

# **MANUAL**

# **ANAGATE**

# **CAN**

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# Revision History

| Version | Date        | Changes  |
|---------|-------------|--|
| 1.1     | 01.06.2007  | Description of bridge mode settings via web interface. |
| 1.0     | 016.09.2006 | Initial version  |
|         |             |  |

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# 1 Introduction

## 1.1 Description

The AnaGate CAN connects a PC or other general device to a CAN bus via the TCP/IP network protocol. The AnaGate CAN basically works as a CAN Master on the bus.

## 1.2 Features

- Supports CAN send and receive commands for all CAN devices
- Variable CAN bus speed (20, 50, 62.5, 100, 125, 250, 500 or 1000 kbps)
- Separate plug for voltage supply
- System is addressed using a proprietary TCP/IP protocol
- Static or dynamic assignment (DHCP) of IP addresses

## 1.3 Specification

Measurements:

|         |                |
|---------|----------------|
| Length: | approx. 155 mm |
| Width:  | approx. 105 mm |
| Height: | approx. 40 mm  |
| Weight: | approx. 250 g  |

#### CAN Bus:

Baud rate: 20, 50, 62.5, 100, 125, 250, 500 or 1000 kbps, software configuration

CAN controller: Microchip MCP 2515

CAN interface: ISO 11898-2, galvanically decoupled

Interface: 1x DB9 plug incl. CAN\_H and CAN\_L

#### Digital IO:

Inputs: 4, galvanic decoupled

Outputs: 4, galvanic decoupled (max. 5mA)

#### LAN Interface:

Baud rate: 10/100 Mbps

TCP/IP: Static or dynamic (DHCP) IP address

Interface: RJ45 socket

#### Voltage Supply:

Voltage: 9V direct current

Current consumption max. 750 mA, approx. 350 mA in idle state

Current load: max. 200 mA for both 3.3 V and 5 V connections

#### Ambient Temperature:

Storage: 0 .. 85° C

In operation: 0 .. 55° C

## 1.4 Application

### Product Development:

1. Test phase with new CAN devices.
2. Tracing of CAN networks (CAN-Monitoring)

### Automation:

1. Control and data acquisition.

### Repairs and Maintenance:

1. Testing
2. Car repair shops

## 1.5 Order information

| Order no.    | Designation   |
|--------------|---|
| GT-CAN-HW-EU | AnaGate CAN incl. plug-in power supply unit for Europe, galvanically decoupled  |
| GT-CAN-HW-UK | AnaGate CAN plug-in power supply unit for the UK, galvanically decoupled        |
| GT-CAN-HW-US | AnaGate CAN incl. plug-in power supply unit for the USA, galvanically decoupled |
| GT-CAN-AH    | Fastening element for DIN rails   |

*Table 1-1: Order information*

## 2 Hardware

### 2.1 Packing list

The AnaGate CAN is delivered together with the following components:

- 1 x AnaGate CAN
- 1 x set of rubber pads
- 1 x plug-in power supply unit (compatible with country of delivery)
- 1 x CD incl. manual and DLL
- 1 x 2 m Cat. 5 LAN cable

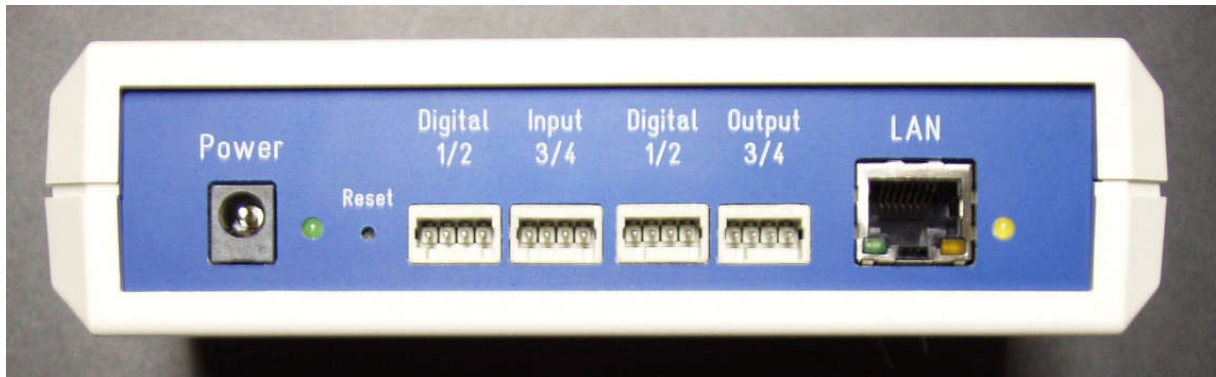
### 2.2 Layout

#### 2.2.1 AnaGate CAN - front view



The CAN bus connector is located on the front of the AnaGate. Please refer to 2.3 “Connections” for further details.

## 2.2.2 AnaGate CAN – rear view



The rear of the AnaGate features the following connectors and LEDs (from left to right):

1. Power supply  
Please refer to 2.3 “Connections” for further details.
2. Power LED (green)  
This LED lights up when 9 V DC voltage is being supplied.
3. Reset button  
The AnaGate can be reset to the factory settings using this button. Please refer to 2.8 “Factory reset” for further details.
4. Digital input 1/2  
Please refer to 2.3 “Connections” for further details.
5. Digital input 3/4  
Please refer to 2.3 “Connections” for further details.
6. Digital output 1/2  
Please refer to 2.3 “Connections” for further details.
7. Digital output 3/4  
Please refer to 2.3 “Connections” for further details.
8. Please refer to 2.3 “Connections” for further details.
9. LAN port  
Please refer to 2.3 “Connections” for further details.
10. AnaGate CAN activity LED (yellow)  
This LED lights up when the AnaGate CAN is processing messages from a PC.

## 2.3 Connections

The AnaGate CAN features the following connections:

## 1. CAN jack

The CAN bus is fed out of the device via a DB9 socket. The pins are assigned as follows:

| Pin | Application |
|-----|-------------|
| 2   | CAN_L       |
| 7   | CAN_H       |
| 3   | GND         |

Table 2-1: CAN jack assignment

## 2. LAN connection

The LAN is fed out of the device via a RJ45 socket. The pins are assigned as follows:

| Pin   | Application   |
|-------|---------------|
| 1     | TX +          |
| 2     | TX -          |
| 3     | RX +          |
| 4 / 5 | Not connected |
| 6     | RX -          |
| 7 / 8 | Not connected |

Table 2-2: LAN jack assignment

## 3. Digital input 1/2

The digital inputs 1 and 2 (galvanic decoupled) are fed out via a Wago clamping socket. The pins (arranged from left to right) are assigned as follows:

| Pin | Application      |
|-----|------------------|
| 1   | Input 1 GND      |
| 2   | Input 1 $U_{in}$ |
| 3   | Input 2 GND      |
| 4   | Input 2 $U_{in}$ |

Table 2-3: Digital inputs 1/2

## 4. Digital input 3/4

The digital inputs 3 and 4 (galvanic decoupled) are fed out via a Wago clamping socket. The pins (arranged from left to right) are assigned as follows:

| Pin | Application      |
|-----|------------------|
| 1   | Input 3 GND      |
| 2   | Input 3 $U_{in}$ |
| 3   | Input 4 GND      |
| 4   | Input 4 $U_{in}$ |

Table 2-4: Digital inputs 3/4

## 5. Digital output 1/2

The digital outputs 1 and 2 (galvanic decoupled) are fed out via a Wago clamping socket. The pins (arranged from left to right) are assigned as follows:

| Pin | Bedeutung                                    |
|-----|--|
| 1   | Output 1 emitter of the opto coupler (npn)   |
| 2   | Output 1 collector of the opto coupler (npn) |
| 3   | Output 2 emitter of the opto coupler (npn)   |

| Pin | Bedeutung                                    |
|-----|--|
| 4   | Output 2 collector of the opto coupler (npn) |

Table 2-5: Digital output 1/2

#### 6. Digital output 3/4

Die digital outputs 3 and 4 (galvanic decoupled) are fed out via a Wago clamping socket. The pins (arranged from left to right) are assigned as follows:

| Pin | Bedeutung                                    |
|-----|--|
| 1   | Output 1 emitter of the opto coupler (npn)   |
| 2   | Output 1 collector of the opto coupler (npn) |
| 3   | Output 2 emitter of the opto coupler (npn)   |
| 4   | Output 2 collector of the opto coupler (npn) |

Table 2-6: Digital output 3/4

#### 7. Voltage supply

9V DC voltage is supplied using the accompanying power supply unit.

## 2.4 Initial installation

Please ensure that the AnaGate CAN is positioned on an even surface. Also keep it away from direct sunlight.

Insert the round plug into the casing socket labelled 9V. Then plug the power supply unit into the wall socket.

Insert the LAN cable into the plug labelled LAN and connect it either to a hub or switch, or directly to the PC using a crossover cable.

The AnaGate is delivered with the following settings:

- Type of address: Static
- IP address: 192.168.1.254
- Network mask: 255.255.255.0
- Gateway: 0.0.0.0
- Bridge mode: OFF

The AnaGate can now be configured using a standard browser (Internet Explorer, Mozilla, etc.) by using <http://192.168.1.254>.

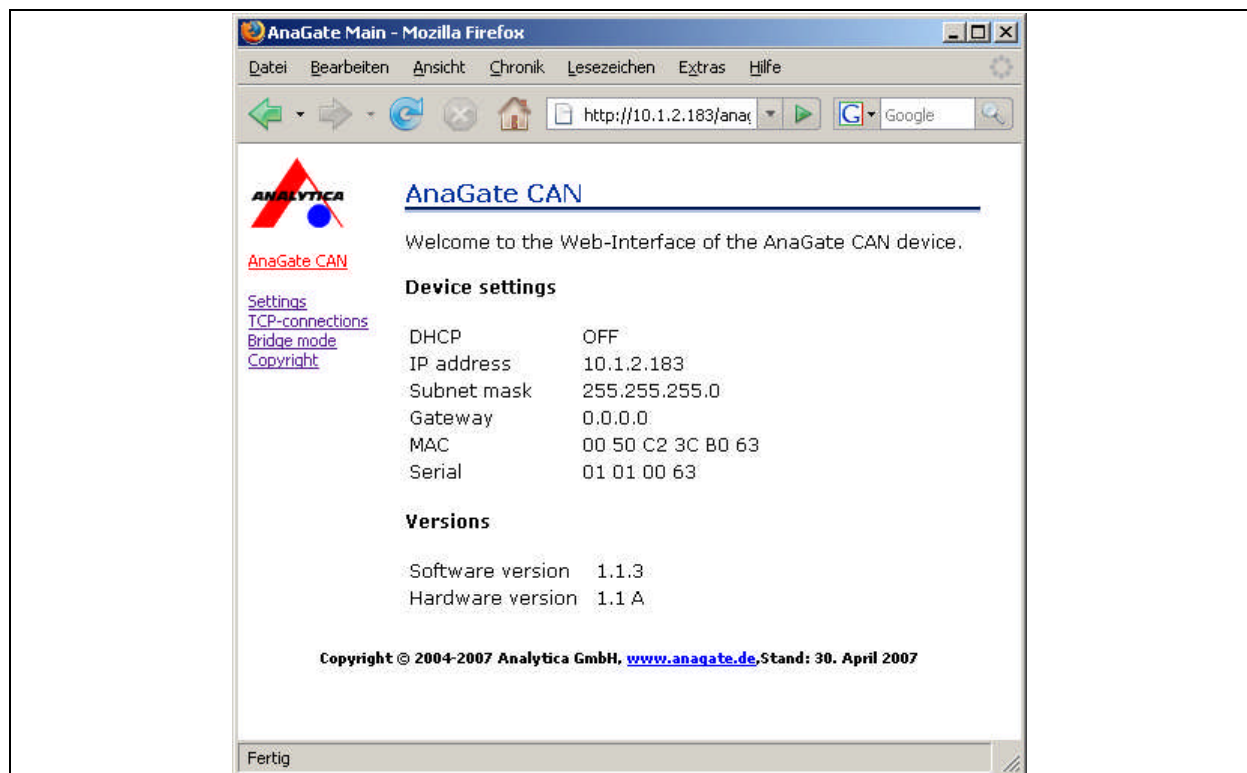


Chart 2-1: AnaGate CAN web interface

## 2.5 TCP/IP settings

Proceed as follows to configure the TCP/IP parameters:

1. Switching the dynamic/static IP address

Here you can switch between static IP and dynamic (via DHCP) addresses. If DHCP is being used, the remaining fields cannot be edited as this information is retrieved from the DHCP server. In this case, a DHCP server must be available and accessible in the network.

2. IP address (not DHCP)

The IP address is entered in a.b.c.d format (e.g. 192.168.1.1) and is permanently stored in the AnaGate.

3. Subnet mask (not DHCP)

The subnet mask is entered in a.b.c.d format (e.g. 255.255.255.0) and is permanently stored in the AnaGate

4. Default gateway (not DHCP)

The default gateway is entered in a.b.c.d format (e.g. 192.168.1.200) and is permanently stored in the AnaGate. Enter "0.0.0.0" if a default gateway is not required.

The screenshot shows a web browser window titled "AnaGate CAN Settings - Mozilla Firefox". The address bar shows "http://10.1.2.183/setti". The page content includes the AnaGate logo, a title "AnaGate CAN Settings", and a form for configuring TCP/IP settings. The form has a "DHCP" checkbox which is unchecked. Below it are three input fields: "IP address" with the value "10.1.2.183", "Subnet mask" with the value "255.255.255.0", and "Gateway" with the value "0.0.0.0". At the bottom of the form are two buttons: "Save settings" and "Reset form". The footer of the page reads "Copyright © 2004-2006 Analytica GmbH, www.anagate.de, Stand: 17. August 2006".

Chart 2-2: AnaGate CAN tcp/ip settings

## 2.6 Bridge mode settings

Proceed as follows to configure the bridge mode parameters:

1. Bridge mode

Aktiviere oder deaktiviere Bridge-Modus über das Kontrollkästchen.

2. IP-Adresse 1. Slave

Gebe die IP-Adresse des ersten AnaGate CAN, der zu brücken ist, und seine Baudrate ein. Die IP-Adresse wird in a.b.c.d-Format (z.B. 192.168.1.1) eingegeben und die Baudrate kann aus einer Liste der unterstützten Werte ausgewählt werden. Verwende "0.0.0.0" für unbenutzte Slave-Slots.

3. IP-Adresse 2. Slave

Gebe die IP-Adresse des zweiten AnaGate CAN, der zu brücken ist, und seine Baudrate ein.

4. IP-Adresse 3. Slave

Gebe die IP-Adresse des dritten AnaGate CAN, der zu brücken ist, und seine Baudrate ein.

Die Bridge-Modus-Einstellungen werden dauerhaft in der AnaGate gespeichert.

**Note:** In Bridge-Modus fungiert immer ein AnaGate CAN als aktiver Partner, der mit bis zu drei weiteren AnaGate CANs verbunden ist, die an individuelle CAN-Bus-Segmente angeschlossen sind. Die passiven AnaGate CAN-Geräte arbeiten im Standardmodus, als wären sie an einen Host-PC angeschlossen und dürfen nicht als Bridge-Modus-Geräte konfiguriert werden.

**WICHTIGER HINWEIS:** Der AnaGate CAN wird immer neu gestartet, wenn die Bridge-Modus-Einstellungen geändert werden.

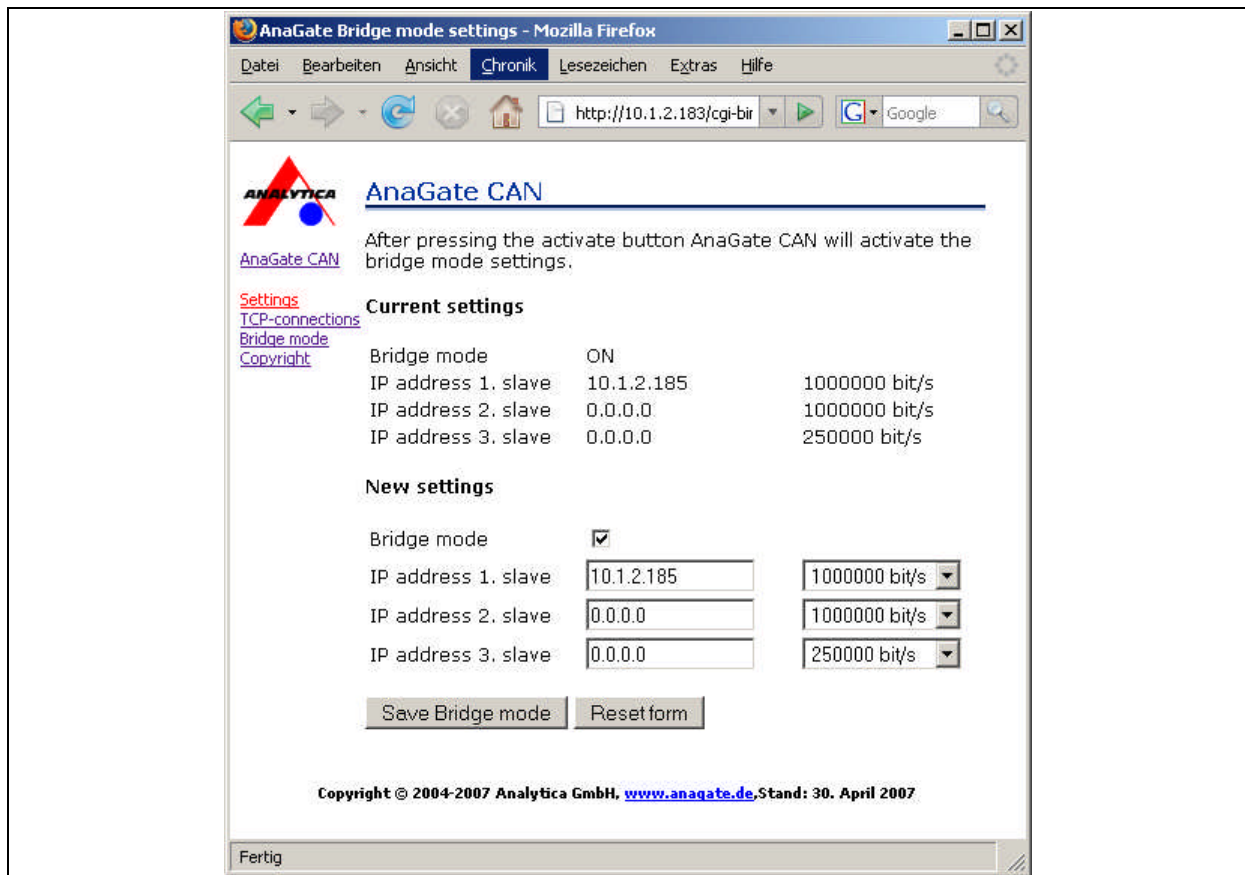


Chart 2-3: AnaGate CAN bridge mode settings

## 2.7 Firmware update

Please visit our Web site <http://www.anagate.de> for further information.

## 2.8 Factory reset

Proceed as follows to restore the default factory settings (IP address/subnet mask: 192.168.1.254/255.255.255.0):

5. Disconnect the AnaGate CAN from the power supply.
6. Press the reset button using a pointed instrument (do not release it).
7. Reconnect the power supply.
8. Release the reset button when the yellow AnaGate CAN activity LED lights up.
9. The device restarts and now operates again with the default factory settings.

## 2.9 Connecting the digital inputs

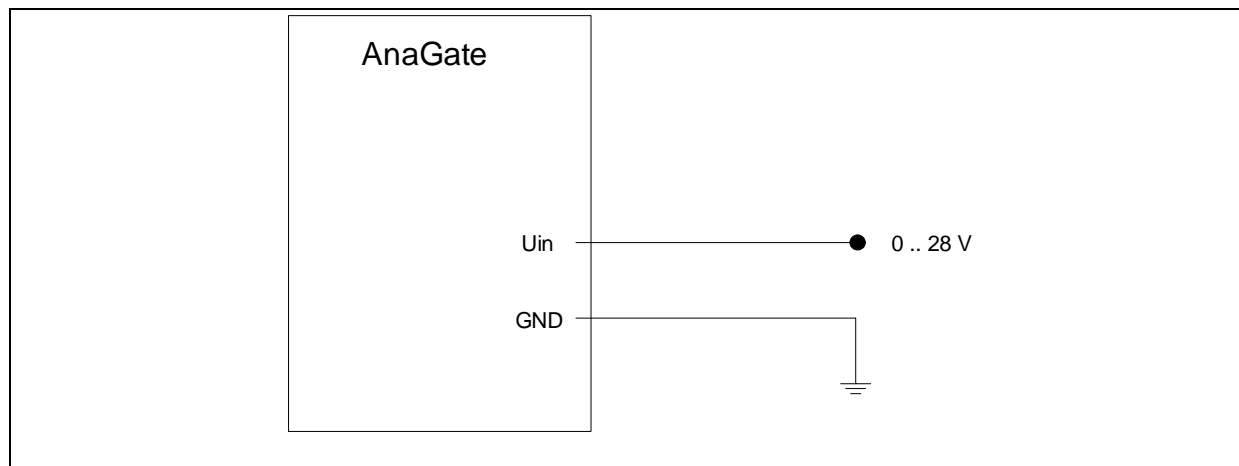


Chart 2-4: Example for connecting the digital inputs

Input  $U_{in}$  of the digital input can be connected to an external voltage between 0 and 28V. If the input voltage at  $U_{in}$  is greater than 2.0 V the AnaGate device interpretes the input as a logical 1, otherwise 0.

## 2.10 Connecting the digital outputs

In principle there are two different kinds of connecting the digital outputs:

- Variant A (positive logic)

If the output of the AnaGate is set to a logical 1, the internal transistor shortens the output to VCC, otherwise the pull down resistor hold the output LOW.

- Variant B (negative logic)

If the output of the AnaGate is set to a logical 1, the interanal transistor shortens to GND, otherwise the pull up resistor hold the output to VCC.

It is to be noted in both variants that the maximum current is 5 mA.

The voltage drop at the internal transistor is typically 0,5V under the indicated operating conditions.

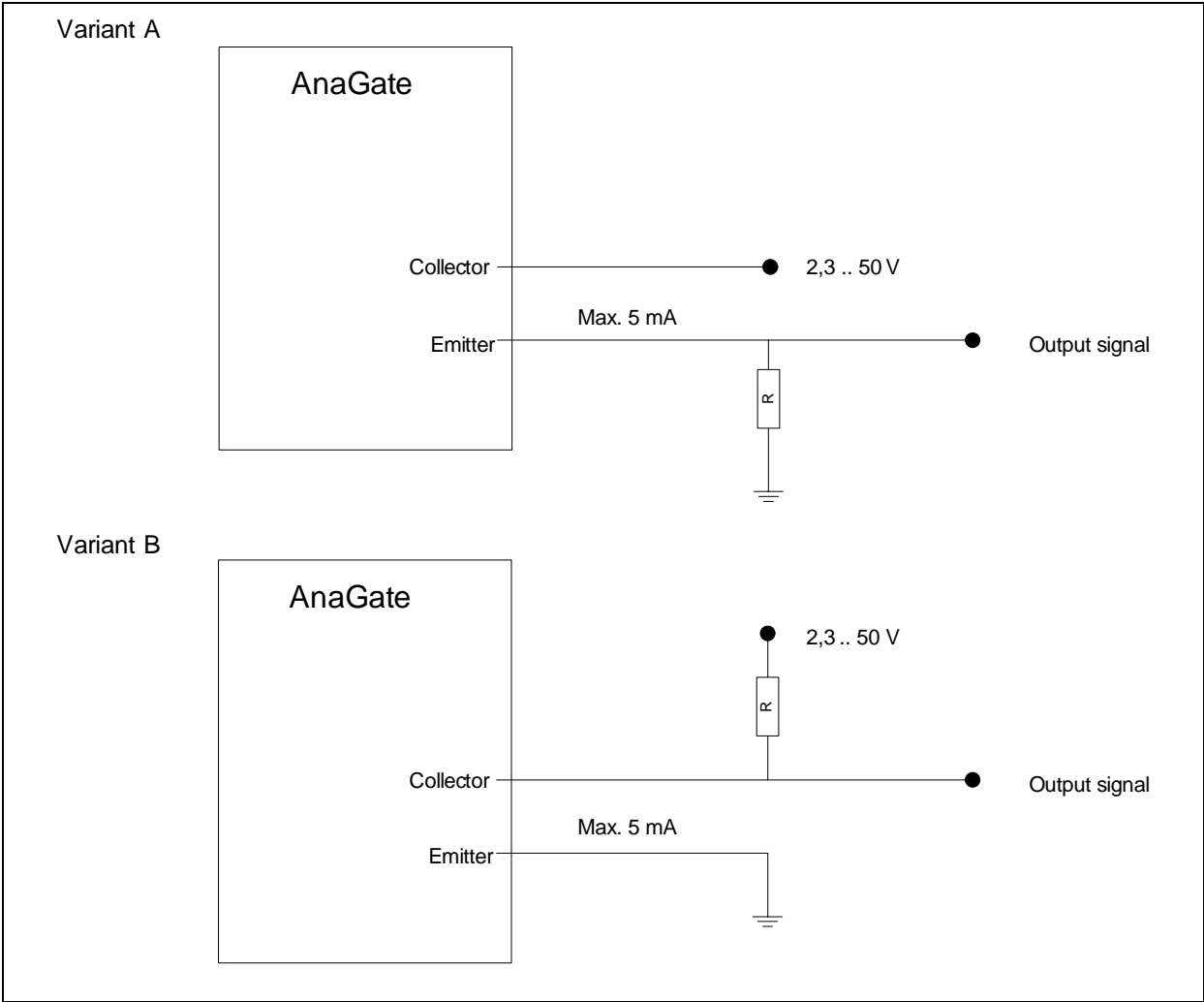


Chart 2-5: Example for connecting the digital outputs

# 3 Application Scenarios

## 3.1 AnaGate CAN in Gateway mode

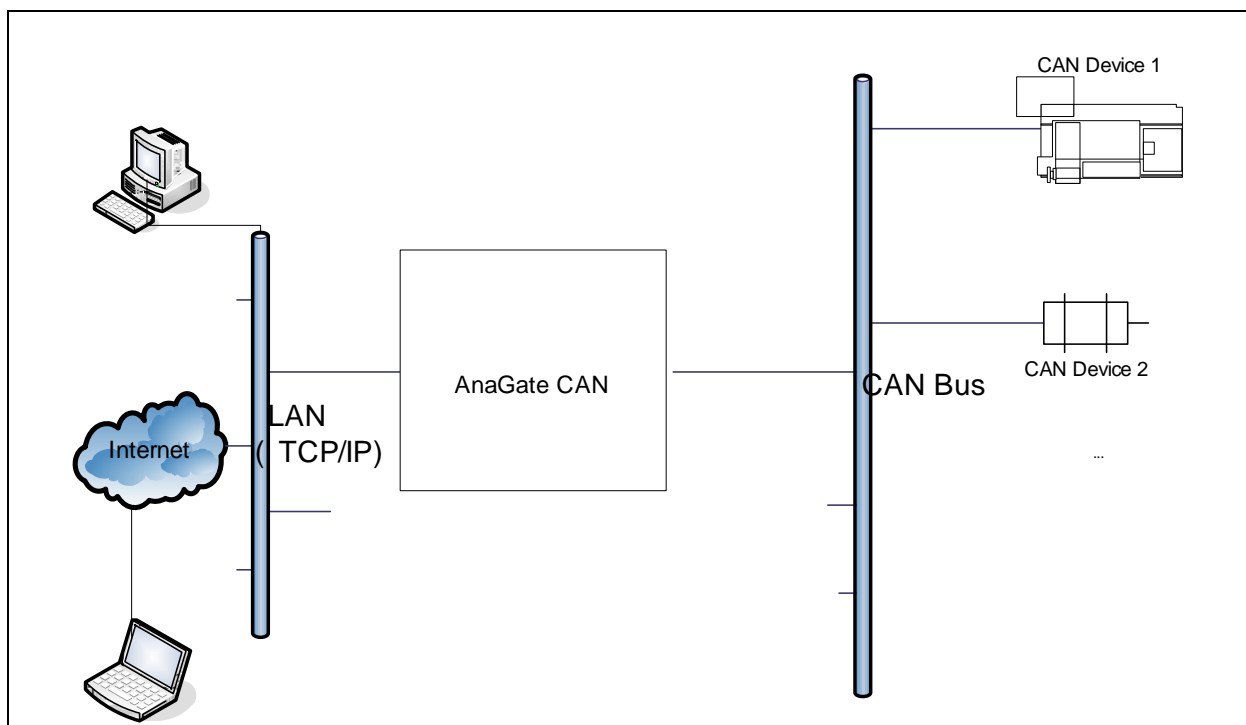


Chart 3-1: AnaGate CAN in Gateway mode

If an CAN device is directly connected to the AnaGate CAN, the following must be considered:

- CAN\_L  
This line has to be connected to the CAN\_Low line of the CAN bus.
- CAN\_H  
This line has to be connected to the CAN\_High line of the CAN bus.
- GND  
This line can be connected optionally to GND of the other bus devices.

In gateway mode the CAN messages are transferred transparently over TCP/IP between the CAN network and the host platform (e.g. PC) in both directions. The AnaGate CAN uses a unique CAN ID when sending telegrams.

All CAN messages received by the AnaGate CAN are transmitted via the API to the host system, if the AnaGate device not requested to discard them generally. Alternatively it is possible to set individual software filters to reduce the message transfer to the host system.

The software program **CAN Monitor**, which is included on the documentation CD, can be used to monitor a CAN bus or to create single CAN telegrams.

## 3.2 AnaGate CAN in bridge mode

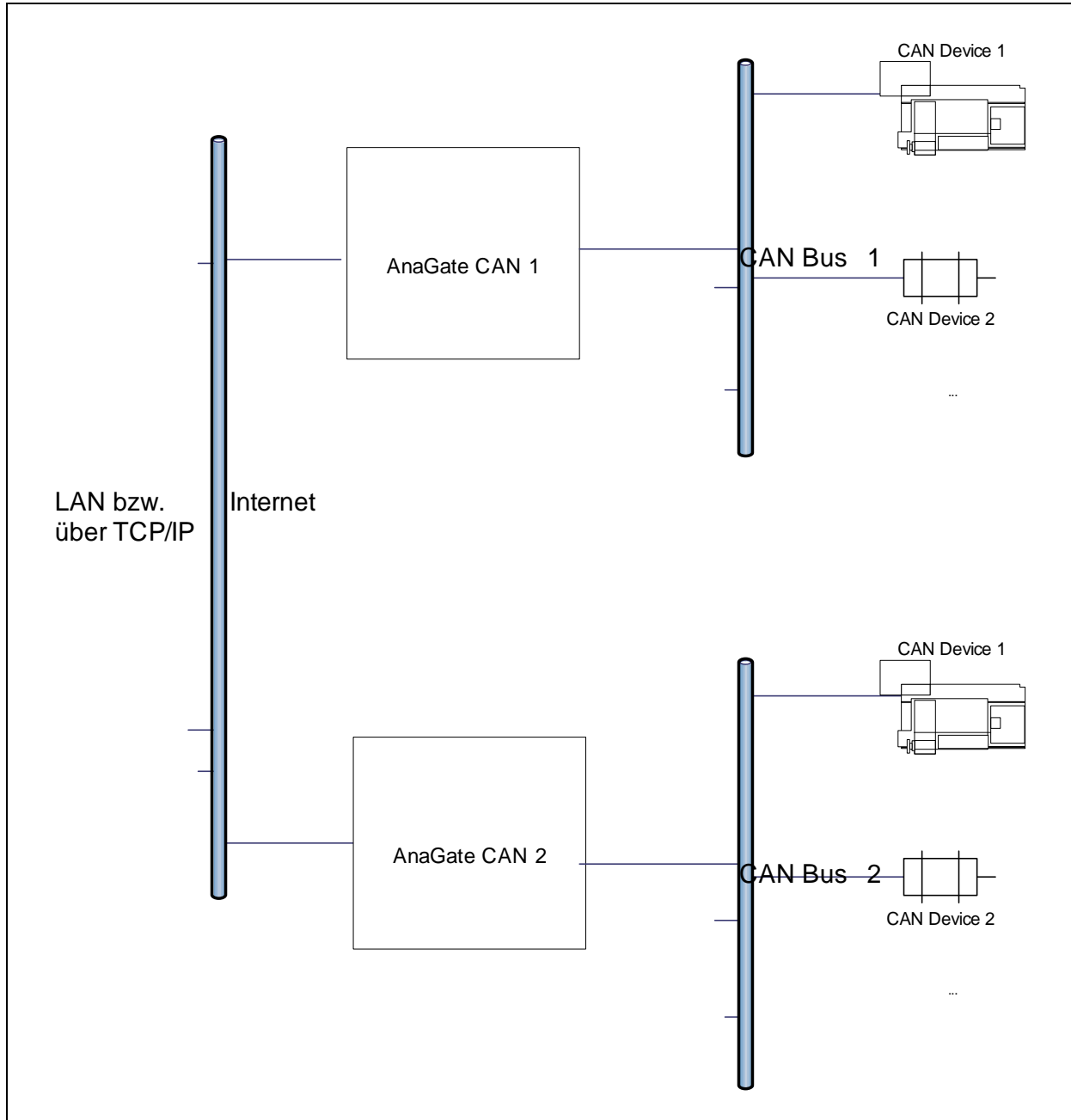


Chart 3-2: AnaGate CAN in bridge mode

In the bridge mode two arbitrary CAN networks can be interconnected by two AnaGate CAN. The CAN messages are exchanged transparently over TCP/IP between the two AnaGate CAN.

It is recommended to use unique Can identifiers in the two CAN networks.

Via the web interface the two AnaGate CAN are configured like usual. The first AnaGate CAN device runs in standard mode (gateway mode). The second AnaGate CAN has to run in bridge mode. The following additional parameters can be set for the device:

- IP address of the partner (IP of the first AnaGate CAN)
- Baud rate of CAN bus 1 (first AnaGate CAN)
- Baud rate of CAN bus 2 (second AnaGate CAN)

## 4 Questions and Troubleshooting

### 4.1 No LAN connection

If no LAN connection is registered (the link LED next to the RJ45 socket does not light up), please check the wiring between the AnaGate CAN and the hub or switch. You need a crossover cable to connect the device to a PC.

Check that the AnaGate CAN is connected to the power supply.

### 4.2 No TCP/IP connection

If you cannot set up a TCP/IP connection to the AnaGate, please proceed as follows:

1. Check for an existing LAN connection (see also 4.1).
2. Check if you can address the device with a ping.

To do this, open the MS Windows command prompt and enter the command “ping a.b.c.d” (replace a.b.c.d with the IP address of the AnaGate). If there is no response, check whether the RX LED next to the RJ45 socket lights up while executing the ping command.

If you still cannot address the device, perform a factory reset (see 2.8 for details), configure your PC using the IP address 192.168.1.253/255.255.255.0, and repeat the aforementioned procedure using the IP address 192.168.1.254.

3. Check whether you can open a TCP connection at port 5000.

To do this, open the MS Windows command prompt and enter the command “telnet a.b.c.d 5000” (replace a.b.c.d with the IP address of the AnaGate). If you do not get a

connection immediately check whether there is a firewall or packet filter installed between your PC and the AnaGate.

## 4.3 No CAN communication

If CAN communication with your CAN device fails, please proceed as follows:

1. Check that the CAN device is connected to the power supply.
2. Check that no other devices/ $\mu$ C are active on the CAN bus.
3. Ensure that the SDA and SCL circuits are provided with an adequate pull-up resistance (e.g. 4.7 kOhm) to the voltage supply (3.3 V resp. 5 V).
4. Ensure that no other electrical components can interfere with communication on the CAN bus between the AnaGate CAN and the CAN device.
5. Ensure that the chip-enable address of the CAN device and the software are identical.

## 4.4 Firewall

When working with a firewall, the TCP port 5002 has to be opened for communication with the AnaGate CAN.

# Literature

[1] CAN Bus <http://www.can.bosch.com>

# Abbreviations

|      |   |
|------|---|
| DHCP | <u>D</u> ynamic <u>H</u> ost <u>C</u> onfiguration <u>P</u> rotocol |
| CAN  | <u>C</u> ontroller <u>A</u> rea <u>N</u> etwork                     |