



CAN Repeater

CRep Opto-.../DS24/RMD

CRep Opto-.../SS24/RMD

User Manual

User manual for CAN Repeater CRep Opto-.../DS24/RMD and CRep Opto-.../SS24/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 Opto 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
- High throughput due to low latency
- ISO 11898 compatible bus interface with galvanic decoupling of CAN segments
- Connection complying to CiA DS102 standard
- Single or dual 12V - 24V power supply
- Extended error suppression

1.2 General Description

The compact CAN repeater CRep Opto transmits and amplifies signals transparent to the CAN protocol. Each of the two galvanically separated CAN connections has the physical behavior of a single bus node. CRep Opto permits a flexible design of the network topology. Star and tree structures can be implemented as well as long stub lines. Being able to use the network structure that fits the application best a reduction of installation costs can be reached.

The maximum data rate in CAN networks, depending on signal propagation delays, can be increased if CRep Opto is used to improve the network structure. An increase of the maximum node count in a CAN network can be reached by splitting the network in subnets that are connected by CRep Opto. Each subnet can include the number of CAN nodes permitted by the drivers output current.

Where CAN signals have to be transmitted over long distances, CRep Opto can be used for signal conditioning. Galvanic decoupling of the bus segments allows to connect subnets with differing ground potential by CRep Opto. The integrated shut down capability in case of errors reduces the impact on intact bus segments by defective segments for the most commonly occurring errors.

CRep Opto can be obtained in two different versions: CRep Opto DS24 has to be supplied from both network sides, CRep Opto SS24 is only supplied on CAN1.

1.3 Ordering Information

12-02-102-xx	CRep I-5/DS24/RMD CAN repeater for rail mounting, galvanic separation, double sided supply 24V, 500ns inhibit time
12-02-103-xx	CRep I-10/DS24/RMD CAN repeater for rail mounting, galvanic separation, double sided supply 24V, 1µs inhibit time
12-02-104-xx	CRep I-20/DS24/RMD CAN repeater for rail mounting, galvanic separation, double sided supply 24V, 2µs inhibit time
12-02-105-xx	CRep I-50/DS24/RMD CAN repeater for rail mounting, galvanic separation, double sided supply 24V, 5µs inhibit time
12-02-106-xx	CRep I-100/DS24/RMD CAN repeater for rail mounting, galvanic separation, double sided supply 24V, 10µs inhibit time
12-02-202-xx	CRep I-5/SS24/RMD CAN repeater for rail mounting, galvanic separation, single sided supply 24V, 500ns inhibit time
12-02-203-xx	CRep I-10/SS24/RMD CAN repeater for rail mounting, galvanic separation, single sided supply 24V, 1µs inhibit time
12-02-204-xx	CRep I-20/SS24/RMD CAN repeater for rail mounting, galvanic separation, single sided supply 24V, 2µs inhibit time
12-02-205-xx	CRep I-50/SS24/RMD CAN repeater for rail mounting, galvanic separation, single sided supply 24V, 5µs inhibit time
12-02-206-xx	CRep I-100/SS24/RMD CAN repeater for rail mounting, galvanic separation, single sided supply 24V, 10µs inhibit time

Note: xx 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 Opto and connected devices.

Parameter	Min.	Max.	Unit
Storage temperature	-20	+80	°C
Operating temperature	0	+60	°C
Power supply voltage	-100	+35	V
Voltage on signal lines	-30	+30	V

2.2 Nominal Values

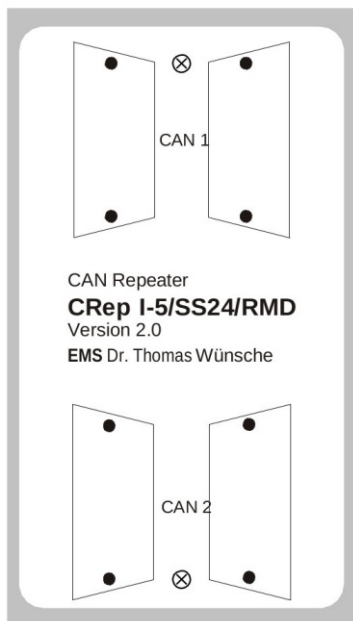
All values, unless otherwise specified, refer to a supply voltage of 24V and an environmental temperature of 20°C. Both sides have an independent power supply.

Parameter	Min.	Typ.	Max.	Unit
Current consumption (no load)	-	30	-	mA
Current consumption (250kBit/s, 100% busload)	-	40	-	mA
Power supply voltage	10	24	30	V
Propagation delay	-	125	200	ns

3 Operating Instructions

3.1 Layout and Pin Assignment

CRep Opto devices include two CAN segments fed to a male and a female plug of type D-Sub9. The plugs carry the CAN signals and the supply voltage.

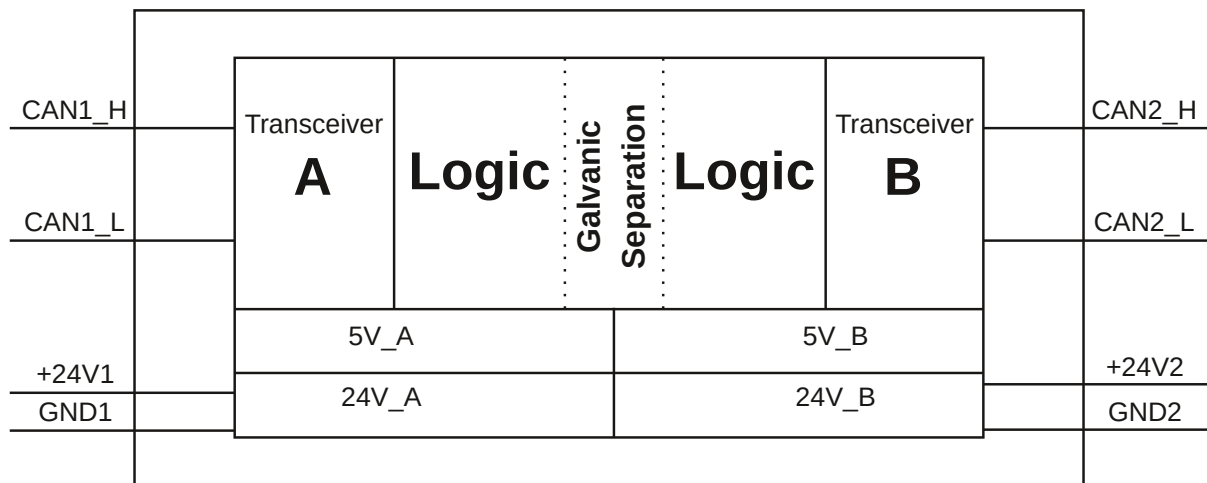


The following table shows the pin assignment of the D-Sub9 plugs (male and female plug are connected internally):

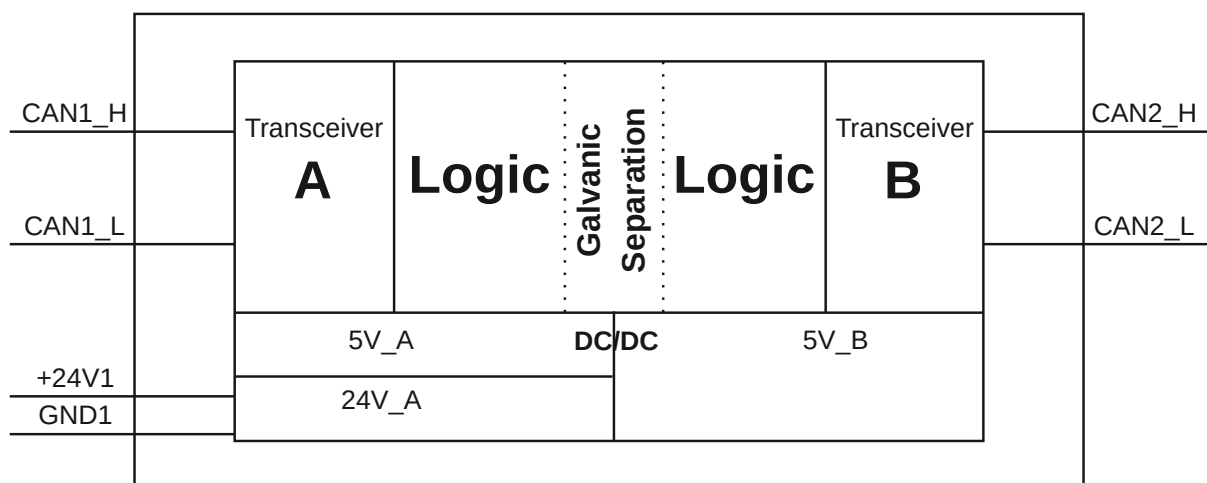
Pin	Name	Function
2	CAN_L	CAN_Low bus line
3	GND	Ground
7	CAN_H	CAN_High bus line
9	V+CAN	Power supply voltage 24V

Please notice that CRep Opto SS can only be supplied over CAN1.

3.2 Block Diagram CRep Opto DS

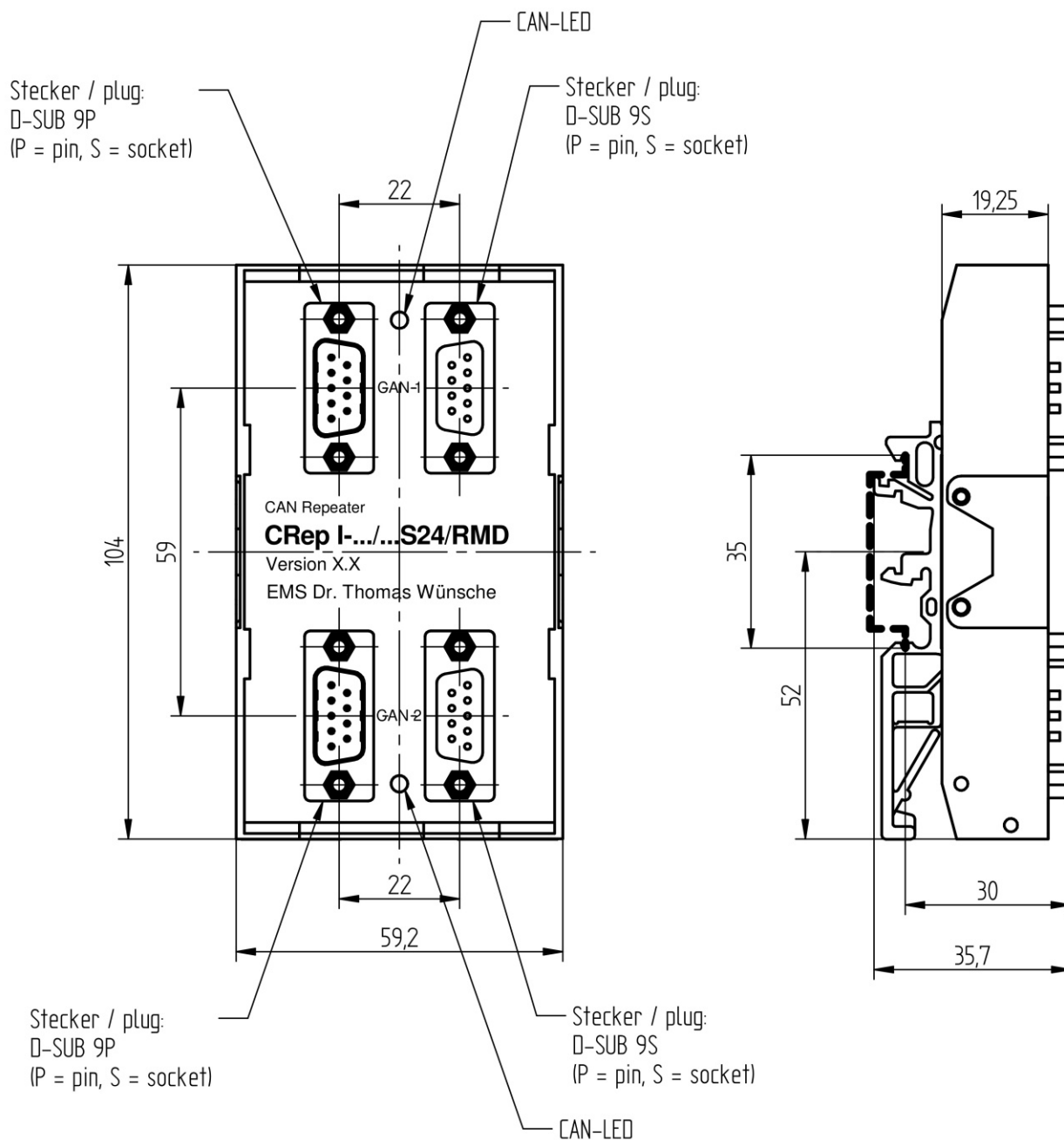


3.3 Block Diagram CRep Opto SS



3.4 Dimensions

All values in [mm].



Dimensions are in millimeters.
General tolerances ISO 2768 1 c

4 Appendix

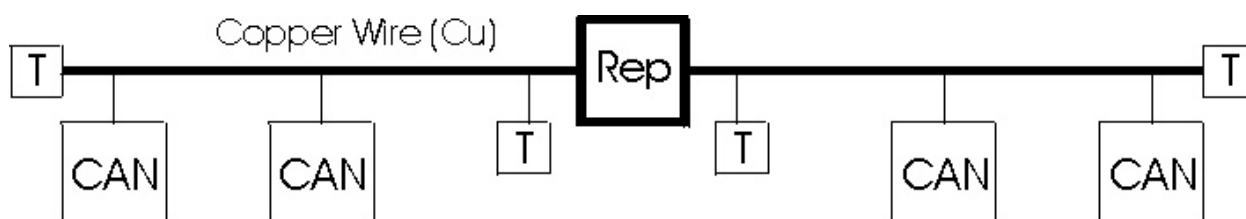
4.1 Topology examples

CAN busses should always be terminated on both ends, typically using a 120Ohm termination resistor between CAN-High and CAN-Low signal lines.

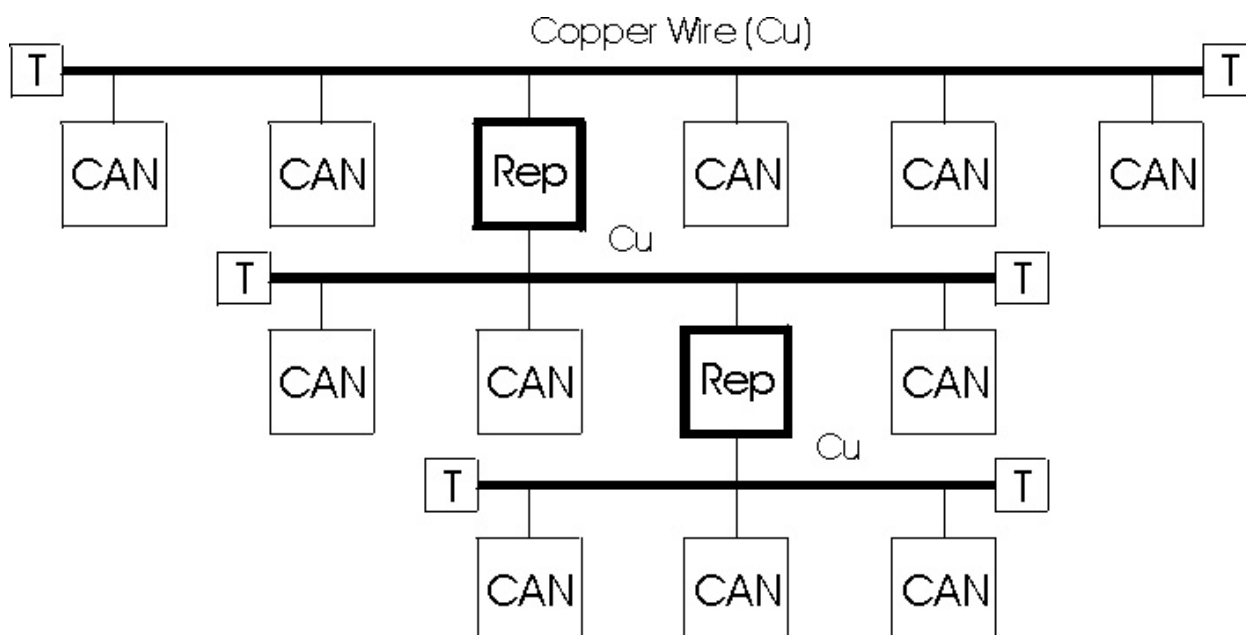
Legend

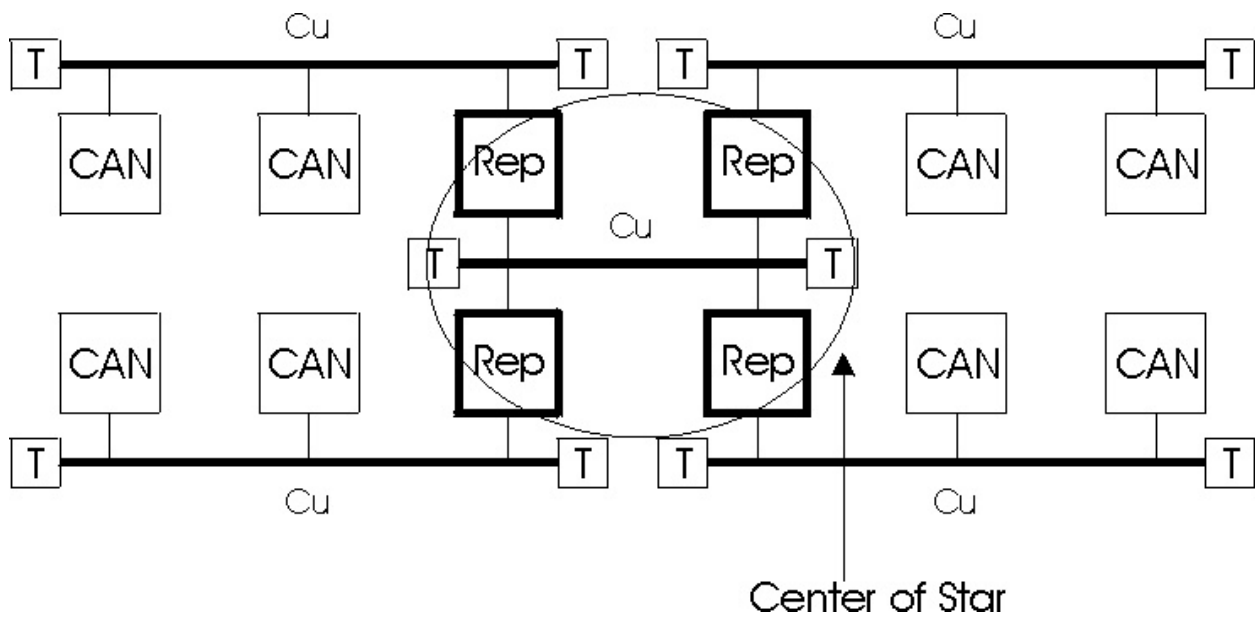


Line topology with repeaters



Tree topology with repeaters



Star topology with repeaters

4.2 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.

4.3 FCC Statement

NOTE: This equipment 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.

4.4 CE Conformity

Declaration of Conformity



The manufacturer

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Sonnenhang 3
85304 Ilmmünster
Germany

hereby declares, that the following products:

Name	Article Number
CRep I-.../DS24/RMD	12-02-11x-xx
CRep I-.../SS24/RMD	12-02-22x-xx

meet the requirements of the following standards:

Electromagnetic Immunity

EN 55035:2018-04; VDE 0878-35:2018-04 – Electromagnetic compatibility of multimedia equipment – Immunity requirements (CISPR 35:2016, modified); German version EN 55035:2017

Electromagnetic Emission

EN 55032:2016-02; VDE 0878-32:2016-02 – Electromagnetic compatibility of multimedia equipment – Emission Requirements (CISPR 32:2015); German version EN 55032:2015

and therefore conform with the EU requirements on:

Electromagnetic compatibility (2014/30/EU)

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 EEE

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.

Ilmmünster, 19.05.2020

Dr. Thomas Wünsche

