



D503

Data Sheet

Ethernet-to-MVB Gateway

Redundant Real-Time Ethernet/MVB Gateway with Bus Administrator and Cybersecurity

- **High-performance Ethernet communication stack**
- **Optimized for cyclic process data**
- **Supports most common real-time Ethernet protocols**
- **Supports MVB devices up to class 4**
- **Optional message data and bus administration**
- **Web server for remote diagnostics and firmware updates**
- **Standard C development library to design customer-specific gateway application**
- **-40 °C to +70 °C operating temperature**

Product Description

Ethernet-to-MVB Gateway

The D503 is an easy to configure Ethernet-to-MVB gateway. It provides a line redundant MVB interface as well as up to two 10/100 Mbit Ethernet interfaces (ETH0/ETH1) on D-coded receptacles.

The flexible platform supports most train-borne real-time protocols, connecting an IP-based end device with the MVB fieldbus, e.g., to acquire diagnostic data.

The Ethernet interfaces comply with IEEE 802.3 supporting 10BASE-T or 100BASE-TX, full duplex mode, auto-negotiation and auto MDI-X.

Variety of Product Options

The optional second Ethernet interface ETH1 is intended to be used as a separate channel, for instance for remote diagnostic and maintenance purposes.

The MVB interface complies with the TCN standard IEC 61375 and supports devices up to class 4. Optionally, the device includes either process data only or also message data, and may act as a bus administrator.

duagon gateways are available in two varieties: as a classic "gateway" with a standard, configurable gateway application, or as a "platform" to build a customer-specific application. For extended or very special requirements, the platform variety is accompanied by a development library that enables fast and efficient design of specific applications, either by duagon as a service or by the customer.



Extended Cybersecurity, Long-Term Availability

duagon offers different cybersecurity packages to harden the D503. The available packages include features such as secure communication for remote access, centralized user access management, secure event logging and secure firmware updates.

Its System-on-a-Chip (SoC) design based on a PLD ensures future portability and long-term availability.

For Rolling Stock Environments

The D503 is designed for harsh rolling stock environment and complies with the EN 50155, EN 50121, and IEC 61373 standards: it withstands -40 °C to +70 °C ambient temperature, complies with interruption voltage supply class S2, is coated against humidity and provides enhanced EMI and vibration robustness.

The gateway is integrated in a stainless-steel housing that can be mounted on a DIN rail or using M4 screws. The device can be powered directly from the vehicle battery or by Power over Ethernet (PoE).

Technical Data

Ethernet Interface Functionality

- General network support: IPv4
- Protocols
 - Interface 0: TCP/IP with UDP Sockets, IPTCom, EtherNet/IP - CIP, CIP Scanner Light, PROFINET, TRDP, TRDP with Safe Data Transmission (SDTv2)
- Web Maintenance
 - duagon Web Maintenance
 - Alstom Web Maintenance
- Maintenance interfaces
 - Web-based interface
 - Command line interface (CLI)

MVB Interface Functionality

- Function
 - Process data
 - Optional: Message data
 - Optional: Bus administrator
- Physical layer: EMD, ESD+, as options

CPU

- FPGA-based soft CPU, 32-bit

Cybersecurity

- Cybersecurity packages
 - duagon Basic Package
 - duagon Enhanced Package
 - Alstom Package

Interfaces

- This product includes interface options
- Ethernet: 2 × 10BASE-T/100BASE-TX, M12, D-coded, receptacle
- MVB: 2 × D-Sub, 9-pin (plug/receptacle)
- Serial: 1 × 12-pin (service)
- JTAG: 1 × 10-pin (service)

- LED
 - Status: initialization, system status
 - Ethernet: activity, link
 - MVB status: 2 ×
- Power: 1 × power in, Phoenix Contact MSTB, 3-pin, plug
- Earthing connection: M5 stud

Electrical Specifications

- Supply voltage
 - 24 V DC to 36 V DC nom. (EN 50155)
 - 48 V DC to 110 V DC nom. (EN 50155)
 - Power over Ethernet (PoE)
- Power consumption: 4 W max.

Mechanical Specifications

- Dimensions: (W) 31.6 mm, (D) 106 mm, (H) 120 mm
- Weight: 415 g
- Cooling: Air cooling, natural convection
- Protection rating: EN 60529, IP30

Product Compliance: Functions

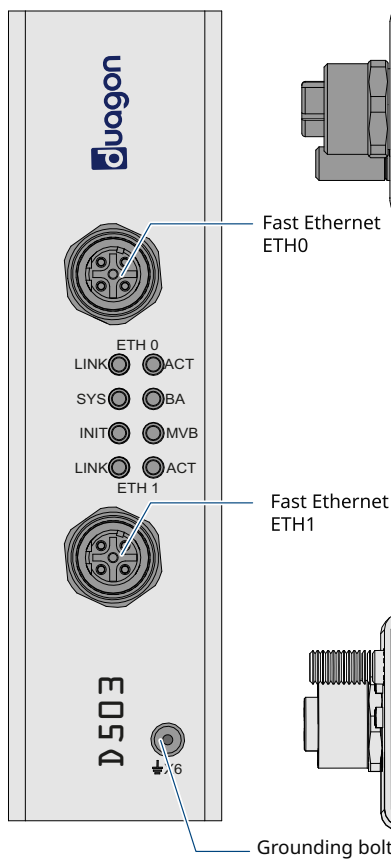
- Ethernet
 - Ethernet: IEEE 802.3-2012
 - Fast Ethernet (FE): IEEE 802.3u
- Train Communication Network (TCN)
 - Part 1: General architecture: IEC 61375-1:2012
 - Part 3: Multifunction Vehicle Bus (MVB): IEC 61375-3-1:2012, IEC 61375-3-2:2012
 - Part 2-3: TCN communication profile, Annex A: Train Real-Time Data Protocol (TRDP): IEC 61375-2-3:2015
 - Part 3-4: Ethernet Consist Network (ECN): IEC 61375-3-4:2014

Product Compliance: Rail - Rolling Stock

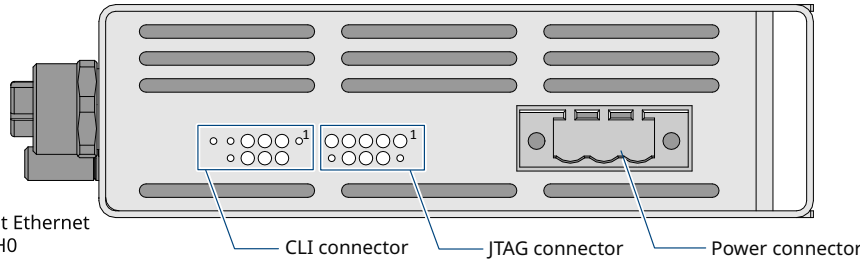
- Operating temperature: -40 °C to +70 °C, +85 °C for 10 min (EN 50155:2021, class OT4, ST1)
- Rapid temperature variations: EN 50155:2021, class H1, no requirements
- Storage temperature: -40 °C (EN 50155:2021) to +85 °C (EN 60068-2-2)
- Altitude: +1800 m max. (EN 50125-1:2014, class AX)
- Humidity: 75 % RH max. typ. yearly average, 95 % RH max. for 30 consecutive days/year (EN 60068-2-30)
- Shock: 30 ms @ 50 m/s² (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- Vibration: 10 min @ 1.01 m/s² (functional) (EN 61373:2010/AC:2017-09, vehicle body, cat. 1, class B)
- Power supply
 - Supply change-over: 0.6 x Un (EN 50155:2021, class C1 w/o limitation in duration)
 - Interruption of voltage supply: 10 ms (EN 50155:2021, class S2)
- Pollution degree: EN 50124-1:2017, class PD2
- Electrical safety: EN 50155:2021
- Fire protection: EN 45545-2:2020, EL9, HL3
- EMC: EN 50121-3-2:2016 + A1:2019
- Protective coatings: EN 50155:2021, class PC2 (Any PCB protected on both sides)
- Useful life: 20 years (EN 50155:2021, class L4)

Interfaces

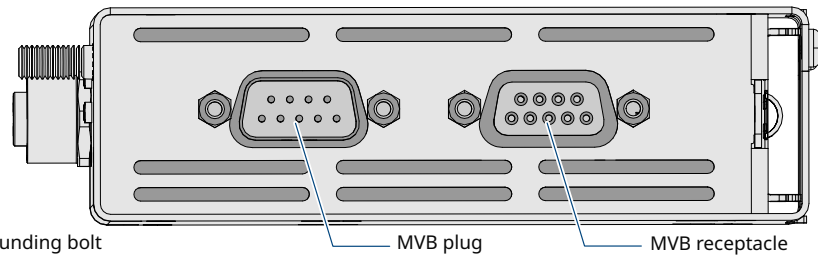
Front View



Top View



Bottom View



Ordering Information

Ordering Options

D503 [1] - [2] - [3] - [4] [5] [6] - [7] - [8] - [9] - [10] - [11] - [12]

D503 G - I - F D - I1 - MM - LV - G (example)

Position	Description	Options	Code
1	Platform configuration	Configurable gateway	G
		Configurable gateway (read-only)	GS
		Programmable platform	H
		Programmable platform (read-only)	HS
2	Ethernet Interface 0	IPTCom	-B
		EtherNet/IP - CIP	-C
		CIP Scanner Light	-CSL
		TCP/IP, UDP Sockets	-I
		PROFINET	-R
		TRDP	-TR
		TRDP with Safe Data Transmission (SDTv2)	-TRS
3	Web Maintenance (Legacy)	None	<empty>
		Alstom web maintenance	-AWM
		duagon web maintenance	-dWM
4	MVB Bus Administrator (Legacy)	Without bus administrator	<empty>
		With bus administrator	-F
5	Message data (Legacy)	Process data only	<empty>
		Including message data	M
6	MVB Physical Layer (Legacy)	ESD+	D
		EMD	T
7	MVB Receiver Insensitivity (Legacy)	Standard RS485	<empty>
		-50/-150 mV	-I1
8	Fieldbus Connector Type (Legacy)	1 × M12	-M
		2 × M12	-MM
9	Power supply	Nominal battery voltage: 48V, 72V, 96V, 110V	-HV
		Nominal battery voltage: 24V, 36V	-LV
		Power over Ethernet (PD)	-PoE
10	D-Sub screw lock (Legacy)	D-Sub with M3 screw locks	<empty>
		D-Sub with UNC screw locks	-UNC
11	Case Options (Legacy)	No grounding bolt	<empty>
		M5 grounding bolt	-G

Position	Description	Options	Code
12	Cybersecurity Packages (Legacy)	No cybersecurity	<empty>
		Alstom Package	-ACS
		duagon Basic Package	-CSB
		duagon Enhanced Package	-CSE

2 -TRS: SDTv2 is a purely functional implementation, it does **not** meet SIL requirements.

- 3+12 **Contact duagon** for availability and selection of AWM/ACS revisions.
- Not all combinations of Web Maintenance and Cybersecurity are possible.
 - Several AWM and ACS revisions are possible.

4-6 Choose one of the two options in each category (bus administrator, message data, physical layer).

► **Contact duagon** for availability and lead times for product models not listed above.