AnaGate CAN uno

User Manual

Analytica GmbH

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AnaGate CAN uno: User Manual

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Abstract

This manual describes the intefaces and modes of operation of a *AnaGate CAN uno*.

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Revision History			
Revision 1.0	08.02.2008	Uwe	Initial version
Revision 1.1	23.07.2008	Uwe	Integration AnaGate CAN duo
Revision 1.2	17.04.2009	ASc	Integration AnaGate CAN quattro
Revision 1.3	18.05.2009	ASc	Description *Firmware-Update* added
Revision 1.4	10.08.2010	ASc	Manual changed to **DocBook** format
Revision 1.5	09.08.2011	ASc	The AnaGate CAN uno DIN rail supports digital inputs/outputs.
Revision 1.6	04.10.2011	ASc	New option *Boot with operational mode* on web configuration page *CAN settings* (FW 1.3.16).
Revision 1.7	14.08.2013	ASc	Description of advanced unit settings on web configuration page *Advanced settings* (FW 1.3.19) and the informational *Status* page.
Revision 1.8	22.05.2014	ASc	Support of CANopen Conformance Test Tool of the CiA.
Revision 1.9	09.06.2014	ASc	Description of the new network parameters *`Name Server`* and *`Local Domain`*.

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Introduction

This document describes the features and objectives of the CAN-Ethernet gateway *AnaGate CAN uno*.

This device is part of a product line, whose single devices only differ in the number of CAN interfaces and/or the device case.

In this manual the term *AnaGate CAN Gateway* is uniformly used, if no specific model is addressed or it is not necessary to differentiate. Otherwise the full product name is used, like *AnaGate CAN USB*, *AnaGate CAN uno*, *AnaGate CAN duo*, *AnaGate CAN quattro*, *AnaGate CAN X2*, *AnaGate CAN X4* or *AnaGate CAN X8*.

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Chapter 1. Description

The *AnaGate CAN Gateway* connects a PC, an embedded PC or an other general device to one or more CAN busses via the TCP/IP network protocol. It basically works as a CAN master with no own CAN identifier on the bus.

For this reason the *AnaGate CAN uno* provides an ethernet interface and a single electrically isolated CAN interface.

Controlling and configuration of an *AnaGate CAN Gateway* is made through TCP/IP. The application protocol itself is described in detail (see [TCP-2010]). Thus the access to the device can be programmed via native calls to the TCP/IP socket interface. This means that any communication partner with a LAN interface is able to communicate to the device. Accessing the device with the supplied application libraries for Windows and Linux is much comfortable. The libraries includes the entire range of device functions and can be used with conventional programming languages.

In bridge mode the *AnaGate CAN Gateway* can interconnect two physically independent CAN networks via LAN/Ethernet (*LAN bridge mode*). With the coupling over LAN/Ethernet it is possible to connect separate CAN buses with different baud rates over long distances.

Note

The *AnaGate CAN duo*, *AnaGate CAN quattro*, *AnaGate CAN X2*, *AnaGate CAN X4* and *AnaGate CAN X8* can additionally interconnect two internal CAN interfaces. The *AnaGate CAN uno* do not support this so called *internal bridge mode*.

1.1. Features

- The *AnaGate CAN uno* can send and receive CAN messages via its CAN interface. This can be done using a device that supports TCP sockets (like a personal computer or a PLC).
- Variable CAN bus speed per interface (10, 20, 50, 62.5, 100, 125, 250, 500, 800 or 1000 kbps).
- Software configurable bus termination for the CAN interface.
- Two different plugs for voltage supply. The DIN rail case model of the *AnaGate CAN uno* has only one plug for power supply.
- System is addressed using a proprietary network protocol.
- Static or dynamic assignment (DHCP) of IP address.
- 2/4 digital inputs and outputs, which can be accessed via LAN/Ethernet.
- Several simultaneous network connections (5x TCP and 1x UPD) are supported on each existing CAN interface.
- Coupling of two independent CAN networks via LAN/internet bridge over two seperate devices. All devices of the *AnaGate* product line except the *AnaGate CAN USB* support this feature.

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1.2. Specification

Technical aspect		Specfication
Measurements	Desktop casing	155mm x 105mm x 40mm
	DIN rail casing	100mm x 125mm x 50mm
	Weight	approx. 285g/202g
CAN bus	Baud rate	10, 20, 50, 62.5, 100, 125, 250, 500, 800 or 1000 kbps, software configuration
	CAN controller	1x Microchip MCP 2515
	CAN interface	1x ISO 11898-2, galvanic decoupled
	Interface	1x DB9 plug incl. CAN_H, CAN_L and GND
Digital IO[1]	Inputs	4, galvanic decoupled (3,3 – 24V)
	Outputs	4, galvanic decoupled, 3,3 – 24V ($I_{total\ max}$ = 0,5A)
LAN interface	Baud rate	10/100 Mbps
	TCP/IP	Static or dynamic (DHCP) IP address
	Interface	RJ45 socket
Voltage supply	Voltage	V_{Input}=9-28V direct current
	Power consumption	max. 350 mA (9V) without plugged USB consumers
Ambient temperature	Storage	0 .. 85 °C
	In operation	0 .. 60 °C (industrial version[2]: -20 .. 70°C)

[1]The din rail version of the AnaGate CAN uno has only 2 digital inputs/outputs without galvanic decoupling. The voltage level depends on the supplied voltage of the device.
[2]The din rail version of the AnaGate CAN uno is only available with industrial temperature range.

Table 1.1. Technical data, AnaGate CAN uno

Note

Protect the *AnaGate CAN Gateway* from direct sunlight.

1.3. Scope of delivery

The *AnaGate CAN Gateway* is supplied with the following components:

- 1x AnaGate CAN uno
- 1x CD with manual, programming API for Windows/Linux and CANopen driver for CANFestival
- 1x 1,8 m Cat. 5 LAN cable (standard, not crossed)

Only included with desktop casing:

- 1x 10 pole plug connector (for digital IO)

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- 1x 2 pole plug connector (for external power supply)
- 1 x plug-in power supply unit, compatible with country of delivery: EU, US or UK.

Only included with DIN rail casing:

- 1x 4 pole plug connector with screw terminals for digital IO
- 1x 4 pole plug connector with screw terminals for CAN interface
- 1x 2 pole plug connector with screw terminals (for external power supply)

1.4. Interfaces and plugs

1.4.1. AnaGate CAN uno - front view

Figure 1.1. Front view, AnaGate CAN uno

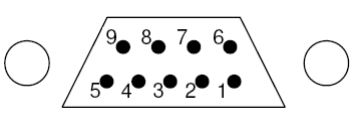
The front panel of the *AnaGate CAN Gateway* features for each existing CAN interface, the following connectors and LEDs (from left to right):

Activity LED — This green LED lights up on activity on the relevant CAN line.

CAN port — 9 pole D-Sub plug to connect the CAN bus (CiA recommondation DS 102).

The pin allocation of the plug can be inferred from the following table.

Pin	Description
3	GND
2	CAN_L
1,4-6,8,9	not connected



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Pin	Description	
7	CAN_H	

Table 1.2. Pin layout, CAN plug, box case

1.4.2. AnaGate CAN uno - rear view

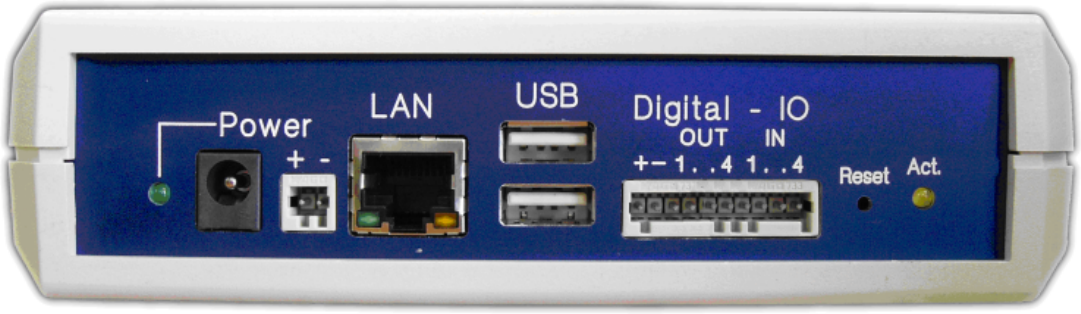

Figure 1.2. AnaGate CAN uno, back panel

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

Power LED — This green LED lights up when voltage is being supplied.

Power supply — The *AnaGate CAN Gateway* can be power supplied in two different ways.

For the use as desktop device the barrel connector socket is intended, in order to supply the device via a plug power supply

For the use in a switchboard the two-pole Wago clamping socket can be used to connect an external power supply.

Warning

Be sure to use only one power supply.

LAN — Via the RJ45 socket the *AnaGate CAN Gateway* is connected with the Ethernet. The device can be connected to a network component like a hub or a switch. For a direct connection to a PC a crossover network cable has to be used.

USB Hosts — The *AnaGate CAN Gateway* has two USB 1.1 interfaces for further extensions or customer specific solutions.

Digital IO — The *AnaGate CAN Gateway* has 4 digital inputs and 4 digital outputs which can be used freely. The digital io are galvanically decoupled from the device and must be externally power supplied from 3,3V to 24V (see Section 2.7, " Digital IO").

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Reset — The *AnaGate CAN Gateway* can be reset to the factory settings using this button (see Section 2.8, " Factory reset" for further details).

Activity LED — This yellow LED lights up when the *AnaGate CAN Gateway* is processing incoming CAN messages.

1.4.3. AnaGate CAN uno DIN rail case

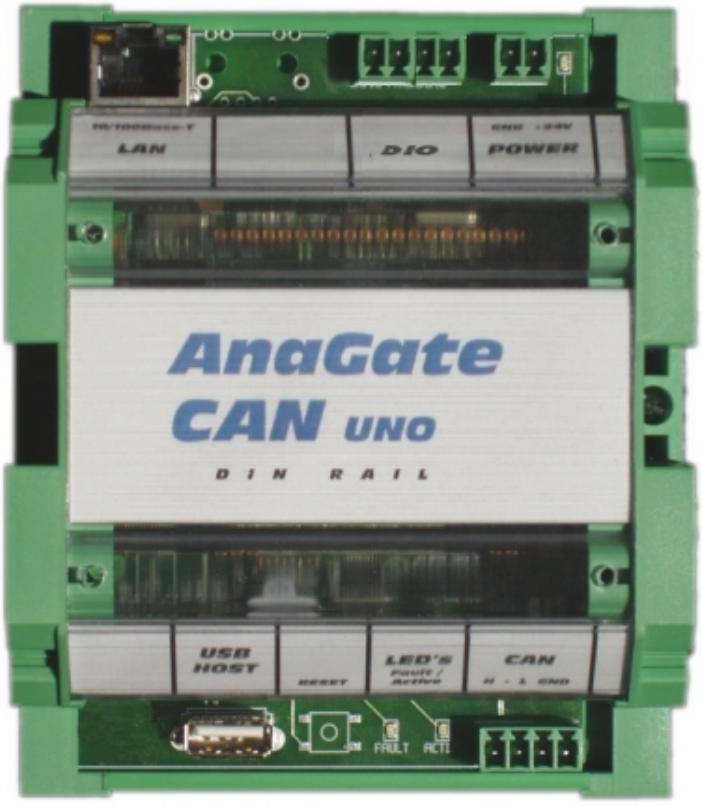

Figure 1.3. Top view AnaGate CAN uno (DIN rail)

The upper connector strip of the *AnaGate CAN uno (DIN rail)* features the following connectors and LEDs (from left to right):

LAN — Via the RJ45 socket the *AnaGate CAN Gateway* is connected with the Ethernet. The device can be connected to a network component like a hub or a switch. For a direct connection to a PC a crossover network cable has to be used.

Digital IO — The *AnaGate CAN Gateway* has 2 digital inputs and 2 digital outputs which can be used freely. The digital io are not galvanically decoupled from the device and are internally power supplied (see ???).

Power supply — The two-pole clamping socket can be used to connect an external power supply.

Power LED — This green LED lights up when voltage is being supplied.

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The lower connector strip of the *AnaGate CAN uno (DIN rail)* features the following connectors and LEDs (from left to right):

USB Host — The *AnaGate CAN Gateway* has a USB 1.1 interface for further extensions or customer specific solutions.

Reset — The *AnaGate CAN Gateway* can be reset to the factory settings using this button. (see Section 2.8, " Factory reset" for further details)

Fault LED — Reserved for future use.

Activity LED — This yellow LED lights up when the *AnaGate CAN Gateway* is processing incoming CAN messages.

CAN port — 4 pole plug to connect the CAN bus. The corresponding connector plug is included in delivery (screw terminal up to 1,5mm²). The pin allocation of the plug can be inferred from the following table.

Pin	Description
1	GND
2	CAN_L
3	not connected
4	CAN_H

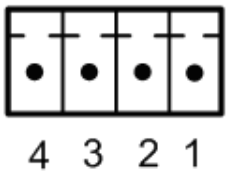

Table 1.3. Pin layout, CAN plug, DIN rail case

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Chapter 2. Configuration

2.1. Initial installation

First the *AnaGate CAN Gateway* must be supplied via the power plug with a tension from 9 to 24 V.

Insert the included LAN cable into the plug labelled LAN and connect it either to a hub or switch. If connecting directly to a PC use a crossover LAN cable (not in scope of delivery) instead of the included LAN cable.

2.1.1. Factory settings

The *AnaGate CAN Gateway* is delivered with the following initial network settings:

IP address	`192.168.1.254`
Address type	static
Network mask	`255.255.255.0`
Gateway	`192.168.1.1`

The device can now be configured using a standard browser (Internet Explorer, Firefox, etc.) by using `http://192.168.1.254` .

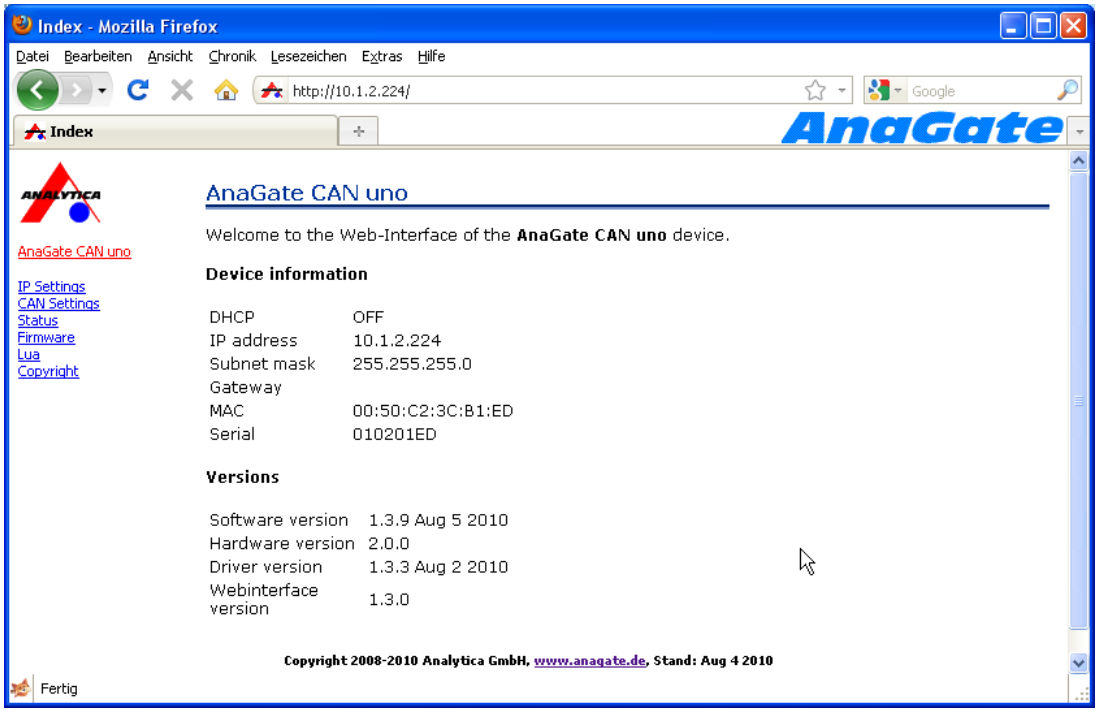

Figure 2.1. HTTP interface, AnaGate CAN uno

Note

The PC used for the configuration must be in the `192.168.1.x` network. The static IP address `192.168.1.2` with the subnet mask `255.255.255.0`

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can be e.g. used. If neccessary the settings of the network interface on the configuration pc has to be changed temporarily.

2.2. Network settings

On the page *IP Settings* the following settings can be changed.

DHCP — Here you can switch between static IP and dynamic (via DHCP) addresses. If DHCP is being used, the remaining fields are ignored, because this information is retrieved from the DHCP server.

In this case, a DHCP server must be available and accessible in the network.

IP address — The IP address of the *AnaGate CAN Gateway* is entered in dot format (e.g. `192.168.1.200`).

Subnet mask — The subnet mask is entered in dot format (e.g. `255.255.255.0`).

Gateway — The default gateway is entered in dot format (e.g. `192.168.1.1`). Leave blank or enter `0.0.0.0` if a default gateway is not required.

Name Server — The IP adress of a name server, which resolves domain names (in dot format). If a name server is set, the end point of a IP bridge can be entered as domain name (see Section 2.3, " CAN settings").

Local domain — Local domain name. Most queries for names within this domain can use short names relative to the local domain in the end point field of a CAN/IP bridge. The domain part is taken to be everything after the first '.'. Is *`xyz.local`* the local domain name, the short name *`dest`* will extended to *`dest.xyz.local`*.

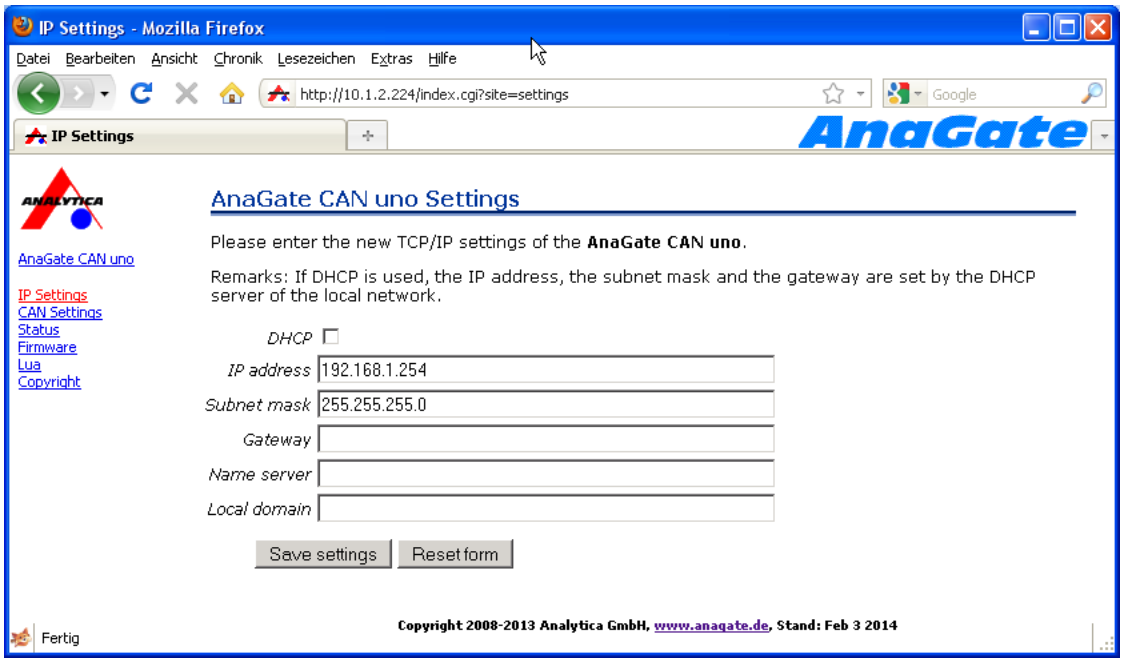

Figure 2.2. HTTP interface, network settings

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The inputs will be taken over immediately after clicking the button **Save settings** and saved permanently on the *AnaGate CAN Gateway* . A restart of the device is not necessary for activation of the settings.

Note

Maybe the *ARP cache* of the PC has to be deleted to find the device with the changed IP address.

2.3. CAN settings

On the page *CAN Settings* the global settings for all existing CAN interfaces are displayed and can be changed individually.

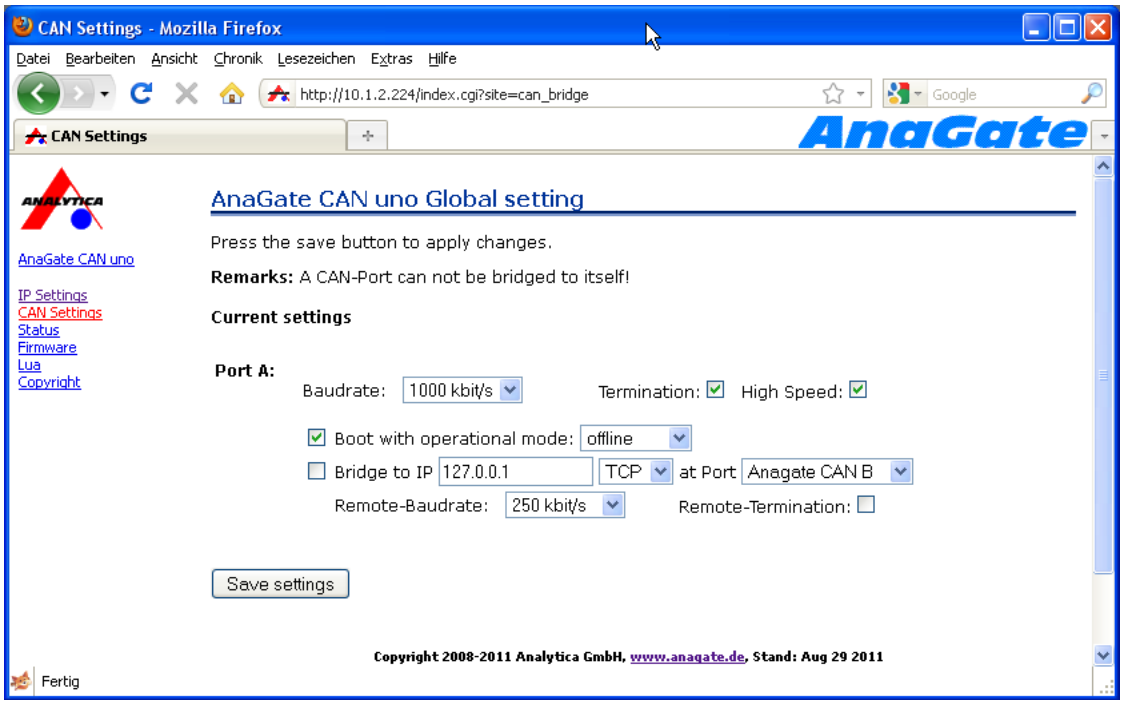

Figure 2.3. HTTP interface, CAN settings

Baudrate	The baud rate can be selected easily via a list box containing all supported values.
Termination	Use the check box to switch on/off the internal termination resistor.
High Speed	Activates/deactivates the *Highspeed mode*. In this operating mode all incoming/outgoing CAN telegrams are not longer confirmed by the opposite LAN side to accelerate process throughput. Software-Filters are switched off too in this mode.
Boot with operational mode	Initial operating mode of the CAN controller. Default value is **offline**.

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	offline	The CAN controller is not active on the CAN bus (offline).
	normal	Normal operating mode. The default setting of CAN baud rate is used.
	listen	In listen mode the CAN controller is passive. CAN messages are received, but no messages can be sent (no ACK, no error). The default setting of CAN baud rate is used.
	loopback	In loopback mode every sent CAN message is mirrowed back by the CAN controller (no ACK, no errors). The default setting of CAN baud rate is used.
	A more detailed description of the operating modes can be found in the data sheet of the CAN controller (Microchip MCP2515).	
Bridge	Activates/deactivates the *bridge mode* (see Section 3.2, " Bridge mode").	
to IP	IP address of the partner device, to which a connection (bridge) is to be made. The IP address has to be entered in dot notation. A domain name can be entered only if a name server is entered in the IP settings (see Section 2.2, " Network settings"). (only *Bridge Modus*).	
at Port	Port of the partner device, to which a connection (bridge) is to be made (only *Bridge Modus*).	
Remote-Baudrate	Baudrate of the partner device, to which a connection (bridge) is to be made (only *Bridge Modus*).	
Remote-Termination	Terminierung of the partner device, to which a connection (bridge) is to be made (only *Bridge Modus*). On destination devices, which can not software-configure the CAN bus termination (like the CAN X2/X4/X8), this setting is ignored.	

The inputs will be taken over immediately after clicking the button **Save settings** and saved permanently on the *AnaGate CAN Gateway*. A restart of the device is not necessary for activation of the settings.

2.4. Advanced settings

On the page *CAN Settings* the advanced settings of the unit are displayed and can be changed individually.

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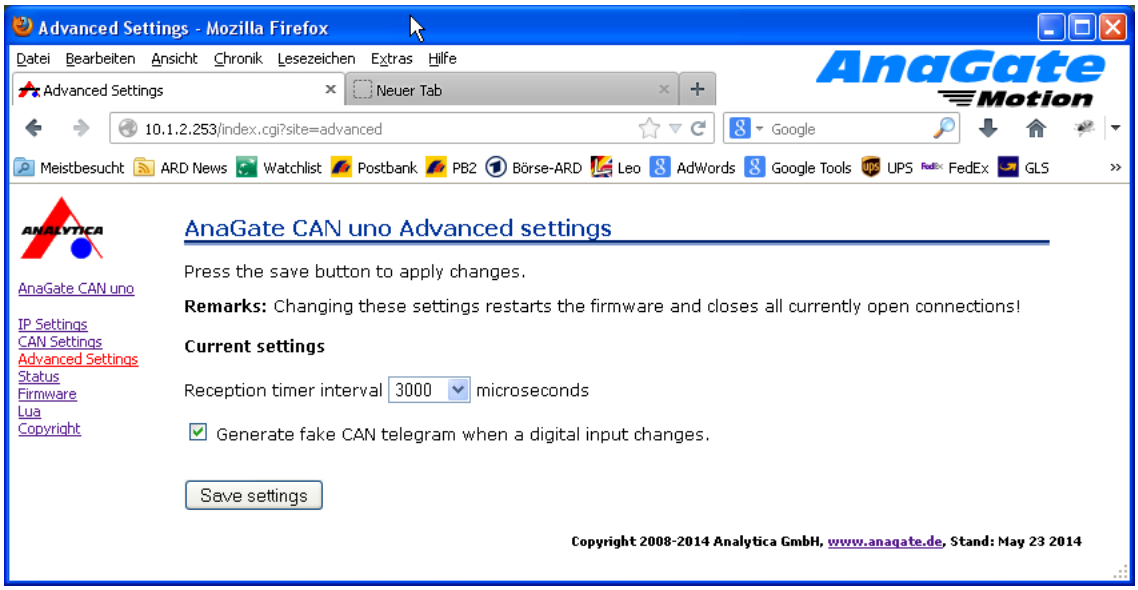

Figure 2.4. HTTP interface, CAN settings

Reception timer interval

This value specifies the frequency which is used to examine if new CAN telegrams are available in the internal driver buffer. The more frequently this examination is done, the shorter is the latency of the re-transmission of the CAN data via ethernet. On the other hand, its maximum message throughput is decreased.

The interval is defined in micro seconds, default value is `3000`. To give control immediately to the firmware after a CAN telegram is received by the CAN driver, the value `0` has to be set.

The inputs will be taken over immediately after clicking the button **Save settings** and saved permanently on the *AnaGate CAN Gateway*. A restart of the device is not necessary for activation of the settings.

2.5. Device status

On the page *Status* the device dependand status information is shown.

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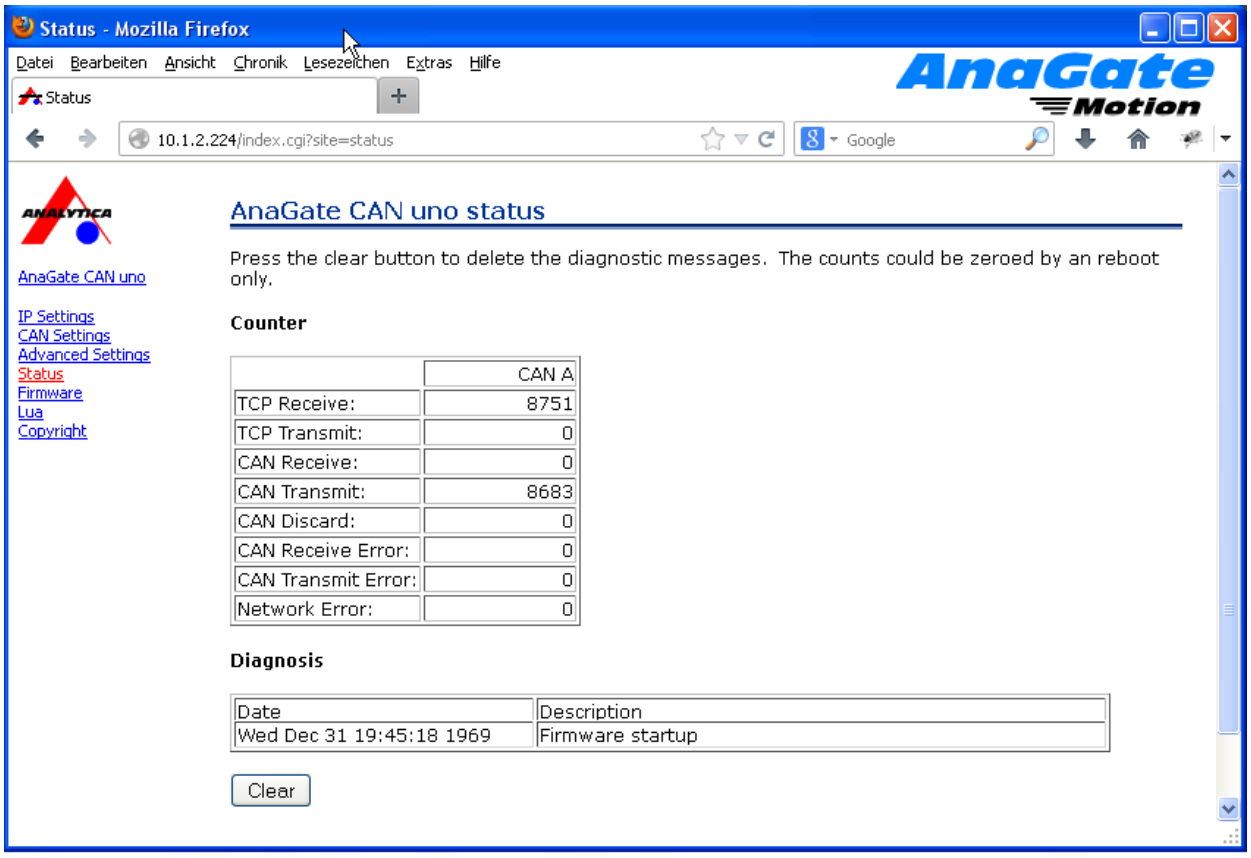

Figure 2.5. HTTP interface, Status

TCP Receive — Number of via TCP/UDP received CAN messages (CAN firmware)

TCP Transmit — Number of via TCP/UDP transmitted CAN messages (CAN firmware)

CAN Receive — Number of received CAN messages (CAN bus, CAN driver)

CAN Transmit — Number of transmitted CAN messages (CAN bus, CAN driver)

CAN Discard

- Timeout sending CAN telegram (1s)

  This indicates that no active partner is connected to the CAN bus (no ACK received). Also a wrong baud rate or missing termination can cause this error.

- A CAN telegram received from CAN bus is discared because the receive buffer is full (600 entries)

  This happens when the CAN firmware does not read telgrams fast enough out of the driver receive buffer. This may be the case even if CAN telegrams routed via TCP/UPD can not received fast enough by the connected ethernet client(PC,PLC) because of load problems (e.g. full receive TCP buffers).

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- The firmware discards outgoing CAN telegrams because the send buffer is running full (1000 entries)

  This happens when CAN telegrams are not sent fast enough successfully to CAN bus. This may be a resultant problem of timeouts during transmission or of overloading the CAN bus concerning the current used baud rate.

CAN Receive Error	Register *Rx-Err-Count* of the CAN-Transceiver
CAN Transmit Error	Register *Tx-Err-Count* of the CAN-Transceiver
Network Error	TCP/UPD transmit error (CAN firmware)

After clicking the button **Clear** all saved diagnosis entries are deleted on the device. To reset the system counters the device must be switched off.

2.6. Functional extensions based on Lua

On an *AnaGate CAN uno* it is possible to execute self-created applications with an installed Lua script interpreter (see [Prog-2013] for a detailed description of all programming features).

On the page *Lua* Lua script files can be uploaded to the device and executed locally.

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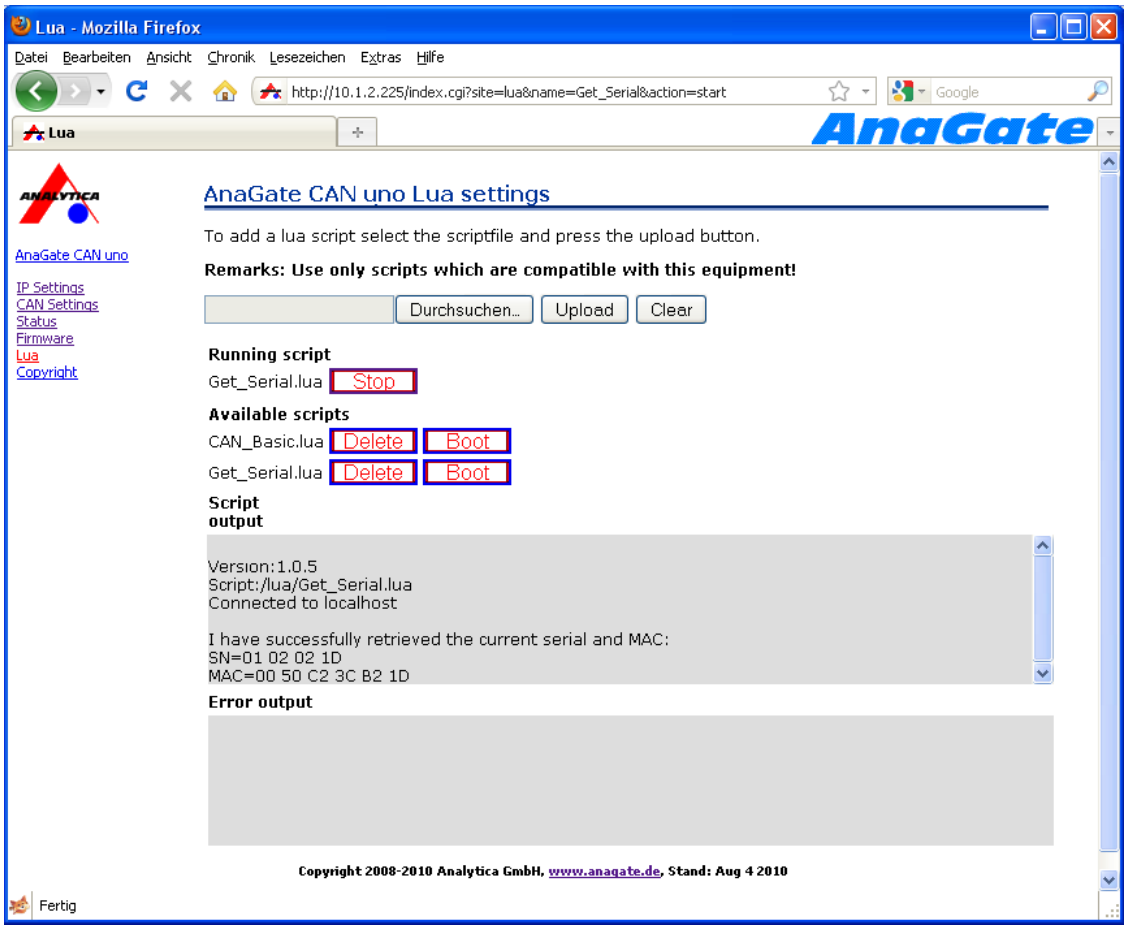

Figure 2.6. HTTP interface, Lua settings

Browse... Opens a file upload dialog to select a Lua script file.

Upload Uploads the selected script file to the device.

Clear Clears the current script file selection.

Boot script — Script file executed on system startup. Via the button **Delete** the boot script can be deactivated. Only one boot script is allowed.

Running script — Displays the currently executing script file. Via the button **Stop** the execution can be cancelled.

Available scripts — Displays all scripts which are currently available on the device.

To start the execution of a script click on the button **Start**. Via button **Delete** a script can be deleted on the device and via **Boot** a script can be defined as boot script.

script output area — In this text area the standard output (stdout) of the currently executing script is displayed. Via the button **Clear** this text area can be cleared.

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error output area — In this text area the standard error output (stderr) of the currently executing script is displayed. Via the button **Clear** this text area can be cleared.

Tip

The text areas for script and error output are not refreshed automatically. A manual page reload of the current page refreshes both text areas.

2.7. Digital IO

The desktop and DIN rail case model version of the *AnaGate CAN uno* are not implemented identically concerning digital io. There are only 2 inputs and 2 outputs installed on the DIN rail version, on the desktop modell are 4 inputs and 4 outputs present.

2.7.1. Pin layout of plug (desktop model)

Over the 10-pole pin row on the back of the *AnaGate CAN Gateway* four digital inputs and four digital outputs are led out, which can be used freely. Since the IO's are electrically isolated from the device, they must be separately supplied via the pins 1 us 2 with a voltage by 3,3V - 24V DC.

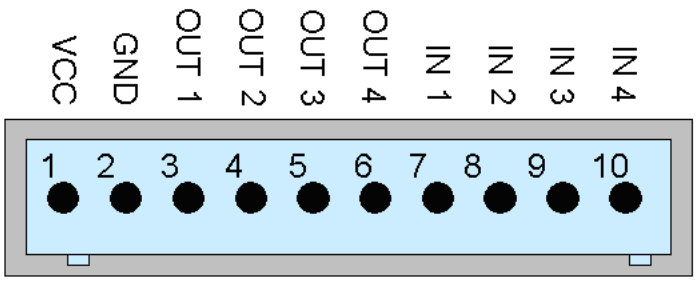

Figure 2.7. Pin layout, digital IO plug (desktop model)

2.7.1.1. Connecting the digital inputs

At the inputs IN1 to IN4 any external voltage between VCC and GND can be applied. As soon as the voltage difference between INx and GND is more than 1.0 V, the *AnaGate CAN Gateway* interprets the input as logically `HI` otherwise `LOW`.

2.7.1.2. Connecting the digital outputs

The outputs are implemented as open collector drivers. If a output is active, it is pulled down to GND. In the inactive condition the output is floating.

In principle the maximum current of each individual output is 400mA. For thermal reasons is the sum of all output currents is limited to 500mA. The outputs not short-circuit proofed, and must be protected with a pre-resistor.

Warning

The outputs are not short-circuit-safe!

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2.7.2. Pin layout of plug (DIN rail model)

Over the 4-pole pin row on the upper connector strip of the *AnaGate CAN Gateway* two digital inputs and two digital outputs are led out, which can be used freely. The IO's are internally power supplied, so they are not electrically isolated from the *AnaGate CAN Gateway*.

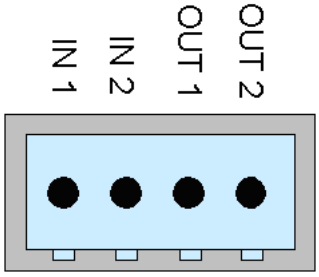

Figure 2.8. Pin layout, digital IO plug (DIN rail model)

2.7.2.1. Connecting the digital inputs

The inputs IN1 to IN2 are optimized for 24V level. A voltage level greater than 12V is interpreted as logically `HI`, a voltage level less than 12V is interpreted as `LOW`.

-	min	typical	max
$V_{IN\ high}$	13V	24V	30V
$V_{IN\ low}$	0V	0V	11V
$I_{IN\ high(@24V)}$		4,2mA	

2.7.2.2. Connecting the digital outputs

The outputs are implemented as open drain outputs. If an output is active, the supply voltage is switched. The output is potenial-free, if not active.

Warning

The outputs are not short-circuit-safe!

2.8. Factory reset

In order to restore the default factory settings, hold the *RESET* for approx. 10 seconds. If the device is reset successfully, the yellow LED blinks until the *RESET* is released.

The default factory settings are activated immediately without a restart of the device:

IP address	`192.168.1.254`
Address type	static

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Network mask	`255.255.255.0`
Gateway	`192.168.1.1`

Important

If the *RESET* push-button is pressed too briefly, the actual IP address and network mask is pulsed via the yellow LED (Morse code). A second push of the *RESET* terminates the pulsing, the device is not reset.

Note

The factory reset is not possible directly after power on until complete loading of the operating system and the firmware of the device. This initialization period is signalled via the yellow activity LED. On power on the LED is switched on and after initialization the LED is switched off.

Note

Maybe the *ARP cache* of the PC has to be deleted to find the device with the changed IP address.

2.8.1. Examining the network settings

It is possible to check the current network settings directly on the device.

After pressing shortly the *RESET* button the device starts to pulse out the current n settings via the yellow activity LED. Pressing again the buttons stops the pulsing immediately.

The IP address and subnet mask are pulsed out, one after the other. Following pulse codes are used:

- Digits 1, 2, 3, ..., 9: 1x, 2x, ...9x Flashing (200ms delay between each flash)
- Digit 0: 10x flashing (200ms delay between each flash)
- Dot: 1x very fast flash

Between two single digits a delay of 1 seconds is made, and between the IP address and subnet mask two fast flashes are pulsed out.

Figure 2.9. AnaGate CAN Gateway, Example blinking output

2.9. Firmware update

The device firmware of the *AnaGate CAN Gateway* is updated via the integrated web server of the device.

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On the home page of the web server the current firmware information is displayed.

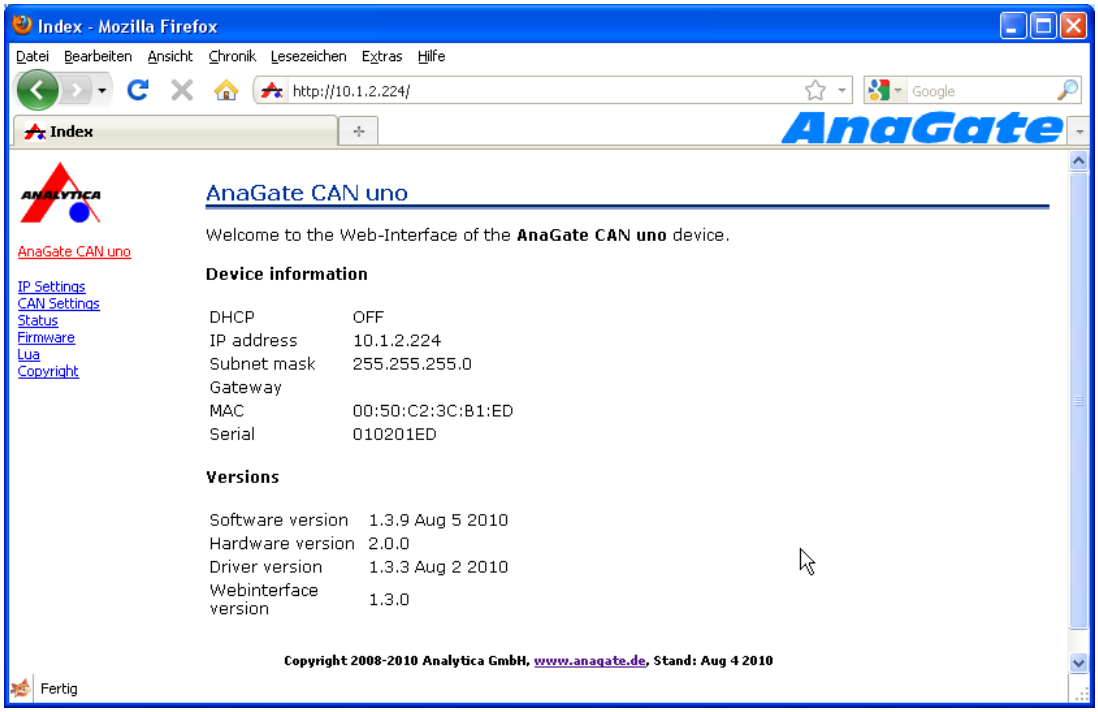

Figure 2.10. HTTP interface, AnaGate CAN uno

Proceed please as follows, in order to install the firmware on the *AnaGate CAN Gateway* :

- Click *Firmware* on the left navigation bar to navigate to the Firmware-Upload page.

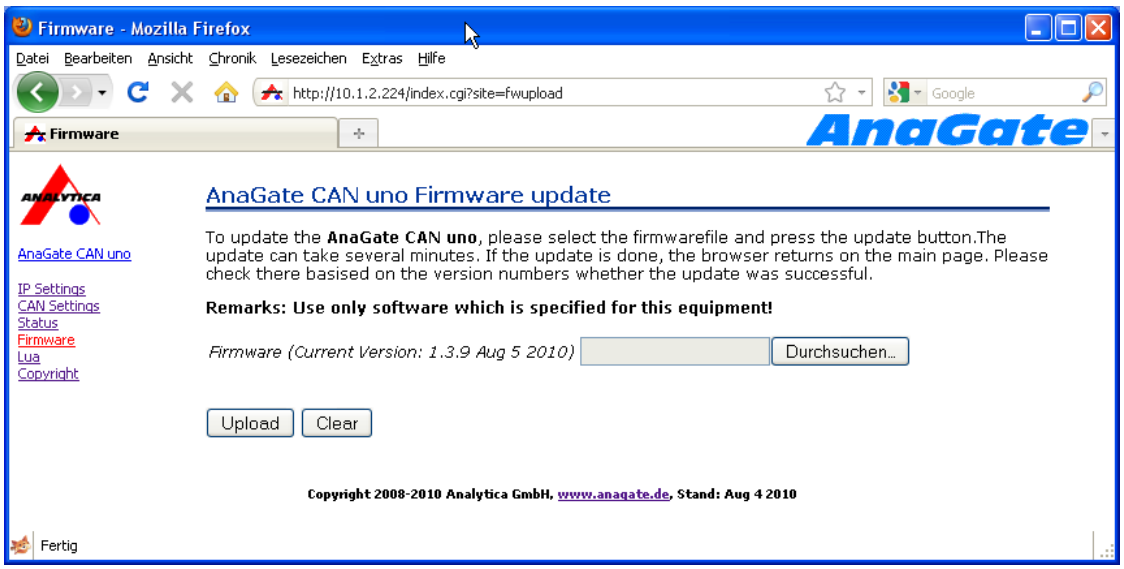

Figure 2.11. HTTP interface, firmware update

- Select the update package (file extension *.upd) via the **Browse** button.

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- Clicking on the button **Upload** loads the update file to the device and starts the update process.
- During the update process several installation messaged are displayed on the website. If the update is successfully finished, **Update done!** is displayed.

When the update is finished the browser navigates back to the home page. Check, if the new firmware version is display here.

Warning

If the firmware could not be flashed correctly on the device, the AnaGate may not longer ready for operation.

Please visit our web site `http://www.anagate.de` for further information.

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Chapter 3. Fields of application

If the *AnaGate CAN Gateway* is connected to the CAN bus, mind the following facts:

- **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.

3.1. Gateway mode

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 Gateway* uses no unique CAN ID when sending telegrams, this ID has to be set explicitly for each transmitted message.

All CAN messages received by the device are transmitted to all active LAN-connected host systems. It is possible to discard all incoming messages in general or to set individual software filters to reduce the message traffic to the host systems.

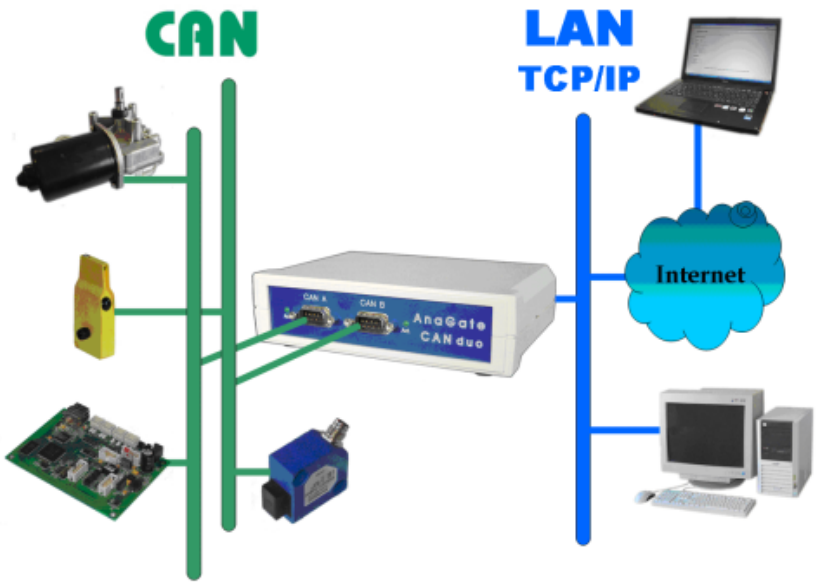

Figure 3.1. AnaGate CAN Gateway in gateway mode

The *AnaGate CAN Gateway* can be accessed via the following interfaces:

- 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.
- Application programs which are using the included software API inteface.

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- Self-created batch files which are executed via the included Lua interpreter with integrated AnaGate software API.

3.2. Bridge mode

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

It is possible to mix different *AnaGate CAN Gateway* models in bridge mode.

Important

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

Via HTTP interface both *AnaGate CAN Gateway* are configured as usual.

Subsequently one of the two devices has to be configured for the bridge mode. This can be done by the page *CAN Settings* of the web interface (see Section 2.3, " CAN settings"). This device acts in a manner of speaking as master and establishes the network connection to the second device and manages connection control. Basically a bridge can be created for each existing CAN interface of the device.

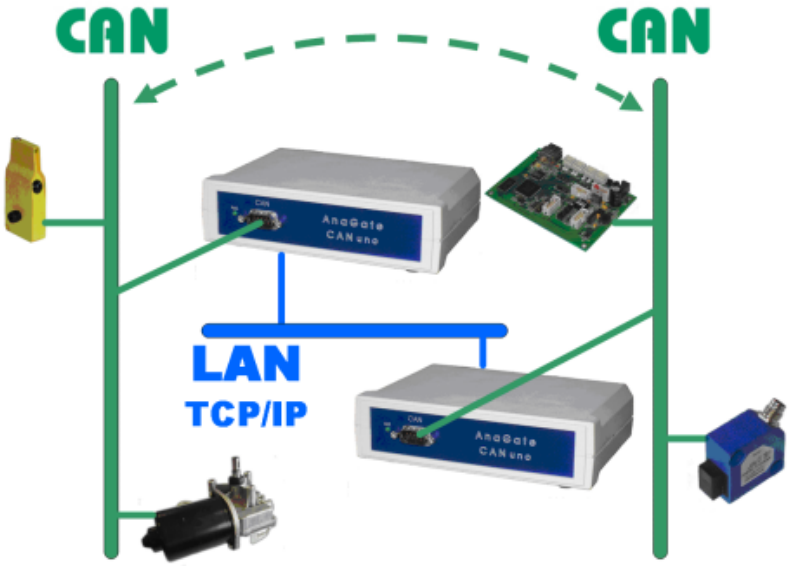

Figure 3.2. AnaGate CAN Gateway in bridge mode

The following additional parameters can be set for the device:

- IP address of the partner device, which is to be connected.
- CAN port of the partner device, which is to be connected (see Table A.1, " Using AnaGate hardware with firewall ").

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- The baudrate of the partner device. The baudrate of the parter device is independant of the own baudrate and has to be configured separatly. So, it is possible to interconnect networks with different baudrates.

- The internal termination resistor is to be set on/off for the CAN port of the parter device. On destination devices, which can not software-configure the CAN bus termination (like the AnaGste CAN X2/X4/X8), this setting is ignored.

When the *AnaGate CAN Gateway* establishes the connection to the partner device succesfully, the specified baud rate and integrated termination option is automatically set on the partner device.

Tip

It is recommended to configure the *operational mode* of the *AnaGate CAN Gateway*, which is connected by the active device, to **offline** or **normal** (together with the valid baud rate). This reduces the risk that error frames are created on the local CAN network, because of an invalid configured baud rate during startup phase until the successful established TCP interconnection.

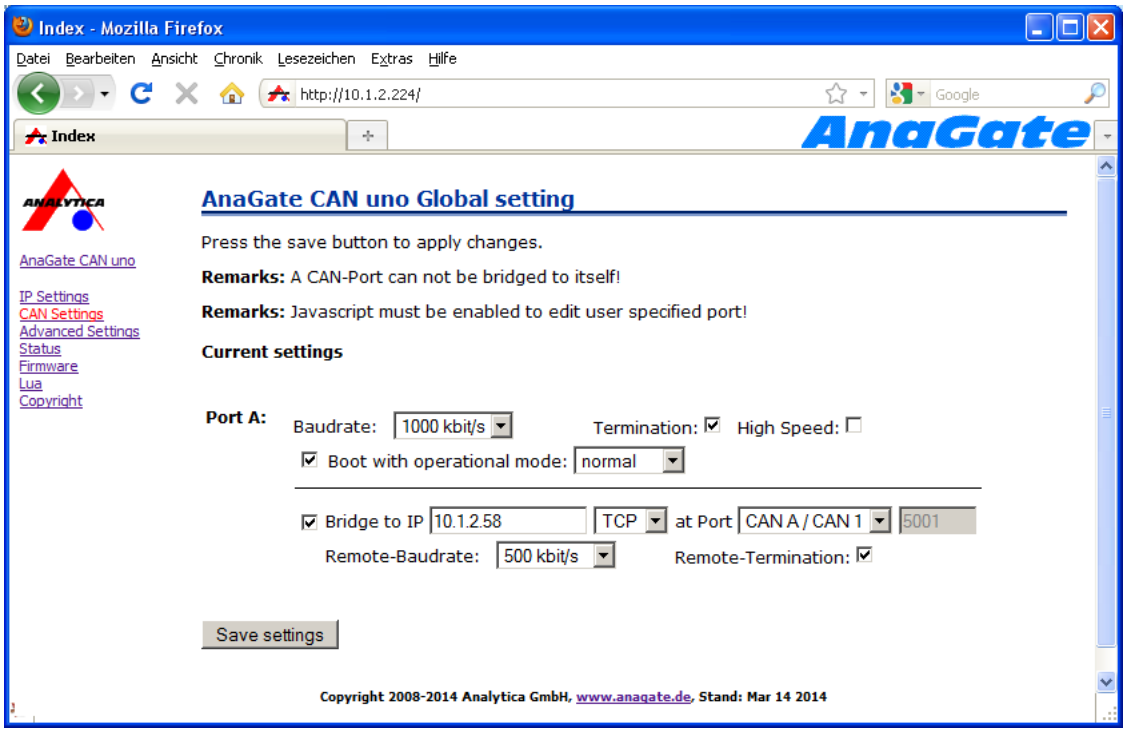

Figure 3.3. Bridge mode: Setting for device which initiates the bridge (here AnaGate CAN uno)

Note

On the models with more than one CAN interface, it is possible to interconnect one CAN interface to another interface of the same device (this is called internal bridge).

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To interconnect the two CAN interface on a single device, the own IP address or `127.0.0.1` has to be used. In this case the specified remote baud rate and termination is used on the interconnected interface.

3.3. CANopen Conformance Test Tool

The *CANopen Conformance Test Tool (CCT)* is a software tool, which is created and supported by the *CAN in Automation (CiA)*. It is used by the CiA to certificate CANopen devices. The Windows tool needs a hardware device to get access to the CAN bus and a manufacturer-specific application library called `COTI.dll`.

All CAN ethernet gateways and the CAN USB gateway offered by *Analytica GmbH* can be used by the *CANopen Conformance Test Tool* of the CiA.

To use the *AnaGate CAN Gateway* with the *CCT* the AnaGate-COTI extension must be copied to the installation path of the *CCT*. The COTI extension files can be find on the AnaGate CD in the path `Tools\COTI`. In addition, the configuration file `Settings.ini` must be customized. The configuration file must also be placed in the installation path of the *CCT*, it can be edited by a standard text editor like *Notepad*.

The following entries are contained in the file `Settings.ini`:

```
[Interface0]
IP=192.168.2.1
Port=0
```

Example 3.1. Settings.ini

IP IP-Address of the used *AnaGate CAN Gateway*.

Default address is `192.168.1.254`, this is the standard network address of all models with Ethernet interface.

Port Used CAN Port of the *AnaGate CAN Gateway*.

Following settings are to be used:

Port A, *`Port=0`*
Port 1

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Appendix A. FAQ - Frequently asked questions

Here is a list of frequently asked questions.

A.1. Common questions

Q: No network connection (1)

A: Please check the physical connection to the device first. In general the *AnaGate* has to be connected directly to a personal computer or to an active network component (hub, switch). If the AnaGate device is connected to a personal computer a cross-wired network cable must be used to connect the device, otherwise the included network cable is to be used.

The physical interconnection is OK if the yellow link LED turns on when LAN cable is plugged in. The yellow light stays on until the connection breaks down. On some hardware models the link LED flickers synchronously to the green activity LED if there is traffic on the network line.

If the link LED is always off then please check the wiring between the *AnaGate* and the hub, switch or the personal computer.

Q: No network connection (2)

A: If the link LED indicates a proper Ethernet connection (see previous FAQ) but you still can't connect to the *AnaGate* then please try the following:

1. Check if the *AnaGate* can be reached via ping. To do so in Windows, open a command prompt and enter the command **ping a.b.c.d**, where `a.b.c.d` is the device IP address.

2. In case the *AnaGate* is unreachable via ping, reset the device to factory settings. Set the IP address of your PC to `192.168.1.253` and the subnet mask to `255.255.255.0`. Check if the *AnaGate* can be reached via **ping 192.168.1.254**.

3. If the device can be reached via ping then the next step is to try if you can open a TCP connection to port 5001. Open a Windows command prompt and enter **telnet a.b.c.d 5001**, where `a.b.c.d` is the device IP address. If this command fails check if a firewall runs on your PC or if there is a packet filter in the network between your PC and the *AnaGate*.

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Q: No network connection after changing the network address

A: After changing the network address of the AnaGate device via web interface the device is not longer reachable. The used internet browser displays only an empty web page, additional error messages are not available.

Please check if your anti-virus software has blocked the new network address. After changing the network address you are redirected to the new network address in the browser. Such activity is suspicious for some anti-virus software so they block the new web page, sometimes even without notification of the user.

Q: Connection problems using multiple devices

A: If multiple devices with identical IP addresses are used in a local area network at the same time the connections to the devices are not stable. Because of this behaviour it is necessary to use different IP addresses.

This problem can also occur if devices with identical IP addresses are used not concurrently but within short intervals. For example this can arise if some new devices which have the default IP address `192.168.1.254` are configured from a single PC.

The **Address Resolution Protocol (ARP)** is used in IPv4 networks to determine the MAC address of a given IP address. The necessary information is cached in the *ARP table*. If there is a wrong entry in the ARP table or even an entry which is not up-to-date it is not possible to communicate with the corresponding host.

An entry in the ARP table is deleted if it is not used any more after a short period time. The time interval used depends on the operating system. On a current Linux distribution an unused entry is discarded after about 5 minutes. The ARP cache can be displayed and manipulated with the **arp** on Windows and Linux.

```
C:\>arp -a

Schnittstelle: 10.1.2.50 --- 0x2
  Internetadresse       Physikal. Adresse     Typ
  192.168.1.254         00-50-c2-3c-b0-df     dynamisch
```

The command **arp -d** can be used to empty the *ARP Cache*.

Note

Possibly the *ARP cache* of the PC has to be deleted if the IP address of a device is changed.

Q: Using a firewall

A: When working with a firewall a TCP port has to be opened for communication with the AnaGate device:

Device	Port number
AnaGate I2C	5000

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Device	Port number
AnaGate I2C X7	5100, 5200, 5300, 5400, 5500, 5600, 5700
AnaGate CAN	5001
AnaGate CAN USB	5001
AnaGate CAN uno	5001
AnaGate CAN duo	5001, 5101
AnaGate CAN quattro	5001, 5101, 5201, 5301
AnaGate CAN X1	5001
AnaGate CAN X2, AnaGate CAN-FD X2	5001, 5101
AnaGate CAN X4, AnaGate CAN-FD X4	5001, 5101, 5201, 5301
AnaGate CAN X8	5001, 5101, 5201, 5301, 5401, 5501, 5601, 5701
AnaGate SPI	5002
AnaGate Renesas	5008
AnaGate Universal Programmer UP/UPP	5000, 5002, 3333, 4444, 20, 21
AnaGate Universal Programmer UPR	5000, 5002, 5008, 3333, 4444, 20, 21
AnaGate Universal Programmer UP 2.0	5000, 5002, 3333, 4444, 20, 21

Table A.1. Using AnaGate hardware with firewall

A.2. Questions concerning AnaGate CAN

Q: What is the value of the termination resistor when the termination option of the device is activated?

A: The termination resistor of the *AnaGate* is driven by a FET transistor. The resistor itself has 110 Ohm while the internal resistance of the FET is 10 Ohm if the FET is activated. So the resulting resistance is 120 Ohm, as required by the CAN bus.

Q: Does Analytica offer a CAN gateway which does not have a galvanically isolated CAN interface?

A: Any device that is actively connected to a CAN bus should be galvanically isolated. Especially when using USB-operated devices (like the *AnaGate USB*) it is essential to have a galvanically isolated device because the device is power supplied by the PC.

Q: How to directly interconnect two CAN ports!

A: If you want to interconnect two *AnaGate CAN* just via a direkt link CAN cable, you have to switch on the internal termination on both *AnaGate CAN* devices. A CAN bus network must have a termination on each side.

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Note

it may work with lower baud rates without termination, but it is recommended to use a termination.

Q: Receiving a NAK when sending a CAN telegram.

A: If no CAN partner is connected to the *AnaGate CAN* (aka the CAN network), it is not possible to send CAN telegrams. The *AnaGate CAN* gets a NAK from the CAN controller. These NAK errors are sent to the AnaGate client via a data confirmation telegram.

Warning

If data confirmations are switched off no errors are sent to the client. The option *confirmations for data requests* can be set via the `CANSetGlobals` function. In High Speed Mode data confirmations are always disabled.

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Appendix B. Technical support

The AnaGate hardware series, software tools and all existing programming interfaces are developed and supported by Analytica GmbH. Technical support can be requested as follows:

Internet

The AnaGate web site [http://www.anagate.de/en/index.html] of Analytica GmbH contains information and software downloads for AnaGate Library users:

- Product updates featuring bug fixes or new features are available here free of charge.

E-Mail

If you require technical assistance over the Internet please send an e-mail to

<support@anagate.de>

To help us provide you with the best possible support please keep the following information and details at hand when you contact our support team.

- Version number of the used programming tool or AnaGate library
- AnaGate hardware series model and firmware version
- Name and version of the operating system you are using

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Abbreviations

I2C	Inter-Integrated Circuit
SCL	Serial Clock Line
SDA	Serial DAta Line
SPI	Serial Peripheral Interface
CLK	Clock
MISO	Master In Slave Out
SS	Slave Select
MOSI	Master Out Slave In
TRST	Test Reset
SRST	Slave Reset
JTAG	Joint Test Action Group
TDI	Test Data Input
TDO	Test Data Output
TMS	Test Mode Select Input
TCK	Test Clock
DHCP	Dynamic Host Configuration Protocol

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