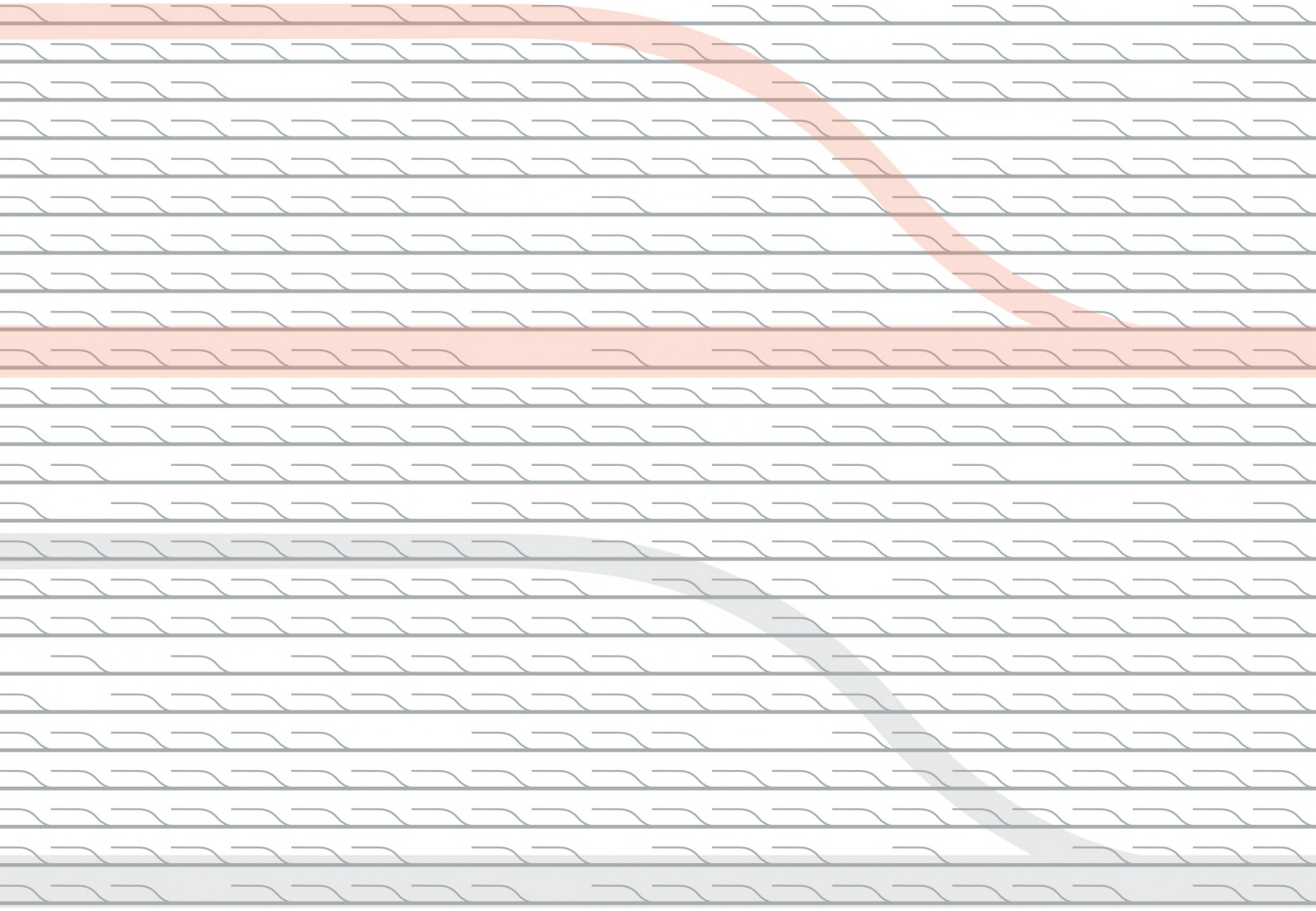
tramway turnouts | product sheets



Výhybkárna a strojírna®

Výhybkárna a strojírna®

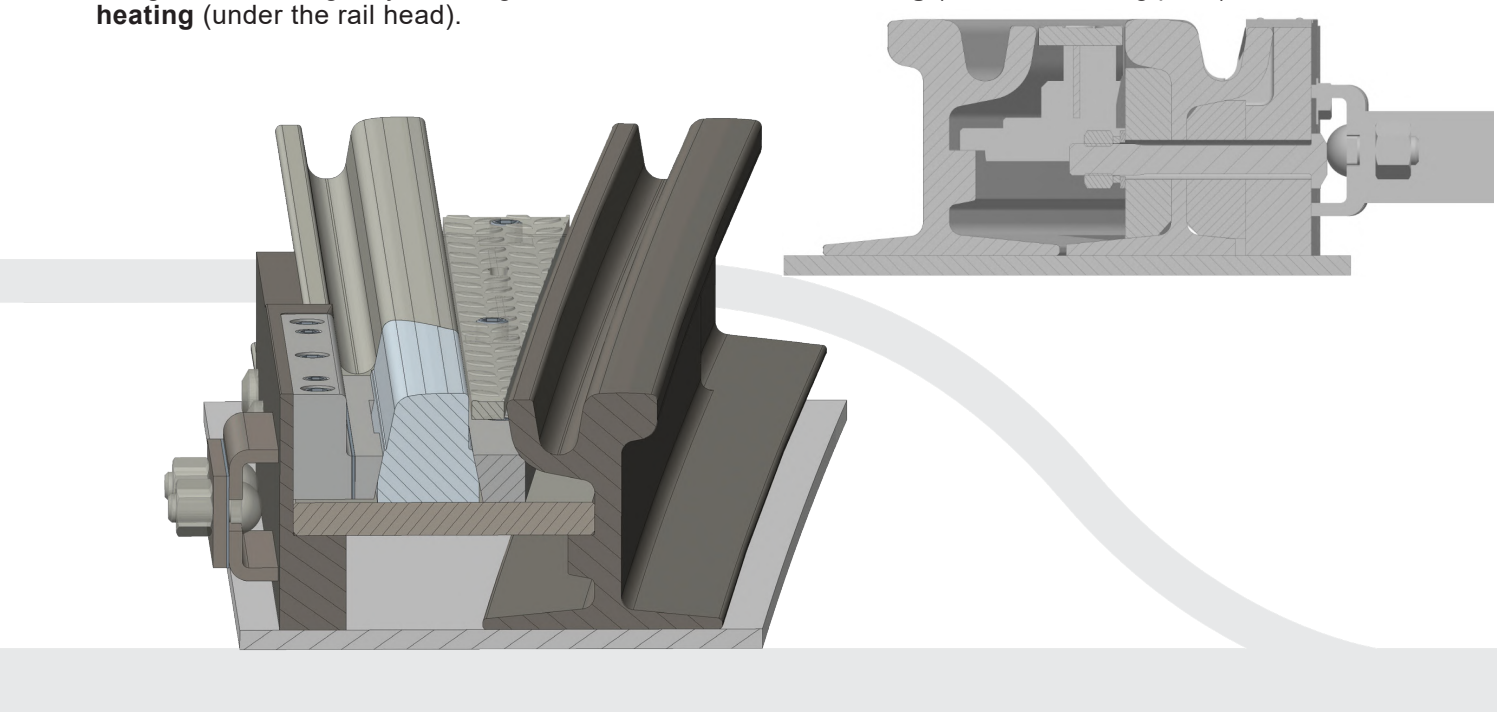
welded switch

Technical description

Welded switch is designed from two separate weldments of half set of switches that are assembled into the compact unit by means of gauge bars to reach the final gauge. Such half set of switches consists of stock rail of a construction rail profile (75C1), alternatively of a prescribed groove rail (60R1, 57R1 etc.), a guarding plate, a supporting plate and a sliding plate. In order to reach the continual running into the branch line, the switch is equipped with flexible switch rails which may be supplied as:

1. **welded switch rails** (switch rail + rail behind the switch rail)
2. **interchangeable switch rail** (the rail behind the switch rail connects to the switch rail with a diagonal cut)

For easier connection to the roadway, the crossing may be equipped with anti-slide filler plates in the shape of wedge. The heating may be designed as either a **chamber heating** (under the sliding plate) or a **stock rail heating** (under the rail head).



Use

- Tramway construction designed primarily for paving
- Tramway construction for urban rail transport

Benefits

- Two options of switch rail design
- High level of safety and collision-free running
- Quiet and smooth running
- Continuous operation in winter thanks to the heating
- The welded switch is designed for both running against the tip of the switch rail (take-off running switch) and running along the tip of the switch rail (downhill switch)

dt

ČSN EN ISO 9001
ČSN EN ISO 3834-2
ČSN EN ISO 14001
ČSN EN ISO 45001

block switch

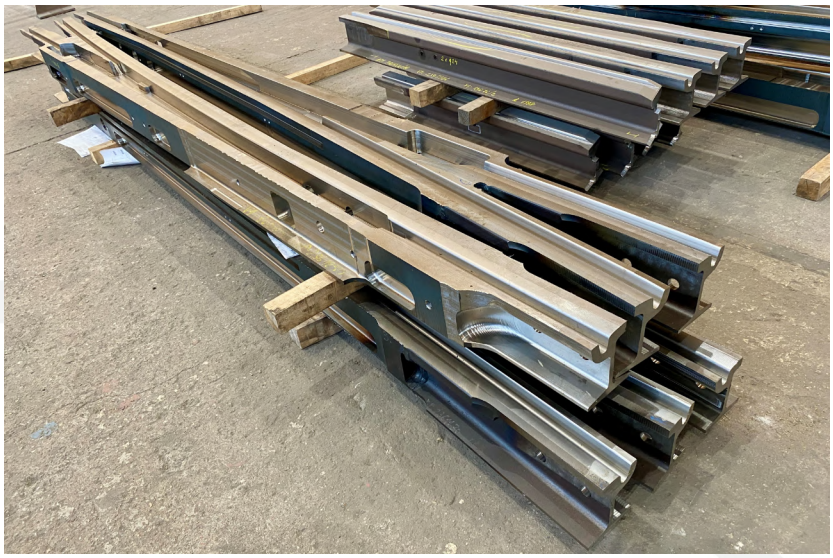
Technical description

Block switch is designed from two separate, compact blocks of half set of switches that are assembled into the compact unit by means of gauge bars to reach the final gauge. Each half set of swithes is designed from one piece of block of material, in which the grooves and the cavity for the switch rail are CNC machined. In the area behind the switch heel, the connecting rails are welded to the separate blocks. In order to reach the continual running into the branch line, the switch is equipped with flexible interchangeable switch rails with a diagonal cut. For easier connection to the roadway, the crossing may be equipped with anti-slide filler plates in the shape of wedge. The heating is designed as a **stock rail heating** (under the rail head).

For extremely demanding conditions, the block switch can be made of wear-resistant material with a surface hardness of approximately 400 HBW.

Use

- Tramway construction designed primarily for paving
- Tramway construction for urban rail transport
- Tramway construction where high traffic load is expected
- Tramway construction where heavy operational conditions are expected



Benefits

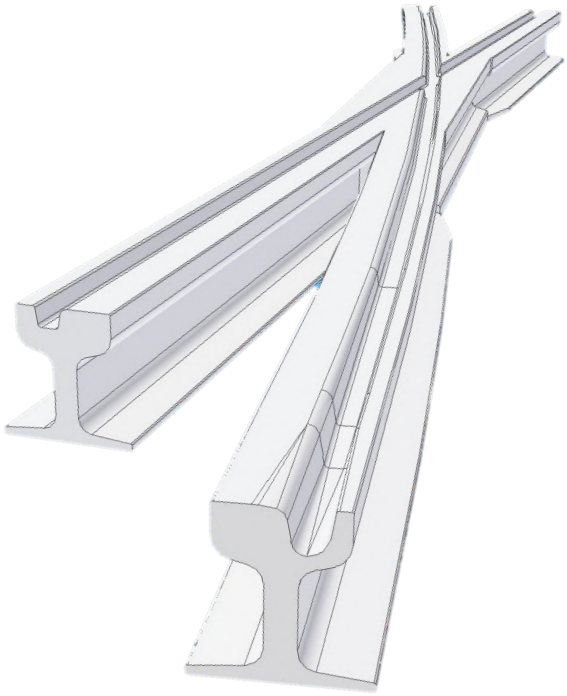
- Easy replacement of the switch rails without any intervention to the surrounding superstructure
- High variability in different type of the superstructure (both groove and Vignole) with no need of trasition rails
- High level of safety and collision-free running
- Optimal trajectory of running surfaces is guaranteed
- Quiet and smooth running
- Continuous operation in winter thanks to the heating
- Minimal maintenance requirements thanks to minimization of switch components
- Guaranteed identical building height of the switch with the rail type used
- The block switch is designed for both running against the tip of the switch rail (take-off running switch) and running on the tip of the switch rail (downhill switch)

block common crossing

Technical description

Block common crossing is manufactured as a weld of block 310C1 with connecting rails 105C1 or 73C1. Aluminothermic welding is designed for the weld of the block with the rails. After the welding, the CNC machining ensures that the grooves are of high shape variability. For easier connection to the roadway, the crossing may be equipped with anti-slide filler plates in the shape of wedge.

For extremely demanding conditions, the block switch can be made of wear-resistant material with a surface hardness of approximately 400 HBW.

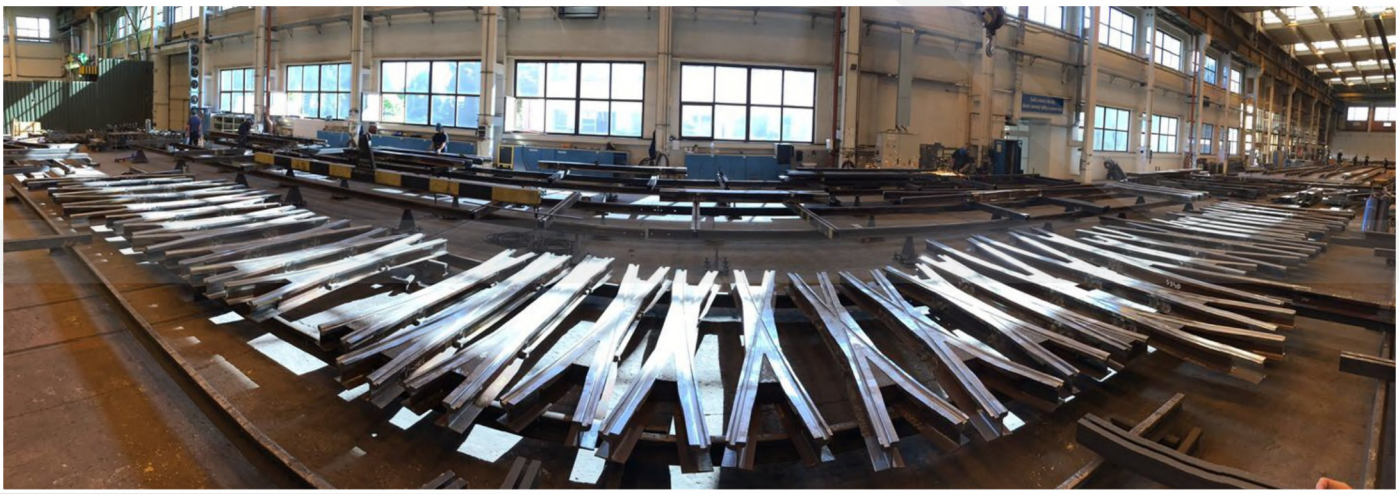


Use

- Tramway construction designed primarily for paving
- Tramway construction with deep and shallow grooves

Benefits

- High variability in the geometry and building dimensions
- Applicable to the crossing agle up to 70°
- High variability in the groove shape
- Applicable to both deep and shallow grooves
- High variability regarding the shape of the superstructure



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ČSN EN ISO 45001

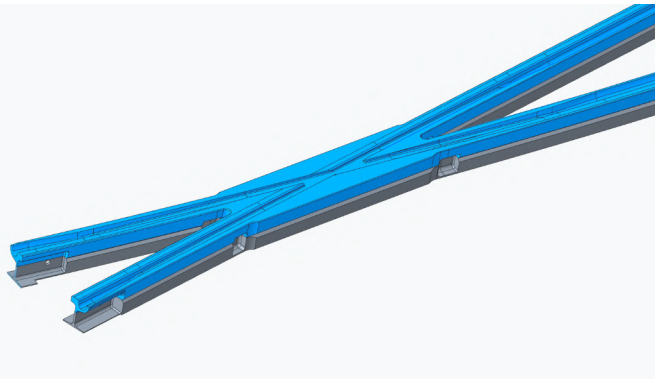
sandwich construction

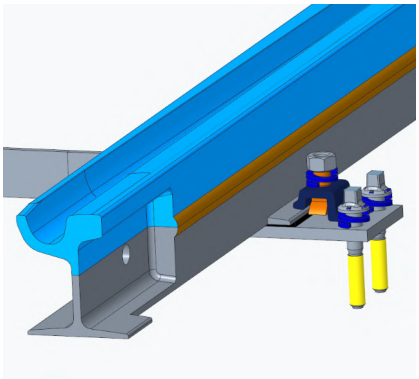
Technical description

The sandwich construction consists of two parts of different grades. The upper, running part is made of wear-resistant steel plate with a surface hardness of approximately 400 HBW. The lower part of the construction is made from a lower-grade steel plate. After the two parts are welded together, grooves are machined into the upper layer of the tramway construction using a machining center, based on a 3D model.

The sandwich construction can be applied to tramway switches, crossings and guard rails.

The fastening of individual components is designed using mounting plates welded to the sides of the lower part of the construction.





Use

- tramway track structures designed for increased operational load
- tramway track structures with both shallow and deep grooves
- tramway track structures for embedded (paved) or open track beds

Benefits

- the top layer made of wear-resistant material ensures longer service life of the construction
- easy fastening of turnout parts using welded mounting plates
- applicable to various geometries and construction dimensions of tramway track structures
- high variability of groove shapes and end profiles

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ČSN EN ISO 14001
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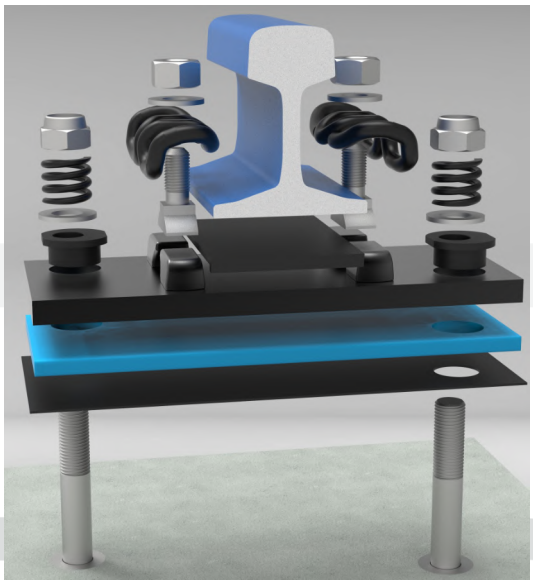
fastening system DTFS-2540

Technical description	
Axle load	≤ 26 t
Type of rail	Any flat bottomed rail
Fastening system stiffness	From 20 kN/mm to 40 kN/mm
Superstructure type	Slab track. System: top-down or bottom-up
Turnout geometry	Any common S&C structures
Maximal speed	≤ 250 km/h
Curve radius	≥ 150 m for conventional rail ≥ 80 m for urban rail ≥ 40 m for tramway rail
Adjusting of horizontal position	–5 mm to +5 mm
Adjusting of height	–2 mm to +40 mm
System approval / homologation	EN 13481-5:2023

Technical description

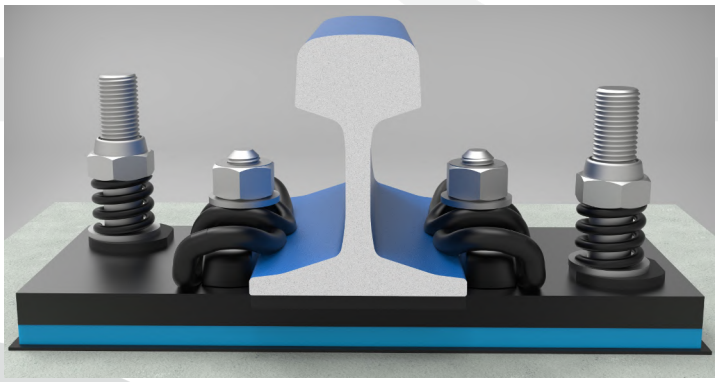
The fastening system DTFS-2540 is designed to fasten the switch panel, the closure panel and the crossing panel of the turnout to the slab track support element for both top-down and bottom-up system and for axle load max 13 t (category A), max 18 t (category B) and max 26 t (category C) according to EN 13481-5.

Modification of the fastening system according the customer's requirements is possible.



Use

- conventional railways
- urban rail (tramways, LRT, metro systems)



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ČSN EN ISO 14001
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manual point machine DT2iDE

Technical description

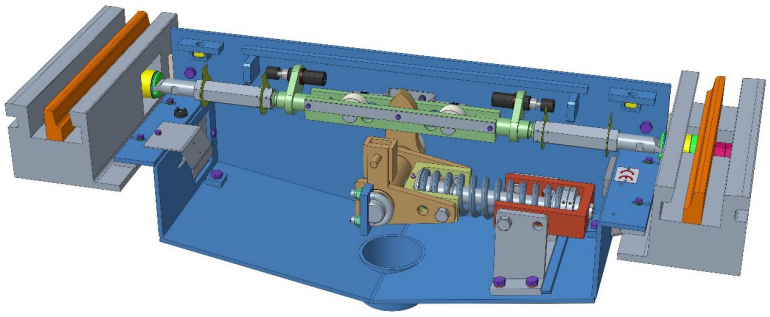
DT2iDE point machine is a simple, manual, sliding machine without mechanical locks. It is designed for manual operation of the tramway switches and its forcing into the extreme positions.

It enables the conversion from the operational mode into the self-resetting mode. DT2iDE point machine is designed as a universal construction kit, which enables a simple change from a operational mode to a self-resetting mode by changing the position of the parts and vice versa.

Technical description	
Switch gauge	min 1000 mm
Switch rail opening	max 75 mm
Thrusting force of the spring mechanism	max 3,5 kN (adjustable)
Moment necessary for manual operation	max 400Nm (dependent on the amount of pressure force)
Maximal speed when cutting	25 km/h
Max load of the cover	12 t for axle load

Use

- Downhill tramway turnouts
- Take-off running tramway turnouts in depots



Benefits

- Good price
- Signaling of the extreme position of switch rails using induction sensors
- Simple yet robust construction
- Long service life with minimal service and maintenance requirements

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ČSN EN ISO 3834-2
ČSN EN ISO 14001
ČSN EN ISO 45001

manual point machine DT4iDE

Technical description

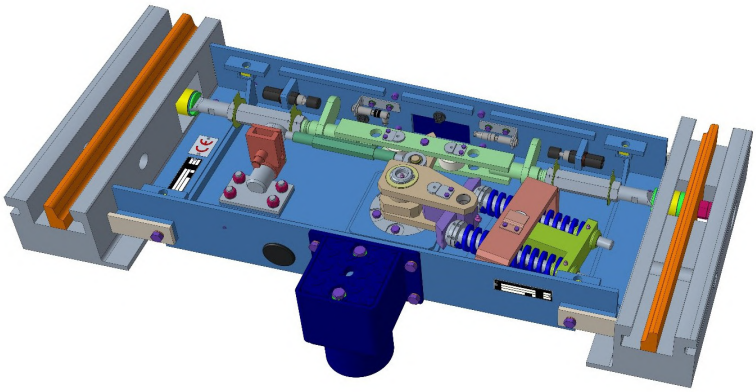
DT4iDE point machine is designed for manual operation of tramway switches and for keeping them in extreme position.

It enables the conversion from the operational mode into the self-resetting mode. DT4iDE point machine is designed as a universal construction kit, which enables a simple change from a operational mode to a self-resetting mode by changing the position of the parts and vice versa.

Technický popis	
Switch gauge	min 1000 mm
Switch rail opening	max 75 mm
Thrusting force of the spring mechanism	max 3,5 kN (adjustable)
Moment necessary for manual operation	max 400Nm (dependent on the amount of pressure force)
Maximal speed when cutting	25 km/h
Max load of the cover	12 t for axle load

Use

- Downhill tramway turnouts
- Take-off running tramway turnouts in depots
- Installation in slender bridge constructions



Výhody

- The lowest downhill point machine on the market
- Waterproof
- The height only 180 mm.The point machine does not extend below the rail foot
- Possibility of the installation into the tramway switches made of both grooved and railway

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manual self-resetting point machine DT9

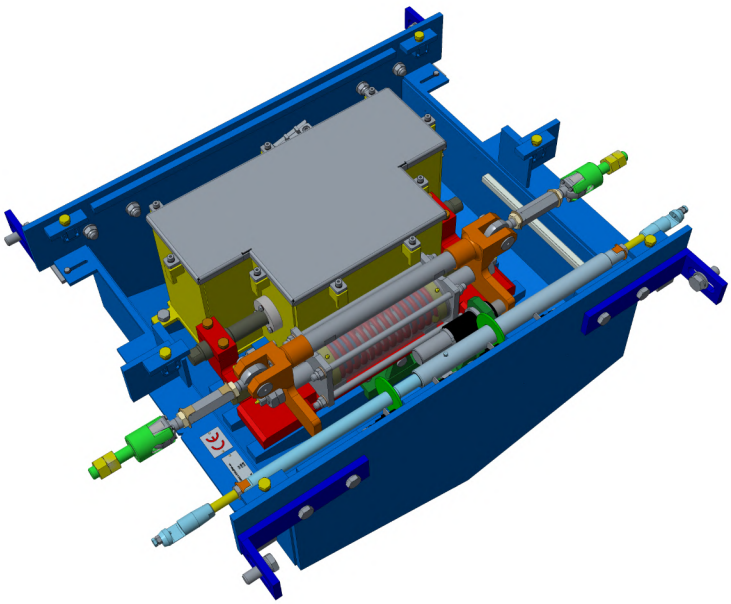
Technical description

Manual point machine DT9 is a self-resetting machine with lockable setting rods and switch rail position sensors. It is primarily designed for areas with public transport against the tip of the turnout with the speed up to 15 km/h while the possibility of multiple trailing in self-resetting mode is required. DT9 enables manual operation of tramway switch rails. **The point machine meets the SIL3 security integrity level.**

Technical description	
Gauge	min 1000 mm
Switch rail opening	36 – 75 mm
Thrusting force of the spring mechanism	1,3 – 3,1 kN
Thrusting force of the trail mechanism	3,5 – 4,5 kN
Moment necessary for manual operation	150 – 300Nm
Induction sensor power supply	24 V DC
Max load of the earth box cover	12 t for axle load

Benefits

- Robust design
- Waterproof
- Low noise level
- Possibility of the installation into the tramway switches made of both grooved and railway
- After the trailing, it assures safe return of the switch rails into its final position of the operation
- Long service life with minimal service and maintenance requirements



ČSN EN ISO 9001
ČSN EN ISO 3834-2
ČSN EN ISO 14001
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electrical point machine DT7

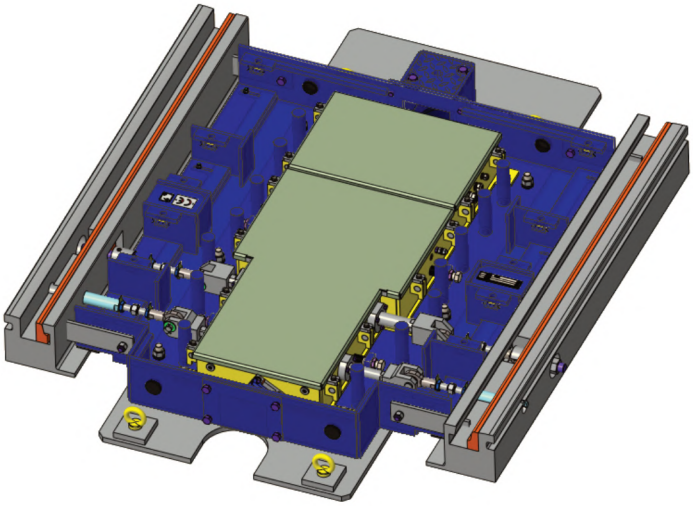
Technical description

DT7 is intended for automatic and manual operation of tramway switches. Thanks to the integrated lock of the setting and control rods and switch position sensors, it enables driving against the switch tip with passengers.

Technical description	
Gauge	min 1000 mm
Switch rail opening	32 – 100 mm
Operating force	5 – 7 kN
Cutting force	7,5 – 10 kN
Thrusting force of the spring mechanism	1,8 – 3 kN
Moment necessary for manual operation	150 – 300 Nm
Electrohydraulic drive	3x400 V AC/ 0,55 kW 1x230 V AC / 0,55 kW 600 V DC / 0,4 kW 24 V DC / 0,4 kW
Operation time	0,9 – 1,5 s
Max load of the earth box cover	12 t for axle load

Benefits

- Meets the requirements of the SIL3 safety integrity level according to CSN EN 61508
- The lowest point machine available on the market
- Waterproof
- Total height only 180 mm – the machine does not get below the rail foot
- Possibility of the installation into the tramway switches made of both grooved and railway profiles



ČSN EN ISO 9001
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ČSN EN ISO 14001
ČSN EN ISO 45001

electrical point machine DT7V

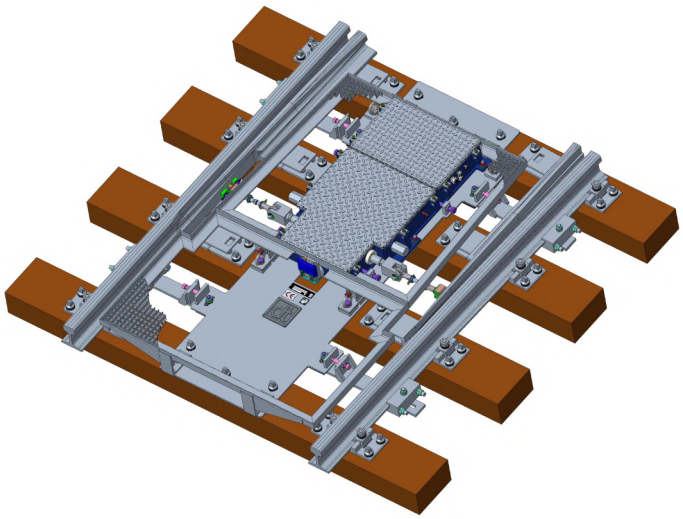
Technical description

The DT7V is designed for automatic and manual operation of the tramway switches in tram depots. It is designed to run against the switch tip without passengers. It is equipped with main rod position detection, pocket operation rod insertion detection and fluid intrusion detection inside the point machine. The pressure of the tongues to the extreme position is provided by an adjustable spring mechanism. Automatic operation is provided by a hydraulic unit. This is also separated from the other mechanisms of the point machine by a watertight partition.

Technical description	
Gauge	min 1000 mm
Switch rail opening	32 – 100 mm
Operating force	5 – 7 kN
Thrusting force of the spring mechanism	max 3,5 kN (adjustable)
Moment necessary for manual operation	max 4 kN
Electrohydraulic drive	3x400 V AC/ 0,55 kW 1x230 V AC / 0,55 kW 600 V DC / 0,4 kW 24 V DC / 0,4 kW
Operation time	max 2 s

Benefits

- The lowest point machine available on the market
- Waterproof
- Total height only 180 mm – the machine does not get below the rail foot
- Possibility of the installation into the tramway switches made of both grooved and railway profiles



ČSN EN ISO 9001
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ČSN EN ISO 14001
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electrical point machine DT10

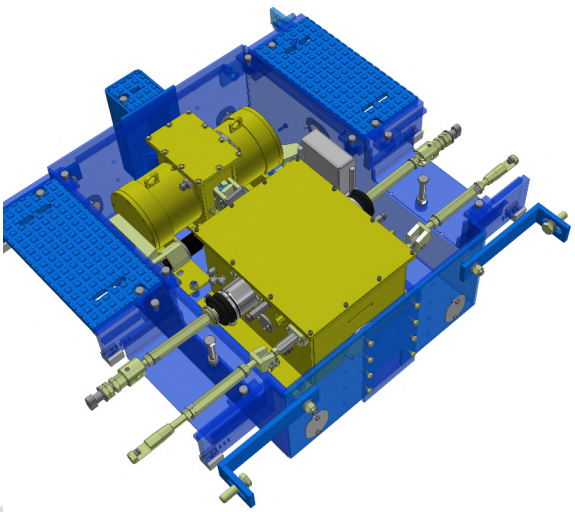
Technical description

Electromagnetic point machine DT10 is designed for automatic as well as manual operation of the tramway switches. Thanks to the integrated locking mechanism of the operating rod and switch rail position sensors it secures driving against the tip of the turnout with passengers.

Technical description	
Gauge	min 1000 mm
Switch rail opening	32 – 70 mm
Operating force	5 kN for automatic drive 5 – 6 kN for hydraulic drive
Cutting force	5 – 6 kN
Thrusting force of the spring mechanism	2 – 3,5 kN
Moment necessary for manual operation	150 – 300 Nm
Electrohydraulic drive	600 – 700 V DC
Hydraulic drive	3x400 V AC/ 0,55 kW 1x230 V AC / 0,55 kW 600 V DC / 0,4 kW 24 V DC / 0,4 kW
Operation time	0,5 – 1,5 s
Max load of the earth box covers	12 t for axle load

Benefits

- It is primarily designed for running against the tip of the turnout. The locking mechanism of the operation rods secures the switch rails in the extreme position against accidental operation
- Simple yet robust design
- Electromagnetic or hydraulic drive
- Non-destructive resistance against trailing
- Low noise level
- Waterproof
- Long service life with minimal service and maintenance requirements



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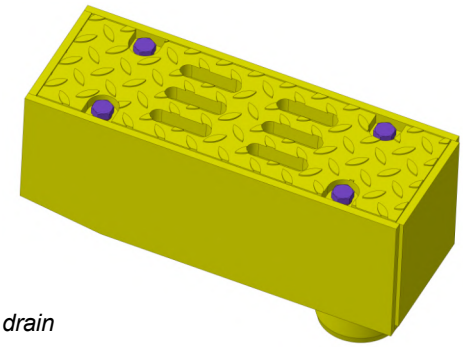
ČSN EN ISO 14001
ČSN EN ISO 45001

accessories

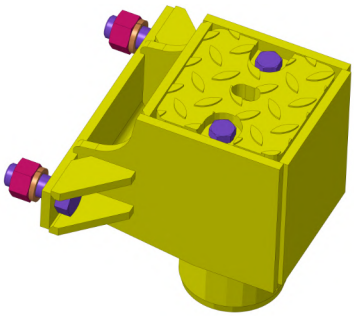
DRAINAGE SYSTEM

It is designed to drain the rainwater and dirt from the rail grooves. Preferably it is installed in front of the turnout and therefore it protects the area around the switch rails from the dirt.

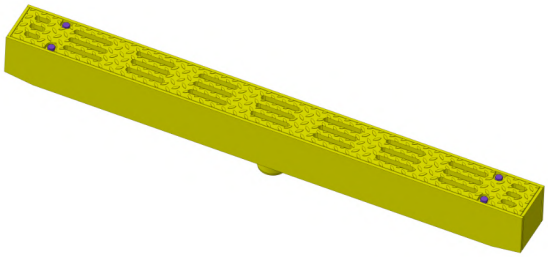
According to the customer's specification, we also supply point drains, gauge drains and intermediate gauge drains.



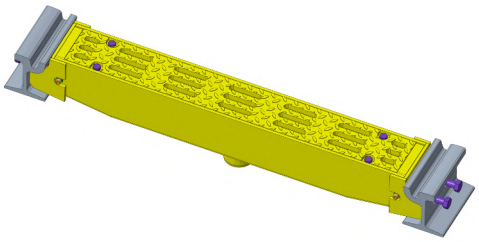
side drain



point drain



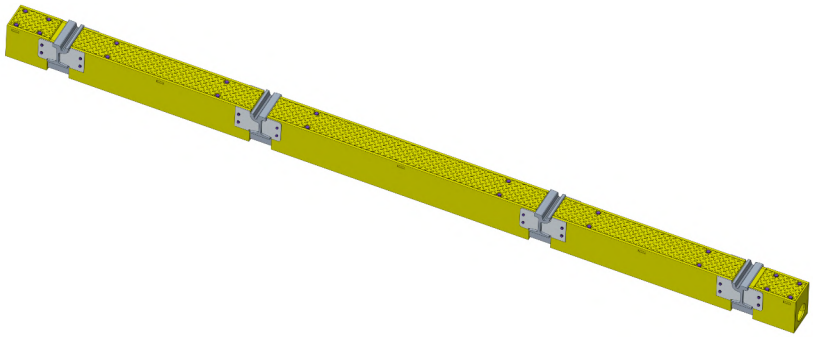
intermediate gauge drain



gauge drain

RAIL TROUGH SYSTEM

It is used for the mechanical protection of power, control and other cable distributions that must be routed over the track. The gutters can also be used to guide other technological distributions and thus gain access to these distributions thanks to the removable lids. The rail trough system consists of an outer trough, a gauge trough and an intermediate gauge. Furthermore, it is possible to supply heating cabinets, rails, etc.

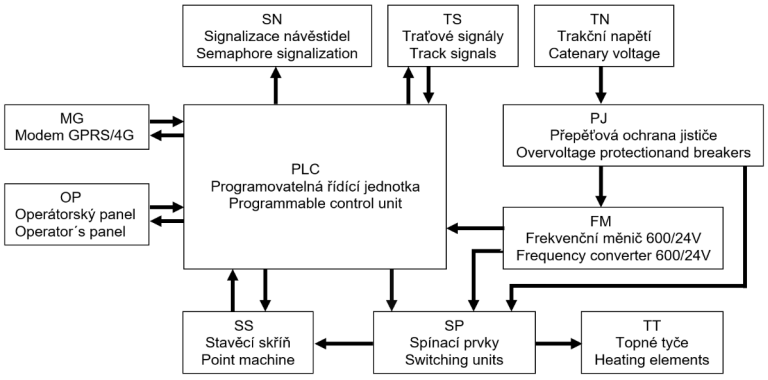


switch control box RK-EOV

Technical description

Switch control box RK-EOV secures the processing of different kinds of track signals, operating, blocking, deblocking of the switch and it ensures the communication with internal and superior system including signalization of direction and blocking on the signalling device. It also allows the control of tramway switch heating and archiving the selected data into the timeline for further evaluation. The remote access is secured by the GPRS / 4G module.

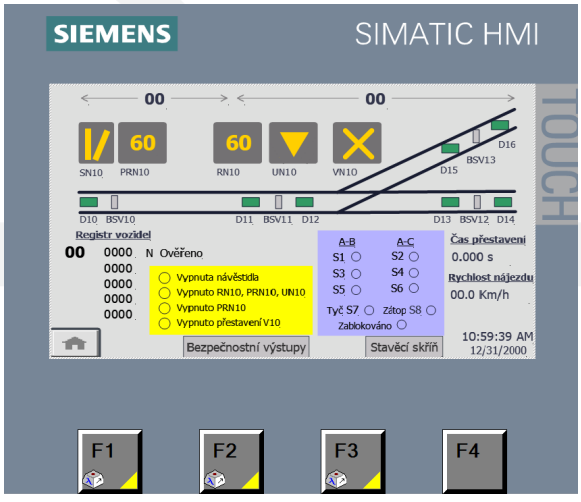
It meets the requirements of the safety integrity level SIL3.



Block diagram of the switch control box RK-EOV

The operator panel

Operator panel is designed for the manual control of the turnout and for changing of selected parameters. The panel screen enables the online monitoring of the situation of all controlled components in the system.



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signalling device T-light

Technical description

The signaling device T-light 3ZN is a single-chamber signalling device intended primarily for controlling urban and suburban tram traffic when passing through switch sections.

The construction of the signalling device and the geometric arrangement of the optical signal elements enables the display of specific signal signs and their combinations, including the simultaneous lighting of all signs:

- sign A (e.g. directional lane for driving in the turning direction)
- sign B (e.g. directional lane for driving in a straight direction)
- sign C (e.g. a target signaling the switch blocking against operation)

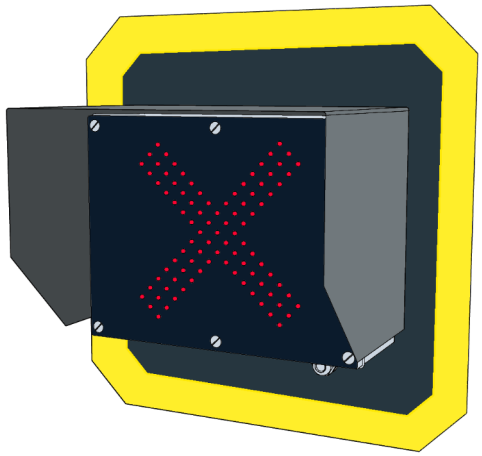
The signalling device can be used as:

- direction indicator
- speed indicator
- warning light
- switch signalling light

Signs are made up of groups of LEDs arranged in the shape of the desired sign. The signalling device allows you to control the brightness according to the time of day / night. Correct function is continuously monitored by diagnostic circuits. The optical assembly with electronic circuits is inserted into a standardized polycarbonate case with transparent lid.

The signalling device is controlled by a system which, based on the feedback indication of the operational status of the signalling device, evaluates the agreement between the desired state and the actual state, i.e. that the signalling light that is required is lit.

Supply voltage	18V DC – 30V DC
Maximál current	640mA
DIM control range	10% – 90%
Degree of coverage	IP65
Impact resistance	IR3
Operating temperature range	-30°C až +70°C



Benefits

- Option to adjust the light intensity
- High visibility in direct sunlight
- A feedback signal informing about the agreement between the desired state and the actual state
- **It meets the requirements of the safety integrity level SIL3.**

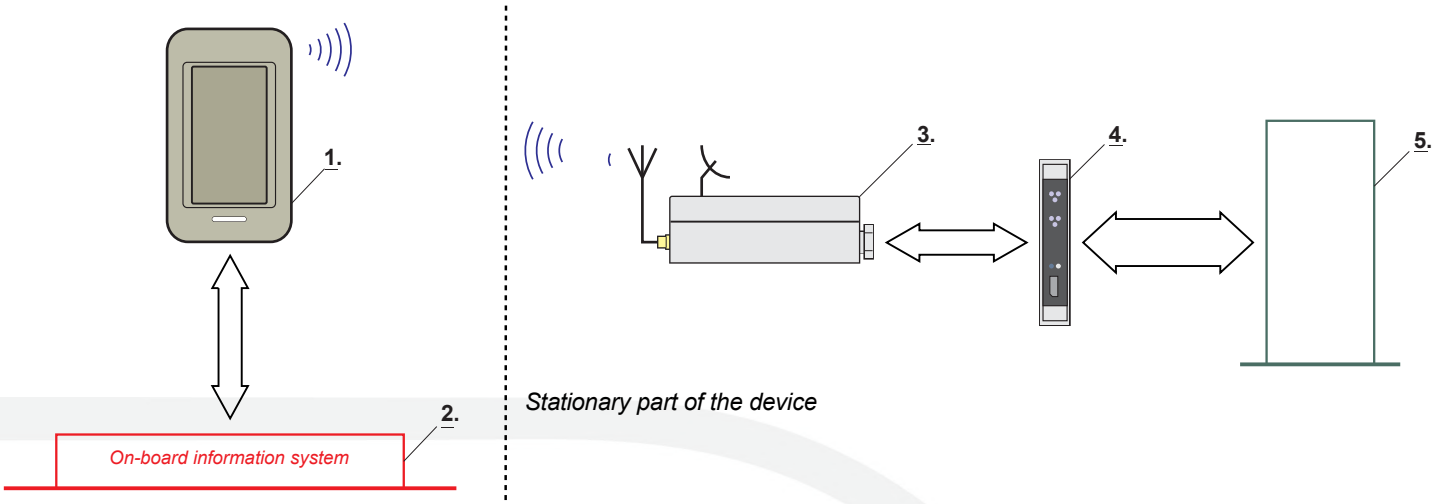
ČSN EN ISO 9001
ČSN EN ISO 3834-2
ČSN EN ISO 14001
ČSN EN ISO 45001

RAIL_RC1 system

Technical description

The electronic system Rail_RC1 is a new generation device designed to transmit the control commands and operational information between mobile device and peripheral fixed equipment used in the city and suburban tramway and trolleybus transport. The binary multiprocessor equipped systém exploits progressive possibilities of the satellite navigation and the both-way radio communication at a distance up to 150 m.

- bidirectional data transmission within band 868 MHz
- multidirectional connection at distance 100 until 150 m
- standardized communication boundaries RS232, RS485, USB, IBIS, digital I/O ports
- compact transmitter equipped with vacuum pad holders can be situated onto the front glass screen or onto the instrumental panel
- illuminated color display screen 4,3" with a touch screen
- direct power supply from the board network of the traction vehicles and the fixed equipment 12/24VDC



Mobile (vehicle) part of the device

Stationary part of the device

1. RAIL-RC remote
2. On-board traction vehicle wiring
3. RAIL-RC reciever
4. I/O ports expander
5. Electrical point machine of remote controlled turnout

Benefits

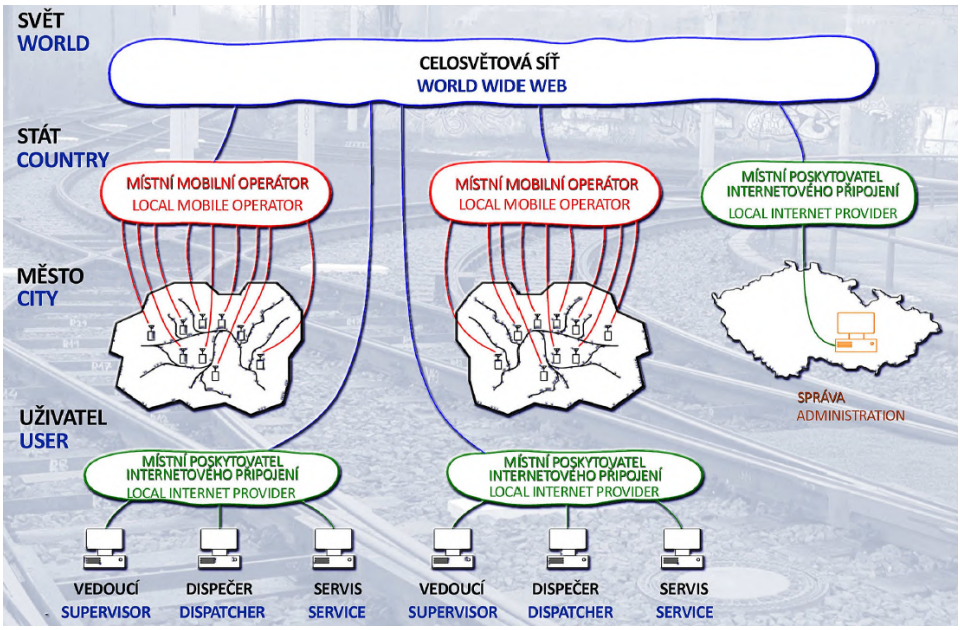
- high operational reliability
- software configurability of the system
- operational data recording and archiving (BLACK BOX function)
- easy installation of the mobile device into the board system
- no need of cable wiring and ground excavation works during the installation
- modular design – optimization of the extent of the supplies, extension of already installed systems

ČSN EN ISO 9001
ČSN EN ISO 3834-2
ČSN EN ISO 14001
ČSN EN ISO 45001

RAIL_RC1 system (remote control)

Technical description

Remote control of the RAIL_RC System is a centralized remote control, as a software extension of operated receivers of the RAIL_RC device, provides individual data communication between each receiver (tramway turnouts) and functional Internet server via secure protocol.
The implementation of this extension does not affect the operating functions of the RAIL_RC System.



Block diagram of the remote control system

Benefits

- unlimited depth of the records of archived events
- unattended data collection (transport and technical information in real time) from all operated switch control boxes integrated into RAIL_RC System without the necessity of operator‘s personal visit
- the basic construction module of the dispatching system for transport organization, the preference of public transport vehicles or optimalization of service operations according to the actual workload of the track superstructure and switch operating mechanism
- automatic detection and notifiaction of the failures of RAIL_RC System (defects on external and internal turnout sensoring system) including the possibility of remote control analysis
- statistical information on traffic density, switch operating mechanism workload and the presence of atypical phenomena
- remote update of the software in case of change in the transport or traffic system organization

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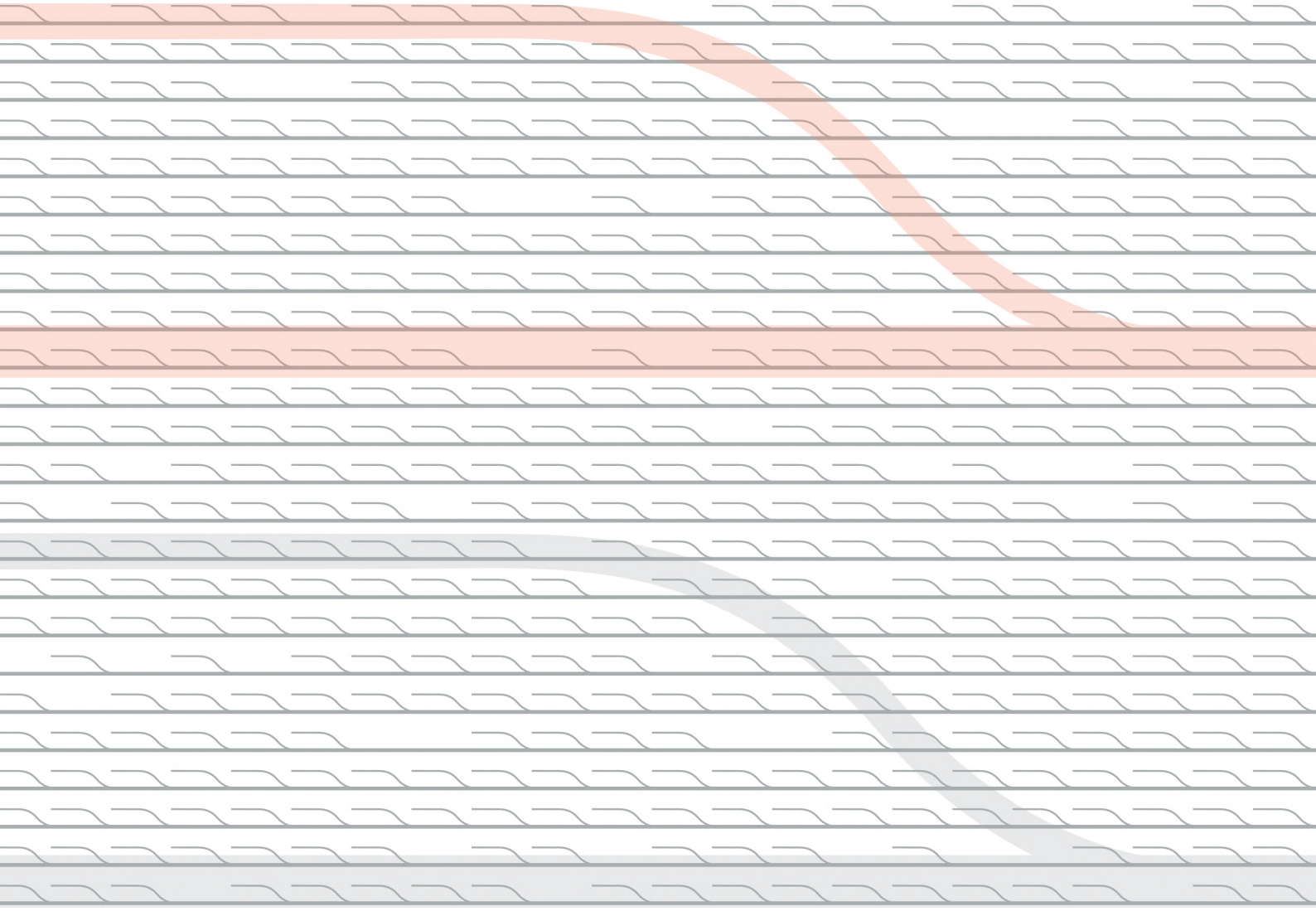

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