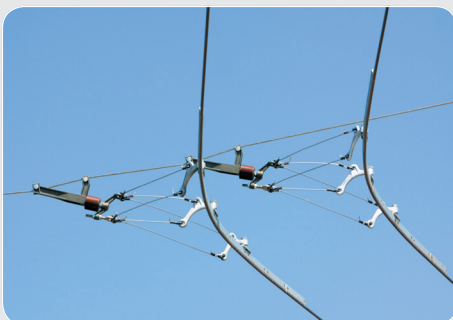
## CANTILEVERS

We usually supply GRP (glass-fiber reinforced plastic) cantilevers, but our production includes aluminium cantilevers as well.



## CURVE CLAMPS

Curve clamps guarantee smooth passage and higher vehicle speed as well as its easy installation.



## CURVE CLAMPS

Correct type (length) of used curve clamps has critical influence on the operation speed.

## INSULATORS

We use special 3kV loop insulators to reach second level of insulation within the cross-wire suspensions.



## TROLLEYBUS CROSSINGS

Trolley-bus crossings and switches allow a transit speed of up to 50 km/hour.

## TROLLEYBUS CROSSINGS

You can choose different geometrical solution (20°-90°) of TBUS x TBUS crossings. Left and right option is available.

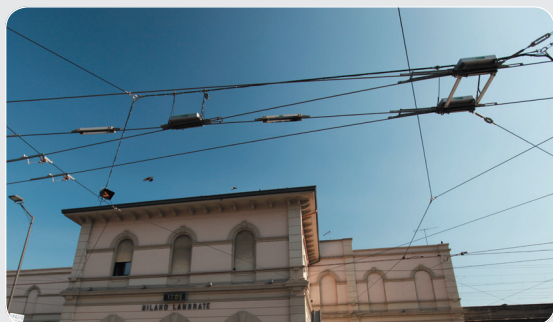


## ROUND ABOUT SOLUTION

For roundabout solution is suitable use of double switch point controlled by VETRA system with fully automatic operation.







## ELECTRICAL SWITCHES

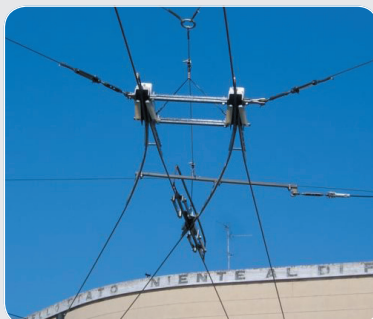
The latest design of our electrical switches is light and airy and it makes the switches less visible overhead.

## MECHANICAL SWITCHES

The passage over the Elektroline mechanical switches is quick, perfectly smooth and silent.

### RELIABILITY

Our over 20 years experience with production of switches makes them highly reliable.



## SIGNAL LAMPS

Signal lamp informs the driver about actual status of the switch position.

## DISCONNECTORS

Special assembly of insulating rods together with disconnecter and motor drive allows simultaneous control of both (plus - minus) polarities.



## UNIQUE IN THE WORLD: TBUS DEPOT CONTROLLED BY VETRA SYSTEM:

In last 2014 we realized the system of fully-automatic transit of vehicles within TBUS depot in the city of Pilsen – it means: at a time when any vehicle enters the depot, whole its itinerary (switches) to the final destination is set automatically. With this unique depot system the motion of the vehicles within depot is faster, safer and better organized as well as more friendly for the operating staff and of course for the drivers.





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