

Bosch Engineering

Rail Vehicle Control Unit: Control Unit for Rolling Stock



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Customer benefits

- ▶ Reliable operation thanks to the robust design of the control unit
- ▶ Flexible integration into the rolling stock via CAN Bus interfaces
- ▶ Optimized vehicle operation thanks to the closed and open loop control of tasks in the rolling stock (vehicle control system, energy management, air conditioning and fan control, diagnostic tasks, data analysis and recording)

Description

The Rail Vehicle Control Unit (Rail VCU) by Bosch Engineering is based on a control unit that was originally designed by Bosch Rexroth for controlling complex mobile work machines. Bosch Engineering has enhanced and validated this proven technology to apply it to rolling stock.

By applying 32-bit TriCore technology with 180 MHz, the Rail VCU is advancing to performance levels that were previously the preserve of significantly larger PLC systems.

A range of inputs and outputs with error detection and centralized deactivation functions enable the Rail VCU to be used in a reliable manner for a range of tasks in rolling stock.

The Rail VCU is characterized by a robust design and a high level of electromagnetic compatibility.

The Rail VCU has a secure watchdog processor that monitors program sequences, while also featuring a hardware-based RAM memory monitoring system and a two-channel stop function. These functions thereby ensure that the control unit is reliable when operating those applications critical to safety during vehicle operation.

In addition, the four autonomous CAN Bus interfaces enable flexible integration into a wide range of vehicle concepts.

Technical characteristics	
Processor	TC1797@180 MHz
RAM	1 MByte
Flash	4 MByte
EEPROM	32 KByte
Communication	4 x CAN 2.0 B
PWM power amplifiers	High-side 18, Low-side 10
Digital output	14
Analog outputs	4; 25–75% U_{bat}
Analog output	1; 4–20 mA
Sensor voltage supply	2 x 5 V and 1 x 10 V
Frequency inputs	10; 0–10 kHz
Temperature inputs	9
Other analog inputs	10
Deactivation channels	2 (1 x external, 1 x internal)
Digital inputs	37
Supply voltage (U_{bat})	8–32 VDC
Operating temperature	–40–85 °C
Protection class	IP65
Dimensions (H/W/L) in mm	40,6/203/204,5
Weight	1000 g
Standards	EN50155, EN50121, EN50128

Areas of application

Designed as a universal control unit, the Rail VCU has a wide range of possible application areas in rolling stock. In terms of controlling the vehicle, the VCU is responsible for coordinating the driver's commands, the drive motor and the transmission. Auxiliaries, such as fans, can be controlled using the Rail VCU. Convenient functions, such as the air-conditioning control and importing and processing sensor signals, also number among the application areas.

The Rail VCU by Bosch Engineering boasts a wide range of tools regarding software development, parameterization and function testing. As a result of the strong affiliation of Bosch Engineering to the entire Bosch Group, the company has access to the product range and tools of divisions, such as Rexroth, that have proved their value when used in mobile working machines.

The Windows-based BODAS-Design tool by Rexroth allows easy and flexible programming of the Rail VCU in accordance with industry standard IEC 61131-3.

Maximum performance can be achieved by using the C programming language. The C code is integrated via a C API. When using this language, the user has access to all the functions required to perform configurations, read the inputs and control the outputs in the form of a software library. The user is also able to use the communication interfaces and create diagnostic information. Easy-to-use software interfaces are prepared in order to establish a simple connection of rail-specific, galvanically isolated I/O extensions.

Employing the C programming language allows established, model-based development tools, such as ASCET, Matlab/Simulink or SCADE, to be used. The software can be parameterized using INCA and other established application tools.

Bosch Engineering can provide you with support in designing and developing safety functions that require safety-relevant design guidelines to be observed.

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