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blue PiraT2

User Manual

Version 1.9.1 - 31.01.2014

Telemotive AG

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3. Overwiev

This user manual is only valid for the second generation of the blue PiraT data logger, called blue PiraT2. This user guide describes the general functions and interfaces of the blue PiraT2, but not the different blue PiraT2 products.

This document refers to blue PiraT2 FW 01.09.01 and blue PiraT2 client version 1.9.1. Some features depending on model and feature license or may not be available in older versions.

Software updates are frequently available in the blue PiraT Service Center. Please make sure to use current software.

4. The blue PiraT2 system

The blue PiraT2 is a data logger for the following interfaces:

- MOST25
- MOST150 incl. ECL
- High Speed CAN
- Low Speed CAN
- RS232
- LIN
- analog Input
- digital Input
- FlexRay
- Ethernet

The data logger can be mounted in a vehicle and due to his large storage capacity of the hard drive of currently 100 GB or higher, the blue PiraT2 is able to support extensive test runs. After the data has been gathered, the data has to be downloaded via Ethernet. For the download and the conversion of the log-ging data a blue PiraT2 Client is available.

For the available providing conversion to various trace file formats please have a look at chapter 5. The blue PiraT2 is with different features available (see Table 4.1: blue PiraT2 data logger versions on page 22).

The blue PiraT2 is designed to create minimum interference with the vehicle's bus systems and interfaces. The data logger listens to the data traffic without operating as a bus node. Additionally to the data re-cording functionality, the blue PiraT2 provides online data processing functions:

- Simple CAN- and MOST filters
- A custom-defined CAN message can trigger the setting of markers (requires license complex trigger)

4.1. Support

Software updates and further information is available from the blue PiraT2 Service Center at http://www.telemotive.de. Logins are supplied by the Telemotive blue PiraT support (productsupport@telemotive.de).

4.2. Accessories

There are various accessories available for the blue PiraT2 data logger:

Various adapter cables

The blue PiraT Remote Control Voice, which allows for recording of voice notes additionally to the functionality of the Remote Control

Please contact Telemotive sales for more information about these accessories. Manuals are available from the blue PiraT2 Service Center.

4.3. Licensed features

Additional features can be activated by purchasing and installing licenses (see section 11.4). Currently, the following licensed features are available:

Feature	Description
Complex Triggers	certain events (e.g., conditions on CAN-signals) can be programmed to be a trigger for certain actions (e.g., display of a message on the remote control) The standard configuration of the blue PiraT2 contains 2 complex triggers. This license allows configuring up to 50 complex triggers.
Remote Control Monitor	Display of CAN-signals in the remote control
DLT logging	This supports logging of DLT messages over Ethernet or serial (restricted) connections.
Video- /Camera	Video recording via video server or network cameras
Wi-Fi	Supporting wireless LAN
GPS	Tracking the GPS data
ETH Spymode	Logging of all raw Ethernet data
CCP	CAN Calibration Protocol
esoTrace	Logging of ESO Trace Ethernet data Conversion of recorded data into JSON format
MOST150 streaming	Logging MOST150 synchronous/isochronous data
Ethernet Online streaming	C++ online streaming libary
Terminal-Modus light	allows to download recorded traces from several blue PiraT2 simultaneously

Table 4.1: License overview

4.4. Software versions

This manual refers to the following software versions:

- Data logger firmware 01.09.01
- Client 1.9.1

Software updates are frequently available in the blue PiraT2 Service Center.

5. The blue PiraT2 data logger

Figure 5.1 shows a picture of the blue PiraT2. The front panel contains all operating controls and displays. On the back side, there are connectors for the interfaces and the power supply.

Figure 5.1: The blue PiraT2 data logger

5.1. Installation

Based on the specification of the hard drive, the data logger should always be fitted vertically or horizontally (upright or upside down). Please avoid tight bending of the MOST fiber optic cables.

5.2. Connectors

5.2.1. Front side

The blue PiraT2 is available with one 1 GBit Ethernet port on the front (see Figure 5.2) and also with four additional 100 MBit Ethernet ports (see Figure 5.3), where an Ethernet switch is integrated. A mini switch is available with 4 RJ45 connectors.

On the front panel there are also a [Trigger] and [Escape] button as well as LEDs for [Active], [Memory], [Error] and [CFActive]. By pressing the [menu] button, the menu will be started.

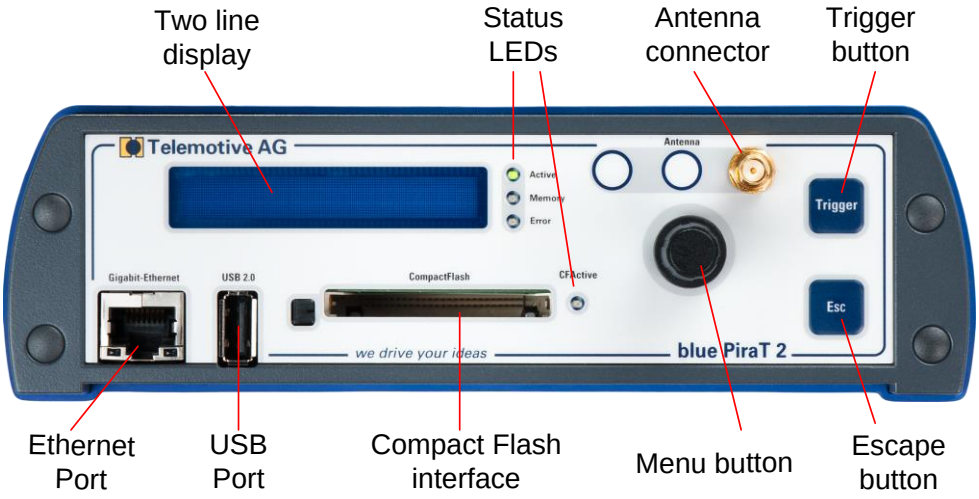


Figure 5.2: Front panel of the blue PiraT2

ATTENTION:

If you have ordered an external antenna eg. for GPS, the connector has to be bolt only by hand, NOT with any tools!

5.3. Back side

Figure 5.3 shows the back side of the data logger.

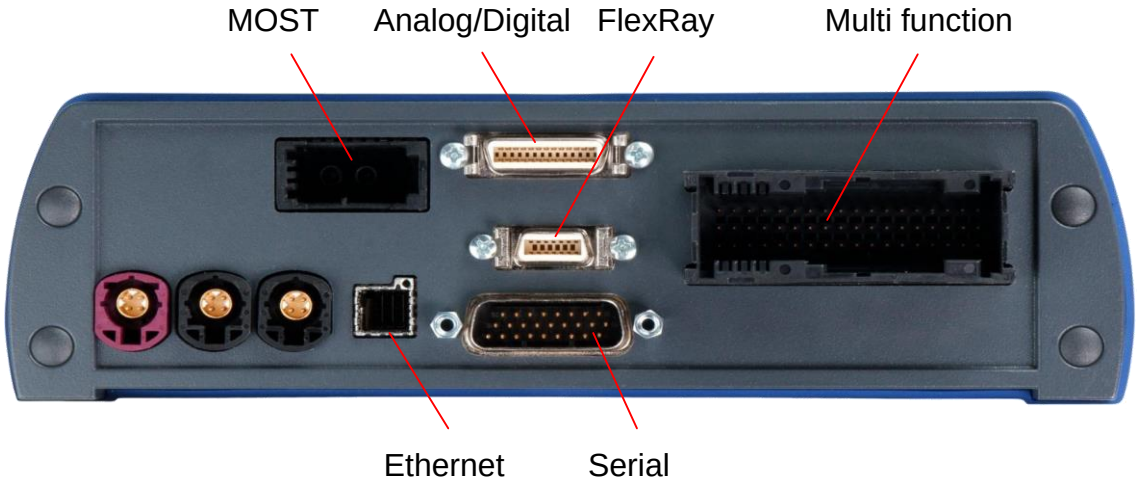


Figure 5.3: Back side of the data logger M150

On the various data logger types are the following connectors possible:

- Multi-function connector: This connector contains the remaining lines for power, high speed CAN 1-12, low speed CAN 12-13, the Remote Control Voice, LIN 1-8. The pin assignment of this connector is described in the chapter 13.2.1.

Warning:

It is possible that devices connected to the data logger might be damaged in case of an incorrect polarity of the data logger power supply.

- MOST: A standard 2+0 connector for MOST fiber optic.

Important:

If the MOST connector is not used, the jack must be covered with a terminating plug. This prevents the sensitive fiber optic contacts from getting dirty. It also makes sure that the data logger does not start up unintentionally when e.g. strong sunlight falls onto the optical contacts.

- FlexRay: One connector for 2 interfaces with a / b. The pin assignment of this connector is described in the chapter 13.2.5.
- Analog/Digital: The connector is described in the chapter 13.2.3.
- Serial: The connector is described in the chapter 13.2.2.

5.4. Adapter cables

This section describes which adapter cables are available for the bluePiraT2.

5.4.1. Universal adapter cable

Telemotive AG offers adapter cables that connect to the multi-function connector and split up its lines to separate connectors (see the universal adapter cable in Figure 5.4).

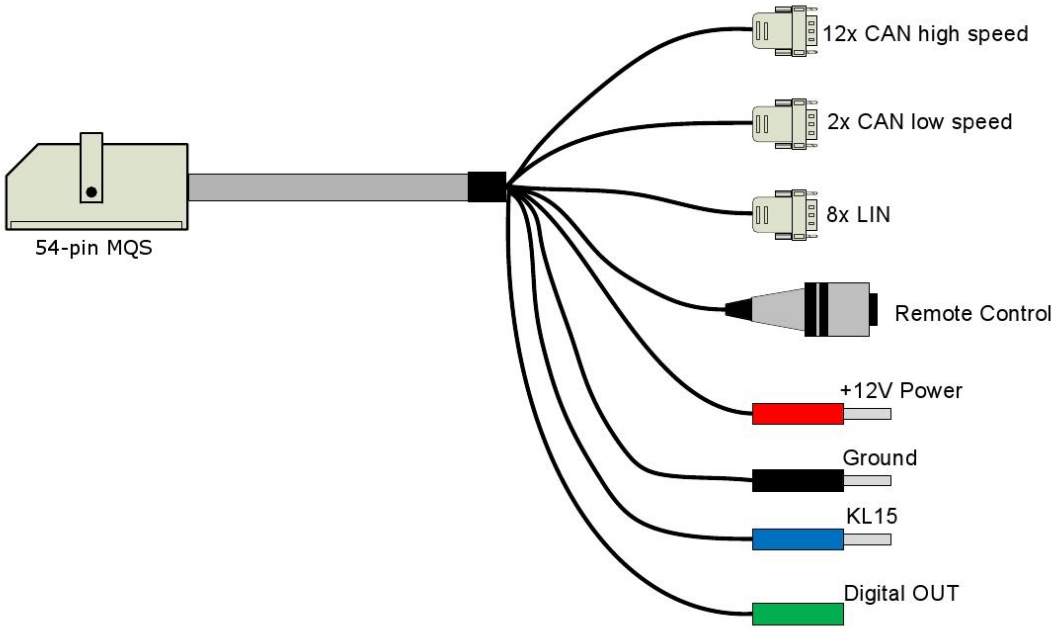


Figure 5.4: Connecting the blue PiraT2 via the universal adapter cable

5.4.2. Adapter cable Serial/RS232, Analog/Digital

The Figure 5.5 shows the adapter cables for 6x RS232, one digital IN and one analog IN.

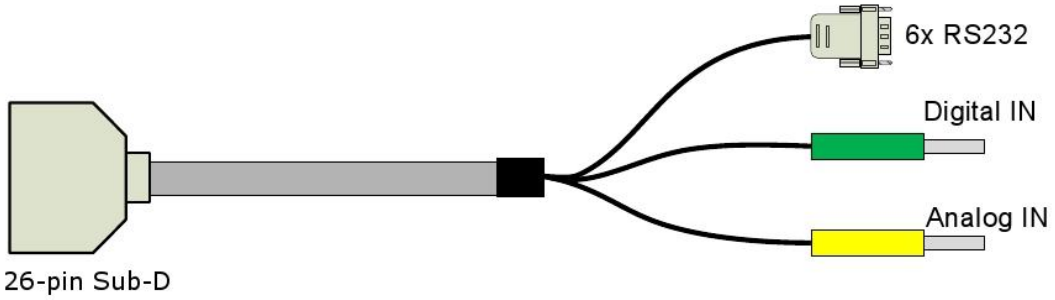


Figure 5.5: RS232/digital/analog adapter cable

Note:

The blue PiraT2 actively sends data on the "Tx" line if a protocol for the serial port is configured. The "Tx" line must only be connected to special devices that support those protocols. If the application is listening to a bidirectional serial communication of two devices, two serial ports of the blue PiraT2 have to be used. The "Tx" lines must not be connected in this case (see Figure 5.6).

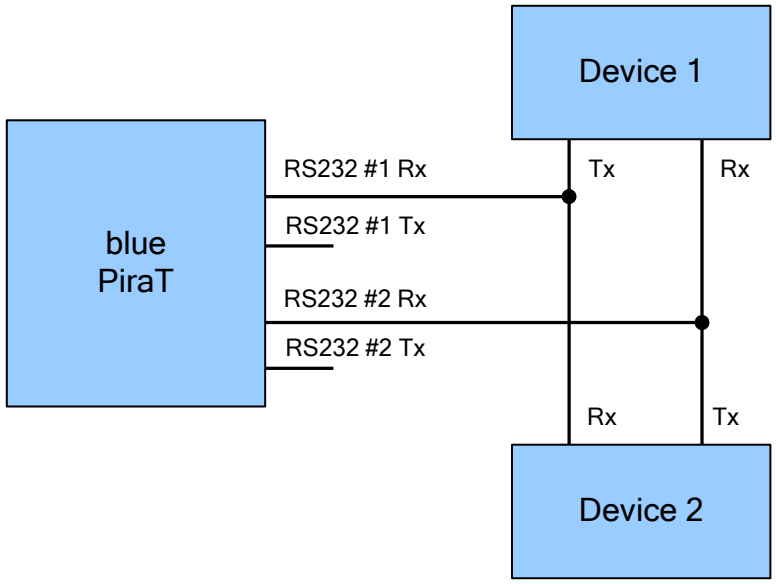


Figure 5.6: Listening to a bidirectional serial communication

5.4.3. Adapter cables for Analog/Digital

The Figure 5.7 shows the adapter cables for ECL, 4x digital IN, 8x analog IN and 2x digital OUT.

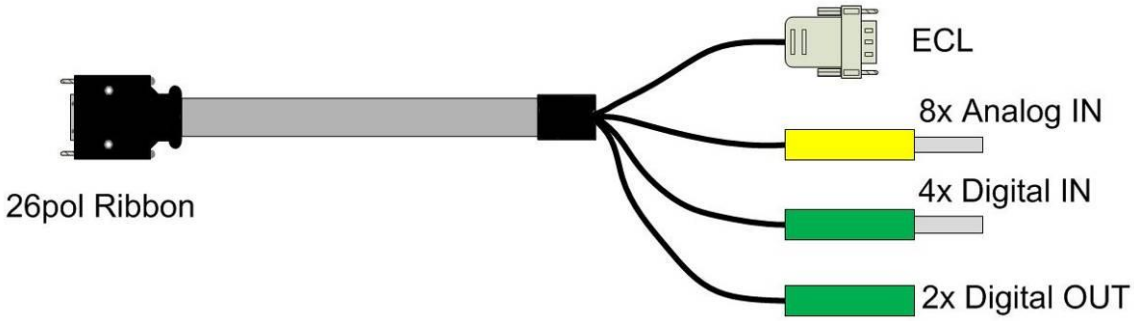


Figure 5.7: Adapter cables for digital/analog

This adapter cable is only for the logger types: 150M14C8LFR and 25M24C8LFR

5.4.4. Adapter cable FlexRay

The Figure 5.8 shows the adapter cables for FlexRay (only for blue PiraT2 150M14C8LFR).

Figure 5.8: Adapter cables for FlexRay

5.4.5. Adapter cables for CAN/FlexRay

The Figure 5.9 shows the adapter cables for 10x High Speed CAN and FlexRay (only for blue PiraT2 25M24C8LFR).

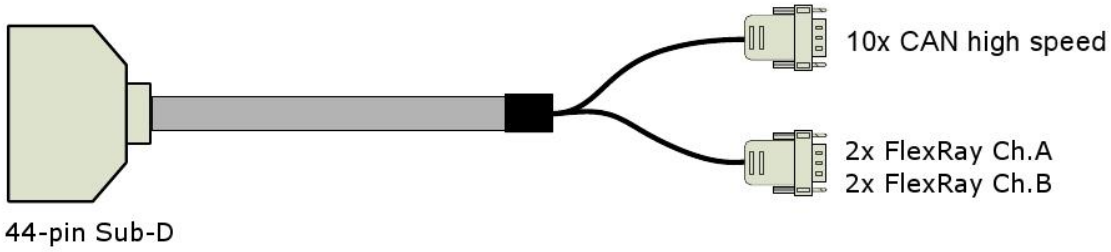


Figure 5.9: Adapter cables for CAN/FlexRay

5.4.6. Adapter cables Ethernet Kit

The Figure 5.10 shows the Ethernet box with four interfaces. This would be connected with a FCI-cable to the blue PiraT2.

Figure 5.10: Adapter box cable for Ethernet

6. Using the blue PiraT2

Let's get started for the first trace. The following steps should help you to generate your first blue PiraT2 data trace.

1. The first steps are to connect the blue PiraT2 to the power and to a PC and install the client. For that please follow the detailed instruction under chapter 9.1
2. Before you can start the logging of data, it is required to configure the data logger. Please read chapter 9.6 for detail instruction.
3. Connect the required interfaces to the data logger.
4. If the data logger is not already running, start the data logger by connecting the data logger to the power or if the logger is already connected then start the logger by pressing the [trigger] button.
5. The data logger will automatic store the information, until at least one interface is still active or by pressing the [ESC] button on the front side as long as the display shows the message "Go Standby Mode".
6. After the data logger has stopped the storage of the logging data, the data logger can again connected to the PC and the trace data can be downloaded (for details please read chapter 9.8) or downloaded and converted to a dedicated file format for importing in an specific analyzing tool. Detail information of the available conversion formats please refer to chapter 8 and for executing the conversion via the client please read chapter 0.

The following chapters will explain the buttons and displays in detail.

6.1. Front panel

The next section describes the usage of the Front Panel of the blue PiraT2.

6.1.1. Trigger button

The [Trigger] button is used to switch on the blue PiraT2 if the data logger is connected to the power and currently into the sleep mode.

During operation, interesting points in time can be designated by the [Trigger] button. When pressing this button, the data logger saves the current time to hard drive. It is possible to configure the data logger to send a CAN message as an acknowledgement of setting a marker. Additionally, it is possible to define a CAN message that triggers a marker. In all cases, triggers are debounced, allowing only up to ten triggers in between every two seconds.

When downloading the data, the Client displays all markers in an event overview. In this event overview, the client can be configured to transfer the data around the selected markers.

6.1.2. ESC button

If the blue PiraT2 is operating and you hold the [ESC] button for longer time, the data logger will go into the standby mode.

Otherwise the [ESC] button will be used for leaving the current menu state.

6.1.3. Menu button

For control the menu of the logger the [menu] button is used. The [menu] button has a rotary/push controller function. Rotate the button to the left equates to up and rotate it to the right equates to down. Pushing the button equates the OK function.

6.1.4. LEDs

The blue PiraT2 has 4 LEDs on his front side: [Active], [Memory] and [Error] to the right side from the display and [CF Active] on the right side from the Compact Flash slot.

- Active LED:
  This LED is on as long as the data logger is operating.
- Memory LED:
  This LED is only active if the data logger is not in the ring buffer mode. The LED is blinking if the storage capability of the data partition is already filled with more than 75%. If the storage capability is used by 100%, the LED is continuous on.
- Error LED:
  If the Error LED is on, a series error occurred. This can mean that the error is still active or one or more errors are stored into the error memory.
- CF Active LED:
  The CF Active LED indicates that the blue PiraT2 has recognized the compact flash card.

6.1.5. External memories

Compact flash card:

The CF card has to be formatted in the FAT 16, FAT 32 or NTFS file format. The card reader supports Compact Flash 4.1 (CF UDMA Modes 0-4, CF Pio Modes 0-6).

We recommend using the “SanDisk Extreme CompactFlash 16GB” or the “STEC SLCF8GM2PUI CompactFlash” (fully suitable for automotive requirements).

USB storage:

The USB storage has to be formatted in the FAT 16, FAT 32 or NTFS file format. You could connect USB flash drives and external hard drive up to a maximal supply current of 500mA. External power supplies must not connected to the hard disk.

6.2. Menu

The menu includes the two line display, the [menu] and the [escape] button. The [menu] button is used for controlling the menu. Rotate the [menu] button to the left equates to an “up” function; rotate to the right equates to a “down” function. Pushing the [menu] button is equates to an “OK” or “enter” function. By pushing the [ESC] button the current menu item will be left.

But holding the [ESC] button pressed for more than 5 s, the logger will switch into the standby mode without any confirmation.

6.2.1. Startup

During the Startup phase the display shows:

blue PiraT2

After the Startup phase is finished, the display shows the status of the most important interfaces. For a MOST25 version the MOST25 and FlexRay will be displayed on the beginning:

M25 -
FR NN--

By rotating the [menu] button you can navigate through the entire interfaces. On Table 6.1 you can find the abbreviation for the displayed interfaces and the possible status information.

Abbr.	Interface	Off: -	Not connected: x	No Traffic: N	Traffic: T	Error: E
CAN	CAN	x		x	x	x
CCP/XCP	CCP/XCP	x	x	x	x	x
ETH	Ethernet	x	x	x	x	
FR	FlexRay	x		x	x	
LIN	LIN	x		x	x	
M25	MOST25	x	x	x	x	
M150	MOST150	x	x	x	x	
VID	Video	x	x		X	
SER	Serial	x		x	x	

Table 6.1: Interface Abbreviations and Status Information

6.2.2. Menu mode

By pushing the [menu] button, you can enter the menu mode and you can see the following two lines.

--- Menu ---
[1] Info

Currently the menu has 5 main categories:
[1] Info
[2] Licenses
[3] Functions
[4] Error Memory
[5] Memory Card
The currently selected category is displayed inverted. By pushing the [menu] button, you can go into the selected menu main category.

[1] Info 1/9
Firmware: 01.09.01

Usually in the first line, the main menu category number and the name will be displayed on the left side. If one line has not enough space to display the name and the value, the first line will be used for the name and the second for the value.
On the right side the menu sub category number and the total numbers of sub categories will be displayed (See above).

6.2.3. Info

This main menu category has currently 9 sub menu categories:

- Firmware: current firmware of the logger
- Hardware: Mainboard version of the logger
- Logger Serial No: Serial Number of the logger
- Date/Time: Date and time of the logger
- Storage: used storage of the hard disc
- Ext. Mem. Storage: used storage of the external memory
- Ext. Mem. Dev: status of the external memory
- DHCP: DHCP status
- IP: IP address of the logger
- Config: the name of the logger configuration
- WLAN-IP option

By rotating the [menu] button you can navigate through the info list.

6.2.4. Licenses

By entering this menu function the logger will lists all installed licenses. The message "No Licenses" appears, if no license is installed. By rotating the [menu] button you can navigate through the license list.

6.2.5. Functions

Currently there are 3 functions available:

“Shutdown Device”
If this function will be started by pressing the [menu] button, the blue PiraT2 will enter into the standby mode without any confirmation.

“Reset IP Config”
If the logger has an unknown IP configuration and it is not possible to access the logger, there is a possibility implemented to reset the IP configuration back to the factory mode (DHCP Server).

Pressing the [menu] controller during the reset IP configuration function is selected, the logger is switching back to the DHCP server mode without any configuration. After that, the message "IP Config reset to mode DHCP server" will be displayed.

To assume this setting, a restart is necessary.

“Lock Keypad”
By activating this function via the menu controller the keypad will be locked without any confirmation. By pressing the escape key for more than 5 s, the keypad will be unlocked.

6.2.6. Error memory

This menu function lists all errors which are stored into the error memory. By rotating the [menu] button you can navigate through the error massages.

6.2.7. Memory card

This main category has currently 8 sub categories. But these functions can be only executed, if an external memory device is installed. Otherwise the message "No Memory Device available" will be displayed.

6.2.7.1. Copy to memory card

There are 5 options available:

- Copy all data
- Copy data of last 60min
- Copy data of last 12 hours
- Copy data of last 24 hours
- Copy data of last 48 hours

By selecting one of the options and pressing the [menu] button the copy function will be executed and a progress will be displayed on the display. After the copy process is finished the message "copy done" will be displayed. By pressing the [ESC] button, the “Memory card” menu is shown.

The folder name of the offline data has the format “bp2_extMem_Offline_yyyymmdd_hhmmss”. The date and time at the end of the filename is the time is the end of the selected data in the time standard UTC.

6.2.7.2. Erase memory card

After pressing the [menu] button a verification message will be displayed. With escape the process can be stopped, by pressing the [menu] controller the blue PiraT2 starts to erase the whole device. After completion the message "Memory card successful erased" will be displayed.

6.2.8. Format memory card

After pressing the [menu] button a verification message will be displayed. With escape the process can be stopped, with the [menu] button the blue PiraT2 starts to format the whole device. After completion the message "Memory card successful formatted" will be displayed.

6.2.8.1. Install license

On the external memory device has to be a directory "license" where only one license file has to be stored.

If the external memory is inserted, now you can navigate to the "Install license" and press the [menu] button. Now a verification message will be displayed. By press the [ESC] button you abort the process or continue by pressing the [menu] button. If you start the function, “Install licenses” will be displayed. If it was successful, the message “Successful install of license file” will be displayed. Otherwise the message “Install failed of license file” will be displayed.

6.2.8.2. Create bug report

By pressing the [menu] controller, the logger will display the progress level on the display. If the copy process is finished the message “Creating bug report done” will be displayed for a few seconds. The bug report will be stored on the external memory device as a zip file beginning with “Bugreport_bP2_All_…”

6.2.8.3. Firmware update

On the external memory device has to be a directory “update” where the update file has to be stored.

By pressing the [menu] button a confirmation check will be displayed. Pressing again the [menu] button the update process will be start. The message “Updating firmware please wait” will be displayed. After a while this message will disappearing and a blank display is shown. Now the logger will be restarted. On the end of this restart process “blue PiraT2” will be displayed for few seconds. After that the progress of the update process will be displayed.

Please note, that after you have update the firmware you should also update the client. Please refer to chapter 11.

6.2.8.4. Install configuration

On the external memory device has to exist a directory “configuration” where only one configuration file has to be stored.

If the install of the configuration file was not successful, the message “Install failed of configuration file” will be displayed.

6.2.8.5. Safely remove ext. mem.

Executing this function will unmount the external memory device. After that you can safely remove it from the data logger.

6.3. Setting markers

Interesting points in time can be designated by the [Trigger] button at the front panel or at the Remote Control. When pressing this button, the data logger saves the current time to hard drive. It is possible to configure the data logger to send a CAN message as an acknowledgement of setting a marker. Besides using the [Trigger] button, it is also possible using the digital inputs and “Complex triggers” function to realize an external [marker] button (have a look at the “Complex Triggers” user guide). Additionally, it is possible to define a CAN message that triggers a marker. In all cases, marker triggers are debounced.

When downloading the data, the Client displays all markers in a data overview (see section 9.8). In this data overview, the Client can be configured to transfer the data close to selected markers.

6.4. Time stamp

Usually the recorded messages will get a time stamp at the end of each received message. Only for the serial interface (RS232) the time of the start of the transfer will be used.

Trace Data	Accuracy	Start	End
MOST25	1 µs		x
MOST150	1 µs		x
ECL	1 µs		x
CAN	1 µs		x
LIN	1 µs		x
FlexRay	1 µs		x
Ethernet	100 ms		x
RS232/422Digital	1 ms	x	

Table 6.1: Time Stamp

6.5. Automatic daylight savings adjustment

If it is required that the data logger automatically adjusts for daylight savings, it is necessary to enable this option and to set the correct time zone in the data logger configuration (see section 9.7.1.8). Please note the following issues:

- If the automatic adjustment for daylight savings is deactivated, the configured time zone is generally not critically important. It is still recommended to rather adapt the time zone than to readjust the data logger's time when moving between time zones because the data logger internally uses the location-independent universal time (UTC). Only changing the time zone avoids trace data with overlapping time stamps
- When converting trace data to the target file formats, the time zone that was configured at the time of data download is used. If a data set "A" is recorded in a time zone "A" and the data logger's time zone is changed to "B" before data download, then the final time stamps will reflect the time of time zone "B".
- To avoid problems when moving within time zones, make sure to delete all data on the data logger after changing the time zone or after changing the data logger's clock by one or more hours.

6.6. Standby mode

The table below shows, which busses or signals are monitored for keeping the logger alive and which busses or signals are able to wake up the logger.

Interface	Keep alive	Wake up	Configurable	Comment
MOST25	✓	✓	W/A: On/Off	Light on
MOST150	✓	✓	W/A: On/Off	Light on
ECL	✓	✓	W/A: On/Off	
High Speed CAN	✓	✓	W/A: On/Off CAN1-10 ,11, 12, 15-24	
Low Speed CAN	✓	✓	W/A: On/Off CAN13-14	
LIN	✓	✓	W/A: On/Off LIN1-2, 3-4, 5-6, 7-8	
FlexRay	✓	✓	W: FlexRay1a-2b	
Serial RS232	✓	×	A: On/Off	
Ethernet 1GBit	✓	×	A: On/Off, Alive time	Time: General/Standby
Ethernet 100MBit	✓	×	W: On/Off	
Analog In	×	×	×	
Digital In 1	×	✓	W: On/Off	Switch on at 9.5V ± 0.3V
Digital In 2	×	✓	W: On/Off	Switch on at 2.5V ± 0.3V
Digital In 3-5	×	×	×	
USB	×	×	×	
Remote Control	×	✓	×	Via [Trigger] button
[Trigger] Button	×	✓	×	
Wi-Fi	×	×	×	

Table 6.2: Standby [W= wake up A= keep alive]

6.7. Cascading loggers

To increase the number of channels, it is possible to use two loggers. To be able to compare the time stamps of both loggers, it is necessary to „cascade“ the loggers, which synchronizes their clocks with a time stamp accuracy of 100µs. For cascading, special adapter cables are required (see Figure 6.1).

Important: For cascading, both data loggers need the same power supply to be connected!

BluePiraT2 data loggers need to have the same firmware releases.

One of the loggers is designated as the „time master“, the other as the „time slave“ by using the configuration program (see section 9.7.1.7).

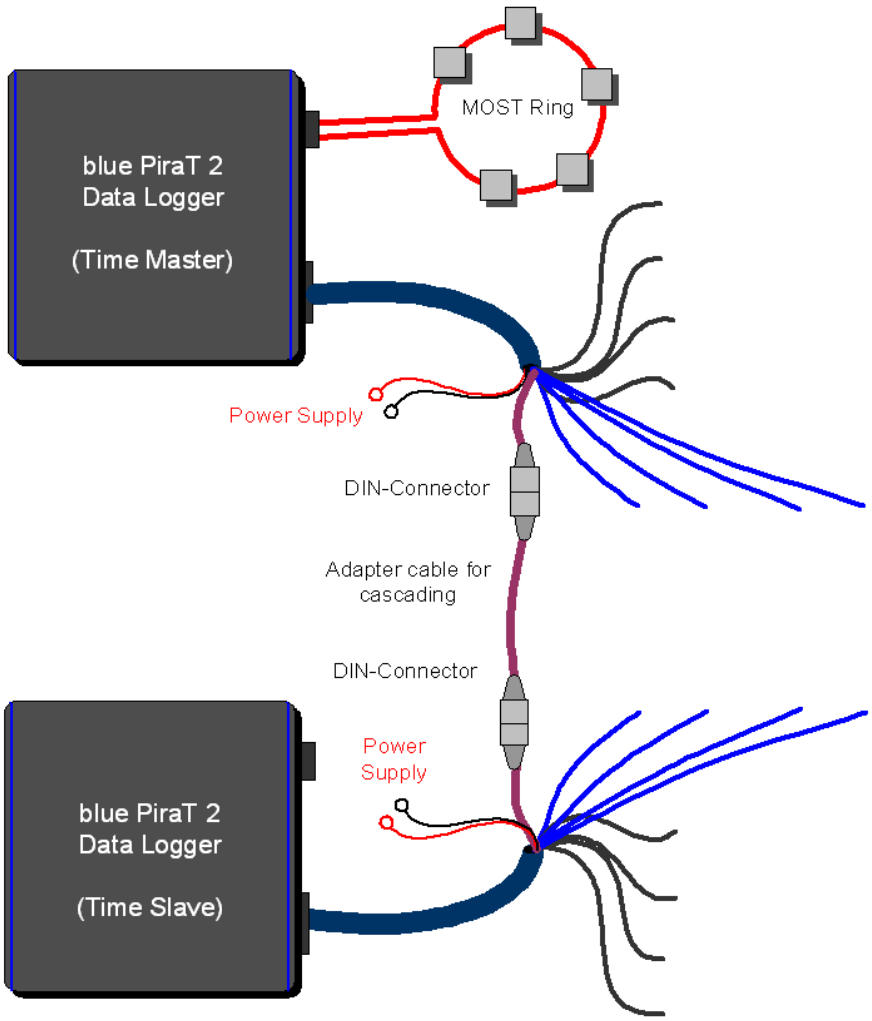


Figure 6.1: Cascading of two data loggers

Note: It is also possible to cascade two loggers and use one blue PiraT Remote Control at the same time. Therefore you have to use a special Y-Cascading cable instead of the standard adapter cable. When remote control and two data loggers are connected with the Y-Cascading cable, the remote control will control the Master Logger. By pressing the [i] button you switch between MASTER and SLAVE Logger. You can buy the cable as an accessory.

Note: If the cascading mode has just been activated through the configuration program, the synchronization is activated only at the next startup.

The time master provides the time basis, and the time slave takes over the time of the master. This includes two tasks:

- Synchronizing the slave clock to the master clock
- Determination of the absolute time offset between master and slave, and correction of the time stamps by this offset

Important: For correctly synchronized time stamps, both data loggers must be set to the same time zone (see section 9.7.1.8).

The trace data has to be downloaded separately from both data loggers. It is possible to specify an offset for the channel numbers of the slave (see section 9.7.1.7).

Warning – The logger names of the master and the slave must be different. Otherwise trace files of master and slave might equal and files could be overwritten.

6.7.1. Startup use cases

Depending on the bus activity, it is possible that the master starts up before the slave (see Figure 6.2) or vice versa (see Figure 6.3). In the latter case, the slave first uses its own clock and switches to the master clock, as soon as the master becomes active. Since the time offset is corrected at the time of downloading and converting the trace data, it is ensured that the time stamps before the sync point are also corrected.

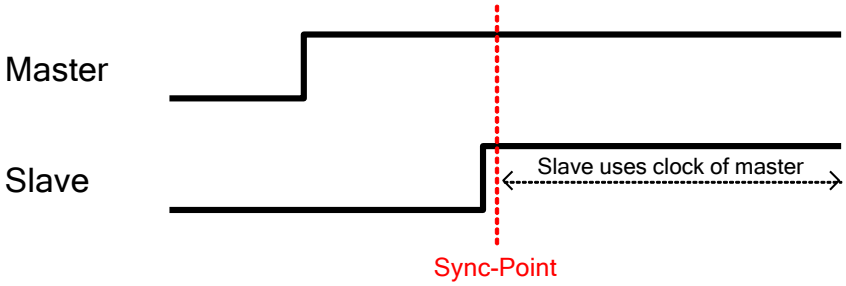


Figure 6.2: Master starts up before the slave

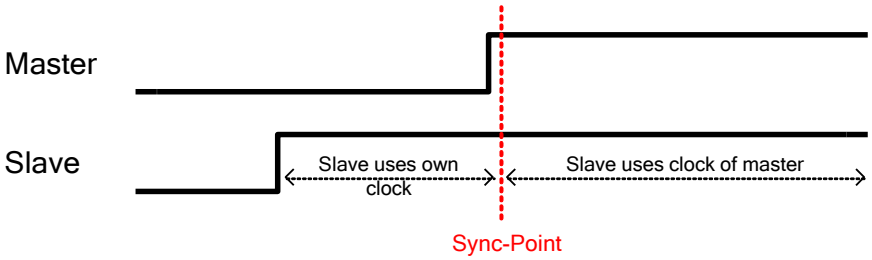


Figure 6.3: Slave starts up before the master

6.7.2. Standby mode in a cascaded system

Master and slave synchronize in that way that they switch to the standby mode at the same time. If the master is ready to go into standby mode before the master is or vice versa, the device that is ready earlier waits for the device that takes longer (see Figure 6.4).

If both loggers are in standby mode, the master wakes up the slave and vice versa.

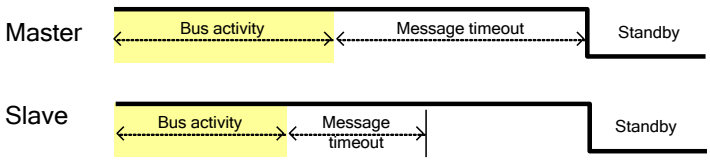


Figure 6.4: Standby sequence of the cascaded system

7. Data recording

The blue PiraT2 supports a various number of busses. The table below shows, which busses will be supported from the different products

Feature / Blue PiraT2	MOST25 (25M)	MOST150 (150M)	ECL	HS-CAN (C)	LS-CAN (C)	RC I/F	LIN (L)	FlexRay a/b (FR)	RS232	Digital In	Digital Out	Analog In	USB	1GBit Ethernet	100 MBit Ethernet
14C6S8L	-	-	-	12	2	1	8	2	6	1	1	1	3	1	4
25M24C8LFR	1	-	-	22	2	1	8	2	6	5	3	9	3	1	4
150M14C8LFR	-	1	1	12	2	1	8	2	6	5	3	9	3	1	4

Table 7.1: blue PiraT2 data logger versions

The notation in brackets is used in the product name. For example blue PiraT2 150M14C8LFR: 1x MOST150, 12x HS-CAN, 2x LS-CAN, 8x LIN, 2x FlexRay a/b, 1x 1GBit Ethernet und 4x 100 MBit Ethernet interfaces. Low speed and high speed CANs are counted together. The different busses are described in the following chapters in more detail.

7.1. CAN

The blue PiraT2 is able to record data in compliance with the CAN specification 2.0a (11 Bit identifier) and 2.0b (29 Bit identifier).

7.1.1. The high-speed and low-speed operating modes

Depending of the model, the blue PiraT2 has different numbers of high and low speed CAN interfaces. It is not possible to change a CAN interface from low to high speed or vice versa. Each type is using different transceivers.

The electrical behavior of the low-speed and the high-speed CAN is different, hence, the low-speed CAN port of the blue PiraT2 must not be connected to a high-speed CAN bus and vice versa.

Both operating modes use differential signals (CANH, CANL). For the correct data recording, all nodes of the bus must have a common reference potential. The blue PiraT2 uses the connection "clamp 31“ as a reference potential. The lines of the high-speed CANs are terminated with a high resistance.

	Low-speed CAN	**High-speed CAN**
Transceiver chip	Philips TJA1054	Philips TJA1041
Terminating resistor	12k	2k6
Baudrate	50 kBit/s - 125 kBit/s	50 kBit/s - 1 MBit/s
Supported identifiers (SW)	11 and 29 Bit	11 and 29 Bit
Disabling of acknowledge	possible	possible
Time stamps	at the end of the telegram	at the end of the telegram

Table 7.1: Technical data of CAN recording

7.1.2. CAN with 29Bit identifiers

The blue PiraT2 can also log CAN data with 29 Bit identifiers. You don’t have to configure anything. All the CAN data will be logged as they are available on the CAN bus. It is also possible to log CAN messages mixed with 11 Bit and 29 Bit identifiers.

There is no configuration sheet for 29 Bit in the client. Filtering and using CAN data bases is supported in the client. The License “Complex Triggers” for blue PiraT2 also supports 11 Bit and 29 Bit identifiers.

7.1.3. Recording contents

The blue PiraT2 is able to record the following error states of the CAN bus:

- Stuff error
- Format error
- Acknowledge error
- Bit 0/1 error
- CRC error
- Overrun

These error states are only included in the Telemotive file formats. After reaching a certain number of errors (50 errors), the recording of error states is interrupted until reception of the next successful CAN message to avoid an overload of the recorded data.

7.1.4. Sending CAN messages

If the blue PiraT2 sends a CAN message, it is shown twice in the trace. The first message indicates the transmit request of the data logger and the second message indicates the actual transmission of the message. In the CANoe file format, these messages are indicated as "TxRq" and "Tx", respectively. The transmit request messages are not included in file format that don't support them.

7.2. LIN

The blue PiraT2 is able to record data compliant to the LIN specification V1.3 V2.0 and V2.1. The data logger does not actively appear as a bus member. Sending LIN messages is currently not supported.

Transmission Rate	1200, 2400, 4800, 9600, 10400, 19200, 20000 Baud
Transmitter	TJA 1021
Status	Parity Bits, Format check for Header, CheckSum for Header and Payload
Terminating resistor	30 kΩ

Table 7.2: LIN

7.2.1. LIN data blocks and time stamps

Each LIN message receives a time stamp, which marks the end of the message. If the data logger receives LIN data without a valid header, it creates blocks containing the erroneous data. The maximum block size is 10 bytes. A block is also concluded after a timeout, which is three times the transmission time of a LIN character.

7.2.2. LIN-Transceiver

The blue PiraT2 uses the LIN transceiver TJA1021 by NXP (former Philips Semiconductor). Supported baud rates are in the range from 1200 to 20000 Baud. Automatic baud rate detection is currently not supported. The LIN interface is configured as a slave device with a terminating resistor of 30 kΩ.

7.2.3. Special frames and states

Additionally to the normal frame data, the following information is recorded:

- Wakeup Frames
- Checksum Errors

7.3. Serial (RS232)

Channels:	6x RS232
Data Bits:	5, 6, 7, 8
Stop Bits:	1, 2, 1.5
Parity:	None, odd, even

Table 7.3: Serial Port

The blue PiraT2 supports only the RS232 specification.

7.3.1. Segmentation of the serial data

The received serial Bytes are clustered into data blocks separately for each channel. Each block is finalized after a certain time or if it has reached a certain maximum size. The time is 30ms to 60ms, depending on the channel. The maximum size is 49 to 80 bytes. A time stamp is assigned to each block when it is finalized.

7.3.2. RS232 transceiver

The threshold voltages for data reception are the usual RS232-defined values. A logical „1“ is recognized for input voltages smaller 0 Volts, a logical „0“ for input voltages higher than 3 Volts.

7.4. FlexRay

The blue PiraT2 is able to record FlexRay bus data according to the FlexRay specification 2.1A. Table 7.4 shows the technical data of the FlexRay module.

The data logger records all valid and also invalid static and dynamic frames of the two FlexRay channels, including ‘a’ and ‘b’, independently if the FlexRay bus is in a synchronous or asynchronous state.

Channels:	2x (a + b)
Max. Bit rate:	10 MBit/s
Frames	Static, Dynamic, Null Sync, Startup
Transceiver:	AS8221

Table 7.4: Technical data of the FlexRay module

7.5. Ethernet

All versions of the blue PiraT2 data logger are able to log Ethernet data. All data loggers have a 1GBit Ethernet port with RJ45 connector on the front. On the back side there is a FCI connector which provides four 100MBit Ethernet interfaces. A small box is available for breaking off this four Ethernet ports to RJ45 plugs.

Usually the 1GBit port will be used for connecting the data logger with a PC.

7.5.1. Supported protocols & functions

The following chapter gives an overview of the available protocols. When a protocol requires a license, this will be marked.

7.5.1.1. GNLogger

For connecting it will be used a standard TCP connect (open socket connection). Therefore the blue PiraT2 is a TCP-Slave Device.

GNLogger is a proprietary serial protocol used for some ECU diagnosis.

7.5.1.2. UTF8

When using the UTF8 data transmission over TCP, the blue PiraT2 will be a TCP-Slave device. Therefore the blue PiraT2 will initiate a TCP connection to a TCP server by using an open socket connection (you can configure IP/Port of server via client software).

By using UTF8 data transmission the logger will write a timestamp after every detected Linefeed (LF) from the incoming data.

If the connection is getting lost, it will take about 5 seconds to build up a new connection for logging data again.

7.5.1.3. RAW

When using the raw data transmission over TCP the blue PiraT2 will be a TCP-Slave device. Therefore the blue PiraT2 will initiate a TCP connection to a TCP server by using an open socket connection (you can configure IP/Port of server via client software).

When using raw data transmission, every data package up to 40kBytes is getting a time stamp and will be written on the logger.

If the connection is getting lost, it will take about 5 seconds to build up a new connection for logging data again.

7.5.1.4. UDP server

The blue PiraT2 can be configured as an UDP server by setting up an IP address and port number.

A Slave device can build up a connection to the blue PiraT2. The blue PiraT2 logs raw data packages up to 40kBytes and write them with a time stamp down. There is no configurable Debug Level. If the connection is getting lost, it will take about 5 seconds to build up a new connection for logging data again.

7.5.1.5. Camera (license required)

If you use “Camera” license on the data logger, it is possible to connect up to 4 Ethernet webcams to the blue PiraT2. After connecting the blue PiraT2 is able to log MPEG4 video streams. For more information please have a look at the “Camera User Guide”.

7.5.1.6. DLT over Ethernet (license required)

If you use a “DLT” license on the data logger, it is possible to connect up to 8 ECU for logging their DLT messages. More information about logging DLT messages can be found in the manual “Logging AUTOSAR DLT”.

7.5.1.7. Ethernet Spy Mode (license required)

By using the Ethernet spy mode it is possible to log the whole ethernet data (promiscuous mode). More information can be found in the manual “Ethernet Spy Mode User Guide”.

7.5.1.8. EsoTrace (licence required)

By using the EsoTrace mode it is possible to log data in the EsoTrace protocol. For more information please have a look at the “EsoTrace User Guide”.

7.6. MOST25

The blue PiraT2 MOST25 data logger is able to log messages from the MOST25 bus of the following types:

Status:	MPR (Maximum Position Register), SBC, Light on, MOST Lock Flag
Control:	Control Messages
Packet:	MDP (MOST Data Packet)
Filter:	Control Messages on/off, Packet on/off, MDP on/off, MDP Transmit and Receive Address, Packet Length, Status on/off

Table 7.5: MOST25 data logging

The SMSC SpyNIC MOST25 is used to provide the MOST25 traffic data. The data logger is not an active part of the bus system because it is working in a spy mode. The device is able to log messages immediately after wake up.

Before the logging data are saved on the hard disk, they are buffered in a ring buffer. In the case of a data rate peak, which exceeds the storage rate of the hard disk, storage of data is still possible. If the MOST25 data rate is permanent higher than the maximum storage rate, the data logger will stepwise deactivate channels: first the MDP-channel, then the control channel and at last the status messages. To ensure logging of maximum continuous data blocks a hysteresis is implemented. Before logging again MPD- messages the ring buffer data has to be fully stored on the hard disk.

Before starting the logging of the MDP- messages again the system sends a “Lost Message” note. This message contains information about how many messages of which type were rejected.

7.7. MOST150

The blue PiraT2 MOST150 data logger is able to log messages from the MOST150 bus of the following types:

Status:	MPR (Maximum Position Register), MDC (MOST Data Channel), Light on, System Lock Flag, Shut Down Flag, Ring Lock Flag, Open Ring / Multi Master Flag, Node Position
Control:	Control Messages
Packet:	MDP (MOST Data Packet) MEP (MOST Ethernet Packet)
Filter:	Control Messages on/off, Packet on/off, MDP on/off, MEP on/off, Status on/off, MDP Transmit and Receive Address, Packet Length, MEP Receive Address, Message Length

Table 7.6: MOST150 data Logging

The SMSC SpyNIC MOST150 is used to provide the MOST150 traffic data.

The data logger is not an active part of the bus system because it is working in a spy mode. The device is able to log messages immediately after wake up.

Before the logging data are saved on the hard disk, they are buffered in a ring buffer. In the case of a data rate peak, which exceeds the storage rate of the hard disk, storage of data is still possible. If the MOST150 data rate is permanent higher than the maximum storage rate, the data logger will stepwise deactivate channels: first the MEP- and MDP-channel, then the control channel and at last the status messages. To ensure logging of maximum continuous data blocks a hysteresis is

implemented. Before logging again MEP- and MPD- messages the ring buffer data has to be fully stored on the hard disk.

Before starting the logging of the MEP- and MDP- messages again the system sends a “Lost Message” note. This message contains information about how many messages of which type were rejected.

7.8. ECL

Currently the ECL (Electrical Control Line) is only supported in conjunction with MOST150. In general, the ECL is a slow LIN bus. The following ECL messages will be recorded:

- EWU (Electrical Wake–Up)
- STWU (System Test Wake-Up)
- STP (System Test Parameters)
- STR (System Test Results)
- Undefined Pulse

8. Conversion of recorded traces

All trace data will be recorded internally in the proprietary Telemotive TMT format (*.tmt). If the recorded trace data will be downloaded and sorted, the data will be converted to an extended TMT format (*.xtmt).

The client provides the possibility to convert the internal format in other formats, to make the data readable or to prepare them to import them into available analyzing tools.

8.1. Conversion format overview

The table below show which data can be converts to other formats.

Format / Trace data	Telemotive ASCII *.txt	CANoe ASCII *.asc	CANCorder *.asc	MOST Data Analyser *.img	Optolyzer *.op2	Serial Trace Analyser *.txt	RAW Serial *.txt	Serial Debug *.txt	Binary Logging *.blf	ASCII Hexadecimal *.txt	APN ASCII *.txt	GN-Log *.[x]aa	Trace Client *.trc	TCPdump *.pcap	MDF Logging *.log	MDF CAN Signal v3.3 *.mdf	Autosar DLT *.dlt	Ethernet Raw *.raw	MPEG-4 *.mpeg4	Extended Telemotive *.xtmt	Eso Trace *.esotrace	NMEA - ASCII GPS *.nmea	KML Google Maps *.kml	KMZ comp.Google Maps *.kmz	MPEG-Transportstrom *.ts
MOST150 CTRL	x			x					x											x					
MOST150 MDP	x			x					x											x					
MOST150 MEP	x			x					x					x						x					
MOST150 Streaming	x			x																x					x
MOST25 Control	x	x		x					x											x					
MOST25 MDP	x	x		x	x				x											x					
CAN	x	x	x						x						x	x				x					
LIN	x	x							x											x					
FlexRay	x	x							x											x					
Serial RS232	x					x	x	x		x	x	x	x				x			x					
Ethernet	x											x					x	x		x					
Analog IN	x																			x					
Digital IN	x																			x					
Kamera/Video																			x						
CCP	x															x				x					
GPS	x																			x		x	x	x	

Table 8.1: Conversion formats

8.2. Short description of the file formats

8.2.1. Telemotive trace file (binary) (*.tmt) (*.xtmt)

This file format is a proprietary binary format of Telemotive AG. It is used for storing the trace data internally on the data logger and into offline data sets. The file names have the extension "*.tmt" or "*.xtmt", if the data are already sorted. The Telemotive Trace File Binary format is able to store all bus types and all of the information that the data logger is logging. Each data entry is stored with a time stamp.

Note:

This file format contains time stamps in the time standard UTC (Coordinated Universal Time).

8.2.2. Telemotive trace file (ASCII) (*.txt)

This file format is a proprietary text format of Telemotive AG. It is mainly used for testing purposes. The Telemotive Trace File ASCII format is able to store all bus types of the data logger. The other file formats are not able to store all information created by the data logger (e.g. error states), therefore it can be useful to select this format for data conversion.

Each line starts with a time stamp followed by the bus type and the channel number (if applicable). Figure 8.1shows an example of a trace in the Telemotive ASCII format.

```
22.06.2006 06:51:52.3422  MOST CTRL   | [0101 -> 0401] . 01.01 . 003.1 . 0 0 ()
22.06.2006 06:51:52.3430  SERIAL #1   | PI:d313 ATN:1 MESSAGES:6 selected:false HEX_ AA BB 01
22.06.2006 06:51:52.3430  SERIAL #1   | Program [1] ixRadio
22.06.2006 06:51:52.3436  MOST CTRL   | [0101 -> 0100] . 01.01 . 003.C . 0 2 (01 01)
22.06.2006 06:51:52.3464  CAN #1      | Rx   0fa  8 1e 5d f6 00 1c 15 84 69
22.06.2006 06:51:52.3476  SERIAL #1   | Starting shutdown
22.06.2006 06:51:52.3545  CAN #1      | Rx   7c9  8 f0 50 01 5a 00 27 9a 00
```

Figure 8.1: Example of a trace in the Telemotive ASCII format

8.2.3. CANoe ASCII (*.asc)

The CANoe ASCII-Format is a data format of the company Vector Informatik. It is possible to read files of this format into the software CANoe. Currently, the blue PiraT2 Client includes CAN, MOST25 control channel and MOST asynchronous channel, FlexRay channel, and LIN channel data in this format.

8.2.4. CANCorder ASCII (*.txt)

The CANCorder format is an ASCII format of the data logger CANCorder of the company IXXAT. It is possible to use this format for the CAN data recorded by the blue PiraT2.

8.2.5. Optolyzer (*op2)

The Optolyzer format contains data of the MOST25 control and asynchronous channel. It has the extension „.op2". It is possible to import files of this format with the "OptoLyzer Suite" from the company SMSC. For newer versions of the "OptoLyzer Suite" it is recommended to use the *.img format.

8.2.6. MOST data analyser(*.img)

The MOST Data Analyzer format contains data of the MOST control and asynchronous channel as well as MDP, MEP and streaming messages. It has the extension „.img“. It is possible to read files of this format with the „OptoLyzer Suite“ of SMSC.

8.2.7. Serial trace analyser (*.txt)

The Serial Trace Analyser format is a simple text format for serial data (see Figure 8.2: Example trace in Serial Trace Analyzer format

```
0006394 22.06.2006 07:12:01.5  | Startup sequence initiated
0006395 22.06.2006 07:12:02.3  | performing mem test
0006396 22.06.2006 07:12:02.5  ========= Marker 5 =========
0006397 22.06.2006 07:12:03.1  | time: 0455334
```

Figure 8.2: Example trace in Serial Trace Analyzer format

Most times a single channel can be stored in this format. Each line starts with a line number followed by a time stamp and the serial data. This format also supports markers.

8.2.8. Serial raw format (*.txt)

This format only contains the unmodified serial raw data without any formatting. At most a single channel can be stored in this format.

8.2.9. Serial debug *.txt

The serial debug format is also a format for unmodified raw data. In contrast to the serial raw format one message contains all characters up to the next end-of-line. This format equals the serial raw format of the blue PiraT.

8.2.10. ASCII hexadecimal format (*.txt)

This format contains the serial data in hexadecimal format. Each line starts with a time stamp. A line is finished if the number of bytes in this line of the difference in the time stamps exceeds certain values.

8.2.11. APN format

This format contains the serial data in binary format. Each line starts with a time stamp. A line is finished if the pattern 0x0D 0x0A 0xAA or 0x0D 0x0A 0xBB occurs in the data. In this case, the characters 0x0D 0x0A is written to the current line, and 0xAA or 0xBB is written to the new line, respectively.

8.2.12. GN-Log format (*.<yy>aa)

This is a proprietary format for serial data.
<yy> contains the last two digits of the year.

8.2.13. Ethernet - RAW/UTF8 (*.raw)

It is possible to log raw or utf8 data over Ethernet:

- RAW data = Data packages with packet-length of 40kByte getting an time stamp and will be stored on the data logger
- UTF8 data = Data packages which are ending with LF or CR are getting an time stamp and will be stored on the data logger Trace Client Format This is a proprietary format for serial data.

8.2.14. Trace client format (*.trc)

This is a proprietary format for serial data.

8.2.15. CANoe BLF (*.blf)

The CANoe BLF-Format is a data format of the company Vector. It is possible to import files of this format into the software CANoe. Currently, the blue PiraT2 Client includes CAN, MOST control channel and MOST asynchronous channel, FlexRay channel, and LIN channel data in this format.

8.2.16. TCPdump (*-pcap)

TCPdump is a well-known program (*.pcap) for controlling and evaluating network traffic. For Windows operating system “WinDump” is available. For more information please have a look on www.tcpdump.org.

8.2.17. MDF CAN signal v3.3 (.mdf)

MDF (Measurement Data Format) is a binary data format for measurement data, which was developed by Vector. This format includes all **signals of the CAN** trace, that are specified within the assigned DBC file.

8.2.18. MDF logging (.log)

MDF (Measurement Data Format) is a binary data format for measurement data, which was developed by Vector.

This format can be used for **CAN messages**. It defines one channel group related to MDF specification V3.3.

The channel group includes:

- #1 Event-Type
- #2 CAN-Channel
- #3 CAN-ID
- #4 Direction Rx/Tx
- #5 RTR+
- #6 DLC
- #7-14 Byte 0 – 7
- #15 Time Stamp

8.2.19. Autosar DLT (.dlt)

This format bases on AUTOSAR Diagnostic Log and Trace 4.0. The format can be used for Ethernet and serial data. Due to a special costumer requirement, the serial DLT messages are extended with a DLT Serial header. The header is put in front of each message and consists of the four bytes "0x44 0x4C 0x53 0x01" (ASCII representation: „DLS“+0x01).

8.2.20. KML, KMZ

Keyhole Markup Language (KML) is the format for geo data for the applications Google Earth and Google Maps. KMZ is the compressed version of KML in zip format. The format bases on the XML standard.

8.2.21. GPX

The GPS exchange format GPX is the format for geo data. It is an open license free format, which should be used for the exchange of geo data. The format bases on the XML standard.

8.2.22. MPEG4 format (.mpeg4)

MPEG4 is a well known format for video streams. For more information please have a look on http://mpeg.chiariglione.org/standards/mpeg-4/mpeg-4.htm.

8.2.23. MPEG-transportstream (.ts)

MPEG Transportstream is a standardised communication protocol for continuous digital video and audio streams. This format is used for DVB and ATSC.

The format is used for MOST150 Streaming data. The format is generated by extracting the raw data from the data stream.

8.2.24. NMEA - ASCII GPS (.nmea)

NMEA 0183 is a well known format for geo data, which was defined by the National Marine Electronics Association. It bases on ASCII.

8.2.25. Eso Trace (.esotrace)

This format was defined by the company ESolution and can be used for ethernet data.

9. blue PiraT2 client – configuration and settings

The following section shows how to use the client with the data logger bluePiraT2.

9.1. Connecting the bluePiraT2

Connect the blue PiraT2 via the power harness (red/+/clamp30 and black/GND/-/clamp31) with the vehicle battery or a power supply.

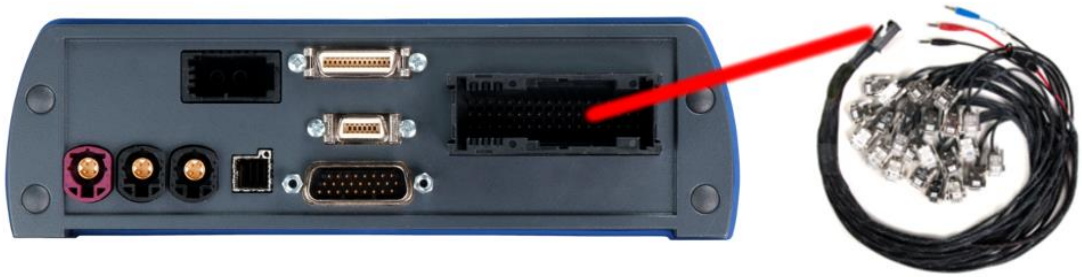


Figure 9.1: Power connection

ATTENTION:

If you have ordered an external antenna eg. for GPS, the connector has to be bolt only by hand, NOT with any tools!

Connect the Gigabit-Ethernet port with the Ethernet port of your PC. (Note: the blue PiraT2's default configuration is as DHCP Server.)

Figure 9.2: Connection to the PC

Switch the blue PiraT2 on by pressing the [Trigger] button and wait until the logger is ready. Telemotive Logo changes into showing the available bus ports.

Figure 9.3: Switching on

For switching off the blue PiraT2 later please press the [Esc] button for some seconds.

Pressing down the rotary knob will enter the Operation menu. Now select [1] Info, then choose 9/10 IP. This IP address is required for the next step.

Figure 9.4: Info screen IP address

Open your internet browser and enter the IP address from step 4. Note: Java Runtime Environment 32bit (JRE) is necessary to run the program!

Figure 9.5: Client download from the blue PireT2

The connection between Logger and PC will be established. Make sure your PC's network settings are set to "Obtain an IP address automatically".

Click on the central image (see Figure 9.5) area to download the client software (~40MB). Confirm the download by selecting "Run". Follow the instructions on the screen, select an installation directory and then click "Install".

After successful installation you will find a blue Pirat2 client icon on your desktop. Double-click the icon to start the application.

9.2. Console installer for blue PiraT2 client

For installing the blue PiraT2 client software by a batch script or Windows prompt (console) you need an additional tool which can be downloaded from the ServiceCenter of Telemotive AG.

If there appear some errors during installation by the console installer these errors were displayed in the console. When the installation runs successful, no messages will be shown in the console.

9.2.1. Starting the console installer

Please start the console installer in this way:

blue_PiraT2_Console_Installer.exe <path to setup> [/L=...] [/D=...] [/DS=...]

The first argument is the path to the clients setup file. The next arguments /L, /D and /DS are optional.

/L to set the installation language - „e“ for englisch (default), „g“ for german

/D to set the installation path. This must be an absolute path. If there are blanks in the path you have to surround them by apostrophes. Without this argument the Client will be installed into the default path:

“<Program Files>\Telemotive AG\blue PiraT 2”

/DS to define if you want to install a DesktopSymbol or not - "0" = no, "1" = yes (Default).

You can call the help file by using /h

example:

blue_PiraT2_Console_Installer.exe blue_PiraT_2_Client_Setup_1.9.1.exe /L=g /D=”C:\Tools\blue PiraT 2” /DS=1

9.2.2. Uninstaller

The client installation installs 2 different uninstaller into the installation folder. For uninstalling the client with a batch script you have to use the "uninst_silent.exe“ which will not create any messages but errors will be shown at the console.

9.3. General functions of the blue PiraT2 client

This section describes the usage of the client in general. Please have a look at the following steps.

9.3.1. Network Logger

In the window "Network Logger" you find a list of connected data loggers in your network (with their corresponding IP). After selecting one of the devices you have access to the following applications:

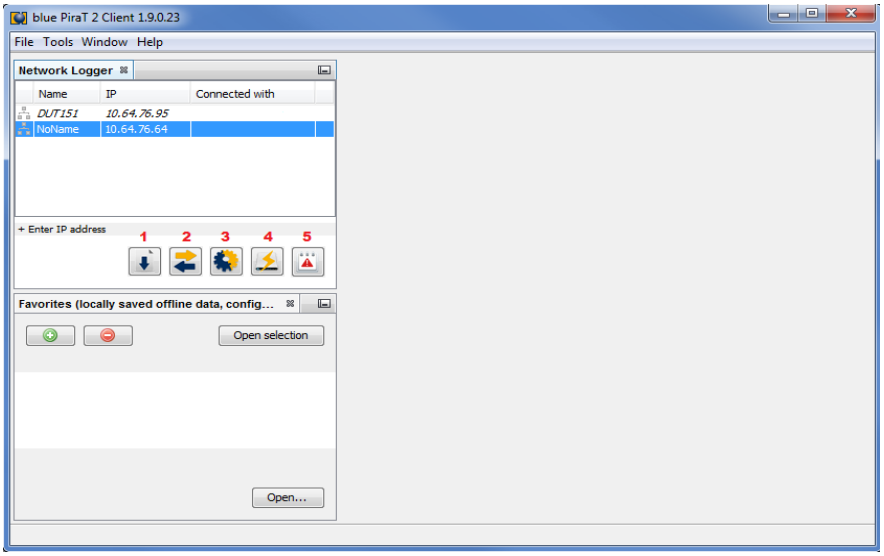


Figure 9.6: blue PiraT2 client start screen

Available applications:

1. Data download
2. Data conversion
3. Configuration menu
4. Firmware/License menu
5. Bug report menu

9.3.2. Choose logger and start an application

Clicking on one of the applications establishes an exclusive connection to the logger (no other clients will be able to connect).

If another client is already connected to a logger, the client's user is shown in the "Connected with" column and the row is displayed as italics. Also the applications are grayed out and cannot be activated.

A device in error mode is shown in red with an error icon (see Figure 9.7, third device). All applications are still available.

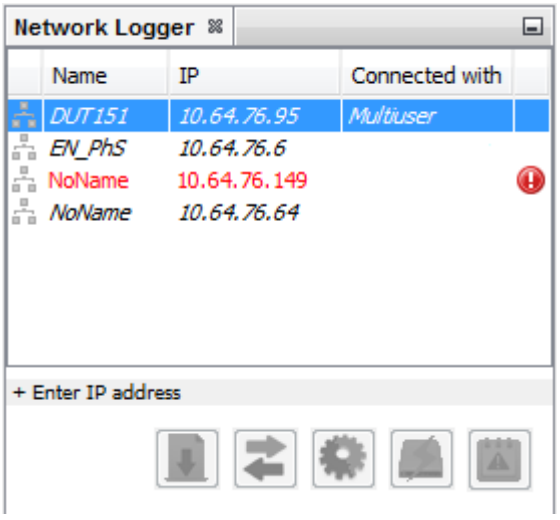


Figure 9.7: Connected loggers

The context menu (accessed via right clicking on a logger) allows quick access to the applications as well as the following actions:

- Resetting the device to default configuration. (Note: This is only available for data loggers in error mode.)
- Activating the LED of the device. This can be used to identify a physical device.
- Basic functions of the client (see Figure 9.8)

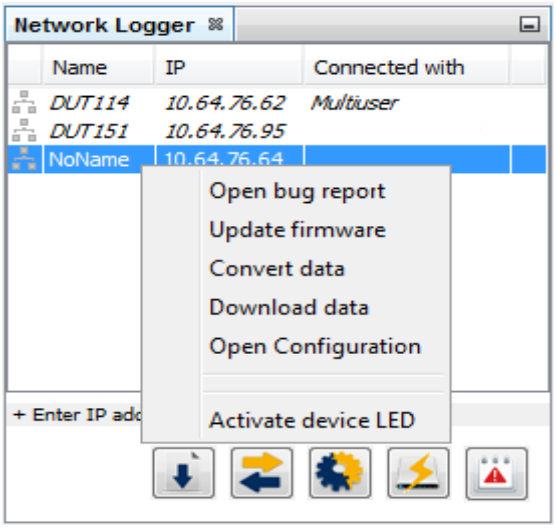
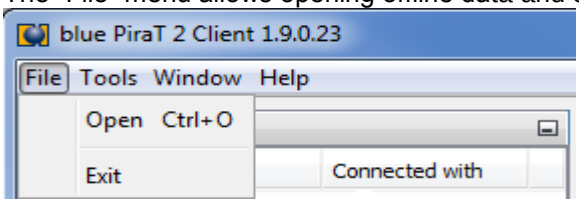


Figure 9.8: Quick access menu

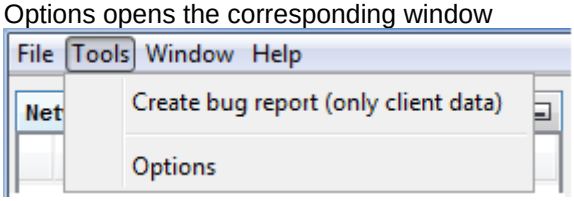
9.4. Toolbar of the client

The Toolbar of the client contains four menus.

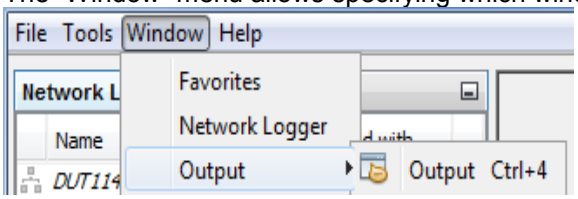
1. The “File” menu allows opening offline data and closing the client.



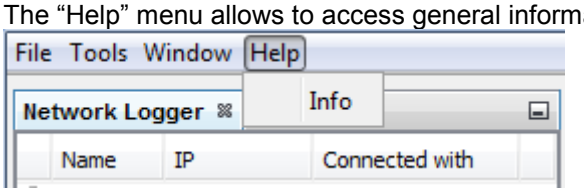
2. The “Tools” menu allows creating a bug report (see the Bug report Quick Start) and a click on Options opens the corresponding window



3. The “Window” menu allows specifying which windows appear on the client screen.



4. The “Help” menu allows to access general information about the client.



9.5. The favorite box

The “Favorites” box allows displaying saved offline data, configuration, and bug report. At first the list is empty. To add an offline data set, click on the [green +] button allows to open entire tree files or .zip in the list.

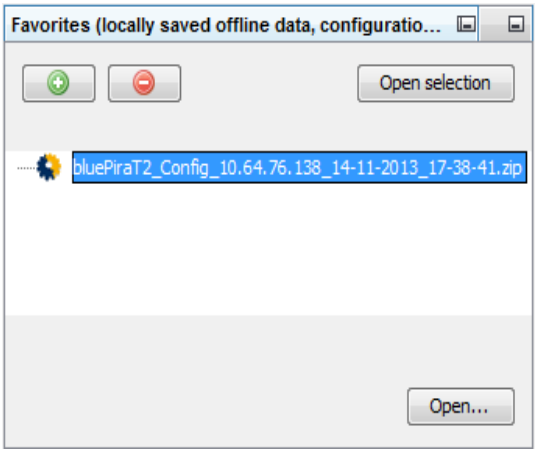


Figure 9.9: Favorite box

Selecting a file and a double click or a click on “Open selection” opens the offline data. The [red -] button removes the selected entrees.

9.6. Configuration of the blue PiraT2

The next section describes the configuration of the bluePiraT2 using the Client.

9.6.1. Selecting a device (logger)

Select a device, and then click on the Configuration icon (see Figure 9.10).

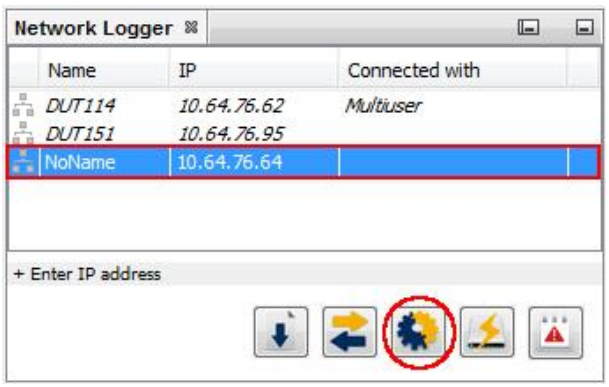


Figure 9.10: Open the logger configuration

9.6.2. Configuration page (application)

The configuration page is displayed in the main display area on the right.

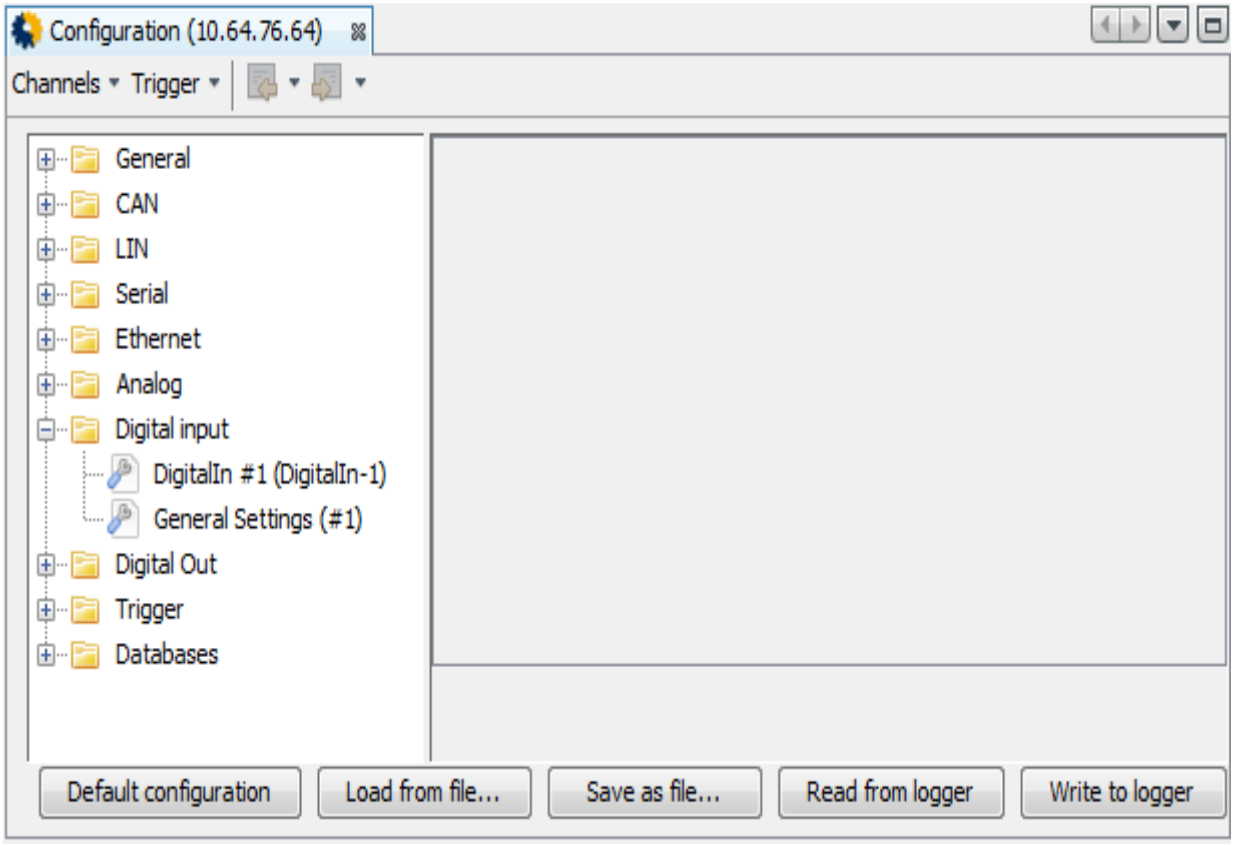


Figure 9.11: Configuration page

Configuration is split into categories. Each category can be expanded by clicking on the "+" on the left.

Selecting one of the sub-categories will open the corresponding configuration form.

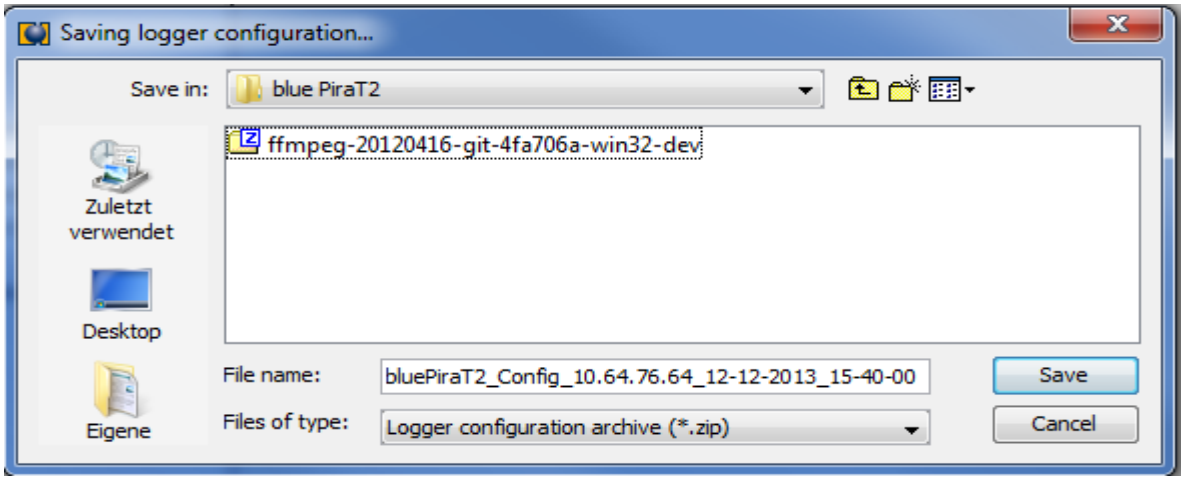
At the bottom of the dialog, there are five buttons available.

1. Default configuration
   It resets all settings to factory defaults. Changes are only local! To apply changes on the device use "Write to logger".
2. Load from file...
   Loads all settings from a file
3. Save as file...
   Saves all settings to a file
4. Read from logger
   This button loads the most current settings from the device. Any local changes will be lost!
5. Write to logger
   It writes all settings back to the data logger. Changes are applied immediately. (Exception: The settings for cascading/synchronized operation and the network configuration are applied at the next startup of the logger)

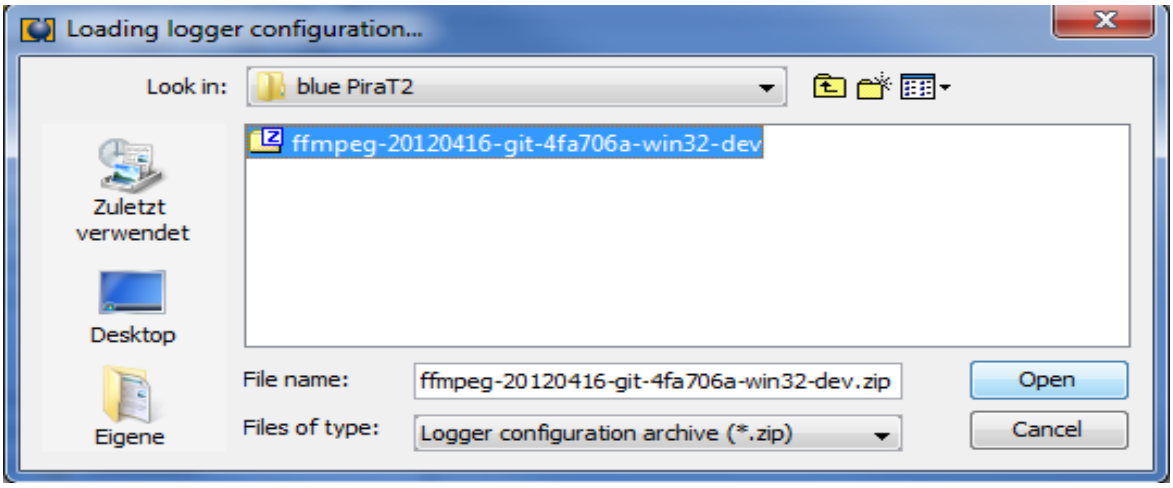
9.6.3. Loading and saving configurations

Loading and saving locally helps applying the same configuration to several data loggers. The following procedure explains how to do it.

1. Setup the desired configuration of one of the data loggers.
2. Save this configuration to a local file.



3. For the remaining data loggers, load this file.



4. Then apply the configuration to each device by clicking [Write to logger].

9.7. The configuration tree

The following section describes the configuration tree and the parameters the user will be able to configure.

9.7.1. General settings

The following sections describe the General Settings of the data logger.

9.7.1.1. Name of the data logger and configuration

Assign a name to the device. This name will be used in trace file names. The Name of configuration can be output on the display of logger (Under Menu/Info).

Note: Any changes have to be applied to the device by clicking on [Write to logger].

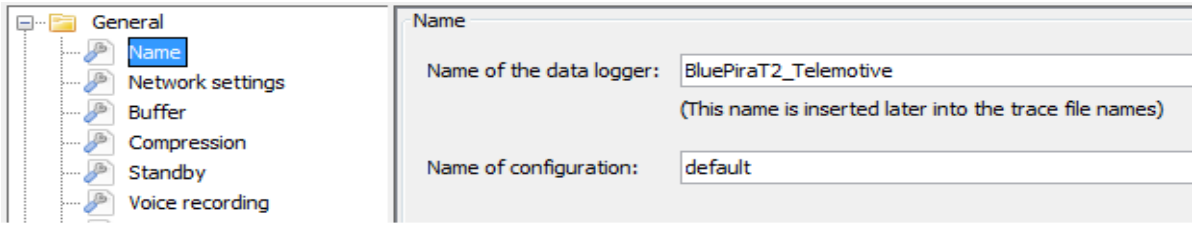


Figure 9.12: Name settings

9.7.1.2. Network settings

Network settings can be modified. Please read the descriptions carefully about the connection of the data logger to a network before modifying these settings.

Note: Network changes have to be applied to the device by clicking on [Write to logger] and a restart of the logger.

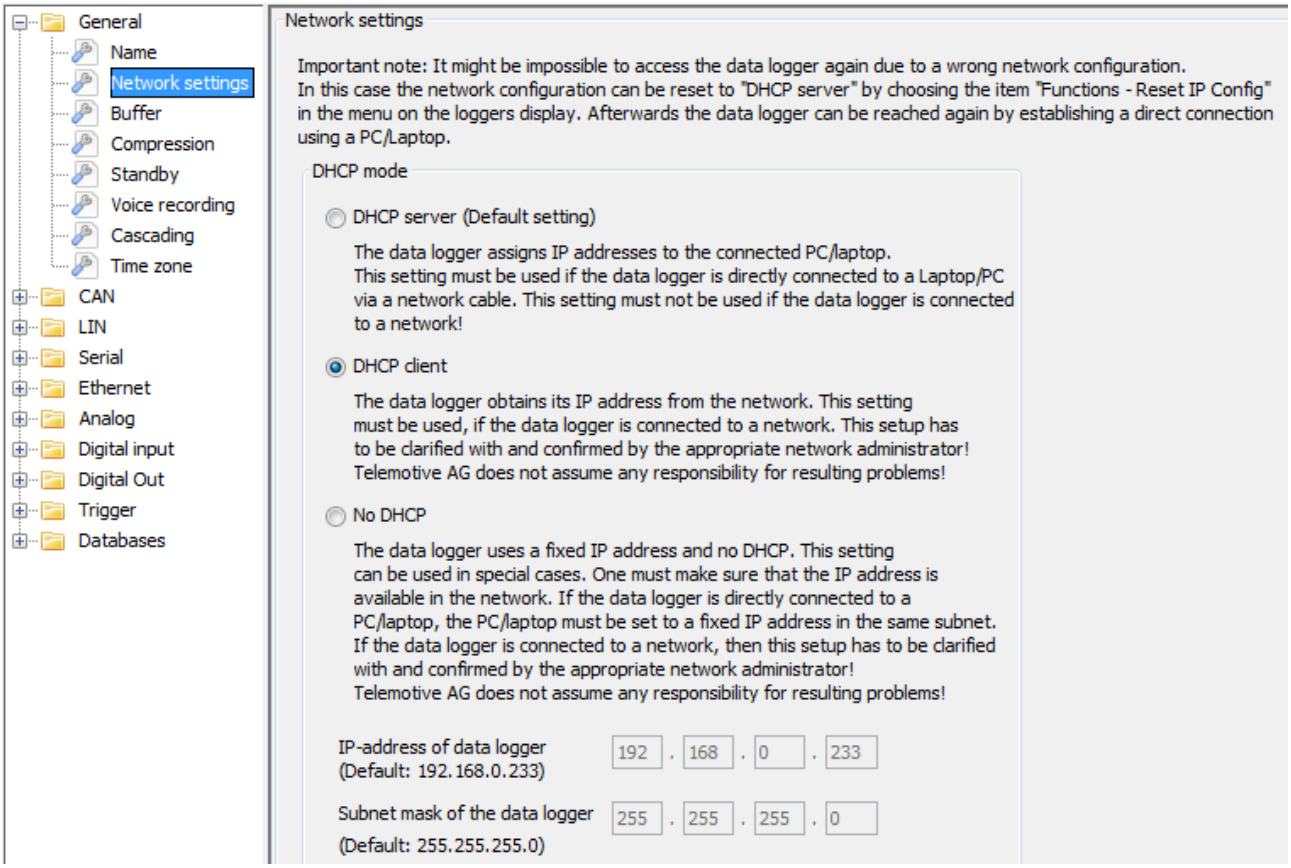


Figure 9.13: Network settings

9.7.1.3. Buffer

The Buffer option affects logger behavior when running out of disk space.

- If "Circular buffer mode" is disabled, the logger will stop logging additional data until the issue is resolved manually.
- If "Circular buffer mode" is enabled, the logger will automatically delete the oldest data as required and remain operational.

However, data designated by markers can be protected against being overwritten. This feature is enabled via the appropriate checkbox. The length of this data block is specified below.

If a time is given as the data block end, and the data logger shuts down before this time, then the marker data protection ends with the shutdown of the data logger.

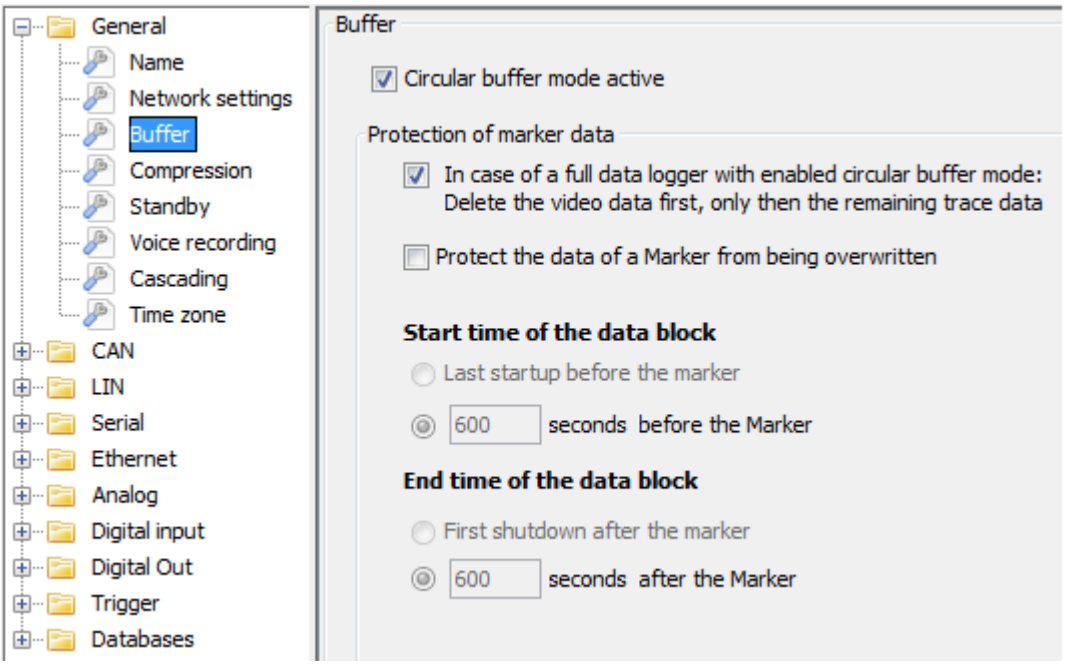


Figure 9.14: Buffer settings

9.7.1.4. Compression

Trace files can be compressed during recording by a click on “Compression” and ticking the corresponding checkbox.

If the compress mode is activated, the logger switches automatically to the normal mode, if the traffic at the recorded busses is too high. In this case, the trace data on the data logger are mixed in zipped and normal data. If you convert the data by the client, it has no effect.

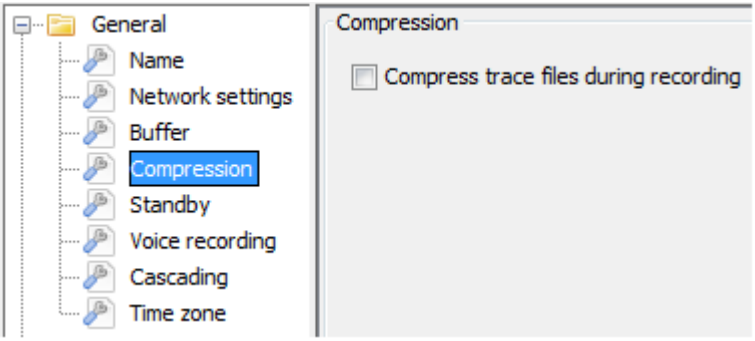


Figure 9.15: Compressing data

9.7.1.5. Standby

The Standby settings provide the setup of the shutdown condition of the data logger. It is possible to deactivate the automatic standby but this must be ticked only if the logger is connected to a sufficient power supply.

If the data logger is not connected to a network and does not receive any data during the timeout entered in the first text field, then it shuts down and enters standby mode.

If the data logger is connected to a network and does not receive any data during the timeout entered in the second text field, then it shuts down and enters standby mode.

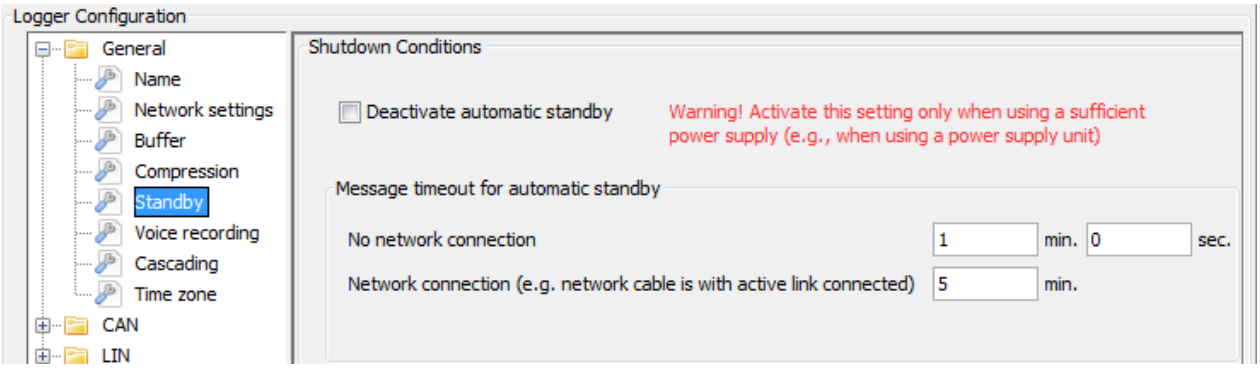


Figure 9.16: Shutdown conditions

9.7.1.6. Voice recording

Voice recording settings allow adjusting the maximum length for each entry recorded by the Remote Control Voice device.

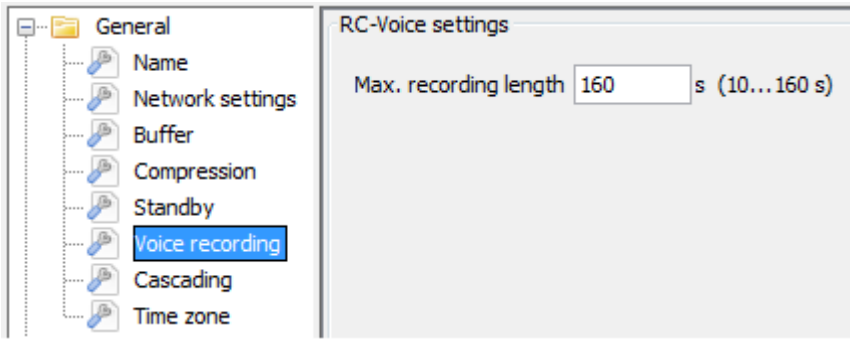


Figure 9.17: Remote control voice settings

9.7.1.7. Cascading

The cascading concerns the settings for the utilization of two loggers.

If the cascading mode has just been activated through the configuration program, the synchronization is activated only at the next startup.

Following modes are supported:

- No cascading:
  Default operation mode for a single data logger
- Data logger is time master:
  This box allows designating the data logger as the master (set the logging time).
- Data logger is time slave:
  This box allows designating the data logger as the slave.

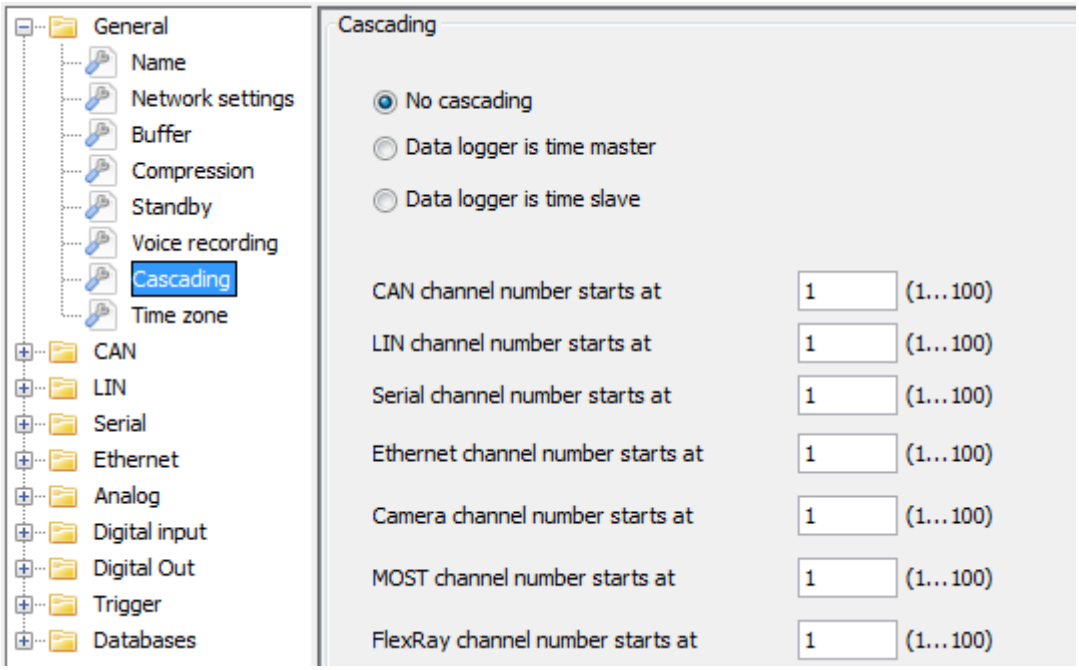


Figure 9.18: cascading settings

To allow different channel numbers of the master and the slave, it is possible to specify an offset for the slave. The channel numbers of the different channels are corrected by this offset.

Please make sure that the data logger names of the master and the slave are different (see section 9.7.1.1). Otherwise equal file names might be created for the master and slave trace files, which could cause an overwriting of the trace files.

For further information about cascading loggers see section 6.7.

9.7.1.8. Time zone

After choosing "Time zone" in the selection tree, the settings regarding the internal clock of the data logger appear (see Figure 9.19). These settings regard the time zone of the data logger and enabling the automatic daylight savings adjustment (for more information, see chapter 6.5).

If the latter checkbox is selected, then the data logger automatically switches between summer and winter time, without the need to adjusting the clock manually.

The Logger time could be set in the “Data Download” menu (please have a look at section 9.8.2)

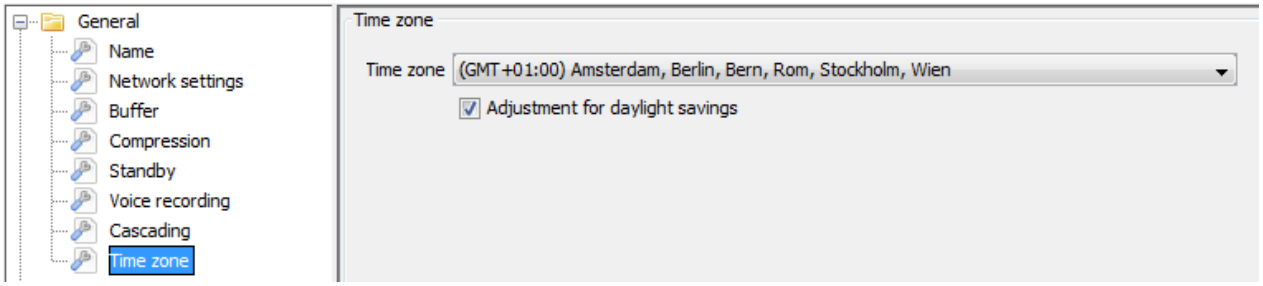
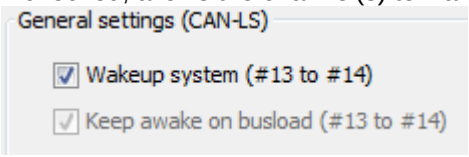


Figure 9.19: Time zone settings

9.7.1.9. Common Settings

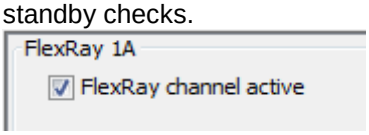
Some settings are common to more than one bus or feature. This section will provide an overview.

- General Settings: “Wakeup system”
  This setting affects one or several (the affected channels are listed in brackets) channels and, if checked, allows the channel(s) to wake the system from standby mode.

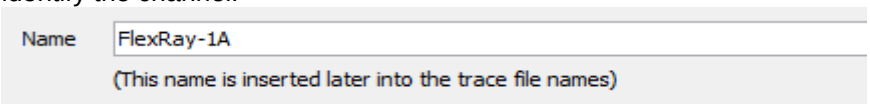


- General Settings: “Keep awake”
  This setting affects one or several (the affected channels are listed in brackets) channels and, if unchecked, allows the standby check to ignore this channel, meaning that the system may enter standby mode even though a channel is still receiving data. If paired with a “Wakeup system” option, “Keep awake” is only available if “Wakeup system” is disabled (see Figure above).

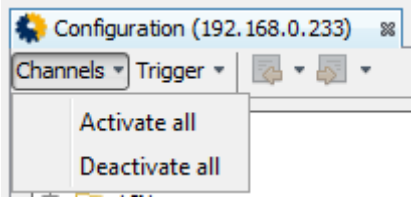
- Channel Settings: “Channel Active”
  Unchecking this setting disables the channel completely. It will not be logged or considered for standby checks.



- Channel Settings: “Name”
  This setting assigns a name to the channel. This name will be used in log files to easily identify the channel.



- Enable / Disable all Channels / Trigger
  With this option, you could activate or deactivate all channels or triggers.



9.7.2. CAN settings

CAN settings are accessible by opening the CAN folder. In this window you could set the general settings of the CAN bus (see Figure 9.20).

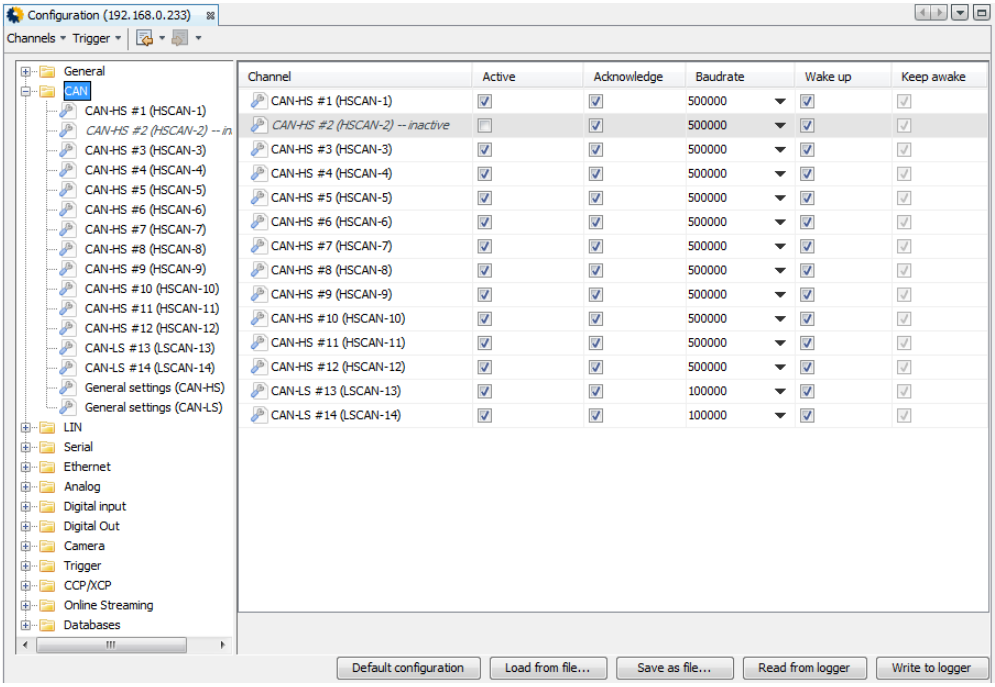


Figure 9.20: Can overview

9.7.2.1. CAN interface settings

All CAN interfaces are listed in the tree. Selecting an interface will open its configuration form.

High Speed CAN (CAN-HS) or Low Speed CAN (CAN-LS.

Each CAN interface allows basic channel configuration (see section 9.7.1.9). Additionally acknowledge can be toggled.

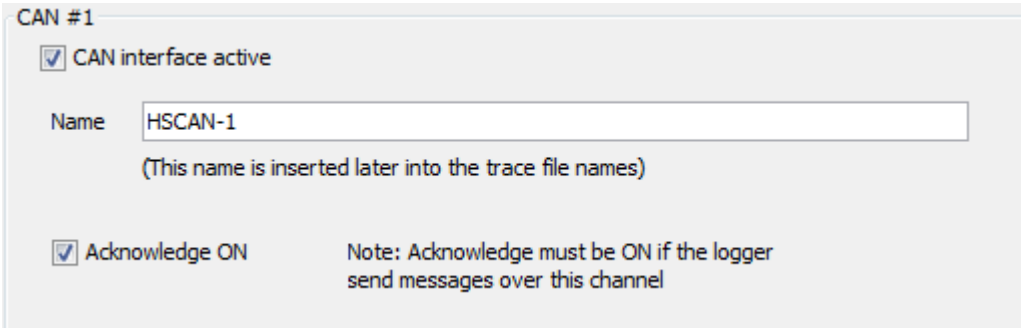


Figure 9.21: CAN interface settings

The acknowledge must be ON for the CAN channels used to send CAN messages

The CAN bit-timings can be configured by specifying the baud rate or by configuring directly the chip parameters.

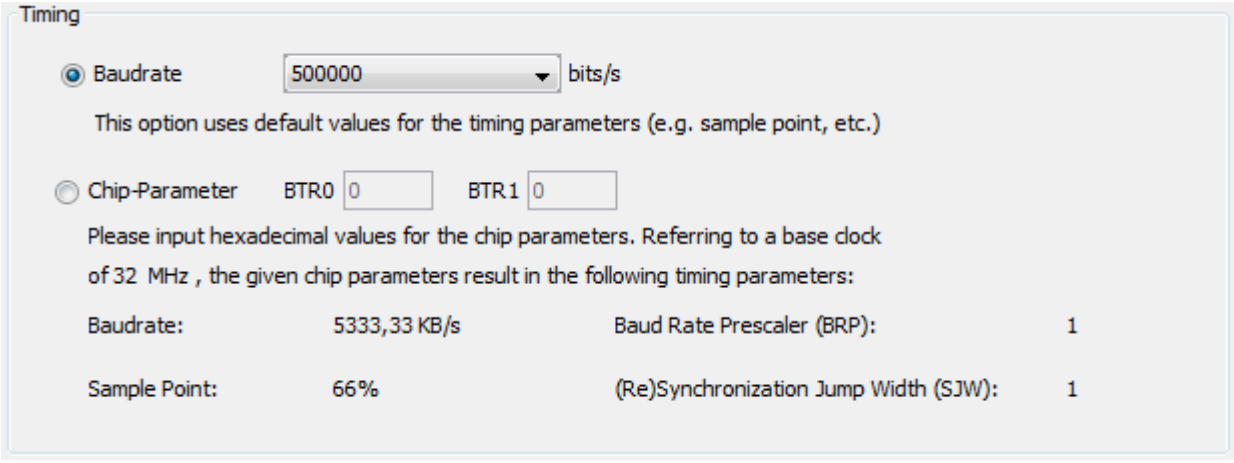
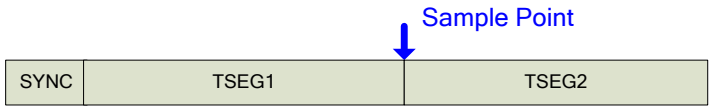


Figure 9.22: CAN timing settings

The chip-parameters are given by two Bytes:



BTR1							
7	6	5	4	3	2	1	0
0	TSEG2			TSEG1			

BTR0							
7	6	5	4	3	2	1	0
SJW		BRP					

Parameter	Range	Description
BRP	0…63	Baud Rate Prescaler. The base clock is divided by 2 * (BRP + 1), resulting in the base unit for the timing, the so-called “time quantum” TQ
TSEG1	2..15	(TSEG1 + 1) is the number of time quantums before the sample point
TSEG2	1..7	(TSEG1 + 1) is the number of time quantums after the sample point
SJW	0…3	(Re) Synchronization Jump Width. Adjust the bit time by maximum (SJW + 1)

Table 9.1: CAN chip parameter

9.7.2.2. CAN filter

The CAN filter allows to reduce the amount of recorded data. It can be activated or deactivated by the checkbox.

Figure 9.23: CAN filter settings

The database here is configured in the database settings (see section 9.7.11).

The list contains all CAN message identifiers (in hexadecimal format) that will be recorded (message IDs not listed will be ignored).

If a CAN database is provided the associated message name is shown for each ID.

Clicking on “Add massage” opens the following dialog.

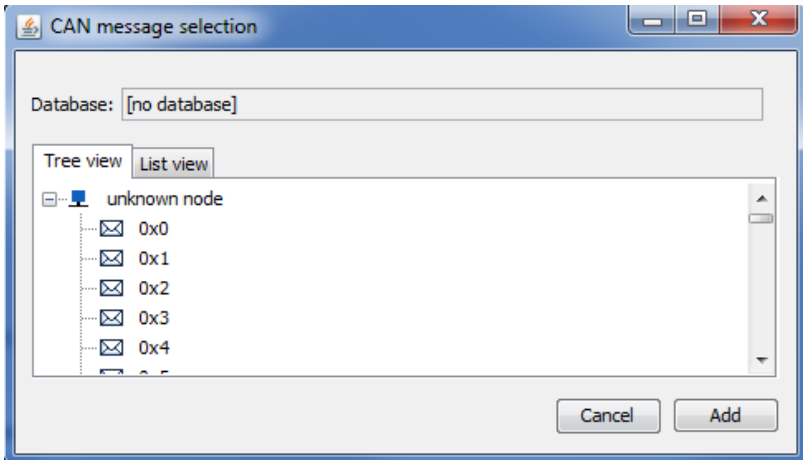


Figure 9.24: Add CAN massage

The database is the one selected in the database settings (see section 9.7.11). A click on the branches of the tree and then “Add” the message make the message appear in the list presented in Figure 9.23.

To remove a message from the list, select the massage and click “Remove massage”.

9.7.2.3. General CAN settings

The general setting for CAN are separated into High Speed (HS) and Low Speed (LS) interfaces. Both general configuration pages allow setup of standby behavior (see Figure 9.25). More about general settings see section 9.7.1.9

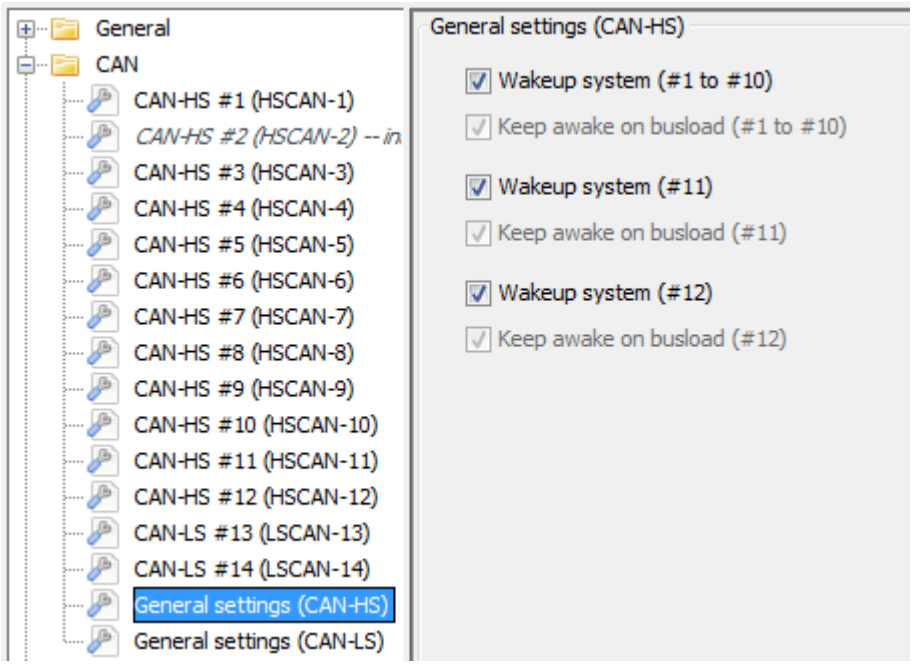


Figure 9.25: General CAN settings

9.7.3. LIN settings

LIN settings are accessible by opening the LIN folder. In this window you could set the general settings of the LIN bus (see Figure 9.26).

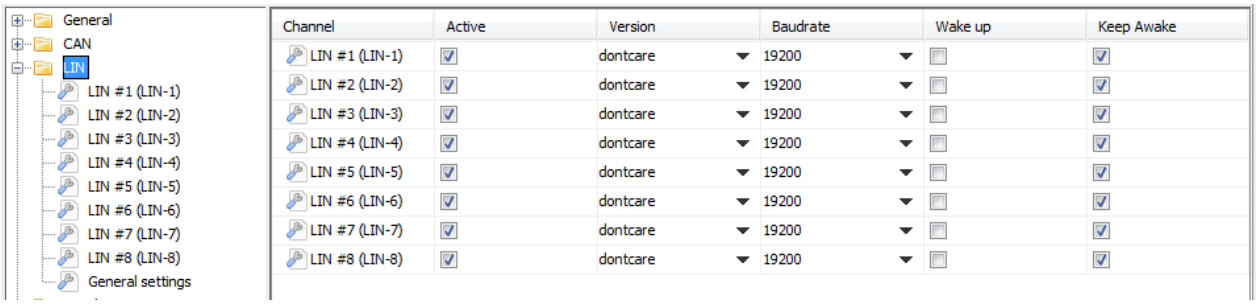


Figure 9.26: LIN overview

9.7.3.1. LIN interface settings

LIN channel settings provide basic channel configuration (see section 9.7.1.9) as well as LIN-specific parameters.

The following parameters must be set:

- Baud rate: Set the baud rate of your LIN interface
- Version: Version 1.3, 2.0 and 2.1 are available
- Sample- Position: Select the sample Position

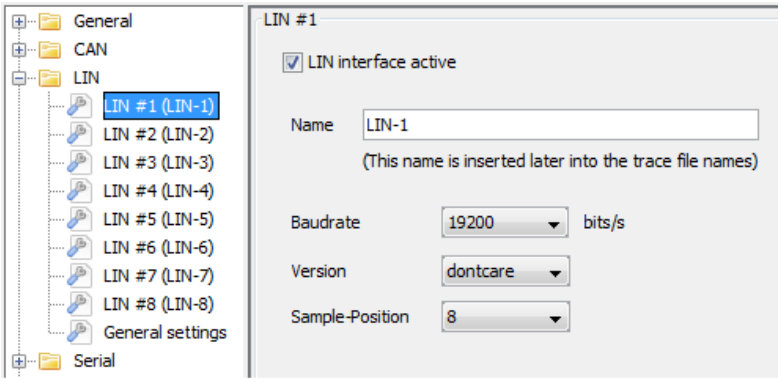


Figure 9.27: LIN settings

9.7.3.2. LIN general settings

LIN general settings allow setup of standby behavior (see section 9.7.1.9).

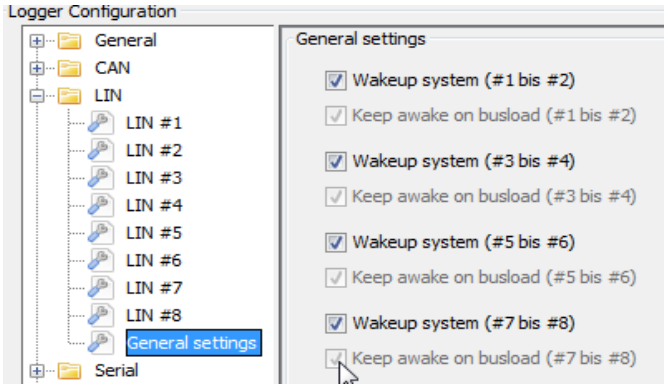


Figure 9.28: LIN general settings

9.7.4. Serial settings

Serial settings are accessible by opening the serial folder. In this window you could set the general settings of the serial bus (see Figure 9.1).

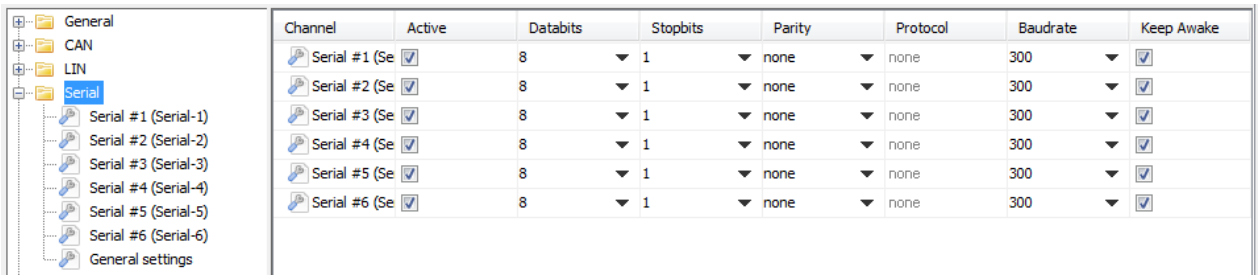


Figure 9.29: Serial overview

Serial interface settings provide basic channel configuration (see section 9.7.1.9) as well as serial interface specific parameters (see Figure 9.30).

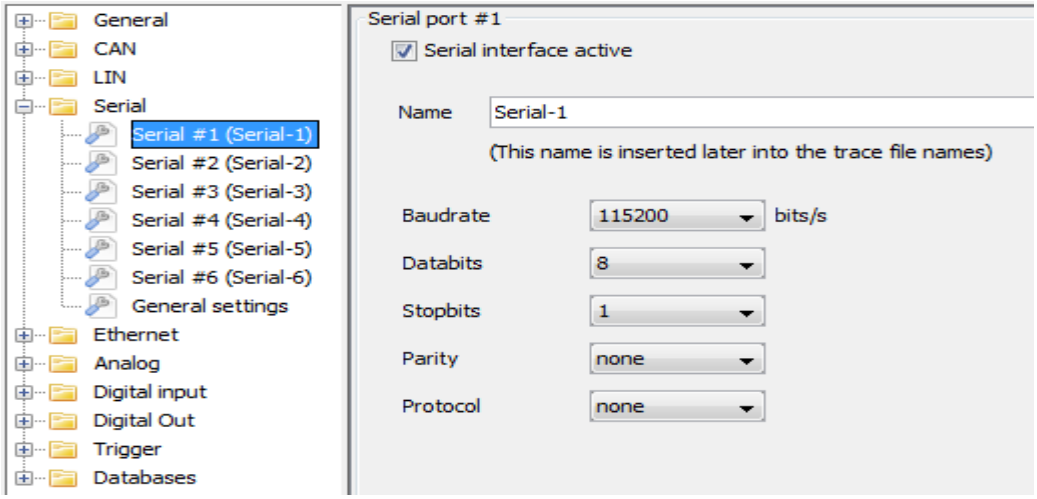


Figure 9.30: Serial settings

Serial general settings allow setup of standby behavior (see section 9.7.1.9).

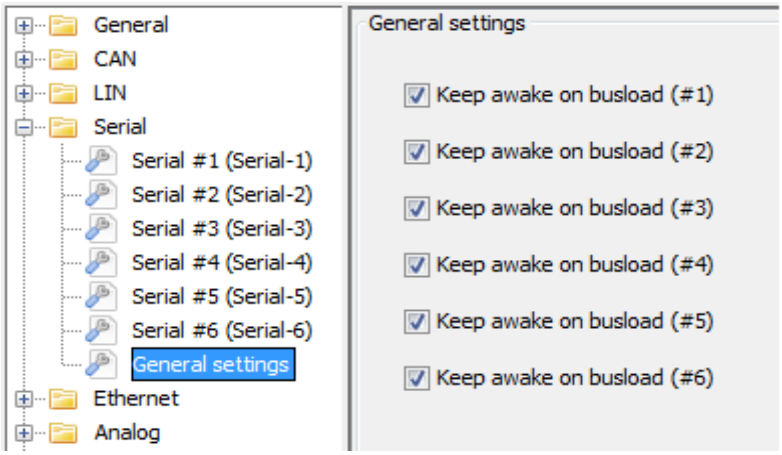


Figure 9.31: Serial general settings

9.7.5. FlexRay settings

FlexRay settings are accessible by opening the FlexRay folder. In this window you could set the general settings of the FlexRay bus (see Figure 9.32).

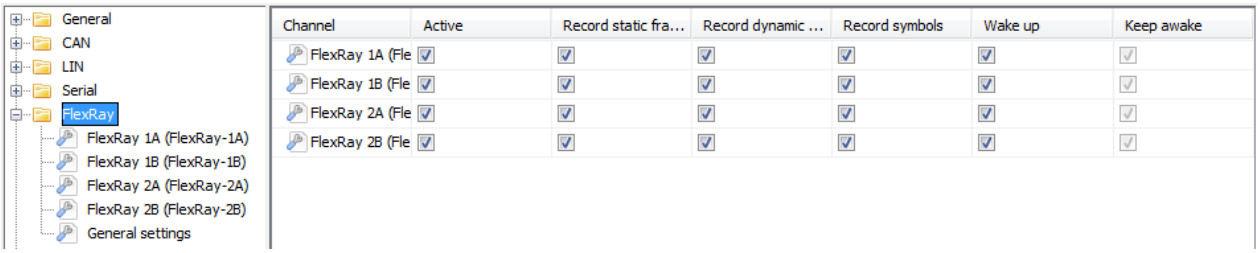


Figure 9.32: FlexRay overview

FlexRay channel settings provide basic channel configuration (see section 9.7.1.9) as well as additional options to reduce recorded data (see Figure 9.33).

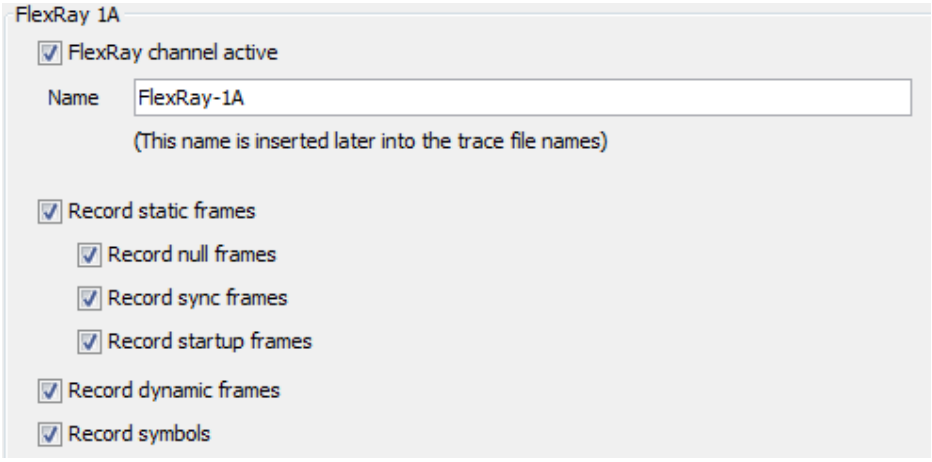


Figure 9.33: FlexRay settings

FlexRay general settings allow setup of standby behavior (see section 9.7.1.9) and baud rates. Baud rates are set for a pair (e.g.1A and 1B) of FlexRay channels.

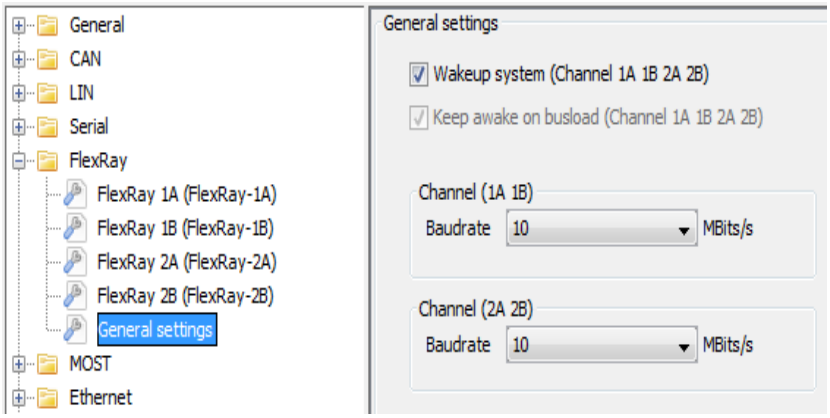


Figure 9.34: FlexRay general settings

9.7.6. MOST settings

MOST settings allow setup of standby behavior ,basic channel configuration (see section 9.7.1.9), and MOST specific settings. These MOST specific settings may vary based on the version of MOST (25/150) used. These options can place limits on message length or filter specific messages based on addresses (see Figure 9.35).

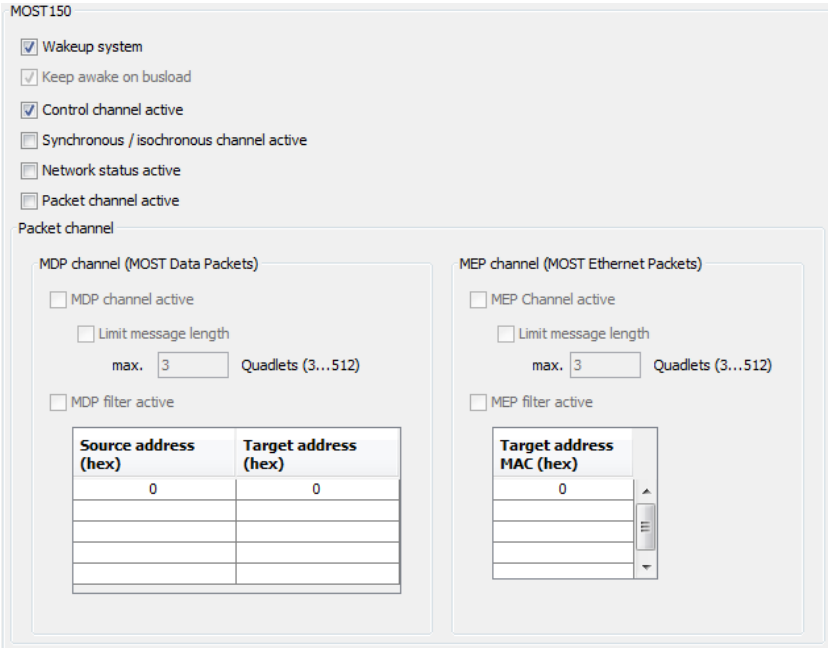


Figure 9.35: MOST settings

MEP/ECL is only available for MOST150

9.7.7. Ethernet settings

Ethernet channel settings provide basic channel configuration (see section 6.4.1.9) as well as Ethernet/IP specific properties (see Figure 9.36).

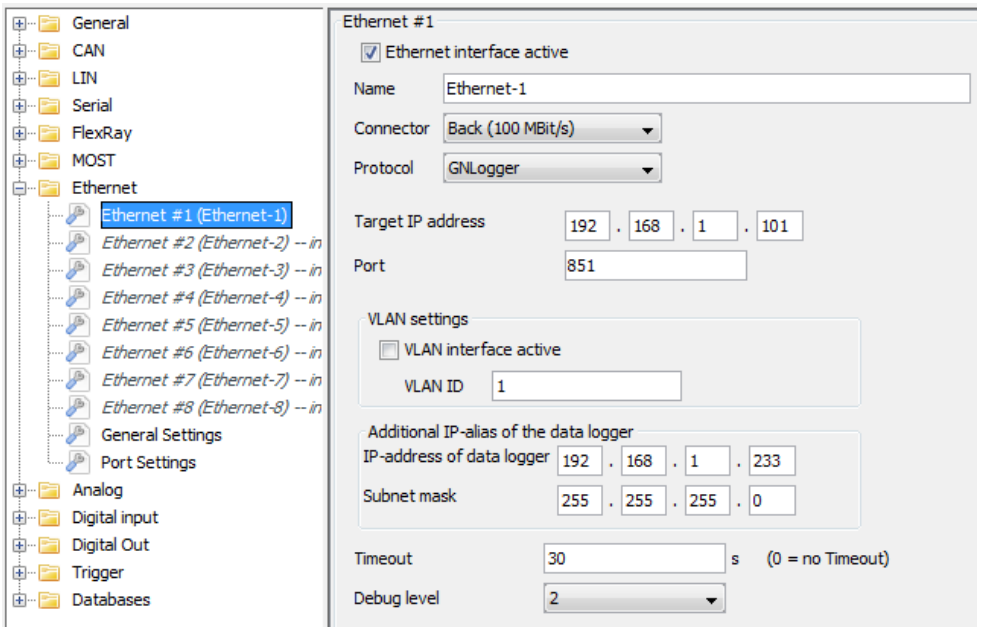


Figure 9.36: Ethernet settings

Note:

If you activate “VLAN interface active”, the target have to use also a VLAN interface with the same VLAN ID.

Subnet masks of VLAN interfaces and other channels without VLAN have to be diferent.

The protocol can also be selected (see Figure 9.37).

Note: Some of them are running only with a license

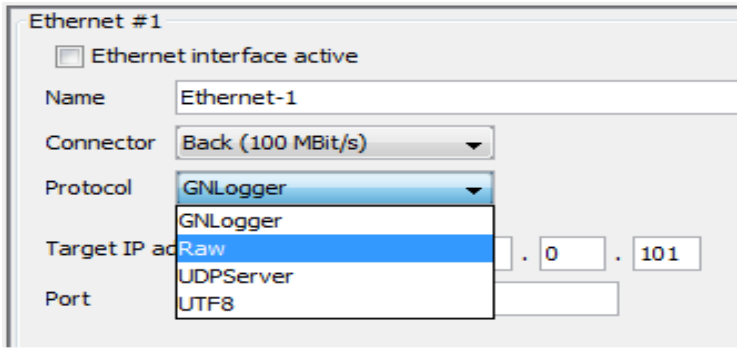


Figure 9.37: Ethernet protocol

9.7.8. Analog channel settings

Analog settings are accessible by opening the Analog folder. In this window you could see the name of the analog channels and you enable or disable each channel (see Figure 9.38).

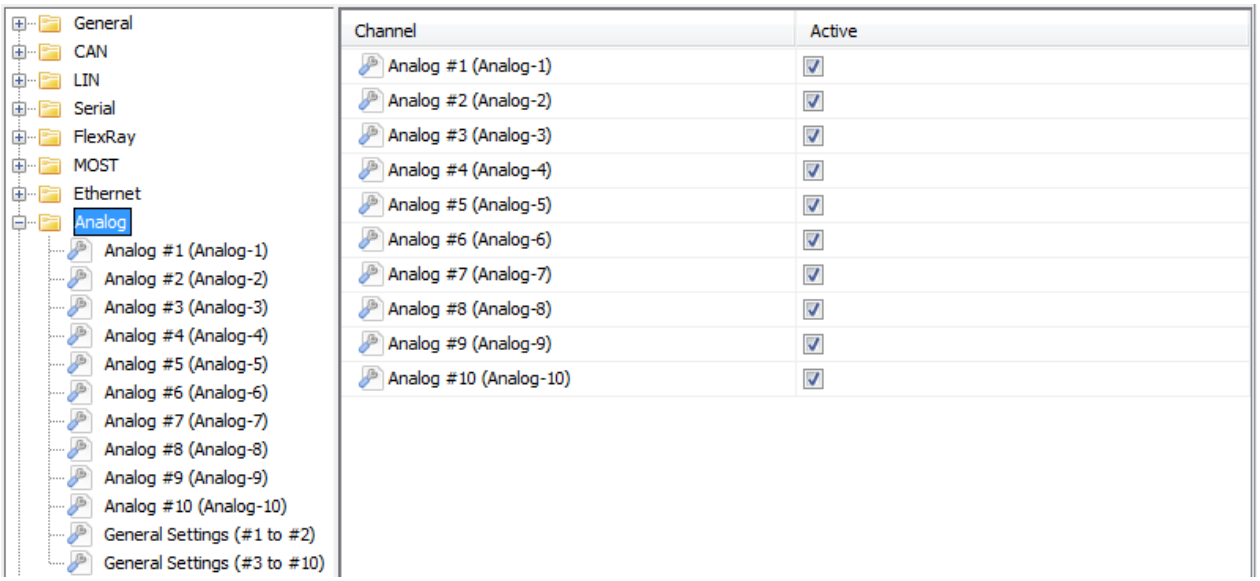


Figure 9.38: Analog channels overview

If you select an analog channel, you could set the basic channel configuration (see section 9.7.1.9).

Note:

Analog#1 has no external input. It measures only the input voltage of the data logger (see Figure 9.39).

Note:

If you use the channel "Analog #2", please connect the ground of "Analog #2" to the ground clamp of the logger (see section 13.2.2).

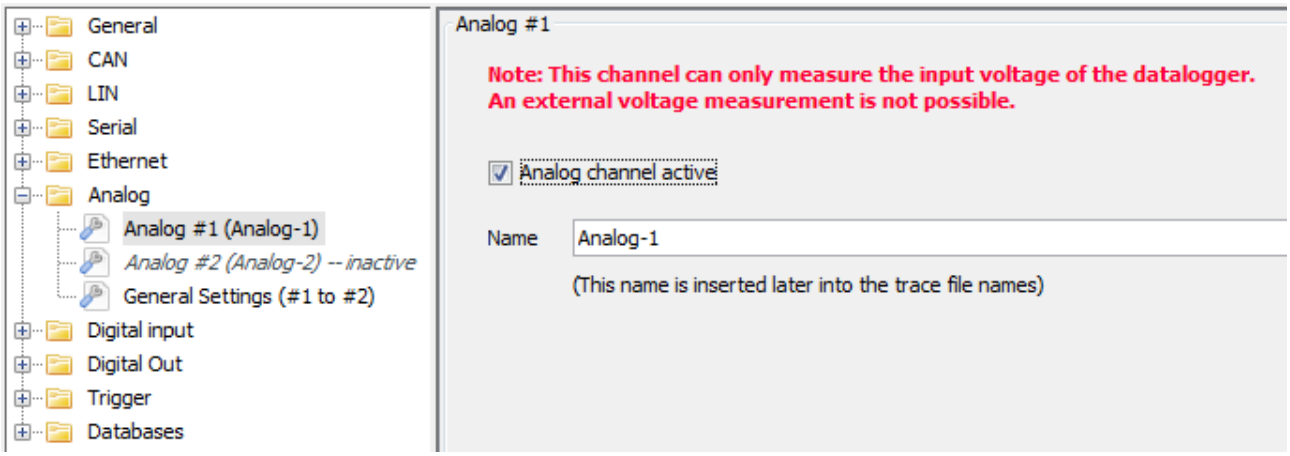


Figure 9.39: Analog channel settings

Analog general settings allow specifying the sampling interval. The general settings can be done separate for channel 1# to #2 and channel #3 to #10.

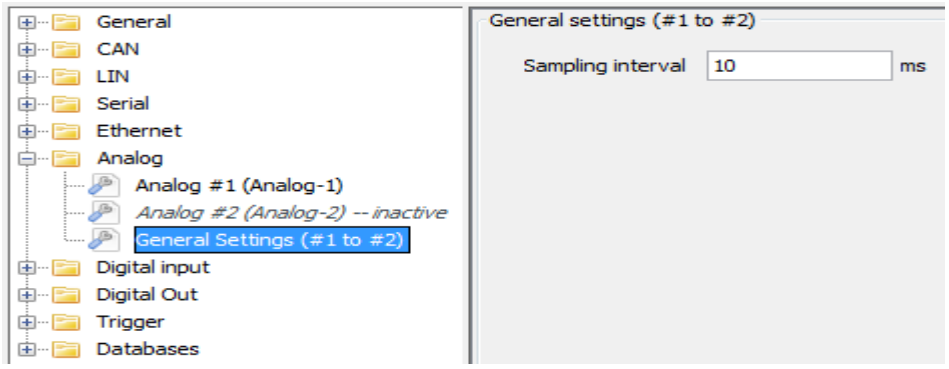


Figure 9.40: Analog channels general settings

9.7.9. Digital input settings

Digital settings are accessible by opening the digital folder. In this window you could see the name of the digital channels and you enable or disable each channel (see Figure 9.41). For channel#1 and #2 is a wake up function available.

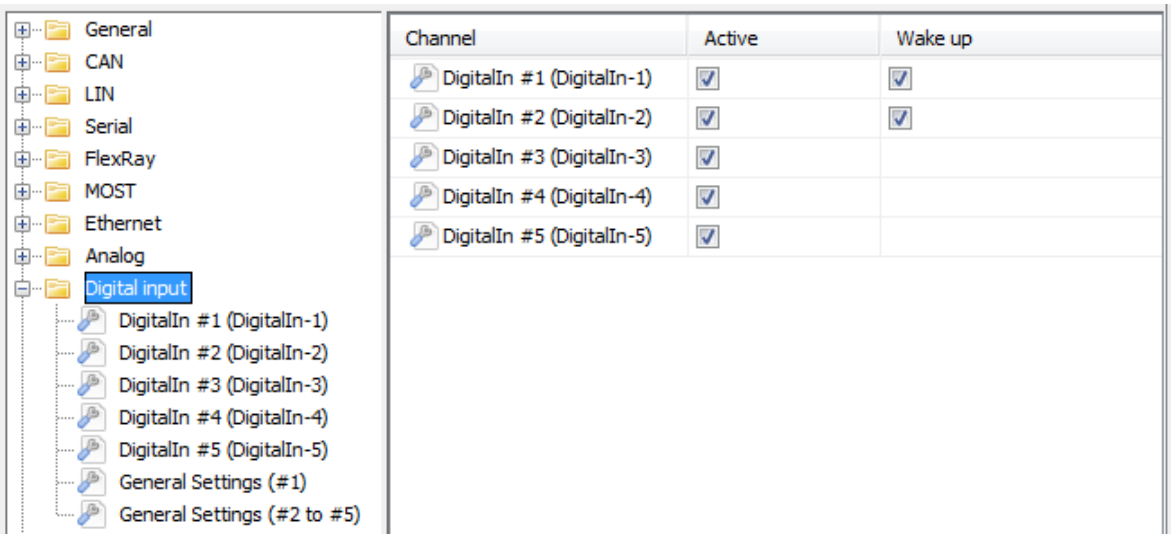


Figure 9.41: Digital channels overview

Digital input channels settings provide basic channel configuration (see section 9.7.1.9).

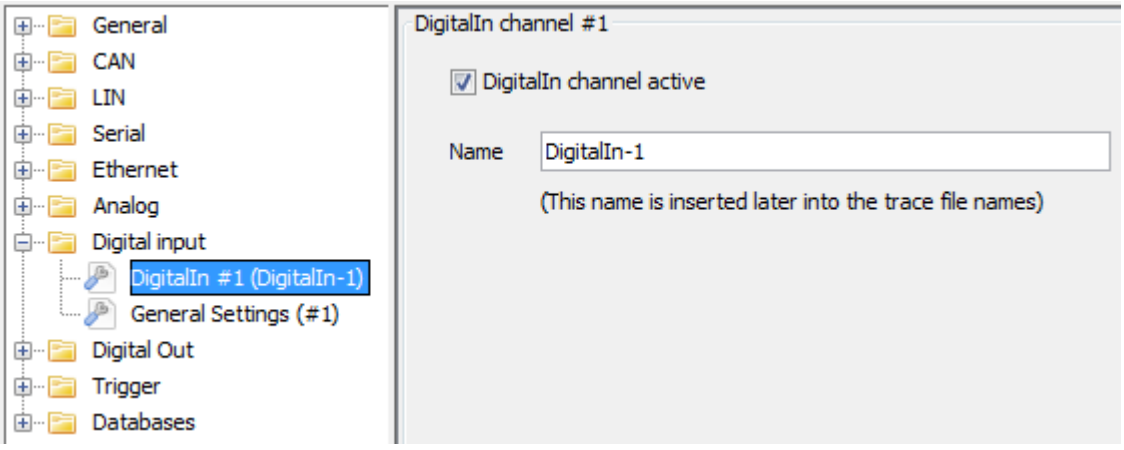


Figure 9.42: Digital channel settings

General settings (#1) allow setup of standby behavior (see section 9.7.1.9) and logging mode.

Two logging modes are currently available:

- Timing mode (above) will record a sample after each interval. Intervals are specified in milliseconds (between 1ms and 100000ms)
- Edge detection (below) will record a sample on a detected signal change, either rising, falling or both.

The threshold voltage of channel #1 is 9.5V±0.2V with a hysterics of 0.3V±0.2V (see Figure 9.44).

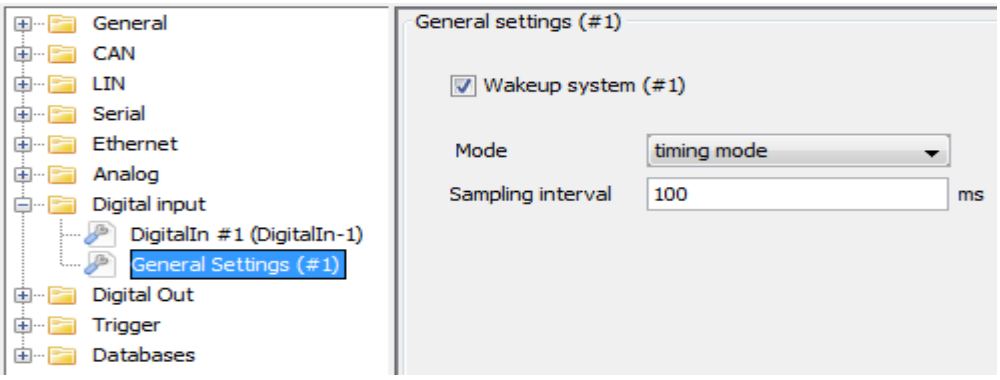


Figure 9.43: General settings (#1)

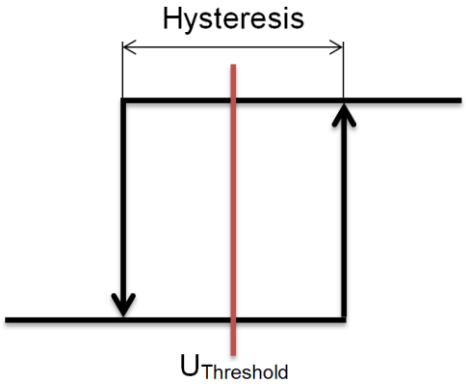


Figure 9.44: Hysteresis curve

General settings (#2 to #5) have the same settings as channel #1. In addition to these settings, you could set the threshold voltage for these channels.

The threshold voltage is adjustable between 0 to 12V. The hysteresis in this case is 3.2V±2V (see Figure 9.44).

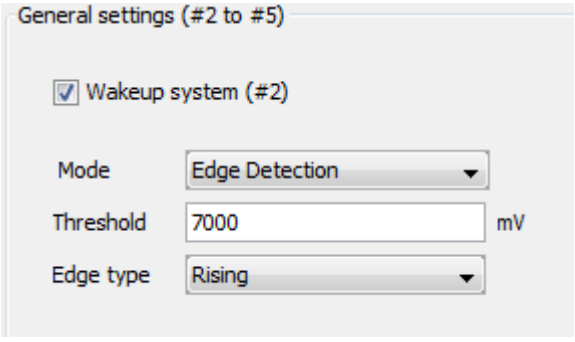


Figure 9.45: General settings (#2 to #5)

9.7.10. Digital output settings

The initial default value of the digital output channels could be set to ‘0’ or ‘1’.

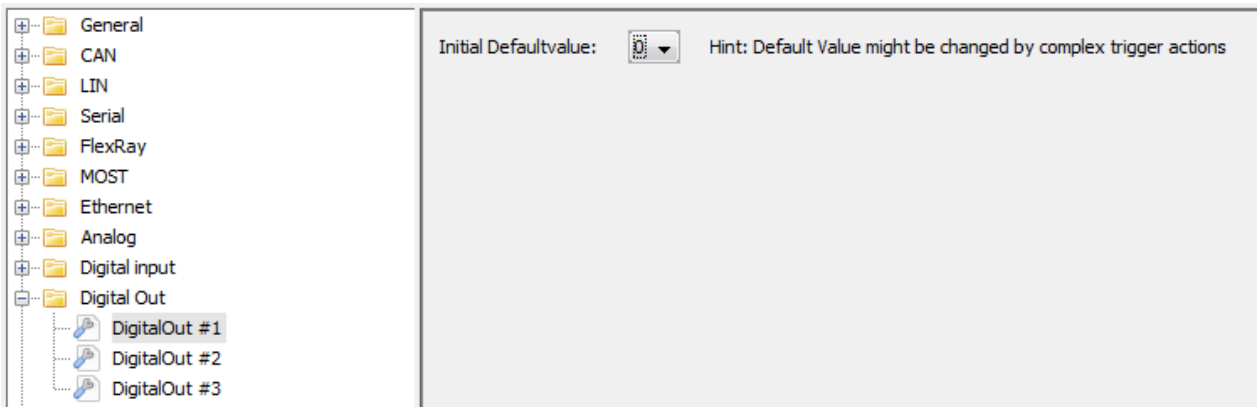


Figure 9.46: Digital output settings

9.7.11. Database settings

Databases settings are accessible by opening the Databases tree. This menu allows configuring a database for each CAN channel. Databases contain human readable names and organization for CAN message IDs which allows easier configuration of CAN filters (see section 9.7.2.2).

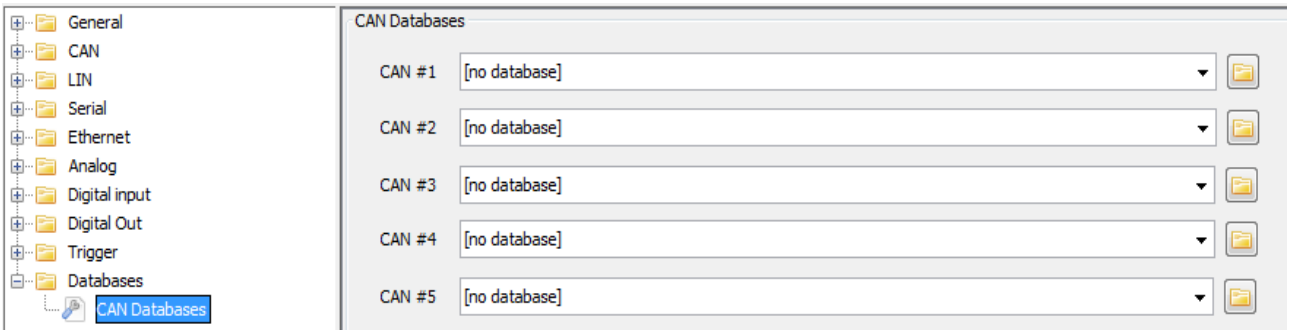


Figure 9.47: Database settings

Via the combo box of a channel it is possible to quickly select previously used databases or to disable the use of databases for this channel. The file icon  on the right side of the combo box opens a file selector to choose a database (*.dbc file) from the file system.

9.8. Data download - blue PiraT2

The following section describes how to use the data download application.

9.8.1. Starting the download application

The Download application allows saving internal data (in Telemotive format) from the logger on the computers disk.

Connect the client to the data logger by selecting it in the list.

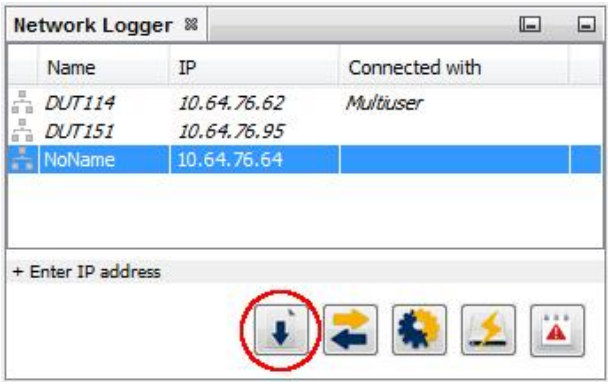


Figure 9.48: Open download menu

A click on the [Download data] button displays this dialog on the right hand side of the window.

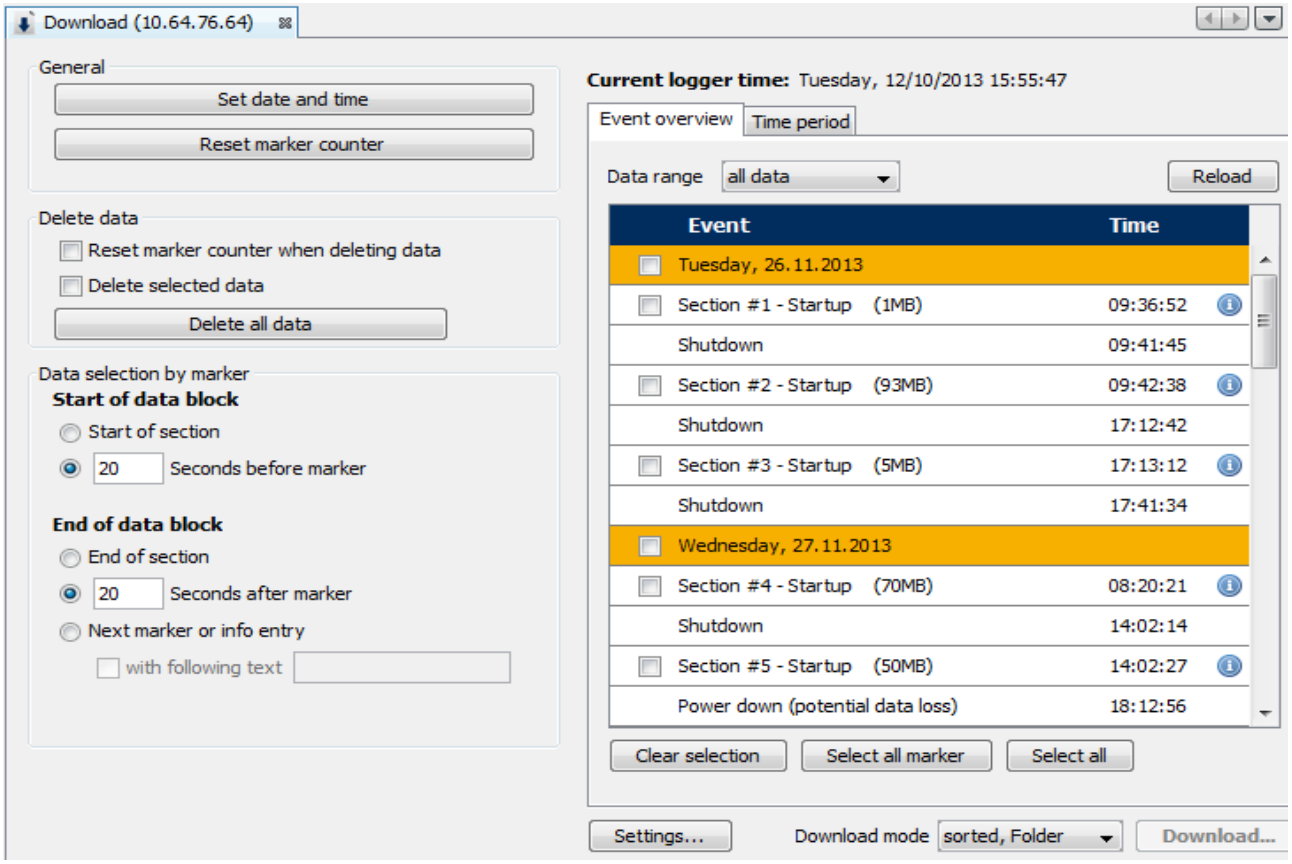


Figure 9.49: Data download menu

Attention:

Only Startups and Markers are events that you can select in this window. The in orange displayed days are only for a better overview. If you select a day, all events on this day will be marked. If you want to select data of a special day please use the "time period" window for selecting the hours of this day.

9.8.2. General settings

Concerning the general actions, two buttons can be pressed.

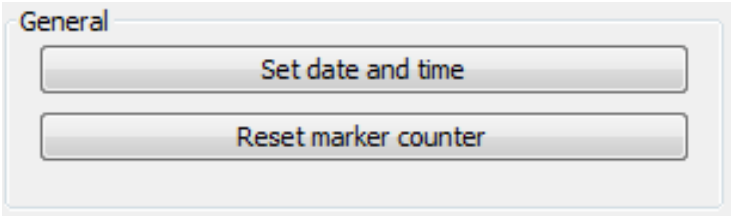


Figure 9.50: Download general settings

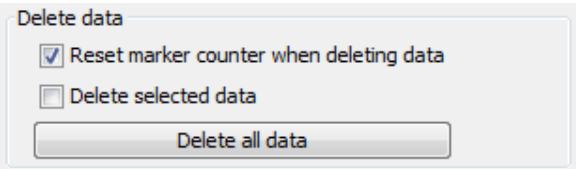
Set date and time:
This means that the date and time of the data logger's real-time clock have been set to the date and time of the PC.

Reset marker counter:
Each marker is assigned a consecutive number that is displayed in the data overview and may be used in file output. This resets the marker counter to zero.

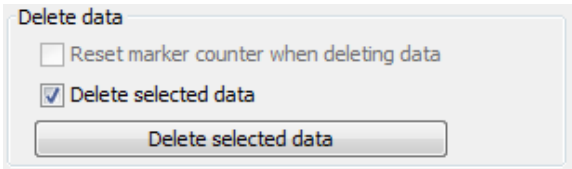
9.8.3. Delete data

To delete data from the logger, you have two options:

Delete all data:
All data from the logger will be erased. In this case, you have the option to reset the marker counter.



Delete selected data:
Only selected data will be erased



9.8.4. Data selection by marker

The tab “Data selection by marker” refers to the event overview, which is used for data download and conversion when a marker is selected in the data overview.

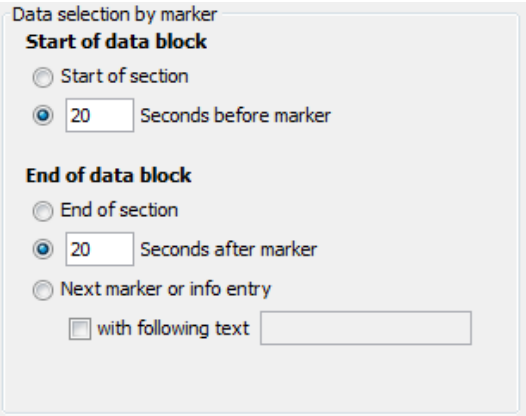


Figure 9.51: Data selection by marker

Data selection begins either at the last startup before the marker or at a fixed time before marker time.

For the upper boundary of the time frame there are four possibilities. It ends at:

- the end of the section
- a fixed time after the marker time
- the next marker or info entry
- the next marker or info entry for a particular label, which can be entered in the text field (see also user guide “Complex Trigger”).

9.8.5. Event overview tab

The tab “Event overview” displays the recorded data as sections (defined by a startup and shutdown of the data logger), including all markers set and info events. The following functions and information are available (see Figure 9.1).

- “Reload" will request any new data from the logger.
- Marker selection by the checkboxes: A time span around this event will be downloaded. (See section 9.8.4)
- The button [clear all] (it clears the choice, not the data), select all marker and select all

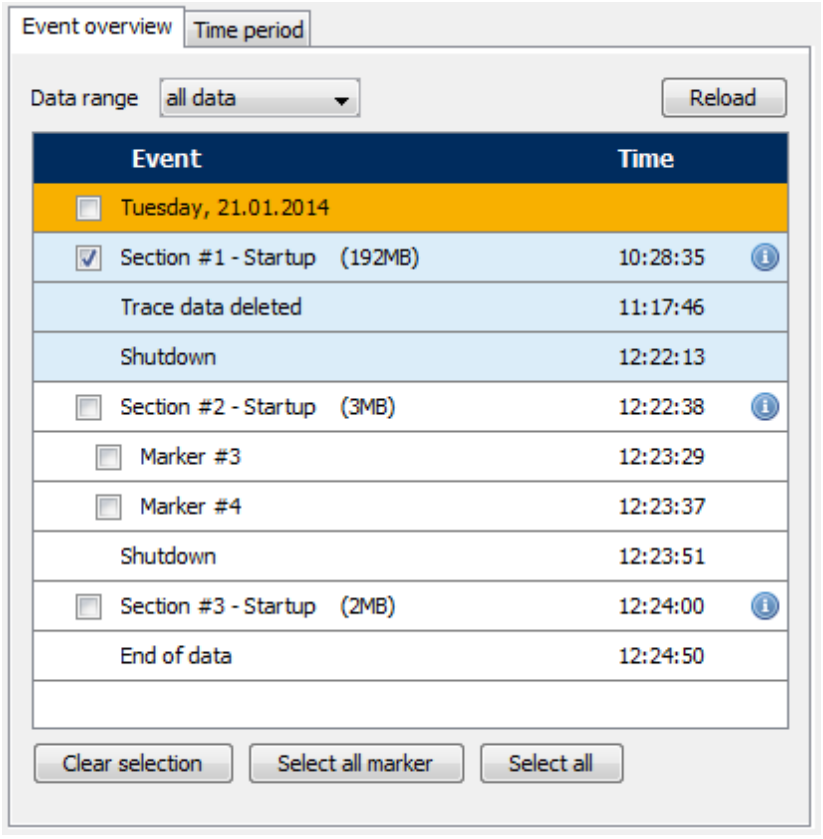


Figure 9.52: Event overview

A click on the button opens the Recorded channel window for a section (see Figure 9.53).

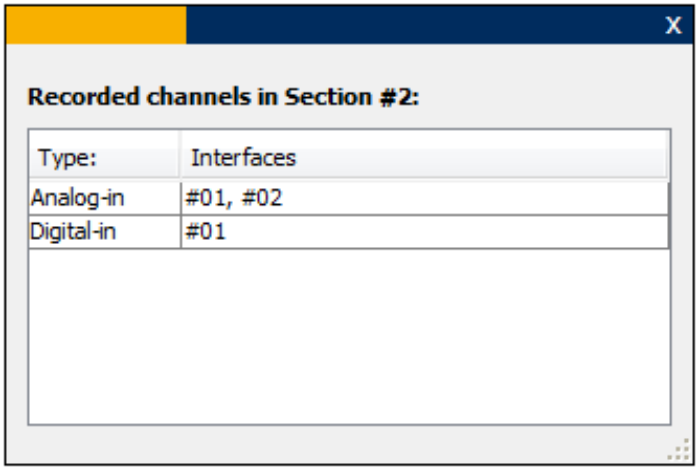


Figure 9.53: Section info

9.8.6. Time period overview

The tab “Time period” selects all data for download that is selected between a start time and an end time.

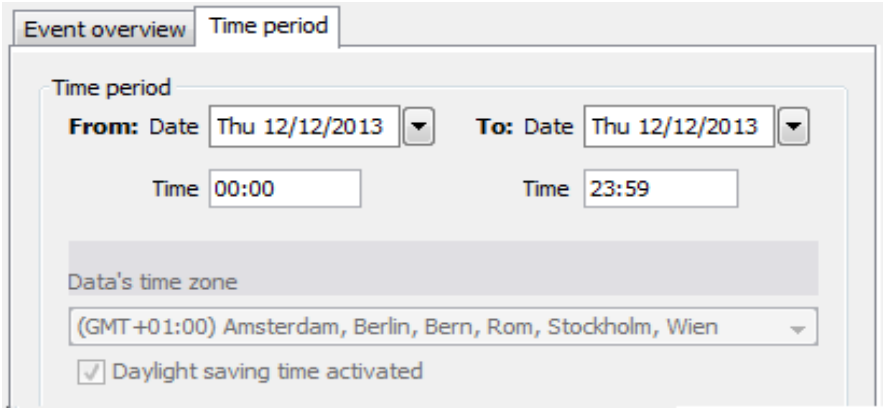


Figure 9.54: Time period overview

9.8.7. Data download button & settings

By a click on “Settings…” the download options window opens.

Here you have the choice between short and long trace file name. If the long format is selected, the data and the time are formatted differently.

Choose the download mode: Sorted and unsorted is available as Folder or ZIP option.

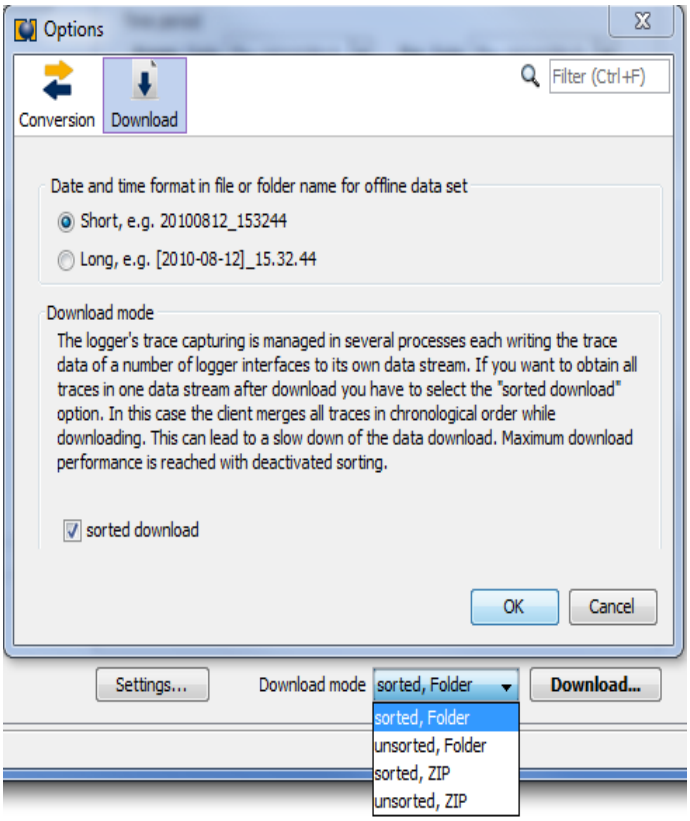


Figure 9.55: Download options

9.8.8. Starting the download

The download of data can be initiated by a click on the button [Download]. Data can be stored sorted or unsorted in folders or in zip-folder.

After a click on the [Download] button, you have to set a name for your offline data and a place to store.

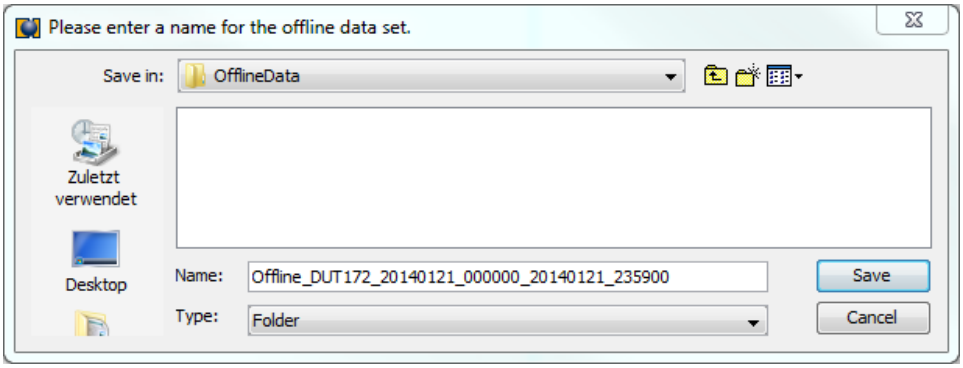


Figure 9.56: Saving offline data

9.9. Trace file viewer

To get an overview about the offline data, a trace file viewer is available. Add the offline data (unzipped) to the favorite box (see section 9.5). In the directory tree, you can find the trace data. A double click opens the trace file viewer. By the filter function, you could select the recorded channels.

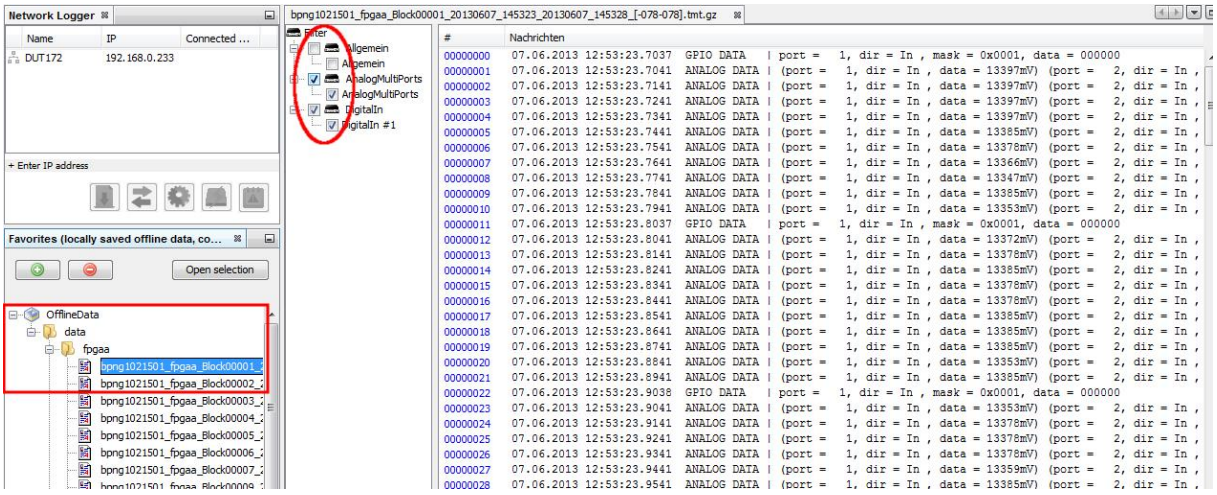


Figure 9.57: Trace file viewer

10. Data conversion of blue PiraT2 traces

The Conversion application allows saving the internal data from the logger on the computer disk in a chosen format. It is possible to convert or to load from two or more parallel data loggers. This requires a proper network configuration of the logger (recommended with setting „DHCP Client“ or „Fixed IP“).

10.1. Starting data conversion application

Convert logger data:

Connect the client to the data logger by selecting it in the list and click on the [Convert data] button.

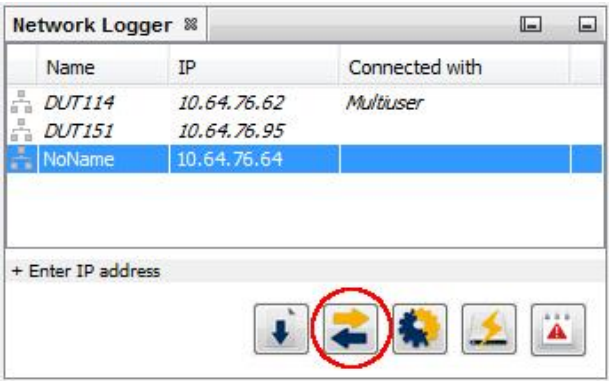


Figure 10.1: Open conversion menu

A click on the [Convert] button displays a dialog on the right hand side of the window (see Figure 10.3).

Convert offline data:

Add the offline data to the favorite box (see section 9.5).

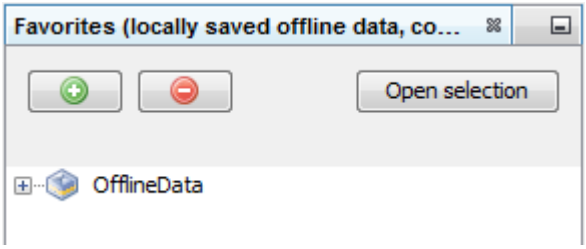


Figure 10.2: Favorite box

A double click on the offline data opens the followed window.

The conversion process can divide in three parts (see Figure 10.3)

- Event or Time Period selection (left)
- Channel selection (middle)
- Output selection (right)

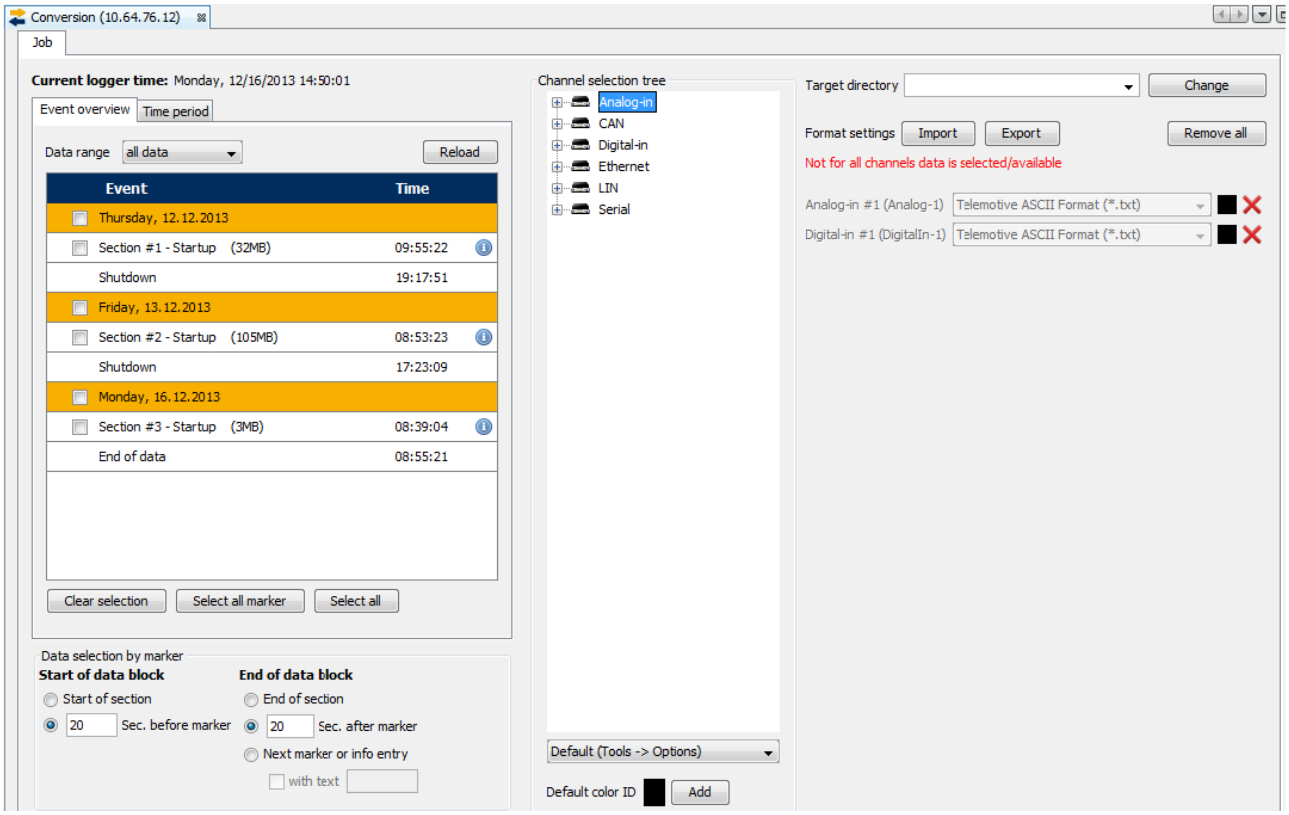


Figure 10.3: Data conversion overview

10.2. Event and time overview

The Event or Time Period selection:

- The tab “Event overview” displays the recorded data as sections (defined by a startup and shutdown of the data logger), including all markers set and info events (see section 9.8.5).
- The tab „Time period“ selects all data for conversion that is selected between a start time and an end time (see section 9.8.6).
- To select data by marker see section 9.8.4

10.3. Channel selection tree

Each channel is sorted into its type.

A double click on an available channel adds a line on the output window side.

Available channels appear in black when some data from the event overview is selected. Unavailable channels stay in gray.

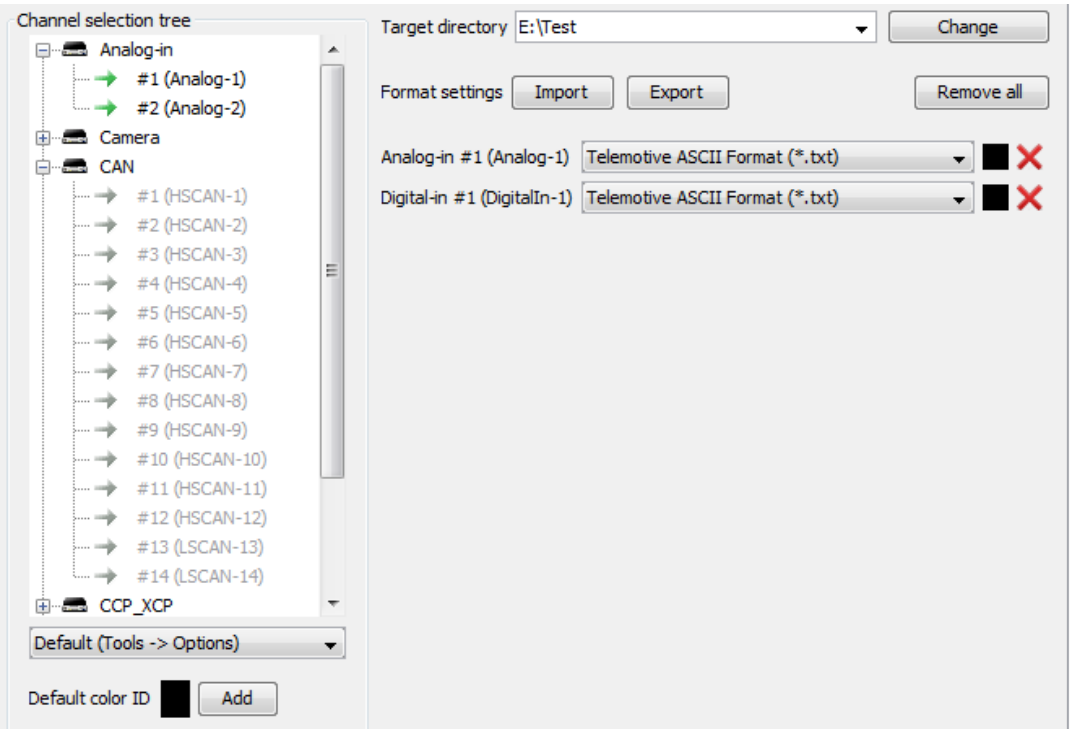


Figure 10.4: Channel selection tree

The combo box allows to choose the conversion format and the square on the right to change the color ID (data from the same channel being converted into the same format can be separated using different color IDs). By a click on the red cross the conversion channel is removed.

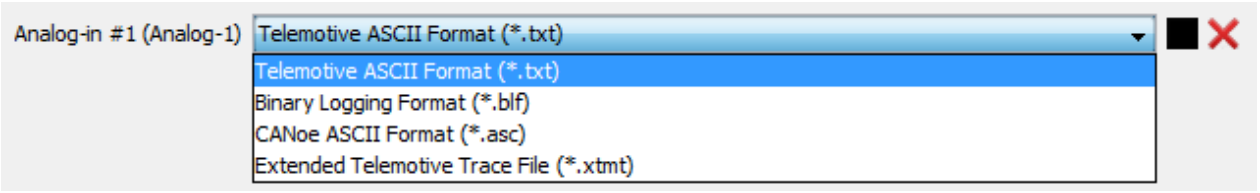


Figure 10.5: Changing the conversation format

In the drop down menu at the bottom (see Figure 9.1) you could set the file. This format is used for all channels, which are set to the conversion list. If “Default (Tools->Options)” is set, the default settings of section 10.5.5 are selected.

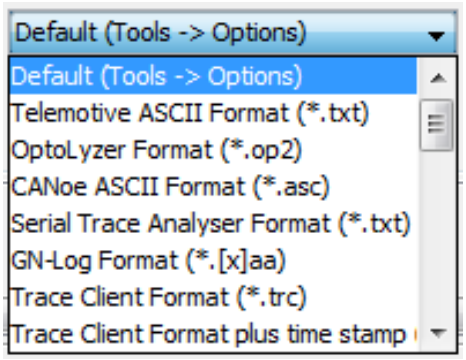


Figure 10.6: Default format

10.4. Output

The Output path can select here. The target directory combo box allows entering the name of the directory in which the converted data will be saved.

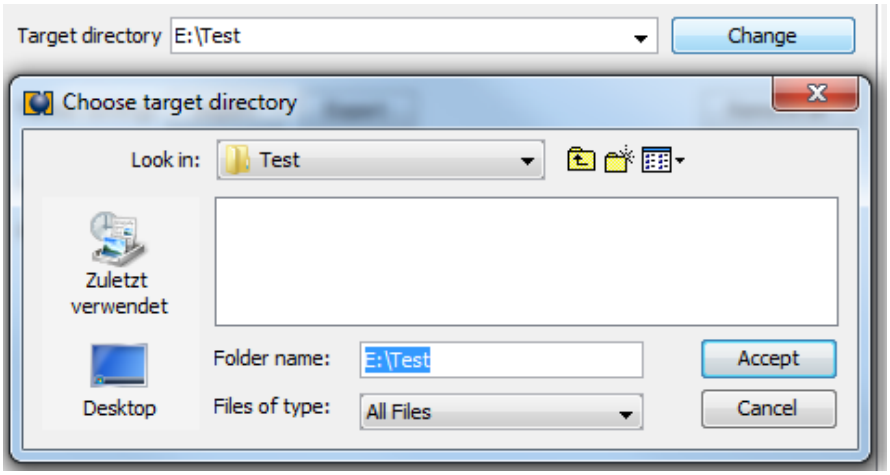


Figure 10.7: Choose output directory

Import Export Format Settings:

The Format settings with the selected channels can import or exported.

10.5. Conversion options

You could enter the options window by the toolbar “Tools/Options” or by the [Settings…] button.

10.5.1. General tab

On the “General” tab you can define the name of the tester which will be inserted into the converted file names.

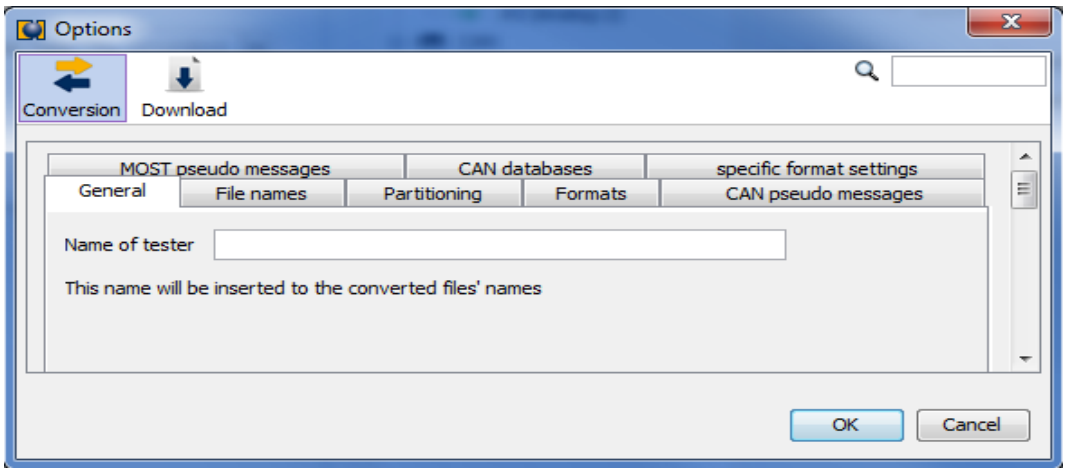


Figure 10.8: Enter name of tester

10.5.2. File names tab

The format of the converted data and the time span in the file name can be specified here (see Figure 10.9).

Here you have the choice between short and long trace file name. If the long format is selected, the data and the time are formatted differently.

Short: start date and time to end date and time
yyyymmdd_hhmmss_ yyyymmdd_hhmmss

Long: start date and time to end date and time
[yyyy-mm-dd]_hh.mm.ss_[yyyy-mm-dd]_hh.mm.ss

10.5.3. Time span in the file name:

According by the effectively included data:
The time stamp of the first and last recorded data in the selected interval is written in the filename

According to the time stamps in the data selection dialog
The time of the selected interval is written in the filename

Inserts all selected marker numbers in the file name.

Note:

If you set many markers, the filename will be very long.

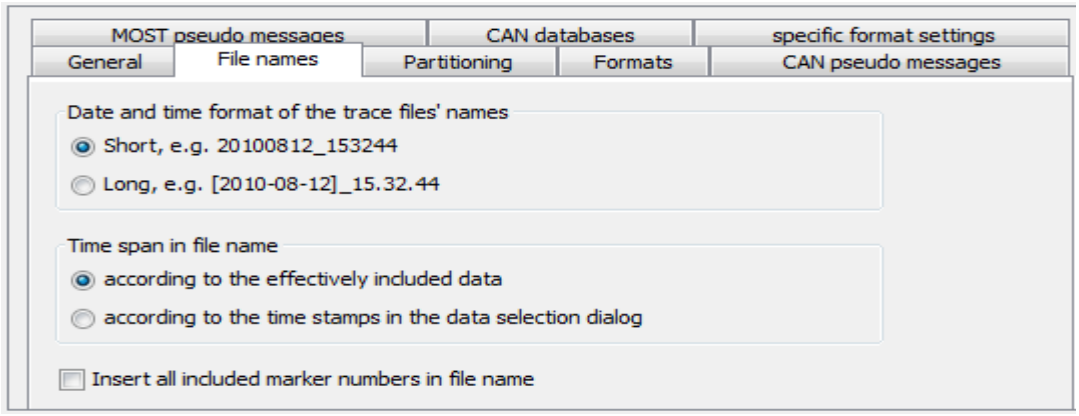


Figure 10.9: File names settings

10.5.4. Partitioning tab

The partitioning concerns splitting of the target trace files in multiple parts.

If the upper checkbox is selected, the client makes subdirectories for the converted data. You can choose if the names of these folders only contain the date or also the name of the data logger.

The maximum file size can be adjusted. If this file size is reached, the trace file is closed at this point and a new one is created.

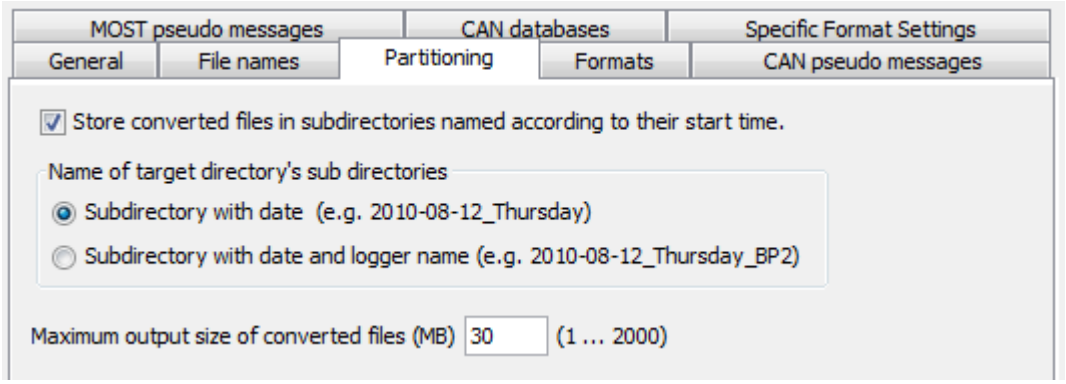


Figure 10.10: Partitioning settings

10.5.5. Formats tab

The available file formats are shown in Table 8.1 on page 29.

The default settings for format selection can be chosen here.

To convert analog data into *.asc of *.blf, the data must be transformed first into CAN Pseudo messages. The corresponding DBC file can be found on the associated CAN channels that are allocated among databases.

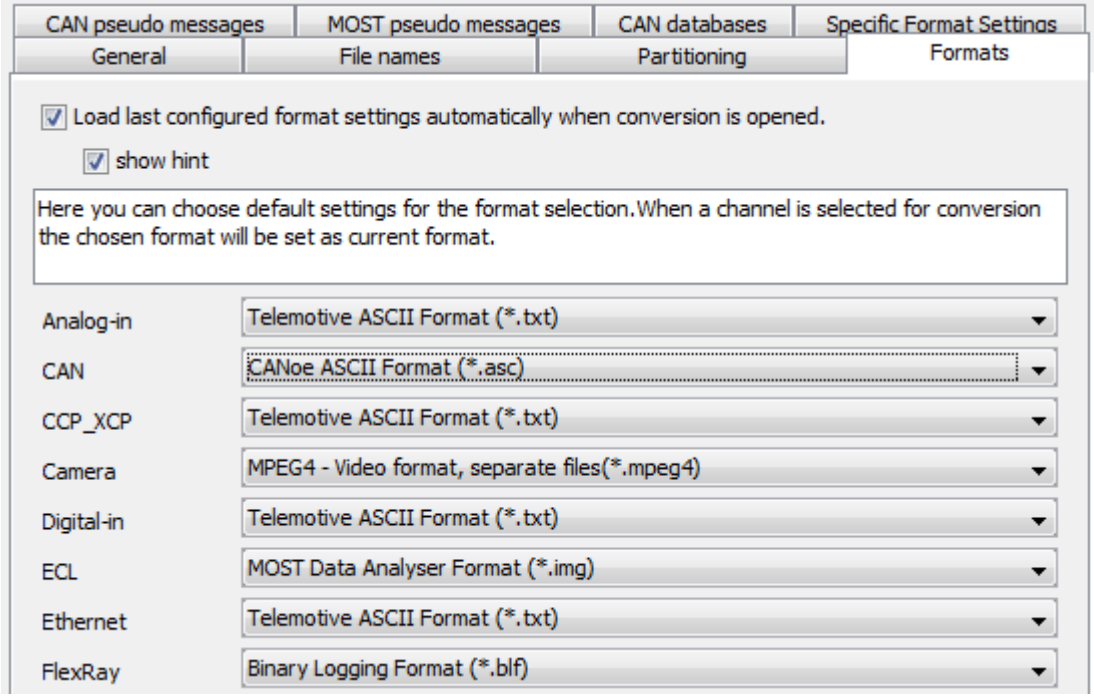


Table 10.1: Default format settings

10.5.6. CAN pseudo message tab

Some CAN file formats (e.g., CANoe ASCII) don't support the inclusion of the markers and the absolute time stamps. For this reason, the client can be configured to insert pseudo CAN messages with this information. A pseudo message is defined by the channel number, the CAN ID and the number of data bytes.

The pseudo message for the absolute time stamps is inserted every second. It contains the hour, minute, second, day, month, and year of the time stamp.

The pseudo message for markers is inserted at the time of the marker. It contains the marker number.

It is also possible to write analog measurements as a CAN pseudo messages. So the analog data could be written in the CANoe format as *.asc or *.blf files.

Therefore you have to assign a CAN Id and a CAN channel to each analog port that you want to convert. The selected CAN channel must be configured with a CAN data base (see section 9.7.11). This dbc file must contain a description of the CAN message of the selected CAN Id including a CAN signal with at least 16 bit of data length.

The analog data will be written to this signal when converting.

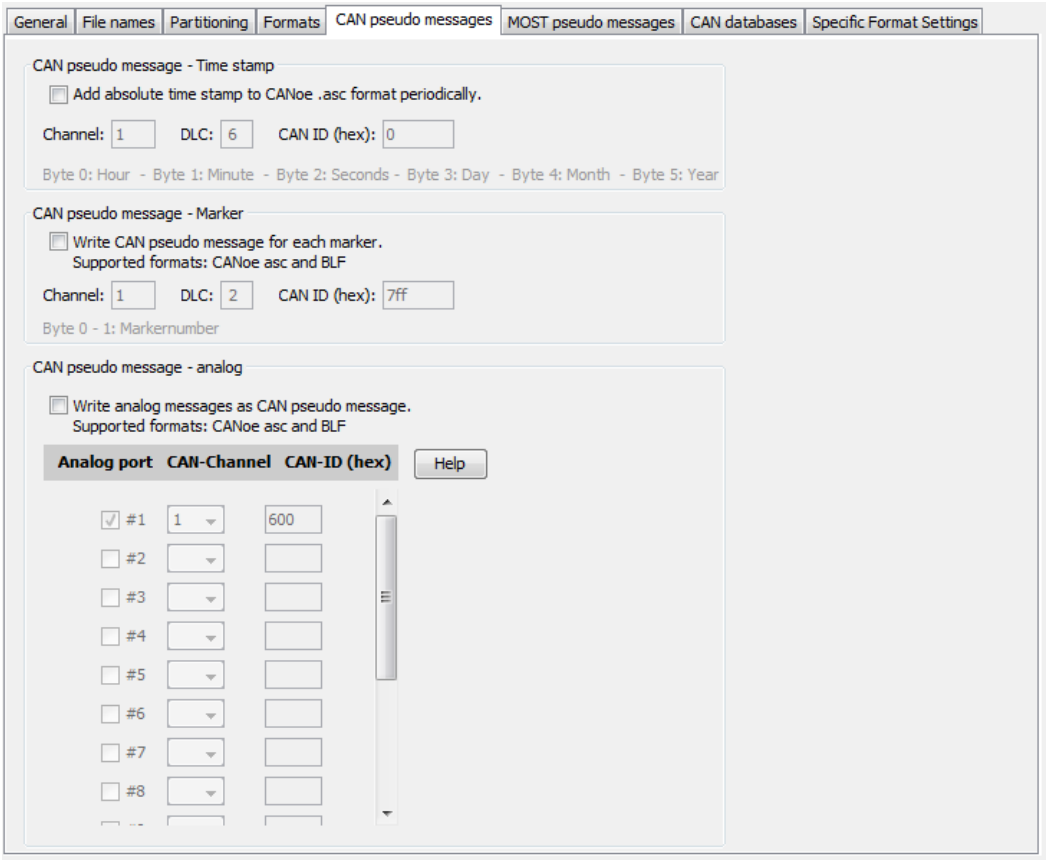


Figure 10.11: CAN pseudo massages settings

10.5.7. MOST pseudo message tab

Some MOST file formats (e.g., Optolyzer .op2) support the inclusion of the markers and the absolute time stamps. For this reason, the client can be configured to insert pseudo MOST messages with this information.

A pseudo message is defined by its source address, the target address, the function block ID and the function ID. The marker number is stored in the first two data bytes (the lower 8-bit are stored in the first data byte).

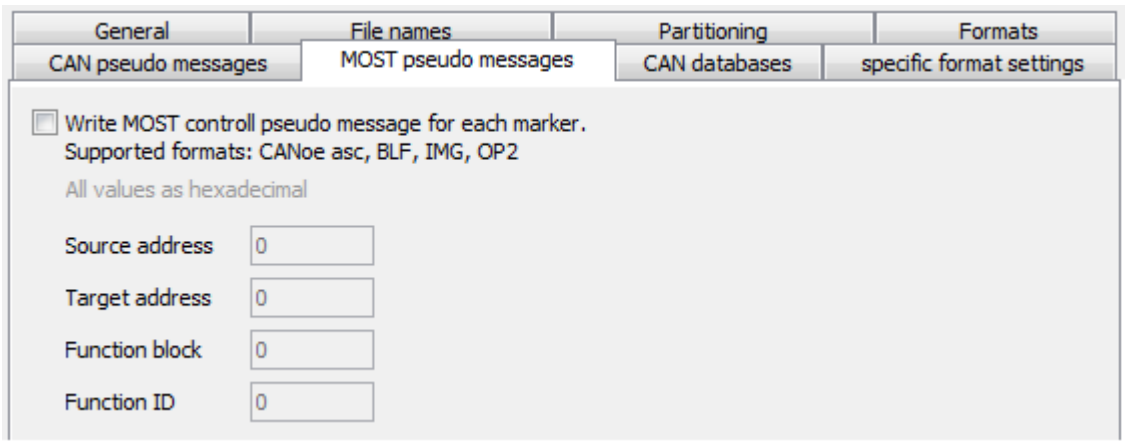


Figure 10.12: MOST pseudo massages settings

10.5.8. CAN databases tab

Databases settings are accessible by opening the Databases tab in the options menu. This menu allows configuring a database for each CAN channel. Databases contain human readable names and organization for CAN message IDs which allows easier configuration of CAN filters

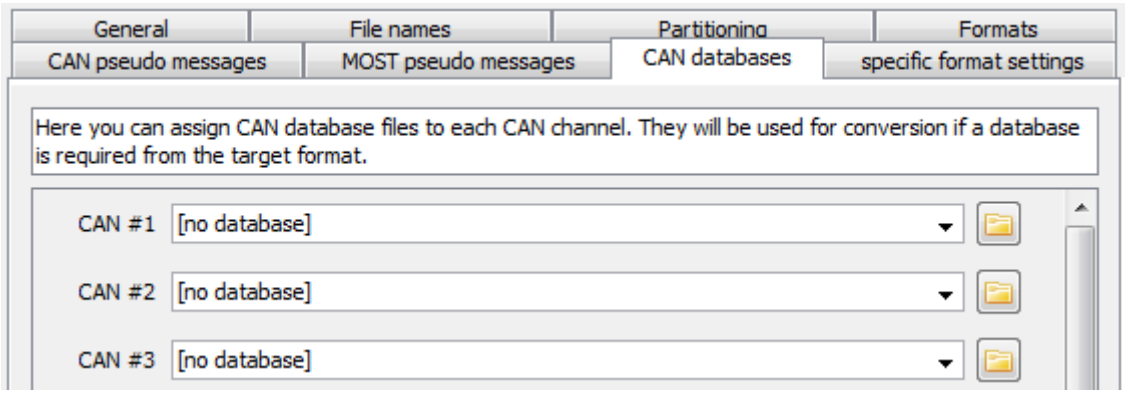


Figure 10.13: CAN database settings

10.5.9. Specific format settings tab

Here you can set up specific format settings for GPS Logging (option) and MOST 150 streaming.

For converting GPS data in GPS eXchange Format (*.gpx), KML Google Maps (*.kml), KMZ comp. Google Maps (*.kmz), or NMEA - ASCII GPS (*.nmea), you could select the time stamp source. It is possible to use the logger time or the satellite time.

The option “Show hint on TS format conversion” enable the hint (see Figure 10.15) by a conversion in the Isochronous raw format (*.ts).

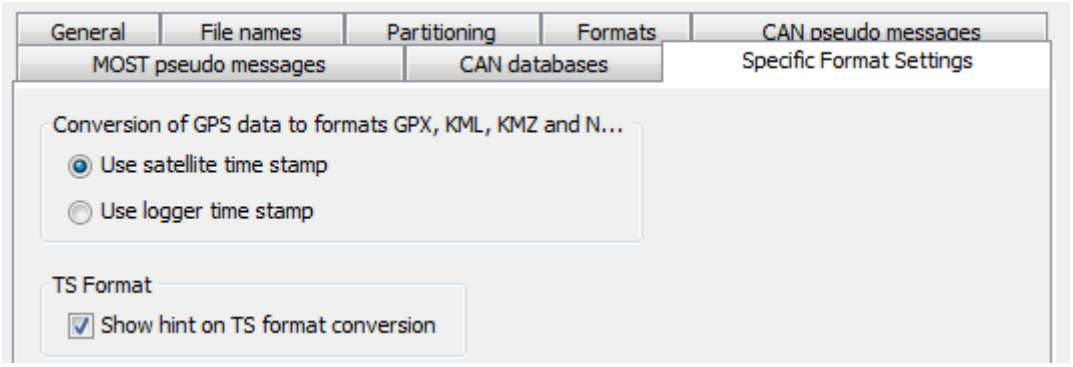


Figure 10.14: Specific format settings

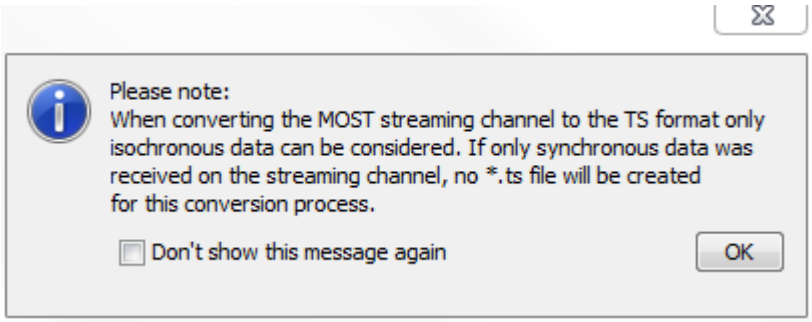


Figure 10.15: Hint on TS format conversion

11. Firmware- / license update of blue PiraT2

This section describes the handling of licenses and the update process.

Starting the License and Update application

Connect the client to the data logger by selecting it in the list and click on the [Firmware - / Licenses update] button.

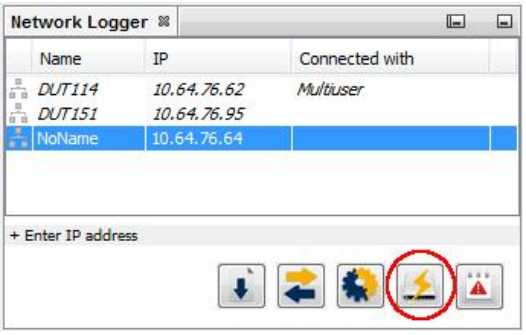


Figure 11.1: Firmware - / license update button.

A click on the [Firmware- / license update] button displays this dialog in the right hand side of the window.

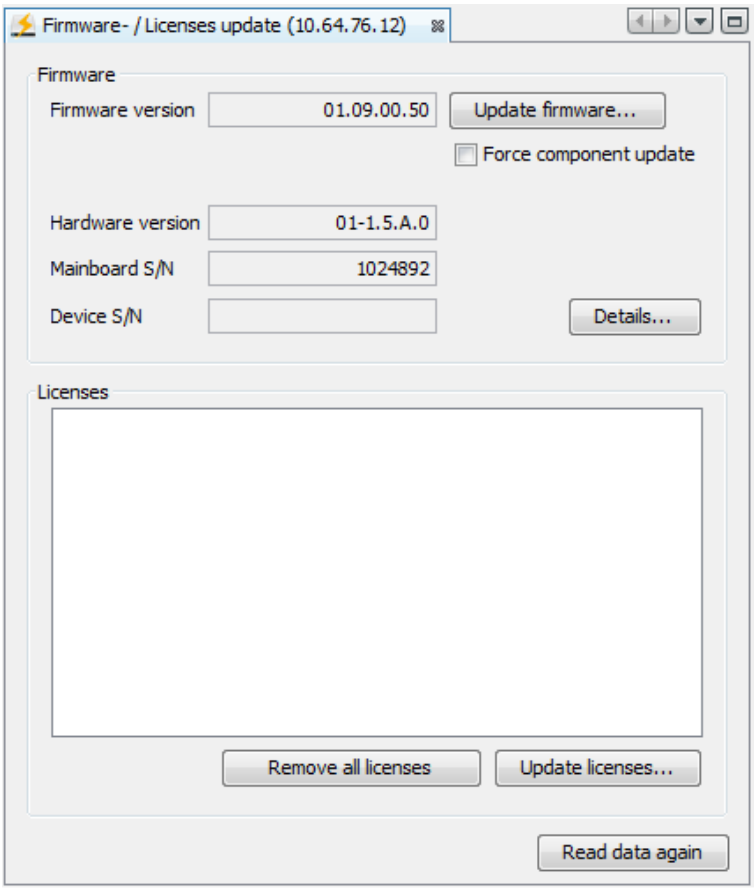
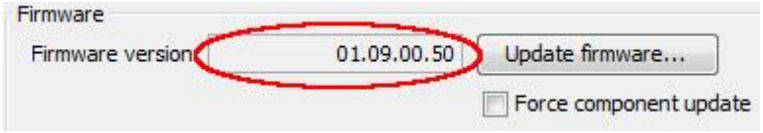


Figure 11.2: Firmware - / license update

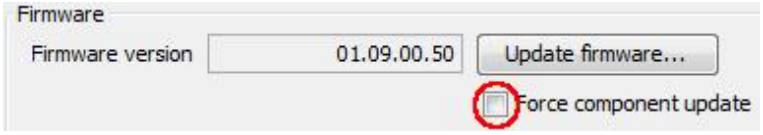
11.1. Current version

The current version of the firmware on the data logger appears.



11.2. Forced update

The update can be forced by ticking the corresponding checkbox. This can be useful to reinstall the same version or to downgrade to an older version on the logger.



11.3. Firmware update

In order to update the firmware, click on the button and then select the file containing the desired version (file extension should be .dat). Open it and wait until the update is completed.

Note: The firmware files can not be renamed. If you rename this file, the firmware update fails.

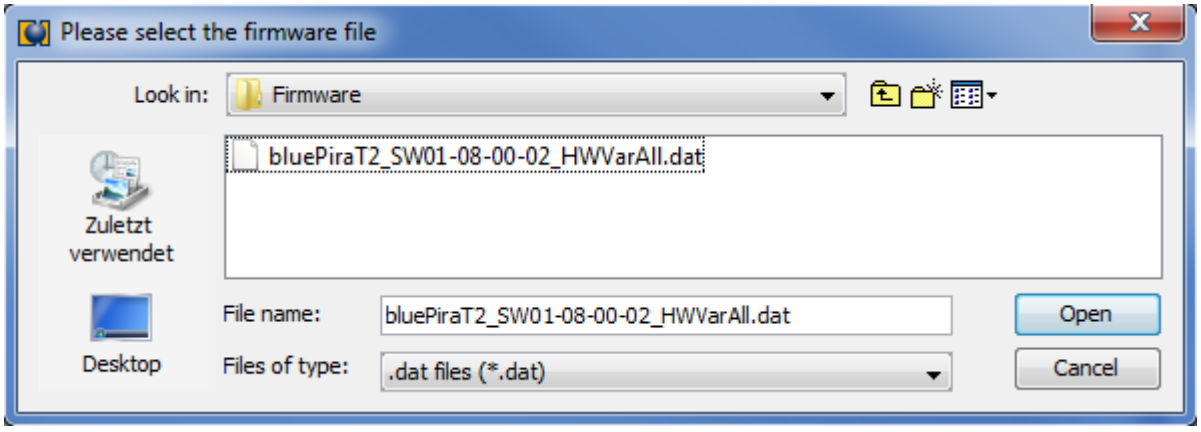
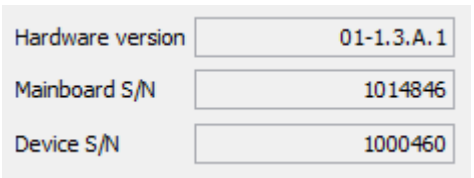


Figure 11.3: Select a firmware

The hardware version and the mainboard's serial number are shown.



11.4. Licenses

The active licenses are shown in the Licenses field.

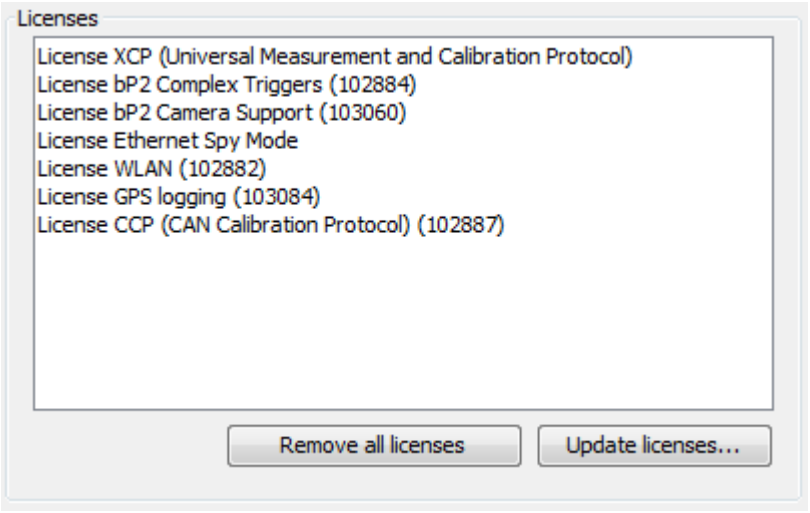


Figure 11.4: Licenses at the data logger

11.5. License update

In order to update licenses, click on the [Update licenses] button and choose the file containing the license (it should be .tml).

It is possible to remove all licenses by a click on the corresponding button.

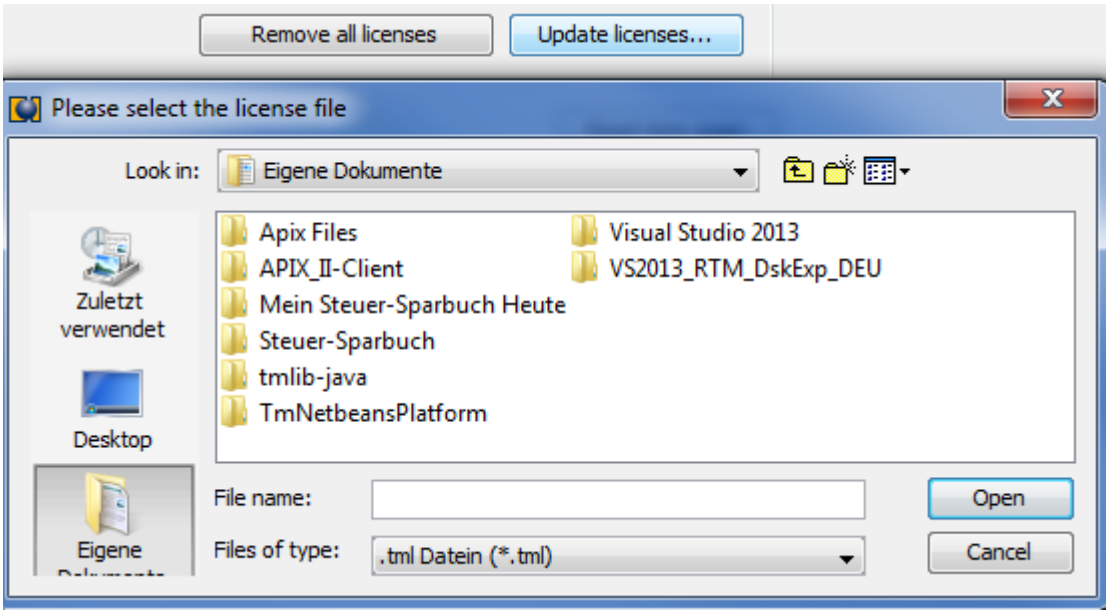


Figure 11.5: Select a license file

12. Creating a bug report

The Bug report application is meant to help in the understanding of logger's errors. Some errors are very simple to fix by the user himself.

12.1. Starting the bug reporting application

Connect the client to the data logger by selecting it in the list and click on the [Open bug report] button.

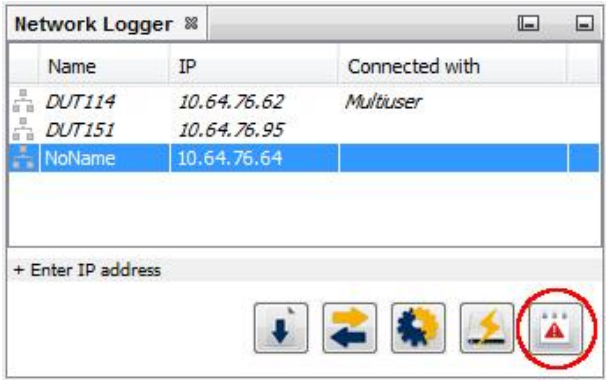


Figure 12.1: Bug report button

A click on the [Open bug report] button displays this dialog on the right hand side of the window.

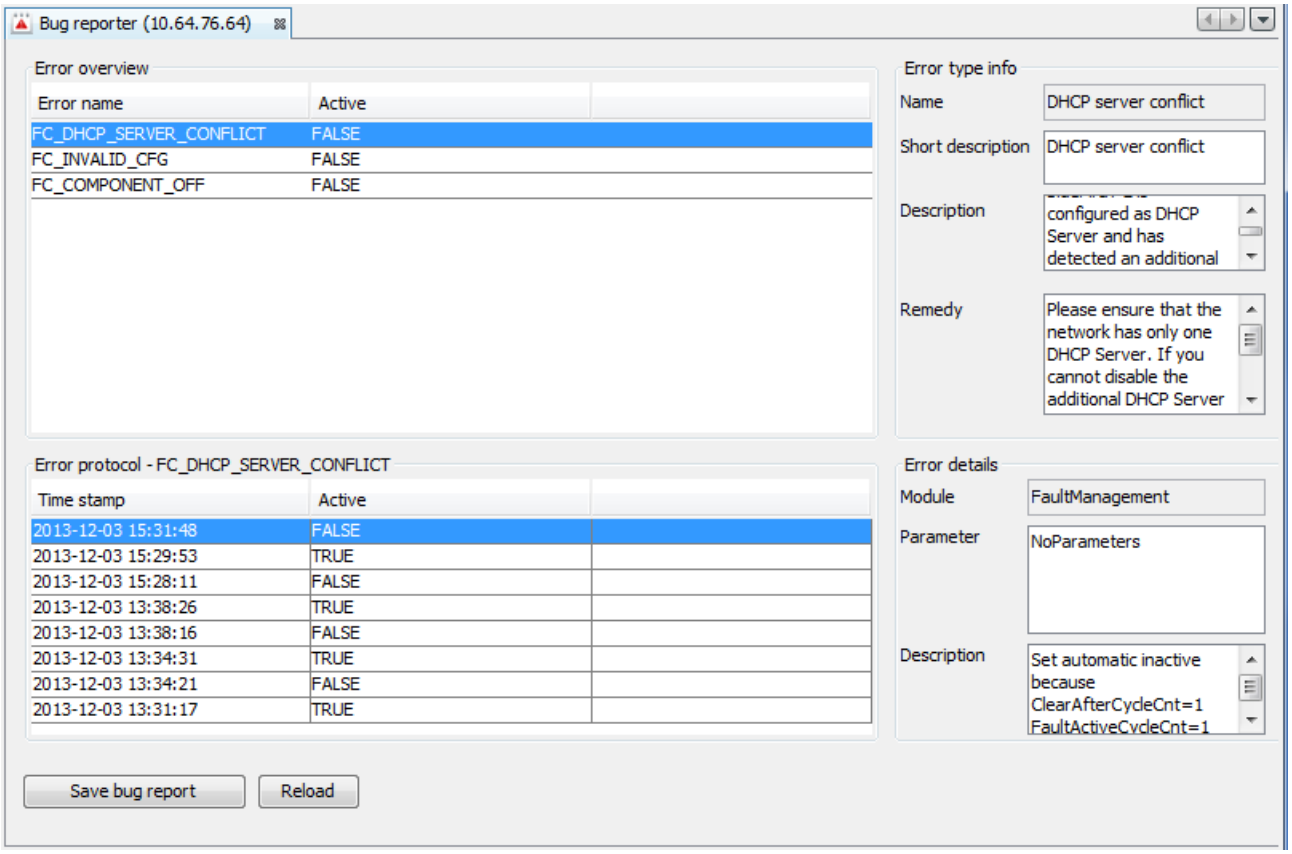
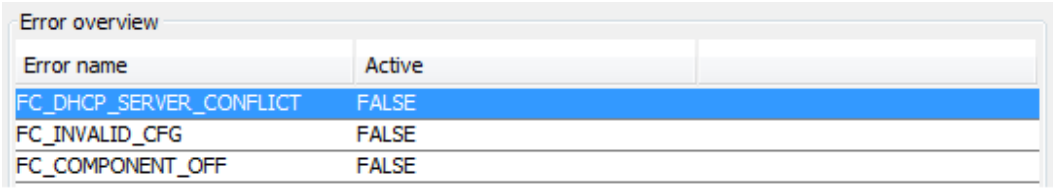


Figure 12.2: Bug report window

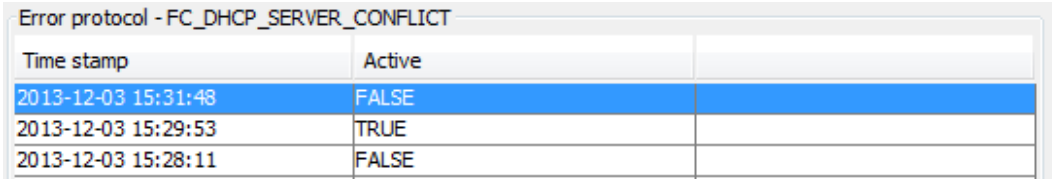
12.2. Error dialog

The Error dialog is separated in four areas:

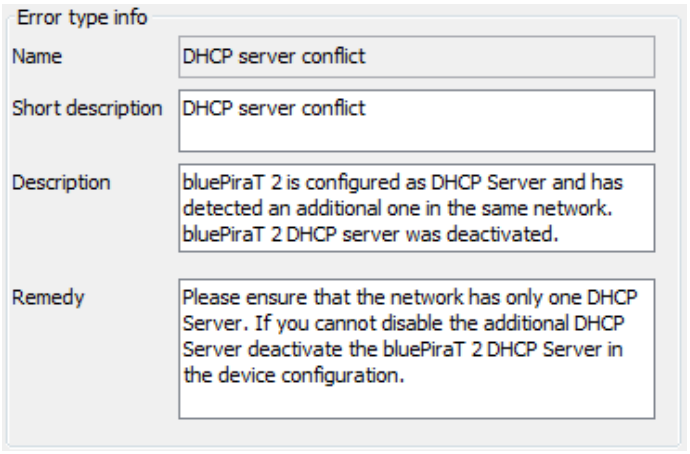
1. All errors kept on the logger are listed with their currently active status. True means that the error is still active.



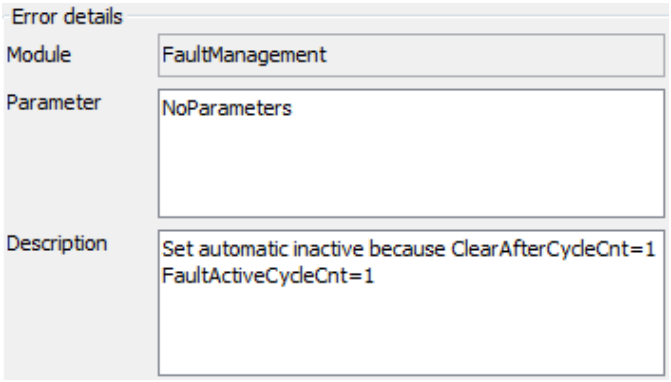
2. Each error has its history stored on the logger, even errors that are not currently active. The error protocol displays the error history.



3. Information about the type of error such as the name of the type, its short description, its description and a possible solution are provided.

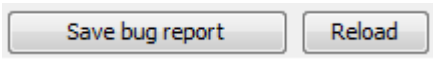


4. The details of the error are then explained in the last box.



12.3. Save error bug report

Errors already occurred are stored in the data logger. The bug report can be saved or refreshed (to get any new information from the logger).



A click on the [Save bug report] button opens a dialog window allowing to configure the saving. The user has three options for the included data.

- Option 1: This is the standard option. It includes client and data logger logs and configuration files, but does not include trace data.
- Option 2: Includes all raw trace data in the bug report. In most cases, this leads to a huge zip archive, which cannot be sent by email. Additionally, the creation of the bug report can take much longer. For these reasons, this option should only be used when requested by the blue PiraT 2 support team.
- Option 3: To avoid a possible huge zip archive when including all trace data, one can store only the raw trace data of a specific time period in the bug report.

Please insert details about the error on the right hand side (see Figure 12.3)

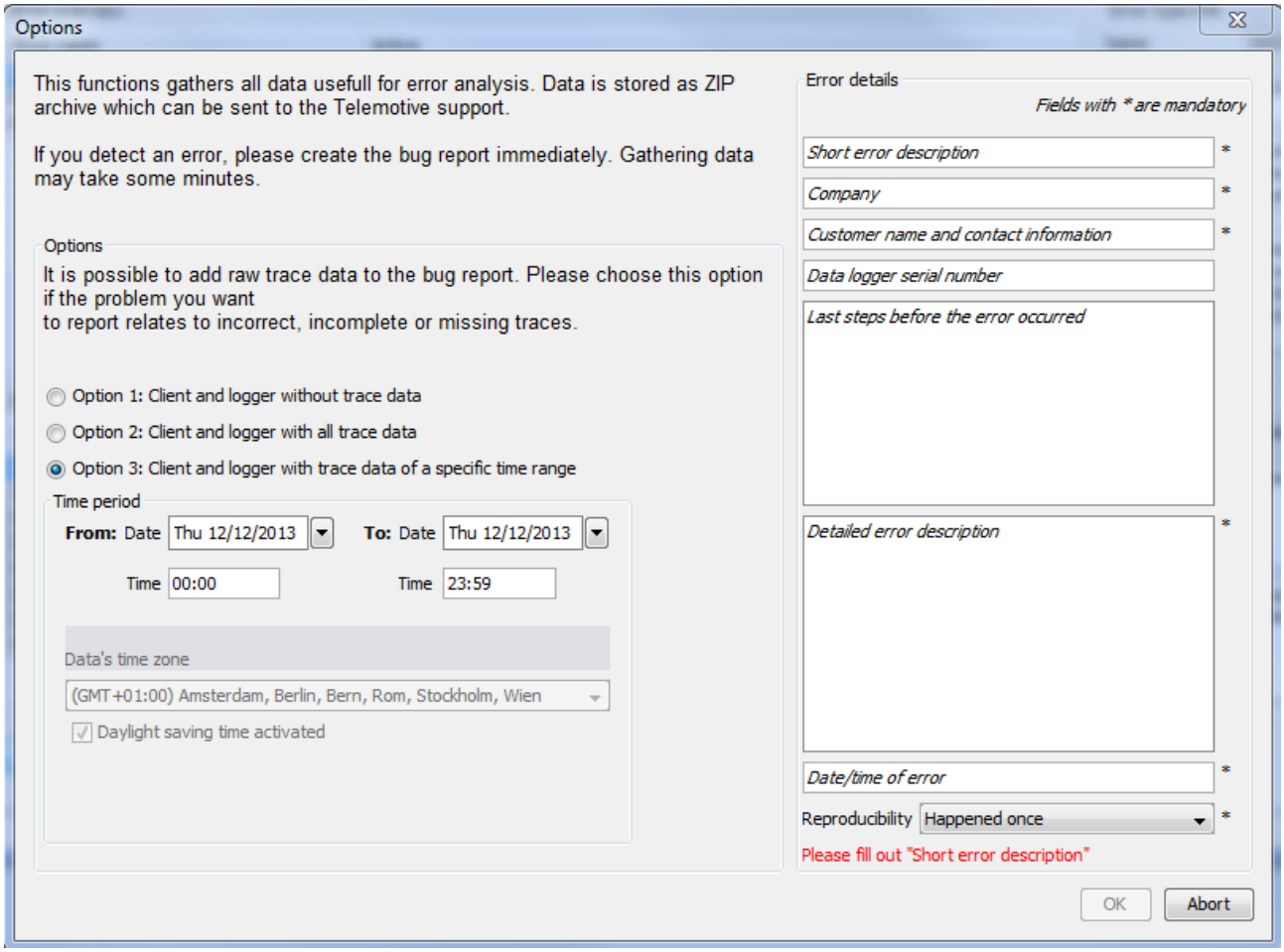


Figure 12.3: Saving the bug report

13. Data sheet

13.1. Technical data (standard version)

General data	
Nominal power supply voltage	13,8V
Power supply voltage	6.5 to 32 V (on system start needs >8,5V)
Reverse polarity protection of the supply voltage	Yes
Resistance to short-circuiting	Yes
Operating current (typ.)	1,8 A (@ 13,8 V)
Operating current (peak)	10 A
Standby current	< 10mA
Suspend Mode	No Suspend Mode
Operating temperature	-30°C to 60°C
Storage temperature	-30°C to 70°C
Weight (ca.)	2,4kg
Power management	
Startup time	< 30s (from standby to full operation)
Startup Logging	CAN, LIN, Serial, Analog (#1, #2), Digital (#1) < 25ms FlexRay, MOST, Digital (#2 to #5) < 45ms Analog (#3 to #10) < 53ms Ethernet < 18s
Standby Mode	Configurable time by no bus load
Wake	MOST, CAN-HS, CAN-LS, LIN, FlexRay, Digital (#1 , #2),KL 15, Trigger button
Case	
Size (ca.)	9.02" x 6.23" x 1.97" (275 mm x 190 mm x 60 mm)
Operating controls	- Pushbutton to startup data logger and set markers - Pushbutton to shutdown - Menu button
Displays	- Two line display - Active-LED (green): Displays data logger activity - Error-LED (red): Displays internal errors - Memory-LED (yellow): Displays memory warnings -CFActiv (green)
Connectors	
Connectors (front)	Gbit Ethernet, Wi-Fi 802.11 b/g/n (optional), GPS (optional), CF-Flash, USB 2.0 type A
BP2 150M14C8LFR (back)	Power supply, 12 x HS-CAN, 2 x LS-CAN, 8 x LIN, 4 x ETH, 6 x serial, 10 x Analog input, 5x Digital input, 3x Digital output, 2x(a/b) FlexRay, MOST150, Rosenberger (2xUSB 2.0 type A, 1xUSB 2.0 type B)
BP2 25M24C8LFR (back)	Power supply, 22 x HS-CAN, 2 x LS-CAN, 8 x LIN, 4 x ETH, 6 x serial, 10 x Analog input, 5x Digital input, 3x Digital output, 2x(a/b) FlexRay, MOST25, Rosenberger (2xUSB 2.0 type A, 1xUSB 2.0 type B)
BP2 14C6S8L (back)	Power supply, 12 x HS-CAN, 2 x LS-CAN, 8 x LIN, 4 x ETH, 6 x serial, 2 x Analog input, 1 x Digital input, 1 x Digital output, Rosenberger (2xUSB 2.0 type A, 1xUSB 2.0 type B)
Data recording	
Storage type	Hard drive 2,5" 100GB

	CF-card USB flash drive
Recording modes	Normal, circular buffer
Timestamp accuracy	1µs (MOST, CAN, LIN, FlexRay) 1ms (serial) 100ms (Ethernet)
MOST150 recording	**BP2 150M14C8LFR**
Channel	MDP MOST data packets, MEP MOST Ethernet packets, control channel, Network Status, MOST streaming (Synchron / Isochron) (option)
Status recording	Light on/off, Lock on/off
Filter	MDP filter (source address, target address), MEP filter (target MAC address)
MOST25 recording	**BP2 25M24C8LFR**
Channel	MDP MOST data packets, control channel, Network Status,
Status recording	Light on/off, Lock on/off
Filter	MDP filter (source address, target address)
CAN recording	**All types**
Channel	BP2 150M14C8LFR: 12 High speed, 2 Low speed BP2 25M24C8LFR: 22 High speed, 2 Low speed
Baud rate	up to 1000000 Baud at HS-CAN up to 125000 Baud at LS-CAN
Transceiver	TJA1041A, TJA1054A
Filter	CAN ID Filter
Status	Error frames
Serial recording	**All types**
Type	RS232
Channel	6
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600 Baud
Data Bits	5,6,7,8
Stop Bits	1,1.5,2
Parity	none, odd, even
LIN Recording	**All types**
Channel	8
Baudrate	1200, 2400, 4800, 9600, 10400, 19200, 20000 Baud
Tranceiver	TJA1021
FlexRay	**not in BP2 14C6S8L**
Channel	2x(a/b)
Bitrate	Up to 10 Mbit/s
Tranceiver	AS8221B
Recording	Null frames, Startup Phase, Trailer CRC, Symbol
Ethernet recording	
Channel	5
Baud rate	1x1GBit/s (front) 4x100Mbit/s (back)
Recording	GN-Log, raw, UTF8, UDP, DLT (optional), EsoTrace (optional)
Analog recording (#1 and #2)	**All types**
Channel	1xUbat (internal), 1x external

Range of measurement	0 V - +20 V
Resolution	7 mV
Accuracy	3%
Sampling interval	1ms to 100s
Digital Input (#1)	**All types**
Channel	1
Switching threshold	9,5V ±0,2 V
Hysteresis	0,3 V ±0,2 V
Sampling interval	1ms to 100s
Digital Output (#1)	**All types**
Channel	1
Output voltage	~Ubat
Output current	Up to 1 A
Analog recording (#3 to #10)	**not in BP2 14C6S8L**
Channel	8
Range of measurement	-10V to +20V
Resolution	8mV
Accuracy	3%
Sampling interval	1ms to 100s
Digital Input (#2 to #5)	**not in BP2 14C6S8L**
Channel	4
Switching threshold	Configurable between 0V and 12V
Hysteresis	3,2 V ±2V
Sampling interval	1ms to 100s
Digital Output (#2 to #3)	**not in BP2 14C6S8L**
Channel	2
Output voltage	~ Ubat
Output current	up to 0.5 A (continuous load) BP2 150M14C8LFR up to 1.0 A (continuous load) BP2 25M24C8LFR

13.2. Pin assignments and harnesses

Part	For Vehicle	150M14C8LFR	25M24C8LFR	14C6S8L
blue PiraT2 universal harness see section 13.2.1	Power, GND, Wake 12x high speed CAN 2x low speed CAN 8x LIN 1x digital out Remote Control I/F	✓	✓	✓
blue PiraT2 Serial/UART extension harness see section 13.2.2	6x RS232 1x Analog in 1x Digital in	✓	✓	✓
blue PiraT2 Analog/Digital extension harness see section 13.2.3	8x Analog in 4x Digital in 2x Digital out 1x ECL	✓	✓	-
blue PiraT2 FlexRay extension harness see section 13.2.5	2x FlexRay a 2x FlexRay b	✓	-	-
blue PiraT2 CAN/FlexRay extension harness see section 13.2.6	10x high speed CAN 2x FlexRay a 2x FlexRay b	-	✓	-
blue PiraT2 Ethernet extension kit see section 13.2.4	4x Ethernet RJ45	✓	✓	✓

Table 13.1: extension harness overview

Warning: Clamp 31 should be the only ground connection between the data logger and connected devices. Connecting signal ground lines is limited to special cases in which one can guarantee that ground loops cannot occur.

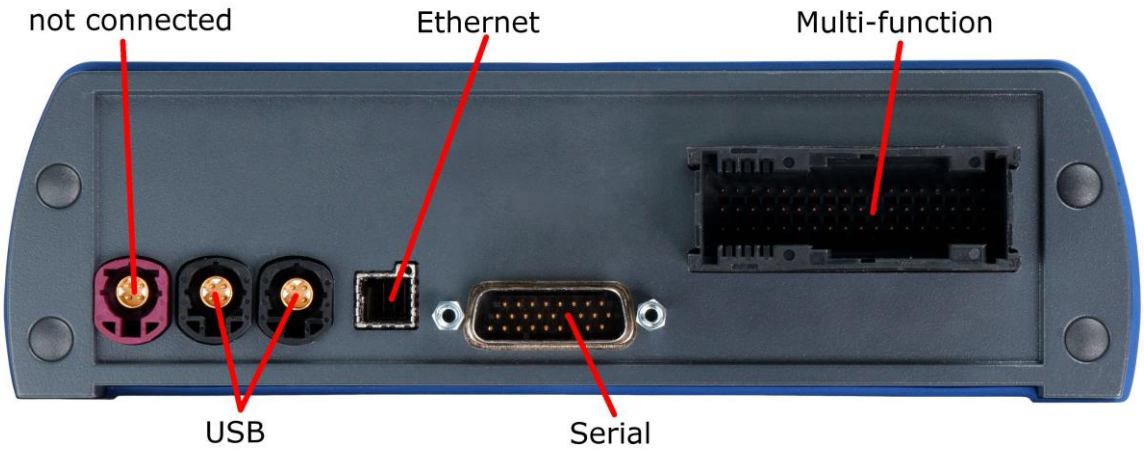


Figure 13.1: Back side “blue PiraT2_14C6S8L”

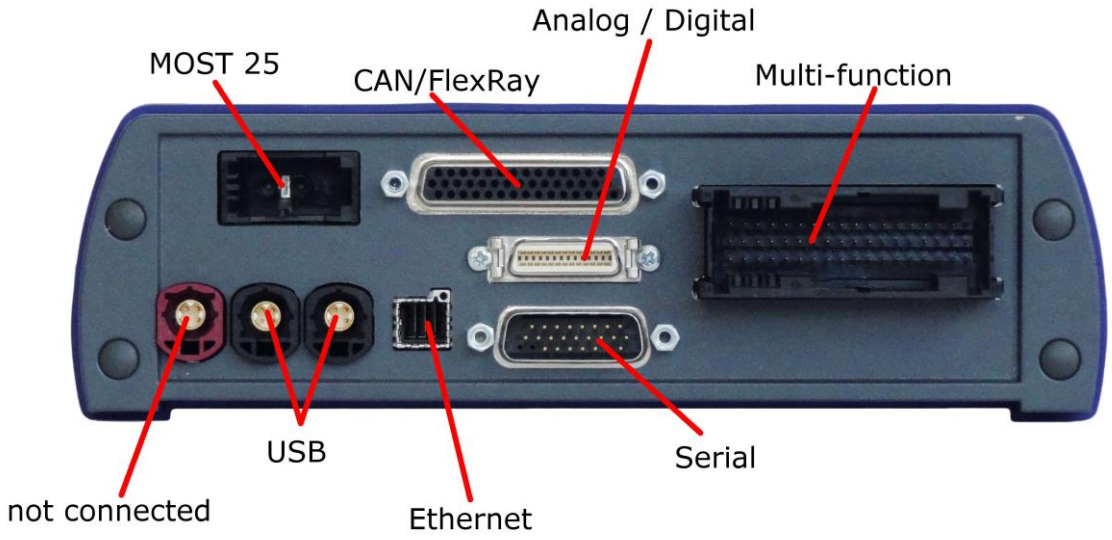


Figure 13.2: Back side “blue PiraT2_ 25M24C8LFR”

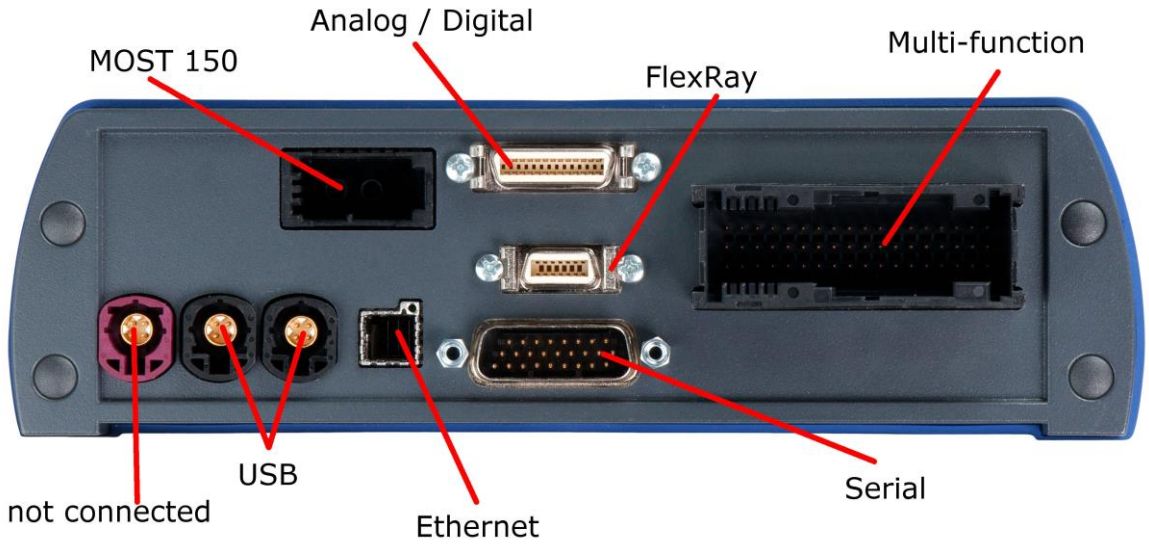


Figure 13.3: Back side “blue PiraT2_ 150M14C8LFR”

13.2.1. Data logger: Multi-function connector

Name	Type	Manufacturer-Nr.	Manufacturer
ELO 54pin	Shield	1-1355928-2	Tyco
	Housing	1355929-2	Tyco
	Housing	1355930-2	Tyco
	Contakt	2-1411550-1	Tyco

Table 13.2: MQS 54pin

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
MQS 54pin	Signal		Type	Pin
1	KL15_Wake	Wake Up from KL15	banana plug blue	----
2	HSCAN_L_11	High Speed CAN #11 LOW	DSUB-9 / male	2
3	HSCAN_L_10	High Speed CAN #10 LOW	DSUB-9 / male	2
4	HSCAN_L_9	High Speed CAN #09 LOW	DSUB-9 / male	2
5	HSCAN_L_8	High Speed CAN #08 LOW	DSUB-9 / male	2
6	HSCAN_L_7	High Speed CAN #07 LOW	DSUB-9 / male	2
7	HSCAN_L_6	High Speed CAN #06 LOW	DSUB-9 / male	2
8	HSCAN_L_5	High Speed CAN #05 LOW	DSUB-9 / male	2
9	HSCAN_L_4	High Speed CAN #04 LOW	DSUB-9 / male	2
10	HSCAN_L_3	High Speed CAN #03 LOW	DSUB-9 / male	2
11	HSCAN_L_2	High Speed CAN #02 LOW	DSUB-9 / male	2
12	HSCAN_L_1	High Speed CAN #01 LOW	DSUB-9 / male	2
13	LSCAN_L_1	Low Speed CAN #13 LOW	DSUB-9 / male	2
14	LIN_CON_7	LIN #7	DSUB-9 / male	7
15	TOUT_BAT	NA (rfu)	open	----
16	NA	Not connected	----------	----
17	NA	Not connected	----------	----
18	DIG_OUT_1	Digital OUT #01	banana jack green	----
19	HSCAN_H_12	High Speed CAN #12 HIGH	DSUB-9 / male	7
20	HSCAN_H_11	High Speed CAN #11 HIGH	DSUB-9 / male	7
21	HSCAN_H_10	High Speed CAN #10 HIGH	DSUB-9 / male	7
22	HSCAN_H_9	High Speed CAN #09 HIGH	DSUB-9 / male	7
23	HSCAN_H_8	High Speed CAN #08 HIGH	DSUB-9 / male	7
24	HSCAN_H_7	High Speed CAN #07 HIGH	DSUB-9 / male	7
25	HSCAN_H_6	High Speed CAN #06 HIGH	DSUB-9 / male	7
26	HSCAN_H_5	High Speed CAN #05 HIGH	DSUB-9 / male	7
27	HSCAN_H_4	High Speed CAN #04 HIGH	DSUB-9 / male	7
28	HSCAN_H_3	High Speed CAN #03 HIGH	DSUB-9 / male	7
29	HSCAN_H_2	High Speed CAN #02 HIGH	DSUB-9 / male	7
30	HSCAN_H_1	High Speed CAN #01 HIGH	DSUB-9 / male	7
31	LSCAN_H_1	Low Speed CAN #13 HIGH	DSUB-9 / male	7
32	LIN_CON_8	LIN #08	DSUB-9 / male	7
33	RIN_BAT	NA (rfu)	open	----
34	NA	Not connected (rfu)	----------	----
35	KL30	Please combine pins 35, 37, 39 for the KL30	banana plug red	----
36	NA	Not connected (rfu)	----------	----
37	KL30	Please combine pins 35, 37, 39 for the KL30	banana plug red	----
38	HSCAN_L_12	High Speed CAN #12 LOW	DSUB-9 / male	2
39	KL30	Please combine pins 35, 37, 39 for the KL30	banana plug red	----
40	TT_OUT_CON	Clock_Out for cascading device	Lumberg KV81-8	4
41	TT_IN_CON	Clock_IN for cascading device	Lumberg KV81-8	5

42	LIN_CON_1	LIN #01	DSUB-9 / male	7
43	LIN_CON_2	LIN #02	DSUB-9 / male	7
44	LIN_CON_3	LIN #03	DSUB-9 / male	7
45	LSCAN_L_2	Low Speed CAN #14 LOW	DSUB-9 / male	2
46	LSCAN_H_2	Low Speed CAN #14 HIGH	DSUB-9 / male	7
47	LIN_CON_4	LIN #04	DSUB-9 / male	7
48	LIN_CON_5	LIN #05	DSUB-9 / male	7
49	LIN_CON_6	LIN #06	DSUB-9 / male	7
50	LSCAN_L_RC	CAN RemoteControl	LUMBERG KV81-8	1
51	LSCAN_H_RC	CAN RemoteControl	LUMBERG KV81-8	3
52	KL31	Please combine pins 52, 53, 54 for the KL31	banana plug black	----
53	KL31	Please combine pins 52, 53, 54 for the KL31	banana plug black	----
54	KL31	Please combine pins 52, 53, 54 for the KL31	banana plug black	----

Table 13.3: Pin assignment of the multi-function connector

13.2.2. Serial connector (D-Sub 26)

The 26-pin D-Sub connector combines RS232, digital and analog interfaces.

Name	Type	Manufacturer-Nr.	Manufacturer
DSUB 26pin	Connector	HD 26F	(Reichelt)
	Shell	1-1478762-5	Tyco

Table 13.4: D-SUB 26pin

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
D-SUB 26pin	Signal		Type	Pin
1	RS232_TOUT_1	RS232 #1 Tx	DSUB-9 / male	3
2	RS232_ROUT_1	RS232 #1 Rx	DSUB-9 / male	2
3	RS232_TOUT_2	RS232 #2 Tx	DSUB-9 / male	3
4	RS232_ROUT_2	RS232 #2 Rx	DSUB-9 / male	2
5	NA	Not connected	----------	----
6	NA	Not connected	----------	----
7	NA	Not connected	----------	----
8	NA	Not connected	----------	----
9	NA	Not connected	----------	----
10	RS232_TOUT_3	RS232 #3 Tx	DSUB-9 / male	3
11	RS232_ROUT_3	RS232 #3 Rx	DSUB-9 / male	2
12	RS232_TOUT_4	RS232 #4 Tx	DSUB-9 / male	3
13	RS232_ROUT_4	RS232 #4 Rx	DSUB-9 / male	2
14	NA	Not connected	----------	----
15	NA	Not connected	----------	----
16	TT_CASCADE_CON	NA (rfu)	----------	----
17	NA	Not connected	----------	----
18	ANA_IN_GND_2	Please connect ANA_IN_GND_2 to KL31	banana plug yellow	----
19	RS232_TOUT_5	RS232 #5 Tx	DSUB-9 / male	3
20	RS232_ROUT_5	RS232 #5 Rx	DSUB-9 / male	2
21	RS232_TOUT_6	RS232 #6 Tx	DSUB-9 / male	3
22	RS232_ROUT_6	RS232 #6 Rx	DSUB-9 / male	2
23	SYNC_CASCADE_CON	NA (rfu)	----------	----
24	DIG_IN_1	Digital IN #01 is referenced to KL31 with internal Pull down, Threshold 9,2 ± 0,1 Volts, Hysteresis 0,4 ± 0,1 Volt DIG_IN_1 might be used as a Marker (with a push-button to positive Supply Voltage KL30)	banana plug green	----
25	NA	Not connected	----------	----
26	ANA_INSGNL_2	Analog Interface #02 SIGNAL IN	banana plug yellow	----

Table 13.5: Pin assignment of the Digital/Analog connector

13.2.3. Analog / Digital connector (26-pin) (not at 14C6S8L)

Name	Type	Manufacturer-Nr.	Manufacturer
Ribbon 26pin	Plug Connector	10126-3000PE	3M
	Shell	10326-52F0-008	3M

Table 13.6: Mini D Ribbon 3M 26pin

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
3M 26 pin	Signal		Type	Pin
1	DIG_IN_2	Digital IN #02 (Referenced to KL31)	banana plug green	----
2	DIG_IN_3	Digital IN #03 (Referenced to KL31)	banana plug green	----
3	DIG_IN_4	Digital IN #04 (Referenced to KL31)	banana plug green	----
4	DIG_IN_5	Digital IN #05 (Referenced to KL31)	banana plug green	----
5	DIG_OUT_2	Digital OUT #02	banana jack green	----
6	DIG_OUT_3	Digital OUT #03	banana jack green	----
7	SHIELD	NA	----------	----
8	SHIELD	NA	----------	----
9	ANA_IN_SGNL_3	Analog Interface #03 SIGNAL IN	banana plug yellow	----
10	ANA_IN_SGNL_4	Analog Interface #04 SIGNAL IN	banana plug yellow	----
11	ANA_IN_SGNL_5	Analog Interface #05 SIGNAL IN	banana plug yellow	----
12	ANA_IN_SGNL_6	Analog Interface #06 SIGNAL IN	banana plug yellow	----
13	ANA_IN_SGNL_7	Analog Interface #07 SIGNAL IN	banana plug yellow	----
14	ANA_IN_SGNL_8	Analog Interface #08 SIGNAL IN	banana plug yellow	----
15	ANA_IN_SGNL_9	Analog Interface #09 SIGNAL IN	banana plug yellow	----
16	ANA_IN_SGNL_10	Analog Interface #10 SIGNAL IN	banana plug yellow	----
17	ANA_IN_GND_3	Analog Interface #03 GROUND	banana plug yellow	----
18	ANA_IN_GND_4	Analog Interface #04 GROUND	banana plug yellow	----
19	ANA_IN_GND_5	Analog Interface #05 GROUND	banana plug yellow	----
20	ANA_IN_GND_6	Analog Interface #06 GROUND	banana plug yellow	----
21	ANA_IN_GND_7	Analog Interface #07 GROUND	banana plug yellow	----
22	ANA_IN_GND_8	Analog Interface #08 GROUND	banana plug yellow	----
23	ANA_IN_GND_9	Analog Interface #09 GROUND	banana plug yellow	----
24	ANA_IN_GND_10	Analog Interface #10 GROUND	banana plug yellow	----
25	SHIELD	NA	----------	----
26	ECL_IN	Electrical Control Line (SMSC)	DSUB-9 / male	7

Table 13.7: Pin assignment of the Analog/Digital connector

13.2.4. Ethernet connector

Name	Type	Manufacturer-Nr.	Manufacturer
FCI	Cable Assembly	10054999-R0050Aulf	FCI

Table 13.8: FCI-Connector (Cable assembly 50 cm)

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
3M 26 pin	Signal		Type	Pin
A1	TX-	ETH1 Tx-	RJ45	2
B1	Tx+	ETH1 Tx+	RJ45	1
C1	GND			----
D1	RX+	ETH1 Rx+	RJ45	3
E1	RX-	ETH1 RX-	RJ45	6
A2	TX-	ETH2 Tx-	RJ45	2
B2	Tx+	ETH2 Tx+	RJ45	1
C2	GND			----
D2	RX+	ETH2 Rx+	RJ45	3
E2	RX-	ETH2 RX-	RJ45	6
A3	TX-	ETH3 Tx-	RJ45	2
B3	Tx+	ETH3 Tx+	RJ45	1
C3	GND			----
D3	RX+	ETH3 Rx+	RJ45	3
E3	RX-	ETH3 RX-	RJ45	6
A4	TX-	ETH4 Tx-	RJ45	2
B4	Tx+	ETH4 Tx+	RJ45	1
C4	GND			----
D4	RX+	ETH4 Rx+	RJ45	3
E4	RX-	ETH4 RX-	RJ45	6

Table 13.9: Pin assignment of the Ethernet connector

13.2.5. FlexRay connector (just 150M14C8LFR)

Name	Type	Manufacturer-Nr.	Manufacturer
Ribbon 14pin	Plug Connector	10114-3000PE	3M
	Shell	10314-52F0-008	3M

Table 13.10: Mini D Ribbon 3M 14pin

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
3M 14pin	Signal		Type	Pin
1	FR_BP_1	FlexRay+ Channel 1a	DSUB-9 / male	7
2	NA	Not connected	----------	----
3	FR_BP_2	FlexRay+ Channel 1b	DSUB-9 / male	7
4	NA	Not connected	----------	----
5	FR_BM_2_2	FlexRay- Channel 2b	DSUB-9 / male	2
6	NA	Not connected	----------	----
7	FR_BM_2_1	FlexRay- Channel 2a	DSUB-9 / male	2
8	FR_BM_1	FlexRay- Channel 1a	DSUB-9 / male	2
9	NA	Not connected	----------	----
10	FR_BM_2	FlexRay- Channel 1b	DSUB-9 / male	2
11	NA	Not connected	----------	----
12	FR_BP_2_2	FlexRay+ Channel 2b	DSUB-9 / male	7
13	NA	Not connected	----------	----
14	FR_BP_2_1	FlexRay+ Channel 2a	DSUB-9 / male	7

Table 13.11: Pin assignment of the FlexRay connector

13.2.6. CAN/FlexRay (D-Sub 44) (just 25M24C8LFR)

Name	Type	Manufacturer-Nr.	Manufacturer
DSUB 44pin	Connector	17EHD-044-P-AA-0-00	Amphenol
	Shell	17E-1726-2	Amphenol

Table 13.12: D-SUB 44pin

@ Logger		comment / depiction / signal name	@ Vehicle Interface	
D-SUB 44pin	Signal		Type	Pin
1	HSCAN_L_15	High Speed CAN #15 LOW	DSUB-9 / male	2
2	HSCAN_L_16	High Speed CAN #16 LOW	DSUB-9 / male	2
3	HSCAN_L_17	High Speed CAN #17 LOW	DSUB-9 / male	2
4	HSCAN_L_18	High Speed CAN #18 LOW	DSUB-9 / male	2
5	HSCAN_L_19	High Speed CAN #19 LOW	DSUB-9 / male	2
6	HSCAN_L_20	High Speed CAN #20 LOW	DSUB-9 / male	2
7	HSCAN_L_21	High Speed CAN #21 LOW	DSUB-9 / male	2
8	HSCAN_L_22	High Speed CAN #22 LOW	DSUB-9 / male	2
9	HSCAN_L_23	High Speed CAN #23 LOW	DSUB-9 / male	2
10	HSCAN_L_24	High Speed CAN #24 LOW	DSUB-9 / male	2
11	NA	Not connected	----------	----
12	FR_BM_1	FlexRay- Channel 1a	DSUB-9 / male	2
13	FR_BM_2	FlexRay- Channel 1b	DSUB-9 / male	2
14	FR_BM_2_1	FlexRay- Channel 2a	DSUB-9 / male	2
15	FR_BM_2_2	FlexRay- Channel 2b	DSUB-9 / male	2
16	HSCAN_H_15	High Speed CAN #15 HIGH	DSUB-9 / male	7
17	HSCAN_H_16	High Speed CAN #16 HIGH	DSUB-9 / male	7
18	HSCAN_H_17	High Speed CAN #17 HIGH	DSUB-9 / male	7
19	HSCAN_H_18	High Speed CAN #18 HIGH	DSUB-9 / male	7
20	HSCAN_H_19	High Speed CAN #19 HIGH	DSUB-9 / male	7
21	HSCAN_H_20	High Speed CAN #20 HIGH	DSUB-9 / male	7
22	HSCAN_H_21	High Speed CAN #21 HIGH	DSUB-9 / male	7
23	HSCAN_H_22	High Speed CAN #22 HIGH	DSUB-9 / male	7
24	HSCAN_H_23	High Speed CAN #23 HIGH	DSUB-9 / male	7
25	HSCAN_H_24	High Speed CAN #24 HIGH	DSUB-9 / male	7
26	NA	Not connected	----------	----
27	FR_BP_1	FlexRay+ Channel 1a	DSUB-9 / male	7
28	FR_BP_2	FlexRay+ Channel 1b	DSUB-9 / male	7
29	FR_BP_2_1	FlexRay+ Channel 2a	DSUB-9 / male	7
30	FR_BP_2_2	FlexRay+ Channel 2b	DSUB-9 / male	7
31	NA	Not connected	----------	----
32	NA	Not connected	----------	----
33	NA	Not connected	----------	----
34	NA	Not connected	----------	----
35	NA	Not connected	----------	----
36	NA	Not connected	----------	----
37	NA	Not connected	----------	----
38	NA	Not connected	----------	----
39	NA	Not connected	----------	----
40	NA	Not connected	----------	----
41	NA	Not connected	----------	----
42	NA	Not connected	----------	----
43	NA	Not connected	----------	----
44	NA	Not connected	----------	----

Table 13.13: Pin assignment of the CAN/FlexRay connector

13.3. Abbreviations

blue PiraT	Processing Information Recording Analyzing Tool
CAN	Controller Area Network
ECL	Electrical Control Line
LIN	Local Interconnect Network
MOST	Media Oriented Systems Transport. (www.mostnet.de)
USB	Universal Serial Bus
UTC	Coordinated Universal Time
GMT	Greenwich Mean Time

14. Contact

Telemotive AG

Office München
Frankfurter Ring 115a
80807 München

Tel.:	+49 89 357 186-0
Fax.:	+49 89 357 186-520
E-Mail:	info@telemotive.de
Web:	www.telemotive.de

Vertrieb

Tel.:	+49 89 357 186-550
Fax.:	+49 89 357 186-520
E-Mail:	sales@telemotive.de

Support

Tel.:	+49 89 357 186-518
E-Mail:	produktsupport@telemotive.de
ServiceCenter:	https://sc.telemotive.de/bluepirat