

# TracFeed® TRx

English



Diode rectifier

## THE NEW TracFeed® TRx

### Uncompromisingly slimline

Improved efficiency and higher power density – less use of resources: With TracFeed® TRx in the TracFeed® TRA (DC750 V) and TracFeed® TRB (DC 1 500 V) versions, Rail Power Systems (RPS) has developed a rectifier that optimally meets current market requirements. Railway operators can therefore continue to rely on the proven strengths of RPS rectifiers and benefit from a whole range of new advantages as well.

- **The new design:**  
Better use of space thanks to PowerUnit configuration
- **Enlarged heat sinks:** More power
- **Higher diode reverse voltage:**  
Greater operational safety
- **Extended modularity:**  
Perfectly adapted to requirements
- **Increased performance:**  
Improved diode characteristic
- **Improved use of resources:**  
Much less material
- **Exact dimensioning:**  
Suitable power
- **Recyclability:**  
In excess of 95 per cent can be recycled in the cycle

### The experience

With our 130-year history in the development of systems and solutions, products and components for railway energy supply, we have consistently been able to play a key role in shaping technological progress in the construction and expansion of railway infrastructure. The knowledge and expertise we have gained in the process remains the ideal prerequisite for helping to shape the future of global rail transportation. Be it as Allgemeine Elektrizitäts-Gesellschaft (AEG), ADtranz (AEG & ABB), Balfour Beatty Rail or – today – Rail Power Systems: our expertise is also our promise for the stability, efficiency and performance of your railway operation.

### The basis

Rectifiers with natural air cooling are a common feature of DC railway power supplies. To convert AC to DC voltages, power diodes in AC bridge connections are predominantly used. This enables nominal voltages of up to DC 3 000 V.



Clamping units on heat sink string



## The design

Rectifiers are typically installed in individual panels. In this regard, diodes and fuses are grouped into units (PowerUnits). The installations in RPS rectifier panels are always aligned in such a way that technical interventions – e.g. in the event of maintenance or repair – can be carried out easily from the front of the panels.

For nominal voltages above DC 1 500 V, this can be achieved by directly connecting the diodes in series or by connecting rectifiers in series. By selecting different transformer switching groups, 12- or 24-pulse operation with reduced mains feedback effects can be achieved in relation to series or parallel connections of the singular units (PowerUnits or rectifiers).



Project-specific special solution



Diodes between heat sinks

The connections can be installed in both the upper and lower sections of the rectifier panel. This ensures the greatest possible flexibility. The rectifiers can be connected or wired in different arrangements, thereby enabling straightforward as well as time- and cost-saving installation.

The new rectifier design made it possible to significantly increase the performance. Consequently, the resources required and the number of components could be reduced. This allows us to optimise the TracFeed® TRx generation of RPS rectifiers vis-à-vis the predecessor series TracFeed® GR without compromising on quality or performance.

## Extended modularity

- **Perfectly adapted to requirements**

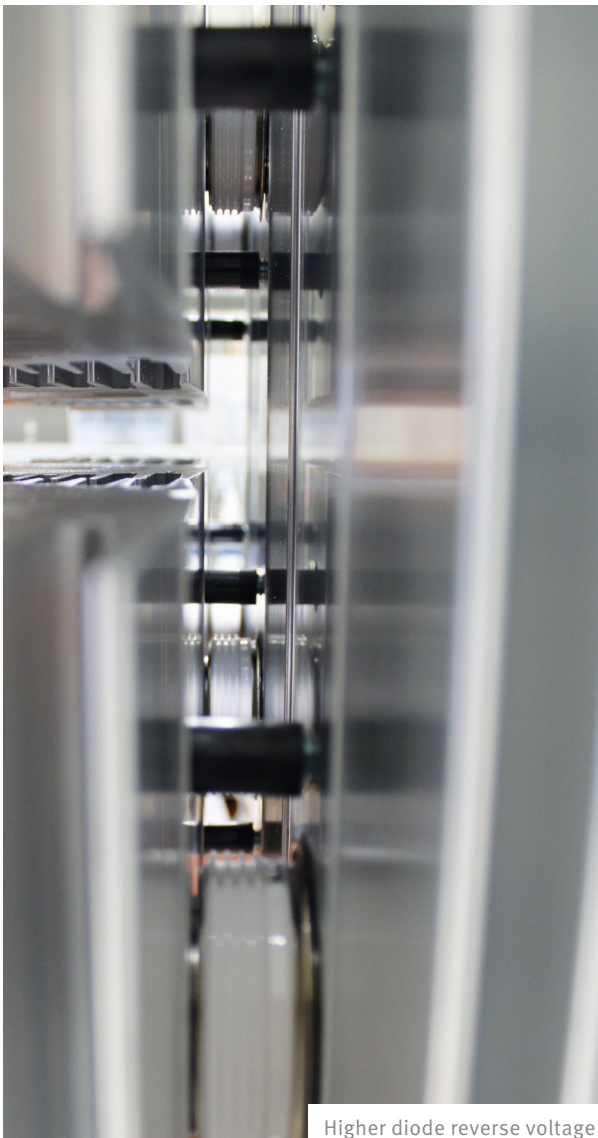
The newly developed rectifier system has a modular design. The new “PowerUnit configuration” is scalable and can be easily adapted to the relevant project requirements. The corresponding configuration is installed in the rectifier panel.



## ADVANTAGES OF THE NEW DESIGN

### The new design

- **Better use of space thanks to PowerUnit configuration**  
In the predecessor model of the TracFeed® GR, one to three powerblocks (TracFeed® PB) were connected to a rectifier. The new rectifier groups the diodes together on a string as a “PowerUnit” (TracFeed® PU). This new configuration creates room for a whole range of interior design improvements, but above all it saves a considerable amount of space.



Higher diode reverse voltage

### Enlarged heat sinks

- **More power**  
Despite “downsizing” the rectifier panel, it was possible to increase the volume of the heat sinks via the improved design. The larger heat sink surfaces, in turn, enable better performance values, as higher currents can be conducted through the diode as a result of the enhanced cooling effect. Conversely, this means: we required a significantly lower number of diodes for the same performance. Reducing the number of diodes allowed us to reduce the required installation space.

### Increased performance

- **Improved diode characteristic**  
In the course of redeveloping the TracFeed® TRx, it was not only possible to optimise the heat sinks and thus make them more powerful. It was also possible to reduce heat output by using a higher-performance diode with a better characteristic curve. This also had an influence on reducing the number of diodes and the higher currents in our rectifier system.

### Higher diode reverse voltage

- **Greater operational safety**  
A further strength of RPS rectifiers: reverse voltages of 2 400 V are offered as standard for DC 750 V. This distinguishes RPS rectifiers from the market environment, where diodes with a reverse voltage of 2 200 V are offered as standard.



## Improved use of resources

- **Much less material**

Thanks to a better rectifier design vis-à-vis its predecessor, a lower use of materials was achieved. This new design has also made it possible to significantly reduce requirements, especially for copper.

## Exact dimensioning

- **Suitable power**

A further advantage of the new design: the TracFeed® TRx provides standard market services and makes it possible to implement suitable offers. Overdimensioning with regard to requirements, as with the previous product, is not possible. It is thus possible to avoid disadvantages resulting from overdimensioning, such as higher costs and increased space requirements.

## Recyclability:

- **In excess of 95 per cent can be recycled in the cycle**

In addition to comprehensive resource conservation, the new RPS rectifiers offer a very high level of recyclability.

- > 95 % fully recyclable – metals (steel, aluminium, copper)
- < 3 % thermally recyclable (e.g. insulators)
- < 1,5% recyclable electronic scrap (diodes), capacitors, lines



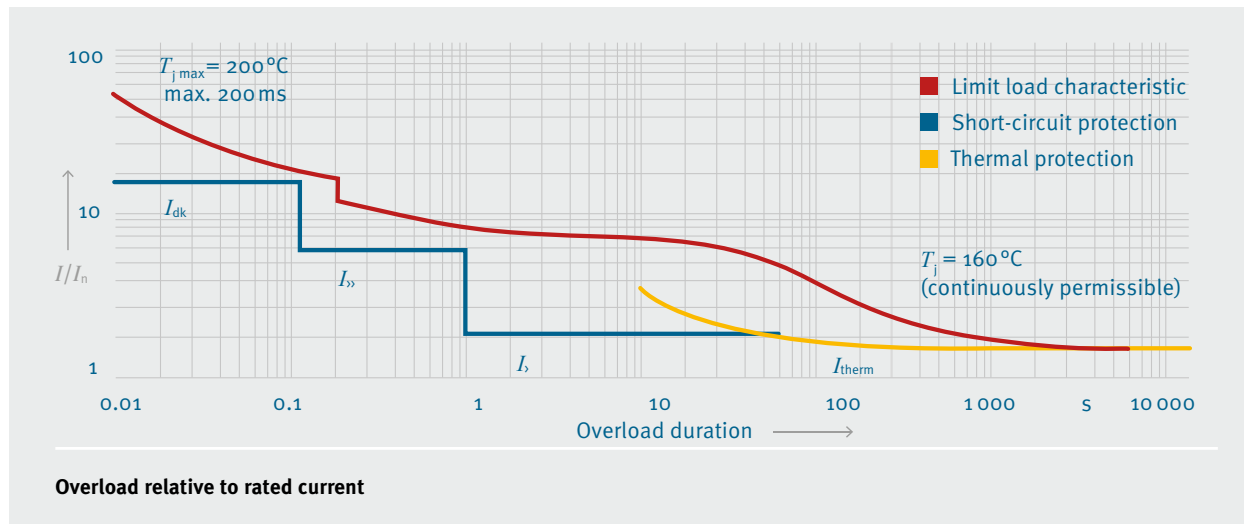
Rectifier damping



AC and DC connections



## Limiting current characteristic curve with protection characteristic curve



The illustration depicts an example of the Limit load characteristic curve (load capacity limits  $I_{BD}$  and  $I_D$ ) for the Nominal input voltage rectifier, giving due consideration

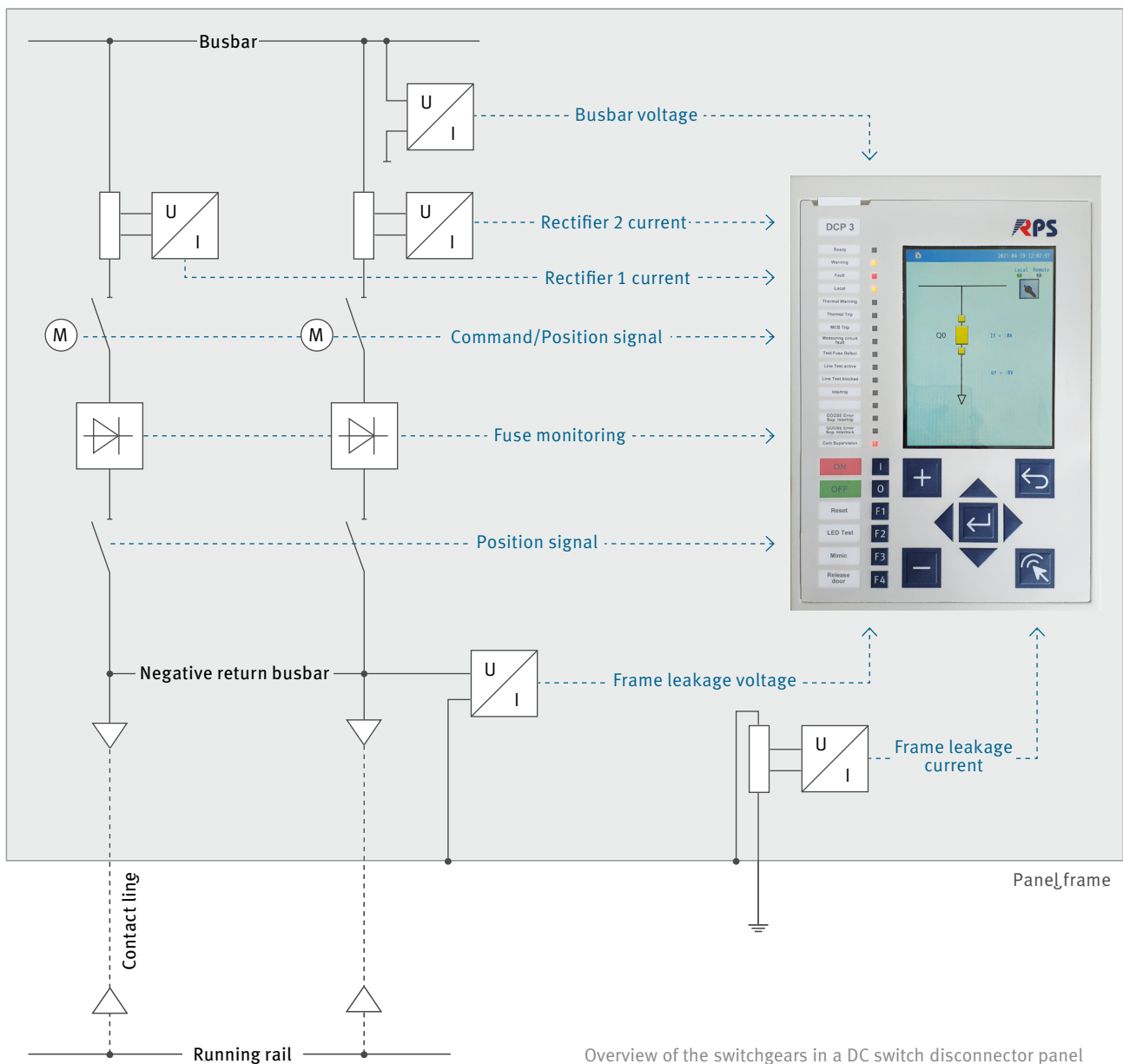
to the in-line transformer and the feeding medium voltage network.

## Nominal input voltage

Circuit no.	Transformer circuit on valve side	Valve circuit	p	q	Valve-side power factor $I_v/I_d$	$\frac{U_{di}}{U_{v0}}$	TracFeed® TRA DC 750 V	TracFeed® TRB DC 1 500 V
8			6	3	$0.816$ $\frac{\sqrt{2}}{\sqrt{3}}$	$1.35$ $\frac{3\sqrt{2}}{\pi}$	Input: 555 V ( $U_{di}$ ) Output: 750 V ( $U_{v0}$ )	Input: 1 111 V ( $U_{di}$ ) Output: 1 500 V ( $U_{v0}$ )
9			12	3	$0.408$ $\frac{1}{\sqrt{6}}$	$1.35$ $\frac{3\sqrt{2}}{\pi}$	Input: 555 V ( $U_{di}$ ) Output: 750 V ( $U_{v0}$ )	Input: 1 111 V ( $U_{di}$ ) Output: 1 500 V ( $U_{v0}$ )
12			12	3	$0.816$ $\frac{\sqrt{2}}{\sqrt{3}}$	$2.7$ $\frac{6\sqrt{2}}{\pi}$	Input: 277 V ( $U_{di}$ ) Output: 750 V ( $U_{v0}$ )	Input: 555 V ( $U_{di}$ ) Output: 1 500 V ( $U_{v0}$ )

## MULTIFUNCTIONAL DEVICE **TracFeed® DCP3** FOR PROTECTION AND CONTROL IN DC SWITCHGEAR ASSEMBLIES

**Rectifier and DC disconnecter panel – the third generation of the highly successful TracFeed® DCP device family.**



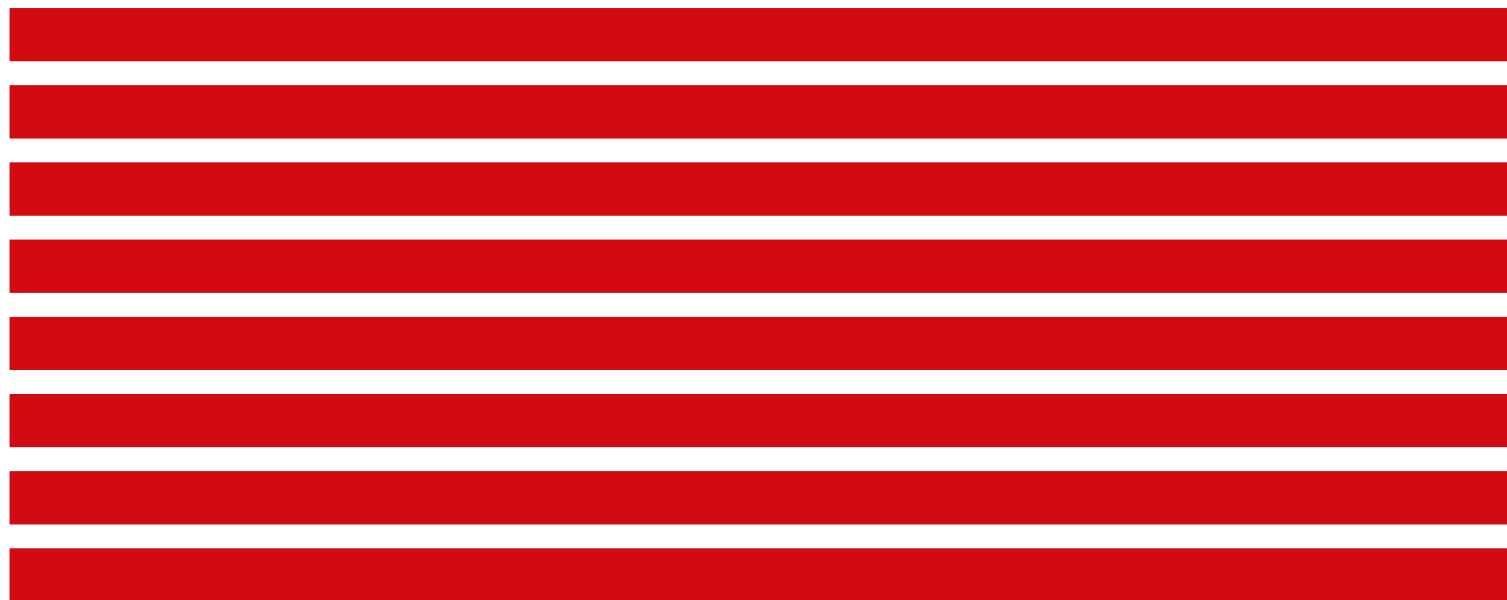
Overview of the switchgears in a DC switch disconnector panel

The TracFeed® DCP3 is a powerful system platform that serves as a protection and control device for universal use in the field of DC railway power supply.

**Advantages:** The hardware is compatible for exchange with TracFeed® DCP1x6 and TracFeed® DCP2 devices.

**New:** Communication as per IEC 61850





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