# Ixxat®
**BY HMS NETWORKS**

# CANnector Bridge

## USER MANUAL

**4.01.0091.23000  1.1  en-US    ENGLISH**

**HMS** *Connecting Devices*™

# Important User Information

## Disclaimer

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# Table of Contents

# 1        User Guide

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

## 1.1        Target Audience

This manual addresses trained personnel who are familiar with CAN, CAN FD, LIN and the applicable national standards. The contents of the manual must be made available to any person authorized to use or operate the product.

## 1.2        Related Documents

| Document | Author |
| --- | --- |
| IxAdmin Online Help | HMS |
| ACT Installation Manual | HMS |
| Installation Guide *CANnector* | HMS |

## 1.3        Document History

| Version | Date | Description |
| --- | --- | --- |
| 1.0 | October 2020 | First release |
| 1.1 | November 2020 | Minor corrections, added pin allocation power connector |
| | | |
| | | |

## 1.4        Trademark Information

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

## 1.5 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. 4*

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 Instructions

## 2.1 Information on EMC

> **!** Risk of interference to radio and television if used in office or home environment! The product is a class A device.
>
> Use exclusively included accessories or HMS accessories that are intended for use with the device. Use exclusively shielded cables.
>
> Make sure that the shield of the interface is connected with the device plug and the plug on the other side.

## 2.2 General Safety Instructions

- ► Protect product from moisture and humidity.
- ► Protect product from too high or too low temperature (see *Technical Data, p. 35*).
- ► Protect product from fire.
- ► Do not paint the product.
- ► Do not modify or disassemble the product. Service must be carried out by HMS Industrial Networks.
- ► Store products in dry and dust-free place.

## 2.3 Intended Use

The CANnector Bridge is used to connect computer systems to CAN, CAN FD and LIN networks, to connect the networks with each other and to change or manipulate the network data. The device is intended for installation on standard DIN rail or for use with adhesive feet on an even surface.

# 3 Scope of Delivery

Included in scope of delivery:

- • CANnector Bridge
- • adhesive device feet
- • Installation Guide *CANnector*
- • power supply connector

# 4 Product Description

The CANnector Bridge can act as Bridge and as Gateway. The four provided ready-to-use basic configurations initialize all six CAN interfaces with 125 Kbit/s, 250 Kbit/s, 500 Kbit/s, or 1000 Kbit/s and forward all received data as follows:

- CAN 1 to CAN 2 and vice versa

- CAN 3 to CAN 4 and vice versa

- CAN 5 to CAN 6 and vice versa

By default the configuration with 250 Kbit/s is loaded. With the ACT tool configuration can be created, that allow for example to forward individual messages and signals and to change message ID and content. Signal manipulation and the creation of specific algorithms that are executed directly on the device is possible by writing own C code extensions with Eclipse IDE.

## 4.1 Features

- measurement and analysis platform

- 4 x high speed Classic CAN interfaces

- 2 x CAN FD interfaces

- 1 x Mini USB device interface

- 2 x USB 2.0 host interface

- 1 x 10/100 Base-T Ethernet interface

- 2 x LIN interfaces

- 2 x digital I/Os

- 8 x LEDs, of which 7 are freely configurable

- real-time clock

- 2 D-Sub 9 galvanically isolated (4 kV for 1 s)

## 4.2 Software for Configuration and Visualization

The CANnector Bridge provides various possibilities to manage configurations.

**Dashboard**

With the dashboard, that is accessible via the IP address and a web browser, the state of the CANnector Bridge and the connected bus systems can be monitored, the different basic configurations can be selected and downloaded to the device, and data can be visualized.

**ACT Tool**

The ACT is Windows based and allows the easy creation of configurations via drag and drop. The ACT tool provides further configuration possibilities (e.g. forwarding individual signals, changing message ID and content).

**IxAdmin**

IxAdmin is included in the ACT. With IxAdmin the different basic configurations can be selected, started and stopped and downloaded to the device. Changing baud rate settings is also possible as well as updating the firmware and managing the connected devices.

# 5      Installation

## 5.1      Installing the Software

To connect the CANnector Bridge to a PC via USB a driver is needed. With installation of the configuration tool ACT the driver is automatically installed.

The ACT tool can be downloaded on www.ixxat.com.

► On www.ixxat.com/technical-support/support select **Advanced Configuration Tool** and open **Secured Downloads**

► Download the ACT tool ZIP container from the support area.

> ❗  To be able to download the ACT, a valid e-mail address must be submitted.

► Unpack the ZIP container in a user defined folder on the local drive.

► Execute the included installation file *Ixxat ACT Setup w.x.yyy.z CM.exe*.

→ ACT setup assistant is started.

► Follow instructions in ACT setup assistant.

→ When installation is finished, ACT and IxAdmin are installed.

→ Required USB driver for configuration is installed.

## 5.2      Installing the Hardware

The device can be installed on a grounded 35 mm DIN rail or used with the adhesive feet on an even surface.

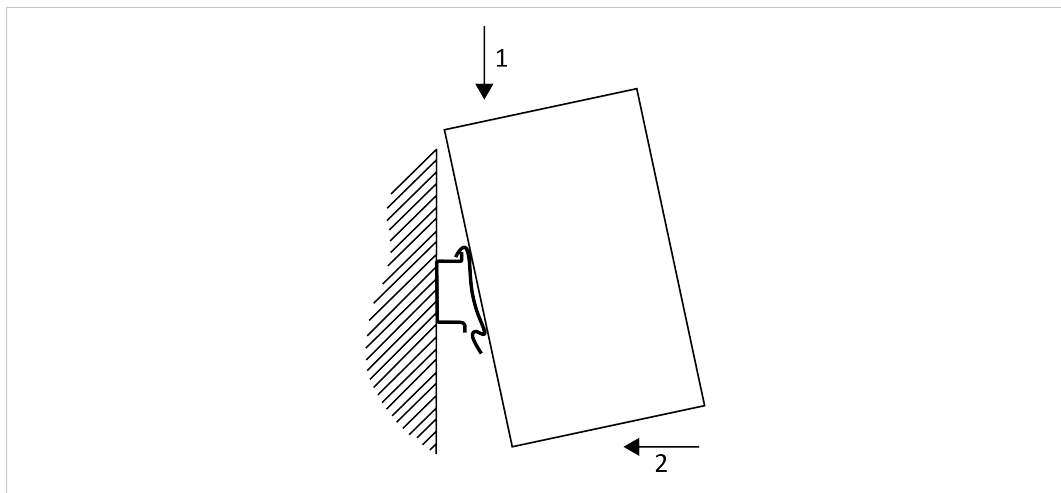### 5.2.1      Installing on DIN Rail



**Fig. 1          Installing on din rail**

► Hook the din rail clip onto the upper lip of the rail and push the device downwards (**1**).

► Push the device towards the rail until it snaps into place (**2**).

► Make sure, that the venting slots are not covered and ensure adequate air circulation (recommended mounting distance: 2 cm distance to venting slots).

### 5.2.2 Installing the Adhesive Feet

▶ Stick the adhesive feet to the bottom of the device.

▶ Place the CANnector on an even surface.

▶ Make sure, that the venting slots are not covered and ensure adequate air circulation (recommended mounting distance: 2 cm distance to venting slots).
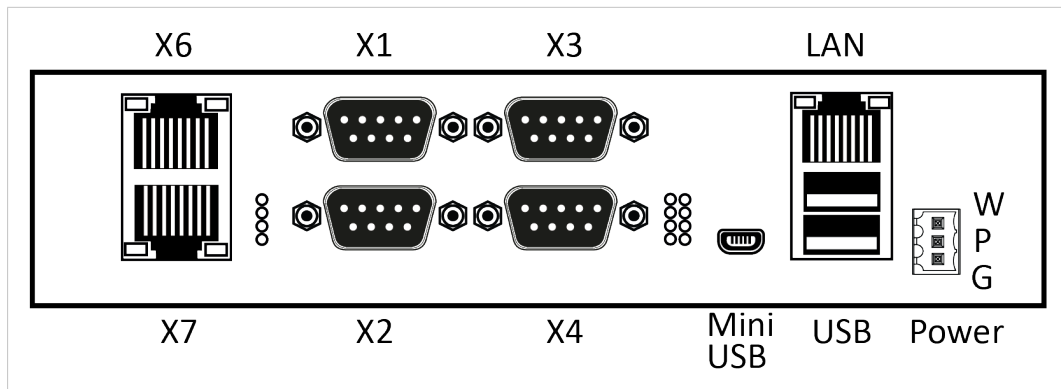
## 5.3 Connecting the Device



**Fig. 2      CANnector front connectors**

| Pin Allocation Power Connector | | |
|---|---|---|
| Pin | Signal | Description |
| 1 | G | Ground |
| 2 | P | Permanent power supply to provide power in standby mode (+6 to +36 V DC) |
| 3 | W | Input to switch on the device (wake up) |

For more information about the interfaces, the detailed pin allocations, available accessories, and the LEDs see Installation Guide *CANnector*.

▶ Make sure, that the software is installed (see *Installing the Software, p. 7*).

▶ Connect the three pins of the power supply connector (**W**, **P**, and **G**) with the power supply. A ready to use power cable is available as accessory from HMS Industrial Network.

▶ Connect the CAN interfaces X1 to X4 to be used.

▶ If required, integrate a bus termination in the CAN connection.

▶ Connect the bus termination to the cable and/or to the connector.

▶ Use suitable cable assemblies for the CANnector Bridge, available from Ixxat.

▶ Switch on the power supply.

→ Default configuration with 250 Kbit/s starts automatically.

# 6        Configuration

By default the CANnector Bridge starts with a CAN Bridge configuration that initializes all six CAN interfaces with 250 Kbit/s and forwards messages from CAN 1 to CAN 2 and vice versa, from CAN 3 to CAN 4 and vice versa, and from CAN 5 to CAN 6 and vice versa. To change the baud rate of all CAN interfaces to 125Kbit/s, 500 Kbit/s, or 1000 Kbit/s another pre-configured configuration can be selected with the dashboard (see *Selecting a Configuration with Different Baud Rate, p. 9*). With IxAdmin, it is possible to set specific baud rates for individual interfaces in the pre-configured configuration (see *Setting a Specific Baud Rate, p. 10*).

To change how the data is forwarded, for example only specific messages and for further configuration possibilities a new configuration can be created or a default configuration can be adopted with the ACT tool (see *Creating Bridge/Gateway Configurations, p. 14*).

## 6.1      Pre-Configured Configurations

### 6.1.1    Selecting a Configuration with Different Baud Rate

By default the configuration with 250 Kbit/s is loaded. To use another pre-configured configuration with another baud rate for all CAN interfaces, the configuration can be selected in the dashboard via a web browser.

► Make sure, that the required software is installed (see *Installing the Software, p. 7*) and that the CANnector Bridge is connected (see *Connecting the Device, p. 8*).

► Use the USB cable (included in the scope of delivery) to connect the Mini USB connector of the CANnector Bridge to the PC.

► Open a web browser on the PC.

► Enter the IP address 169.254.254.254 as URL.
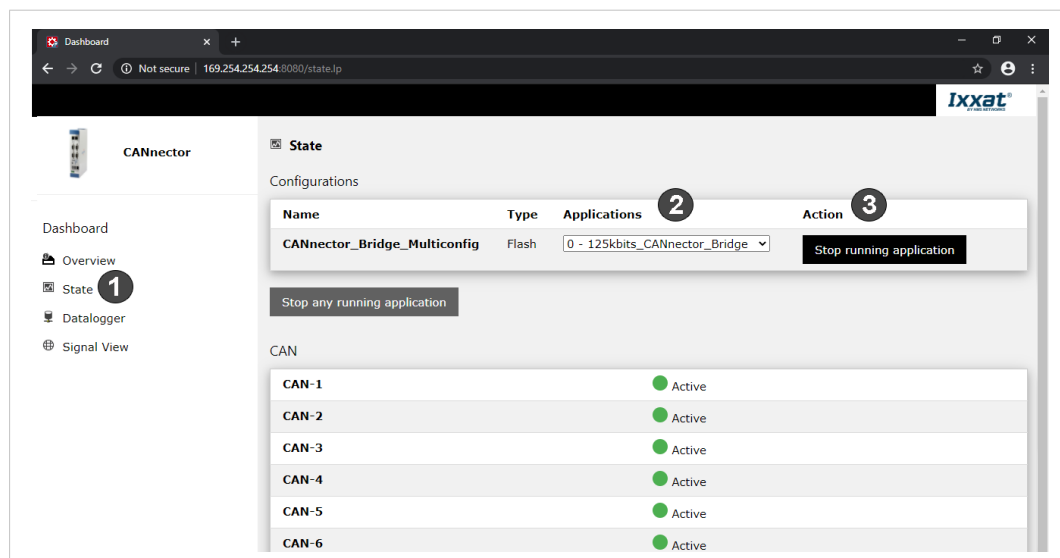
→ CANnector Bridge dashboard is opened.



**Fig. 3      Dashboard**

► Select **State** (**1**) in the configuration tree.

→ State of configuration and CAN ports is shown.

► Click button **Stop running application** in column **Action** (**3**).

► In drop-down menu in column **Application** (**2**) select the desired baud rate.

▶ Click button **Start selected application** in column **Action** (**3**).

→ Application with selected baud rate is running.

→ Configuration starts automatically for the selected baud rate.

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ⓘ *After a power cycle the last selected configuration is automatically started.*

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## 6.1.2 Setting a Specific Baud Rate

With IxAdmin it is possible to set an individual baud rate for each CAN bus or a specific baud rate (e.g. 666 kBit/s) without creating a new configuration.

▶ Connect the CANnector Bridge (see *Connecting the Device, p. 8*).

▶ Make sure that ACT is installed (see *Installing the Software, p. 7*).

▶ Use the USB cable (included in the scope of delivery) to connect the Mini USB connector of the CANnector Bridge to the PC.

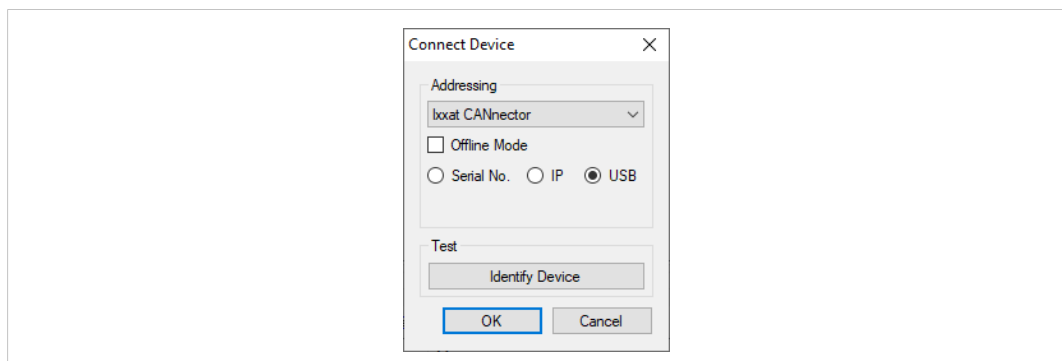▶ Start IxAdmin on the PC.

→ Window **Connect Device** is opened.



**Fig. 4** IxAdmin

▶ Select **Ixxat CANnector** and **USB**.

▶ Click button **OK**.

→ Connection to CANnector is established.

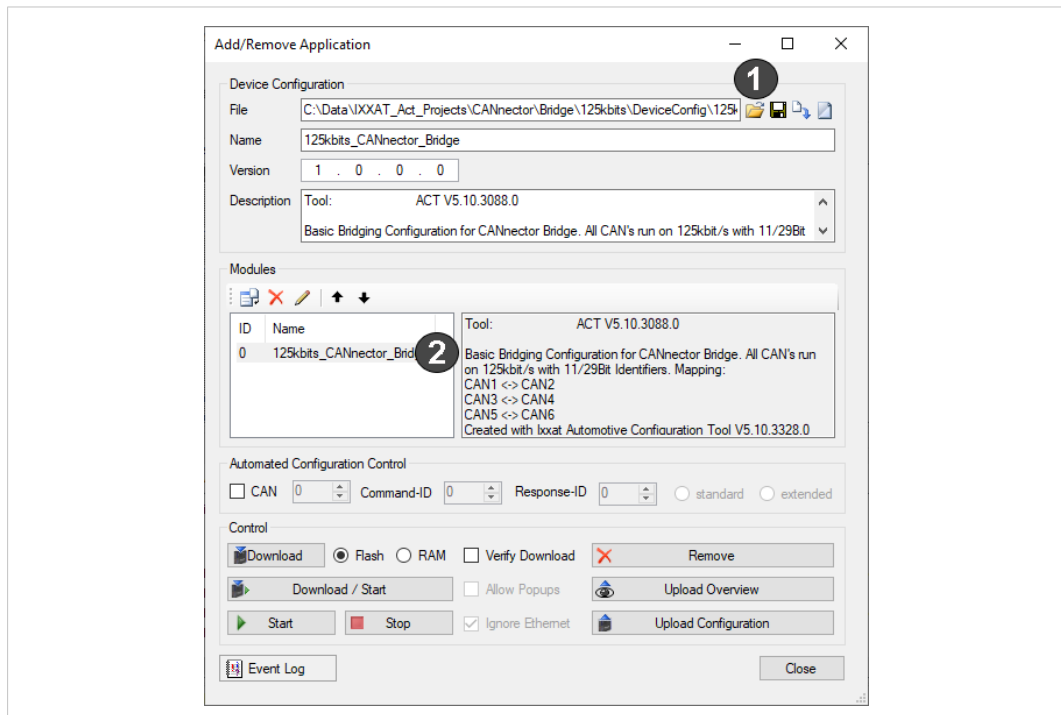► Open menu **Device** and select **Add/Remove Application**.



**Fig. 5** **IxAdmin CANnector configuration**

► Click button **Open folder** (**1**).

► Select one basic configuration (sdcfg file) and click button **Open**.

ℹ *The sdcfg file is the download project file of a configuration, that contains all links to all files that are required for one configuration.*

→ Selected basic configuration is opened.

► Double-click on the configuration in window **Modules** (**2**).

→ Window to configure the application is opened.

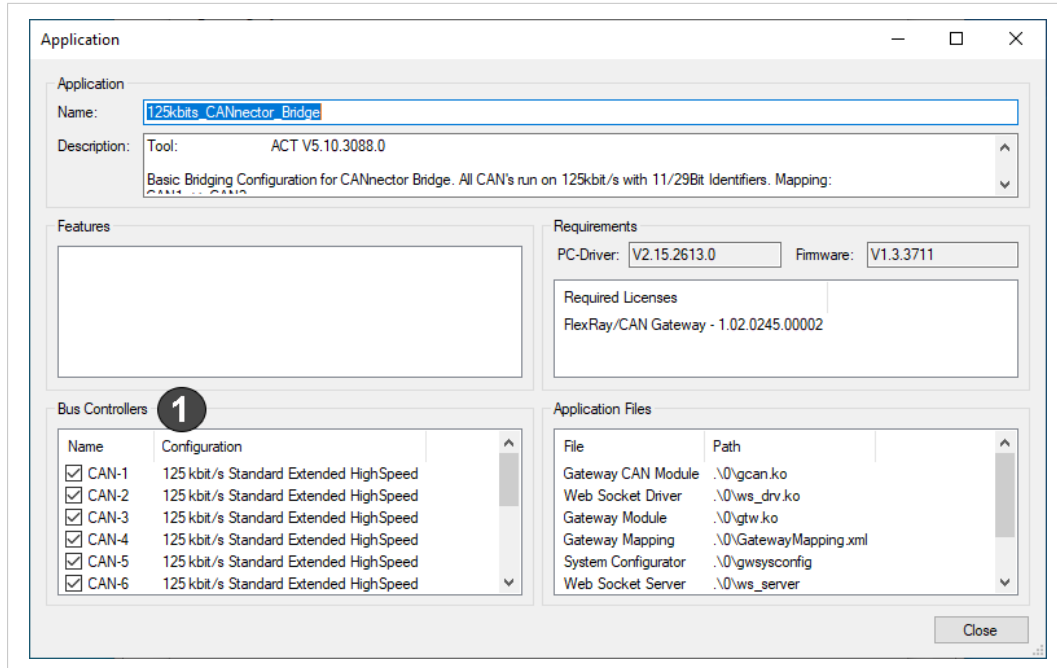→ Available CAN controllers are listed in field **Bus controllers**.

**Fig. 6     IxAdmin CANnector application**

▶   In field **Bus Controllers** (**1**) select the desired CAN controller and right-click on the desired controller.

   →   Window to edit the controller is opened.
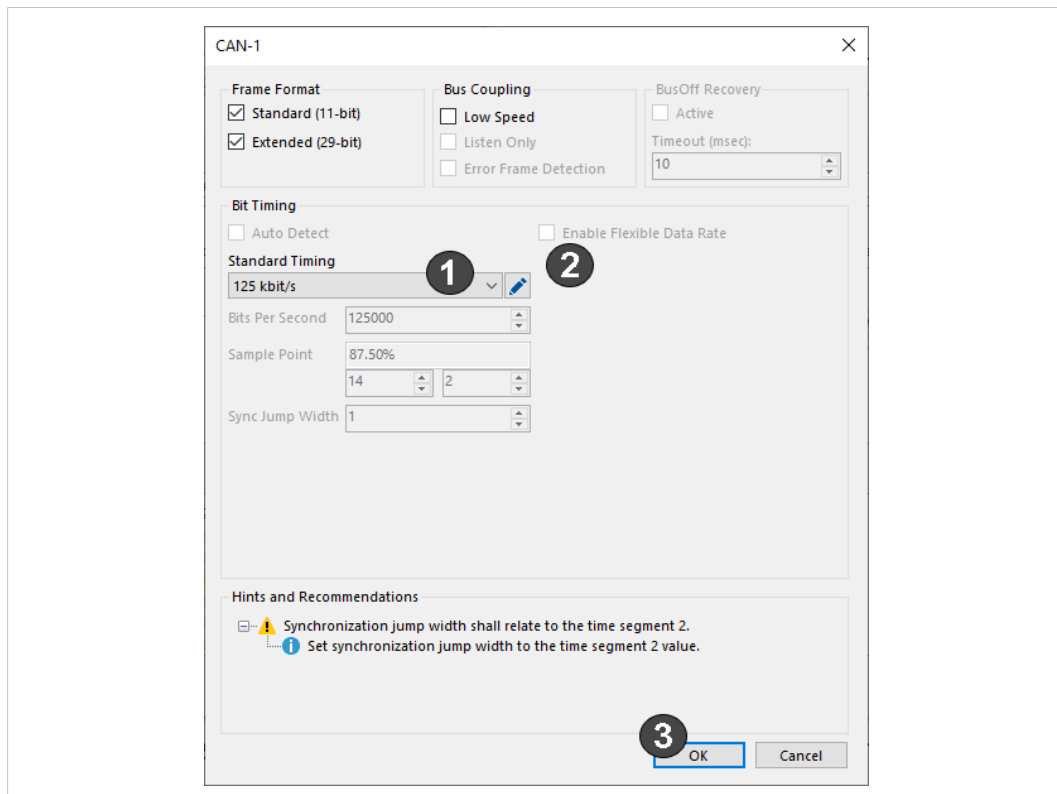


**Fig. 7     IxAdmin Edit Baud rate of CAN controller**

▶   Select the desired baud rate in drop-down menu **Standard Timing** (**1**).

▶   To enable CAN FD with CAN 5 and CAN 6, activate **Enable Flexible Data Rate** (**2**) to be able to set the Standard baud rate and the Fast Timing baud rate for CAN FD.

► To assign the selected baud rate to the controller, click button **OK** (**3**).
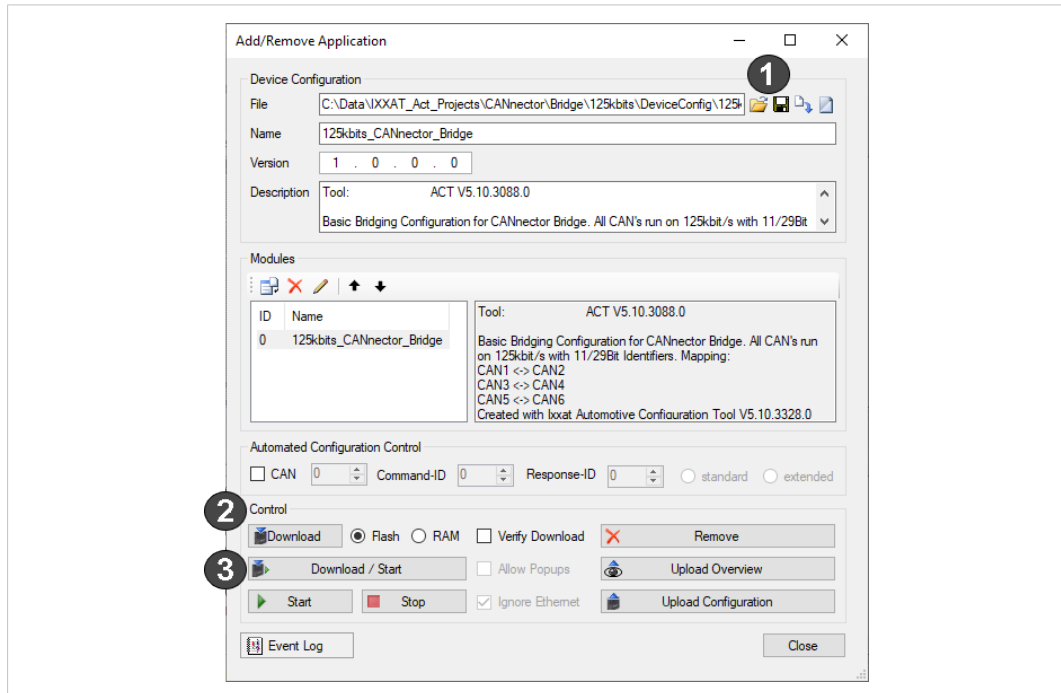
► To close the window, click button **Close**.



**Fig. 8    Save application**

► In window **Add/Remove application** save the configuration with button **Save** (**1**).

► In field **Control** (**2**) define the memory the configuration is downloaded to:

– Select Flash for the non-volatile memory of the target device. Configurations which are downloaded to the Flash memory, are automatically started at the next power-on of the device.

– Select RAM for the volatile memory of the target device. Configurations which are installed in the RAM memory are lost when the device is switched off.

► To start the configuration on the CANnector, click button **Download/Start** (**3**).

ⓘ *When combined with a WiFi extensions it is possible to access the device wireless. For more information see ACT Help.*

## 6.2        Creating Bridge/Gateway Configurations

> **!**  Only use the Eclipse version that is provided for downloading on www.ixxat.com. HMS
> has pre-configured Eclipse to the requirements of the CANnector Bridge. These settings
> are only contained in the Eclipse version available from Ixxat.

To use more functions of the CANnector Bridge, configurations can be created with the freeware
ACT tool. Different configurations types can be created: configurations without bus description
files (mapping messages) and configurations with bus description files (mapping messages and
mapping on signal level). For signal manipulation and defining algorithms via C usercode the
Eclipse based IDE is needed.

For example the following functions can be used with the CANnector Bridge:

*   forward only defined messages

*   change the message ID

*   import bus description file for CAN busses

*   forward specific signals of a CAN message in another CAN message

*   cyclic transmission of CAN messages

*   add algorithms for signals or message content

*   manipulate signals or message content

### 6.2.1        Creating a Configuration without Bus Description File

►   Make sure, that the required software is installed (see *Installing the Software, p. 7*) and that
the CANnector Bridge is connected (see *Connecting the Device, p. 8*).

►   Start the ACT tool.

►   Open menu **File** and select **New**.
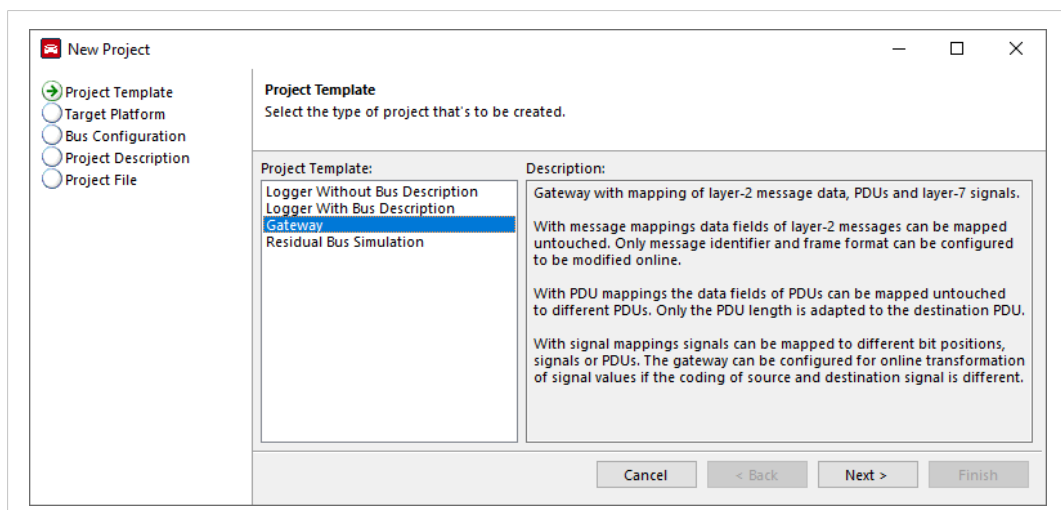
→   Wizard to create a new project is opened.



**Fig. 9        New project wizard**

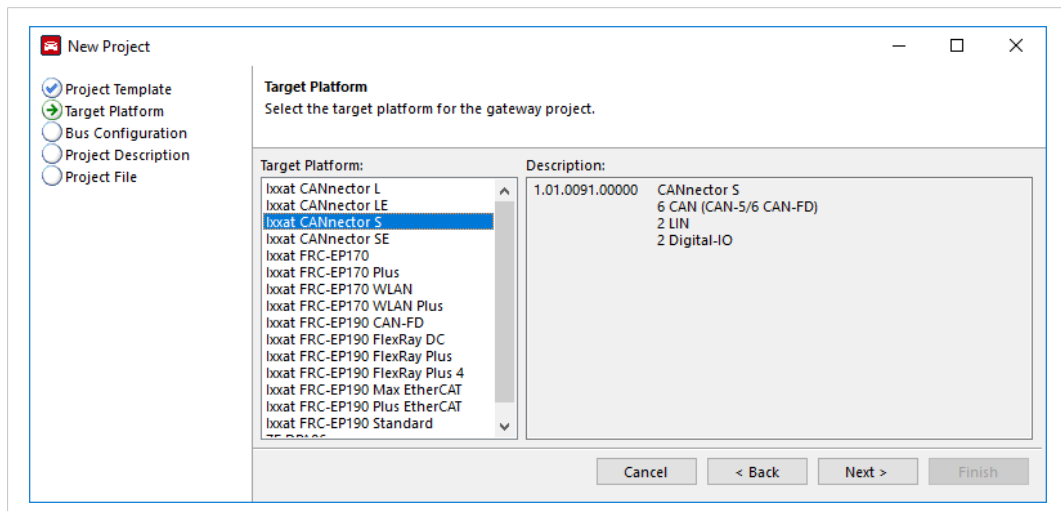▶ Select the project template **Gateway** and click button **Next**.



**Fig. 10**     **Select target platform**

▶ Select target platform **Ixxat CANnector S** and click button **Next**.

ⓘ *The CANnector Bridge is based on the CANnector S.*



**Fig. 11**     **Bus configuration**
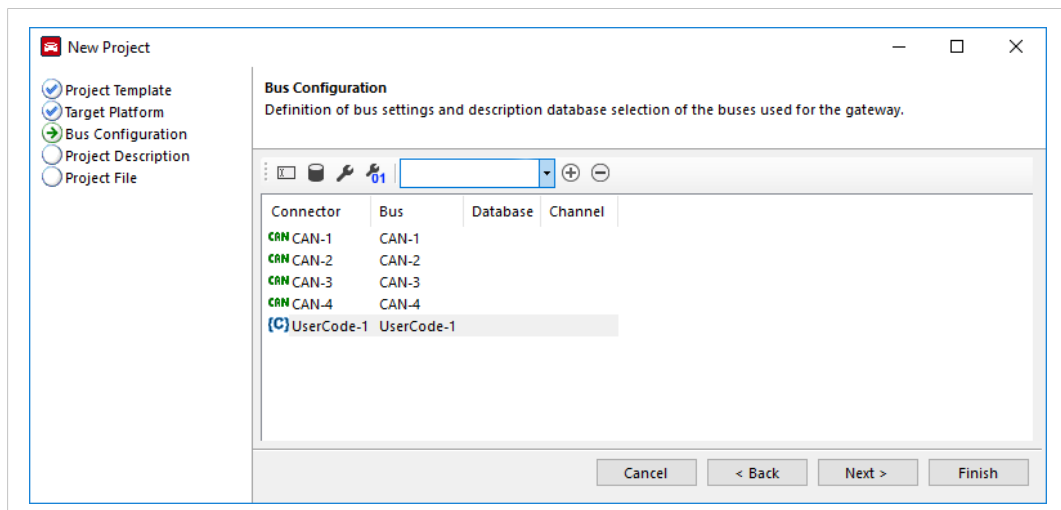
▶ To set the baud rate of the CAN busses, click button 🔧 and select the desired baud rate. For CAN 5 and CAN 6 CAN FD can be enabled.

▶ Click button **Next**.

▶ Name the project and define the path where the project is stored.

► Click button **Next**.
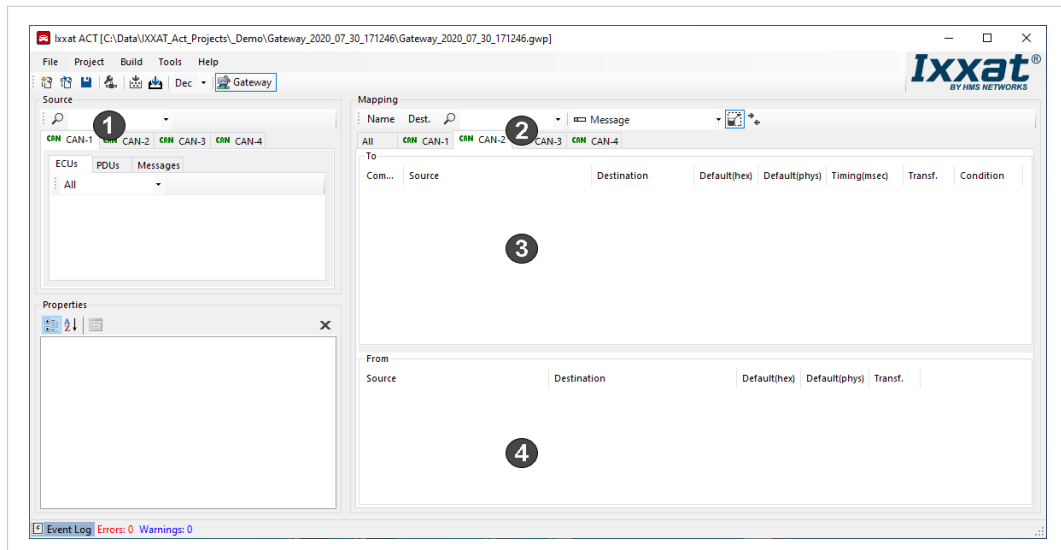
→ Window to configure the Bridge is opened.



**Fig. 12    Mapping configuration window**

► Select the desired CAN bus as source (**1**) and the desired CAN bus (**2**) as destination.

→ Field **To** (**3**) shows the data that is forwarded to the selected CAN bus from the selected source CAN bus.

→ Field **From** (**4**) shows the data that is send from the selected CAN bus to the selected source CAN bus.

► To forward messages to the selected CAN bus, define and map the desired messages to the **To** field with drag and drop (see *Mapping Messages, p. 20*).

► To send messages from the selected CAN bus, define and map the desired messages to the **From** field with drag and drop (see *Mapping Messages, p. 20*).

► When the configuration is finished, open menu **Build** and select **Build** to produce the configuration.

► To load the configuration to the device, open menu **Build** and select **Download**.

→ IxAdmin is started.

► Load the configuration with IxAdmin to the CANnector Bridge (see *Loading Configurations to the Device, p. 29*).

### 6.2.2 Creating a Configuration with Bus Description File

With the ACT CAN and CAN FD description files (e.g. in CANdB format) can be assigned to the respective CAN busses. Bus description files allow access to the signals and the possibility to transmit individual signals (compared to complete messages) as well as the possibility to use signal values (e.g. a defined engine speed) on a physical layer (e.g. 2500 rpm instead of 24 hex) for data manipulation.

Raw values are automatically calculated to physical values. Automatic signal transformation, if the signal description on the source bus is different form the description on the destination bus (e.g. different quantification, offsets, bit length or litte endian and big endian) is also possible without the need to write own C user code.

▶ Make sure, that the required software is installed (see *Installing the Software, p. 7*) and that the CANnector Bridge is connected (see *Connecting the Device, p. 8*).

▶ Start the ACT tool.

▶ Open menu **File** and select **New**.
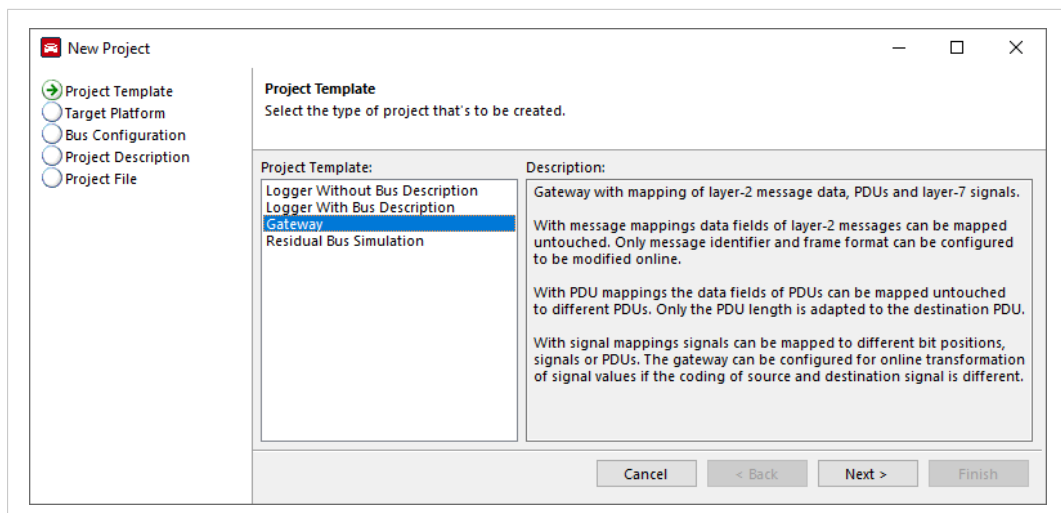
→ Wizard to create a new project is opened.



**Fig. 13      New project wizard**

▶ Select the project template **Gateway** and click button **Next**.
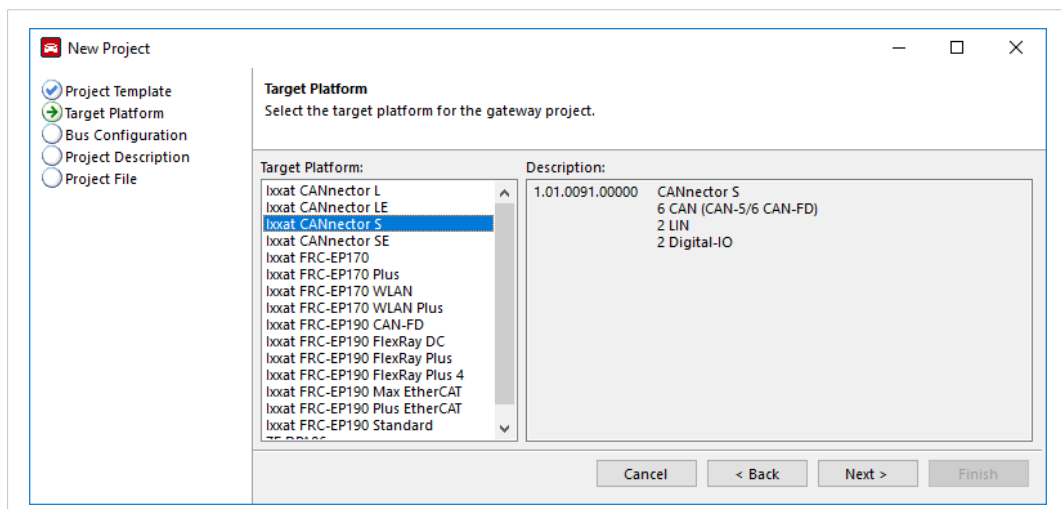


**Fig. 14**

► Select target platform **Ixxat CANnector S** and click button **Next**.

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ⓘ    *The CANnector Bridge is based on the CANnector S.*

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► To assign bus description files to the CAN busses, select the desired CAN bus (**3**) and click the data base button (**1**).
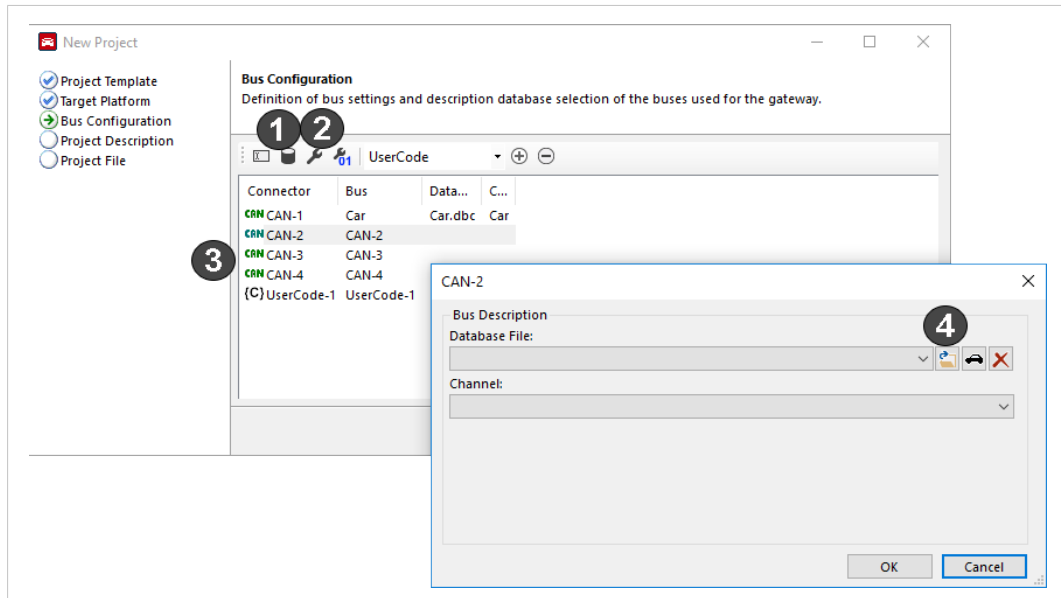


**Fig. 15      Assign database**

► Click button **Open** (**4**) to select a CAN database.

► Click button **OK** to assign the data base.

► To set the baud rate of the CAN busses, click button **Settings** (**2**) and select the desired baud rate. For CAN 5 and CAN 6 CAN FD can be enabled.

► Click button **Next**.

► Name the project and define the path where the project is stored.

▶    Click button **Next**.

→    Window to configure the Bridge is opened.

→    Content of assigned data bases is shown in the field **Source**.



**Fig. 16        Content of assigned data base**

▶    Select the desired CAN bus as source (**1**) and the desired CAN bus (**2**) as destination.
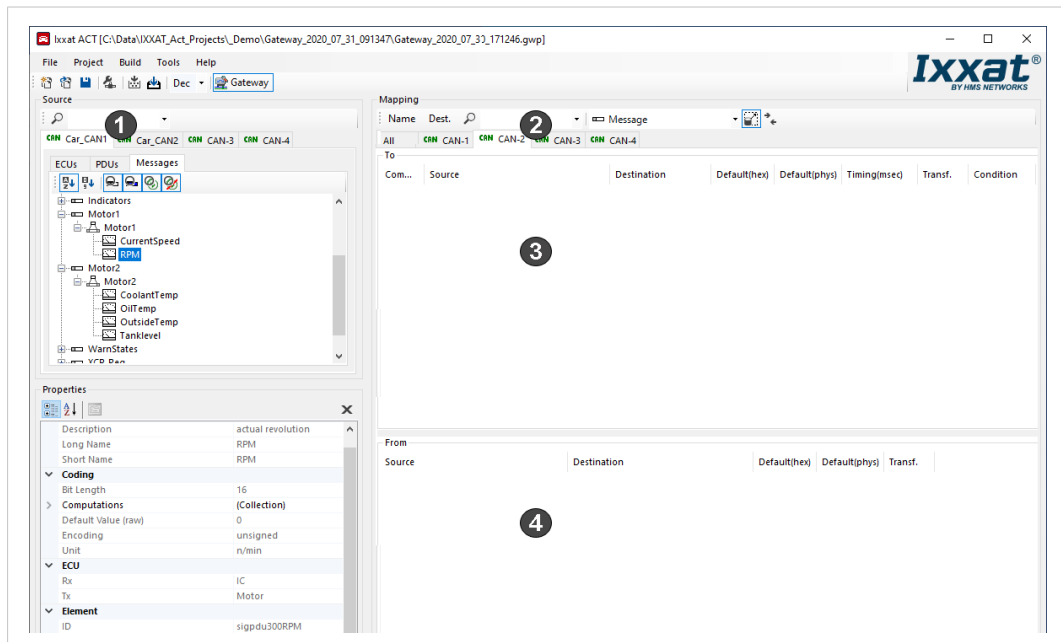
→    Field **To** (**3**) shows the data that is forwarded to the selected CAN bus from the source CAN bus.

→    Field **From** (**4**) shows the data that is send from the selected CAN bus to the source bus.

▶    To forward messages to the selected CAN bus, map the desired messages to the **To** field via drag and drop (see *Mapping Messages, p. 20*).

▶    To send messages from the selected CAN bus, map the desired messages to the **From** field via drag and drop (see *Mapping Messages, p. 20*).

▶    To forward signals to the selected CAN bus, map the desired signals to the **To** field (see *Mapping Signals, p. 26*).

▶    To send signals from the selected CAN bus, map the desired signals to the **From** field (see *Mapping Signals, p. 26*).

ⓘ    *If no data base is assigned to the destination CAN, the ACT generates a new data base that contains the mapped messages and signals. If a data base is assigned to the destination CAN bus the messages and signals to which the mapping shall be done must be selected.*

▶    When the configuration is finished, open menu **Build** and select **Build** to produce the configuration.

▶    To load the configuration to the device, open menu **Build** and select **Download**.

→    IxAdmin is started.

▶    Load the configuration with IxAdmin to the CANnector Bridge (see *Loading Configurations to the Device, p. 29*).

### 6.2.3    Mapping Messages

ACT provides the following configuration possibilities:

- mapping specific, individual messages

- mapping an entire CAN bus

- excluding individual messages from transmission

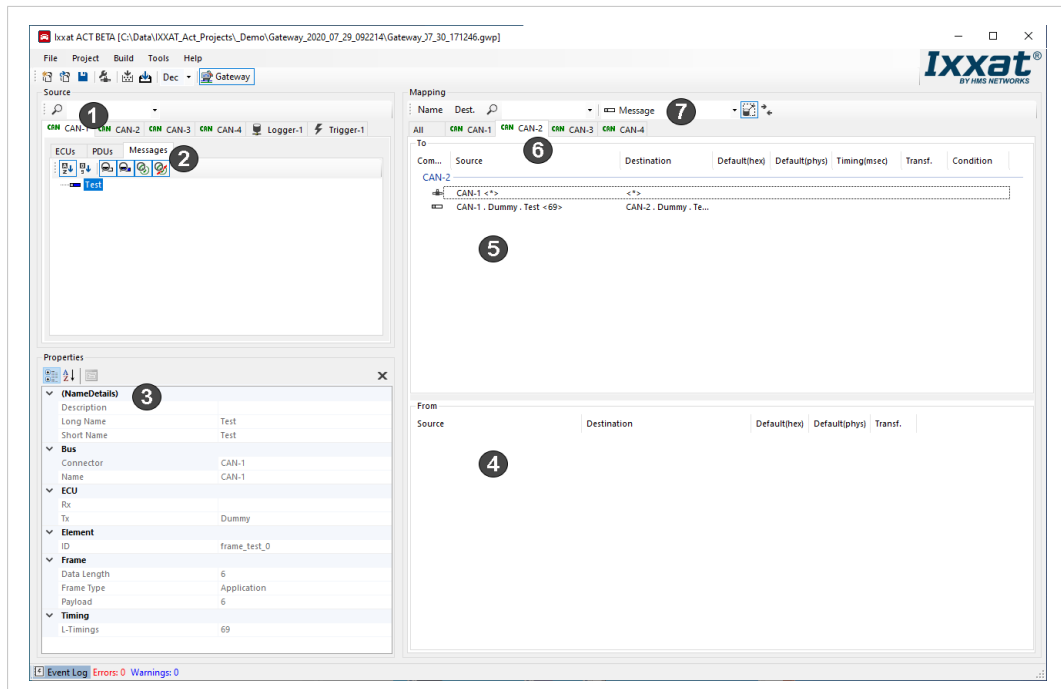- defining individual messages (in configurations without data base)



**Fig. 17    Mapping configuration window**

▸ Create a configuration without bus description file (see *Creating a Configuration without Bus Description File, p. 14*) or with bus description file (see *Creating a Configuration with Bus Description File, p. 17*).

▸ Select the desired CAN bus as source (**1**) and the desired CAN bus (**6**) as destination.

    → Field **To** (**5**) shows the data that is forwarded to the selected CAN bus from the source CAN bus.

    → Field **From** (**4**) shows the data that is send from the selected CAN bus to the source CAN bus.

▸ In **Source** (**1**) open tab **Message** (**2**).

▸ In drop-down list **Map Subject** select **Message** (**7**).

▸ To forward an entire CAN bus (wildcard mapping), drag and drop the tab of the desired CAN bus from source (**2**) in the field **To** of the desired CAN bus (**5**).

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   ⓘ   *To exclude individual messages, define individual messages, map the messages in the destination, right-click on the message and select **Exclude**.*

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▸ To define an individual message:

    ▸ Right-click in source field (**2**) and select **New Message** in the context menu.

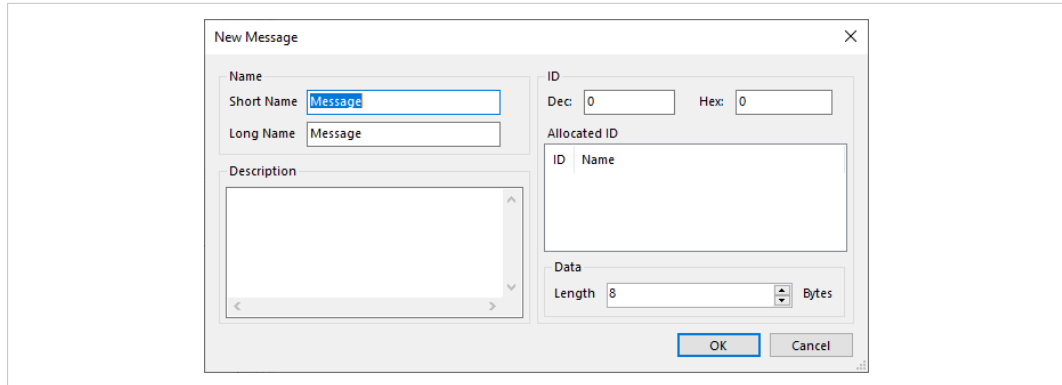       → Window to define a message is opened.

**Fig. 18     Configure new message**

▶   Create the desired message and click button **OK**.

→   In the source field message and message properties are shown (**3**).

▶   To forward messages to the selected CAN bus, map the message to the **To** field with drag and drop.

▶   To send messages from the selected CAN bus, map the message to the **From** field with drag and drop.

ⓘ   *Several messages can be selected and dragged and dropped simultaneously.*

▶   If desired change the ID of the forwarded message (see *Changing the Message ID, p. 21*).

▶   If desired change the content of the message (see *Changing the Message Content, p. 22*).

ⓘ   *To remove messages that are not mapped correctly (e.g. if deleted in destination but not in source), right-click in source field and select **Clean Up**.*

### 6.2.4     Changing the Message ID

▶   To change the ID of the forwarded message, right-click the message in the destination field and select **Edit Destination Message**.

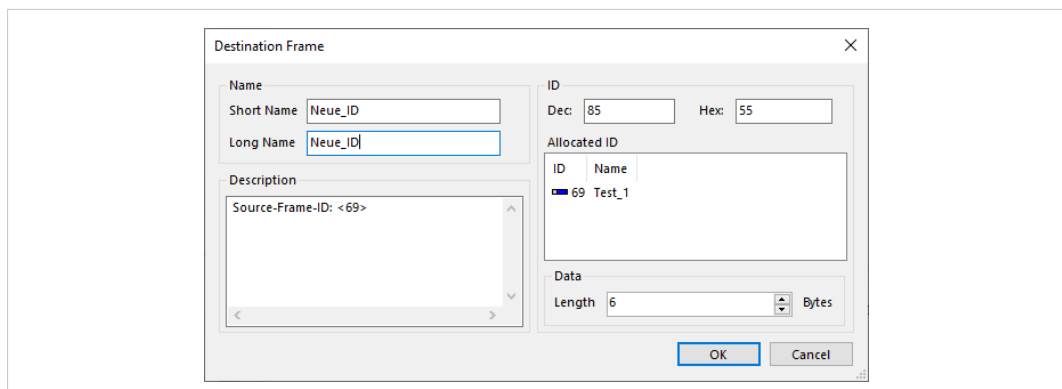→   Window to edit the message is opened.



**Fig. 19     Edit message ID**

► Edit name and ID if desired and click button **OK**.

→ In example *Fig. 19* the source CAN receives the message ID 69 and forwards the message with ID 85 to the destination CAN.

## 6.2.5 Changing the Message Content

> ! Only use the Eclipse version that is provided for downloading on www.ixxat.com. HMS has pre-configured Eclipse to the requirements of the CANnector Bridge. These settings are only contained in the Eclipse version available from Ixxat.

The message content can be changed with an additional C user code bus module, that is handled as a virtual bus by the ACT. Messages or signals to be changed are transmitted to the user code bus and then forwarded with changed content to the desired CAN bus. In a configuration with bus description manipulation is possible on physical signal level.

► In the ACT tool open menu **Project — Bus Configuration**.

→ Window **Bus Configuration** is opened.
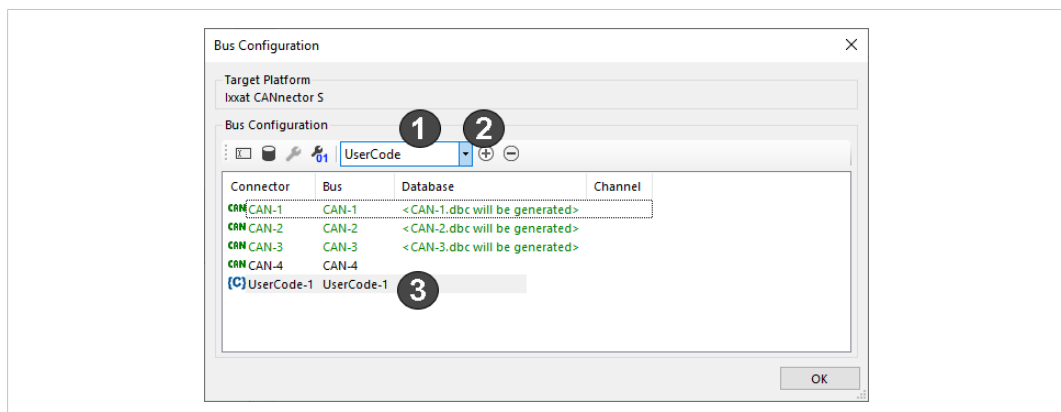


**Fig. 20      Bus configuration**

► Open drop-down menu (**1**) and select **UserCode**.

► Click button **Add** (**2**).

→ User code bus is added to the configuration (**3**).

► Click button **OK**.

→ User code bus is added as tab in the source field.

The following example shows how a message content can be changed with Eclipse. In the example the message *CAN2_Input* is received on CAN 2 and then forwarded as *CAN3_Output* with an offset of 1 added to the content of the second data byte.

► In the ACT define message *CAN2_Input* on source bus CAN 2 and map the message to the **To** field of the user code bus.

► Define message *CAN3_Output* on source bus CAN 3 and map the message to the **From** field of the user code bus.

▶     For more information see *Mapping Messages, p. 20*.

---

ⓘ   *On the user code bus both messages get a new ID. This ID is only relevant for the automated handling in the C user code module and should not be changed manually.*

---

ⓘ   *To change individual signals, map the signal to be changed to the user code bus (from sending CAN in **To** field and from receiving CAN in **From** field) and map the remaining unchanged signals of the message directly to the desired destination bus.*

▶     Open menu **Build** and select **Build** to produce the configuration.

→     ACT creates a selection for the C user code module and generates the required settings for the Eclipse IDE.

→     Eclipse is started automatically.

▶     Open the created project in the project explorer.



**Fig. 21      Eclipse Project Explorer**
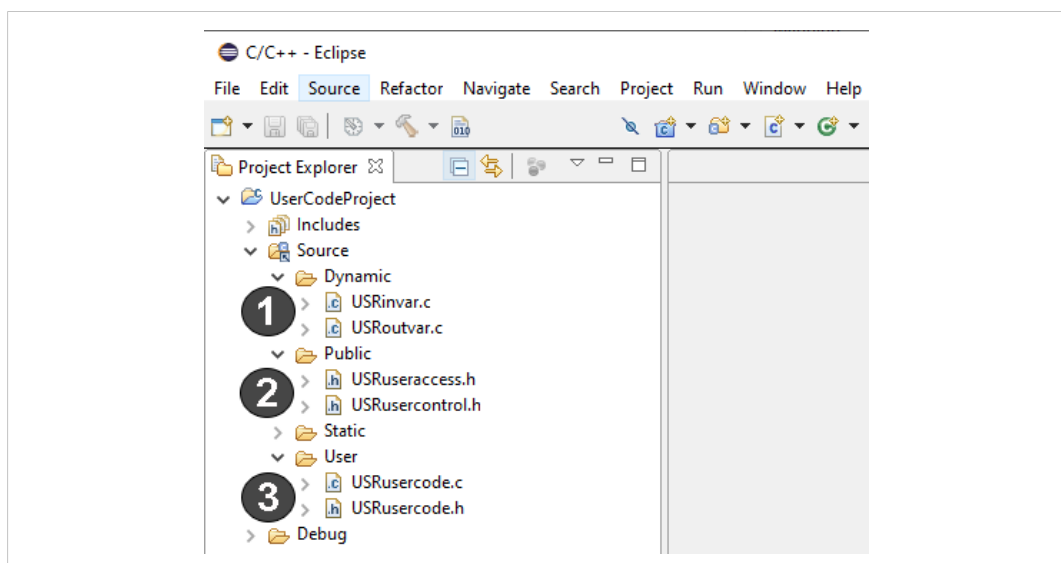
| 1 | Folder **Dynamic** contains the generated memory variables for the mapped frames. Generated automatically by the ACT with each build. Do not change. |
|---|---|
| 2 | Folder **Public** contains the dynamically generated defines for the mapped frames. Generated automatically by the ACT with each build. Do not change. |
| 3 | Folder **User** contains the USRusercode.c module. |

▶ Open folder **User** and double click on **USRusercode.h** to open the module.
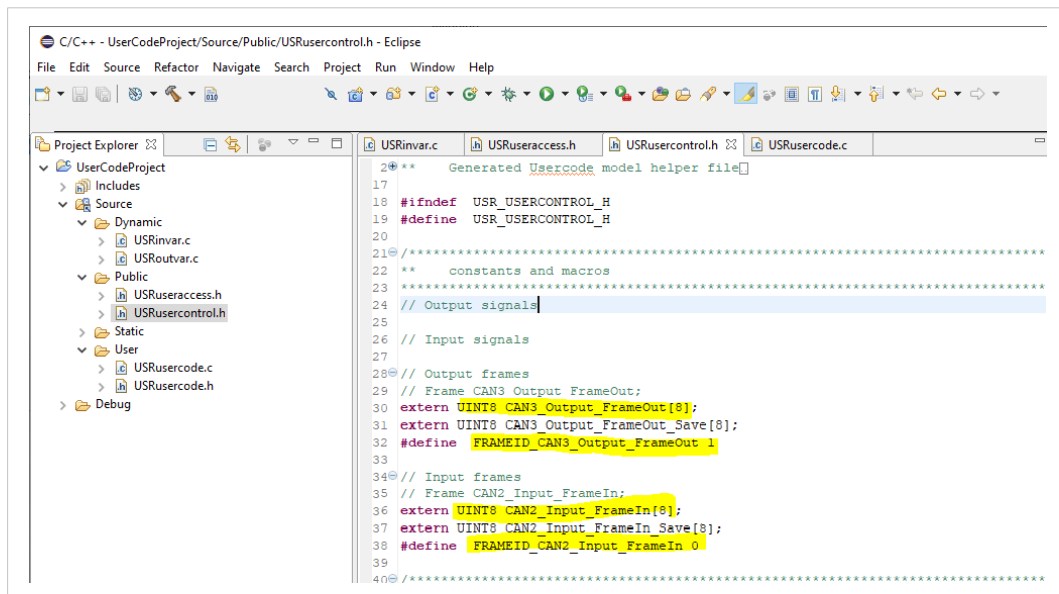


**Fig. 22        IDs in Eclipse**

▶ Check the IDs that the ACT defined for the messages CAN2_Input and CAN3_Output.

> ❗ Work with the define instead of the value of the define. With a new build the values might change, but the define stays the same.

▶ Check in which memory the message is stored. Each time the user code module receives a message, the message is copied to this area.

> ⓘ *The memory areas $\_Save$ are filled automatically and store the latest received content. If pb_ smartUpdateMode =1 these areas are used to make sure that data is only sent if changed since the last transmission.*

▶ Open folder **User** and double click on **USRusercode.c** to open the module.

| Pre-defined functions | |
|---|---|
| **Function** | **Description** |
| OnStart | Executed with each start of the user code module. |
| OnStop | Executed with each stop of the user code module. |
| OnCycle | Executed depending on the cycle time (parameter *pdw_ cycletime_ms*) that is defined in function OnStart. |
| OnReceiveSignal | Executed when user code module receives a mapped signal (relevant in configurations based on bus description files). |
| OnReceiveFrame | Executed when user code module receives a mapped message. |
| OnReceiveAnonymousFrame | Reserved |

▶ In OnReceiveFrame filter for the ID of the message *CAN2_Input*.

▶ Copy the content of array *CAN2_Input_FameIn[8]* to the array *CAN3_OutputFrameOut[8]* and add the offset to the second data byte.

► Send the message *FRAMEID_CAN3_Output_FrameOut*.

```
**
******************************************************************************
void OnReceiveFrame(UINT16 w_frameId, UINT64 qw_timestamp)
{
  switch (w_frameId)
  {
  case FRAMEID_CAN2_Input_FrameIn:
    {
      memcpy(CAN3_Output_FrameOut, CAN2_Input_FrameIn, sizeof(CAN2_Input_FrameIn));
      CAN3_Output_FrameOut[1] += 1;
      USR_model_send_one_frame(FRAMEID_CAN3_Output_FrameOut);
      break;
    }
    /* example
    case FRAMEID_WN_FR_STAT_FrameIn:
```

**Fig. 23    Message in Eclipse**

ⓘ    *All ANSI C functions can be used. Floating comma arithmetic is supported.*

► For a compiling test and a check for errors, open menu **Project** and select **Build All**.

► Close Eclipse.

► Open ACT, open menu **Build** and select **Build** to produce the configuration.

► When the configuration is finished

  → C user module is integrated in configuration.

► To load the configuration to the device, open menu **Build** and select **Download**.

  → IxAdmin is started.

► Load the configuration with IxAdmin to the CANnector Bridge (see *Loading Configurations to the Device, p. 29*).

If further signals or messages are mapped to the user code bus, Eclipse is automatically started with the build. To manually start Eclipse, select the user code bus and click icon settings 🔧.

## 6.2.6      Mapping Signals

Configurations with bus description files allow access to the signals and the possibility to map individual signals.
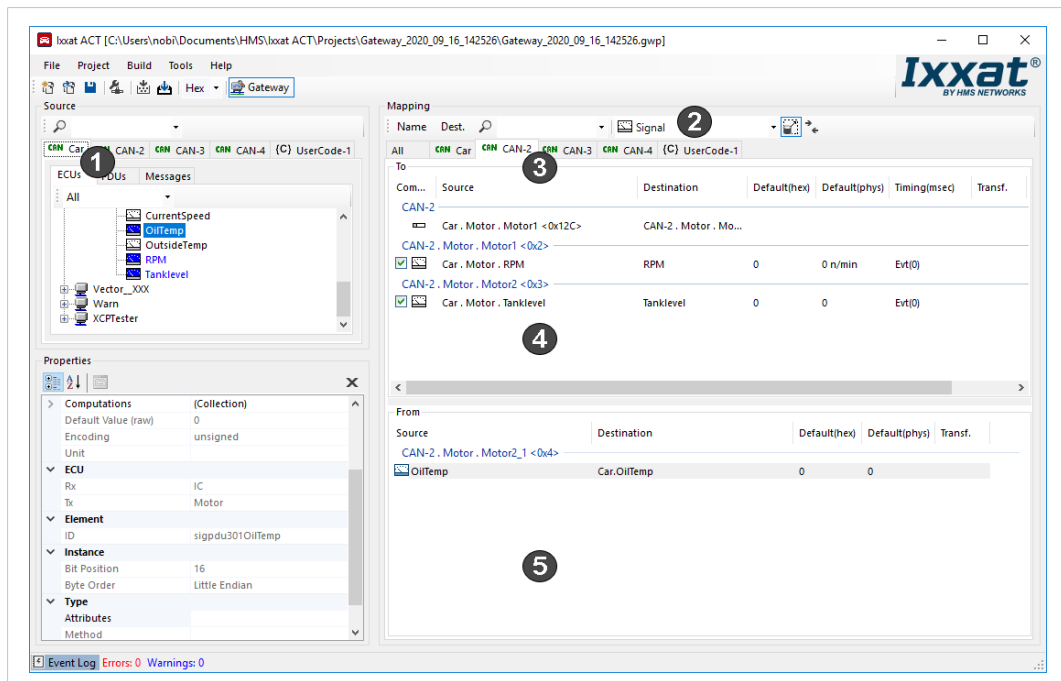


**Fig. 24       Configuration window**

▶  Create a configuration with bus description file (see *Creating a Configuration with Bus Description File, p. 17*).

▶  Select the desired CAN bus as source (**1**) and the desired CAN bus (**3**) as destination.

   →  Field **To** (**4**) shows the data that is forwarded to the selected CAN bus from the source CAN bus.

   →  Field **From** (**5**) shows the data that is send from the selected CAN bus to the source CAN bus.

▶  In source open tab **ECUs** (**1**).

▶  In drop-down list **Map Subject** (**2**) select **Signal**

▶  To forward signals to the selected CAN bus, map the signal to the **To** field with drag and drop.

▶  To send signals from the selected CAN bus, map the signal to the **From** field with drag and drop.

**If a data base is assigned to the source bus and one to the destination bus:**

   →  Window to select the destination signal is opened.

   →  Respective signal in the data description file of the destination bus is shown.
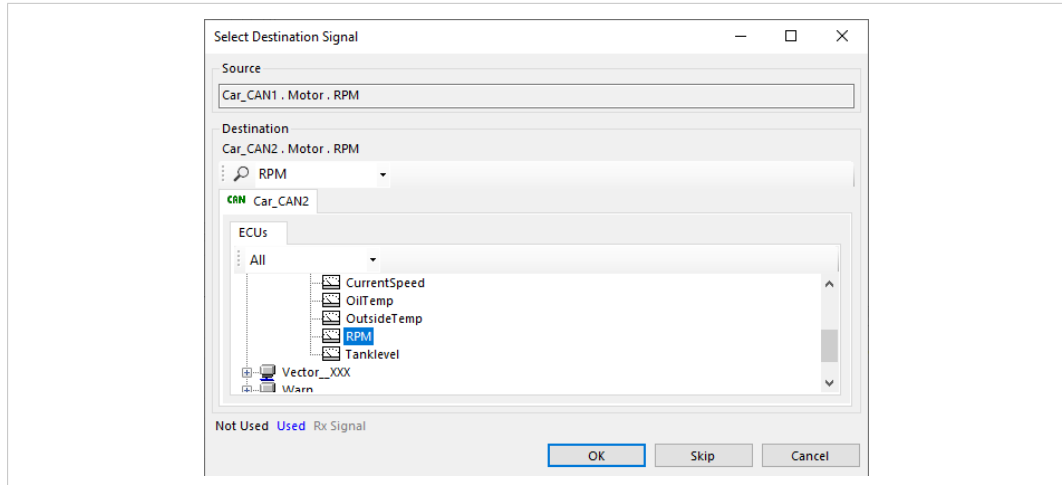
**Fig. 25      Select destination signal**

▶  Click button **OK**.

   or

   Select another signal and click button **OK**. Note that the units of the mapped signals should be identically to avoid mapping issues.

   →  Signal from source bus is mapped to the selected signal.

   →  In case of mapping issues (e.g. different bit lengths of the signal, or different data type) a warning is shown.
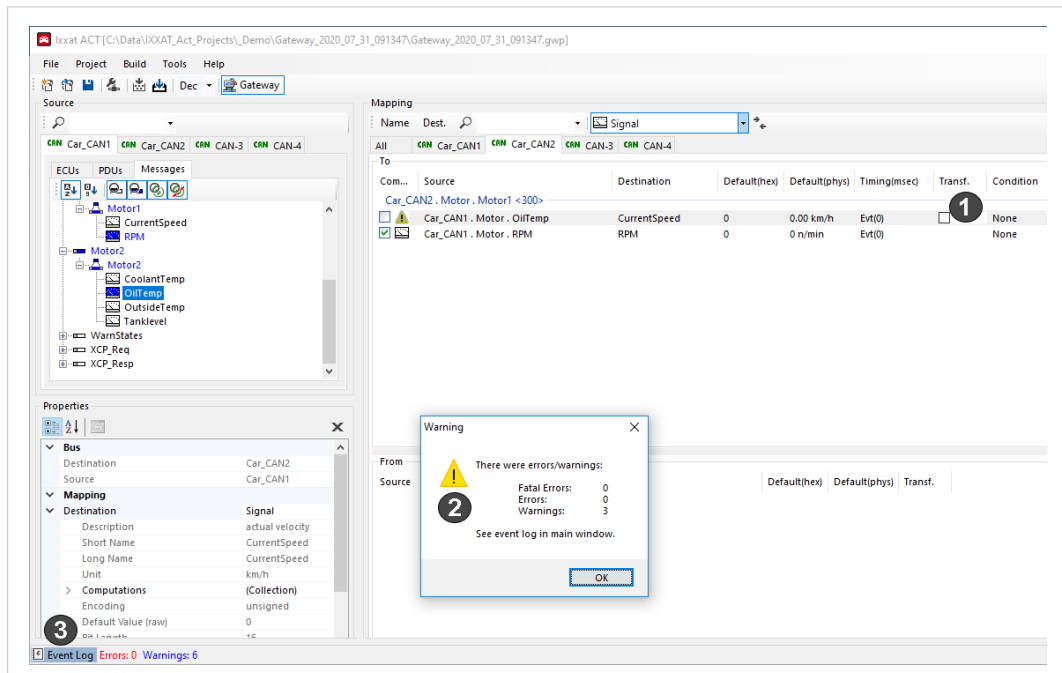


**Fig. 26      Warning**

▶  To check the reason for the warning, mouse hover over the warning symbol (**2**) or check the log (**3**).

▶  To solve value related mapping issues, activate checkbox **Transf** (**1**) for automatic signal transformation.

   →  Based on the bus description file of the source CAN bus the physical value of the selected signal is automatically calculated.

→ In the bus description file of the destination CAN bus the corresponding raw value for the physical value is calculated.

→ The aim of the signal transformation is to have the same point of view on both sides, for example that the speed of the vehicle is the same on both sides.

**If a data base is only assigned to the source bus:**

→ ACT automatically creates a data base with the mapped messages and signals for the destination bus.

► To forward signals in individual messages, drag and drop the signal to the empty space in field **To**.

► To forward several signals in one message, drag and drop the signal to an existing message in field **To**.

► If desired change the ID of the destination message (see *Changing the Message ID, p. 21*).

---

ⓘ *Several signals can be selected and dragged and dropped simultaneously.*

---

**Message Transmitting Behavior**

If the checkbox **Commit** is activated, the message containing the signal is transmitted by the Bridge when the signal is received.
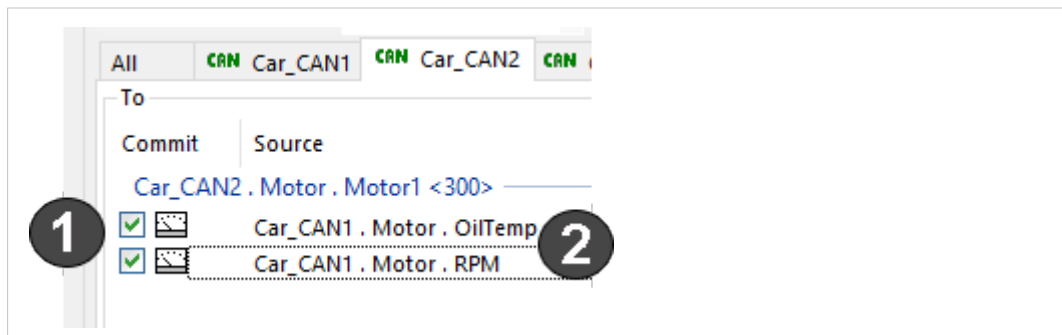


**Fig. 27**    **To field in Bridge configuration**

If **Commit** is activated for two signals of the same message, the message is transmitted twice. In example *Fig. 27* the message *Motor1* is transmitted twice (e.g. in case of receiving signals *OilTemp* and *RPM*). To prevent from transmitting messages twice, the checkbox **Commit** of signals can be deactivated.

► To deactivate the transmitting of the message when a signal is received, deactivate the checkbox **Commit** (**1**) for the respective signal.

→ The signals are stored in a buffer.

→ If another signal with activated checkbox **Commit** (**1**) is received, the last received value of the deactivated signal is also transmitted.

▸ To transmit a signal only in defined intervals, right-click the mapped signal on the destination CAN (**2**) and select **Timing**.



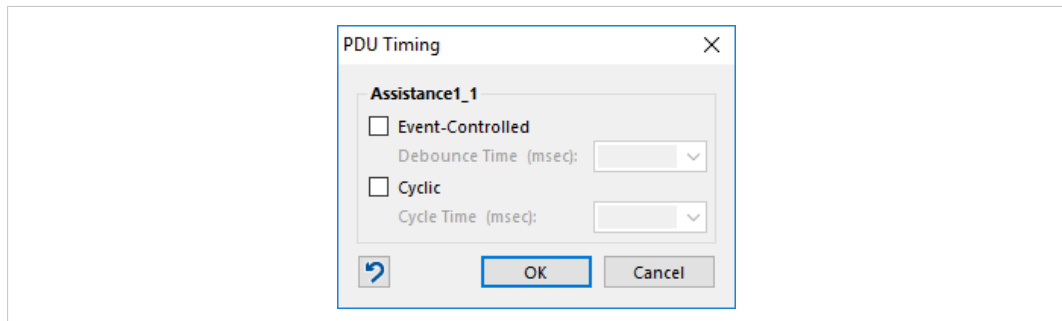**Fig. 28      Defining interval**

▸ To transmit the signal in defined cycles, select **Cyclic** and define the cycle time.

▸ To define a debouncing time for a signal (next signal is only transmitted if the defined time is exceeded), select **Event-Controlled** and define the debounce time.

### 6.2.7        Loading Configurations to the Device

▸ Make sure, that the required software is installed (see *Installing the Software, p. 7*) and that the CANnector Bridge is connected (see *Connecting the Device, p. 8*).

▸ Start IxAdmin.

  → Window **Connect Device** is opened.



**Fig. 29      IxAdmin**

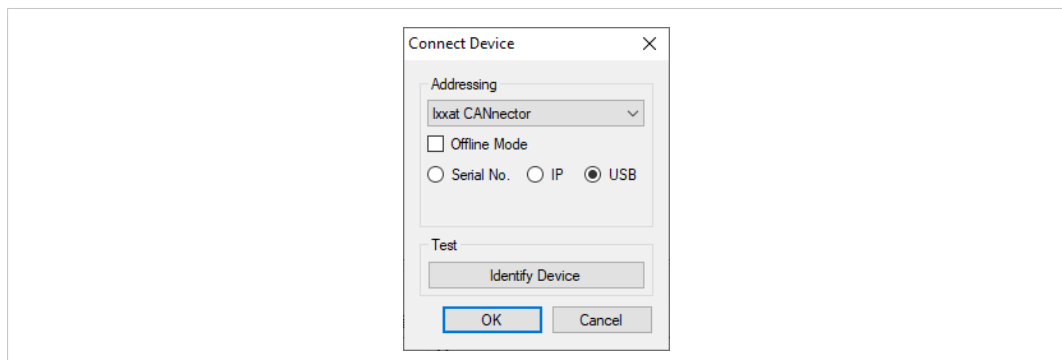▸ Use the USB cable (included in the scope of delivery) to connect the Mini USB connector of the CANnector Bridge to the PC.

▸ Select **Ixxat CANnector** and **USB**.

ⓘ *It is possible to access the device via Ethernet or when combined with a WiFi extensions it is possible to access the device wireless. For more information see IxAdmin Help.*

▸ Click button **OK**.

  → Connection to CANnector is established.

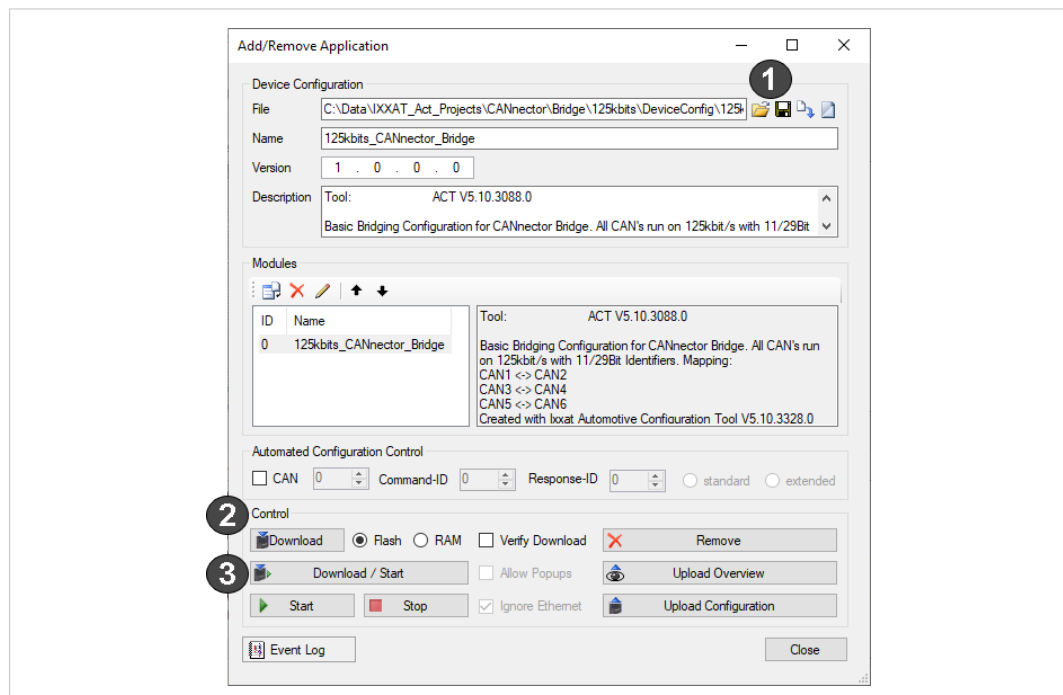► Open menu **Device** and select **Add/Remove Application**.



**Fig. 30** **IxAdmin CANnector configuration**

► Click on button **Open folder** (**1**).

► Select the created configuration (sdcfg file) and click button **Open**.

→ Selected configuration is opened.

► Save the configuration with button **Save** (**1**).

► In field **Control** (**2**) define the memory the configuration is downloaded to:

– Select Flash for the non-volatile memory of the target device. Configurations which are downloaded to the Flash memory, are automatically started at the next power-on of the device.

– Select RAM for the volatile memory of the target device. Configurations which installed in the RAM memory are lost when the device is switched off.

► To start the configuration on the CANnector Bridge, click button **Download/Start** (**3**).

## 6.3 C User Code Debugging

Eclipse IDE can be used for debugging the code, for example by setting breakpoints in the code and going through the code step by step. While debugging only the user code module is stopped, the configuration keeps running. Therefore it is possible to debug directly in Eclipse, to compile the user code and restart without stopping the configuration. After debugging, the corrected user code module can be integrated into the configuration with a new build of the configuration in the ACT.

> ! Only use the Eclipse version that is provided for downloading on www.ixxat.com. HMS has pre-configured Eclipse to the requirements of the CANnector Bridge. These settings are only contained in the Eclipse version available from Ixxat.

► To start Eclipse while configuration on CANnector Bridge is running, open menu **Project — Bus Configuration** and double click the user code bus (**2**).
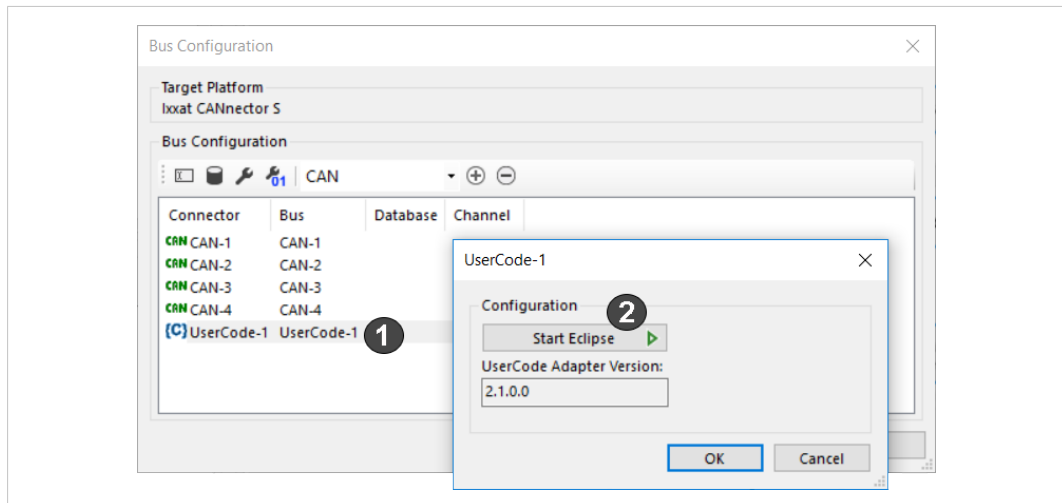


**Fig. 31      Starting Eclipse**

► Click button **Start Eclipse** (**2**).

→ Eclipse can connect via Ethernet, USB or WiFi (with WiFi extension) with the CANnector Bridge.

► To edit the connection data according to the type of connection (Ethernet, USB, or WiFi), open menu **Run** and select **Debug Configurations**.



**Fig. 32      Eclipse debug configuration**

► Click button **Edit** (**1**).

► For USB based connection use IP address 169.254.254.254 as host name (**2**).

or

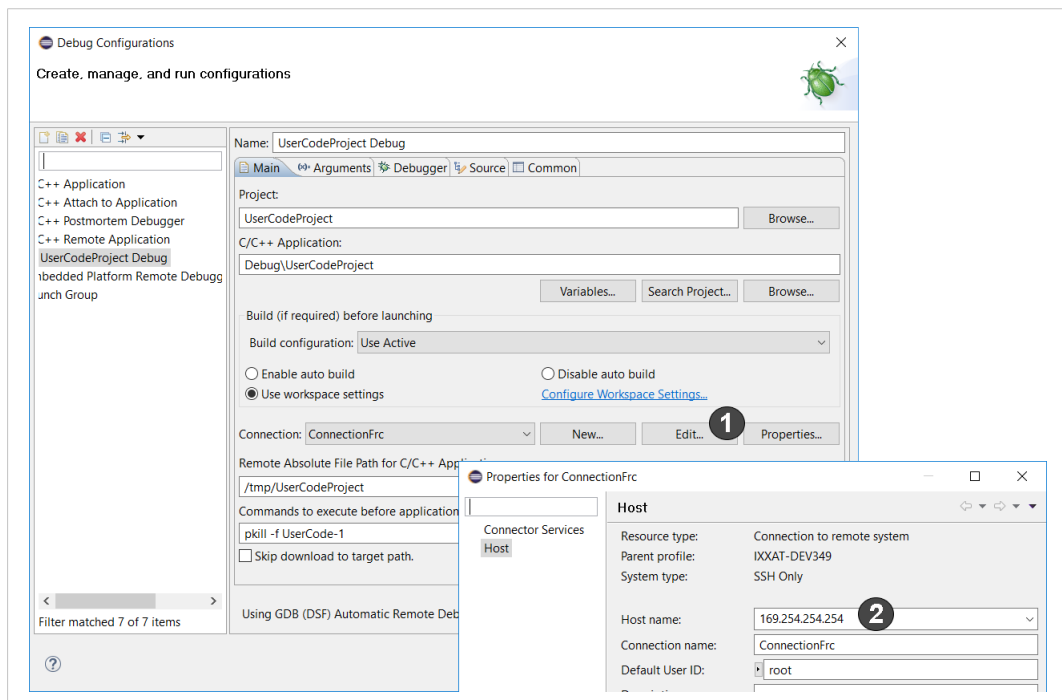► For Ethernet based connection use IP address on the label of the device in use as host name (**2**).

  or

► For WiFi based connection use IP address of the CANnector WiFi access point (192.168.0.1 as host name (**2**).

► Use password *mamboo12* and click button **Ok**.

► To start the debugger, click button **Debug** (**1**).
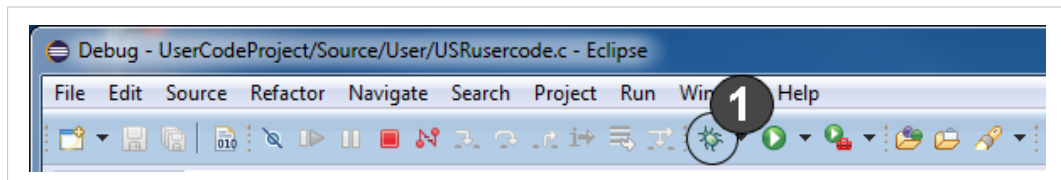


**Fig. 33      Start debugger**

→ User code is stopped.

→ Eclipse debug module is opened.
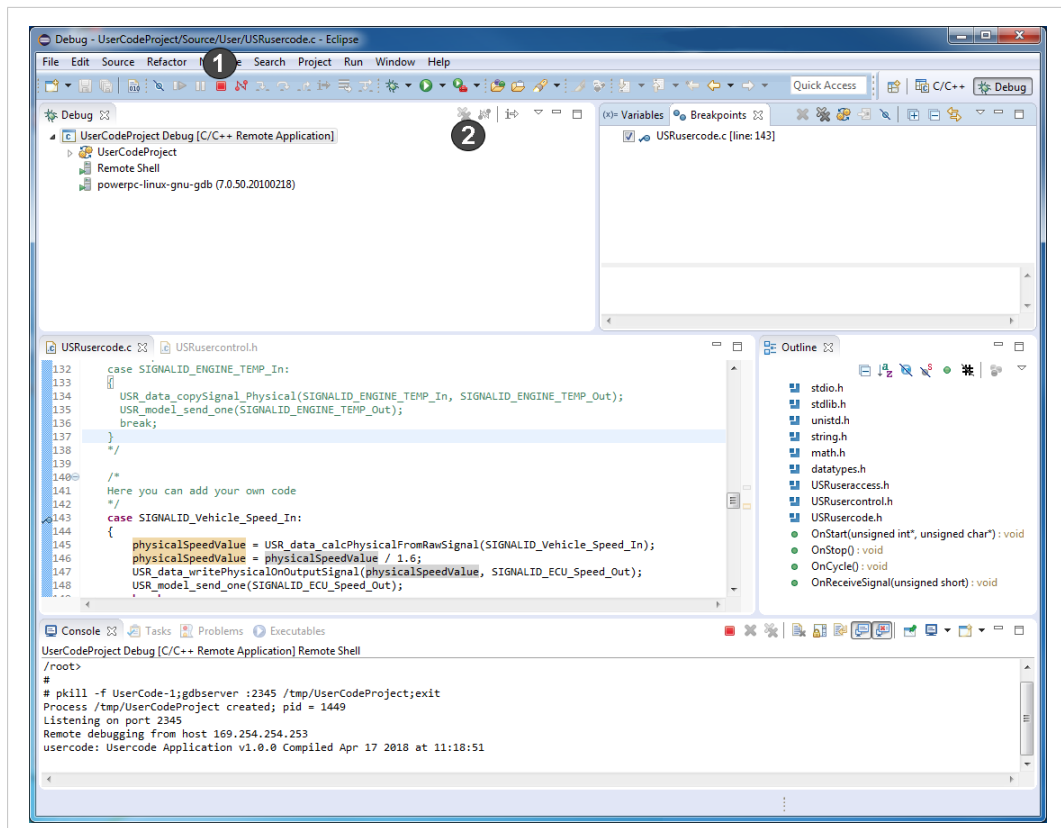


**Fig. 34      Eclipse debug mode**

► Go through the code step by step and fix the bugs.

► To stop the debugging, click button **Stop** (**1**) and button (**2**).

► To add the changes to the configuration, in ACT open menu **Build** and select **Build** to produce the configuration.

► To load the configuration to the device, open menu **Build** and select **Download**.

→ IxAdmin is started.

► Load the configuration with IxAdmin to the CANnector Bridge (see *Loading Configurations to the Device, p. 29*).

► For more information about Eclipse see www.eclipse.org/eclipseide

## 6.4 Configuring Further Functions

The CANnector Bridge can additionally be used as Logger, to manipulate data and to visualize data. When combined with a WiFi or LTE extensions it is possible to access the device wireless from the cloud or to configure the device to send logging data to a server in the cloud.

The following functions are possible:

| | | |
|---|---|---|
| FDX | Fast Data Exchange | Standardized protocol to exchange data via Ethernet |
| GenEthernet | Virtual CAN interfaces on Ehternet | Ixxat protocol to transmit CAN busses via Ethernet, allows to represent Range Extender applications (see *User Manual CANnector Range*) |
| IO | Digital I/Os | Allows to use the Digital I/Os of the CANnector Bridge (e.g. to trigger the logger or to switch on a light) |
| MatLab | MatLab/Simulink models | Possibility to calculate signals with a Simulink model that runs on the CANnector Bridge |
| OPC | OPC-UA | Standardized protocol for data exchange with a cloud |
| System | System bus | Contains all status signals of all used bus systems, e.g. CAN bus status |
| Logger | Data logger | Possibility to extend the configurations with data loggers, e.g. to log signals and messages parallel to the Bridge/Gateway (see *User Manual CANnector Log*) |
| Trigger | Trigger module | Possibility to trigger on messages or signal values and for example start logging with the trigger. Possibility to trigger the transmission of a message or to switch a digital I/O (see *User Manual CANnector Log*) |
| Virtual | Define own signals | Possibility to define signals, e.g. to count via usercode how often a certain event happens |
| WebSock | Data visualization/stimulation | Signals that are mapped to this bus, can be visualized and stimulated with the web browser |
| XCP | XCPonEthernet | Standardized protocol to exchange data via Ethernet |

▶   To additional functions to the configuration, in the ACT tool open menu **Project — Bus configuration**.

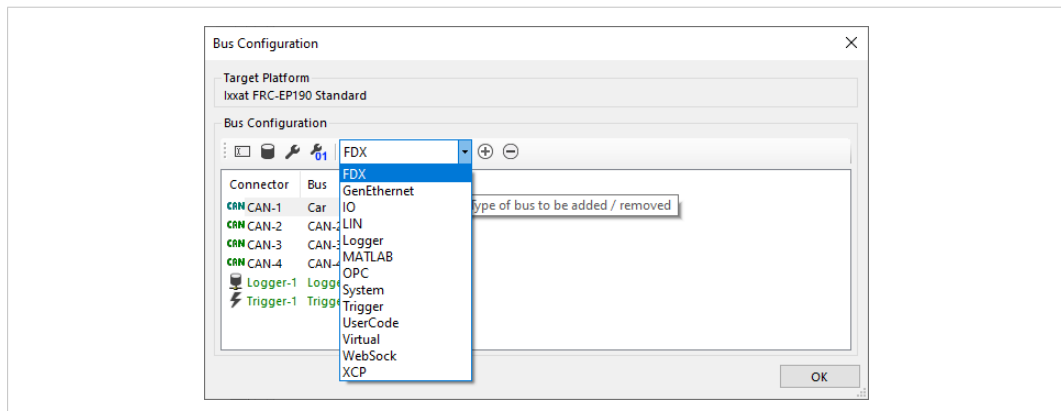→   Window **Bus Configuration** is opened.



**Fig. 35      Bus Configuration**

▶   Open drop-down menu and select the desired function.

▶   Click button **Add (+)** to add the selected function.

→   Module is added to the configuration.

▶   For information about the configuration of the additional functions see *ACT Help*.

# 7 Technical Data

| Basic Unit | |
| --- | --- |
| Dimensions (L x W x H) | 196 x 113 x 43 mm (without DIN rail bracket and device feet) |
| Weight | 790 g |
| Operating temperature | -40 °C to +80 °C |
| Storage temperature | -40 °C to +85 °C |
| Power supply | 6-36 V DC |
| Current consumption | Typ. 420 mA at 12 V |
| Housing material | Aluminium, stainless steel |
| Relative humidity | 10-95 %, non-condensing |
| Host system | Power PC, 256 MByte RAM, 256 MByte Flash |
| Ethernet | 10/100 MBit/s, RJ45 |
| USB | 2.0 high-speed device, USB-B<br>2.0 high-speed device, USB-A |
| CAN transceiver high-speed | Texas Instruments SN65HVD251 |
| CAN-FD transceiver | Microchip MCP2562FD |
| CAN bus termination resistor | None |
| CAN signal delay with galvanic isolation: | Typ. 27 ns |
| LIN transceiver | Microchip MCP2003B |
| System startup time | < 5 sec from power-on |

# 8 Support/Return Hardware

## 8.1 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.

## 8.2 Return Hardware

► Fill in the form for warranty claims and repair on www.ixxat.com/support/product-returns.

► 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.

# 9 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)

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     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.

# B    Open Source Software

The software of the Ixxat CANnector Bridge contains software components that are licensed as Free Software or Open Source Software by the rights holders. The corresponding licenses are available on the support area of the CANnector Bridge on www.ixxat.com. (Included in Firmware Download Package as well as included in Offline Help Package). You may obtain the complete corresponding source code of the software components from us on a data carrier and within three years as of the distribution of the software by us or at least for as long as we offer support and spare parts for the software, if you make a request to HMS Industrial Networks AB at the following address:

HMS Industrial Networks AB
Box 4126
SE-300 04 Halmstad
Sweden

The source code is also available at the support area of the CANnector Bridge on www.ixxat.com.