avisaro

industrial information technology

Avisaro 4.0 Product Series

Quick Guide

CAN-Bus Data Logger & Gateway

‘4.0 Shell’

(“M3xx7” / “C43xx7” / “G43xx7”)

Version / Date: 2024/04/05

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2 THIS DOCUMENT

2.1 HISTORY OF CHANGES

The document version equals the document date in the format yyyy.mm.dd.

Version	Description
2023/05/23	Update of links to new website
2023/03/08	More corrections
2022/03/28	Added “configuration via USB stick” / Firmware 2.66 and higher
2021/06/14	Multiple additions and first public release
2021/05/02	Initial version extracted from existing documents

2.2 AUDIENCE

The intended reader of this document are technical personnel installing, configuring, and using the Avisaro device.

2.3 LOCATION

Check for the latest document version the following link:

Link: https://www.avisaro.de/files/Avisaro/40_Docu/M43xx7-C43xx7-G43xx7.pdf

2.4 LANGUAGE VERSIONS

This document is available in English language only.

2.5 OTHER DOCUMENTS AND RESOURCES

Other documents and resources can be found in the support area of our website:

English: https://shop.avisaro.com/en/info/support.html

German: https://shop.avisaro.com/de/info/support.html

2.6 ACTIVE LINKS

This PDF contains active links. By 'clicking', e.g., in the table of contents, you can get to the appropriate paragraph or by 'clicking' on the "Go to:" in the header you can get back.

2.7 DOCUMENT CREATION

This document was created using the “Avisaro Document Builder”. Single text blocks are merged into targeted documents. Thus, text blocks can be reused in several places, yet no need to update them manually when changes occur.

We point this out because:
Advantage is that compact and targeted documents are available. The disadvantage is that on rare occasions, a paragraph might have comments which do not fit 100% in the place it is used.

2.8 IMPRINT AND CONTACT

This document is provided by:

Avisaro AG
Grosser Kolonnenweg 18 E
30163 Hannover
Germany

Web: www.avisaro.com

Email: info@avisaro.com

3 Enclosure and User Controls

3.1 Start and stop operation

The Avisaro 4.0 starts with operation right after power on if an USB stick is inserted. Also, after re-inserting a USB stick, the operation starts automatically.

3.2 LED Blink-Codes

There is one multicolor LED to signal states of the Avisaro device.

Code	What is means	Action
Green & blue fading	All is fine Idle state, no data arriving	None
Green flashing	Data are coming in (RS232, CAN interface)[1)]	None
Yello constant	All is fine, USB stick is checked after mounting	None
Red flashing	No USB stick or button was pushed	Insert USB stick Or press button again
Red (about 2sec) than blue (about 2sec)	Logger restarts. This should not happen during normal operation	Check power supply

[1)] On analog loggers (e.g., 4…20mA) and similar interfaces, data are read continuously, thus no green flashing is shown

3.3 Real-Time Clock

A battery buffered internal real time clock is available for time stamping data, start and stop network upload and other controls. The battery is a rechargeable “memo-buff” cell - specifically designed for RTC operations. During regular operation, the battery is recharged over a 48h period. During non-operating times (= supply power off), the date and time settings are maintained for several month.

If the Avisaro device is networked, a network time server (SNTP) can be used to set time and date automatically.

If an Avisaro GPS receiver is connected, the RTC can be set using satellite time.

It is possible to define time zones settings.

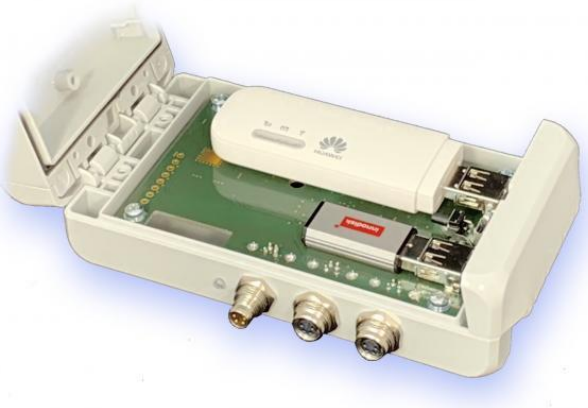
3.4 Enclosure "4.0 Shell"

Front with the 3x "M8" connector configuration. The enclosure is opened by opening the "snap lock" as shown here:

"4.0 Shell" version with PG cable gland:

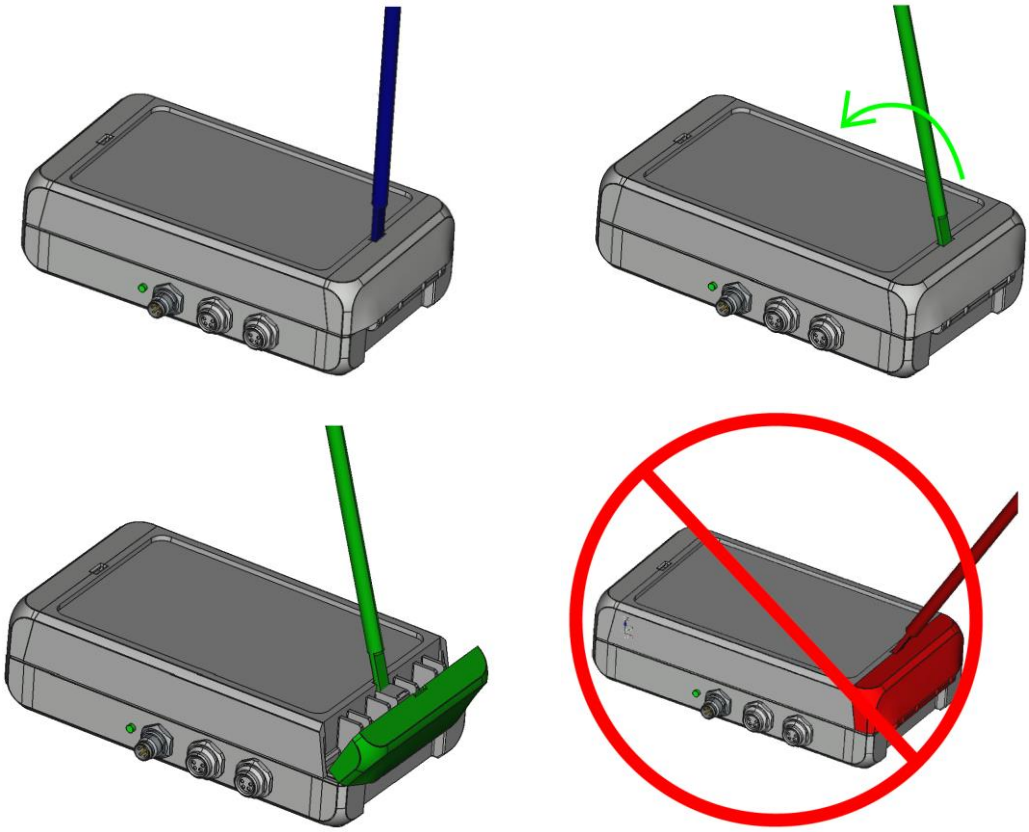
"4.0 Shell" version with WAGO terminal

Opened enclosure with (optional) LTE device and USB stick (not included unless purchased):



For the M8 option, the interfaces are located as follow:

3.4.1 Opening “Shell” enclosure



4 USB STORAGE STICK

4.1 FILESYSTEM AND STORAGE SIZE

Commercially available USB 2.0 / 3.0 memory sticks can be used. It is recommended to exclude branded products - no "promotional items" with your own logo imprint.

There are no speed requirements. Memory sticks that are advertised as particularly fast offer no (!) advantage in the Avisaro data logger. Typically these optimizations are designed for cameras etc..

Memory sizes from 4 to 256 GByte are supported. As file system FAT or FAT32 (preferred) is used. NTSF or others are not supported.

Memory sticks are typically not in the scope of delivery - each application typically has different requirements.

4.2 FORMATTING

Usually, sticks come pre-formatted, so you don’t have to do anything. Even larger than 32GByte sticks are preformatted with FAT32.

Sticks equal or smaller than 32 GByte can be formatted with Windows Operating system as it is. Use “FAT32” as the desired format.

Windows Operating System does not allow to format sticks larger then 32 GByte with the FAT32 file system. Usually, sticks come pre-formatted, so you don’t have to do anything. If there is a need to reformat a stick, the Avisaro Device can be used. Please refer to later chapter “Configuration: PC Companion Software” .. “USB Storage” ether in this document, or in the overall “User Manual Serie 4.0” document.

Alternatively, third party tools for Windows can be used to format large USB sticks. Please note: Avisaro can not support those third party tools within our technical support via telephone or email.

4.3 CHOOSING THE RIGHT MEMORY STICK

For **industrial** use, special parameters may have to be observed:

The **temperature** range should be considered. There are "industrial grade" memory sticks available - often designed as "SLC" version - which are also suitable for harsh environments.

The **mechanical dimension** should also be considered. It is disadvantageous if the stick protrudes openly from the housing and could be knocked off. In this case short sticks are recommended. If the logger is installed protected, then a longer stick is easier to use.

The appropriate **memory size** also depends on the intended use. Due to the technology, memory sticks with an extremely high capacity are typically less robust than smaller memory sizes. The loggers have a "ring memory" that can be optionally activated. If the memory stick becomes full (approx. less than 100MB free memory) the oldest files are deleted - this is a useful setting for some applications.

4.4 Recommended Memory Sticks

It is difficult to recommend consumer grade USB sticks as detailed technical information are not published.

Nevertheless, we try (please check for updated documentation often, link found in previous chapters):

Last updated: April 5th, 2022

4.4.1 Recommended

Manufacturer	Model	Picture	Capacity	Technology	Remarks
SanDisk	Ultra Fit		16 GB	Consumer	
SanDisk	Ultra		32 GB	Consumer	
Intenso	Slim Line		8 GB	Consumer	
Kingston	Data Traveler 2		16 GB	Consumer	

Innodisk	USB Drive 3SE		4-32 GB	Industrial	SLC Technology

4.4.2 Not recommended

Manufacturer	Model	Picture	Capacity	Technology	Remarks
Verbatim	Slider Store N Go		8 GB	Consumer	Stick failures after short period of time

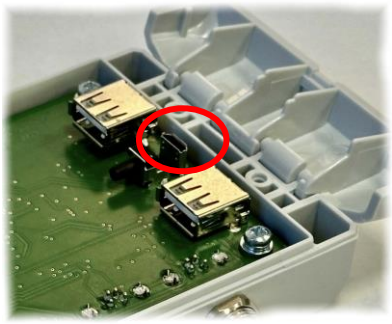
5 Interface description and Pin Layout

5.1 Micro-USB Client

The Micro-USB client interface is used for configuration only.

USB in "4.0 Sky" products

USB Client in "4.0 Silver" products



USB Client in "4.0 Shell" products

Most Avisaro devices are powered through the Micro-USB client port, however only for configuration. A stable regular operation is not guaranteed. Use the regular power supply for normal operation.

A "Micro USB" cable is used. As those cables are widely available, this cable is not part of the scope of delivery to avoid electronic waste.

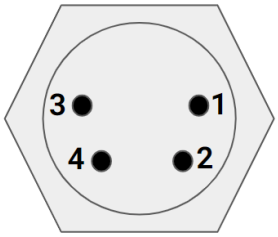
Heads-up: There are sometimes Micro USB cable which only do power supply, but not data. Those are used i.e., with mobile phones. If the Avisaro device is powered, but no data connection to the PC – just choose a different USB cable.

5.2 Power Supply

For regular operation, an external power supply must be connected. Powering the device through micro-USB is not (!) sufficient.

5.2.1 Power M8 Connector

Power supply is used with a male plug:



Connector	Interface	Pin	Signal	Direction
M8, 4 pol, male	Supply Power	1	n/c (for selected devices: Trigger In)	IN
		2	GND	PWR
		3	n/c	
		4	12V to 32V DC	PWR

The matching plug are industry standard M8 4pol female connector. Examples:

- CONEC: SAL-8-RKC4-S5,5
- Binder: 99 3376 100 04

5.3 CAN Interface

This is an industry standard CAN interface

5.3.1 Default CAN settings

The baudrate needs to be configured using the Avisaro Companion Software.

The default baudrate is 250kBaud.

5.3.2 Storage format and network packaging

Please check chapter “Avisaro Internal Data Formats” later in this document on how CAN messages are stored on USB memory or forwarded over the network.

There are easy to read text formats as well as compact binary formats available.

5.3.3 Signal levels

Voltage range on CAN-H / CAN-L: 4 - 16V

Transceiver used: SN65HVD family by Texas Instruments. Other transceivers upon request

5.3.4 Terminating resistor

Whether or not there is a 120 ohm terminating resistor depends on the product:

Product No	Name	120 Ohm Termination
M43076 / C43076	CAN Silver	Can be switched on/off via configuration

5.3.5 1x CAN “SHELL” (“M43077”, “C43077”, “G43077”)

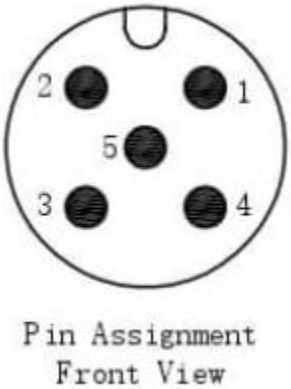
Connector	Interface	Pin	Signal	Direction
Screw Type	CAN	1	GND	Power & Signal
		2	VCC (6..32V)	Power
		3	n.c.	
		4	n.c.	
		5	n.c.	
		6	n.c.	
		7	CAN-H	1nd CAN Bus

		8	CAN-L	1nd CAN Bus

The 120 Ohm “Line Termination” resistor can be switched on/off via configuration. Thus, no DIP switch needs to be used. Refer to the “PC Companion” document in the section “Interfaces->(2nd) CAN” for details.

5.3.6 M12 (male) - 1x CAN Interface

Optional, a M12 male connector is available.

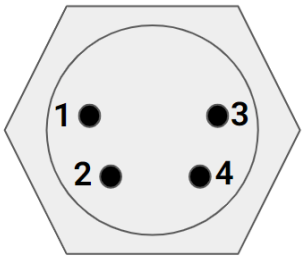


Standard M12 connector (male)

Connector	Interface	Pin	Signal	Direction
M12, 5 pol, male	1st CAN	1	CAN-H	I/O
		2	CAN-L	I/O
		3	do not use	n/c
		4	Supply Power	Supply Power
		5	GND	Signal and Power Ground

5.3.7 M8 - 1x CAN Interface

Standard M8 connector (female)

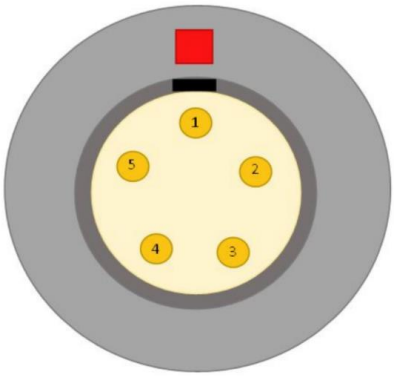


Connector	Interface	Pin	Signal	Direction
M8, 4 pol, female	1st CAN	1	CAN-L	I/O
		2	Supply	O
		3	CAN-H	I/O
		4	GND	

Matching connectors are industry standard M8 4x pol connectors. Examples:

- CONEC SAL8 RSC4
- Binder 99 3383 00 04 Binder

5.3.8 LEMO - 1x CAN Interface



Standard LEMO connector (female)

Connector	Interface	Pin	Signal	Direction
LEMO, 5 pol, female	1st CAN	1	CAN-H	bus
		2	CAN-L	bus
		3	Future use	do not connect
		4	VCC	supply voltage
		5	GND	ground

In some implementations, Pin3 carries supply voltage to power sensors.

6 CONFIGURATION: 'PC COMPANION SOFTWARE'

6.1 HOW TO CONFIGURE AVISARO "SERIES 4.0" PRODUCTS

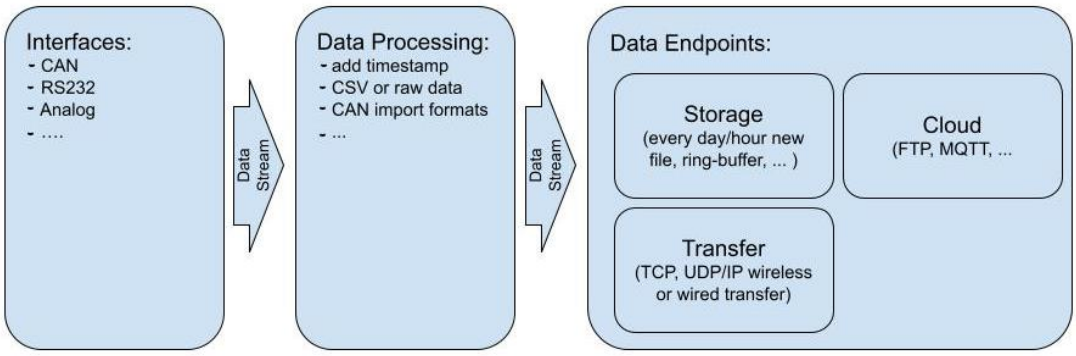
The basic principle of how to configure the Avisaro "Series 4.0" products is:

1) Download and install the "Avisaro PC Companion Software".
2) Connect the Avisaro device via USB cable.
3) Choose the correct COM port and click on "connect".
4) The software presents all the settings you can make and guides you to avoid conflicting configurations.
5) Click on "save configuration" to store changes in the Avisaro device.
6) Reboot the Avisaro Device so that the new configuration takes effect.

Details are described further down in this document.

6.2 CONCEPT OF OPERATION

The Avisaro 4.0 is divided into sections:



Data are received through an "Interface" and then forwarded to the "Data Processing" section. All formatting happens here and then data is forwarded to the "Data Endpoint".

6.3 DETAILED DOCUMENTATION

This current document shows only selected parts of the full "Avisaro PC Companion Software" user manual. The motivation is to keep this document as compact as possible.

Please find the extensive "Avisaro PC Companion Software" document in the support section of the Avisaro website:

German: https://www.avisaro.de/de/40_Dokumentation.html

English: https://www.avisaro.com/en/40-ENG-Documentation.html

6.4 "PC Companion Software" Installation

Download the latest version from:

German site: https://shop.avisaro.com/de/Z46330.html

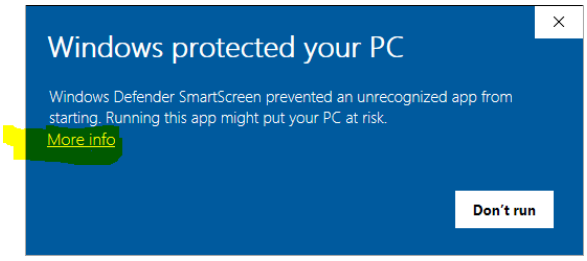
English site: https://shop.avisaro.com/en/Z46330.html

Please check the section "DRAFT version" only if advised by Avisaro Support.

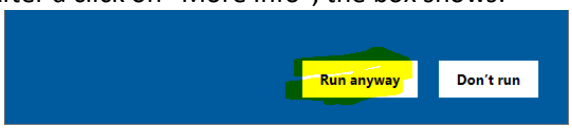
There are two version available:

- Install: this runs a Windows installer. You need admin rights to run.
- Direct: this contains a folder with all files. You can run the *.exe directly from there.

Windows warns the user before installing or using software downloaded from the Internet. So, if you click on "Avisaro_40_Companion_v2.56_Setup.exe", the warning will occur:



After a click on "More Info", the box shows:



Select "Run anyway" to continue.

6.5 Driver Installation

If you connect the Avisaro Device to the PC using a Micro USB cable, a virtual COM port driver is installed. If this driver does not install automatically, you can download and install this manually.

Scroll down in the same download sites as above to the headline "Serial Driver Software" (en) or "Serielle Treiber Software". Or, follow directly this link:

https://download.avisaro.com/files/Avisaro/40_PC_App/en.stsw-stm32102.zip

6.6 Initial Set-Up

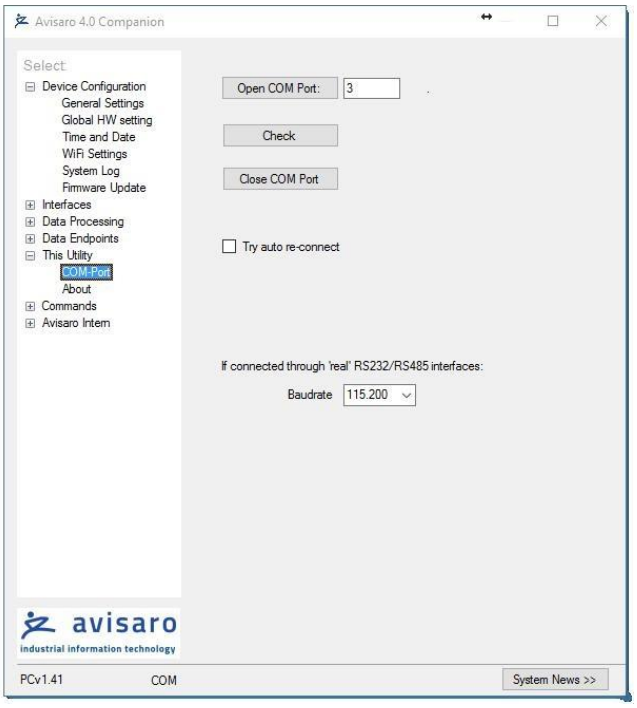
After starting the companion software, the virtual COM port number needs to be entered. You can find this number in the Windows “Device Manager”.

This setting is stored for future use.

Click on ‘open COM port’ – which will turn green if successful. You can use the “check” button to verify that the connection is alive.

You can use the “Check” button to verify the connection to the Avisaro Device. It should light up green when clicked.

The baudrate setting for “if connected through real RS22.. “ can be ignored. This setting is used only in special projects and not scope of this document.



All settings are deactivated if there is no Avisaro Device attached.

6.7 Using the PC Companion Tool

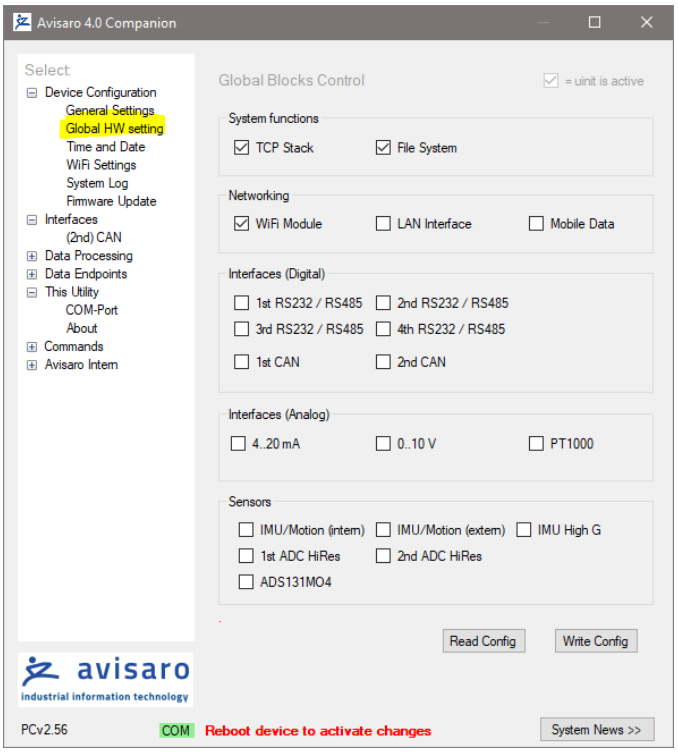
Click on “Write Config” to transmit changes in the PC tool to the Avisaro device. Click on “Read Config” to display the currently stored values (if you navigate between options, the latest settings are read of course automatically).

Most settings become active only after reboot. This can be done in Commands ⇨ Device Control: Reboot Device.

6.8 Global Hardware Setup

Hardware modules are enabled/disabled in this setting. Of course – only those interfaces who are physically there can be activated. Please check device serial number for details.

In most cases, devices are shipped with proper settings on this page.



6.8.1 Global HW settings ⇨ System functions

Don't touch those settings unless advised by technical support team from Avisaro.

6.8.2 Global HW settings ⇨ Networking

Activate the network interface which is physically present.

6.8.3 Global HW settings ⇨ Interfaces (Digital)

Activate the digital interface which is physically present.

6.8.4 Global HW settings ⇨ Interfaces (Analog)

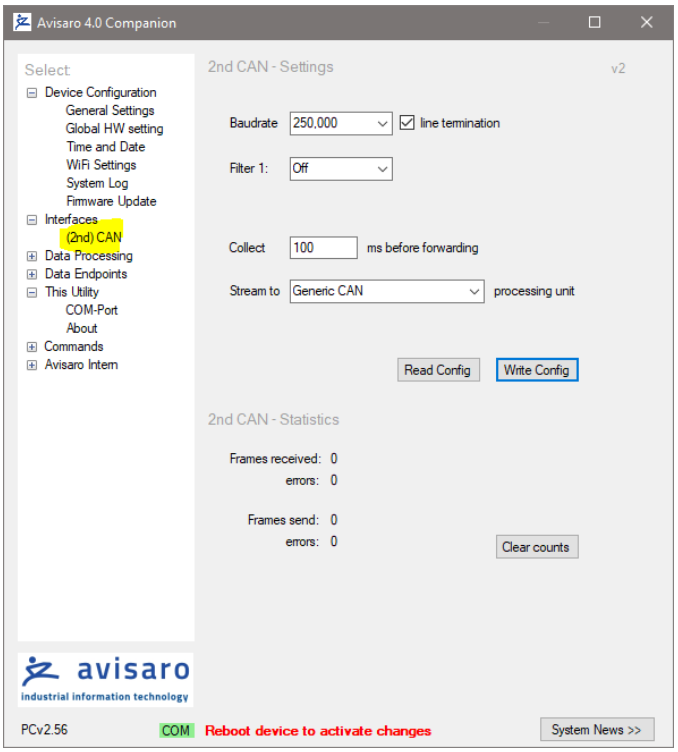
Activate the analog interface which is physically present.

6.8.5 Global HW settings ⇨ Sensors

Activate the sensor which is physically present.

6.9 INTERFACES ⇨ (1ST) CAN // (2ND) CAN

The up to two CAN busses are configured in this section.

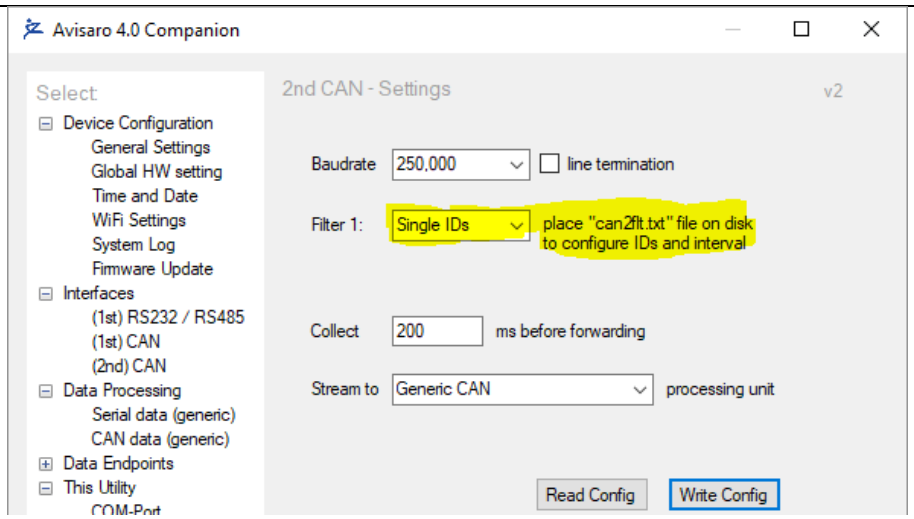


6.9.1 Baudrate & Line termination

Baudrate	Selected the matching baudrate
Line Termination	The 120 Ohm line termination resistor can be switch on/off with this setting. The feature is available for Avisaro “4.0 Silver” and “4.0 Sky D-Sub” only. Only for 2nd CAN interface

6.9.2 Filter

Off	No filter is applied, all CAN messages are passed on
Range	A range “from … “ to “to …” is set. Enter values as decimal numbers
Single IDs	Single CAN IDs can be filtered on both channels. To activate single CAN IDs:



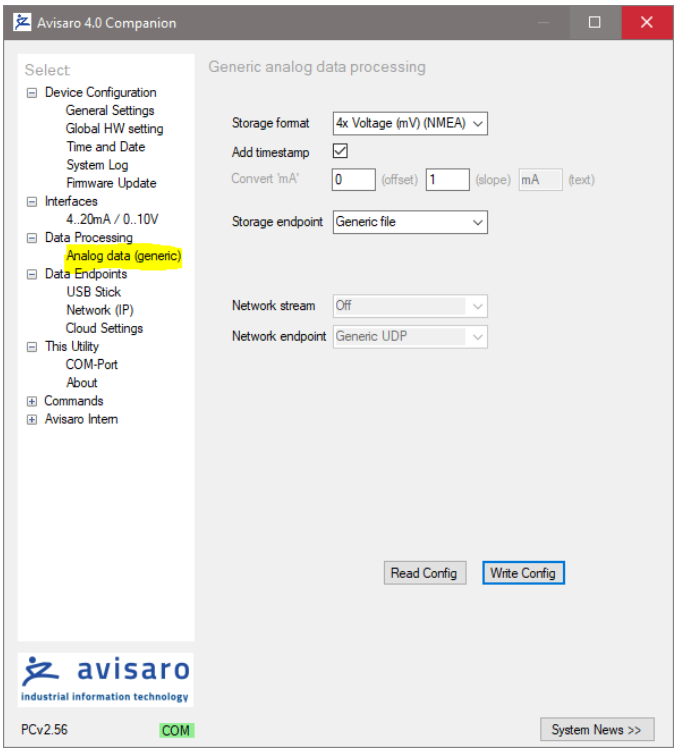
To define the CAN IDs and the intervals, a configuration file is placed on USB stick. The file names are “can1flt.txt” for CAN 1 and “can2flt.txt” for CAN 2. The content of the file is (example):

```
218000622, 500
1616, 1000
1626, 1000
1813, 500
1620, 5000
419363367, 5000
```

Use a regular text editor to create the files. The first number is the CAN ID in decimal format, the second number is the time interval in millisecond. I.e. 500 - the CAN ID is stored once every 500 ms.
Maximal 50 entries are allowed.

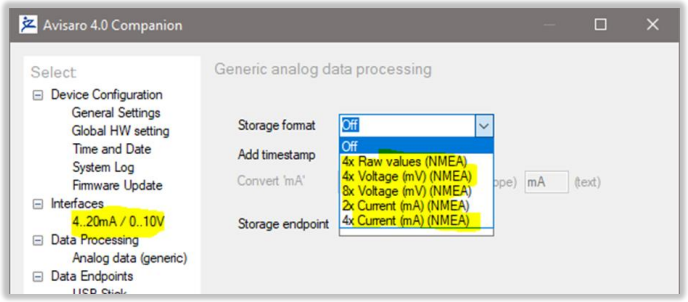
6.10 Data Processing ⇨ 4..20mA / 0..10V

The …



6.10.1 4..20mA / 0..10V ⇨ Storage Format

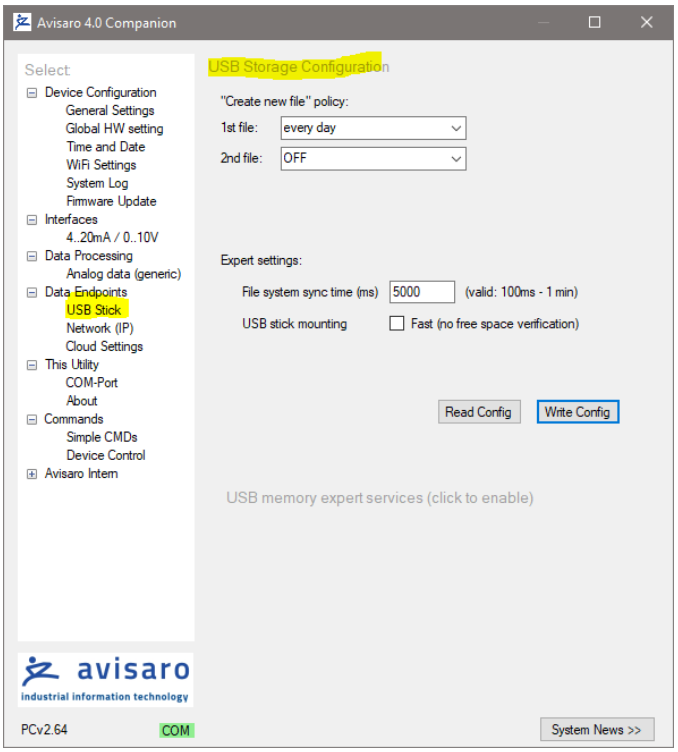
Description …:



Storage format ⇨		
	OFF	**This is the default setting.** …

6.11 Data Endpoints ⇨ USB Stick

The file handling is configured in this section. Depending on the application, choose when and how to create files.

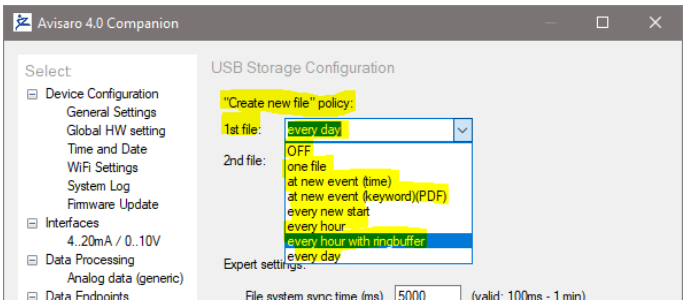


6.11.1 "Create new file" policy

Description of "Create new file" policy selection.

"1st file" settings are relevant. A directory called "log_1" is created on the USB memory. All data are contained in this directory.

"2nd file" settings apply to customer specific applications only.



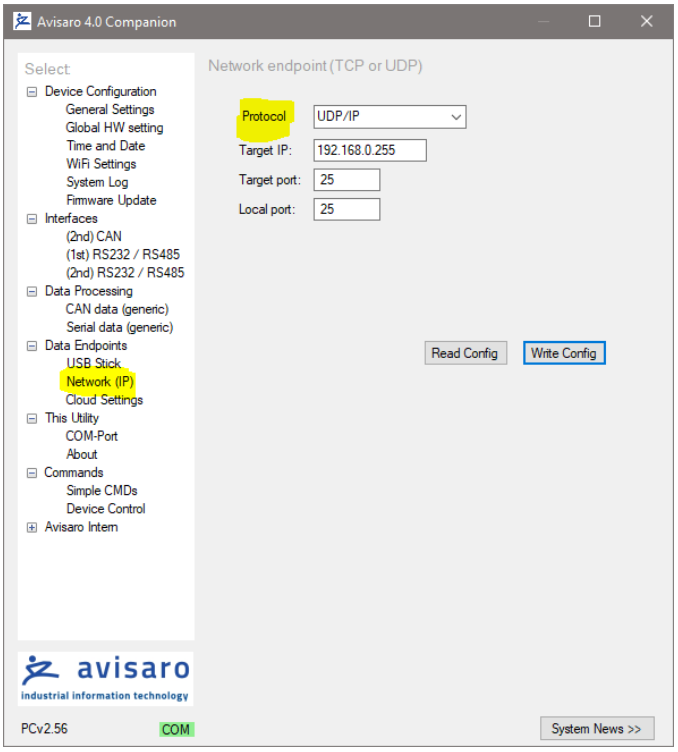
"Create new file" ⇨		
	OFF	No log file is created, no data are logged
	one file	
	every hour	Every hour a new file Log file name: yymmddhh.txt
	every hour with ringbuffer	Every hour a new file. If memory space is exceeded, the oldest file is deleted.

		Log file name: yymmddhh.txt
	every day	Log file name: yyyymmdd.txt
	at new event (time)	
	at new event (keyword)(PDF)	
	every new start	

6.12 Data Endpoints ⇨ Network endpoint

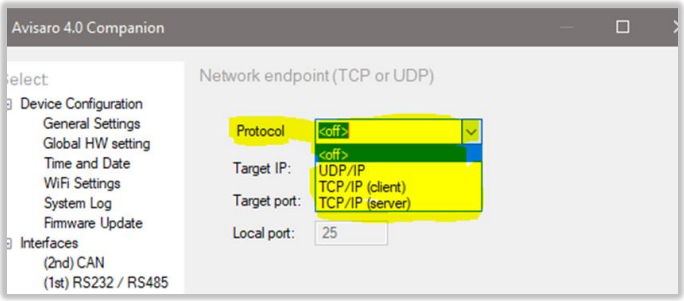
Data from a digital (RS232, CAN, ..) interface and some of the analog interfaces (0..10V, 4..20mA) can be streamed over the network.

Remember to active the “Forward data” option in the ‘data processing’ section.

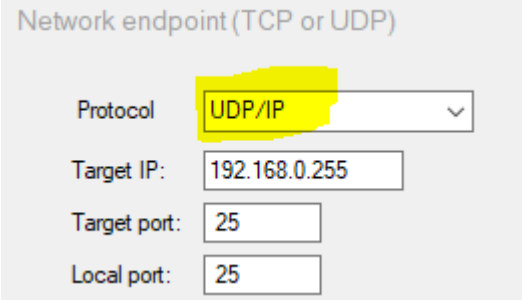
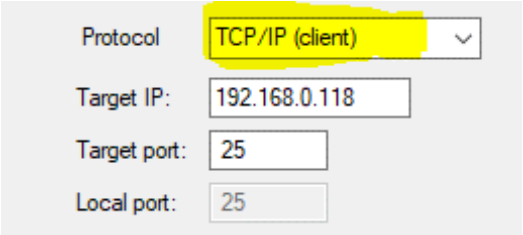
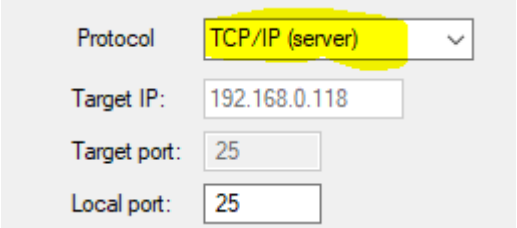


6.12.1 Data Endpoints ⇨ Network endpoint ⇨ Protocol

Description of “General Settings”:

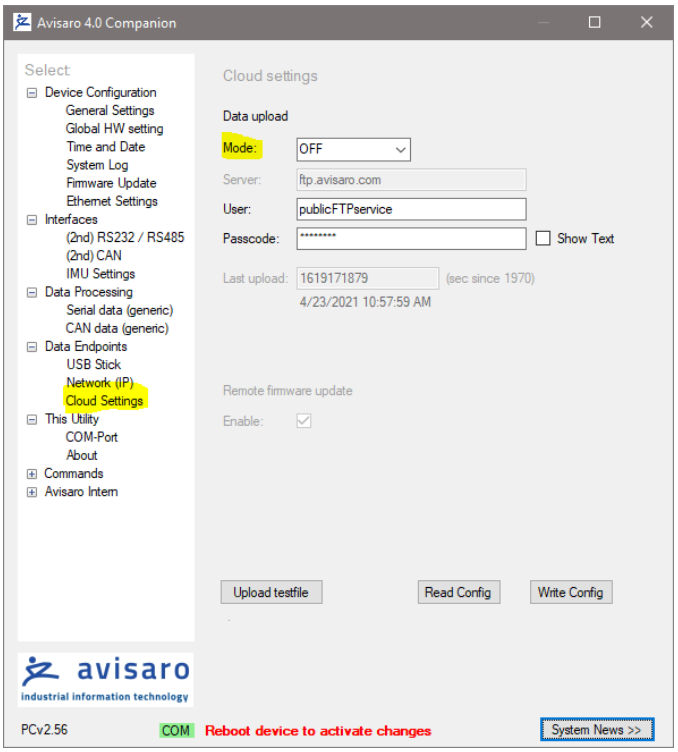


Protocol ⇨	
OFF	**This is the default setting.**

	No data is forwarded.
UDP/IP	Data is send and received using the UDP/IP protocol  **Target IP:** data are sent to this IP. Use *.*.*.255 for subnet broadcasts **Target port:** port data are sent to **Local port:** port data are received (see "WiFi Setting" for this device IP address)
TCP/IP client	Data is send and received using the TCP/IP protocol. The Avisaro device is client – thus it is connecting to a server.  **Target IP:** data are sent to this IP address. **Target port:** port data are sent to **Local port:** not used
TCP/IP client	Data is send and received using the TCP/IP protocol. The Avisaro device is server – thus it is waiting for a client to connect to the Avisaro device.  **Target IP:** ignore, not used **Target port:** ignore, not used **Local port:** port data are received (see "WiFi Setting" for this device IP address)

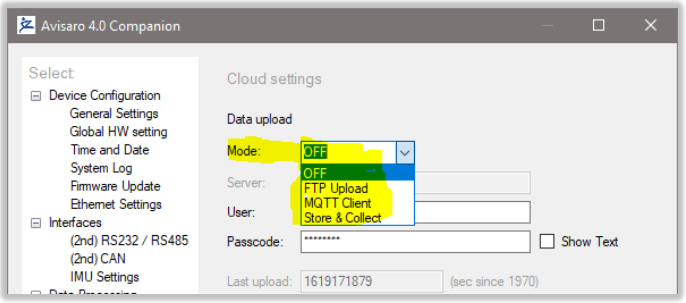
6.13 Data Endpoints ⇨ Cloud Settings

The Cloud features of the Avisaro devices are best described in separate application specific documents. Thus, here the settings are described briefly without the 'large picture' behind it.



6.13.1 Data Endpoints ⇨ Cloud Settings ⇨ Mode

Description of "General Settings":

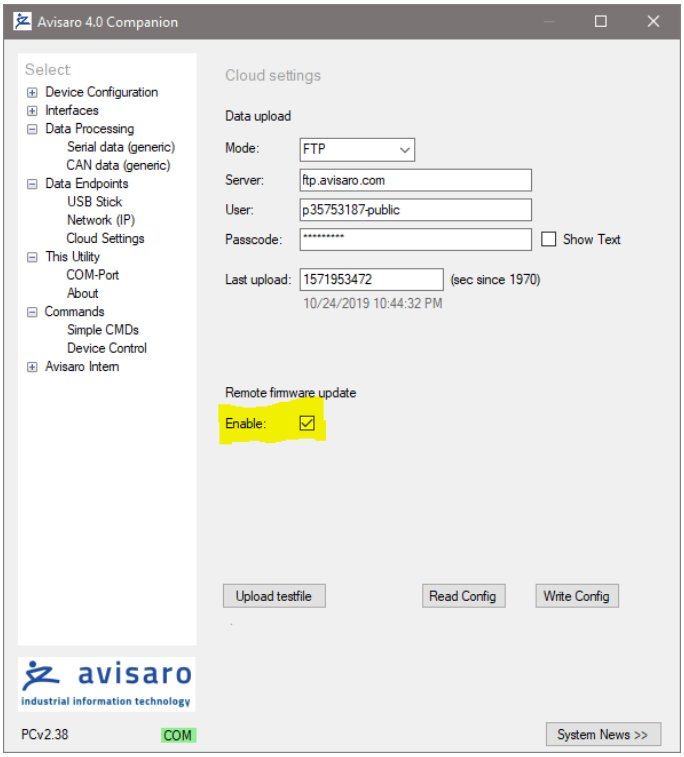


Mode ⇨		
	OFF	**This is the default setting.** **No data are uploaded into the Cloud or FTP Server.**
	FTP Upload	Data stored are uploaded on an hourly base to the FTP server specified in the settings.
	MQTT Client	This feature is defined in customer specific projects only.
	Store & Collect	Stored data are made available to be picked up by a Server Software. Parameter are:

		• User and Password • Device Name Typically, “Store&Collect” goes along with the “Avisaro Dashboard Software” (see separate documentation)

6.13.2 Data Endpoints ⇨ Remote firmware update

Check chapter “Firmware and Configuration Update” later in this document for details.



7 Firmware and Configuration Update

7.1 Configuration Update

7.1.1 Introduction

The configuration of the Avisaro 4.0 defines how the devices behave. Settings like baud rate, time and date, Internet access parameter, etc. are variable and can be defined by the user.

There are two ways to configure the Avisaro 4.0 devices:

1) Connect the device to a PC using a Micro-USB cable. On the PC, configuration software can be used to make all the settings via user-friendly drop-down menus. The software ("PC Companion") is provided by Avisaro free of charge.
2) The configuration can also be applied by USB stick. Once a valid configuration is made using the PC Companion software, a configuration file can be created. This configuration file is placed on a USB stick and automatically loaded by the device.

7.1.2 Via "PC Companion" Software

Configuration via the "PC Companion" software is the most user-friendly way to configure the Avisaro devices. Use this as your preferred method.

See paragraph "PC Companion Software" for details on where to get and how to operate the software.

Find the complete reference manual for the PC Companion Software here:

https://www.avisaro.de/files/Avisaro/40_Docu/Avisaro-PC-Companion-Manual.pdf

7.1.3 Via USB Stick

Firmware requirements: 2.66 or larger (2022/03/28 or newer)

To configure devices within the application or without the usage of a PC/Notebook, a USB stick with a configuration file can be used. This configuration file is generated using the PC Companion tool.

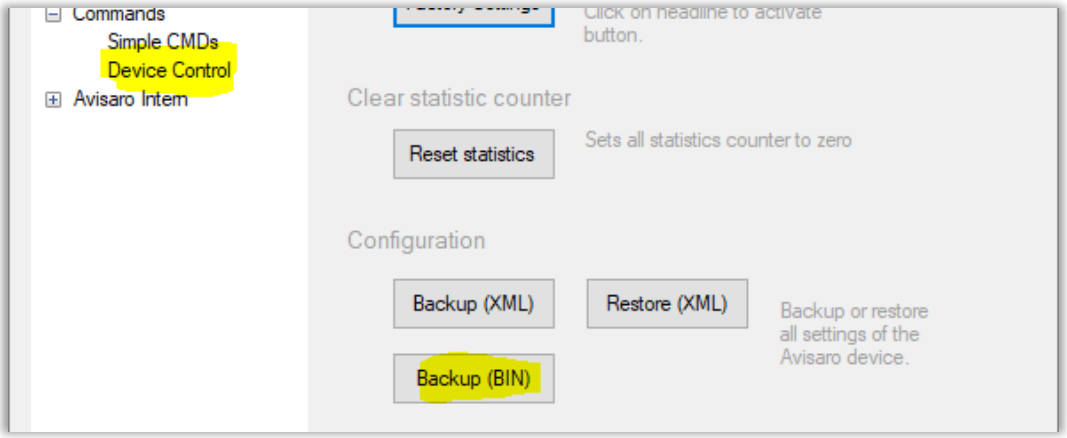
Please note: The PC Companion Tool needs a connected device to operate. Thus, one device 'on your desk' is needed to generate this update file.

Please note: It is important the firmware versions match. The device from which the configuration is extracted must have the same firmware as the device the configuration is applied to.

How is works:

1) Connect to the local Avisaro 4.0 device which contains the configuration to be extracted.
2) Use the "PC Companion" software and navigate to "Commands->Device Control"

3) Click on “Backup (BIN) to generate a binary copy of the configuration:



The generated file is usually named like “20220328 configuration” for better documentation.

4) Copy the configuration file on a USB Stick and **rename it to “avi40cnf.bin”** and insert the USB stick in the Avisaro 4.0 device.
5) … the update is performed and the Avisaro device reboots … this takes roughly 30sec to 1 minute
6) The **“avi40cnf.bin” file is deleted** from the USB stick once the configuration update was successful.

Please note: A firmware update and a configuration update can be done in one sequence. Thus, place both files on the same USB stick. The SET PC_Headline_DataEndp TO $'''%RootDir%\\Kapitel - Companion\\Kapitel PC Headline DataEnd.docx''' order is: first, the firmware update is performed, second, the configuration update is performed.

7.2 Firmware Update

7.2.1 Introduction

There are three ways to update the firmware of the Avisaro 4.0 family:

1. Via USB Stick
   If the Avisaro 4.0 product has a USB Host port, a new firmware can be uploaded using a USB stick. See details below.
2. Via PC Companion software
   If the Avisaro 4.0 product is connected to a PC via USB cable, the firmware can be updated using the PC companion software. See details below.
3. Via Remote Update
   For selected products, a remote firmware update via FTP server / Internet is provided.
   See paragraph “Remote Firmware Update” for details.

The latest firmware version can be found online: http://www.avisaro.de/de/40-Firmware.html

7.2.2 Via USB stick

Instructions:

- Download the latest version of the firmware from the link posted above
- Unpack the *.zip file to retrieve the “avi40up.bin” file
- Copy the file onto a USB stick in the root directory
- Power up the Avisaro data logger
- Insert the USB stick
    - After a few seconds, the LED flashes red (the firmware is loaded)
    - After about 30 seconds, the LED flashes white (critical update phase, to not interrupt)
    - The logger reboots and starts again to show a green LED
- The firmware update file is deleted from the USB stick when finished - this is to avoid accidentally a restart of the process.
- Done !

Warning:

- Ensure stable and sufficient power supply during this process. There is a risk that the device becomes unusable if there is a power failure during the process. Those broken devices needs to be send in to Avisaro for repair.

Background:

- The configuration remains - if not stated otherwise - the same. Thus, all settings stay the same after a firmware update

7.2.3 Via “PC Companion” Software

See paragraph “PC Companion Software” for details.

7.2.4 Via FTP server / internet

Avisaro Devices can be updated remotely. This is a powerful service feature. To enable, navigate to “Data Endpoints”->“CLoud setting” and activate “Remote firmware update”. Please refer to the document “PC Companion” for details, chapter “Data Endpoints-> Cloud Settings”.

The update procedure is as follows:

- Place the new firmware file - usually called “avi40up.bin” on the FTP server
- Rename the file into “avi40up.xin
- The data logger, if enabled, searches every hour the directory. If an update file is found, it is downloaded and executed automatically.

Important note:

- Make sure that the data logger has sufficient and stable power supply during the update procedure. If power fails, the device can be left non-operational and needs service attention.

(To be precise: the download is not critical, but when the update is executed, there is a window of 30 seconds which is sensitive to power failure)

Recommendations:

- It is highly recommended to create a different user pointing to a different subdirectory for each Avisaro Data logger. This way, a firmware update can be directed to each.

8 AVISARO INTERNAL DATA FORMATS

8.1 CAN – CSV TEXT FORMAT

This is the default format for CAN recording into a file. The format is

8.1.1 CAN CSV text description

File name depends on configuration (every day a new file or every hour), i.e. “181102.txt”:

Format: Date, Time, Millisecond, CAN Bus Nr., CAN ID, Message length, Data

```
2018/11/02,15:06:27,480, $C2, 0fffffff, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:06:28,512, $C2, 0fffffff, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:06:29,387, $C2, 00000012, 6, 02, 03, 04, 05, 06, 07, 00, 00
2018/11/02,15:06:31,096, $C1, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:06:31,840, $C1, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:06:32,048, $C1, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:06:32,216, $C2, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:06:32,407, $C2, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:06:33,129, $C2, 0fffffff, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:06:33,348, $C2, 00000123, 1, 12, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:06:33,449, $C2, 0fffffff, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:50,499, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:50,844, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:51,147, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:51,447, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:52,163, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:12:52,387, $C2, 00000581, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:13:12,446, $C2, 00000123, 1, 12, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:20:24,227, $C2, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:20:24,227, $C2, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:21:44,635, $C2, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:21:54,900, $C1, 18ff0233, 8, 01, 02, 03, 04, 05, 06, 07, 08
2018/11/02,15:39:00,561, $C1, 00000283, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:39:07,469, $C2, 00000283, 8, 00, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:39:33,882, $C1, 00000123, 1, 12, 00, 00, 00, 00, 00, 00, 00
2018/11/02,15:49:44,075, $C1, 00000064, 1, 12, 00, 00, 00, 00, 00, 00, 00
```

Lines are terminated with <cr><lf>

This format needs about 75 bytes per CAN message. This gives 26 million messages in a 2GByte file, or 426 million messages on a 32 GByte USB stick. At a rate of 1 message per millisecond, this gives a storage for 5 days.

8.2 CAN VECTOR(TM) FORMAT

File name depends on configuration (every day a new file or every hour), i.e. “181102.asc”:

```
date 2018/11/02 16:12:33
base hex  timestamps absolute
no internal events logged
// version 7.0.0
8465.765000 2  283             Rx   d 8 00 00 00 00 00 00 00 00
8466.094000 2  283             Rx   d 8 00 00 00 00 00 00 00 00
```

```
8466.949000 1  283            Rx   d 8 00 00 00 00 00 00 00 00
8467.133000 1  283            Rx   d 8 00 00 00 00 00 00 00 00
8467.269000 1  283            Rx   d 8 00 00 00 00 00 00 00 00
8467.591000 2  123            Rx   d 8 01 23 45 06 00 00 00 00
8467.710000 2  123            Rx   d 8 01 23 45 06 00 00 00 00
8467.862000 2  123            Rx   d 8 01 23 45 06 00 00 00 00
8468.792000 2  123            Rx   d 8 01 23 45 06 00 00 00 00
8469.070000 2  123            Rx   d 8 01 23 45 06 00 00 00 00
8469.532000 2  283            Rx   d 8 00 00 00 00 00 00 00 00
8470.046000 1  123            Rx   d 8 01 23 45 06 00 00 00 00
8470.650000 1  283            Rx   d 8 00 00 00 00 00 00 00 00
8472.127000 1  123            Rx   d 8 01 23 45 06 00 00 00 00
```

Lines are terminated with <cr><lf>

8.3 CAN - BINARY DATA FORMAT

8.3.1 CAN frame container

CAN messages are mapped into a 28 byte long array. This “container” format allows to hold variable length CAN messages while always maintaining the same container length. It also adds a timestamp:

Byte	Bits	Description
1	7..0	User definable header bytes. Usually all '0'.
2	15...8	
3	23..16	
4	31..23	
5	7..0	Frame descriptor: reserved bits, all '0'
6	7..0	Frame descriptor: reserved bits, all '0'
7	7..4	Frame descriptor: reserved bits
	3..0	Frame descriptor: CAN data length
8	7	Frame descriptor: Frame type (0 = standard, 1 = extended)
	6	Frame descriptor: RTR bit ('1' = RTR bit is set)
	5..0	Frame descriptor: reserved bits
9	7…0	Message ID
10	15...8	Standard message: valid bits 10..0
11	23..16	Extended message: valid bits 28..0
12	31..23	
13	7..0	CAN data bytes in the order 1 …8
14	7..0	Valid number of bytes defined by CAN data length
15	7..0	
16	7..0	
17	7..0	
18	7..0	
19	7..0	
20	7..0	
21	7…0	Real time clock time stamp in seconds since 01.01.2007
22	15...8	

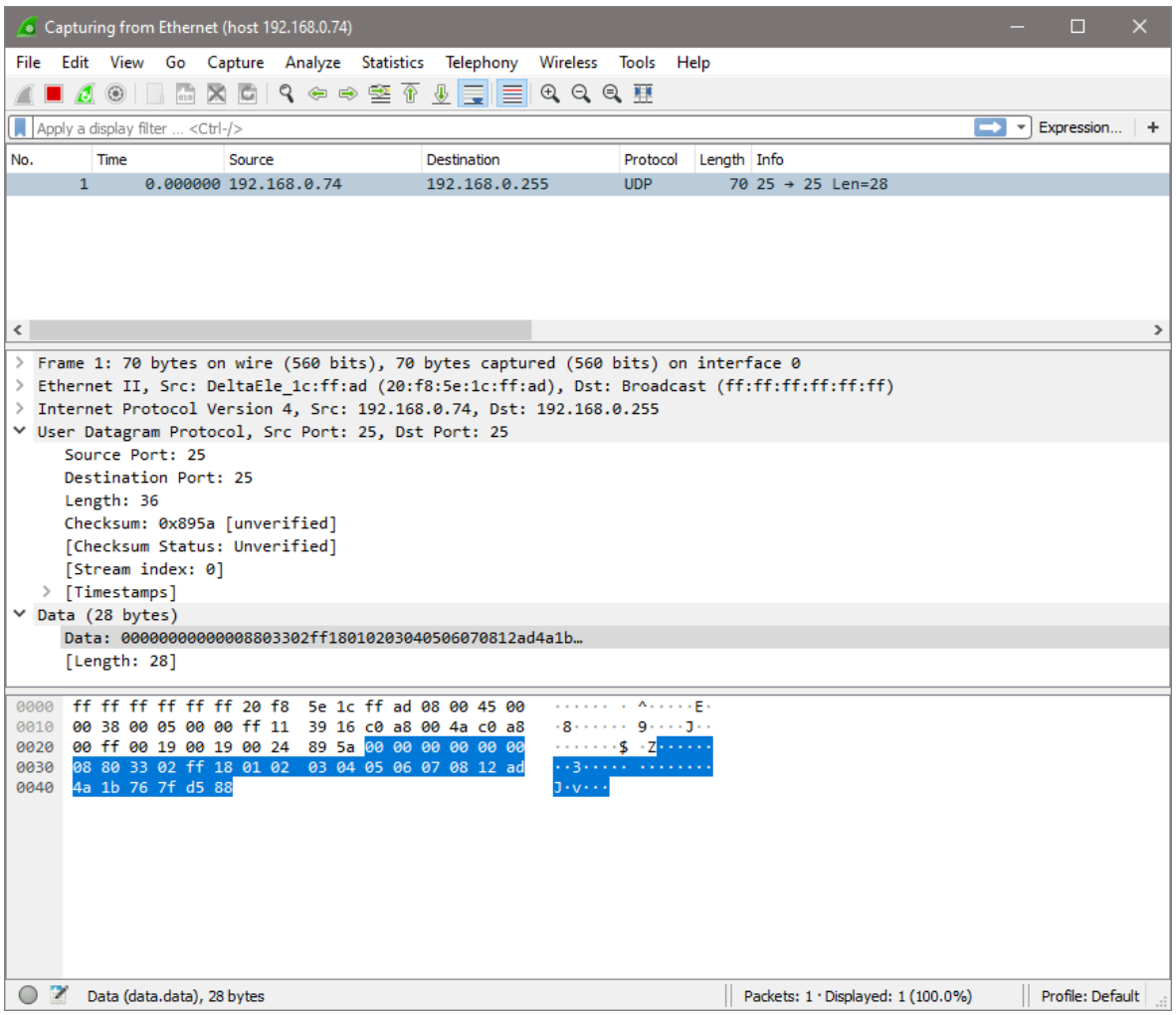
23	23..16	
24	31..23	
25	7…0	Millisecond time stamp. Value in ms since module power on.
26	15…8	
27	23..16	
28	31..23	

8.3.2 Packaging

Multiple CAN frame container could be packed into one UDP or TCP packet. It is ensured that always a complete CAN container is packed.

8.3.3 Networking: Example “Whireshark” screenshot

When used in network streaming, this would be an example of a “Whireshark” screenshot:



This CAN message has a length of 8 Byte. Payload is 01, 02,03,04,05,06,07 – as found in the data stream.

9 DECLARATIONS

10 Contact and Support

Please contact Avisaro if there are any questions:

Avisaro AG
Grosser Kolonnenweg 18 E
30163 Hannover
Germany

Email: support@avisaro.com

End of this documentation