



**Vossloh  
Rolling Stock**



# Modula BFC

Technical Data

New variant coming soon

## Hybrid locomotive for hauling freight

Small Battery + Fuel Cell Traction

# Hybrid locomotive **Modula BFC**

The Modula is a hybrid locomotive concept with different traction modules on a standardised centre-cab locomotive platform. These systems have the same interfaces so that, for example, the two diesel engine unit can be replaced by a two battery unit.

## Variants:

- **BDD** (small battery + two diesel engines),
- **EDD** (electric traction + two diesel engines) and
- **EBB** (electric traction + two larger batteries).
- In addition a **BFC** (Fuel Cell traction system) is in development as a further traction variant.

This modularity allows the operator to adapt the locomotive quickly and easily to changing requirements. It offers a range of standardised functions and systems that can be assembled into customised versions to suit the customer's specific requirements. With its high proportion of identical parts, the platform concept provides synergy effects and simplifies the management of replacement parts.

## The benefits of a BFC at a glance

- Sturdy, mid-cab construction, excellent shunting locomotive qualities and a wide range of operational applications
- Optimised vehicle design that takes into account the full range of customer requirements
- Power at the wheel of CO<sub>2</sub> free shunting use up to 300 kW
- Simple and flexible integration of current and future energy storage and electricity generation technologies
- The BFC variant has considerable potential for savings in maintenance and energy costs
- High level of reliability through the use of high-quality components
- High availability thanks to a redundant drive configuration and two drive systems
- Remote Cloud access to data and the locomotive's condition enables its deployments to be precision-planned (an advantage when refueling or when replacing parts subject to regular wear and tear)
- Design and safety aspects structured according to the CSM and EN 50126 V-Model process
- The planned TSI approval allows the locomotive to be used in many European countries



approx. **50%**  
more power at the wheel  
compared to the DE 18

The first variants are the **Modula-EBB**, **Modula-EDD** and **Modula-BDD**. The bogies, locomotive frame, driver's cab, pneumatics, air-conditioning and inverter are all identical and constitute the basic configuration. And each **Modula** variant is powerful with a high starting tractive effort.

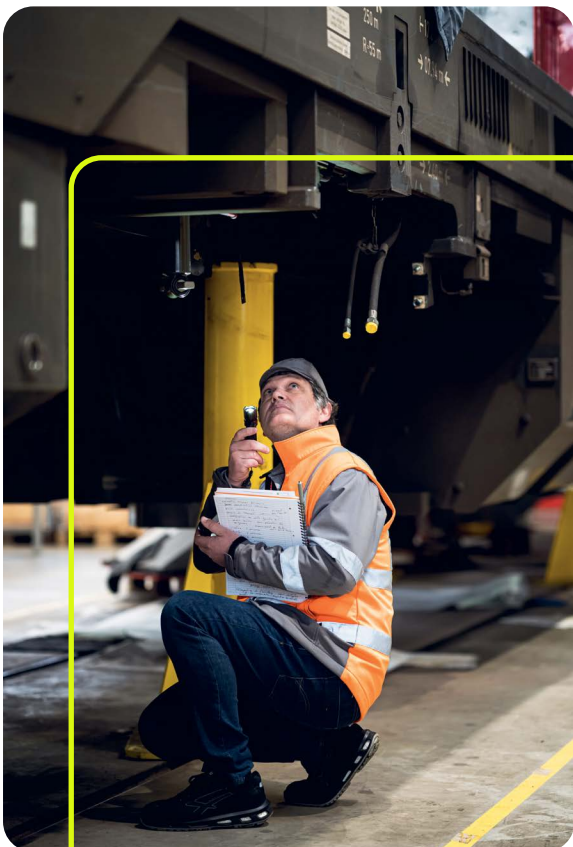
The **Modula** offers a lot more in Dual-Mode operation compared to the DE 18. A freight train can be picked up in an area with no catenary and transported to its destination (2 traction modules per variant provides more flexibility and makes best use of the line infrastructure available). Consequently, an additional locomotive for hauling without catenary is not required. The EDD or the EBB, however, can use inexpensive, carbon-neutral electricity as soon as catenary becomes available. The **Modula's** power at the wheel can be increased by 50% in comparison to the DE 18. The **Modula** stands for higher output during line operation, more flexibility and more energy-saving options.

The **Modula-BFC** variant is the next-generation hybrid, utilizing hydrogen fuel cell technology to provide a zero-emission alternative to traditional diesel power.

Still under development, this variant represents the future of sustainable rail transportation by offering a clean and flexible energy source.

The fuel cell provides power either in conjunction with the battery or without the battery electric traction power enabling the BFC to operate without reliance on overhead catenary or fossil fuels.

This makes it an ideal candidate for regions where catenary infrastructure is limited or where strict environmental regulations are in place. The fuel cell technology, combined with Modula's high adaptability, ensures a forward-thinking, green alternative with high efficiency and operational flexibility for diverse rail operations.



## Maintenance

There's a focus on maintenance with the **Modula** platform because an electric locomotive also has to operate reliably. Consequently, every **Modula** variant is designed for easy maintenance. The continuous analysis of sensor data allows maintenance work to be predicted and planned better, which means that downtime can be reduced considerably. What's more, the modular system also allows the user to completely remove a diesel engine or battery unit, replace it with one that has already been serviced and go straight back into operation. This opens up completely new possibilities in the area of maintenance and service.

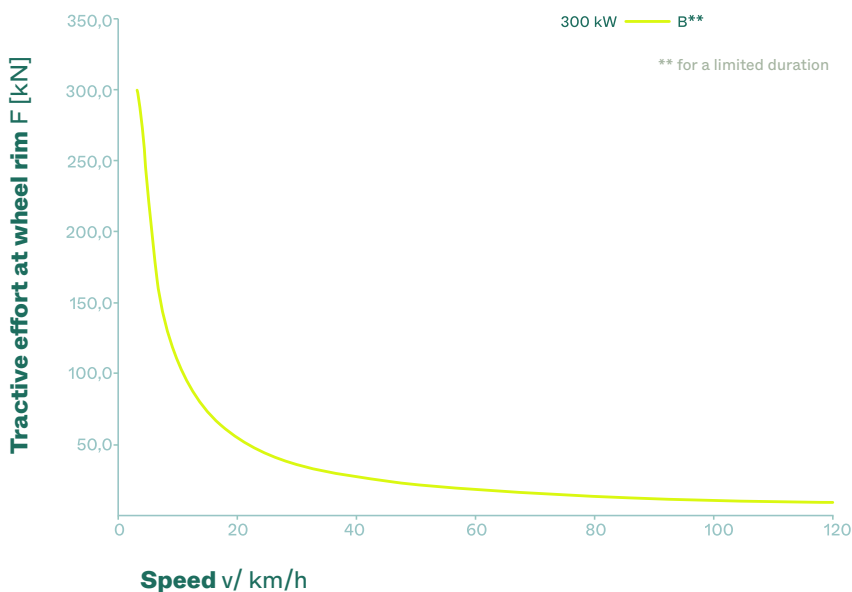
## Modula Technical Data



<b>Wheel arrangement</b>	Bo'Bo'
<b>Length over buffers</b>	18.700 mm
<b>Min. curve radius</b>	75 m
<b>Vehicle mass</b>	84 – 90 t
<b>Battery capacity (EBB)</b>	160 kWh
<b>Battery technology</b>	LTO
<b>Power transmission</b>	AC/AC wheelset-selective control
<b>Converter</b>	IGBT-inverter
<b>Power at the wheel B</b>	300 kW (limited duration)
<b>Tractive effort</b>	300 kN starting tractive effort
<b>Top speed</b>	120 km/h
<b>Ambient conditions</b>	T1 -25°C to +40°C
<b>Tunnel classification</b>	Category B (20 km) as per TSI SRT
<b>Homologation</b>	As per TSI initially planned in Germany, Austria and the Netherlands

## Modula BFC

### Power at the Wheel



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