



# Ethernet/CANopen Gateway

## **EtherCAN CI-ARM9/RMD-900**

User Manual

User manual EtherCAN CI-ARM9/RMD-900 Version 3.0

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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:** EtherCAN CI-ARM9/RMD-900 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

- Connection of CANopen systems to Ethernet
- CANopen Gateway server CiA 309-3 from "Port"
- Referring to company "Port" it can be used as a replacement for the discontinued IGW900
- 2 CAN interfaces
- CiA DS 102 and ISO 11898-2 compatible physical layer
- 24V nominal power supply
- Galvanic decoupling of CAN transceivers
- 454 MHz ARM9 CPU (NXP I.MX287)
- 128 MByte DDR2 RAM
- 4 GByte EMMC Flash
- RS232 interface for configuration
- SD-Card slot for mass storage
- USB host interface
- Embedded Linux operating system
- Rail mountable

## 1.2 General Description

EtherCAN/ARM9-900 acts as a CiA 309-3 gateway between CANopen and Ethernet systems. It is preconfigured to run two instances of the gateway software and can be used as a replacement for IGW900.

A NXP ARM9 CPU (I.MX287) clocked with 454 MHz gives enough power for this application. The device has 128 MB SDRAM and 4 GB eMMC Flash memory. The CAN interface is realized by the two internal CAN controllers of the CPU. Both channels are individually galvanic decoupled from CPU and power supply.

### 1.3 Ordering Information

12-20-314-xx	<b>EtherCAN CI-ARM9/RMD-900</b> Ethernet/CANopen gateway with IMX287 CPU, 128MByte DDR2, 4GByte EMMC, two CAN interfaces
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**Note:** xx denotes language of delivery:

10 german

20 english

## 2 Hardware

EtherCAN CI includes a NXP I.MX287 CPU with 454MHz clock. In addition the device has 128 MByte DDR2 RAM and 4 GByte EMMC Flash. The connection to the CAN bus is provided by the two internal Flexcan controllers of the CPU and supports the CAN protocols 2.0a and 2.0b.

The device has two identical CAN interfaces with CAN transceivers NXP PCA82C251. Both CAN segments are equipped with pluggable screw terminals and have individual galvanic separation. Power is supplied by a pluggable screw terminal.

EtherCAN CI includes also an RJ45 Ethernet connector with integrated LEDs (Link status: yellow, Ethernet active: green) and a serial RS232 connection (D-SUB) on the front panel.

Furthermore there are four LEDs on the front panel. The two green LEDs are controlled by the CAN transceiver and indicate CAN traffic, while the yellow ones are controlled by the CPU, their meaning is application specific. Please refer to the related program documentation for details.

## 3 Software

### 3.1 Additional Software

Besides the CANopen server application EtherCAN CI may be equipped with additional application specific software, either by 3rd party vendors or written by the customer. Please contact 3rd party vendor for additional help on this software packages or EMS Dr. Thomas Wuensche for support on application development.

### 3.2 CANopen Server Configuration

Two parameters have to be configured for the CANOpen Gateway Server. One is the CAN baud rate, the other is the listening TCP port number.

Both are set in a configuration file which is located at /etc/port-m4d on the device. A sample is shown below:

```
# This file template shows how start parameters for
# the CANopen Gateway Server are set

# Please note that without licence only a baud rate of
# 125 (kBaud) is possible
#####
# First instance running on CAN1
# Baudrate
BAUD0=125
# TCP port number to listen on
PORT0=7234

# Second instance running on CAN2
# Baudrate
BAUD1=125
# TCP port number to listen on
PORT1=7235
```

It is mandatory that the name of the configuration file is "**port-m4d.conf**". It can be edited on a host computer and copied onto the device with scp.

Example Linux commandline:  
scp port-m4d.conf root@192.168.1.15:/etc/port-m4d/

In the directory /etc/port-m4d two log files m4d\_0.log and m4d\_1.log are generated when the application start up.



## 4 Webinterface

To offer a convenient way to configure basic settings the device offers a web page for this purpose. Direct your web browser to the IP address of the EtherCAN and a login screen will appear.

### 4.1 Login and main menu

Login with standard data:

**User** : admin

**Password** : admin

We strongly recommend to change the password as soon as possible for security reasons (menu "Change User/Pass"). This change will take effect with the next login attempt. Other changes may need a device reboot to take effect.

The screenshot shows a web interface for the EtherCAN-ARM9 device. At the top, it displays 'EMS Dr. Thomas Wuensche'. Below this is a blue horizontal line, followed by the title 'EtherCAN-ARM9' in large, bold black font. Another blue horizontal line separates the title from the login form. The login form contains two input fields: 'User' with the text 'admin' and 'Password' with masked characters '.....'. Below the input fields are two buttons: 'Send' (highlighted with a blue border) and 'Clear'. At the bottom of the form area, there is a footer with the website address 'www.ems-wuensche.com'.

After login a menu overview appears.

**EtherCAN-ARM9**

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Network Configuration

CAN driver selection

Enable/disable CAN Server

CAN Configuration

Show CPUs Temperature

Change User/Pass

Log Out

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[www.ems-wuensche.com](http://www.ems-wuensche.com)

GUI Version 1.2.5

## 4.2 Network configuration

There are two possibilities to configure EtherCAN-ARM9 "Static IP" and "Dynamic IP (DHCP)". Standard is a static IP address 192.168.1.15.

**Please select configuration**

Static IP

→

**Current Values**

IP Address= 192.168.1.15

Netmask= 255.255.255.0

Gateway=

Nameserver=

**Change values**

IP address

Netmask

Gateway

Nameserver

**Values given**

IP address= 192.168.1.16

Netmask= 255.255.255.0

Gateway=

Nameserver=

>> A reboot is needed for changes to take effect <<

←

## 5 Electrical Characteristics

### 5.1 Absolute Limiting Values

Any (also temporary) stress in excess of the limiting values may cause permanent damage on EtherCAN CI and connected devices.

Parameter	Min.	Max.	Unit
Storage temperature	-40	85	°C
Operating temperature	-20	60	°C
Voltage on CAN bus pins*	-36	36	V
Supply voltage	10	30	V

### 5.2 Nominal Values

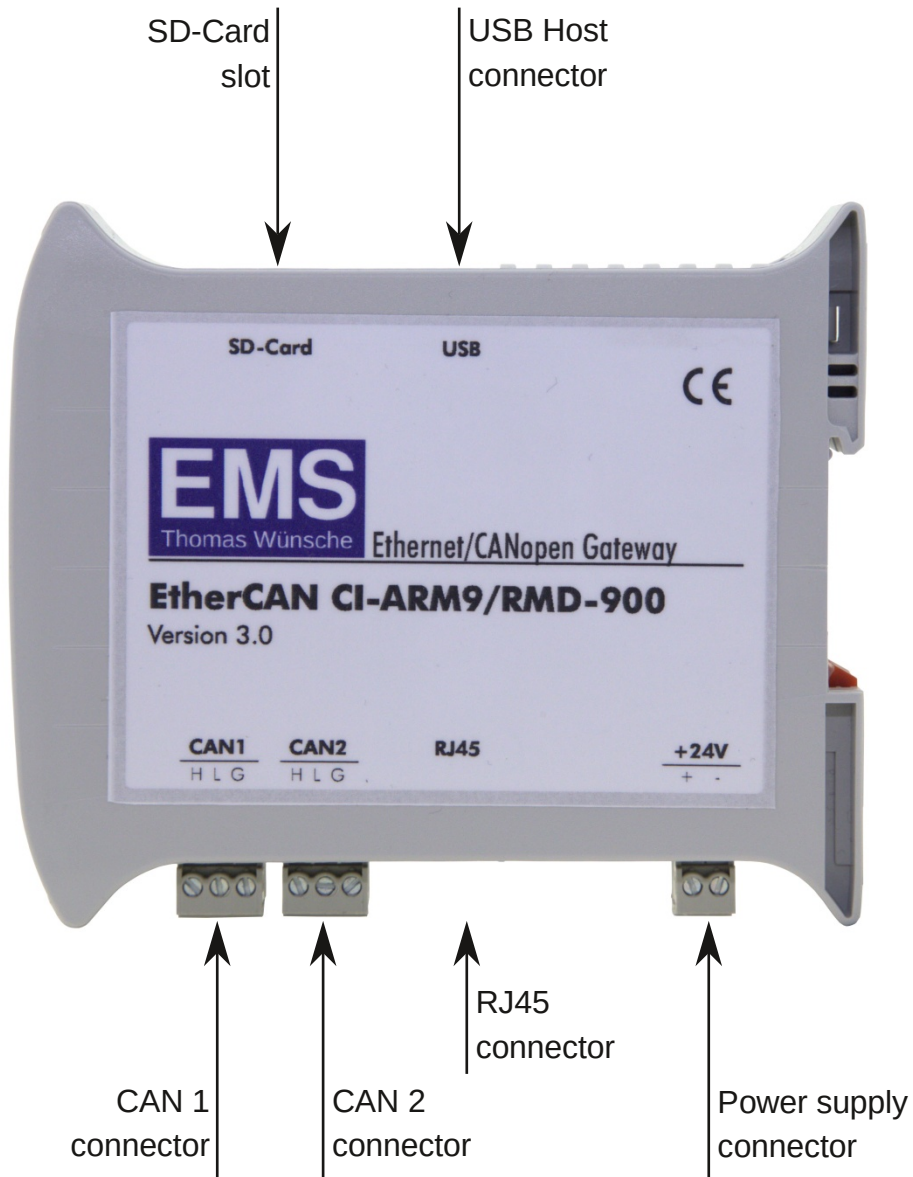
Parameter	Min.	Typ.	Max.	Unit
Voltage on CAN bus pins*	-30	-	30	V
Supply current**	-	100	150	mA
CAN controller clock frequency	-	24	-	MHz

\* This potential is measured against the ground potential of the related CAN transceiver

\*\* Value measured with a supply voltage of 24V

## 6 Operating Instructions

### 6.1 Connection Scheme



The following table shows the assignment of the RS232 male connector located at the front panel of the device.

Pin	Name	Function
2	RxD	Receiving data line
3	TxD	Sending data line
4	DSR	Data-Set_Ready line
5	GND	Ground
6	DTR	Data-Terminal-Ready line



## 6.2 Installation

To setup and use EtherCAN CI within a network, the following is needed:

- A PC running Windows 7/8/8.1/10 or Linux, connected to the Ethernet network
- An Ethernet network with a free twisted pair connection for EtherCAN CI
- A 24V DC power supply
- A terminal program to connect to the RS232 port of EtherCAN CI. With this terminal it is always possible to get access to the device. Login over Ethernet is also possible, but needs a working Ethernet connection.

## 6.3 Configuration

### 6.3.1 General Configuration

EtherCAN CI can be accessed by using a terminal program connected to its RS232 port.

- Connect a serial cable to the RS232 port of the EtherCAN CI.
- Connect the other end to a free COM port of your PC.

**Note:** The serial cable must have the pins 2 and 3 crossed and pin 5 connected directly (Nullmodem-Cable).

- Start the terminal software. Configure the software for a direct connection using the PC's COM port. The communication parameters are the following:

**Baud rate** : 115200 Baud  
**Data bits** : 8  
**Parity** : none  
**Stop bits** : 1  
**Flow control:** none

- Power on EtherCAN CI
- On the terminal window the output from the startup procedure is displayed. When it has finished login as user "root". The default password is "EMSethercan".

This method to connect to the device via RS232 will always work. Besides this it is also possible to login via ssh, but then the IP address of the device has to be known.

### 6.3.2 Device Configuration

As the device is run by an embedded Linux operating system, it is configured as such. Start/Stop scripts are located in "/etc/init.d". If a service controlled by such script should start at boot time, a symbolic link has to be created from within "/etc/rc.d" to the related script in "/etc/init.d".

This enables customized applications and third party programs to be integrated into the system.

### 6.3.3 Configuration by Web Access

To offer a convenient way to configure basic settings the device offers a web page for this purpose. Direct your web browser to the IP address of the EtherCAN and a login screen will appear. Login with:

**User** : admin  
**Password** : admin

We strongly recommend to change the password as soon as possible for security reasons. This change will take effect with the next login attempt. Other changes may need a device reboot to take effect.

### 6.3.4 CAN Driver

Although the web interface offers loading of a different driver for the CAN interface the CANopen server application needs the socketCAN driver which is selected by default. It must not be changed in the web Interface.

### 6.3.5 Default Configuration upon Delivery

The default delivery of EtherCAN CI has the following parameters set:

**IP address** : 192.168.1.15  
**Netmask** : 255.255.255.0  
**Gateway** : none  
**Nameserver** : none  
**CAN driver** : ems\_fcan  
**cansrv 1** : configured as server listening on port 1500  
**cansrv 2** : configured as server listening on port 1501  
**root password** : EMSethercan

This password is for ssh or scp access only. The web interface has a different access credentials.

### 6.3.6 Restore Default Configuration

In order to restore the default configuration the following command must be run after login at the serial console:

**`$/etc/restore`**

After a reboot changes will take effect.

## 7 Appendix

### 7.1 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.

### 7.2 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.



## 7.3 Declaration of Conformity CE

### Declaration of Conformity



The manufacturer

**EMS Dr. Thomas Wünsche e.K.**  
**Sonnenhang 3**  
**85304 Ilmmünster**  
**Germany**

hereby declares, that the following products:

Name	Article Number
EtherCAN CI-ARM9/RMD – Version 3.0	12-20-309-xx
EtherCAN CI-ARM9/RMD – M4D – Version 3.0	12-20-310-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**

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, 02.06.20

Dr. Thomas Wünsche



## 7.4 Declaration of Conformity REACH

### Declaration of Conformity REACH

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The manufacturer

**EMS Dr. Thomas Wünsche e.K.**  
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**85304 Immünster**  
**Germany**

hereby declares, that the following products

Name	Article Number
EtherCAN CI-ARM9/RMD – Version 3.0	12-20-309-xx
EtherCAN CI-ARM9/RMD – M4D – Version 3.0	12-20-310-xx

contain the following SVHC (*Substances of Very High Concern*), which are part of the REACH Candidate List published by ECHA on the 16.01.2020 in Helsinki.

Substance	CAS Nr.
Lead monoxide (lead oxide)	1317-36-8
Diboron trioxide	1303-86-2
Lead titanium trioxide	12060-00-3

Immünster, 30.01.2020



Dr.-Ing. Thomas Wünsche