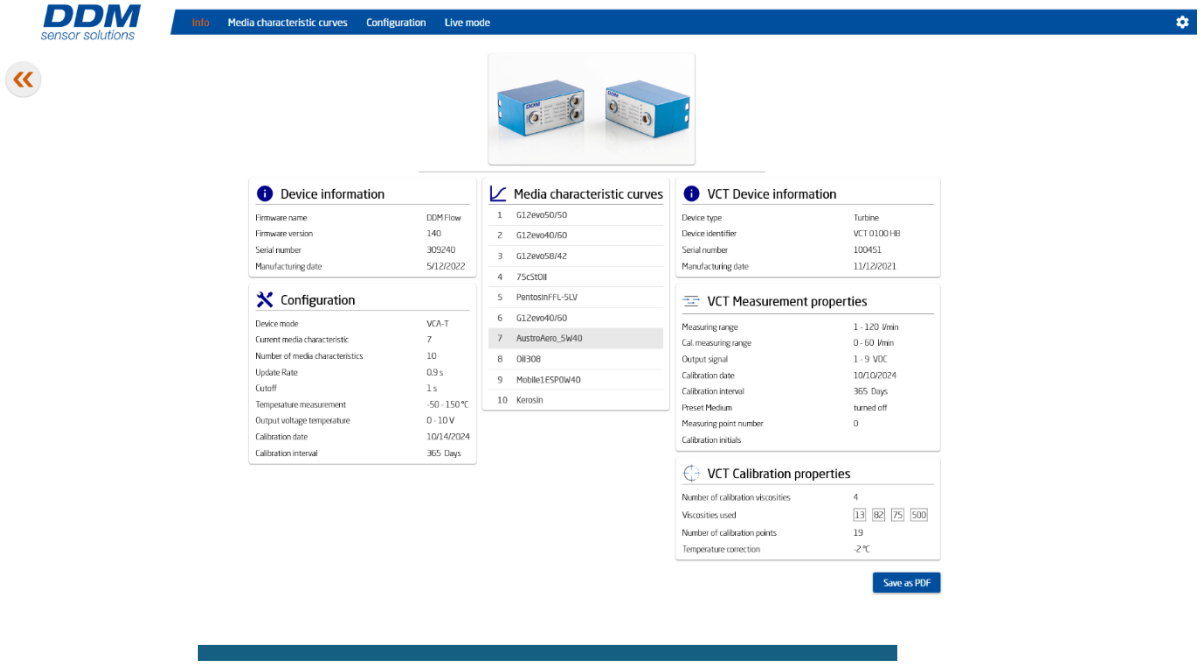
DDM
sensor solutions

OPERATING INSTRUCTION

Diagnostic interface



Version: 1.0.2 - as of October 2024

Contents

Software installation

Step 1: Start the installation by executing the installation routing "Setup Diagnostic Interface"

Illustration 1 - Software installation step 1

Step 2: Select the desired language (German/English) for the installation routine and confirm this by clicking on "OK".

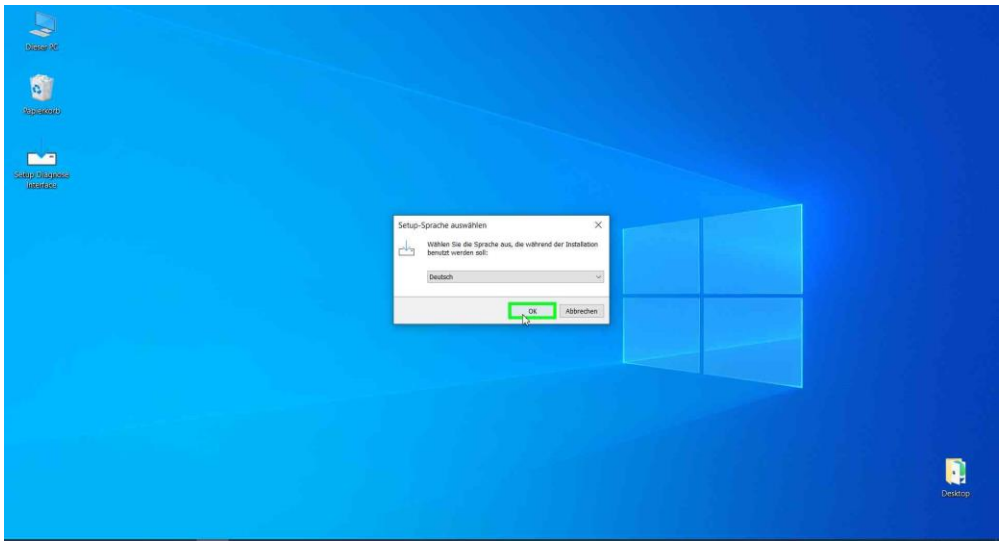


Illustration 2 - Software installation step 2

Step 3: Select the target folder in which the program is to be installed. You can also simply install the program in the default directory already selected. Confirm by clicking on "Next".

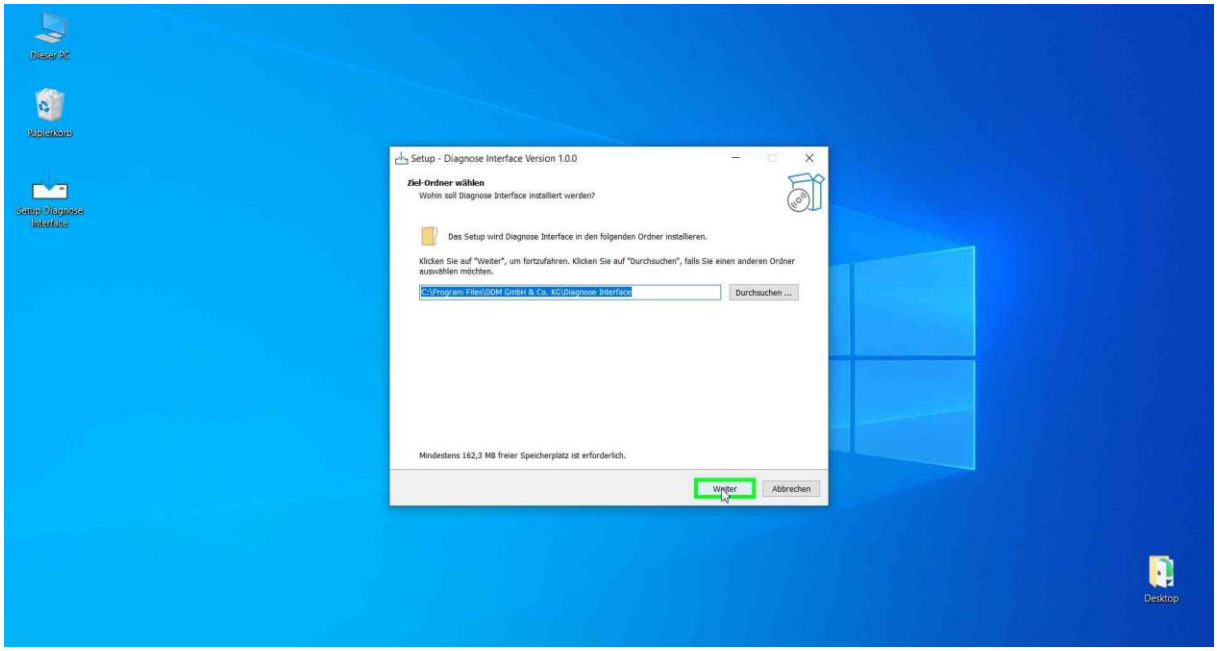


Illustration 3 - Software installation step 3

Step 4: The installation routine creates a shortcut in the Start menu. You can customize the name of the shortcut here or simply keep the pre-selected default. Confirm by clicking on "Next".

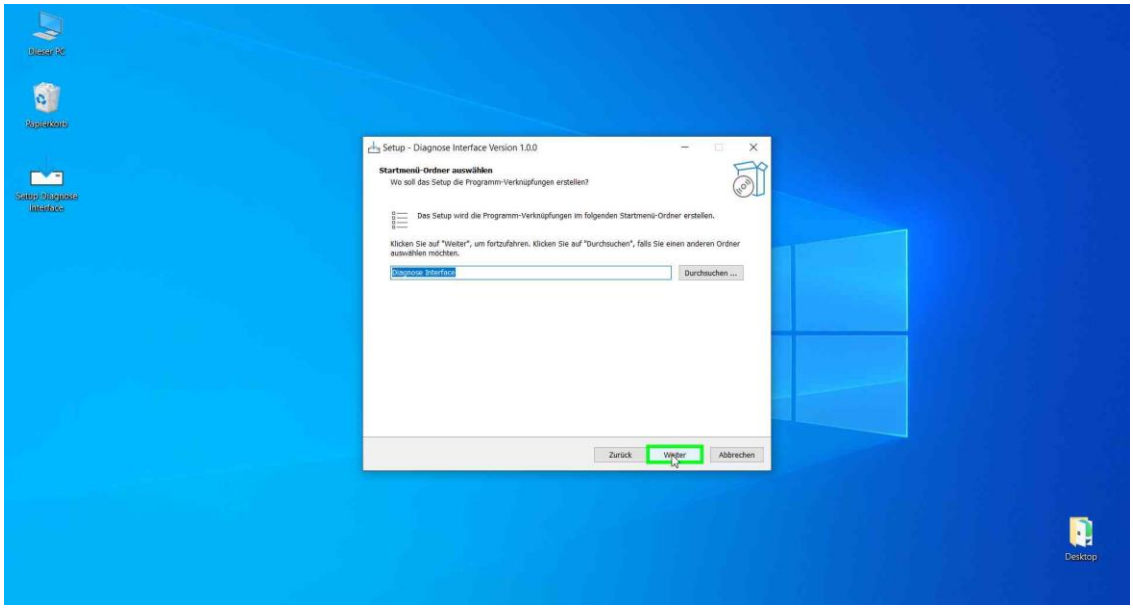


Illustration 4 - Software installation step 4

Step 5: We recommend that you create a desktop shortcut to our software. If you do not wish to do this, uncheck the box next to "Create desktop icon". Confirm by clicking on "Next".

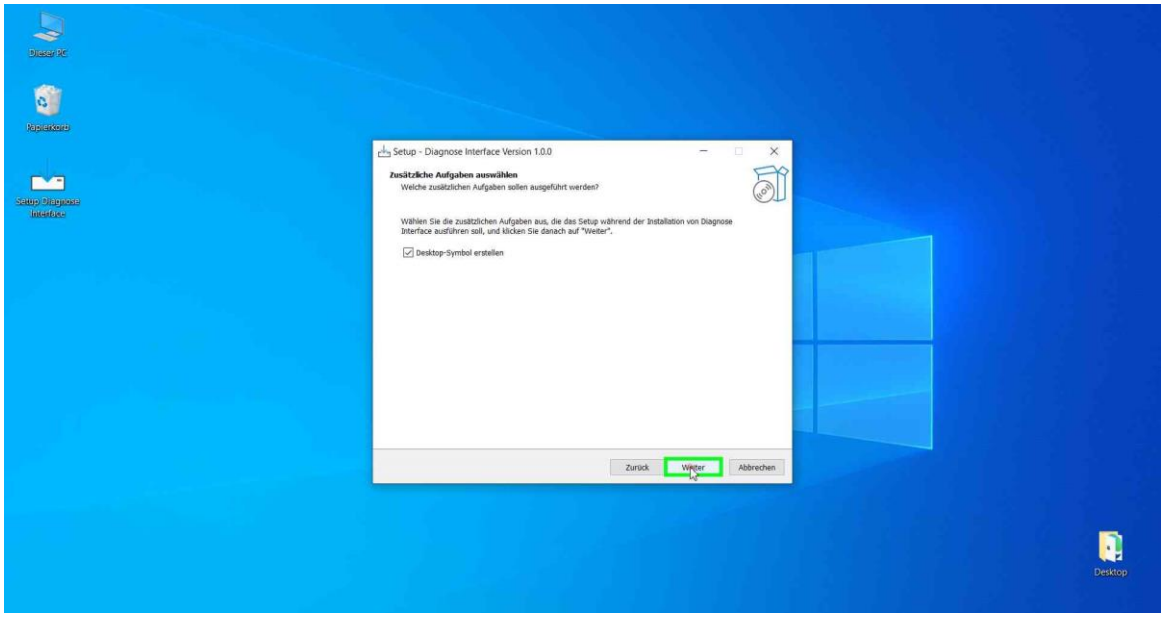


Illustration 5 - Software installation step 5

Step 6: The software is now ready for installation. You will now see an overview of the selected options. If you would like to change a selection, you can navigate back at any time using the "Back" button in the setup routine. Otherwise, start the installation by clicking on "Install".

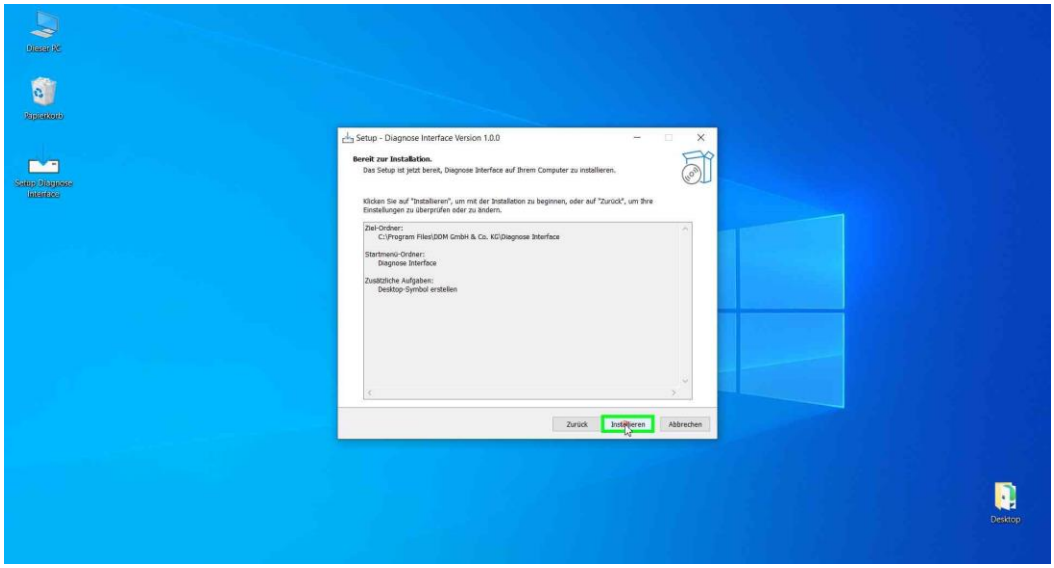


Illustration 6 - Software installation step 6

Step 7: A special driver is required to use our hardware. The driver installation starts automatically as part of the installation routine. Start the process by clicking on "Next"

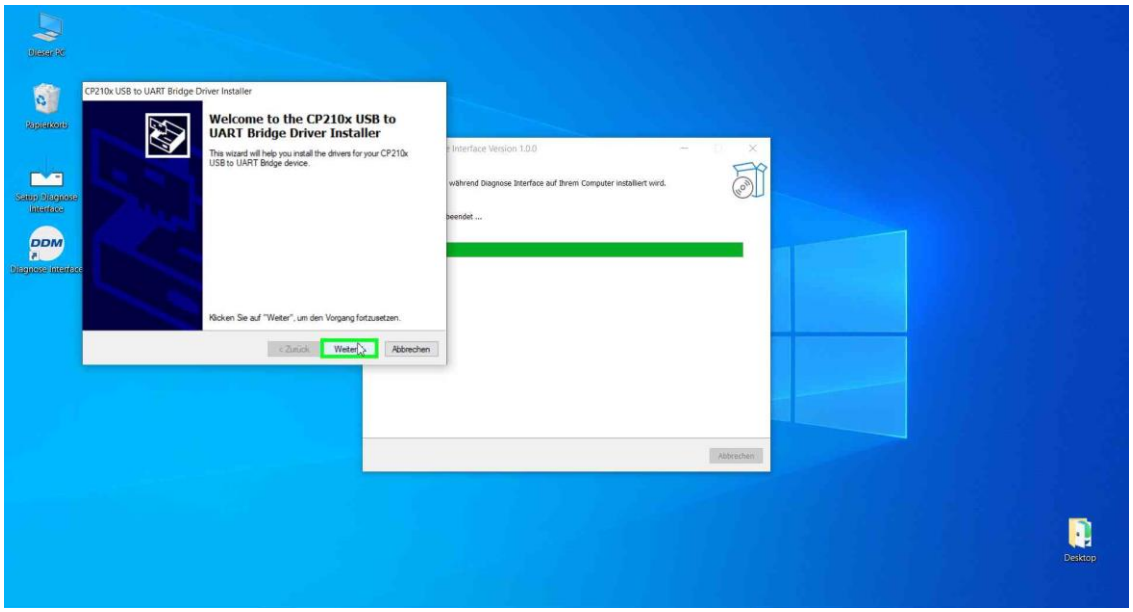


Illustration 7 - Software installation step 7

Step 8: Read and confirm the driver manufacturer's license agreement.

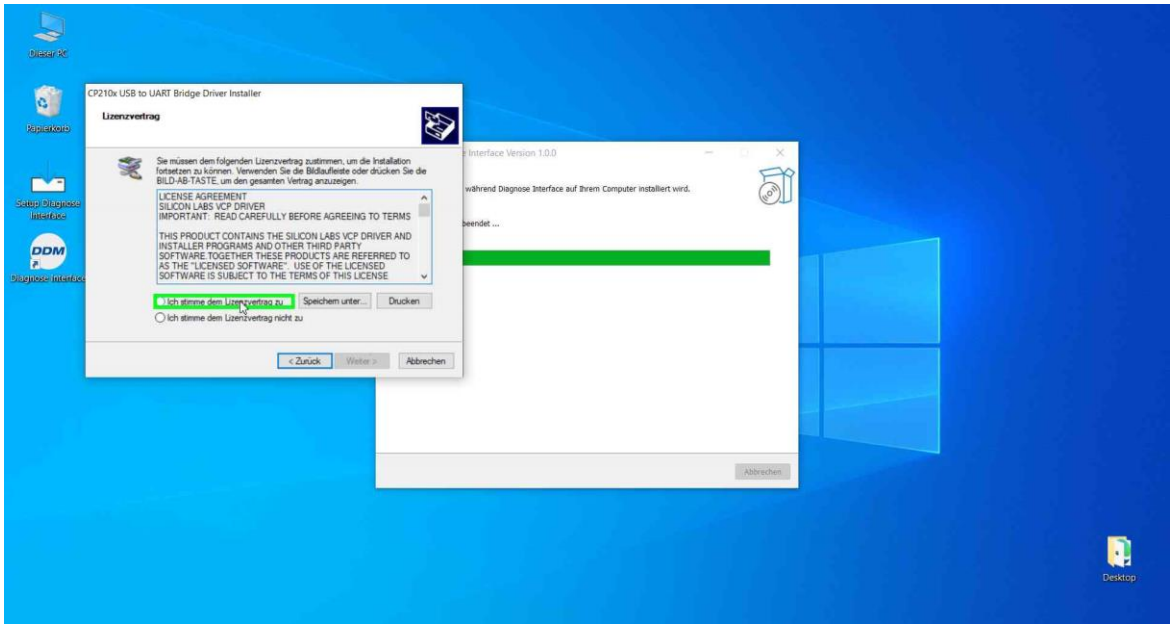


Illustration 8 - Software installation step 8

Step 9: Confirm by clicking on "Next".

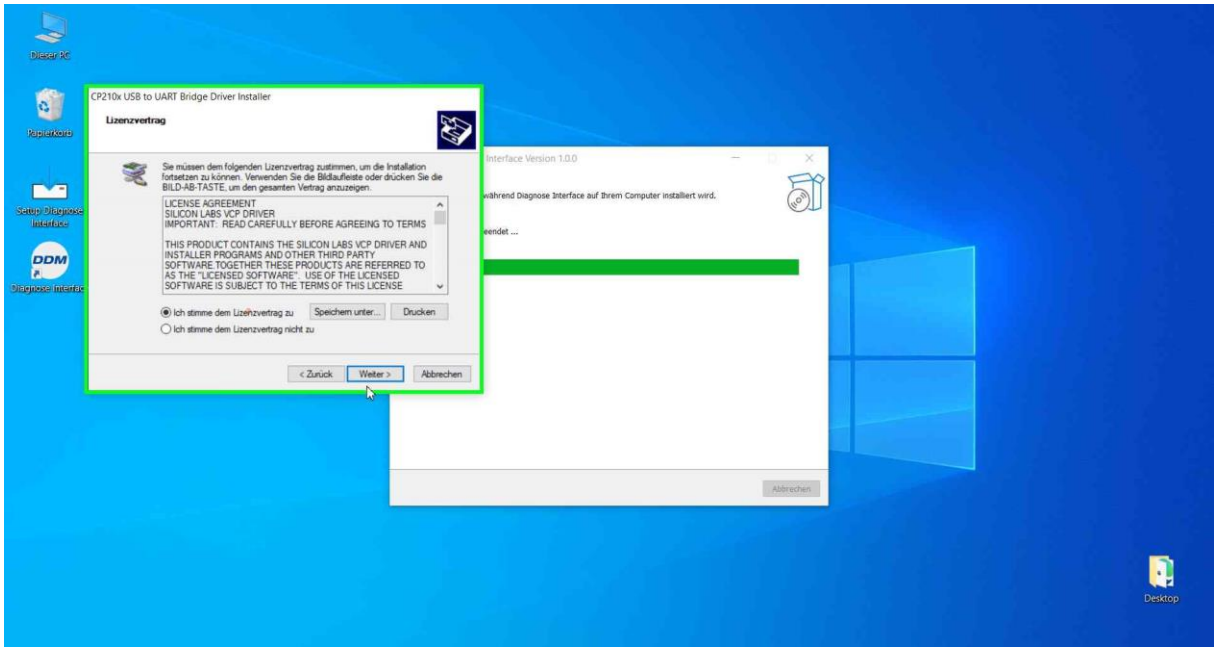


Illustration 9 - Software installation step 9

Step 10: Once the driver installation is complete, exit the setup routine by clicking on "Finish".

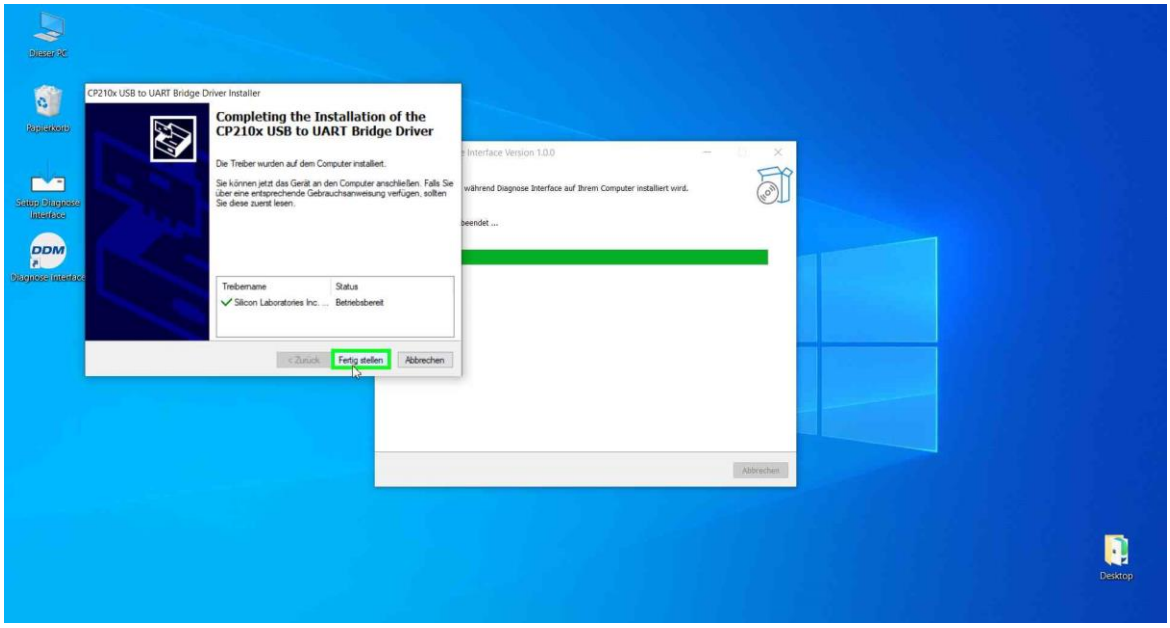


Illustration 10 - Software installation step 10

Step 11: The software installation is complete. Exit the setup routine by clicking on "Finish".

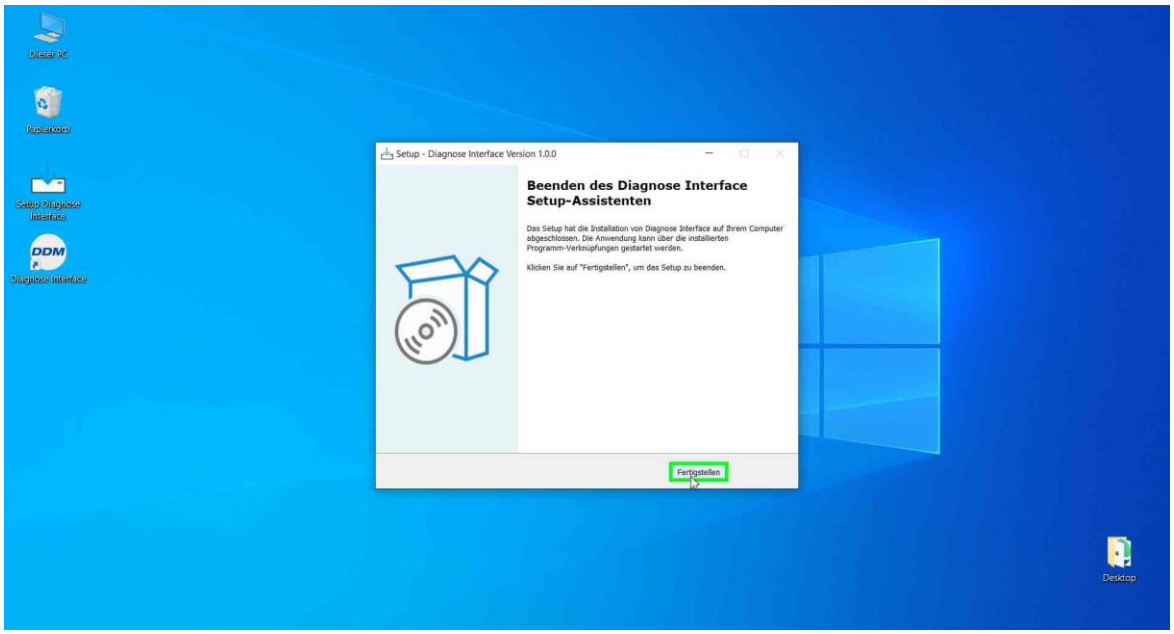


Illustration 11 - Software installation step 11

Step 12: Start the "Diagnostic Interface" program via the link on the desktop or from the start menu.

Illustration 12 - Software installation step 12

Program start

After starting the program, you must connect to the diagnostic interface hardware. Plug the device into a free USB port and click on the Refresh button.

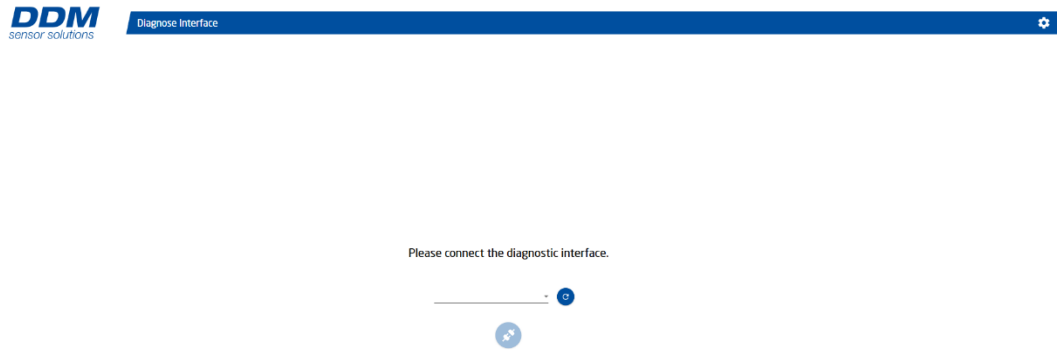


Illustration 13 - Program start

Select the appropriate device from the drop-down menu and connect to the device.

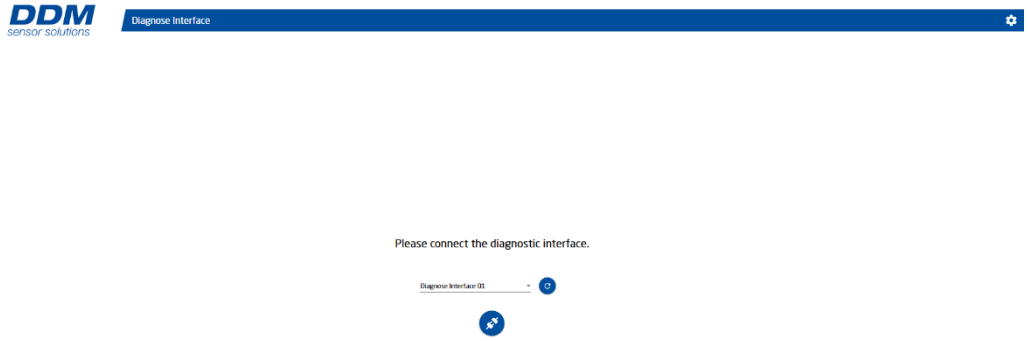


Illustration 14 - Select diagnostic interface

The software is now ready for use and the device connection has been established. In the main menu, you can now select whether you want to configure/parameterize the VCT or the VCA.

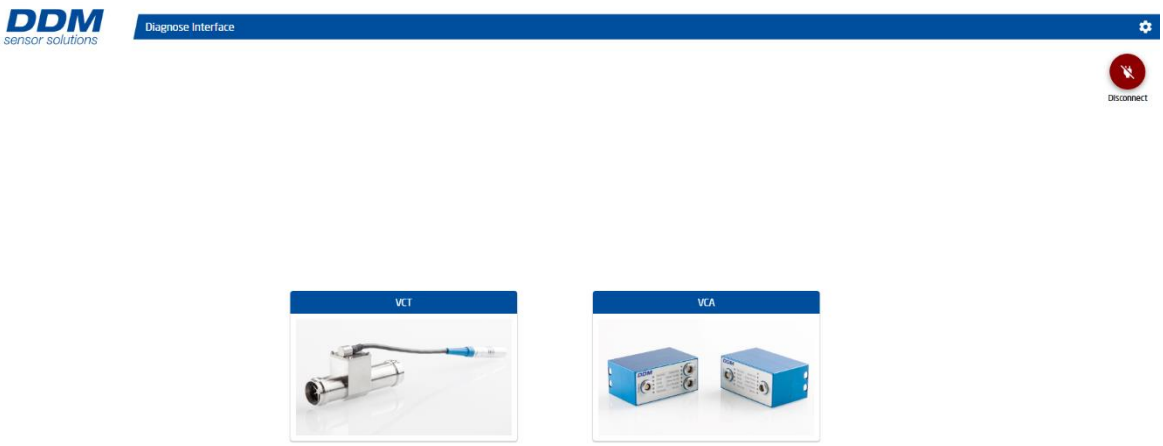


Illustration 15 - Home page Diagnostic interface

VCA configuration/parameterization

Compatible products

The **Flow computer - VCA** (https://www.ddm-sensors.de/durchflussmesser/flow-computer-vca/) and the **Flow computer - VCA-T** (https://www.ddm-sensors.de/durchflussmesser/flow-computer-temperaturausgang-vca-t/) are compatible products for this application.

Info

This section provides you with an overview of **Info - Device information**, **Info - Configuration**, **Info - Media characteristics**, **Info - VCT device information**, **Info - VCT measurement properties** and **Info - VCT calibration properties**. You can use the "**Save as PDF**" button at the bottom to export the overview page as a PDF, for example for documentation or information purposes.

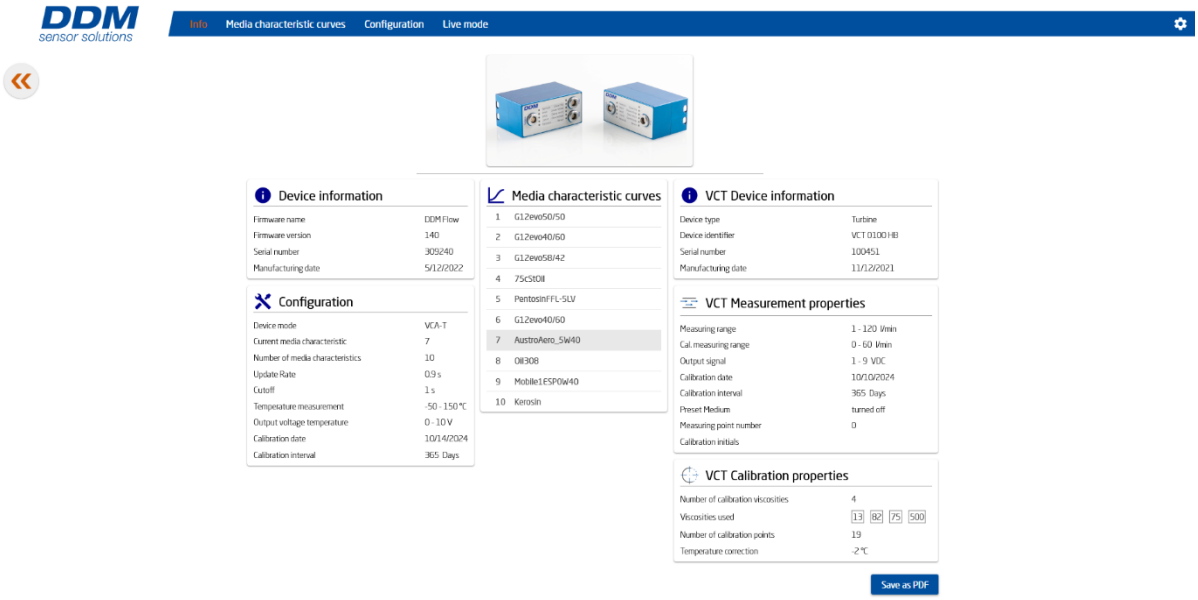


Illustration 16 - VCA configuration/parameterization

Info - Device information

This section shows the **firmware name**, the **firmware version**, the **serial number** and the **date of manufacture** of the VCA or VCA-T.

Note: This information was entered into the device during production and cannot be changed.

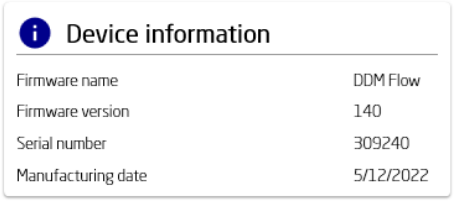


Illustration 17 - VCA device information

Info - Configuration

The non-changeable **device mode**, the **current media characteristic curve**, the **number of stored media characteristic curves**, the **configured Update rate**, the configured **Cut-off**, the configured **temperature measurement**, the configured **output voltage** for the temperature measurement as well as the **calibration date** and the **calibration interval** in days are displayed here.

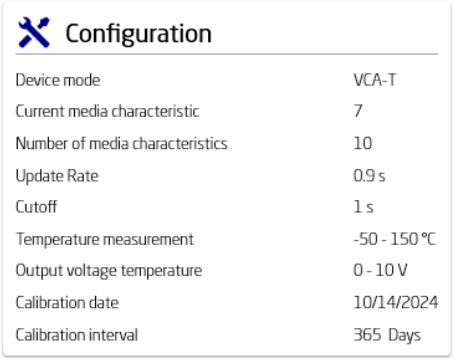


Illustration 18 - VCA configuration

Info - Media characteristics

In this section, you can see the **number** (maximum 10) and the **names** of the stored **media characteristics**. The currently **selected media characteristic curve** is highlighted in color (grey).

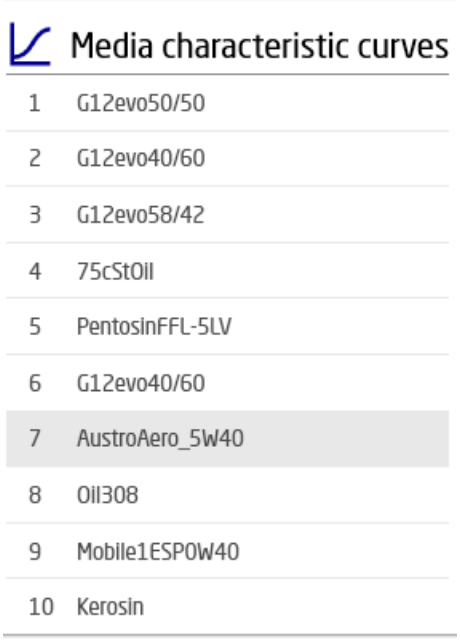


Illustration 19 - VCA Mendien characteristics

Info - VCT device information

Note: Only works with the turbine connected to the VCA/VCA-T.

The **device type**, the **device ID**, the **serial number** and the **date of manufacture of** the connected turbine are displayed.

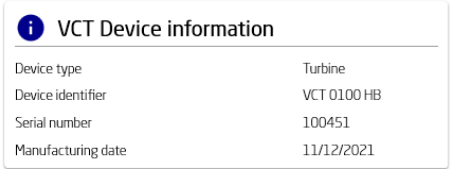


Illustration 20 - VCT device information

Info - VCT measurement properties

Note: Only works with the turbine connected to the VCA/VCA-T.

This section shows the **measuring range**, the **calibrated measuring range**, the **output signal**, **the calibration date**, the **calibration interval**, the **preset medium**, the **measuring point number** and the **calibration initials**.

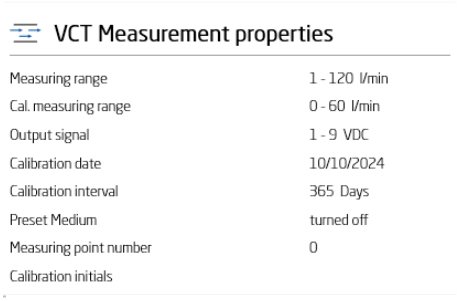


Illustration 21 - VCT measurement properties

Info - VCT calibration properties

Note: Only works with the turbine connected to the VCA/VCA-T.

The **number of calibration viscosities**, the **viscosities used** in detail, the **number of calibration points** and the stored **temperature correction** are displayed here.

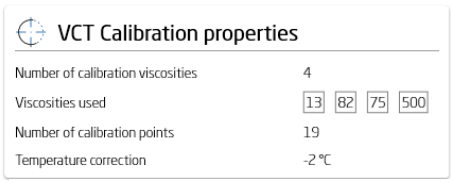


Illustration 22 - VCT calibration properties

Media characteristics

Under the menu item Media characteristics, the same overview as on the **Info-page** is presented. In this section, you can see the number (maximum 10) and the names of the stored media characteristics. The currently selected media characteristic curve is highlighted in color (grey).

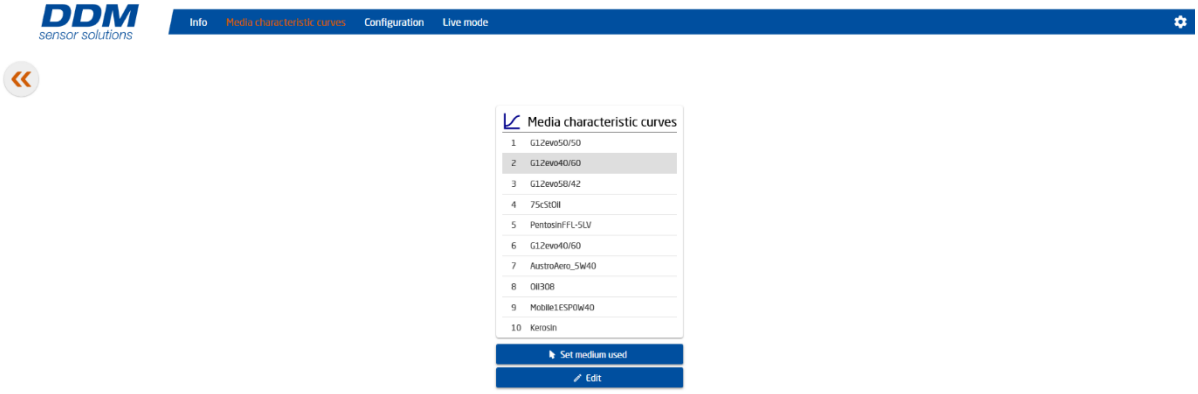


Illustration 23 - VCA media characteristics

Specify medium used

The "Set medium used" function is located below this overview. To do this, select a medium in the displayed overview with a mouse click and set it as active with the "Set medium used" button. Alternatively, you can set the media characteristic directly on your VCA or VCA-T as usual using an RFID tag.

Edit media characteristic curve

To edit a media characteristic curve, first select the desired medium in the overview with a mouse click and then press the "Edit" button. The detailed view of the medium now opens.

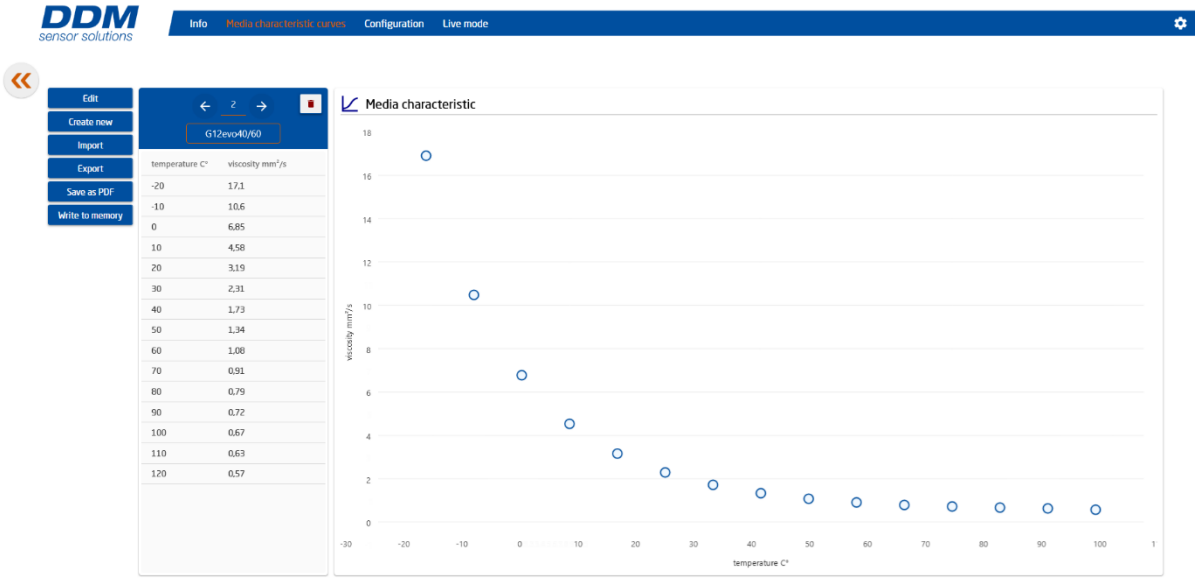


Illustration 24 - Edit media characteristic curve

Structure of the media characteristic curves - detailed view

On the left-hand side of the detailed view, you will find the buttons/commands that are available in this overview for configuring the media characteristic line:

- Edit
- Create new
- Import
- Export
- Save as PDF
- Write to memory

The right-hand side of the screen shows the media characteristic curve selection control panel, the **name of the media characteristic curve**, as well as a tabular display of the points and a large tabular display of the stored points in a diagram.

Illustration 25 - Media characteristic curve selection Control panel

Menu items for configuring the media characteristics

Edit menu item

Edit name: Click in the text field and change the name using the keyboard.

Change points in the table view: Select the desired cell and change the value, or click in the empty row at the end to add more points.
Graphical display: The changes are applied directly in the graphical display.
Save changes:
On the device (VCA/VCA-T): Via the menu item "**Menu item "**Write to memory""
As a CSV file: Via the menu item "Export" on the local computer
As a PDF file: Via the menu item "Save as PDF" on the local computer

Menu item Create new

Set name: Click in the text field and enter the desired name.
Add points: Click in the empty line at the end and add new points.
Graphical display: The changes are applied directly in the graphical display.
Save changes:
On the device (VCA/VCA-T): Via the menu item "**Menu item "**Write to memory""
As a CSV file: Via the menu item "Export" on the local computer
As a PDF file: Via the menu item "Save as PDF" on the local computer

Import menu item

Import a media characteristic curve (including its name) from a previously exported CSV file via the "Export" menu item. This is useful for importing into other VCA/VCA-T devices, for example.

Export menu item

Export the selected media characteristic curve (including its name) as a CSV file to the local computer.

Menu item "Write to memory"

Saves the selected media characteristic curve including all changes made to the selected position in the memory of the VCA/VCA-T.

Delete media characteristic curve

Next to the position selection of the media characteristic curve is the delete button (symbol of a red dustbin). You can use this button to delete the currently selected media characteristic curve. After pressing the button and then confirming in the dialog box that pops up, the change must still be saved via the menu item "**Menu item "**Write to memory"" menu item to the VCA/VCA-T.

Note: Only the last media characteristic curve can be deleted. If, for example, four characteristic curves are stored and you want to delete the second one, you must first delete the fourth and third and then import them again.

Configuration

The "Configuration" area offers setting options for **Update rate**, **Cut-off**, **output voltage range** for the temperature measurement, the **calibration date** and the set **calibration interval**.

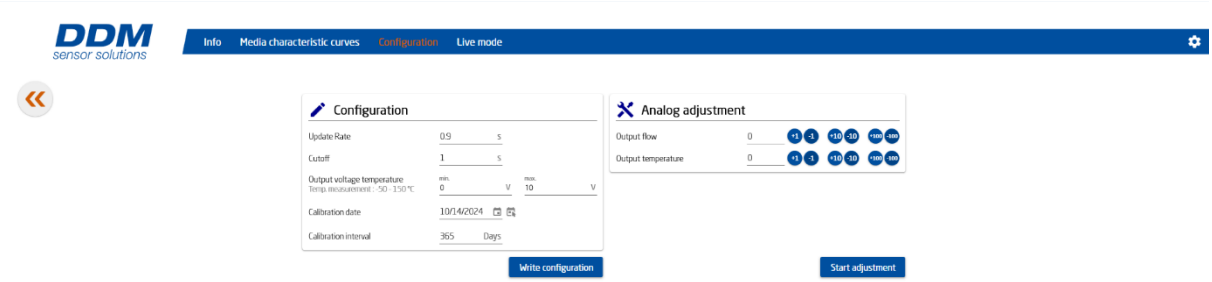


Illustration 26 - VCA configuration

Write configuration

Once you have made the desired settings in the Configuration area, write them to the device by clicking on the "Write configuration" button.

Analog adjustment

The analog adjustment function allows you to adjust the output signal of the VCA or VCA-T (hereinafter referred to as the **Flow computer**) with a calibrated voltmeter.

Preparation of the adjustment

1. **Connect the flow computer:**

- Close the **Flow computer** to the **VCA socket** of your diagnostic interface.
- Connect a compatible turbine from the VCT series to the **"Turbine"** socket on your **Flow computer** on your flow computer.

2. **Connect the measuring device:**

- Connect the signal output of the diagnostic interface labeled **"Signal out"** to your calibrated voltmeter.

Performing the analog adjustment

1. **Start synchronization:**

- Click on the "**Start synchronization**" button.

2. **Set the voltage:**

- The **Flow computer** sets the output voltage to **10 V**.
- Read the voltage output on your calibrated voltmeter.
  - Correct the output voltage of the **Flow computer** using the operating elements next to the **"Flow output"** display.

3. **Save synchronization data:**

- As soon as your meter displays exactly **10.0 V**, click on "**Write adjustment**" to transfer the adjustment data to the device.

Analog adjustment temperature output

With the **VCA-T**, you can also perform an analog adjustment for the temperature output.

Preparation of the adjustment

1. **Connect the flow computer:**
    - Connect the **Flow computer** to the **VCA socket** of your diagnostic interface.
    - Connect a compatible turbine from the VCT series to the **"Turbine"** socket on the **Flow computer** socket.
2. **Connect the measuring device:**
    - Connect the signal output of the VCA-T labeled **"Temp"** to your calibrated voltmeter.

Performing the analog adjustment

1. **Start synchronization:**
    - Click on the "**Start synchronization**" button.
2. **Set the voltage:**
    - The **Flow computer** sets the output voltage to **10 V**.
    - Read the voltage displayed on your calibrated voltmeter.
    - Adjust the output voltage using the operating elements next to the **"Output Temp"** display.
3. **Save adjustment data:**
    - As soon as the meter displays exactly **10.0 V**, click on "**Write adjustment**" to save the settings to the device.

Live mode

Live mode offers you the option of displaying the data generated by the VCA or VCA-T (hereinafter referred to as the **Flow computer** (hereinafter referred to as the flow computer) of your connected VCT series turbine in real time.

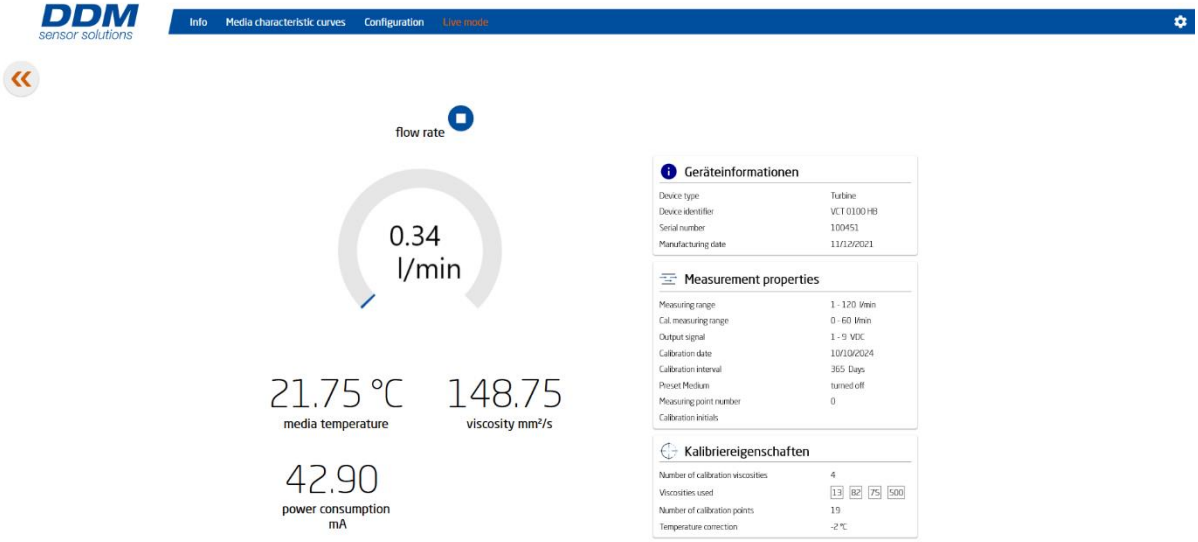


Illustration 27 - VCA live mode

Prerequisites

- **Connect the turbine:** Connect the turbine to the **flow socket** of your **Flow computer**.

Start live mode

- **Starting live mode:** Click on the blue button at the top of the screen.

Display real-time data

After starting live mode, the following real-time data is displayed:

- **Current calculated flow rate:** In liters per minute (l/min).
- **Corrected medium temperature:** The currently measured and corrected temperature of the medium.
- **Current viscosity:** Depends on the set medium.
- **Current total current consumption:** Shows the total current consumption of the system (**Flow computer** + turbine).

  Note: Please note the **Total current consumption**.

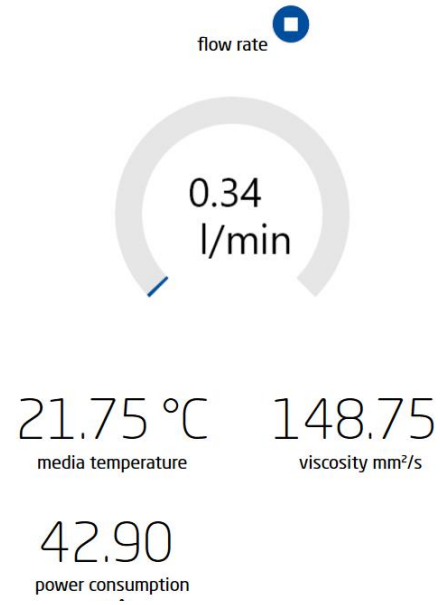


Illustration 28 - VCA real-time data

Information on the connected turbine

Detailed information about the connected turbine is displayed on the right-hand side of the screen, including

- **VCT device information:** See section Info - Device information.
- **VCT measurement properties:** See section Info - VCT measurement properties.
- **VCT calibration properties:** See section Info - VCT calibration properties.

Note: Ensure that all connections are established correctly to obtain accurate real-time data.

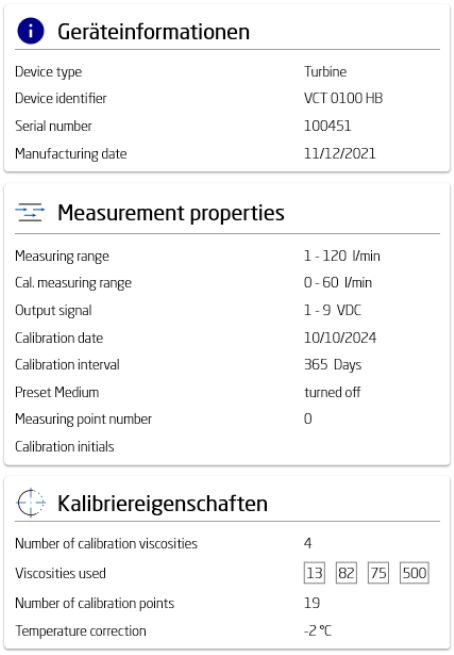


Illustration 29 - VCT information area

VCT/ASP configuration/parameterization

Compatible products

The **DDM flow meter measuring turbine with threaded connection (VCT-AN)** (https://www.ddm-sensors.de/durchflussmesser/turbinen-durchflussmesser-gewindeanschluss/) and the **DDM flow meter measuring turbine with hose connection (VCT-HB)** (https://www.ddm-sensors.de/durchflussmesser/turbinen-durchflussmesser-schlauchanschluss/) and the **DDM Smart-Pickoff (ASP)** (https://www.ddm-sensors.de/durchflussmesser/messaufnehmer-smart-pickoff/) are compatible products for this application, regardless of their measuring range.

Illustration 30 - DDM flow meter measuring turbine

Connection

Connect the DDM diagnostic interface to your workstation via USB. Connect the DDM diagnostic interface to the DDM measuring turbine (VCT) or the DDM Smart Pickoff (ASP) via the "VCT / ASP" socket.

Info

This area provides you with an overview of **device information**, **measurement properties**, **calibration properties** and the stored **calibration characteristic**.

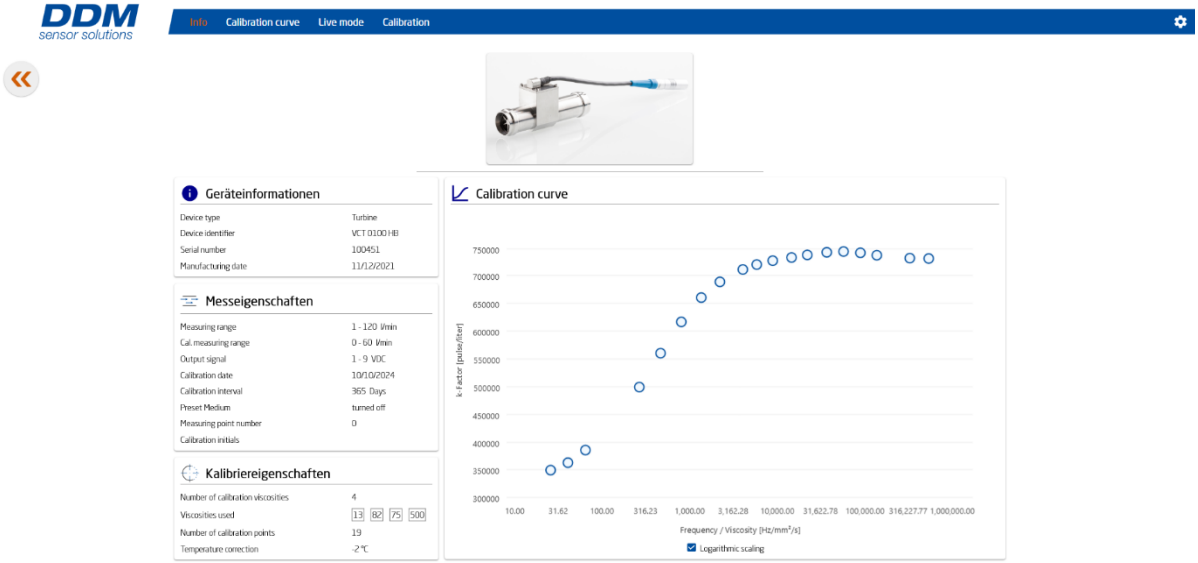


Illustration 31 - VCT/ASP Info

Info - Device information

This section shows the **device type**, the **device ID**, the **serial number** and the **date of manufacture** of the VCT or ASP.

Illustration 32 - VCT/ASP device information

Note: This information was entered into the device during manufacture and cannot be changed.

Info - Measuring properties

This section shows the **measuring range**, the **calibrated measuring range**, the **output signal**, **the calibration date**, the **calibration interval**, the **preset medium**, the **measuring point number** and the **calibration initials**.

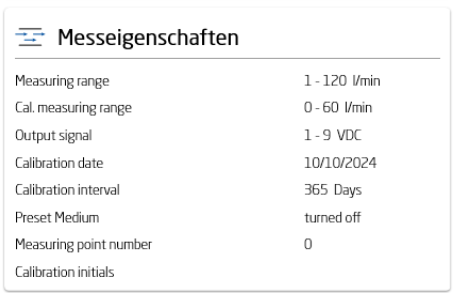


Illustration 33 - VCT/ASP measurement properties

Info - Calibration properties

The **number of calibration viscosities**, the viscosities used **in detail**, the **number of calibration points** and the stored **temperature correction** are displayed here.

Illustration 34 - VCT/ASP calibration properties

Info - Calibration characteristic

The calibration curve visualizes the course of the calibration curve in the form of a graph. This graph uses logarithmic scaling on both axes to display the data precisely and clearly over a wide range of values.

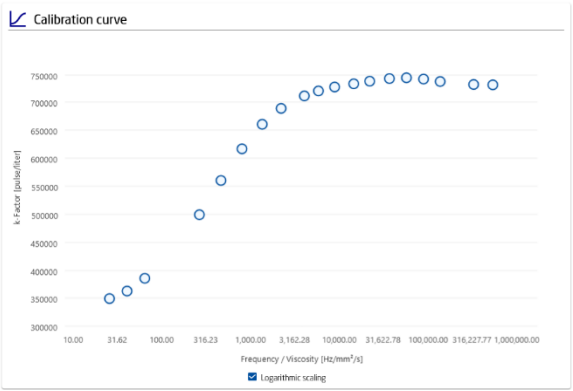


Illustration 35 - VCT/ASP calibration curve

- **X-axis (horizontal):**

  The **frequency divided by the viscosity** (frequency/viscosity) is shown on the x-axis. Due to the logarithmic scaling, both very small and very large values can be displayed in detail.

- **Y-axis (vertical):**

  The **k-factor** is shown on the y-axis. The K-factor describes the measured number of pulses per liter of medium flowed through.

»***Note***: A uniform curve indicates a consistent calibration. Deviations may indicate measurement errors or non-linear properties of the system.

Calibration characteristic

This area shows the same graph that is displayed under **Info - Calibration characteristic** is described in detail. In addition, you can see the individual value pairs in a tabular overview to the left of the graph.

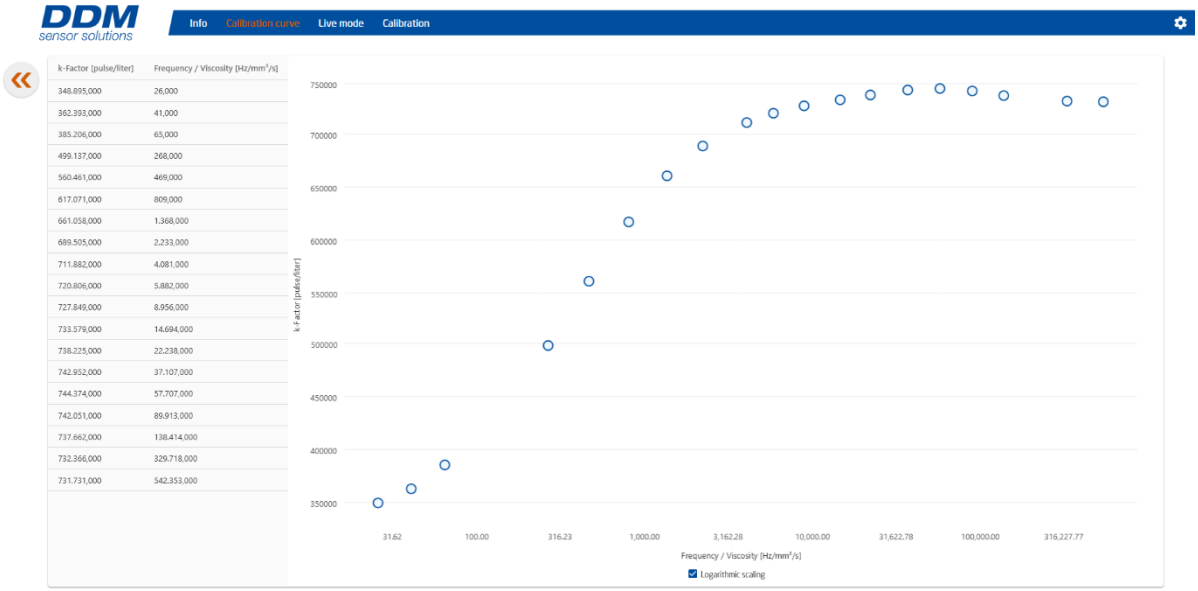


Illustration 36 - Calibration characteristic

Live mode

Live mode allows you to view the measurement data recorded by the VCT or in real time.

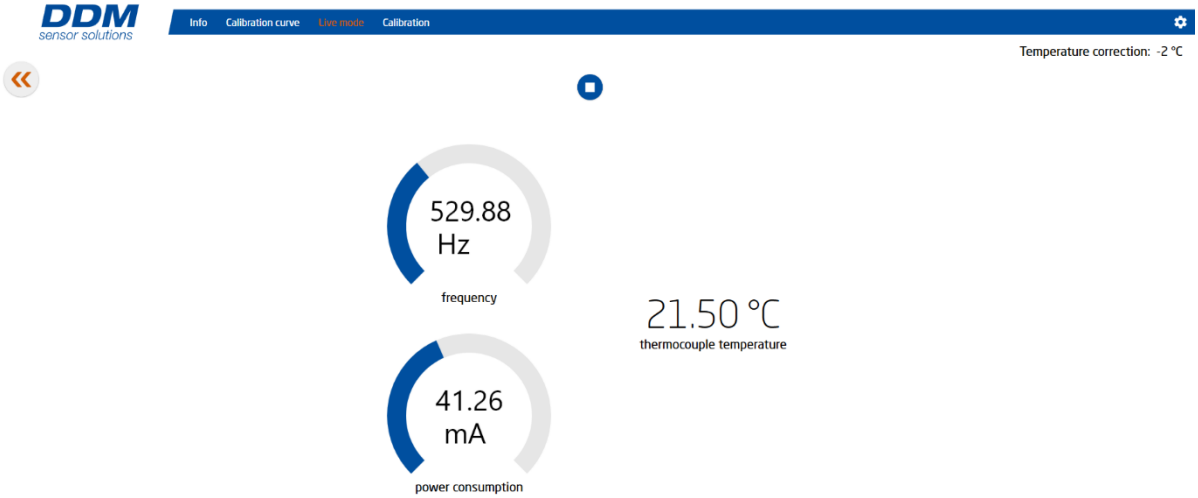


Illustration 37 VCT/ASP -Live mode

Prerequisites

- **Connect the turbine:** Connect the turbine to the **VCT/ASP socket** of your diagnostic interface.

Start live mode

- **Starting live mode:** Click on the blue button at the top of the screen.

Display real-time data

After starting live mode, the following real-time data is displayed:

- **Frequency:** In Hertz (Hz).
- **Corrected medium temperature:** The currently measured and corrected temperature of the medium in degrees Celcius.
- **Current total current consumption:** Shows the total current consumption of the system (**Flow computer** + turbine). Please note the **Total current consumption**.

Note: Ensure that all connections are established correctly to obtain accurate real-time data.

Guided calibration

The guided calibration starts automatically if you have **deactivated** the **expert mode** in the settings and select the **Calibration** area in the top menu bar.

Unit and measuring range

In this screen, you can first select the **unit** of the calibrated measuring range. The following units are available:

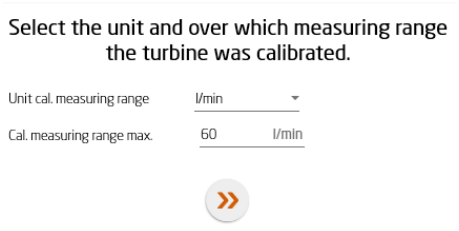


Illustration 38 - VCT/ASP unit and measuring range

- Liters per minute (l/min)
- Liters per second (l/s)
- Liters per hour (l/h)
- US gallons per minute (US.liq.gal/min)
- US gallons per second (US.liq.gal/s)
- US gallons per hour (US.liq.gal/h)
- Imperial gallons per minute (Imp.gal/min)
- Imperial gallons per second (Imp.gal/s)
- Imperial gallons per hour (Imp.gal/h)

Then set the maximum measuring range that you require for your application. Please note: The maximum measuring range must be less than or equal to the maximum possible measuring range, depending on the type of your turbine (VCT or ASP). Here is a list:

Type	Measuring range (l/min)	
VCT / ASP	min.	max.
0005	0,05	5
0010	0,1	10
0020	0,2	20
0030	0,3	30
0060	0,6	60
0100	1,0	100
0250	2,0	250
0350	3,0	350

Illustration 39 - VCT/ASP overview of measuring ranges

Note:: Further information can be found in the data sheet.

Flow output signal

In this screen, you configure the **minimum and maximum output signal** of the **Flow computer** for the flow rate. The maximum voltage is **10 V**.

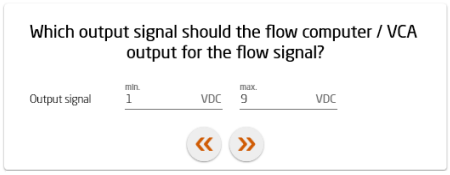


Illustration 40 - VCT/ASP output signal flow

Note: Please note that the minimum value must always be smaller than the maximum value.
Typical values are **0-10 V** or **1-9 V**.

Calibration information

Here you specify the **calibration interval** in days and the **last calibration date.**

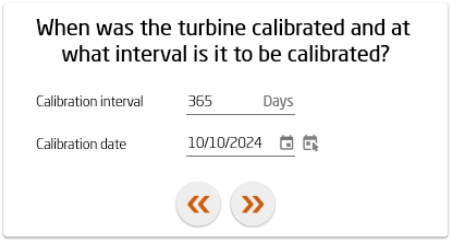


Illustration 41 - VCT/ASP calibration information

Measuring point number and calibration initials

In this screen, you assign or change the **measuring point number** (numeric value between **1 and 255**) and the **calibration initials** (three-digit alphanumeric value).

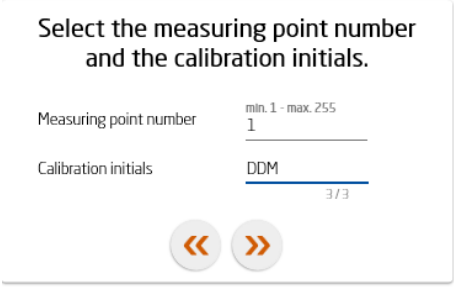


Illustration 42 - VCT/ASP measuring point number and calibration initials

Temperature correction

Here you set the **temperature correction** in degrees Celsius, which was determined, for example, by averaging the 3-point temperature calibration of DDM.

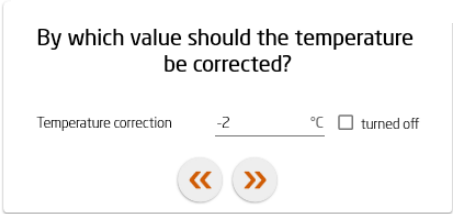


Illustration 43 - VCT/ASP temperature correction

Number and type of calibrated viscosities

In this screen, you first select the **number of calibration viscosities** used via a drop-down menu. Depending on this selection, input fields appear in the **"Viscosities used"** area in which you enter the viscosities in **mm²/s**.

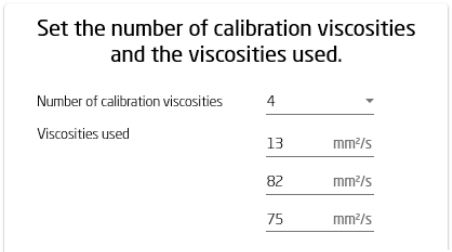


Illustration 44 - VCT/ASP Number and type of viscosities

Data check

In this overview, you will see a summary of all the entries previously made under **Unit and measuring range**, **Output signal flow**, **Calibration information, Measuring point number and calibration initials**, **Temperature correction** and **Number and type of calibrated viscosities**. If the data is correct after your check, confirm this with the **"Confirm"** button (green button with white tick). Otherwise, you can go back one or more steps by using **the Back button** (gray button with orange arrows pointing to the left).

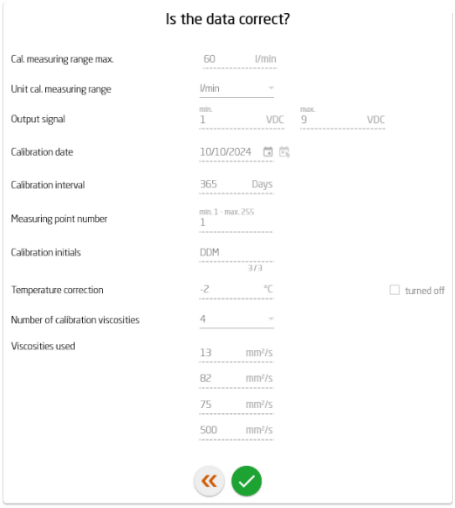


Illustration 45 - VCT/ASP data check

Viscosity selection/editing

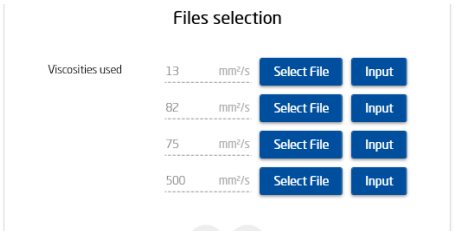


Illustration 46 - VCT/ASP viscosity selection/editing

For each viscosity that is to be used for the calibration curve, the corresponding **measurement points of the calibration** must be specified. You can do this by selecting a corresponding **CSV file** from your device or by entering the measurement results (**K-factor** and **frequency/viscosity**) manually using the **"Input"** button. This must be done for all viscosities used. If you wish to retain the currently stored characteristic curve, you can skip this step by clicking the **"Retain characteristic curve" button.**

Matching

In the following area, all data points that you have previously selected or entered in the **"Viscosity selection/editing"** section are displayed in a graph. The aim is now to **match** the data sets, i.e. to create a viscosity-independent curve. To do this, you can remove data points that do not fit the curve. Select the relevant data point within the graph or table and press the **"DEL"** key on your keyboard or use the button with the **red wastebasket** symbol. The aim is to obtain a rising curve.

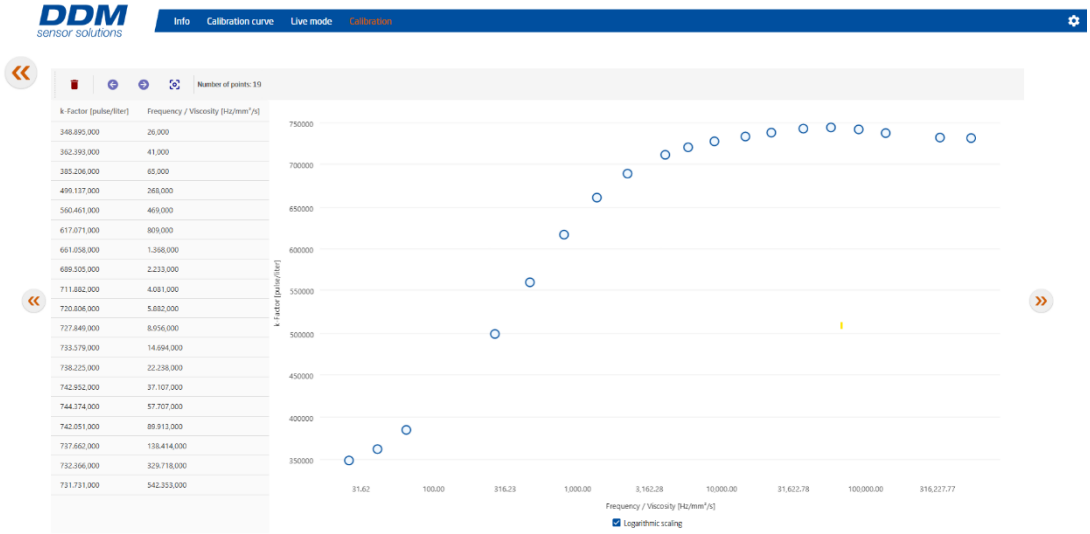


Illustration 47 - Matching

Write data

To transfer the configuration or configuration changes you have made to your **VCT/ASP**, click on the **"Write data" button**. The button then acts as a progress bar and shows you the progress of the write process.

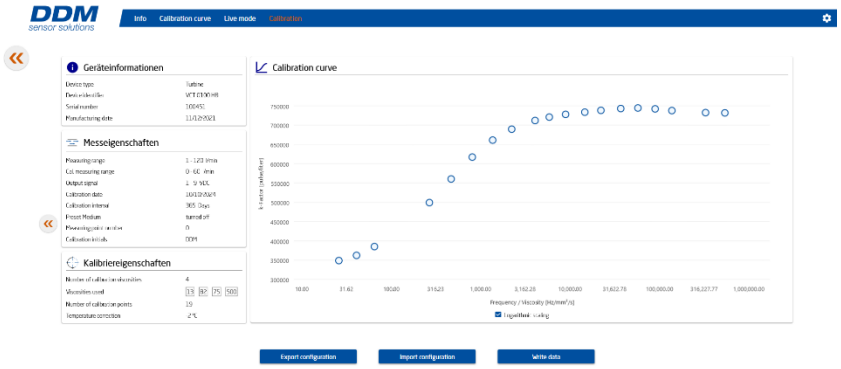


Illustration 48 - Writing VCT/ASP data

Export configuration

You can use this function to export the current configuration as a **JSON file.**

Import configuration

Import a previously saved configuration from a **JSON file**.

Calibration (expert mode)

Calibration in expert mode starts automatically if you have activated expert mode in the settings and selected the **Calibration** area in the top menu bar.

Configuration

In Expert mode, the same configuration options are available as in **Guided calibration.** However, the steps for **unit and measuring range**, **output signal flow**, **calibration information, measuring point number and calibration initials**, **temperature correction** as well as the **number and type of calibrated viscosities** are combined in a single screen.

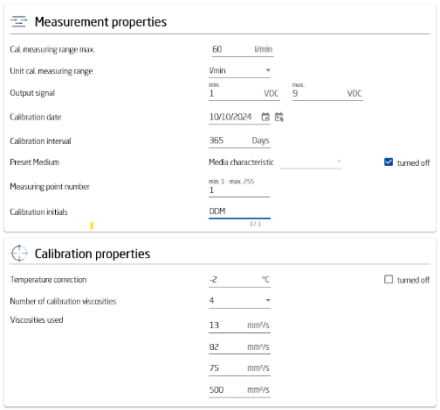


Illustration 49 - VCT/ASP configuration (Expert mode)

Viscosity selection/editing

For each viscosity that is to be used for the calibration curve, the corresponding **measuring points of the calibration** must be specified. Further information on this can be found in the **Viscosity selection/editing** section.

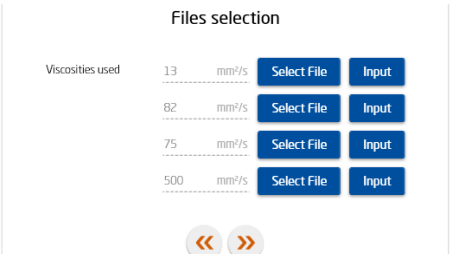


Illustration 50 - VCT/ASP viscosity selection/editing

Matching

This screen is identical to the guided calibration. Please follow the instructions in the **Matching** section.

Write data

To transfer the configuration or configuration changes you have made to your **VCT/ASP**, click on the **"Write data"** button. This process corresponds to the process described under **Guided calibration** in the **Write data** section.

Export configuration

You can use this function to export the current configuration as a **JSON file.**

Import configuration

Import a previously saved configuration from a **JSON file**.

Settings

You can access the **settings** by selecting the white cogwheel in the top menu bar.

Illustration 51 - Program settings

Language

Choose between the two available operating languages **German** and **English**. The language is set directly after the selection in the drop-down menu.

Note: It is not necessary to restart the application to change the language.

Expert mode

Expert mode is deactivated by default. This means that the VCT/ASP configuration is carried out in guided mode. If you are familiar with the operation of the software, you can activate expert mode. The VCT/ASP configuration then starts in expert mode.

Automatic connection with dongle at startup

If this option is activated, the software automatically connects to the recognized diagnostic interface dongle at startup. Manual selection is no longer necessary.

Activate VCA firmware update

By activating this option, it is possible to perform a firmware update on the connected **Flow computer** to the connected flow computer.

About DDM Diagnostic Interface

In this area you will find information about the current **license information**, the **software version** and links to **external libraries** and their **licenses**.

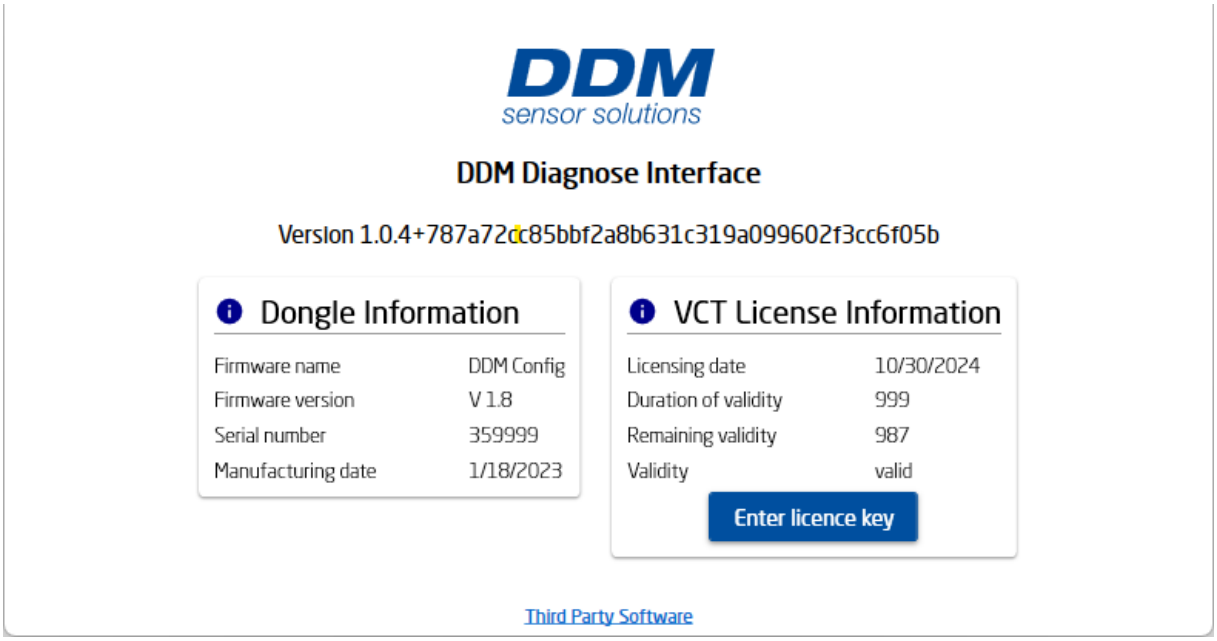


Illustration 52 - About DDM Diagnostic Interface

Explanation of terms

Flow computer

The DDM flow computers VCA (viscosity compensated amplifier) linearize and viscosity-correct the measured flow rate and output it as an analogue or digital signal. In order to be able to use the flow computers universally with different liquids, up to 10 customer-specific media characteristics can be stored and selected without tools using an RFID tag.

Update rate

The update rate determines the time interval from the detection of the turbine frequency to the change in the output signal of the **Flow computer**over this time interval, the turbine frequency is averaged. With an update rate of 0.5 sec, the average value of the flow rate over 0.5 sec is output in proportion to the span.

Cut-off

The cut-off describes the period after which the output signal is set to minimum (0V) if no turbine frequency is detected.

Total current consumption

Is connected to the **Flow computer** and a VCT/ASP are connected, the total current consumption exceeds 60 mA, there is most likely a fault in the device.
If the total current consumption exceeds 15 mA when the VCT/ASP is connected, there is most likely a fault in the device.
In both cases, please contact the manufacturer.

List of illustrations