dVISION

Software Manual

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1 Introduction

1.1 Functions

dVISION is the application software for devices of the so-called *DACM*-family from SARAD GmbH. The abbreviation *DACM*, coined by SARAD, stands for *Data Acquisition and Control Module* and refers to the central control unit of this device family, which controls all sensors and actuators of the measuring device, provides the user interface on the device and enables the connection to an external PC.

The devices of the *DACM*-family are easily recognizable from the outside by their large display, which distinguishes them from all other SARAD GmbH devices. These are *Aer 5xxx*, *EQF 32xx*, *EQF 33xx*, *Nuc Scout*, *RPM 2xxx*, *RTM 2xxx Soil Gas*, *RTM 22xx*, *RTM 23xx* and *poCAMon*. All of SARAD GmbH's customer-specific special solutions with various sensors and actuators and several spectrometers also work with *dVISION* as application software.

dVISION 4 is backwards compatible and can also read DVB files saved with earlier versions of *dVISION*. The app is independent of the device type and its configuration and allows the following operations:

- Setting the measuring device, retrieving the measurement data from the device:
  - for measuring devices connected locally to the PC via USB, RS-232 or RS-485,
  - for measuring devices that are connected via the ZigBee components of the *Net Monitors* family,
  - for measuring devices with integrated WiFi module,
  - for measuring devices that are connected via components of the *Aranea* family.
- Data management in binary files:
  - Automatic creation of a canonical working directory
  - Automatic assignment of file names
  - Recursive searching of directories for measurement files
- Interactive graphical display of the measurement data in a diagram with:
  - Selection of the measurement campaign to be displayed
  - Multiple zoom of the x-axis
  - Adjustable y-axis
  - Data cursor
  - Diagram printout

- Data export to text and KML files
- Simple diagram editing
  - Line color and thickness
  - Position and scaling of the y-axis
  - Smoothing
  - Marking the measuring points
- Display of the standard deviation as error bars or the minimum and maximum values as additional graph lines
- Calculation of the integral over the currently displayed section

- Diagram of the alpha or gamma spectrum:
  - Spectrum of individual measuring cycles
  - Diagram printout
  - Switchable logarithmic display
- Display of the measured values on a map background

A separate program, *dCONFIG*, is available for changing the device configuration. This separates device administration from routine operation so that incorrect settings are avoided and the operating software is kept simple and clear.

1.2 System requirements

- Windows operating system (tested with Windows 10 and 11)
- 100 MB free capacity on hard disk
- Minimum graphics requirements: 1024×768 pixels, 256 colors
- Mouse or other pointing device
- USB or RS-232 interface for reading out the measurement data

To be able to access measuring devices with *dVISION*, the *SARAD Registration Server service* must be installed on the same PC.

2 Installation and Configuration

2.1 Installation of the SARAD Registration Server service

Insert the installation CD into the drive or download the setup file from the SARAD website and start `setup-regserver_service.exe`. The installation program will guide you through the installation process.

If you want to connect measuring devices via USB, you will also need the USB driver for the FT232 from FTDI on your PC. If your PC is connected to the internet the first time you plug in a SARAD device, this driver will be installed automatically. For PCs that are permanently operated without an internet connection, you must install the driver manually. The latest driver and the corresponding installation instructions can be found on the website of the company FTDI Chip.

2.2 Installation of dVISION

Insert the installation CD into the drive or download the setup file from the SARAD website and start `setup_dVISION-4.exe`. The installation program will guide you through the installation process.

As shown in figure 2.1, the Windows program directory is suggested as the target folder by default. You can change this as required. You can install *dVISION 4* in parallel with an earlier version of *dVISION*, but you should then choose an installation directory that is different from that of the earlier version.

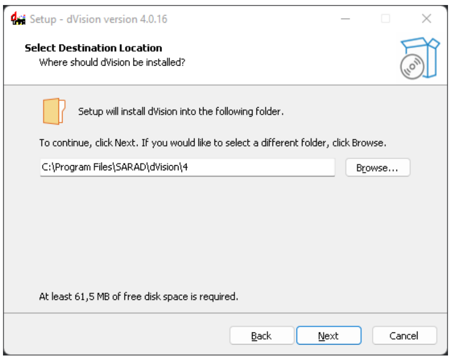

Figure 2.1: Enter the destination folder for the installation

2.3 Setup wizard

When *dVISION* is started for the first time, a setup wizard is started, which is used to make basic settings for the behavior of the software.

The first thing to select is where *dVISION* should save user data and store configuration settings (Fig. 2.2).

There are two options here:

Standard *dVISION* stores user data in the Windows folder for application data (`%appdata%`), the configuration in the Windows registry.

Portabel Use this option if you have installed *dVISION* on a USB stick or in a network directory. Application data and the configuration are then stored in the same directory as the program code.

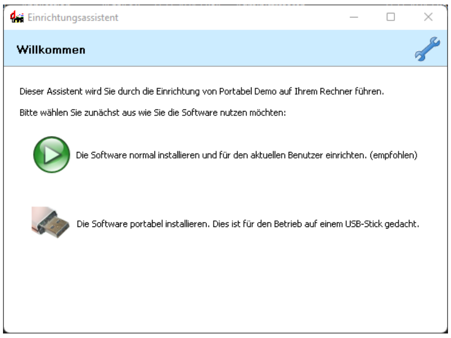

Figure 2.2: Selection of storage locations for user data and configuration

If you are unsure, choose the first option!

3 Operation of dVISION

3.1 Important terms

Measuring cycle The time interval in which a complete set of measurement data is recorded by the measuring instrument. Within a measuring cycle, the sensors usually measure several individual values, which are not recorded individually, however, but are only included in the data set as minimum, maximum and average values.

Measurement campaign A set of chronologically related measurement data from the same measuring device, which are stored together in a measurement file. A measurement campaign begins when the measurement is started on the instrument and ends when the measurement is stopped or when the measurement data is downloaded from the instrument. Measurement data downloaded from the instrument consists of at least one measurement campaign.

Measurement file Measurement data downloaded from the instrument can be saved as a file on the PC with *dVISION 4*. The raw data (counts) of one or more measurement campaigns are stored in a proprietary binary file as they come from the instrument.

3.2 Overview

Figure 3.1 shows the main window of *dVISION 4* with the following operating and display elements:

1. Selection list of connected measuring instruments
2. Tab for a measuring instrument. All measurement data associated with this particular device is displayed below this tab.
3. Toolbar for the most important functions:

   Get Data Downloading measurement data from the instrument

   Delete Deleting the measurement data stored on the instrument

   Open Opening a measurement file (DVB file) from the hard disk

   Folder Open all measurement files from a specific directory

   Save Saving the data records downloaded from the instrument in a measurement file (DVB file)

   Save Copy Saving a copy of the measurement file

Start Starts the measurement on the device

Stop Ends the measurement on the device

Components Downloads information about device components available in the *DACM* device

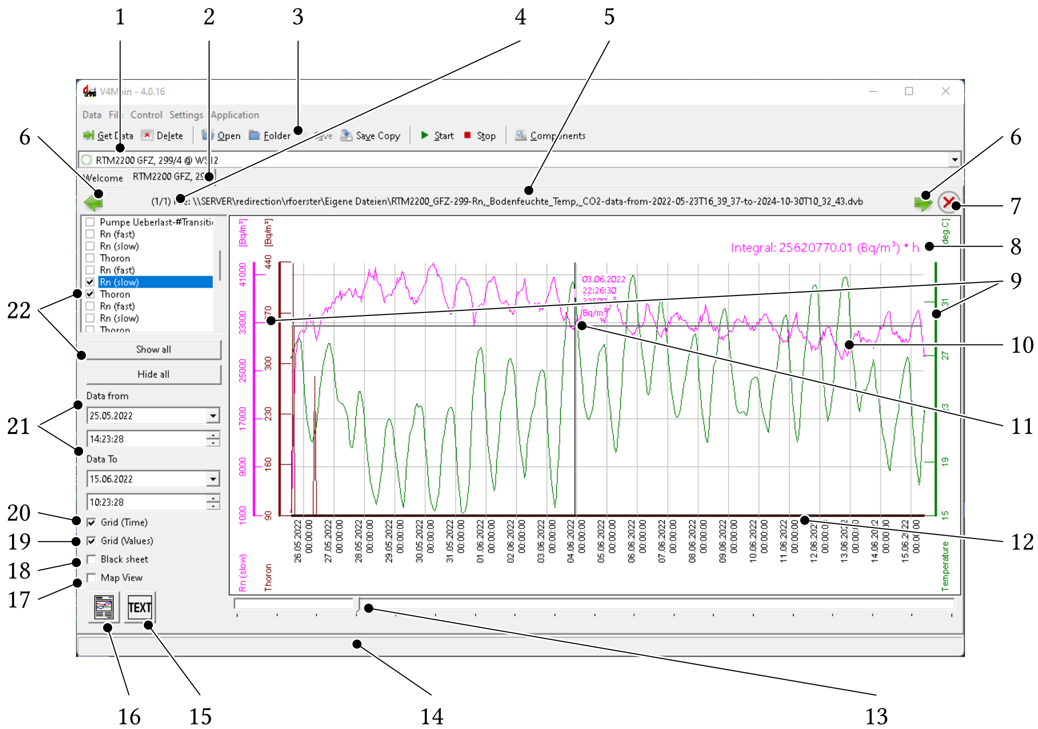

Figure 3.1: Operating and display elements in the main window

4. Sequence number of the file displayed in the tab and number of measurement files available in the tab
5. Name of the measurement file or—if the measurement has not yet been saved—start and end time of the downloaded measured value records
6. Buttons for navigating between the open measurement files
7. Button to close the currently displayed measurement file
8. Integral calculated over the displayed measured values
9. Y-axes for the active measurement parameters (left and right of the diagram)
10. Time history of the active measurement parameters (track)

11. Crosshairs with display of the x and y value at the display location

12. Timeline

13. Slider for navigating between the measurement campaigns of the displayed measurement file

14. Status bar for help texts (tooltips)

15. Export to a text file

16. Printing the diagram view

17. Display of the measured values on a map background

18. Display of the diagram on a dark background

19. Switching the horizontal grid lines on and off

20. Switching the vertical grid lines on and off

21. Defining the start and end time of the time interval to be displayed

22. Control elements for selecting the measurement parameters to be displayed

3.3 Connecting the measuring instrument

So that *dVISION* can connect to a measuring instrument, the *SARAD Registration Server service* must be installed (see section 2.1).

Most current SARAD measuring instruments can be easily connected to the PC running *dVISION* using the USB cable supplied. As an alternative, some devices allow the use of their RS-232 connection via the supplied cable with 9-pin D-Sub connector. This assumes that your PC still has a physical RS-232 interface (COM port).

In any case, the *SARAD Registration Server service* ensures that the selection list of connected devices (1 in Fig. 3.1) is automatically kept up to date. If this is not the case for devices connected directly via RS-232, you can select Scan for local devices from the context-sensitive menu of the selection list and instruct the *SARAD Registration Server service* to search all available local interfaces for connected SARAD devices. The context-sensitive menu opens after a right-click in the selection list (see Fig. 4.5).

3.4 Changes to the measuring instrument

To change the configuration of a *DACM* device, use the application software *dCONFIG*, which is described in a separate manual [2].

dVISION 4 only allows the following elementary operations that change the state of the measuring instrument (3 in Fig. 3.1):

- Delete the measurement data (Data » Delete or)
- Start a measurement (Control » Start or. ▷). The measuring cycle to be started must be selected from a list of preconfigured cycles in the device.
- Ending a measurement (Control » Stop or ☐)

3.5 Displaying and analyzing the measurement data

3.5.1 Reading out the measurement data

With a click on the *Get Data* (or Data » Get Data) button to start reading the measurement data from your measuring instrument.

The window shown in figure 3.2 then opens, in which you can specify the time period for the data to be downloaded from the device.

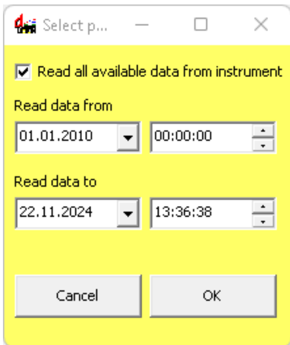

Figure 3.2: Restricting the time period for data download

In the window that opens, the number of data records already downloaded is displayed until the download is complete (Fig. 3.3).

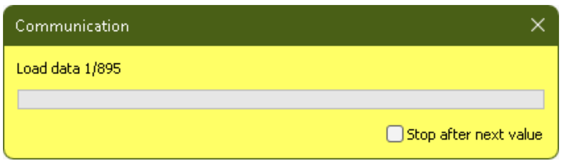

Figure 3.3: Progress bar with cancel option

Hint

Regardless of any previously set time limit, the progress bar always shows the total number of data records available on the device. Please do not be confused by this technically justified restriction!

As soon as the readout is complete, a new tab appears with the diagram view.

3.5.2 Selection of the parameters to be displayed

In figure 3.1, the 22 marks all control elements that are used to select the parameters to be displayed in the diagram. The list box at the top contains all the data series generated by the device. To display or hide a data series in the diagram, the checkbox in front of the name of the data series must be checked or unchecked. The two buttons below make this easier, especially if the list of measurement parameters is very long.

A prerequisite for the display is that data from this measurement series is available for the display period (21 in Fig. 3.1).

Simply click on the name of a data series in the list to select it for the cursor or export function. The values of the selected measurement series indicated by the dark background then appear at the crosshairs of the cursor (11 in Fig. 3.1). These always refer to the cursor position in both axes, regardless of the measurement series. The grid is also aligned with the y-axis of the selected measurement series.

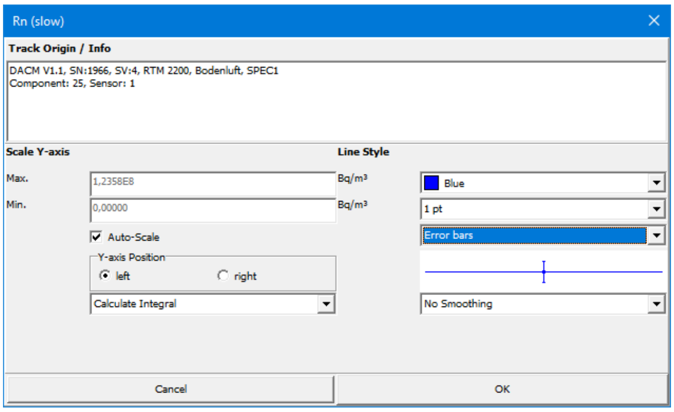

Figure 3.4: Display options for a parameter

Double-clicking on the name of a parameter in the list box opens the dialog box shown in figure 3.4 with various options for formatting the display of this parameter in the diagram. The origin of the data series is displayed in the text field at the top. The default automatic adjustment of the y-axis can be canceled by unchecking *Auto-Scale* and the desired display limits can be entered in the two input fields above. The position of the axis to the left or right of the diagram can also be selected. The display of the graph can be controlled using the three upper list boxes on the right. In addition to the selection of line color and thickness, error limits (*Error bars*) or variance ranges (*Min/Max*) of the measured values within a measurement cycle can also be displayed.

In the bottom line on the left, you can request the calculation of the integral under the area of the curve visible in the current diagram, which is shown in figure 3.1 at the position marked 8.

On the right-hand side, you can specify whether and over how many measurement cycles the curve should be smoothed.

3.5.3 Zooming and panning

Table 3.1 lists the options for changing the axis scaling and the position of the measurement lines in the diagram.

Table 3.1: Zooming and moving in the diagram

Goal	Action
Zoom In of the timeline	Left-click at the beginning, right-click at the end of the range
Zoom Out of the timeline	Right-click on 21 in Fig. 3.1, then All data...
Defining the timeline	Editing the fields in 21 in Fig. 3.1
Defining the y-axis	Double-click on parameter (see section 3.5.2)

3.5.4 Spectrum display

For parameters that have a spectrometer as a data source, the acquired spectrum of a single measurement cycle can be displayed in a separate window (Fig. 3.5). To do this, select a spectrometric parameter in the parameter list and click in the diagram while holding down the Ctrl key. The spectrum that is then displayed belongs to the measurement cycle you clicked on.

The energy ranges defined for the calculation of the radon measurands—also called *regions of interest* or *ROI*—are represented by vertical lines indicating the respective nuclide, the range limits and the counts contained therein.

As in the main diagram, the button allows you to print the spectrum or export it to a PDF file using a PDF printer.

Spectrometer components for gamma detectors also have a range of tools for calibration and analysis, which can be accessed via the button within the spectra display. These functions are described in the user manual of the respective device.

Hint

Ctrl+click also displays the so-called basic data for the measured value displayed in the diagram for the non-spectroscopic parameters. However, these are limited to the minimum and maximum value of the parameter during the measurement cycle and, if applicable, the GPS data.

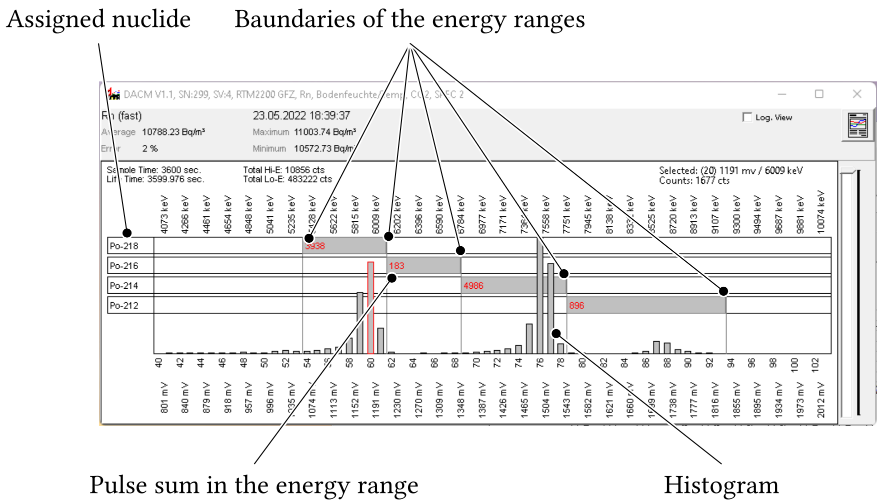

Figure 3.5: Spectrum display

3.6 Measurement data management

3.6.1 Workspace and last-used directory

With File » Save you can save the measurement data downloaded from the measuring instrument in a measurement file. The corresponding dialog box gives you the choice between *Workspace* and *Last Used* for the directory in which the measurement file is to be stored. Here *Workspace* stands for a standard directory in which you want to save all your measurement files. By default, this is `%appdata%\SARAD\data`. *Last Used*, on the other hand, means that the measurement file is written to the same directory that was last used.

In the dialog under Application » App Settings you can specify which of the two memory models should be used in preference. In this dialog window, you can also adjust the directory for *Workspace* to your requirements.

3.6.2 Automatically generated file names

dVISION 4 automatically suggests a file name for the binary file to be saved. This is formed according to the following scheme:

```
<type code>_<serial number>--<start date>--<end date>.dvb
```

The start and end date correspond to the compact date and time format according to ISO 8601 (i. e. `YYYYMMDDThhmmss`).

Example:

```
AER_274--20241203T142411--20241222T155411.dvb
```

3.6.3 Opening multiple measurement files

dVISION 4 allows you to keep several measurement files open at the same time. You can open individual measurement files from different directories with File › Open or the *Open* button.

It is more convenient to use the *Folder* button taking you to a dialog for selecting a directory. When closing this dialog window with *Select folder*, all measurement files from this directory are opened in *dVISION 4*.

By selecting *Recursive* in the dialog window, you can specify that all subdirectories of the selected directory should also be searched for measurement files to be opened.

3.6.4 Measuring devices and measurement campaigns

The measurement files or the measurement data downloaded from the measuring instrument and not yet saved are stored by *dVISION 4* in individual tabs sorted by measuring instrument (2 in Fig. 3.1). Several measurement files can be open in each tab, between which you can switch using the and buttons (6 in Fig. 3.1). The status bar between these buttons shows the file name (marker 5) and the sequential number (4) of the open file in front of it.

Each measurement file can in turn contain several measurement campaigns, between which you can switch using the slider (13). If this is on the far left, all campaigns in this measurement file are displayed; in all other positions, the individual campaigns are displayed in chronological order.

3.7 Print and export

With the button (marker 16 in Fig. 3.1), the diagram can be printed in the currently displayed form.

By clicking in the white area below or above the diagram, you can add a title or caption. Buttons 19 and 20 in figure 3.1 allow you to adjust the grid.

The button opens the dialog box shown in figure 3.6, which allows you to choose from three export options for saving the measurement data in text files.

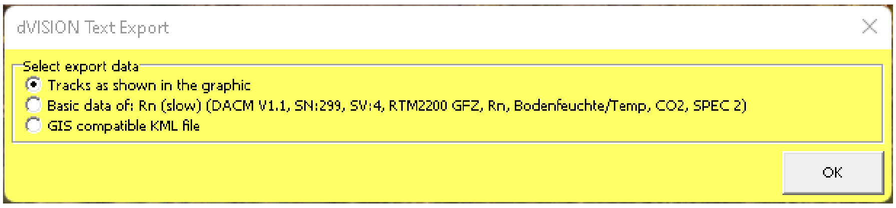

Figure 3.6: Options for text export

Tracks as shown in the graphic Export of a text file with the measured values of the parameters currently displayed in the diagram. The selection of data corresponds to what is displayed in the diagram. This affects the measurement period, the selection of measurement series and the display options set for the respective measurement series. If the options 'Error bars' or 'Min/Max' have been selected, a corresponding number of additional columns will be generated. Each line of the text file contains a data record. The format corresponds to a CSV file with tabulator as separator and several header lines so that the file can be opened with common spreadsheet programs.

Basic data of... The basic data of the component that generated the selected measurement series is exported here. Each line of the text file contains the basic data of a measuring point. The header of the file also contains all relevant setting and calibration parameters. The data format depends on the component type. This export function is only available for parameters of complex components (e. g. spectroscopy modules).

GIS compatible KML file This selection generates a file in KML format. This format is supported by all geographic information systems (GIS). Files of this type can be opened e. g. with Google Earth. A prerequisite for use is that the corresponding GPS coordinates have been recorded by the device. Data points without valid coordinates are not taken into account. Each measuring point is displayed as a position marker. The measured parameter that always appears next to this marker can be selected. To do this, select the desired measurement series in the list box before exporting. All other measured parameters selected for display in the diagram appear in a pop-up window that opens after clicking on the position marker.

3.8 Map display

Ticking the checkbox *Map View* (17 in Fig. 3.1) activates an additional window with the display of the currently selected parameter against a map background. This function requires that the measurement data was recorded using a device with GPS functionality.

Within the map view, you can click on individual measuring points and the corresponding measured value will be displayed.

Zooming and moving the map view is done intuitively with the left mouse button or the scroll wheel of the mouse. Right-clicking opens a context-sensitive menu that allows you to save and copy the currently displayed map section.

3.9 Display of the component configuration

The sensors and actuators installed in a DACM device are referred to as *components*. Use the Settings > Components menu item or the button to open a window with an overview of the sensor components present in the selected SARAD measuring instrument (3 in Fig. 3.1).

Hint

It takes a few seconds to download the data for displaying the window. You can follow the progress in the status bar (14 in Fig. 3.1).

In this view, shown in figure 3.7, you can also see the measured values of the current cycle (*Recent*) or the summarized values (*Average*, *Min*, *Max*) of the last completed cycle while the measurement is running.

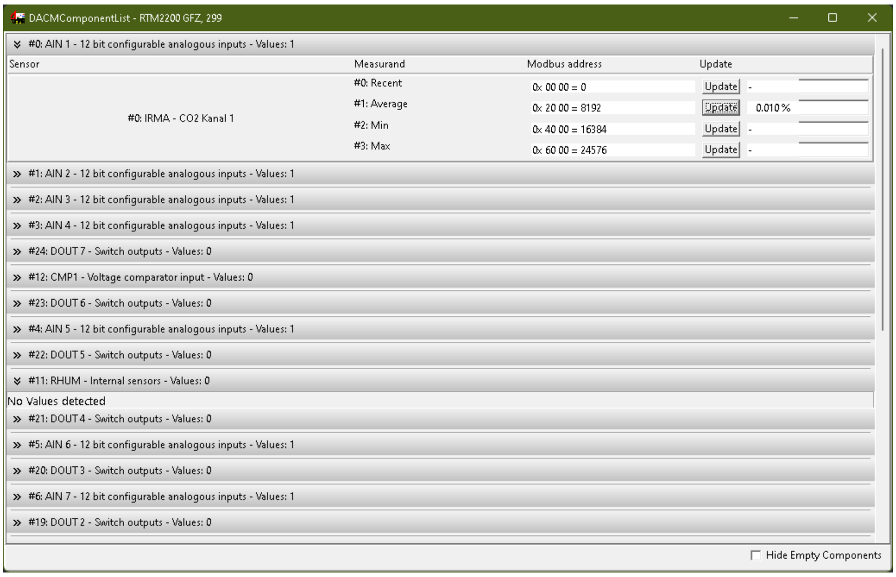

Figure 3.7: Overview of the sensor components of the connected device

Not all sensors installed in the device are in use in each of the defined measuring cycles. By ticking *Hide Empty Components* (Fig. 3.8), you can therefore hide the sensor components not used in the currently selected measurement cycle.

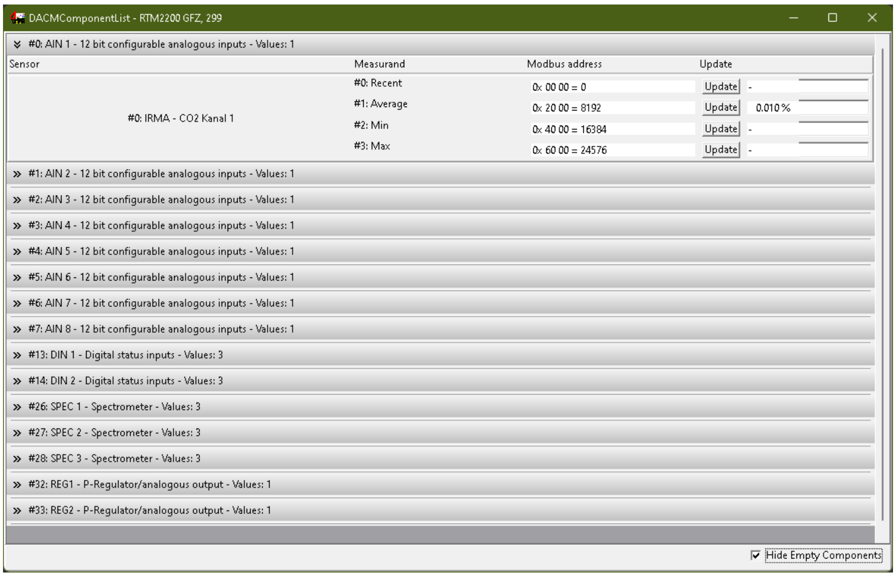

Figure 3.8: Reduction of sensors to components active in the current cycle

4 Remote Data Transmission

4.1 The SARAD Registration Server service

SARAD instruments can be connected to the PC running *dVISION* in a variety of ways:

local connection The measuring instrument is connected directly to a USB, RS-232 or RS-485 cable connected to the PC.

ZigBee network One or more measuring instruments are connected via SARAD's ZigBee products of the *Net Monitors* family.

LAN Measuring instruments are connected via SARAD's *Aranea LAN*.

WiFi SARAD measuring instruments with a built-in or external WiFi module connect to the PC directly or indirectly via a server in the LAN.

via internet Measuring instruments are connected to the PC via Ethernet with *Aranea LAN* or via mobile radio with *Aranea LTE* or *Aranea Outdoor* via the *SARAD MQTT Broker*.

All these communication channels, which can also be combined with each other, are supported by the *SARAD Registration Server service*. All devices connected via it are listed in the drop-down device list (1 in Fig. 3.1) and can be used in exactly the same way as locally connected measuring instruments.

The *SARAD Registration Server service* is complex and highly configurable and is also used by other SARAD applications (*Radon Vision*, *ROOMS*). It is therefore documented in a separate manual [3]. The devices of the *Aranea* family, on which the *SARAD Registration Server service* runs on the device side, also have their own manual [1].

Therefore, only the basic functionality that is activated by default in *SARAD Registration Server service* and a few basic aspects that are essential to understand if something does not work as expected need to be discussed here.

4.2 A Windows service

The *SARAD Registration Server service* is a Windows service that is started immediately after installation, runs constantly in the background and is started automatically every time Windows is restarted. This service is configured so that it is terminated and restarted automatically in the event of an error.

You can see whether the service is running in the Windows program *Services*. With administrator rights, you can also stop or restart the service there.

A second way to check the function of the *SARAD Registration Server service* is to access the API of the service. To do this, visit the address `localhost:8008` with your web browser. If the API documentation appears at this address, then the *SARAD Registration Server service* is working correctly.

If you start *dVISION 4* without the *SARAD Registration Server service* running, you will receive the error message shown in figure 4.1.

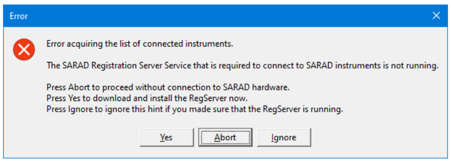

Figure 4.1: Error message for missing *SARAD Registration Server service*

4.3 Configuration of the SARAD Registration Server service

All configuration options are managed in the `%programdata%\SARAD\RegServer-Service` directory in the `config.toml` file. This is a simple text file in TOML format [4], which you can edit with any text editor. After installation, there is only a template for this configuration file in the above-mentioned directory, which contains all configuration options and their default settings and briefly explains them. As long as no `config.toml` with different settings exists in this directory, the *SARAD Registration Server service* works with these default settings.

The *SARAD Registration Server service* must be restarted after each editing of `config.toml`. To do this, run the Windows system program *Services* as an administrator (Fig. 4.2) and restart the service via the pop-up menu that opens with the right mouse button (Fig. 4.3).

Warning

Pay close attention to the syntax when editing `config.toml`! If you make a mistake here, the service will stop immediately every time you try to restart it and will enter an endless loop of automatic restarts.

4.4 Locally connected devices

In the basic configuration, the *SARAD Registration Server service* assumes that a SARAD device could be connected to any existing RS-232 interface (COM1) or to any USB port.

At the USB ports, plugging in a device for the *SARAD Registration Server service* is the trigger for checking whether the new device is a SARAD measuring instrument. COM1, on the other hand, checks every 30 s whether a SARAD device is connected.

These default settings can be customized in the `[usb_backend]` section of the `config.toml` file.

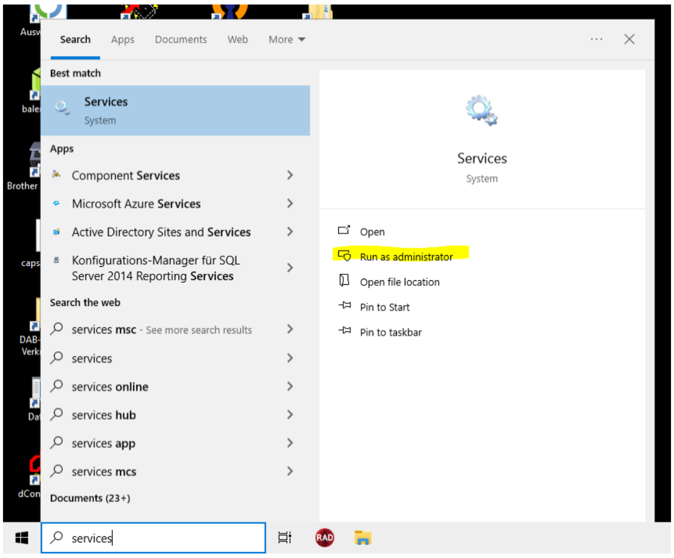

Figure 4.2: Start *Services* via the Windows search function with win and enter 'Services'

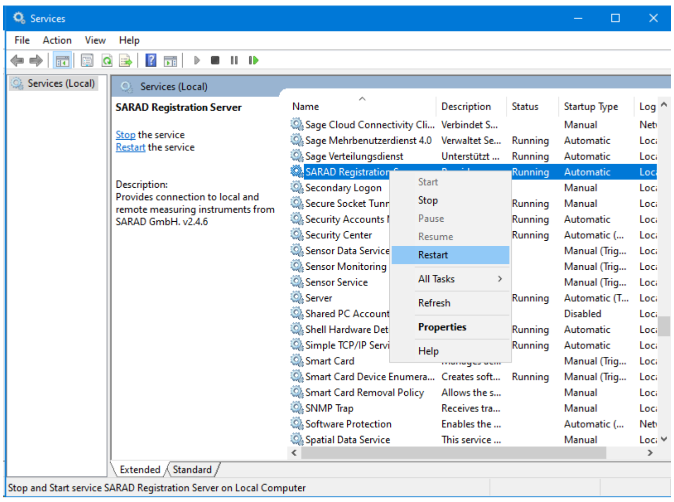

Figure 4.3: Restarting the *service*

4.5 Devices in the local network

In the basic configuration, the *SARAD Registration Server service* installed on your PC sees the SARAD measuring instruments connected to other PCs in your LAN on which the *SARAD Registration Server service* is also installed. Conversely, your colleagues will also see the device connected to your PC in their device list in *dVISION 4*.

This behavior is configured in the sections `[frontends]` and `[backends]`. If you do not want other users to see the devices connected to your PC, set `mdns = false` in the `[frontends]` section. Conversely, if you do not want to see any devices from other workstations in your device list, then set `mdns = false` in the `[backends]` section.

4.6 Handling of device access conflicts

As mentioned in section 4.5, multiple users with *dVISION 4* can have access to one and the same measuring instrument. However, SARAD measuring devices are not capable of multitasking, i.e. they cannot communicate with several instances of *dVISION 4* at the same time. That's why a reservation mechanism ensures that access conflicts are avoided. The respective reservation status is indicated by a colored dot in front of the device name in the drop-down device list. With each access (e. g. with Data › Get Data), the device is reserved and thus blocked for other users, which is indicated by a red dot in the device list. If you move the mouse over a device marked in this way, a tooltip shows who is using the device (Fig. 4.4). Once the setting or data download is complete, the device is released and the dot turns white again. If you are the person who has reserved the device, the dot is green.

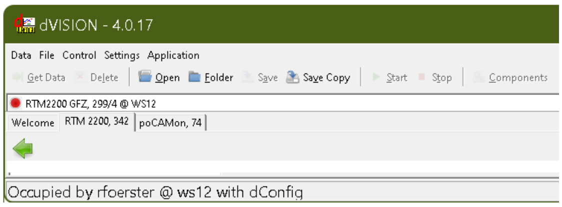

Figure 4.4: Display of the reserving user with host name and application program

In an emergency, it is possible to take the device away from the other user by force. The context-sensitive menu of the drop-down device list contains the item Steal chosen device (Fig. 4.5). This immediately releases the device again and the other user receives an error message.

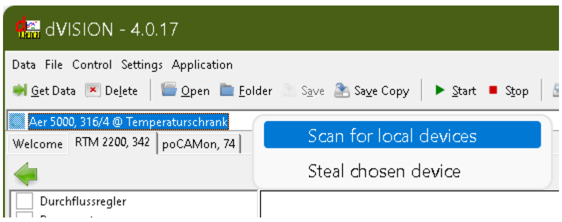

Figure 4.5: Taking over a blocked device

Bibliography

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[2] *dConfig 4 – Software Manual*. English. SARAD GmbH, 2025. *dConfig 4 – Softwarehandbuch*. Deutsch. SARAD GmbH, 2025.

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