

# TracFeed®

## CONTACT LINE SYSTEMS

English



Products and Services

## BRINGING PEOPLE SAFELY AND PUNCTUALLY TO THEIR DESTINATIONS – BY MEANS OF POWERFUL, STATE-OF-THE-ART, AND SUSTAINABLE CONTACT LINE INSTALLATIONS

This requirement is essential for the innovative solutions of Rail Power Systems. We aim to pave your way to the sustainable mobility of the future with our specialist knowledge and proven technical concepts. The name Rail Power Systems stands for high performance railway infrastructure projects that reconcile ecological considerations with economic benefits. Energy efficiency, investment protection, easy and quick maintenance, the occupational health and safety initiative ZERO HARM and assuming responsibility for the community are extremely important to us. We also focus on durable products, solid quality, in-house production, and a high level of integration.

At Rail Power Systems you are able to consult experienced experts from a variety of disciplines. With advice and solution concepts that have a modular structure and are planned systemically. With tried and tested product platforms that meet the high level of efficiency required by customers.

### Contact line systems – for a changing world

Despite the variety of railway electrification systems available worldwide and due to increasing mobility bottlenecks, Rail Power Systems is rising to the challenge of this market:

We are tailoring our product range and our service to customer benefit and efficiency more than ever before. Detailed information about the service life and life-cycle costs (LCC) of the products is just as much a part of this as details of the reliability, availability, maintenance, and safety (RAMS) of the systems.

## THEN, TODAY, AND TOMORROW – TOP PERFORMANCE IN RAILWAY INFRASTRUCTURE



### Renowned partner

The brochure focuses on products, systems, and services for contact line systems in intercity and local transport. It also provides an overview of other Rail Power Systems products and services.

## CONTACT LINE ENGINEERING

As the world's leading supplier of railway electrification and power supply systems, we are adopting a strategic position in all relevant key markets. In doing so, we are incorporating our decades of experience in electrification projects and in the use of innovative technologies in every track section – with a consistent focus on the specific needs of our customers. This way we guarantee customised solutions with maximum efficiency.

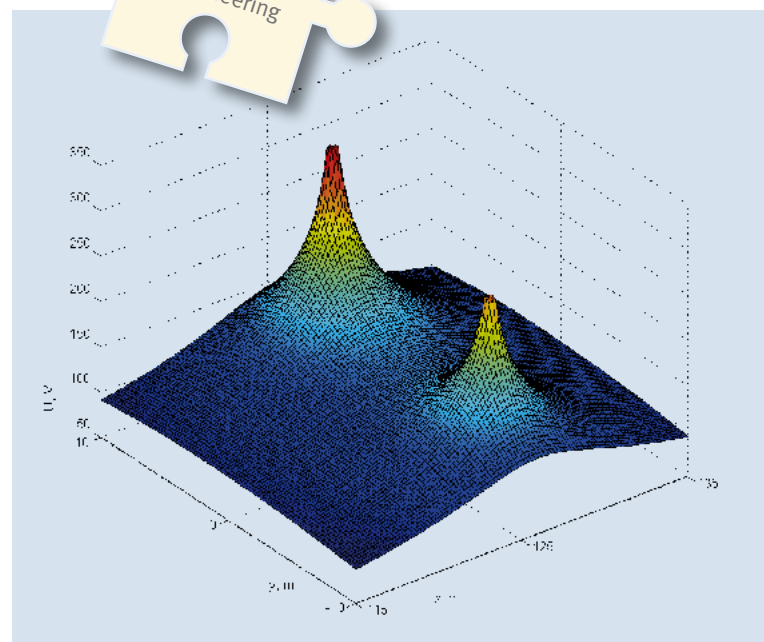
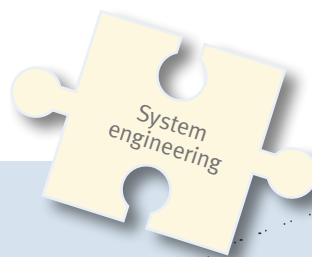
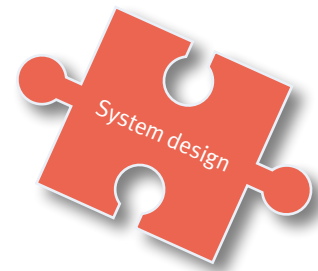
## OUR ENGINEERING SERVICES INCLUDE:

### System design

As an expert specialist for electric railway infrastructures, system design plays a key role in ensuring that users of the infrastructure are able to enjoy reliable and, most importantly, secure mobility. Our decades of experience in the most important international markets and the use of state-of-the-art technologies are what set system design apart. Our experienced specialist engineers apply their exceptional know-how as well as state-of-the-art computer applications and simulation systems to analyse all relevant aspects which affect the system.

### The system technology area serves as an internal and external service provider for:

- Design and optimisation of traction power supply installations
- Simulations for alternating current and direct current traction systems
  - Planning
  - Customer orders
  - Sales and processing
- EMC investigations
- Measurements and tests
- Economic feasibility studies
- Life-cycle costs/RAMS
- Subcontractor for the interoperability notified body (Eisenbahn-Cert)
- TSI-compliant design planning
- Calculation of dynamic behaviour current collector/overhead contact line with CATMOS® and OSSCAT



Earth surface potential in the event of a short circuit due to a flashover of an insulator on the pole



## Planning competence

Thanks to our planning team's size and decentralised distribution, they can offer you advice, availability, and corresponding customer proximity throughout Germany. Our expertise and experience guarantee not only complete solutions, but also special technical solutions with absolute deadline and cost certainty.

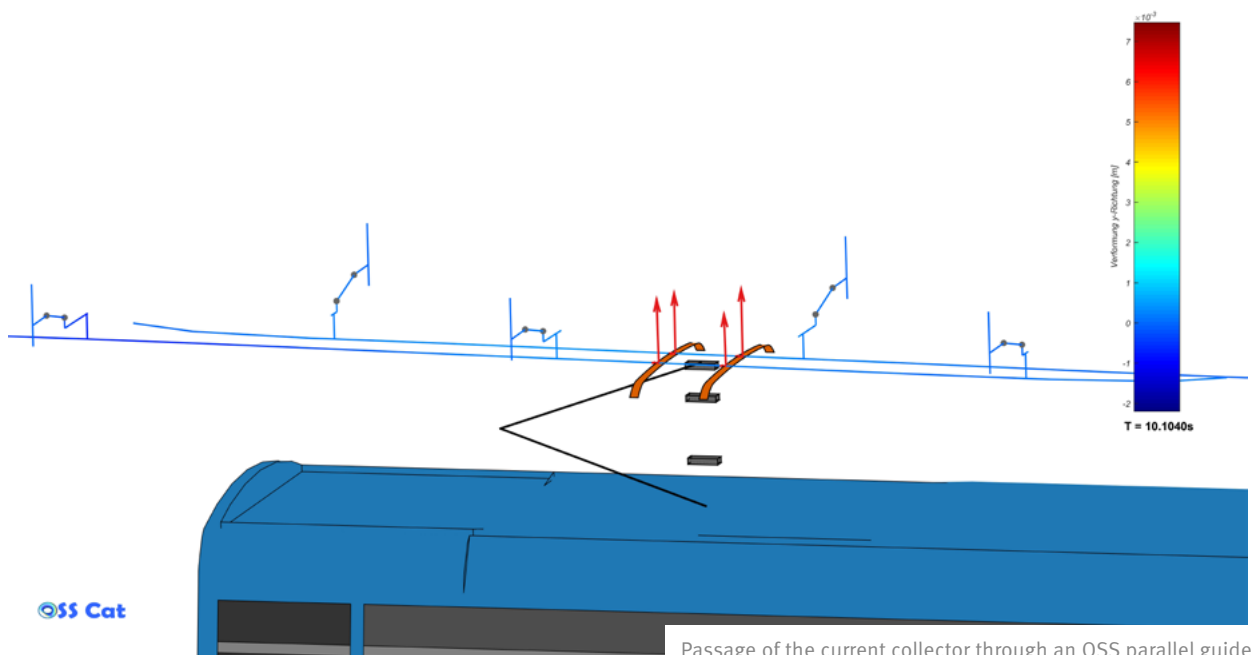


## Portfolio

- Overhead contact line planning
  - In all speed segments
  - In all voltage levels
  - For new construction, conversion, and servicing
- Overhead conductor rail
- Statics
- OSE planning
- Project management domestically and internationally
- Design engineering

## Some of our planning references:

- Leipzig City Tunnel
- Zurich Cross-City Link, Switzerland
- Rail connection for BBI airport
- Conversion of Berlin Ostkreuz station
- Katzenberg Tunnel
- Electrification of Erzingen–Schaffhausen
- Line upgrade Munich–Ingolstadt
- VDE 8.1.1–VP Ebensfeld
- HPA, Rethe Bridge (bascul bridge and foreland bridge)
- Line upgrade Berlin–Frankfurt/Oder (EP)







## System Engineering contact line

Contact lines are the mating contacts to the current collector. They must satisfy electrical as well as mechanical requirements. Fundamental mechanical and electrical parameters are considered when developing contact line systems and their components. System Engineering has technical control of contact line systems. Contact line components are also developed, constructed, and further optimised. This includes ensuring availability in terms of profiling supply sources and testing these components.

System Engineering carries out the certification of overhead contact lines according to TSI, the approvals of new overhead contact line systems from the German Federal Railway Authority (EBA), and the approval from Deutsche Bahn. DB's overhead contact lines and the Ebs drawings are maintained and further developed by System Engineering in collaboration with DB. The construction-related designs for the German market are also processed.



## Competencies

- Development of contact line installations
- Development of components
- Material availability
- Implementation of projects domestically and internationally
- System creation for planning
- Customer service

## Platforms of Rail Power Systems Deutschland

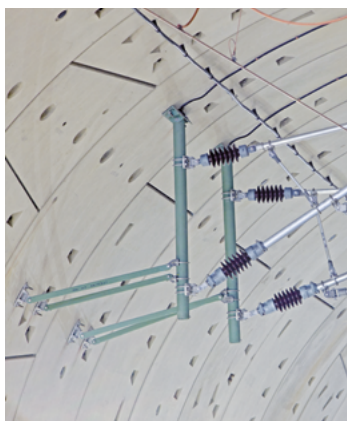
| Systems                            | Speed      | Current |
|------------------------------------|------------|---------|
| TracFeed® ALU3000                  | > 330 km/h | AC      |
| TracFeed® ALU2000                  | < 230 km/h | AC/DC   |
| TracFeed® ALU1000                  | < 120 km/h | DC      |
| TracFeed® GFK1000                  | < 120 km/h | DC      |
| TracFeed® OSS                      | < 200 km/h | AC/DC   |
| TracFeed® STS 3 <sup>rd</sup> rail | < 100 km/h | DC      |

## WHY CHOOSE A SYSTEM FROM RAIL POWER SYSTEMS?

**Rail Power Systems develops, tests, and creates components – Project management has the following distinguishing features:**

- High quality and precision with all components
- High level of flexibility according to customer requirements
- Long life expectancy for components
- Low maintenance requirements
- Qualified personnel
- In-house production in Germany





Installation – TracFeed® ALU3000

## THE HIGH-SPEED CONTACT LINE SYSTEM – TracFeed® ALU3000

The TracFeed® ALU3000 contact line system has proved itself over many years of use on high-speed lines and is optimised for speeds of well over 330 km/h in accordance with the international state of the art.

TracFeed® ALU3000 meets all requirements in terms of higher current carrying capacity, lower elasticity, and safe current collection. It is characterised by its high reliability and low maintenance requirements thanks to standardised components for the most part.

Numerous railway operators have already opted for aluminium contact line installations of the TracFeed® ALU3000 design – a decision they made years ago.

### This includes:

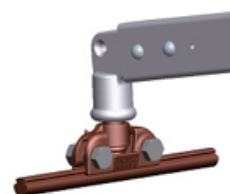
- Deutsche Bahn on the lines Nuremberg-Ingolstadt, Würzburg-Hanover or Hanover-Berlin, and Wendlingen-Ulm
- The Norwegian Bane NOR on line Gardermoen–Oslo
- The Turkish TCDD on line Ankara–Konya
- The Chinese railway on line Wuhan–Guangzhou
- The Spanish Renfe on line Madrid-Seville



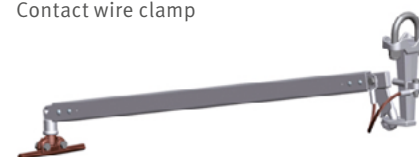
Catenary wire support clamp



Cantilever



Contact wire clamp



Steady arm



## CONTACT LINE SYSTEM – TracFeed® ALU2000

The TracFeed® ALU2000 contact line system has proved itself over many years of use on intercity railways. Thanks to its standardised parts and components, mainly made of aluminium, the system is considered reliable, low-maintenance, and easy to maintain.

Its optimisation for the greatest possible distance between poles and its safe, uninterrupted current collection are the distinguishing features of the overhead contact line.

TracFeed® ALU2000 was designed for freight lines and passenger transport at speeds of up to 230 km/h. The overhead contact line easily spans single and multi-track, straight or curved lines including the smallest possible passable radii. Stations with any arrangement of points as well as lowered catenaries under bridges are just as insignificant an obstacle as modern concrete tunnels or masonry and rock-cut tunnels.

Numerous railway operators have already opted for aluminium contact line installations of the TracFeed® ALU2000 design from Rail Power Systems – a decision they made years ago.

### This includes:

- The Deutsche Bahn in numerous projects
- The Malaysian KTMB on lines Rawang–Ipoh and Ipoh–Padang
- The US operator RTD Denver and CalTrain
- The Chinese railway on line Harbin–Dalian
- The Hungarian GySEV
- The Finnish VR
- The Norwegian Bane NOR



Assembly – TracFeed® ALU2000





Assembly Stuttgart Zuffenhausen – TracFeed® ALU1000

## MASS TRANSIT OVERHEAD CONTACT LINE SYSTEMS – TracFeed® ALU1000 AND TracFeed® GFK1000

The TracFeed® ALU1000 and TracFeed® GFK1000 overhead contact line systems have proved themselves over many years of use on local transport systems. Thanks to their standardised parts and components made of aluminium or GRP (glass-fibre reinforced plastic), the systems are considered to be low-maintenance and reliable. The connections from these components blend harmoniously into the urban, suburban, and rural landscape of the contact line installation.

These overhead contact lines were designed for DC-operated trams, urban railways, and suburban railways with rated voltages of between 600 V and 1500 V. They comply with European standards for overhead contact line installations. Their area of application extends from slow travel routes in pedestrian zones to suburban routes at speeds of up to 120 km/h.



Assembly – TracFeed® GFK1000

The simply structured overhead contact line with catenary suspension does not obscure the view of the sky. It blends in seamlessly with the respective cityscape. The overhead contact line still allows for special solutions despite its high degree of standardisation.

Numerous urban railway operators have already opted for contact line installations of type TracFeed® ALU1000 and TracFeed® GFK1000 from Rail Power Systems – a decision they made years ago.

### This includes:

- Eskisehir and Adana in Turkey
- Baltimore, USA
- São Paulo, Brazil
- Karlsruhe
- Rhenish lignite mining area
- Freiburg
- Dortmund
- Stuttgart
- Oslo, Kolsåsbanen & Ekebergbanen in Norway



## OVERHEAD CONDUCTOR RAILS – TracFeed® OSS

Due to their significantly lower system construction heights, overhead conductor rails are used in confined spaces if there is not enough installation space for a traditional catenary. This can be the case in a new construction and conversion of tunnel structures, for example. For travel speeds of up to 250 km/h, overhead conductor rail systems are already an alternative to the existing overhead contact lines in tunnels. The system also offers a high level of safety and reliability.

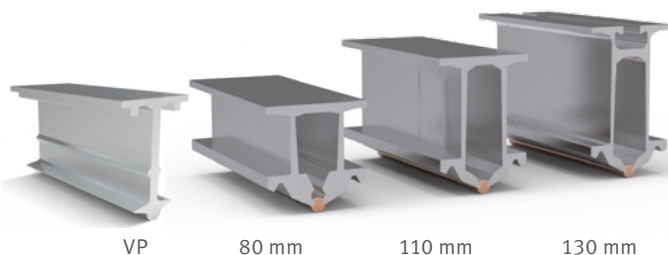
In maintenance halls, the overhead conductor rail can also be installed in a swivelling design in order to keep the work range above the vehicles free.

The minimum construction height of the Rail Power Systems overhead conductor rail TracFeed® OSS is 300 mm for 15 kV. The longitudinal span length can be extended up to 14 m depending on the intended operating speed and the chosen profile. Where the following applies: The higher the speed, the shorter the longitudinal span length.

Rail Power Systems offers different profiles on the basis of project-specific requirements for the overhead conductor rail.

- The profile with a height of **80 mm** is used in very confined spaces that require a very low construction height.
- The profile with a height of **110 mm** is the traditional and most common form and is suitable for speeds up to 200 km/h.
- The profile with a height of **130 mm** allows larger standard longitudinal support widths and, consequently, higher speeds due to the higher moment of inertia. The profile has a groove-shaped head, which means only one screw is needed to establish the connection between the rail and support. This design reduces costs as well as assembly and maintenance requirements.

Profiles available for TracFeed® OSS



### Technical Data – TracFeed® OSS

|   |                             |
|---|-----------------------------|
| <b>Cross section area</b>                     | 2 220 mm <sup>2</sup>       |
| <b>Possible contact wires</b>                 | 100 – 150 mm <sup>2</sup>   |
| <b>Equivalent copper cross section area</b>   | 1 400 mm <sup>2</sup>       |
| <b>Profile heights</b>                        | 80 mm, 110 mm, 130 mm       |
| <b>Delivery lengths</b>                       | 10 m, 12 m*                 |
| <b>Mass of the profile</b>                    | 6.1 kg/m                    |
| <b>Travel speed up to</b>                     | 200 km/h**                  |
| <b>Support distance up to</b>                 | 14 m                        |
| <b>Maximum length of a continuous section</b> | 2 x 300 m                   |
| <b>Rated voltages</b>                         | 750–3 kV DC, 15 kV–25 kV AC |
| <b>Continuous current load capacity</b>       | 2.9 kA***                   |

\* Standard lengths, others available on request

\*\* Dependent on the chosen profile height

\*\*\* Dependent on the temperature range





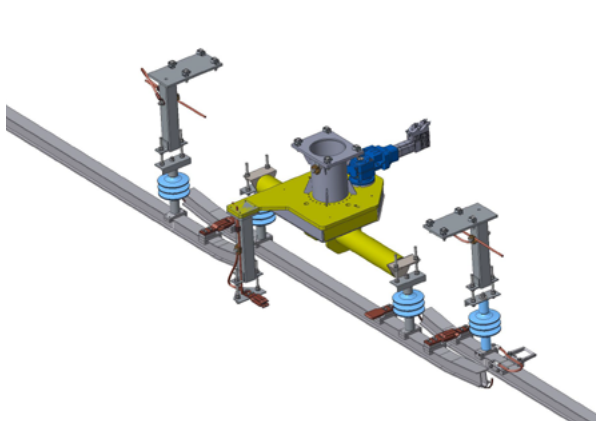


### TracFeed® OSS, swivelling

Rail Power Systems has supplied and installed swivelling variants of the TracFeed® OSS overhead conductor rail in various maintenance facilities (including in Germany, Norway, and Switzerland). Due to the very specific spatial requirements on the one hand and the requirements of the operator on the other, each system is a customised solution. The implementation of these requirements places considerable demands on design and planning, and on the conception of suitable control systems.

#### Application area

- In maintenance halls and depots for trams, urban railways, intercity trains or high-speed trains.
- The TracFeed® OSS overhead conductor rail system enables trains to enter and exit under their own power without the need for additional shunting locomotives.
- In the retracted position, access to the train roof for inspection or maintenance work is possible without the risk of a voltage accident.
- In the retracted position, crane travel can be performed above the work range.
- In the retracted position, it is possible to test trains with operating voltage locally without requiring a separate shunting operation to a live section in order to put the vehicle into operation.



### TracFeed® OSS rotating separator

The rotary separator was specially developed for the electrification of overhead contact lines for internal operations at railway maintenance depots. The system ensures safe electrical connection and segregation between two rigid overhead contact lines inside a depot. This system makes it possible for a rail vehicle to enter the depot under its own power.

#### References for Germany

- Lübeck, Skandinavienkai Container Terminal
- Gemmenich Tunnel
- Leipzig City Tunnel
- Stuttgart S21
- Various maintenance and parking facilities of DB and local transport operators

#### References for Europe

- Zürich (CH), Cross-City Link
- Biel, Pünten, Samstagern, Herisau (all CH), maintenance facilities of SBB and SOB
- Neglinge, Molnby (all SE), maintenance facilities of SL Stockholm
- Skien (NO), maintenance facility of Mantena AS
- London (GB), Thameslink and Canal Tunnel

#### Global References

- Beijing-Daxing Airport Link (CN)
- Tainan (TW)
- Ankara (TR), maintenance facility of TCDD
- Denver (US), maintenance facility of RTD

\* ARA = External cleaning system

\*\* IRA = Internal cleaning system

## CONDUCTOR RAIL, 3<sup>rd</sup> RAIL TracFeed® STS

Conductor rail contact installations of type 3<sup>rd</sup> Rail have been used in large cities and conurbations for decades. On the TracFeed® STS system, the current is routed through a steel or aluminium profile close to the running rail. The vehicle can collect the current with a laterally positioned current collector.

### The 3<sup>rd</sup> Rail offers interesting benefits compared to the contact line:

- Low installation costs, no poles, foundations, etc.
- Low maintenance costs
- Low risk to assembly personnel
- Small number of components and tools
- Easy setting
- Long service life as the wear on the contact surface is very low

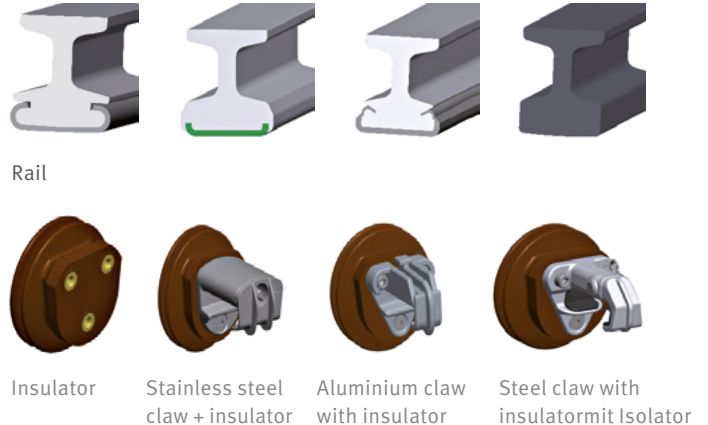
### The current collection on the rail can take place from three sides:

- Current collection from above
- Current collection from below
- Lateral current collection
- Max. speed of a 3<sup>rd</sup> Rail system: 100 km/h
- Rated voltage: from 500 V to 1.5 kV DC
- Continuous current: up to 4 700 A

### References

- Nuremberg, Berlin, Hamburg, Helsinki, Oslo

### Components of TracFeed® STS

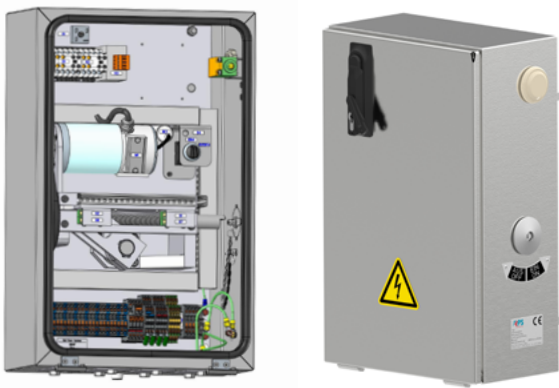


## CONTACT LINE COMPONENTS

Contact line components from Rail Power Systems are suitable for standard solutions and for tailored operating concepts for local and intercity transport created specifically for the customer.

All contact line elements produced by us offer you a long service life, high reliability in daily operation, low life-cycle costs, excellent quality, and safe usability under a wide range of climatic and operating conditions.

### TracFeed® SFA remote motor drives



TracFeed® SFA motor drive

#### Functional description

TracFeed® SFA remote motor drives make it possible to activate the switch disconnectors and earthing switches installed on the pole tips for intercity and local transport contact lines. Using a tooth belt reduces switching noises.

#### Product design

- Enclosure
- Drive unit
- Electrical equipment

The enclosure can be opened in a downward direction and can be secured against unauthorised opening via a swivel lever, depending on the style. Other safeguarding options, such as protection against accidental manual operation, are available on request.

The drive system consists of a drive motor and a gear enclosure with integrated deflection. A permanently energised direct current motor is used as the drive.

The power is transmitted positively by means of a tooth belt to a trapezoidal threaded spindle. This has a self-locking mechanism that effectively prevents a reversal of the direction of rotation due to external force acting on the adjusting lever.

The linear movement of the driven spindle nut is converted into a circular movement on the adjusting lever by a deflector. The resulting stroke on the adjusting lever can be selected in two stages (100 or 200 mm).

An overcurrent relay with current-dependent delay serves as motor protection. This switches off the drive after approx. two seconds if there is a block.

#### Technical data TracFeed® SFA

|   |                        |
|---|------------------------|
| <b>Operating current</b>                | AC or DC               |
| <b>Rated current</b>                    | 2.5 A                  |
| <b>Drive system</b>                     | 450 Nm                 |
| <b>Protection system</b>                | IP54                   |
| <b>Dimensions (h x w x t)</b>           | 600 x 380 x 210 mm     |
| <b>Weight</b>                           | 31 kg                  |
| <b>Enclosure material</b>               | Stainless steel        |
| <b>Stroke</b>                           | 100 or 200 mm          |
| <b>Switching delay</b>                  | 2 to 4 seconds         |
| <b>Torque on the driving crank [Nm]</b> | > 400                  |
| <b>Switching cycles</b>                 | > 20 000               |
| <b>Material</b>                         | Stainless steel 1.4301 |

The remote motor drive can also be operated via a crank handle, which can be used to make the basic setting and perform the function test, for example. The voltage supply is interrupted when the enclosure cover is opened (only for versions without local control).

TracFeed®  
Catenary  
Components



**Mast disconnecter – TracFeed® MTS 3 kV DC,  
TracFeed® MTS 15 kV to 25 kV AC,  
TracFeed® MTS for OLSP 15 kV to 25 kV AC**

**Functional description**

Rail Power Systems has developed a modern and reliable switch family for this application, which now also offers a large number of customisation options thanks to its modular construction method. This also allows for combination with alternative drive concepts.

**The switch disconnector models from Rail Power Systems are divided into the following basic components:**

- Base plate
- Insulators
- Contact sets
- Arcing horns
- Earth contact support
- Earth contact

**Adapted components can be considered on customer request:**

- Alternative drives
- Composite insulator (GRP core/silicone sheath)

**For increased power requirements:**

- Contact unit (dimension, silver plating)

These increase resistance to vandalism in switch disconnector variants with water-repellent composite insulators.

To facilitate assembly, the weight of many switch variants has been significantly reduced by using more lightweight materials. The connection dimensions of all product generations have been deliberately kept the same. This ensures that different generations of switch disconnectors can be easily interchanged.

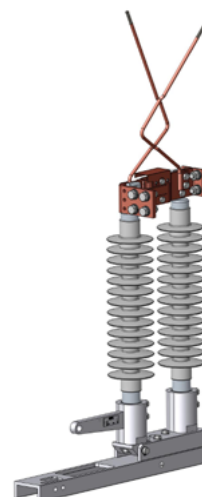


## Basic electrical data

### TracFeed® MTS 15 kV to 25 kV AC

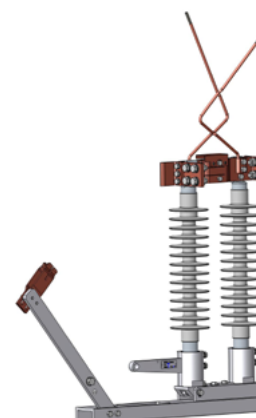
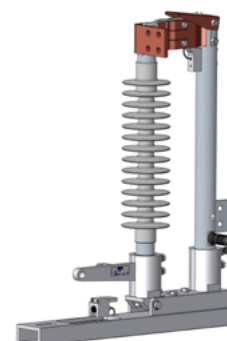
|  |                    |
|--|--------------------|
| Rated voltage                            | 15.0 to 25.0 kV AC |
| Rated operating current                  | 2 300 A            |
| Rated short-time withstand current up to | 50 kA              |
| Short-time current duration              | 1 s                |

TracFeed® MTS



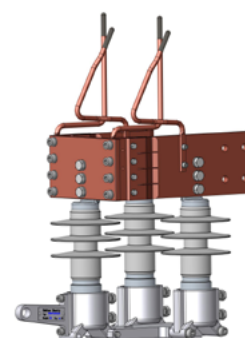
### TracFeed® MTS inflow monitor, suitable for OLSP and AEE

|  |                      |
|--|----------------------|
| Rated voltage                              | 25.0 kV AC           |
| Rated insulation voltage                   | 17.5 to 36.0 kV AC   |
| Rated operating current                    | 1 700 A              |
| Rated short-time withstand current up to   | 50 kA                |
| Short-time current duration                | 1 s                  |
| Mechanical service life (switching cycles) | > 30 000             |
| Weight                                     | 29.5 kg              |
| Switch stroke                              | 200 mm               |
| Dimensions                                 | 785 x 210 x 1 353 mm |

TracFeed® MTS  
with earth contactTracFeed® MTS  
earthing switch for OLSP

### TracFeed® MTS 3 kV DC

|  |           |
|--|-----------|
| Rated voltage                            | 3.0 kV AC |
| Rated operating current                  | 3 150 A   |
| Creepage distance                        | 300 mm    |
| Rated short-time withstand current up to | 50 kA     |
| Short-time current duration              | 0.25 s    |

TracFeed® MTS  
3kV DC





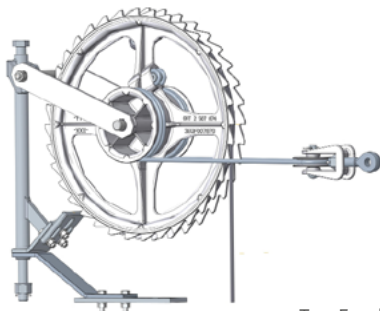
### TracFeed® NSV tensioning wheel assembly

The tensioning wheel assembly connects the weights and overhead contact line wires with constant tensile force. The changes in the length of the contact wire or catenary wire that occur due to permanent temperature changes are compensated. The weight pillar generates a tensioning force that acts on the axis. This creates a force that is transmitted via the axis. This allows the weight set to achieve the requisite tensile force in the wires or ropes via the ratio 1 : 3.

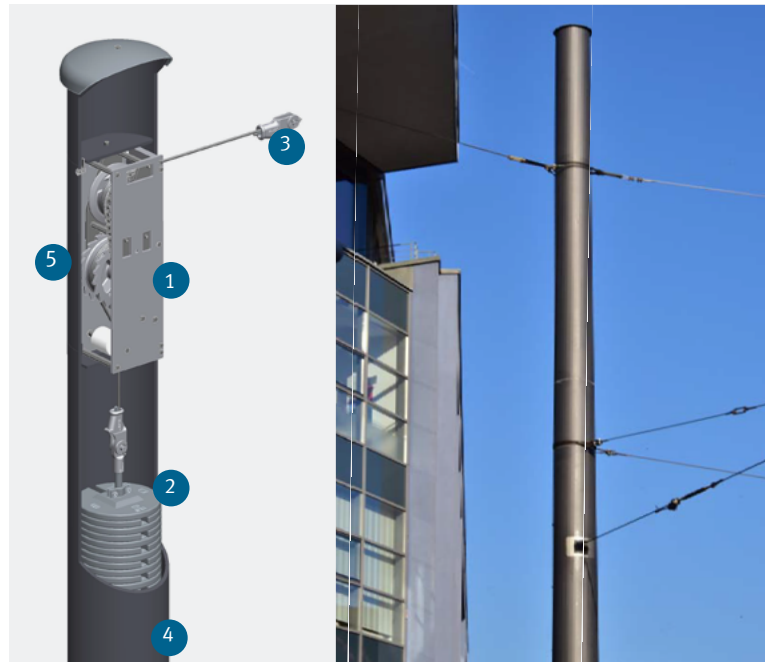
The tensioning device has its own locking device. This device ensures that the balance weight is blocked in the event of a wire break. Further damage to the overhead contact line and pole is prevented in this way.

#### Technical data

|                                     |                   |
|-------------------------------------|-------------------|
| <b>Ratio</b>                        | 1:3               |
| <b>Tensile force</b>                | up to 30 kN       |
| <b>Ambient temperature</b>          | –30 °C to +110 °C |
| <b>Material</b>                     | Aluminium alloy   |
| <b>Diameter of large cable drum</b> | 600 mm            |
| <b>Diameter of small cable drum</b> | 150 mm            |
| <b>Bearing</b>                      | Bz                |



TracFeed® NSV tensioning wheel assembly for 20 kN



1. TracFeed® NSV tensioning device
2. Integrated tensioning wheel assembly, balance weight set, max. 400 kg
3. Connection to catenary
4. Special steel post, approx. Ø 360 mm
5. Upper assembly door

### TracFeed® NSV integrated tensioning wheel assembly

Rail Power Systems has constructed this innovative, integrated tensioning device to optimise the outward appearance of the overhead contact line poles. The benefit to you: It can be completely implemented in the pole and is ideally suited to catenaries and horizontal catenary wires, especially for rural and urban trams such as SL Stockholm and VAG Freiburg, where the TracFeed® NSV is already being used successfully.

#### Technical data

|                               |                            |
|-------------------------------|----------------------------|
| <b>Transmission</b>           | 1:3                        |
| <b>Tensile force</b>          | up to 12 kN                |
| <b>Ambient temperature</b>    | –30 °C to +110 °C          |
| <b>Bearing</b>                | Needle bearing A2          |
| <b>Dimensions (l x w x h)</b> | approx. 230 x 200 x 820 mm |



## TracFeed® STR section insulator for AC and DC installations

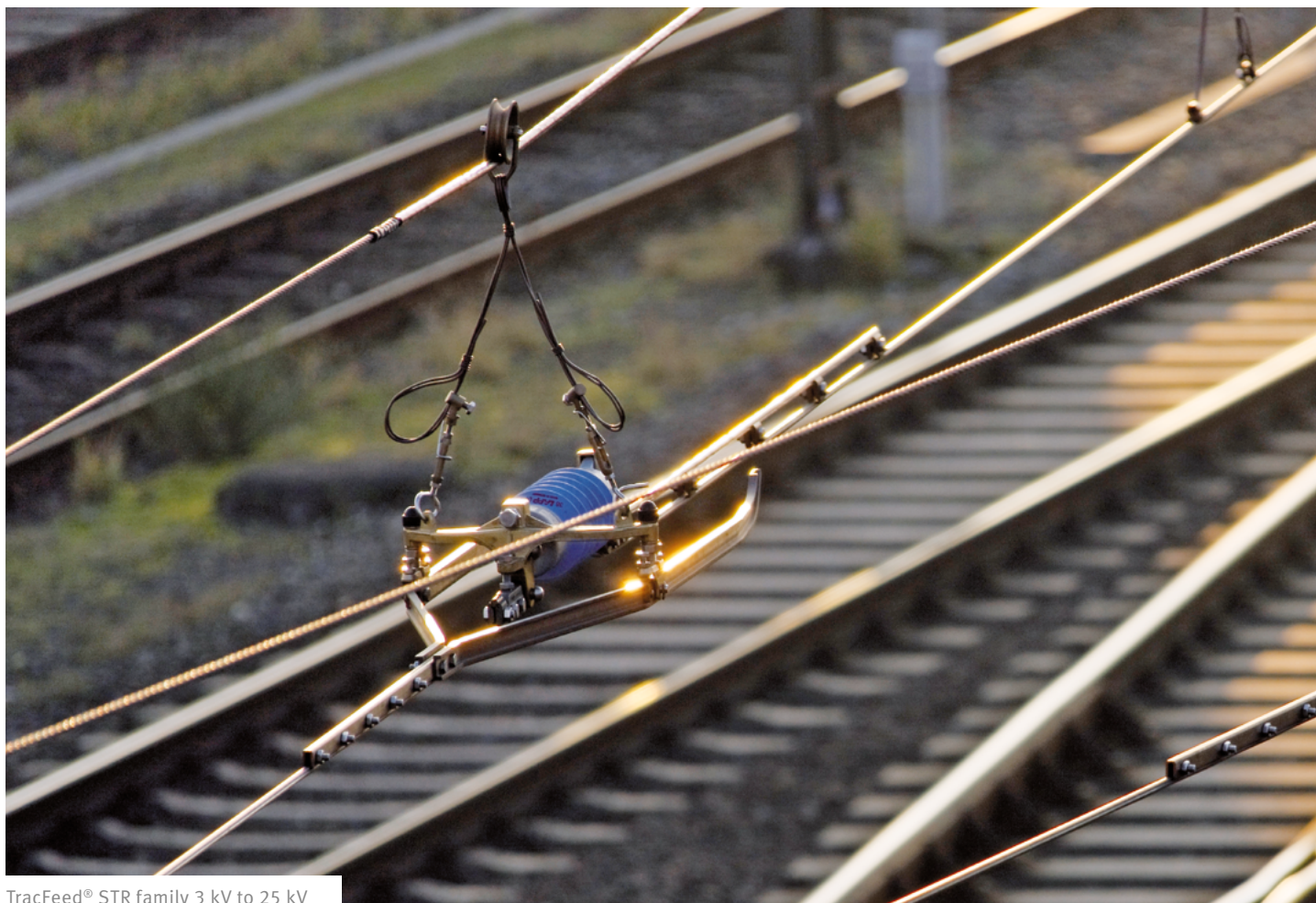
### Functional description

Section insulators perform the function of disconnecting and electrically insulating the overhead contact line in individual sections, without interrupting the mechanical voltage.

This allows electric traction units to travel via the section insulator. They are integrated in the contact line system by means of suspensions.

### Characteristics:

- Up to 3 kV direct current
- 15 or 25 kV alternating current
- Main tracks and adjacent tracks
- Depots and workshops
- Suspension pre-assembled ex-works for single and double contact wire
- Speed range 20 – 130 km/h with or without insulating runners
- Corrosion-resistant, maintenance-free, and not sensitive to weather conditions
- Exchangeable runners and arcing horns with ceramic or composite insulators



TracFeed® STR family 3 kV to 25 kV



## TRACTION POWER SUPPLY – AN IMPORTANT ISSUE FOR RAIL POWER SYSTEMS

Rail Power Systems' portfolio also includes turnkey and ultramodern traction power supply systems. We are there to support you from the configuration of your individual infrastructure, through to assembly and commissioning. Our solutions meet the highest standards.

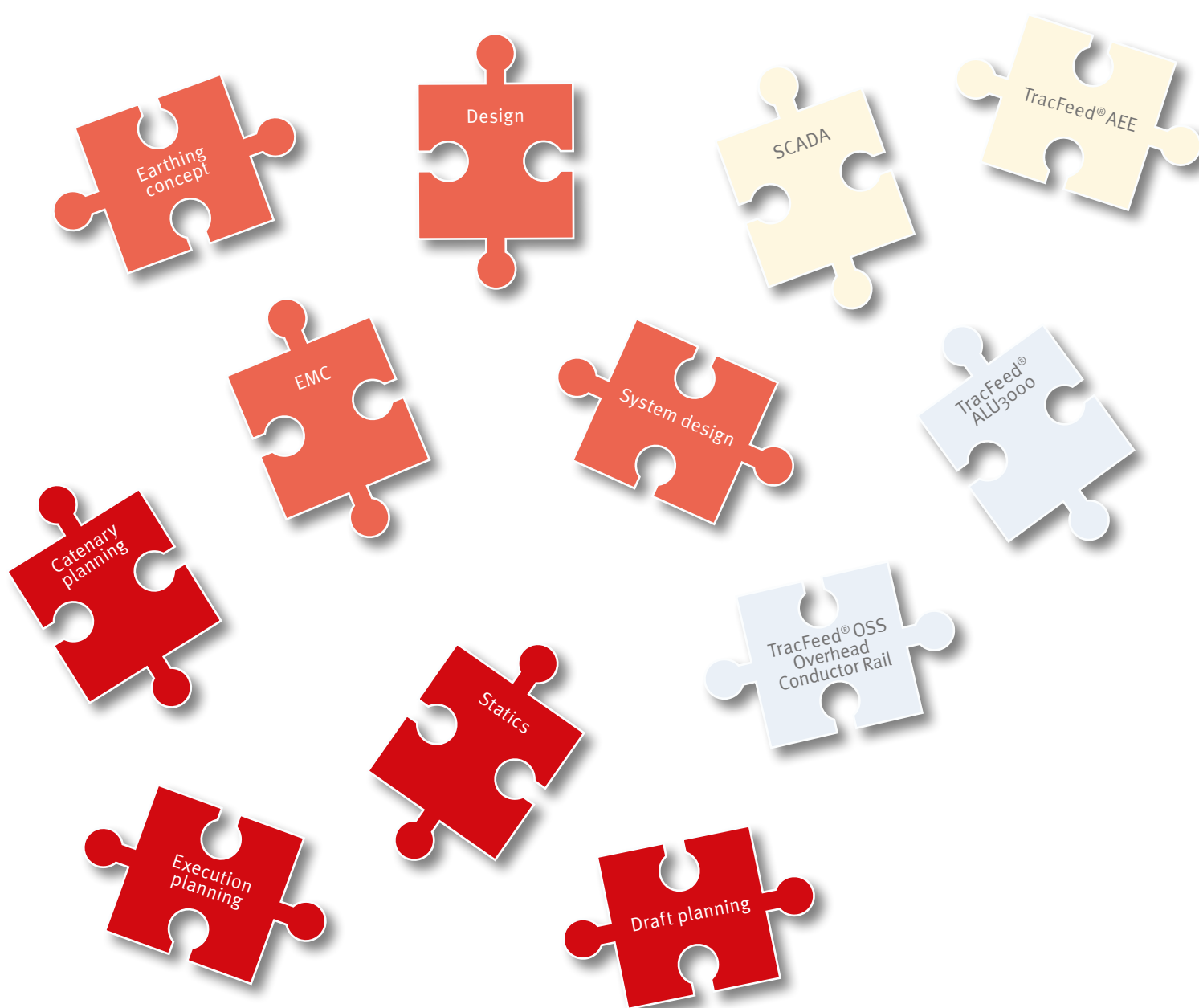
The traction power supply systems from Rail Power Systems include not only the power supply equipment in DC and AC, but also the relevant tailored control and protection technology as well as remote control and network control systems.



## OUR EXPERTISE – PROVEN IN DEMANDING REFERENCE PROJECTS

Sustainable, reliable, and ecologically responsible mobility represents one of the central challenges in many urban centres and large metropolitan areas. Highly efficient local transport will play a prominent role in solving these tasks, both today and tomorrow.

Whether you are currently planning a comprehensive, large-scale transport project for the future or whether you are concentrating on specific areas of focus: You can rely on the know-how and the many years of experience of the experts from Rail Power Systems. Our expertise has proved itself in many challenging reference projects in Germany and numerous other countries. We can accordingly support you individually and success-oriented.





MODULARISED, COST-EFFICIENT,  
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