IXXAT®

CAN@net NT

HMS *Connecting Devices*™

Important User Information

Liability

Every care has been taken in the preparation of this document. Please inform HMS Industrial Networks of any inaccuracies or omissions. The data and illustrations found in this document are not binding. We, HMS Industrial Networks, reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and therefore should not be considered as a binding description of the range of functions (neither for future product versions). HMS Industrial Networks assumes no responsibility for any errors that may appear in this document.

There are many applications of the described product. Those responsible for the use of this device must ensure that all the necessary steps have been taken to verify that the applications meet all performance and safety requirements including any applicable laws, regulations, codes, and standards.

HMS Industrial Networks will under no circumstances assume liability or responsibility for any problems that may arise as a result from improper use or use that is not in accordance with the documented features of this product.

The examples and illustrations in this document are included solely for illustrative purposes.

Intellectual Property Rights

HMS Industrial Networks has intellectual property rights relating to technology embodied in the product described in this document. These intellectual property rights may include patents and pending patent applications in the USA and other countries.

Trademark Acknowledgements

Ixxat® is a registered trademark of HMS Industrial Networks. All other trademarks are the property of their respective holders.

Table of Contents

1   User Guide

Please read the manual carefully. Make sure you fully understand the manual before using the product.

1.1   Related Documents

Document	Author
VCI Installation Manual	HMS
CAN@net Communication in Gateway Setup, Software Design Guide	HMS

1.2   Document History

Version	Date	Author	Description
1.0	July 2016	CoMi	First release

1.3   Conventions

Instructions and results are structured as follows:

▶   instruction 1

▶   instruction 2

   ▷   result 1

   ▷   result 2

Lists are structured as follows:

•   item 1

•   item 2

Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
This font is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```

This is a cross-reference within this document: *Conventions, p. 3*

This is an external link (URL): www.hms-networks.com

Safety advice is structured as follows:

> **!** Cause of the hazard!
>
> Consequences of not taking remediate action.
>
> How to avoid the hazard.

Safety signs and signalwords are used dependent on the level of the hazard.

ⓘ   *This is additional information which may facilitate installation and/or operation.*

> ❗ This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.

> ⚠️ **Caution**
> This instruction must be followed to avoid a risk of personal injury.

> ⚠️ **WARNING**
> This instruction must be followed to avoid a risk of death or serious injury.

2 Safety and Dangers

2.1 Information on EMC

> ❗ Risk of interference to radio and television if used in office or home environment!
>
> Use exclusively included accessories.
>
> Make sure shield of interface is connected with device plug and plug on other side.
>
> Use exclusively shielded cables.

2.2 General Safety Notes

▶ Protect product from moisture and humidity.

▶ Protect product from too high or too low temperature (see *Technical Data, p. 21*).

▶ Protect product from fire.

▶ Don't throw, drop or try to bend the product.

▶ Don't paint the product.

▶ Don't modify or disassemble the product. Service must be carried out by HMS Industrial Networks.

▶ Don't use modified products.

▶ Store products in dry and dust-free place.

3 Scope of Delivery

Included in scope of delivery:

• CAN@net NT

• User Manual

• CD with CAN-Gateway Configurator and VCI driver

• Mini USB cable

4   Features

The CAN@net NT hardware provides connectivity to Ethernet and CAN networks. The application firmware running on the CAN@net NT provides functions to access a CAN bus from virtually every Ethernet TCP/IP host. Any Ethernet TCP/IP host can connect to this server and exchange commands and CAN messages with it using the ASCII Protocol. The server relays the commands and messages to the CAN bus and vice versa.

The CAN@net NT application firmware includes a filtering mechanism based on CAN identifiers. Filtering applies in the direction from CAN system to TCP/IP network. As basis serves a filter list, which contains CAN identifiers. Certain CAN messages can be forwarded and others discarded. The CAN@net NT provides message filtering for gateway and bridge setup.

In gateway setup the filter can be configured by means of ASCII commands. In bridge setup the configuration tool is used to configure the filter.

Features and highlights:

- 2x CAN connections, ISO 11989-2 (terminal adapters)
- 1x RJ45 Ethernet port, 10/100 Mbit/s
- 1x mini USB 2.0 port, high-speed
- Configuration via USB or Ethernet
- With the included CAN-Gateway Configurator a configuration can be created, modified, written to and read from the target device via USB or Ethernet connection.
- Gateway and Bridge setup possible
- Platform independent due to ASCII protocol
- CAN ID filtering

5   Installation

5.1   Installing Software

5.1.1   Installing the Driver

For the operation of the CAN@net NT a driver is needed.

Windows

▶ Install VCI driver (see Installation manual VCI).

5.1.2   Installing the CAN-Gateway Configurator

▶ Insert CD-ROM in CD drive.

▶ Run *CanGWconfig_xy.exe*.

▷ Hardware wizard starts automatically.

▶ Follow instructions in installation program.

5.2   Connectors

Fig. 1   Connectors

1	CAN 1
2	CAN 2
3	Power connector

▶   Make sure that the cross-sectional area of cable is larger than or equal to 0.14 mm².

▶   To remove the connector use screwdriver or similar tool.

▶   Connect cables.

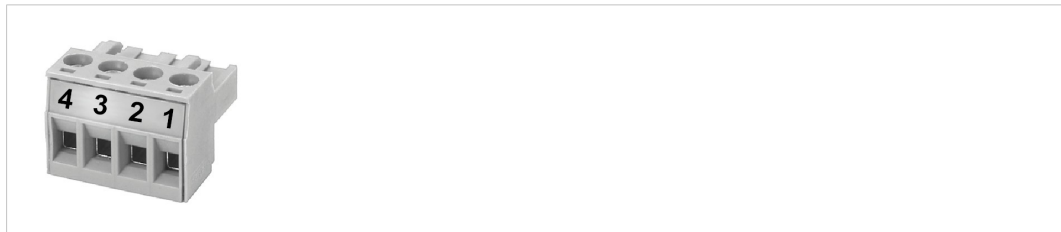▶   Plug connector into housing.

5.2.1   Power Connector

Fig. 2   Power connector

Pin Allocation of Power Connector

Pin no.	Signal
1	V+ (+9 V to +32 V DC)
2	V-
3	Not connected
4	Not connected

5.2.2   CAN Connectors
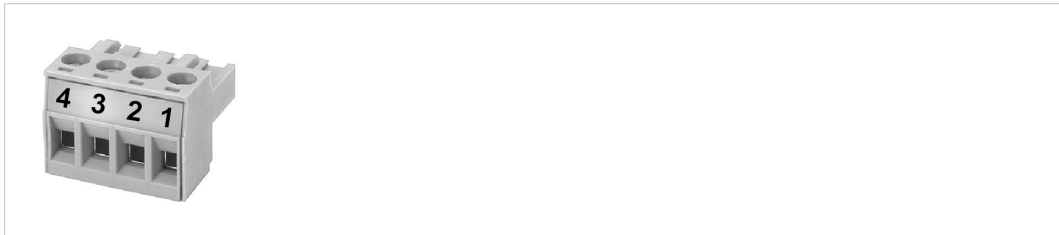
Fig. 3   CAN connector

Pin allocation of CAN connector CAN 1 and CAN 2

Pin no.	Signal
1	CAN-High
2	CAN-Low
3	CAN-GND
4	Shield

If a SubD9 connector is used, observe the following pin allocation of the SubD9 connector:

Pin no.	Signal
1	-
2	CAN-Low
3	CAN-GND
4	-
5	Shield
6	-
7	CAN-High
8	-
9	-

6   Configuration

6.1   Configuration Possibilities

There are different possibilities to connect the CAN@net NT. Depending on the type of connection different ways of configuring the IP address and the device are necessary.
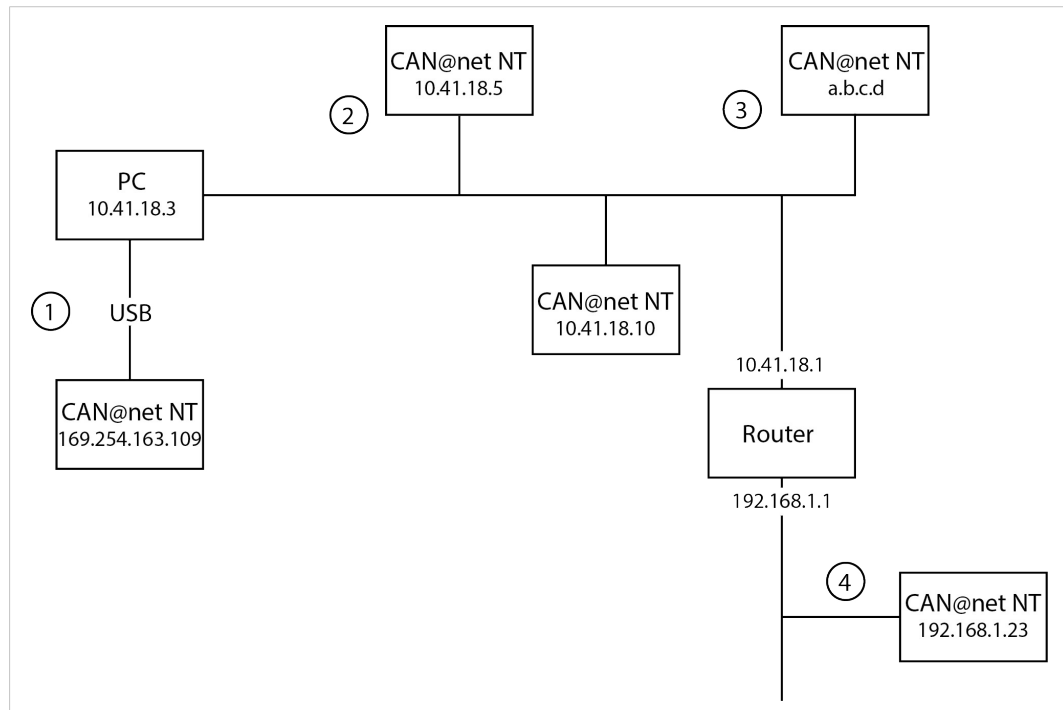

Fig. 4   Types of connection

The following ways of connecting the devices for the configuration are possible:

- via USB (recommended for the first configuration of the device) **(1)**
- via Ethernet in a locale network **(2)** and **(3)**
- via Router (IP address of device has to be known) **(4)**

6.2   Basic Configuration

6.2.1   Configure IP Address

ⓘ *If a CAN@net NT is connected via USB, only this device will be found by scanning.*

Make sure no CAN@net NT is connected via USB, before searching for a CAN@net NT in the locale Ethernet network.

ⓘ *HMS Industrial Networks recommends to use a static IP address.*

▶ Make sure that VCI driver is installed.

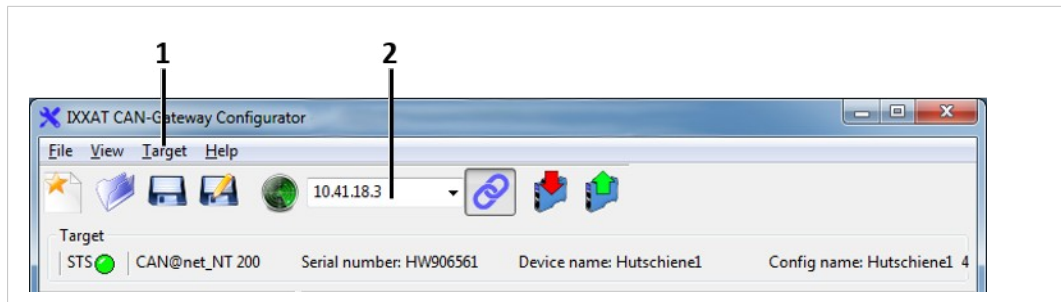▶ Connect a device to the host computer.

▶ Start CAN-Gateway Configurator.

Fig. 5   CAN-Gateway Configurator

If device is connected via a router:

▶ Enter IP address (imprinted on device) in CAN-Gateway Configurator in combo box **Target Device (2)**.

▶ Configure device (*Gateway Configuration, p. 11* or *Bridge Configuration, p. 13*).

If device is connected via USB or via Ethernet in local network:

▶ Open menu **Target** (**1**) and **Change IP configuration**.

  ▷ Dialog **IP Configuration** opens.

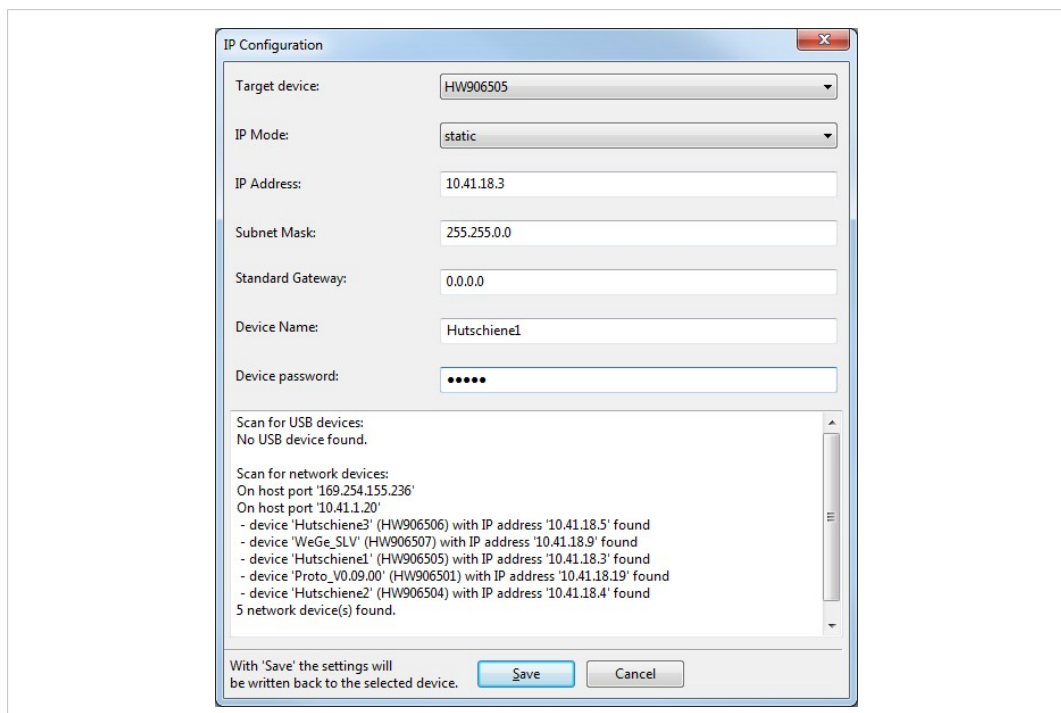 ▷ CAN-Gateway Configurator scans automatically for connected devices.

Fig. 6   Dialog IP Configuration

▶ Make sure that the serial number in combo box **Target Device** points to connected device.

▶ If necessary define a new IP address.

▶ Make sure that IP address is in the range of the network in which the device is integrated.

▶ Define network settings.

► Enter Password (Default: IXXAT) in field **Device password**.

ⓘ *Password is not necessary if device is configured via USB.*

► To write new IP configuration to target device click button **Save**.

► If the CAN@net NT is used in a different network, configure IP address again after the device is configured.
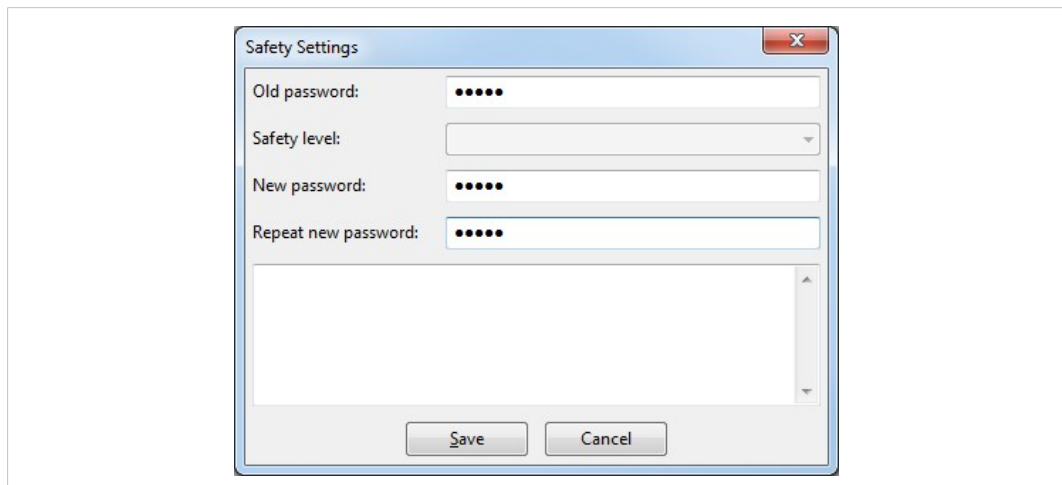
6.2.2   Change Password

Fig. 7   Dialog Safety Settings

ⓘ *HMS Industrial Networks recommends to change the default password.*

► To change password of the connected device open menu **Target** and **Change Safety Settings**.

▷ Dialog **Safety Settings** opens.

► Enter old password.

► Enter new password twice.

► Click button **Save**.

6.3   Gateway Configuration

6.3.1   Description of Gateway Setup

In the gateway setup, the CAN@net NT is hooked to the local intranet or internet (firewall needed) at the site where the CAN system is located. This allows any TCP/IP host within the reach of this intranet to connect to the CAN@net NT and gain control of the CAN system.
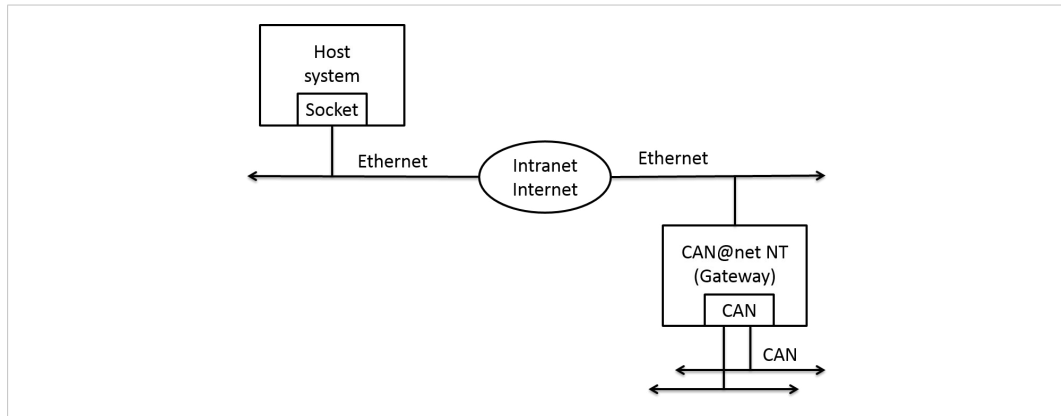

Fig. 8   Gateway setup

For information about communication in gateway setup and commands that are used to exchange CAN messages see *CAN@net Software Design Guide* (included CD or www.ixxat.com).
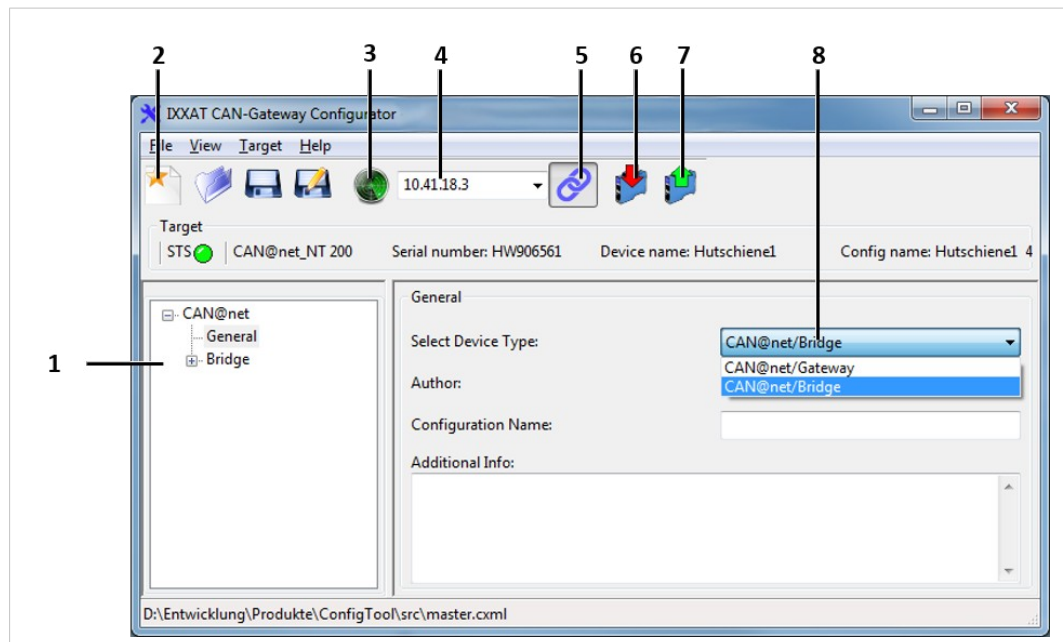
6.3.2   Configure the Device

Fig. 9   CAN-Gateway Configurator

▶ Connect a device to the host computer.

▶ Set basic configurations (see *Basic Configuration, p. 8*).

▶ To find device click button **Scan** (**3**) in the CAN-Gateway Configurator.

▶ In combo box **Target Device** (**4**) select device.

  or

  If device is configured via router, enter IP address in CAN-Gateway Configurator in combo box **Target Device (4)**.

▶ Click Button **Connect** (**5**) to connect the selected device.

▶ To create a new project file click button **New** (**2**).

  or

  To change an existing configuration click button **Read from** (**7**) and save the configuration.

▶ In window (**1**) select **CAN@net — General**.

  ▷ Form to insert data appears on the right side.

▶ In combo box **Select Device Type** (**8**) select **CAN@net — Gateway** .

▶ To write configuration to the device click button **Write to** (**6**).

ⓘ *It is possible to add information about the configuration in fields **Author**, **Configuration Name** and **Additional Info**.*

6.4   Bridge Configuration

> **!**   Exclusively one master device is allowed in bridge configuration.

6.4.1   Description Bridge Setup

The bridge setup allows to connect two CAN systems over an Ethernet TCP/IP network, e.g. the local intranet or the internet (firewall needed). Two devices are required for a bridge configuration. One must be configured as master and one as slave.
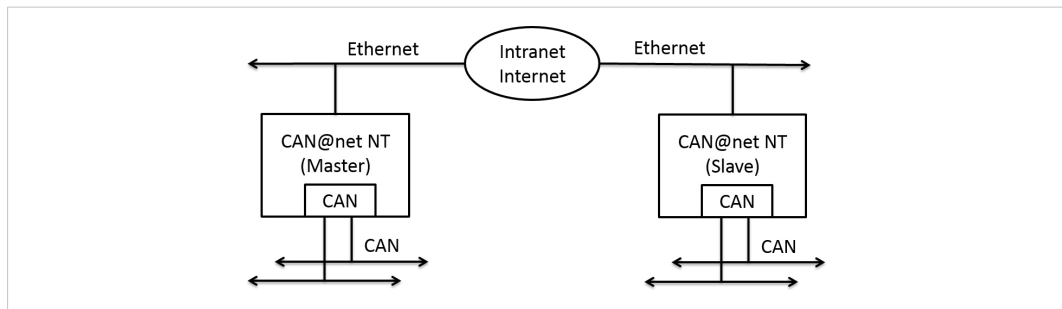
Fig. 10   Bridge setup

6.4.2   Configure Slave Device

In the Bridge setup the slave device has to be configured like a gateway. The baudrates of slave device have to be configured during the master configuration.

▶   Connect a device to the host computer.

▶   Set basic configurations (see *Basic Configuration, p. 8*).

▶   Make sure that a static IP address is used.

▶   Configure slave device like a gateway (see *Configure the Device, p. 12* in chapter Gateway Configuration).

6.4.3   Configure Master Device

Fig. 11   CAN-Gateway Configurator

▶   Connect master device to the host computer.

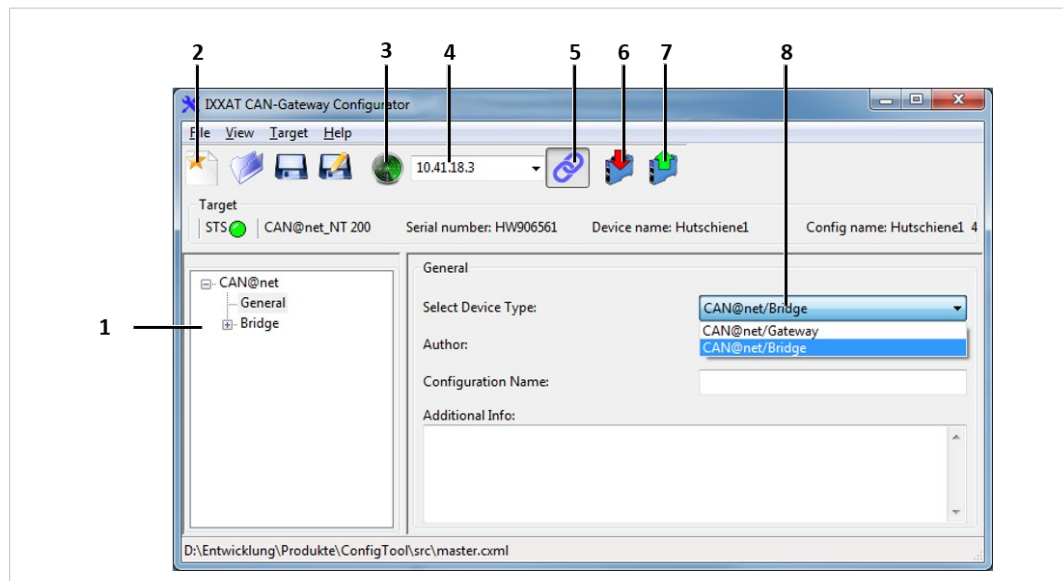▶   Set basic configurations (see *Basic Configuration, p. 8*).

▶   To find device click button **Scan** (**3**) in the CAN-Gateway Configurator.

▶   In combo box **Target Device** (**4**) select device.

         or

         If device is configured via router, enter IP address in CAN-Gateway Configurator in combo box **Target Device (4)**.

▶   Click Button **Connect** (**5**) to connect the selected device.

▶   To create a new project file click button **New** (**2**).

         or

         To change an existing configuration click button **Read from** (**7**) and save the configuration.

▶   In window (**1**) select **CAN@net — General**.

▶   In combo box **Select Device Type** (**8**) select **CAN@net — Bridge**.
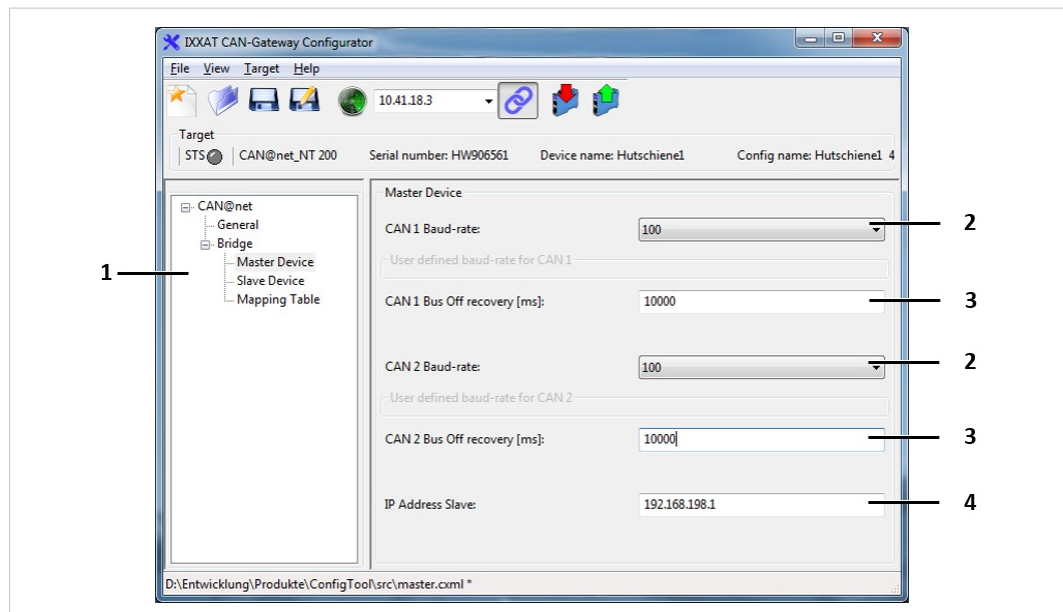
6.4.4 CAN Settings

Fig. 12   CAN setttings

▶ For master device select in window (**1**) **Bridge** and **Master Device**.

▷ Form to set baudrate appears on right side.

▶ For slave device select in window (**1**) **Bridge** and **Slave Device**.

▷ Form to set baudrate appears on right side.

▶ Configure baudrate for each CAN port in combo boxes (**2**) and for master and slave device.

▶ Enter IP address of selected slave device (see *Configure Slave Device, p. 13*) in field **IP Address Slave** (**4**).

If only CAN 1 port is used:

▶ In combo box **CAN 2 Baud-rate** (**2**) select **CAN port deactivated**.

It is possible to configure for each CAN port if the CAN controller restarts automatically after a bus off.

▶ Set time in milliseconds for a restart of the CAN controller after a bus off for each CAN port in fields **CAN Bus Off recovery** (**3**).

▶ Choose value between 1,000 and 60,000 milliseconds (value 0 means *no recovery*).

User Defined Baudrates

ℹ️ *HMS Industrial Networks recommends using the predefined standard baudrates. If user defined baudrates are used make sure that the required values are valid.*

▶ For user defined baudrates select **user defined via register values**.

▶ Set values for **Prescaler**, **sjw**, **Tseg1** and **Tseg2**.
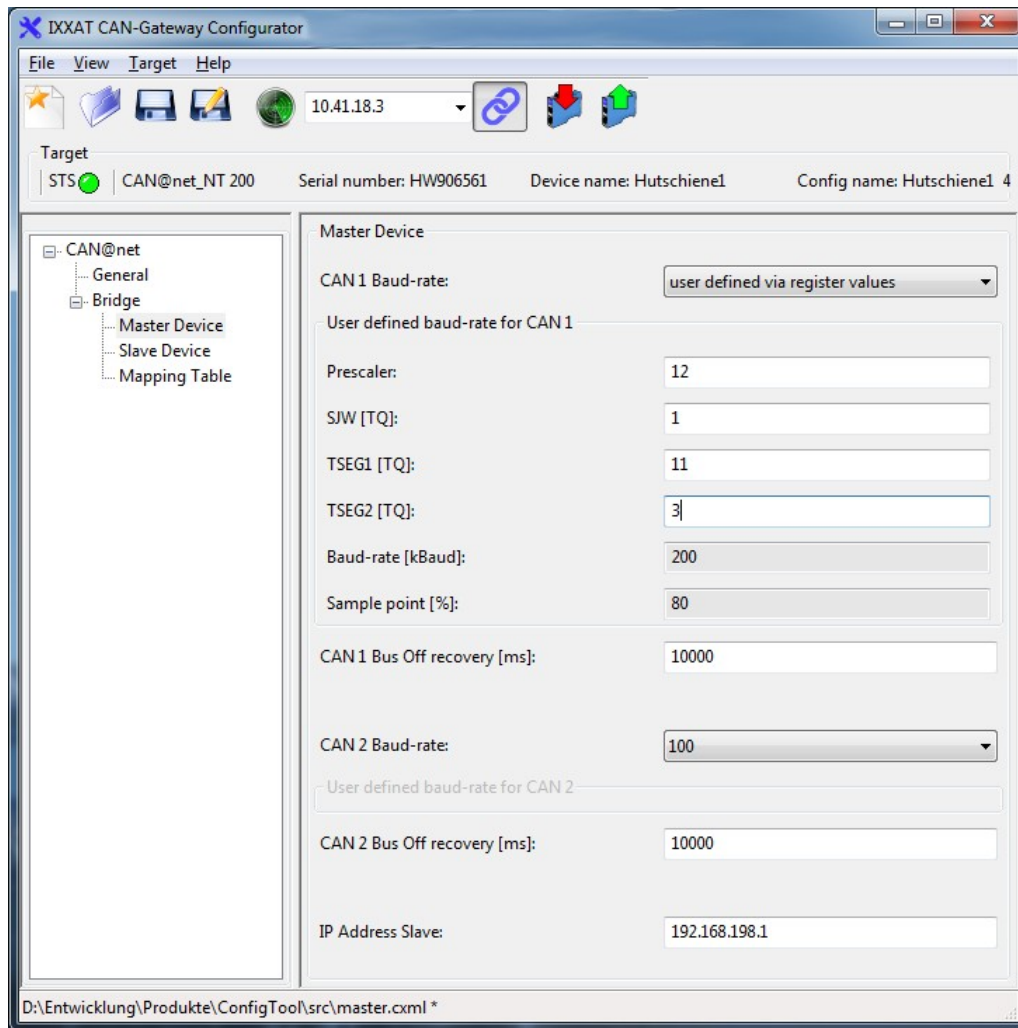
6.4.5   Mapping Table

In the bridge configuration the devices are connected in the following way:

- CAN 1 of master device to CAN 1 of slave device
- CAN 2 of master device to CAN 2 of slave device

This is valid for all standard and extended messages in both directions.

6.4.6 Writing Configuration to Device

▶ Make sure master device is connected to the host computer.

▶ To find potential master device click button **Scan**.

▶ In combo box **Target Device** select device.

▶ Click button **Write to**.

▷ Configuration is written to the device.

6.5 Further Settings

6.5.1 Reset to Factory Settings

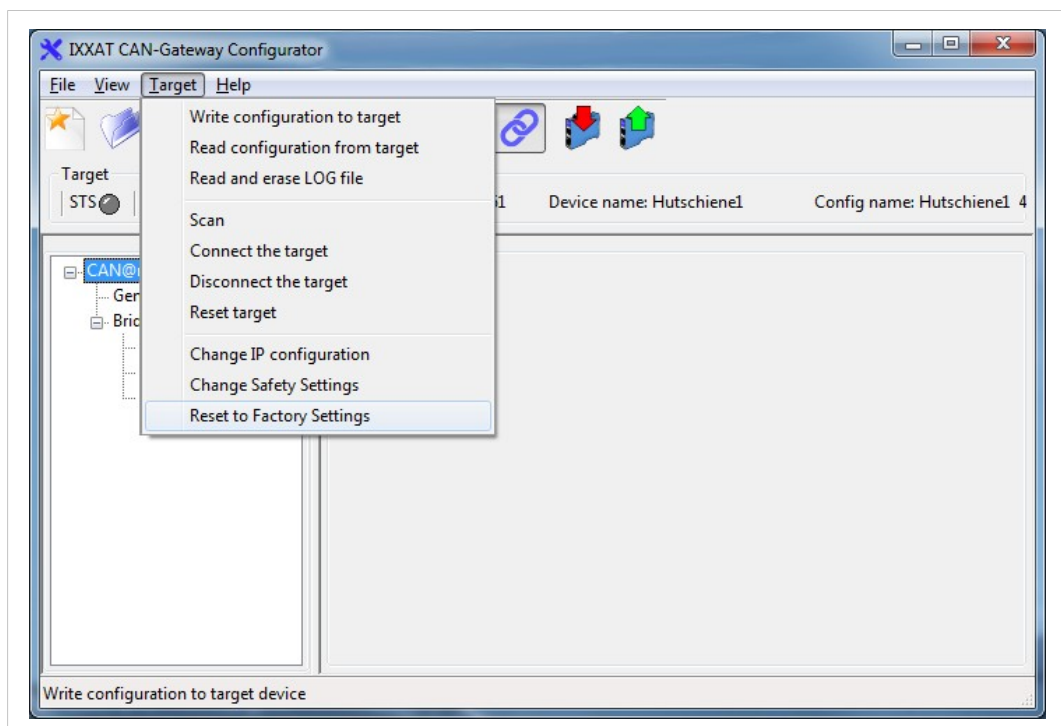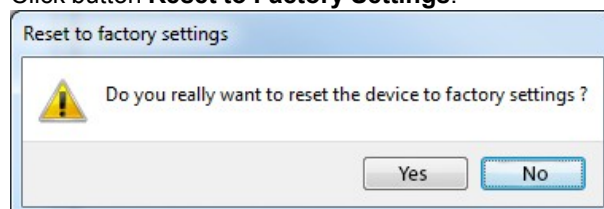It is possible to reset a connected device to factory settings.

Fig. 13   Menu Reset to Factory Settings

▶ Make sure that device is connected via USB.

▶ Open menu **Target**.

▶ Click button **Reset to Factory Settings**.

▶ Click button **Yes** to confirm the reset.

7   Operation
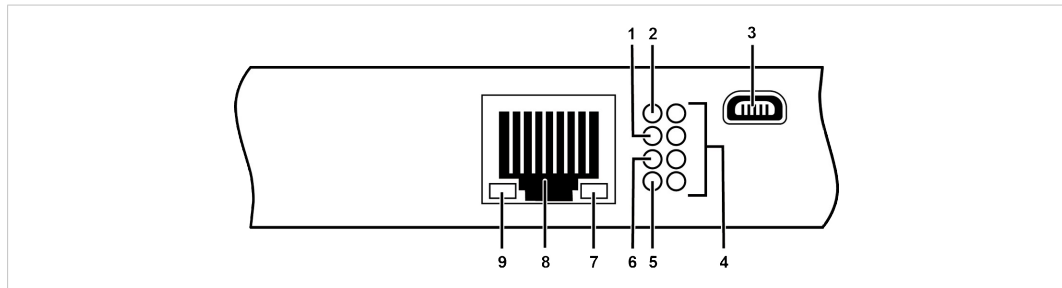
Fig. 14   Ports and LEDs

1	Status LED
2	Power LED
3	Mini USB port
4	CAN LEDs 1 to 4
5	User LED
6	Ethernet LED
7	Link speed LED
8	Ethernet port
9	Link/Activity LED

7.1   Ethernet Port

Designed as standard RJ45 port with pin allocation according to Ethernet standard. Because of the Ethernet PHY auto-crossover feature the device can be connected with a crossover cable or with a one-to-one network cable.

The shield of the port is connected to the ground of the printed board via a 1 nF capacitor.

Pin Allocation of Ethernet Port

Pin no.	Signal
1	TX+
2	TX-
3	RX+
4	Connected to pin 5
5	Connected to pin 4
6	RX-
7	Connected to pin 8
8	Connected to pin 7

7.2   Mini USB Port

Provided to connect the device for configuration.

7.3   Indicators

7.3.1   Power LED

Indicates the status of the power supply.

LED state	Description	Comments
Off	No power	Possible cause: • Device not connected to power supply • Fuse of device damaged • Internal power supply damaged
Green	Power	Device fully functional

7.3.2   Status LED

Indicates the device status.

LED state	Description	Comments
Off	Device not ready	No firmware, application firmware not started
Green flashing (1 Hz)	Application firmware started	Device in *operational* state
Red/green flashing	Configuration file error	Rewriting of configuration to device necessary
Green/orange flashing	Device in *configuring* state	
Red flashing	Device error	Application signals a device error, no configuration or error in configuration

7.3.3   User LED

Indicates the primary application status.

Master Device (Bridge Setup)

LED state	Description	Comments
Off	Not configured	No configuration, no master configuration
Orange/Green flashing	Try to establish slave connection	No slave available, invalid slave IP address
Green flashing	Normal operation	

Slave Device (Bridge Setup)

LED state	Description	Comments
Off	Not configured	*Waiting for master*
Orange/Green flashing	Master lost	Returns to status *Waiting for master*
Green flashing	Connected, normal operation	

7.3.4 Ethernet LED

Indicates the Ethernet communication status.

LED state	Description	Comments
Off	No Ethernet communication	Possible cause: • Device unsuccessfully initialized • Device not connected to Ethernet • No communication
Green flashing	TCP/IP packet transmitted successfully	Communication was successful
Orange flashing	TCP/IP packet not transmitted TCP/IP congestion	Bad or slow TCP/IP connection, messages can not be transmitted to CAN and are jammed

7.3.5 Link Speed LED

The yellow LED indicates the link speed.

LED state	Description
Off	10 MBit/s
Orange	100 MBit/s

7.3.6 Link/Activity LED

Indicates connection status of the Ethernet interface.

LED state	Description	Comments
Off	No link detected	No connection to Ethernet network, Network cable damaged
Green	Link	Ethernet link established, no communication present
Green flashing	Activity	Ethernet link established, communication present

7.3.7 CAN LED

CAN LED 1 to 4 each indicates the status of the corresponding CAN interface.

LED state	Description	Comments
Off	No CAN communication	No connection to CAN
Green flickering	CAN communication	LED is triggered with each CAN message
Red flickering	CAN communication, CAN controller in *error* state	CAN controller in *Error Warning* or *Error Passive* state, reception/transmission of CAN messages possible
Red	Bus off	CAN controller is in *Bus Off* state, no CAN communication possible

8   Default Network Settings

Network parameter	Default setting	Remark
IP Mode	Static	
IP Address	169.254.y.x y = ((device serial number - 80000) DIV 254) MOD 256 x = ((device serial number - 80000) MOD 254) +1	Like APIPA if no DHCP server is available IP address is imprinted on the device
Subnet Mask	255.255.0.0	
Standard Gateway	0.0.0.0	
Device Name	CAN@net NT	
Device password	IXXAT	Transmitted MD5-encrypted

9   Technical Data

Ethernet Interface	10/100 MBit/s, twisted pair
Dimensions	114.5 x 99 x 22.5 mm
Weight	Approx. 150 g
Operating temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +85 °C
Power supply	9 V to 36 V DC
Current consumption	Typically 110 mA (at 24 V input voltage)
Housing material	Polyamide
Galvanic isolation	1 kV for 1 sec
CAN transceiver	Texas Instruments SN65HVD251P
Max. number of bus nodes	120
CAN bus termination resistor	None
CAN baudrates	5 to 1000 kBaud
Protection class	IP20

10   Support/Return Hardware

Observe the following information in the support area on www.ixxat.com:

- information about products
- FAQ lists
- installation notes
- updated product versions
- updates

10.1   Support

▶ For problems or support with the product request support at www.ixxat.com/support.

▶ If required use support phone contacts on www.ixxat.com.

10.2   Return Hardware

▶ Fill in the form for warranty claims and repair on www.ixxat.com.

▶ Print out the Product Return Number (PRN resp. RMA).

▶ Pack product in a physically- and ESD-safe way, use original packaging if possible.

▶ Enclose PRN number.

▶ Observe further notes on www.ixxat.com.

▶ Return hardware.

11   Disposal

▶ Dispose of product according to national laws and regulations.

▶ Observe further notes about disposal of products on www.ixxat.com.

A Regulatory Compliance

A.1 EMC Compliance (CE)

$C\epsilon$

The product is in compliance with the Electromagnetic Compatibility Directive. More information and the Declaration of Conformity is found at www.ixxat.com.

A.2 FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

product name	CAN@net NT
model	200/420
responsible party	HMS Industrial Networks Inc
address	35 E. Wacker Dr, Suite 1700 Chicago , IL 60601
phone	+1 312 829 0601

> **!** Any changes or modifications not expressly approved by HMS Industrial Networks could void the user's authority to operate the equipment.

> **!** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
>
> Reorient or relocate the receiving antenna.
>
> Increase the separation between the equipment and the receiver.
>
> Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
>
> Consult the dealer or an experienced radio/TV technician for help.

A.3   Disposal and recycling

You must dispose of this product properly according to local laws and regulations. Because this product contains electronic components, it must be disposed of separately from household waste. When this product reaches its end of life, contact local authorities to learn about disposal and recycling options, or simply drop it off at your local HMS office or return it to HMS.

For more information, see www.hms-networks.com.

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