

ICALI AND RIO AIR CONDITIONING UNITS FOR DUEWAG N8C TRAMS



Between 2007 and 2014, the City of Gdańsk acquired used Duewag N8C trams from Dortmund and Kassel, originally manufactured between 1978 and 1982. A total of 62 vehicles were obtained. Before entering service in northern Poland, all of them underwent an initial modernization program. As part of this work, the trams received a new low-floor center section and a redesigned exterior appearance. Beginning in 2018, a second major modernization program covering 60 vehicles was launched.

Although the vehicles appeared nearly identical after the first modernization, the trams originating from Kassel (16 units) were designated Duewag N8C-MF 18, while the larger fleet from Dortmund was designated Duewag N8C-MF 01. The principal difference between the two versions is the absence of a hydraulic brake on the third bogie of the ex-Dortmund vehicles ("MF 01"). This distinction was retained during the second modernization program carried out between 2018 and 2027.

The scope of work was not limited to the mechanical portion of the vehicles but also included the electrical equipment. The original thyristor-based equipment had exceeded its intended service life, resulting in an increased number of operational failures. In addition to the comprehensive mechanical overhaul,

all wiring was replaced and new electrical equipment supplied by ENIKA was installed. Deliveries included ENI FT600/N8C/GD traction converters, a TCMS system with a 10.4-inch LCD display, ergonomic operator control desks, a high-speed circuit breaker, and numerous other components, including passenger compartment and operator's cab heating systems.

New onboard converters also formed part of the modernization project. Initially, compact ENI-PT600/24/MR.1 onboard converters with a 7 kW DC output were used, functioning essentially as battery chargers for the onboard battery system. They were later replaced by more powerful ENI-PT600/24AC/50.1 onboard converters featuring an enhanced 10 kW DC output and a 32 kVA AC output. This change was



RIO 17AC/18AC passenger compartment air conditioning unit for Duewag N8C-MF 01 trams.

associated with the operator's decision to equip the trams with passenger compartment air conditioning.

The first modernization program, carried out between 2007 and 2014, included the installation of air conditioning systems for the operator's cab in all vehicles. In addition, 16 trams originating from Kassel received passenger compartment air conditioning. As part of the second modernization program, 44 Duewag N8C-MF 01 trams (ex-Dortmund) were equipped with passenger compartment air conditioning supplied by ENIKA. In 2025 and 2026, additional operator's cab air conditioning units were ordered to replace the previously installed systems. To date, a total of 64 units have been ordered, with ENIKA serving as the supplier.

As part of the most recent modernization program, the iCALI 6DC/5DC air conditioning unit was selected for the operator's cab. This compact rail vehicle HVAC unit features a long service life and incorporates its own onboard converter based on SiC technology. Its dimensions are 1,000 × 1,100 × 335 mm and its weight is 100 kg. The unit combines cooling, ventilation, and heating functions. Cooling capacity is 6 kW and heating capacity



iCALI 6DC/5DC air conditioning unit for the operator's cab.

is 5 kW, ensuring the required thermal comfort at the operator's workstation. The unit is also available in a version without an integrated onboard converter (CALI variant) while maintaining identical performance characteristics. Dimensions remain unchanged, while weight is reduced by approximately 10 kg.

RIO 17AC/18AC air conditioning units were supplied for the passenger compartment. Their power supply is provided by the previously mentioned ENI-PT600/24AC/50.1 onboard converter. The converter supplies the HVAC unit with 3 × 400 V AC / 50 Hz and 24 V DC power. Each RIO unit provides 17 kW of cooling capacity and 18 kW of heating capacity. Two units are installed in every Duewag N8C-MF 01 tram. Each unit weighs approximately 250 kg and measures 1,600 × 1,560 × 400 mm. Compared with other products offering similar performance, particular attention was paid to minimizing installation height.

The installation of the air conditioning units was carried out in conjunction with the comprehensive modernization of the Duewag N8C-MF 01 fleet. Together with the other modifications performed, this resulted in improved comfort for both passengers and operators while extending the service life of the vehicles.



Partially low-floor Duewag N8C-MF 01 tram in Gdańsk equipped with ENIKA electrical equipment.