



CAN Repeater

CRep S8C/FD-.../S24/RMD

User Manual

User manual for CAN Repeater CRep S8C/FD-.../S24/RMD

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If you discover a security vulnerability in one of our products, please report it to **security@ems-wuensche.com**. Thank you for your support.

Our products are continuously improved. Due to this fact specifications may be changed at any time and without announcement.

FCC: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference,
and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: CRep S8C/FD hardware and software may not be used in applications where damage to life, health or private property may result from failures in or caused by these components.

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1 Overview

1.1 Attributes

- Protocol transparent CAN repeater for CAN FD and CC
- 8 CAN channels
- Low propagation delay
- Links for cascading up to 3 devices with one supply
- ISO 11898-2:2016 and CiA 601-4 (SIC) compatible bus interface (TI TCAN1462)
- Detach of dominant locked bus segments
- Optional with 120 Ohm or high impedance termination
- Signal conditioning over long distances
- Rail mountable

1.2 General Description

The DIN rail-mountable CAN repeater CRep S8C/FD was developed with signal quality in mind. The use of a Signal Improvement Capability Transceiver (SIC) for the physical CAN interface and split termination enables stable signal transmission and increased immunity to common-mode interference for Classic CAN and CAN FD.

Each of the eight CAN channels physically behaves like a single bus node. The CRep S8C/FD enables the implementation of star network structures. It is possible to cascade up to three CRep S8C/FD with one power supply acting as one logical device. This opens up the possibility to select a network topology, that can help to reduce installation costs.

The ability to isolate permanent dominant segments from the rest of the CAN system reduces the impact of the most common faults on intact bus segments. CRep S8C/FD features split termination with 2 x 60 ohms and 4n7 to CAN GND. If termination isn't required, the device is offered with high-ohm resistors to ensure that a channel without a connected and terminated cable cannot interfere with the rest of the network.

The operating voltage is indicated by a LED. Each channel is also assigned a LED to indicate which segment has generated a CAN message.

1.3 Ordering Information

12-53-00x-yy	CRep S8C/FD-.../S24/RMD Multiport CAN repeater for rail mounting high impedance resistors (... inhibit time)
12-53-10x-yy	CRep S8C/FD-.../S24/RMD Multiport CAN repeater for rail mounting 120 Ohm termination resistors (... inhibit time)

Note: x ... In case of ordering please specify the baud rate to determine the inhibit time:

2	-5	500ns
3	-10	1000ns
4	-20	2000ns
5	-50	5000ns
6	-100	10000ns

yy denotes language of delivery:

10	German
20	English

2 Electrical Characteristics

2.1 Absolute Limiting Values

Any (also temporary) stress in excess of the limiting values may cause permanent damage on CRep S8C/FD and connected devices.

Parameter	Min.	Max.	Unit
Storage temperature	-40	+85	°C
Operating temperature	-20	+70	°C
Power supply voltage	-100	+35	V
Voltage range on CAN_H and CAN_L with respect to CAN GND*	-36	+36	V
Max differential voltage between CAN_H and CAN_L (Version high impedance termination)**	-45	+45	V
Max permanent voltage between CAN_H and CAN_L (Version 120 Ohm termination)**	-11	+11	V

* According to CAN transceiver and ESD protection diode specification.

** Voltages are limited by max power dissipation of internal termination resistors.

2.2 Nominal Values

All values, unless otherwise specified, refer to a supply voltage of 24 V and an environmental temperature of 20 °C.

Parameter	Min.	Typ.	Max.	Unit
Current consumption (running idle)	-	30	-	mA
Current consumption (250 kBit/s, 100 % busload)	-	80	-	mA
Power supply voltage	19	24	30	V
Propagation delay between two arbitrary channels	-	160	210	ns
Propagation delay cascade	-	12	15	ns
Internal termination resistor	119,6	120,8	122,0	Ohm
Maximum power disipation of termination resistor	-	-	1	W
Internal high impedance termination resistor	3,56	3,60	3,64	kOhm

3 Operating Instructions

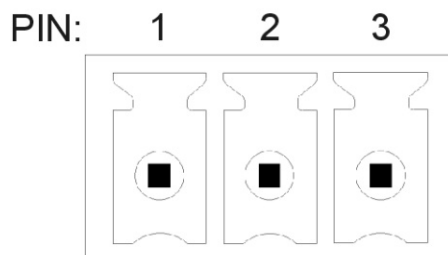
3.1 Pin Assignment

A CRep S8C/FD device includes 8 CAN segments, wired by terminal blocks with 3 clamps. The power supply of CRep S8C/FD is separately wired by a terminal block with 2 clamps.

Each CAN segment is terminated with 120 ohm.

The following table shows the terminal assignment of the CAN connector:

Pin	Name	Function
1	CAN_H	CAN high bus line
2	CAN_L	CAN low bus line
3	GND	CAN ground



The following table shows the terminal assignment of the power connector:

Pin	Name	Function
1	POWER +	Power supply voltage 24 V
2	POWER -	Power supply ground

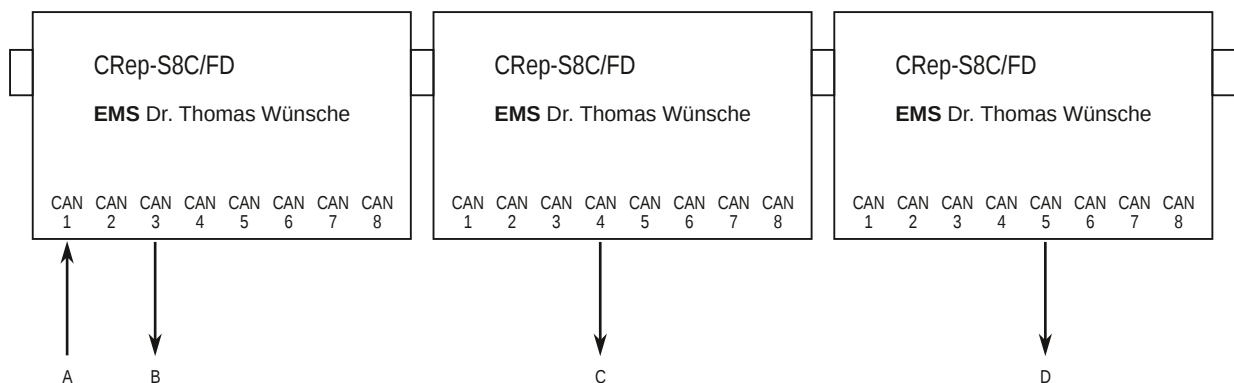
The power supply is galvanically decoupled from the CAN system.

3.2 Cascade

It is possible to connect up to three CRep S8C/FD into a cascade configuration to extend the CAN channel count up to 24. The cascade connectors are the SUB-D9 plugs on the left and right side of the device. When a cascade is used only one power supply needs to be connected.

The following rules are mandatory:

- The cascade connectors must not be used to any other purpose than to form a cascade with another CRep S8C/FD.
- The cascade connection may only be done when no power is supplied to CRep S8C/FD.



Propagation Delay (typical)

A -> B: 160ns

A -> C: 160ns + 12ns = 172ns

A -> D: 160ns + 12ns + 12ns = 184ns

Propagation Delay (worst case)

A -> B: 210ns

A -> C: 210ns + 15ns = 225ns

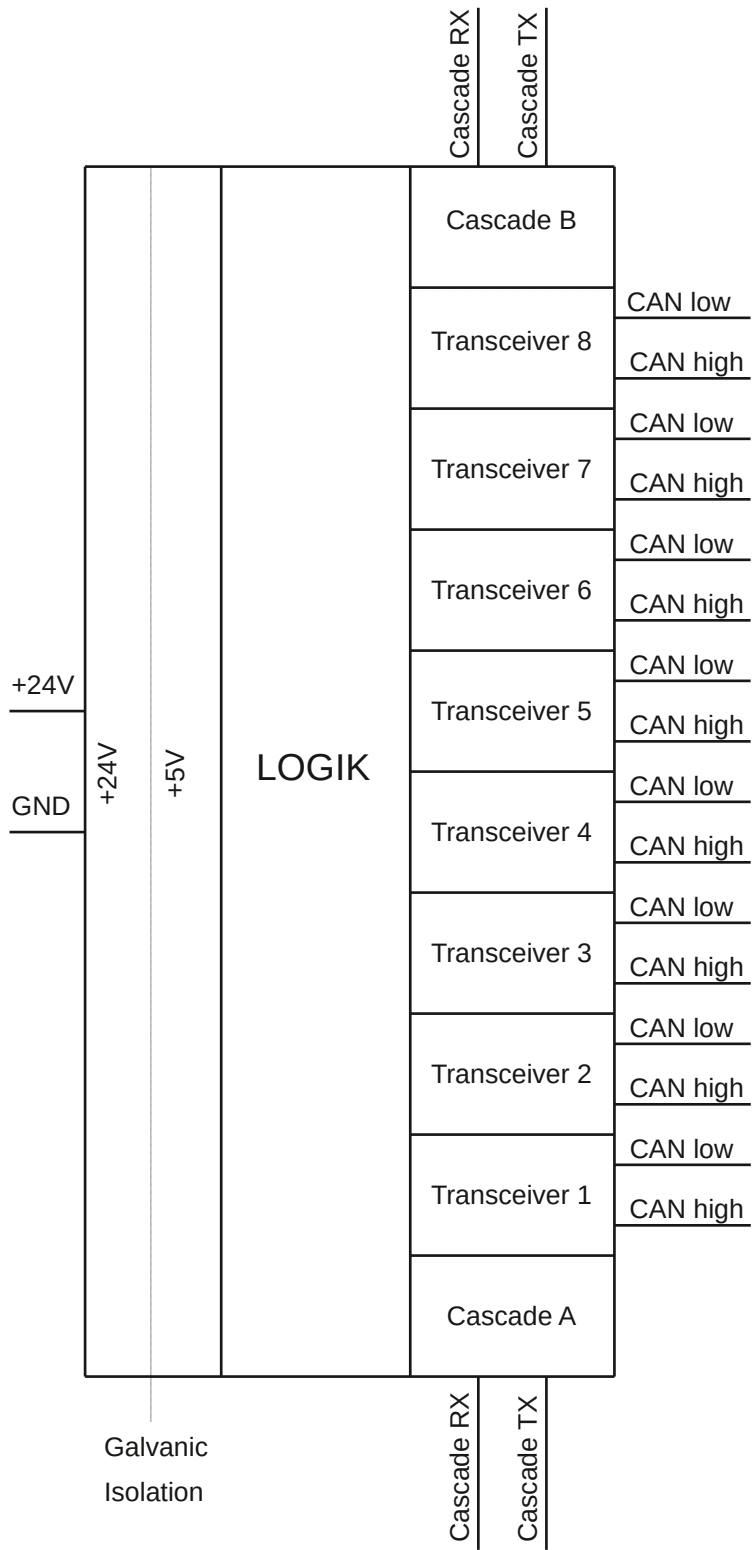
A -> D: 210ns + 15ns + 15ns = 240ns

3.3 Termination

The device is either available with standard 120 Ohm termination resistors or with 3,3 kOhm resistors. The two versions can be distinguished with the label "internal termination" or "high impedance internal termination".

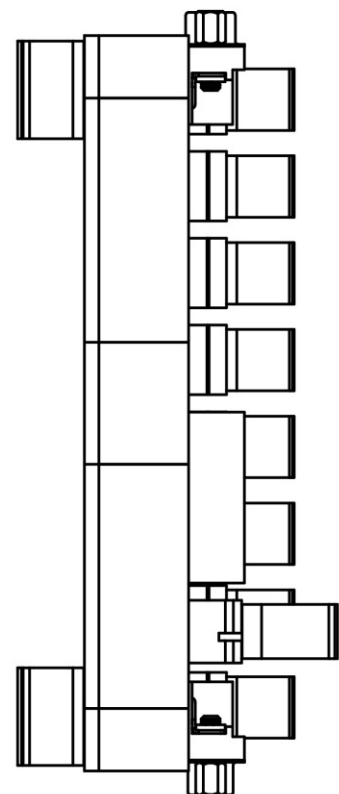
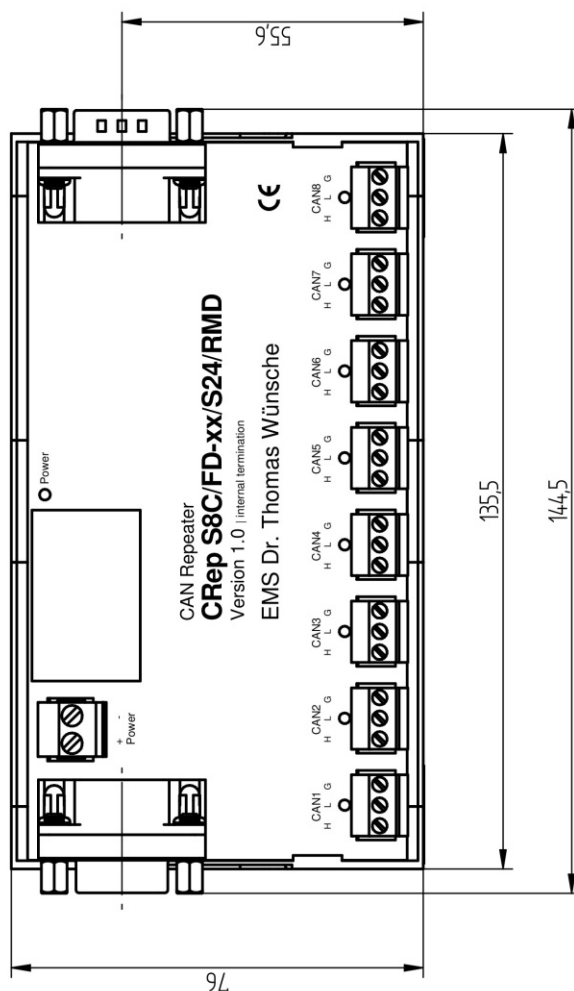
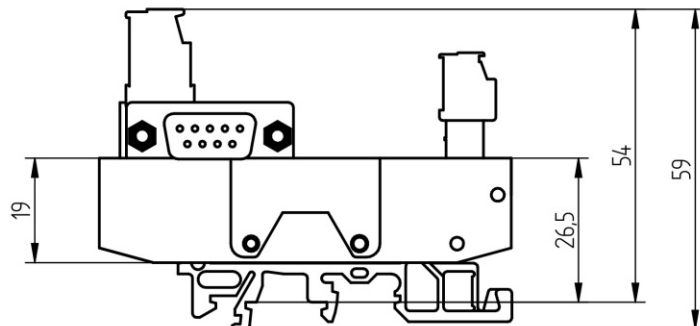
The later version can be used, if the repeater is connected somewhere in the middle of the CAN line and standard termination at the repeaters location is not applicable. However it must be ensured that the CAN signal can fade out fast enough at a repeaters open channel with no external termination. This is ensured by the 3,3 kOhm internal resistors. Although this value is suitable in most cases, it is recommended that an open channel is terminated with a 120 Ohm resistor plugged in the respective connector.

3.4 Block Diagram



3.5 Dimensions

All values in [mm].



DIMENSIONS ARE IN MILLIMETERS
GENERAL TOLERANCES ISO 2768-1 c
DRAWINGS ARE NOT COMPLETELY TRUE TO THE ORIGINAL

4 Appendix

4.1 Instruction for Disposal

Electronic Equipment Act (WEEE)

EMS is selling its products exclusively to commercial customers. This is the reason why all devices are designed for commercial use and have to be disposed appropriately. In accordance to § 10 para. 2 clause 3 Electronic Equipment Act (WEEE) the disposal of EMS products is regulated the following way.

The equipment must not be disposed at the public collection points. In accordance with the applicable law the disposal has to be done by the customer for own account. The same applies to products, which have been sold to third parties, if those parties do not take care of a disposal in accordance to the applicable law. As an alternative the products can be returned to EMS free of charge.

4.2 FCC Statement

CRep S8C/FD has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

4.3 CE Conformity

Declaration of Conformity



The manufacturer

EMS Dr. Thomas Wünsche e.K.
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85304 Immünster

hereby declares, that the following product:

Name	Article Number
CRep S8C/FD-x/S24/RMD	12-53-x0y-zz

meets the requirements of the following standards:

Electromagnetic Emission

DIN EN 55032:2022-08 VDE 0878-32:2022-08 – Electromagnetic compatibility of multimedia equipment – Emission requirements (CISPR 32:2015 + COR1:2016 + A1:2019); German version EN 55032:2015 + AC:2016 + A11:2020 + A1:2020

Electromagnetic Immunity

DIN EN 55035/A11:2022-06 VDE 0878-35/A11:2022-06 – Electromagnetic compatibility of multimedia equipment – Immunity requirements; German version EN 55035:2017/A11:2020

and therefore conforms with the EU requirements on:

Electromagnetic compatibility (2014/30/EG)

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities.

RoHS 3

The RoHS 3 (EU 2015/863) commits manufacturers of „Electrical and Electronic Equipment“ (EEE) to secure compliance with the RoHS Directive before placing a CE mark.

Based on technical documentation and to the best of our knowledge, we hereby confirm that the above mentioned products do not contain any of the restricted substances according to Article 4 of the RoHS Directive in excess of the maximum concentration values tolerated by weight in any of their homogeneous materials.

Immünster, 02.07.26

Dr. Thomas Wünsche

