MITRAC 500
Driven by Reliability

Propulsion & Controls
And this from day one, even under the toughest environmental conditions.

Bombardier offers single products as well as integrated system solutions for propulsion and control equipment. Based on comprehensive experience from all over the world, Bombardier can, in close cooperation with the customer, develop the optimal solution and exceed expectations.

The BOMBARDIER* MITRAC* 500 product portfolio is a family of propulsion systems for light rail vehicles like street cars and trams as well as for automated people mover. It also includes the Train Control and Management System (TCMS) for doors, brakes, heating or air conditioning as well as for passenger information and security systems.

MITRAC 500 supports the 600 / 750 V DC standard supply systems and is also available for dual system mainline application (15 kV 16 2/3 Hz). The modular architecture allows customized applications, based on standard and field proven building blocks, to meet all customer requirements. The synergy of high modularity, efficiency, reliability and excellent maintainability provides low life cycle costs and dependable revenue service. Innovative designs, modern simulation tools and intensive product testing ensure maximum performance and reliable operation.

MITRAC 500 Applications
For Light Rail Vehicles and Automated People Mover:
- Trams
- Street Cars
- Dual System Trams
- People Mover Systems
Driven by Reliability

MITRAC powers the world’s most reliable rail vehicles – a result of uncompromisingly optimizing the reliability of all our products. Bombardier designs for reliability from the start, and also achieves excellent performance. For passengers it means punctual departures, comfortable trips, and on-time arrivals. For fleet carrier it means lowest maintenance efforts and downtimes of their vehicles.

Exceeding Expectations

MITRAC 500 meets customer requirements as well as increasingly demanding industry standards and regulations, today and in the future. Our ambition is to provide true revenue generating solutions in order to exceed expectations of our customers. Receiving the IRIS (International Railway Industry Standard) award reflects the excellent quality of both products and management over the entire supply chain.

Committed to Sustainable Mobility

The consistent energy efficient design of each propulsion unit and control component contributes strongly to more sustainable mobility. The first EPD (Environmental Product Declaration) for a MITRAC product was verified in accordance with EMAS (Eco Management and Audit Scheme) confirming Bombardier’s commitment to preserve the environment.

Boosting Customer Competitiveness

With its outstanding performance and compact design, MITRAC 500 is the most competitive low power propulsion equipment available and powers more than 2,000 vehicles worldwide. It answers vehicle manufacturers needs, and offers railway operators innovative applications that increase their competitiveness by increasing passenger and customers attractiveness and decreasing operational costs.
Bombardier Transportation introduced the world’s first IGBT (Insulated Gate Bipolar Transistor) propulsion converter for Light Rail Vehicles in 1996.

World-leading Converters
Today, we offer the world’s most innovative, efficient and reliable solution based on industry standard IGBT modules, combining the best power-to-weight-ratio with an environment friendly cooling system. It’s one of the reasons why more than 4,200 MITRAC low power IGBT converters have been sold to date.

Solutions for every Low Power Propulsion Application
The MITRAC 500 traction converter product family can be applied to any power system in any country and for different vehicle applications from Trams to People Movers. Bombardier also offers converters for dual system LRVs, running in cities under 750 V DC and mainline supply of 15 kV 16 2/3 Hz. This allows flexible use, not only in the inner cities, but also in the suburban and regional conurbation areas.
**Higher Reliability through Modularity**

*MITRAC 500* traction converters are based on a unique concept that enables extensive standardization. It consists of one modular and scalable core design that can be adapted to a wide variety of applications and power ranges.

The converters are based on the *MITRAC CM-S* converter module. The forced air-cooled CM-S contains up to 12 IGBTs, and provides outputs for two to four AC motors, two brake resistors and the energy storage system. The modular compartments allow a customer specific arrangement of the converter system and its functionality.

One of the features of the CM-S is its easy maintainability combined with the possibility of rapid removal and replacement. The water / air heat exchanger for the traction motor and the brake resistor unit is very easy to maintain as well. The water valves e.g. in the cooling circuit close automatically when the water tubes are removed.

The converter configurations for vehicles with 10 tons or 12 tons axle load are shown in the table below and illustrate the flexibility of the *MITRAC 500* modular converter system. Two times 360 kW for one motor each or 720 kW for two motors in parallel, in combination with the well known basic rheostatic brake and the *MITRAC* Energy Saver system are possible. The basic line voltage system of 750 V DC is also available with a second system for vehicles that run under mainline systems (15 kV AC 16 2/3 Hz).

Bombardier’s stand-alone auxiliary converters (*MITRAC AU 500* family) are available with output power of up to 75 kVA and up to 12 kW DC output for the 24 V DC vehicle supply system as well as for the vehicle battery charging. Different power ratings allow the vehicle builder to optimize the auxiliary supply to the customers’ needs.
Muscles – Providing Traction Effort

This success is based on Bombardier’s ambitious requirements on the reliability, safety, energy efficiency and low life cycle costs in the entire product range. The drives optimally exploit the converters’ characteristics and are designed to fit within a bogie’s limited space.

More than 6,000 Bombardier MITRAC 500 drives are in service worldwide.

Pace-setting Drives
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Drives for every Low Power Application
The MITRAC DR 500 family offers the right drive solution for every Tram, Streetcar or Automated People mover application. The selection of right configuration of traction motor and its associated gear is essential for a powerful, high performing and reliable drive.

An optimized design according to the fundamental requirements of available space, axle load and speed results in a highly reliable solution with low maintenance effort during the whole lifetime of the product.
Brain – Managing the Vehicle and Propulsion System

Control
- Vehicle Control Unit (VCU)
- Drive Control Unit (DCU)

Networking
- Ethernet Switches
- TCN & IP Gateways
- Mobile Communication Gateway (MCG)

Interfacing
- Input / Output Units
- Driver's Desk I/O

Visualization
- Human Machine Interface (HMI)

Bombardier Transportation introduced the world's first integrated IP-based TCMS on track.

Game-changing Electronics
MITRAC TCMS (Train Control and Management System) provides train, vehicle and drive control functions such as those for operating, comfort and train diagnostics. The latter facilitates increased efficiency in operation and maintenance, resulting in greater competitiveness for vehicle builders, maintainers and operators. The backbone of the TCMS is the TCN (Train Communication Network), which consists of the MVB (Multifunctional Vehicle Bus) for intra-vehicle communication, and the WTB (Wire Train Bus) for train-wide information exchange. The MITRAC TCMS also supports the industry-standard IP technology using Ethernet – the latest and most widely used communication technology. The 100 Mbit/s bandwidth creates opportunities for increased functionality such as on-board video surveillance, extended passenger information systems and voice communication.

Vehicle Control
The TCMS provides all the management and control functions that inject life into the vehicle. The TCMS also collects, processes and visualizes diagnostic information.

Drive Control
The drive control units (DCU2) are an integral part of the traction converters. They control and supervise all functions of the converter, including high performance adhesion control for traction motors and effective power management such as energy recuperation.

Wireless Communication
The MITRAC CC TWCS (Train to Wayside Communication System) extends TCMS by providing seamless wireless communication between train and wayside. It supports upcoming requirements of railway operators, such as remote access to diagnostic data and real-time monitoring, passenger information systems, updating seat reservations, retrieving trip databases and more. The heart of the TWCS is the MCG (Mobile Communication Gateway).
Major References

**Flexity Outlook, Brussels**
- Vehicles: 148
- Start of revenue service: 2005
- Converter type: MITRAC TC 520 / TC 530

**Flexity Berlin**
- Vehicles: 4 Base & 138 Option
- Start of revenue service: 2008
- Converter type: MITRAC TC 520

**Flexity Swift, Frankfurt Hochflur**
- Vehicles: 146
- Start of revenue service: 2007
- Converter type: MITRAC TC 530UF

**Flexity Classic, Dresden**
- Vehicles: 115
- Start of revenue service: 2001
- Converter type: MITRAC TC 510 / TC 540

**Variobahn, OEG, MVV, HSB**
- Vehicles: 19
- Start of revenue service: 2009
- Converter type: MITRAC TC 520 ES
- Energy Saver type: ES 500 with partly CFO (300m)

For further technical details see MITRAC specification sheets.

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