

# Application note

## Modular traction motors for railway applications

ABB is a global leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. ABB operates in more than 100 countries and has offices in 87 of those countries to give its global and local customers the support they need to develop and conduct their business successfully.

### What applications are these motors suitable for?

ABB's medium power AMX traction motors are designed for railway vehicles such as electric multiple units (EMUs) for regional trains, light rail vehicles (LRVs) and metropolitan tramways running on ground or under ground.

These modular, robust, flexible and compact high performance motors allow train manufacturers and OEMs freedom both for new designs and for retrofitting. All motors are designed to endure tough operating and environmental conditions, making them suitable for use in any climate zone.

### Why a modular platform for traction motors?

Modern industrial conditions require flexible design concepts to increase standardization, improve quality and cut delivery times. In traction applications, this must be achieved without compromising performance or reliability.

ABB's own-designed AMX motor range is a firm response to increasing demands of shorter lead times in today's rapidly expanding traction markets.

The motors are based on a modular platform, which separates components into modules. Most of the motor's components are standardized in design, ensuring shorter lead times in engineering and production.

By combining modules into different configurations, ABB is able to customize each motor to customer specifications. The modular design also simplifies maintenance, thus reducing operational downtime.



### What about footprint, weight and reliability?

The AMX motor range has mounting straps attached to the casing according to the vehicle builder's requirements. This allows motors to be fitted into the smallest possible space.

The motor features a new electrical design, optimized for high energy efficiency and a competitive performance/weight ratio.

A key design feature is that the rotor cage is made of aluminum, die-cast directly onto the laminations. This is a proven and robust rotor design providing enhanced reliability. On request, ABB can also provide rotors with copper cages.

### What about compatibility with converters?

The motor is designed to work optimally with IGBT-based converters. Special effort has been made to decrease harmonic losses, noise and torque pulsations. The insulation system contains corona resistant materials, has low water absorption properties and complies with temperature class 200.

### What are the main features?

- Modular, compact and flexible design
- Standardized parts
- Competitive performance/weight ratio
- Reliable electrical design

### What exactly is modularized in the AMX range?

The AMX range is an excellent example how the mechanical structure of the motor can be customized to customer specification. The design of the house and shield is standardized, yet prepared for adaption of a range of components:

#### • Scalable design

The flexible house design allows for scaling the motor's performance to customer requirement.

#### • Pre-defined cross sections

Rating according to design requirements ensures high operating efficiency while providing maximum flexibility for the bogie layout.

#### • Cooling arrangements

The standard design is prepared for either Open Self Ventilation or Open Forced Ventilation. Customers can choose to make the air inlets and outlets part of the house or of the shield, on either the drive end side (DE) or the non drive end side (NDE).

#### • Bracket attachment

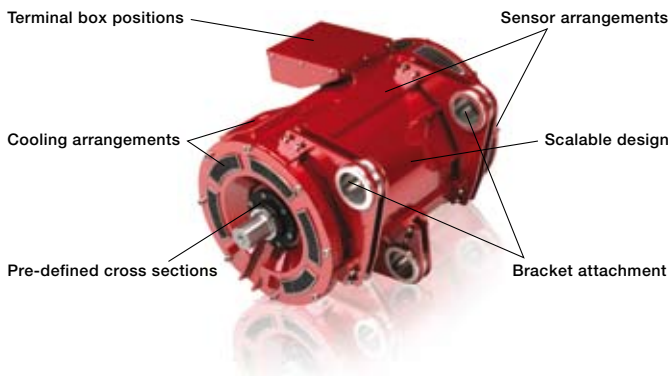
The brackets are adaptable to support all bogies and attachment methods (suspended or non-suspended). The brackets are made as separate parts in order to reduce lead time and increase quality, reliability and flexibility.

#### • Terminal box positions

Customers can choose to place the terminal box in different pre-defined positions on the house. Other positions are also available on request. The design also supports flying leads to an externally mounted terminal box.

#### • Sensor arrangements

Thermal sensors can be placed optionally e.g. in the winding, stator core or bearings. Speed sensors are integrated to keep the motor compact, while allowing sensors to be replaced without de-assembling the motor from the bogie.



In the AMX range, the design of the house and shield is standardized, yet prepared for customization of a range of components.

[Click to watch AMX movie.](#)

### What is ABB's total traction motor offering?

Customers are supported from design concept through all subsequent stages to ensure smooth implementation and optimum performance of the complete traction unit.

#### • Quality products

To supply top quality products with short response times, ABB has developed global manufacturing facilities and an independent supplier network. All arrangements are subject to stringent quality assurance procedures.

#### • Customer support

ABB provides customer support from its manufacturing centers and local offices in more than 100 countries. ABB's rating program assists vehicle builders at the bidding stage. From a schedule of track gradients, distances and journey time, ABB can select the appropriate traction motors.

#### • Service and maintenance

ABB's global after sales service organization has broad experience of electrical machines and can provide superior operational availability and life cycle profitability. ABB uses life cycle management models to plan preventive maintenance procedures – helping customers reduce total life cycle costs.

ABB manufacturing units are certified to ISO 9001:2000, ISO 14001:2004 and IRIS.



### What is ABB's track record in railway applications?

ABB has supplied traction motors since 1909, including high power traction motors for heavy locomotives in intercity expresses and medium power traction motors for lighter applications such as EMUs, LRVs and metropolitan tramways.

### What are the main customer benefits?

- Fast responsiveness to inquiries
- Short delivery times
- Easy access to spare parts
- Global service network
- Global network of suppliers