# SAUTER CASE VAV

**Version 1.5**

## Parameterisation of VAV compact controller ASV115

**Manual**

7010022003 C

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# 1 Preface

Congratulations on choosing Sauter software. You use the SAUTER CASE VAV software in combination with the VAV compact controller ASV115. Both items are quality products from a leading manufacturer of technical control equipment for heating, ventilation and air-conditioning.

This manual describes the SAUTER CASE VAV configuration software, which was specifically developed for simple and cost-optimised parameterisation of VAV compact controllers. The SAUTER CASE VAV software tool offers menu guidance so that you can make all the settings required for the ASV115 to operate perfectly. The most important parameters for input and output configuration are also preset in the factory so that commissioning will be efficient. Special functions for current values and troubleshooting complete the functional scope.

## 1.1 Most important features

- Extremely simple parameterisation for complex applications
- Configurable units for country-specific adaptation
- Overview page for rapid entry of the most important parameters
- Tree view for rapid navigation through the individual configuration pages
- Integrated access to plant schematic and connection diagram
- Export function for commissioning parameters
- Service functions for speedy troubleshooting
- Structured user guidance
- Current values of the most important operating parameters

# 2 Introduction

This manual takes you step by step through the individual functions of the SAUTER CASE VAV software so that you can parameterise a VAV compact controller. Installation of the software on your PC is described, as well as the connection of the PC to a device via the RS485 interface. You will find the accessories required for these purposes in the relevant product documentation (PDS 52.100 or PDS 52.150) and in section 5.2 below in this document.

You will find a general introduction to the subject of demand-led ventilation by means of volume flow control in section 10.

## 2.1 Information on use

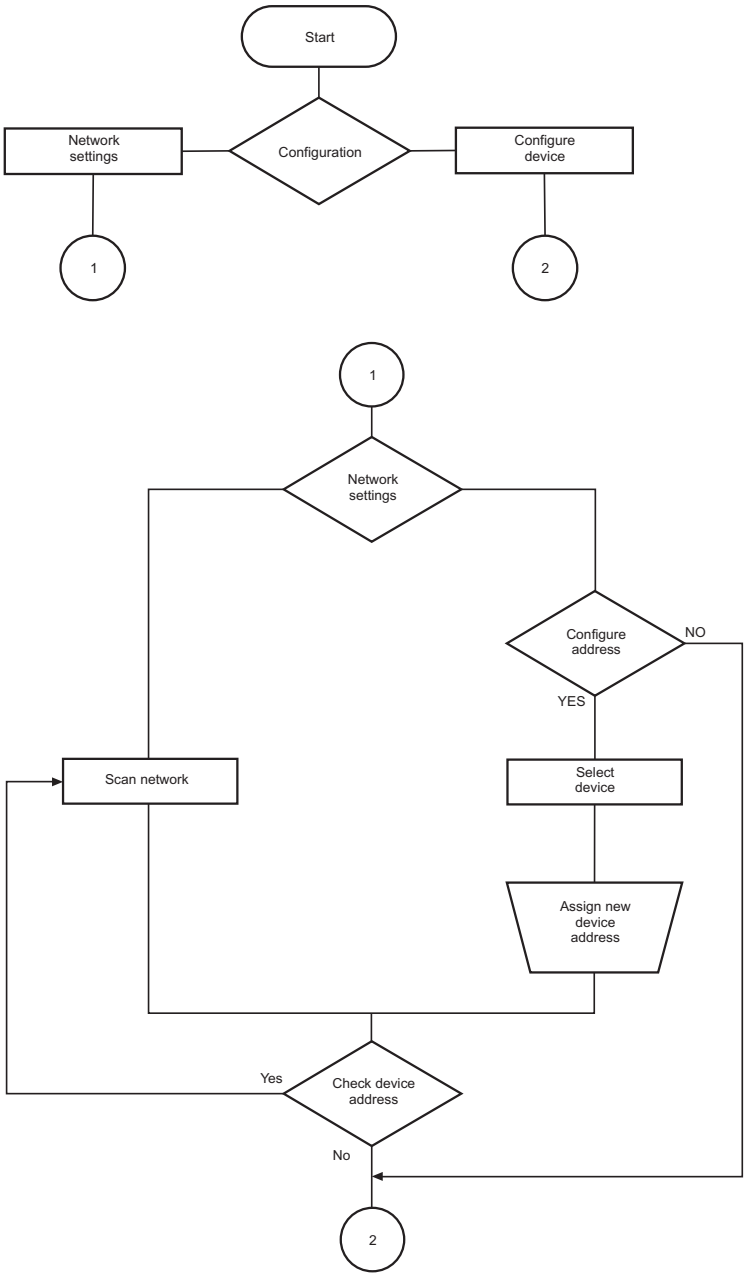
In general, this manual gives no separate descriptions of the usual Microsoft Windows functions such as TAB for navigating through menus, CTRL-C for ‘copy’ or CTRL-V for ‘paste’, unless they can be used to carry out a special function. Key combination ALT- ↓ can be used to open up list boxes inside combo-boxes. If functions can be performed with different sequences of commands, separate descriptions are given in each case.

In some cases, the value for a parameter can be entered on different pages. In this case, note that the values are automatically transferred into the other parameter fields, so there is no need for multiple entries.

# 3 Product structure

## 3.1 Process of configuration

The compact volume flow controller as delivered by SAUTER has been parameterised with a specified configuration (factory setting) as standard. To adapt this configuration to the requirements in your plant, the plant parameters are loaded into the compact volume flow controller via the interface. The actual parameters are entered via the graphic user interface of the SAUTER CASE VAV configuration programme. For configuration sequence, please refer to configuration flowchart below.



Product structure

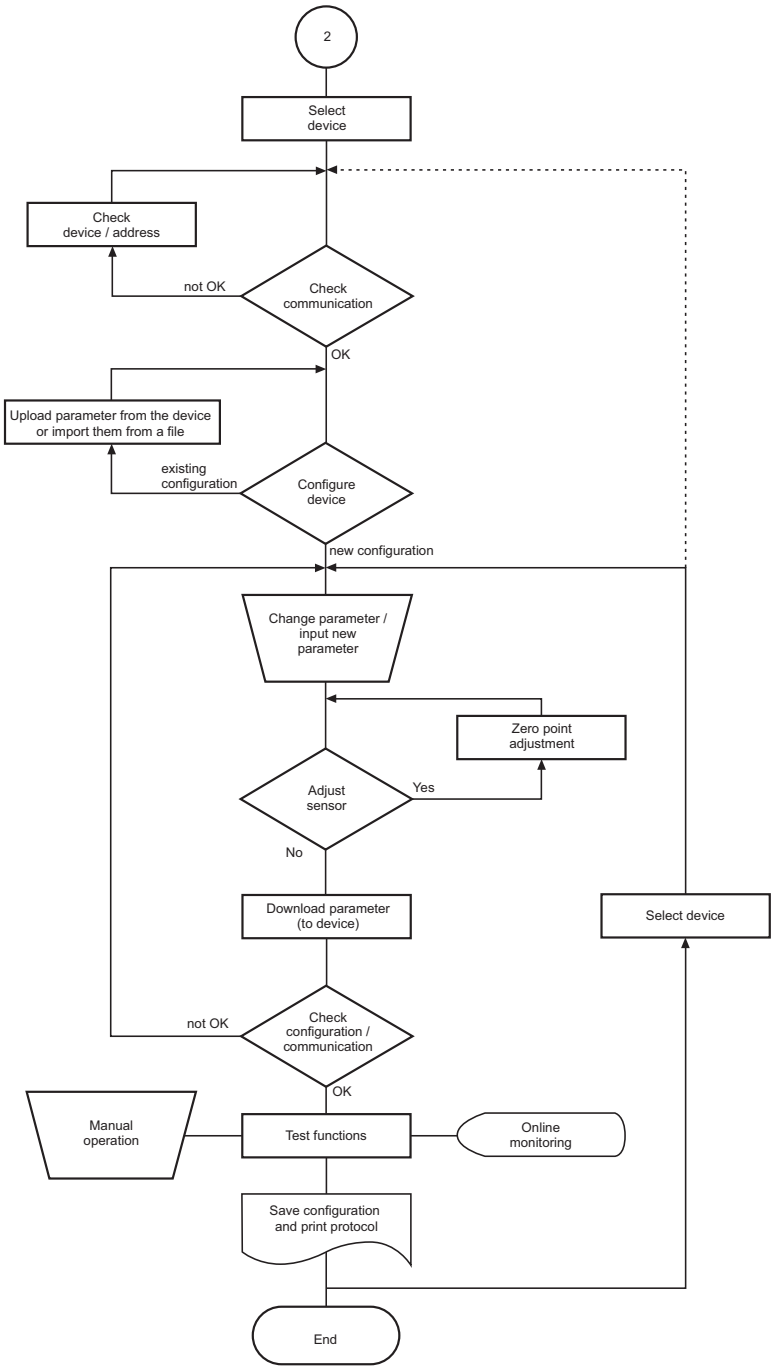



Fig. 1 Configuration flowchart

### 3.2 Program structure

SAUTER CASE VAV
- Start page
    - I. Configure device
        - Select device (type, communication address)
        - Parameter settings
            - Overview
                - Project data
                - Air teminal
                - I/O-configuration
                - VAV control loop
                - VAV setpoints
                - Device information
                - Monitoring
                - Diagrams
            - Upload from device
            - Download to device
            - Zero point adjustment (of differential pressure sensor)
            - Manual operation
            - Current values
    - II. Network settings
        - Scan network
        - Get additional informations (reading the serial number and home address (if entered before) of the device)
        - Change address
- File
    - Create configuration protocol
    - Import configuration
    - Export configuration
    - Exit
- Extras
    - Select device
    - Options
        - Units
        - Language
        - Communication
- Help
    - SAUTER CASE VAV Help
    - About

- Exit

# 4 Safety warnings

You must never operate an ASV115 which is damaged. In case of doubt, contact your local Sauter Service. You will find contact addresses for your nearest Sauter representatives in section 11 Customer service, or on the Internet at www.sauter-controls.com.

- The ASV115 must only be used for its specified operational purpose, which is to control air volume flows in ventilation and air-conditioning installations.
- It is prohibited to use the device in areas with explosion hazards.
- It is prohibited to measure explosive gases with the built-in differential pressure sensor.

# 5 Installation

## 5.1 System requirements

To operate the software, you need:

**Hardware:**
- Processor: Intel Pentium, 1.5 GHz or higher
- RAM: min. 1 GB
- Hard disk: min. 5 GB free memory
- DVD-ROM drive: for installing programmes and drivers
- USB 2.0 connection: for interface converters
- Monitor resolution: min. 1024 × 768

**Software:**
- Framework: .Net Framework 4.0 or higher
- Database: Microsoft SQL Server Compact 3.5 Service Pack 2
- Supported operating systems:
    - Windows XP Home with Service Pack 2 or higher
    - Windows XP Professional with Service Pack 2 or higher
    - Windows Vista Basic Service Pack 1
    - Windows Vista Home
    - Windows 7 32 Bit and 64 Bit
    - Windows 7 Starter

## 5.2 Scope of delivery

- A DVD-ROM with installation and configuration software SAUTER CASE Tools, including SAUTER CASE VAV, RS485-USB driver, .net 4.0 Framework, operating instructions and Adobe Acrobat Reader for viewing the operating instructions
- Brief operating instructions: First Steps

To make the hardware connection between Sauter ASV115 and the PC, you need additional components which must be ordered separately as applicable.

| Order number | Order text |
|---|---|
| 0520450010 | CASE-VAV-USB connection set including software |

Tab. 1 Connection accessories, ASV115 - PC

## 5.3 Software installation

**NOTICE** Only connect the ASV115 VAV compact controller to the PC when the software installation is completed and you are requested to do so by the installation software.

### 5.3.1 Installation of SAUTER CASE VAV

**NOTICE** Parallel installations are not supported.

SAUTER CASE VAV offers you three installation options:

- Stand-alone installation via a zip file. The zip file is available for downloading from the SAUTER Extranet, ASV115 product page, section “Software“.
- Installation via the SAUTER CASE Tools DVD-ROM.
- Installation via the SAUTER CASE Suite DVD-ROM.

**General installation procedure**

1. Start the installation wizard. Carry out one of the following two steps:
- If you want to run the installation from the SAUTER CASE Tools or SAUTER CASE Suite DVD-ROM, please insert the DVD-ROM into the appropriate drive. The installation wizard should start automatically. If not, locate your DVD-ROM drive and double-click the programme **Setup.exe.**
- If you want to run the installation via the zip file, first unzip the zip file and then double-click the programme **Setup.exe**.

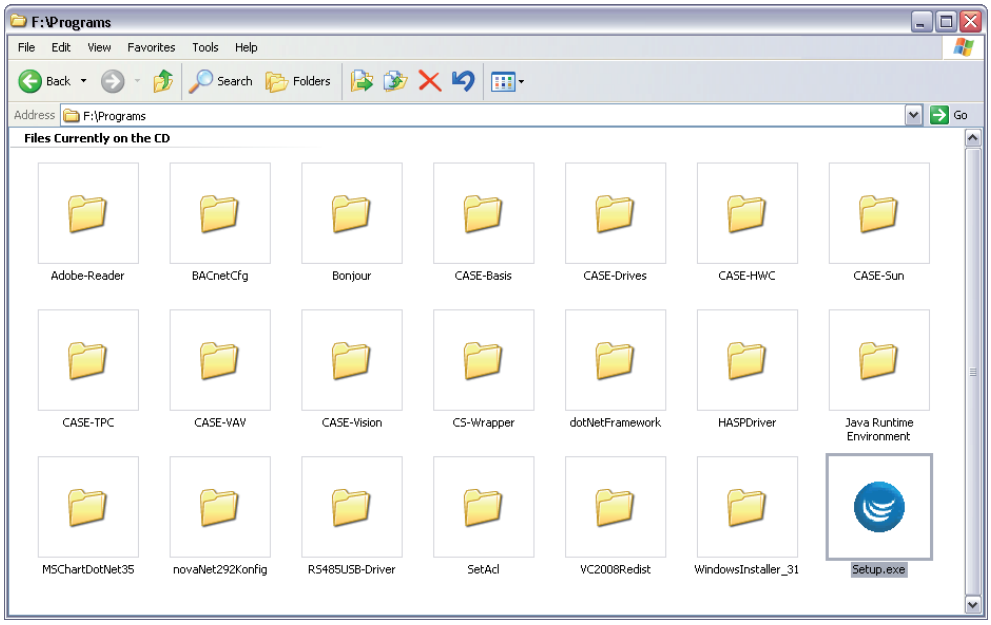



Fig. 2 Setup.exe in the SAUTER CASE VAV Tools DVD

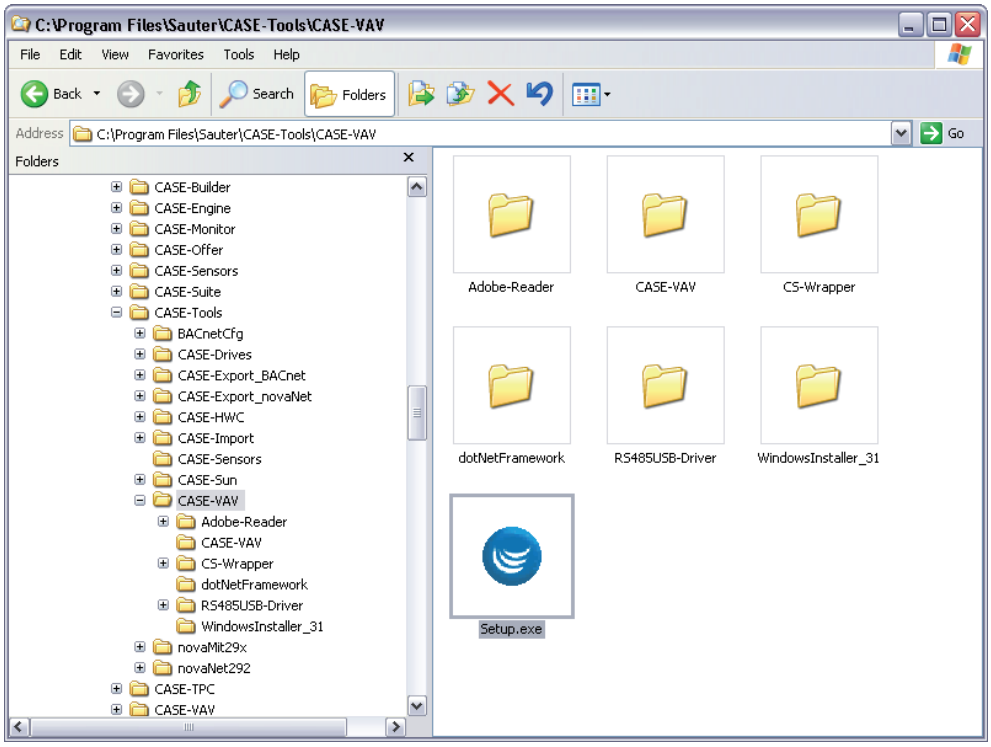



Fig. 3 Setup.exe in SAUTER CASE VAV stand-alone zip file

2. Select the language in which SAUTER CASE VAV is to be installed.

**NOTICE** You can change the language at any time after installation using the menu item **Tools → Options** in the SAUTER CASE VAV software.

3. Read and accept the license agreement and click **Continue**.

4. You can select an installation directory for SAUTER CASE VAV in the next step. If you choose not to specify an installation directory SAUTER CASE VAV will be installed in the standard directory C:\Program\Files\Sauter. Click **Next**.

5. This step only applies to installation via the SAUTER CASE Tools DVD-ROM: choose the tools that you want to install. You must select CASE VAV as the bare minimum. Click **Continue**.

➲ The installation programme installs the software in the selected directory.

➲ After successful installation, the message **Installation successfully completed** appears.

6. Click **Close** to finish the installation procedure.

### 5.3.2 Installation of driver for interface converter

An RS485 interface is available on the device to connect the PC with the transducer. To address this via the PC, the interface converter that is used ‚RS485 to USB, must be set up on the PC you are using. You will find the driver required for this purpose on the provided DVD-ROM.

**NOTICE** You need to install two drivers consecutively: first the “USB Serial Converter” driver and then the “USB Serial Port” driver.

1. Connect the interface converter to the PC at the interface provided for this purpose.

➲ Windows hardware detection starts automatically and queries the installation of the required drivers.

2. Installing the “USB Serial Converter“ driver. Carry out one of the following two steps:
   - If you want to install the driver automatically, first make sure that the RS485 driver directory is available on your hard drive or you have inserted the SAUTER CASE Tools or SAUTER CASE Suite DVD-ROM into the DVD drive. Then select the option **Install the software automatically** and then click **Next**.
   - If you want to install the driver manually, select the option **Install software from a list or specific location**. Then click **Browse** to select the drive and directory in which the driver is located (directory name: RS485USB-Driver). Click **Next**.

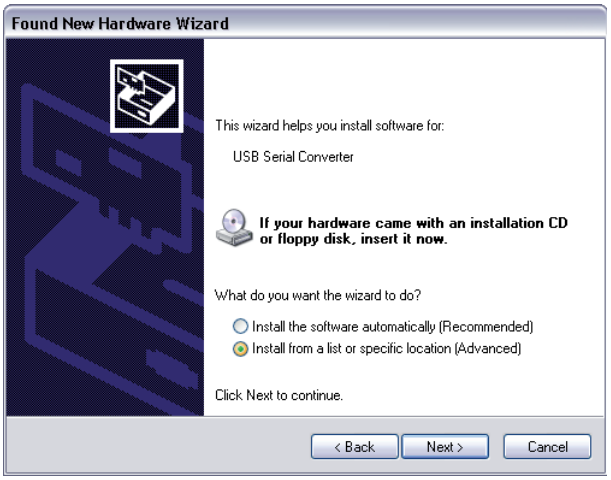



Fig. 4 Installation mode of the “USB Serial Converter”

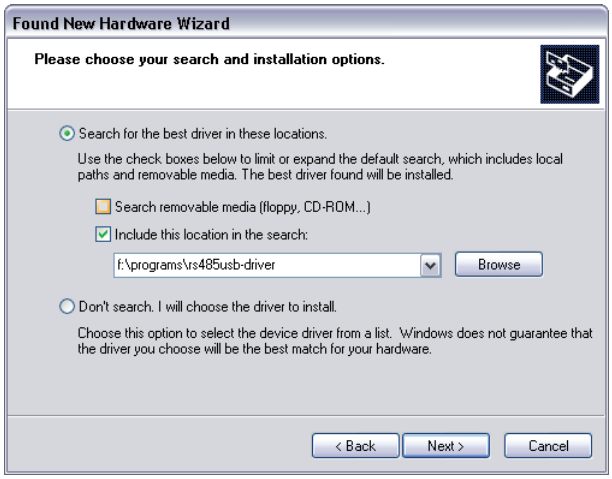



Fig. 5 Entering the path to the RS485 driver directory

➲ The system installs the “USB Serial Converter” driver.

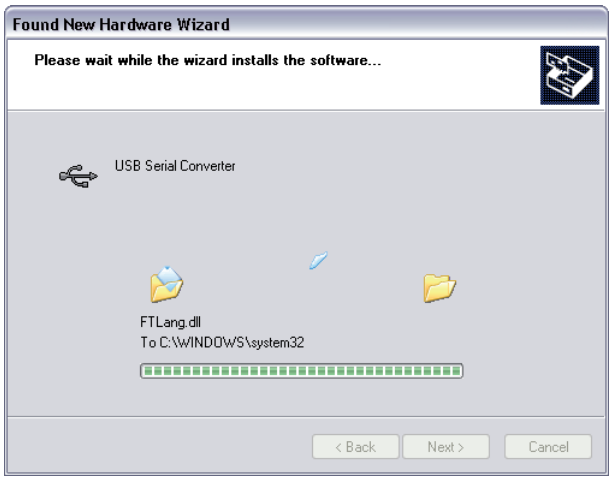



Fig. 6 Installation of the “USB Serial Converter” driver in progress

➲ Once the driver has been successfully installed, the message **The Software for the following hardware has been installed: USB Serial Converter** appears.

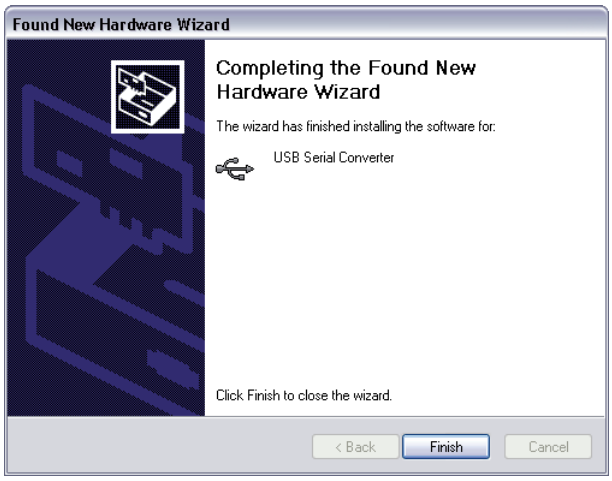



Fig. 7 Completion message following successful installation of the “USB Serial Converter” driver

3. Click **Finish**.

➲ The assistant for detecting new hardware reappears to install the second driver (USB Serial Port).

4. Installing the “USB Serial Port“ driver: carry out the same steps as described under point 2.

➲ Once the driver has been successfully installed, the message “Software for the following hardware was installed: USB Serial Port“ appears.


Fig. 8 Completion message following successful installation of the “USB Serial Port” driver

5. Check the Device Manager as described in section “6.1.1 Setting the COM port“ on page 24 to see whether the drivers were properly installed.

The initial installation of a new interface converter on a PC always requires the installation of a new driver. We recommend that you always work with the same interface converter to avoid having to reinstall drivers.

### 5.3.3 Check installation

If the installation was successful, the SAUTER CASE VAV configuration software is now available and the icon for the SAUTER CASE VAV software is present on your desktop.

1. Double-click on the icon to launch the software.

➲ Click on **Start → All Programs** and select under **CASE Tools** the CASE VAV Program.

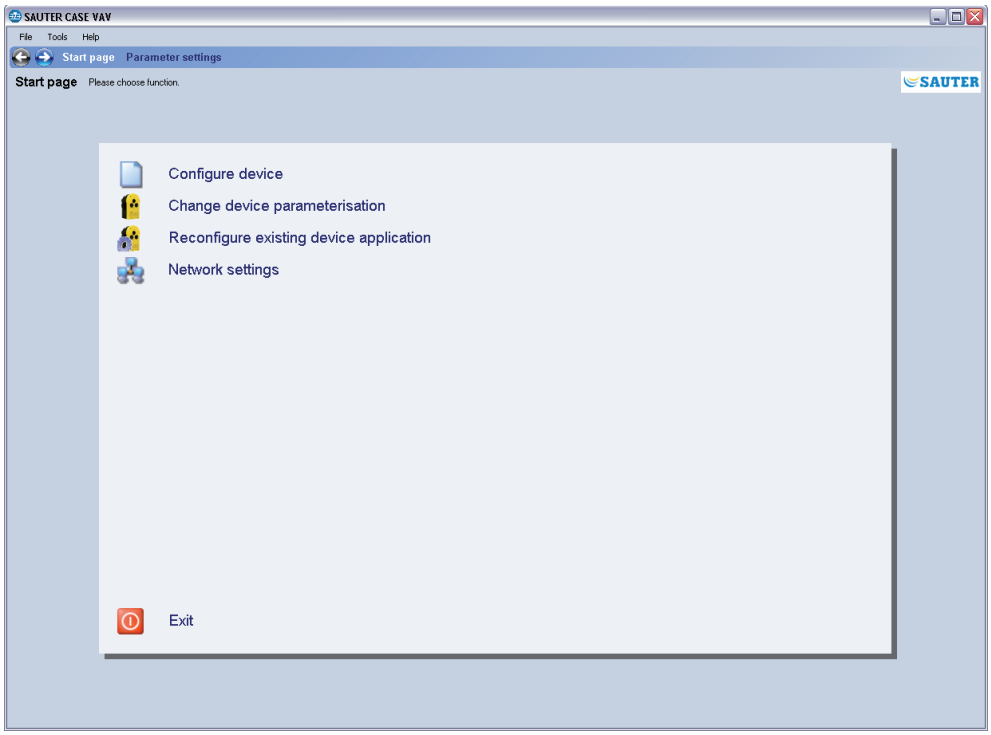



Fig. 9 GUI: SAUTER CASE VAV start screen

If the start screen is not shown or if an error message appears, the installation was probably faulty.

2. De-install the software - see section “5.3.4 De-install software“ on page 22.

3. Install the software again as described in section “5.3.1 Installation of SAUTER CASE VAV“ on page 16. If your software installation is still unsuccessful, please contact your local Sauter representative for further support. You will find this representative in the ‘Customer service’ section.

4. After successfully installing the software, connect the necessary cable and interface converter to your PC as described in section “6.1 Connect the interface converter“ on page 23.

### 5.3.4 De-install software

It may be necessary to de-install the SAUTER CASE VAV software because:

- an error occurred during the installation;
- the SAUTER CASE VAV software is not working correctly and the problem could not be rectified;
- you have a more recent software version and de-installation of the old version is recommended;
- you no longer need the SAUTER CASE VAV configuration software and you want to release hard disk storage.

To de-install the SAUTER CASE VAV software, perform these steps in order:

1. Remove the connected hardware components from your PC

2. Close all programmes that are running

3. Select **Start → Settings → Control Panel → Add or Remove Programs**

4. In the list of installed programmes, find the entry for **CASE VAV** and click on it.

5. In the advanced view, you will now see the ‘Remove programme’ option

6. After you select this option, the de-installation process will start to remove the SAUTER CASE VAV configuration software from your PC.

# 6 Connection and configuration

Before you can configure a SAUTER ASV115, you need to connect and configure the network accessories. Furthermore common configuration parameters can be set.

## 6.1 Connect the interface converter

Select the appropriate cables for the connection to the PC and connect them.

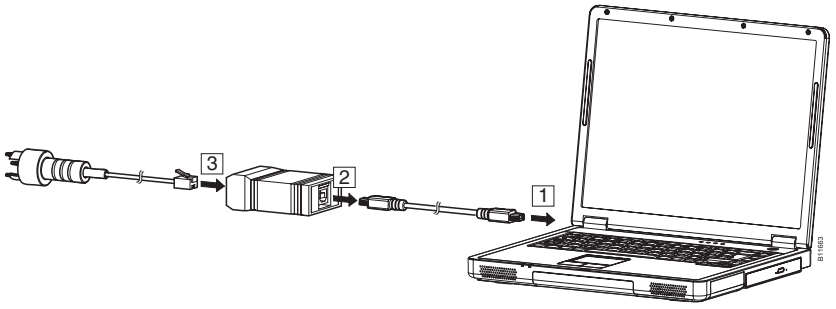



Fig. 10 Connecting the PC to the interface converter

To make the connection to the volume-flow compact controller, open the cap on the ASV115. The plug can be connected to the volume-flow compact controller through this opening.

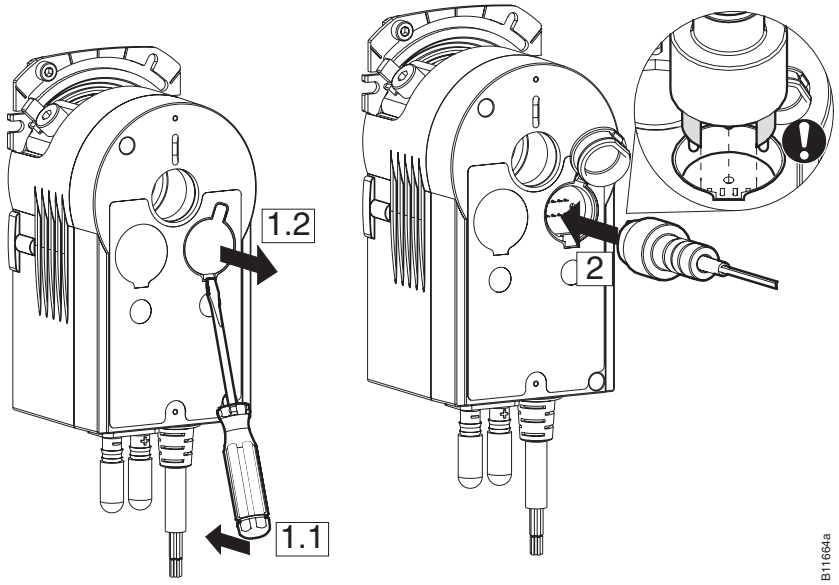



Fig. 11 Connecting the ASV115 to the PC

**NOTICE** If several units are linked to each other, the interface converter must be connected at the start or the end of the network segment.

### 6.1.1 Setting the COM port

To connect the ASV115 to the PC, you have to set the correct COM port. The following procedure is recommended for this purpose:

1. Open the control panel via the start button.

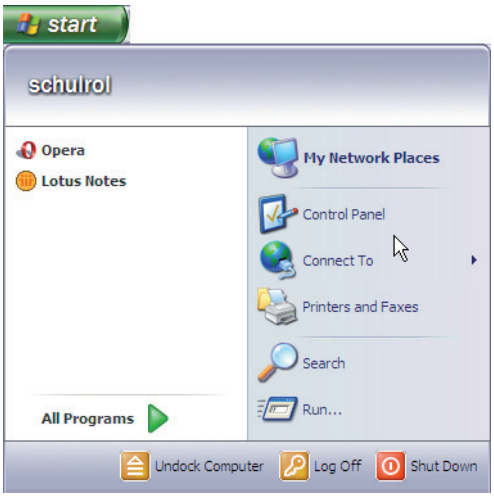



Fig. 12 Windows system controller

2. Click **Control panel**.Double-click **System**. In the System properties dialogue which opens now, select the **Hardware** tab.

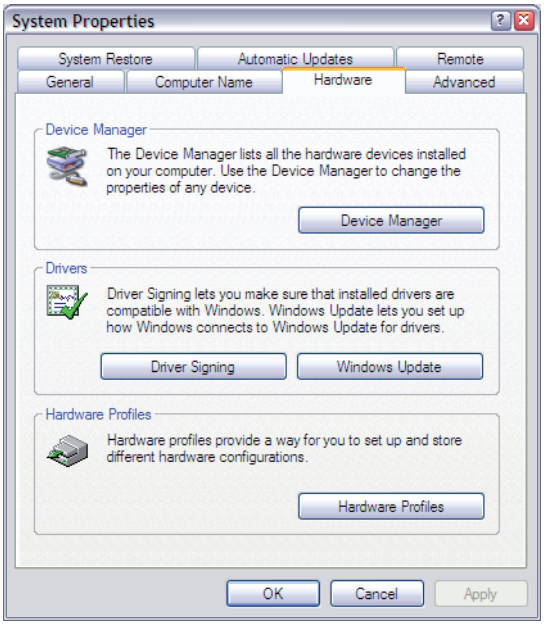



Fig. 13 Windows system setting

➲ Click on the **Device manager** to open the overview of all available devices on your PC. The connected interface converter now appears under **Ports (COM & LPT)**.

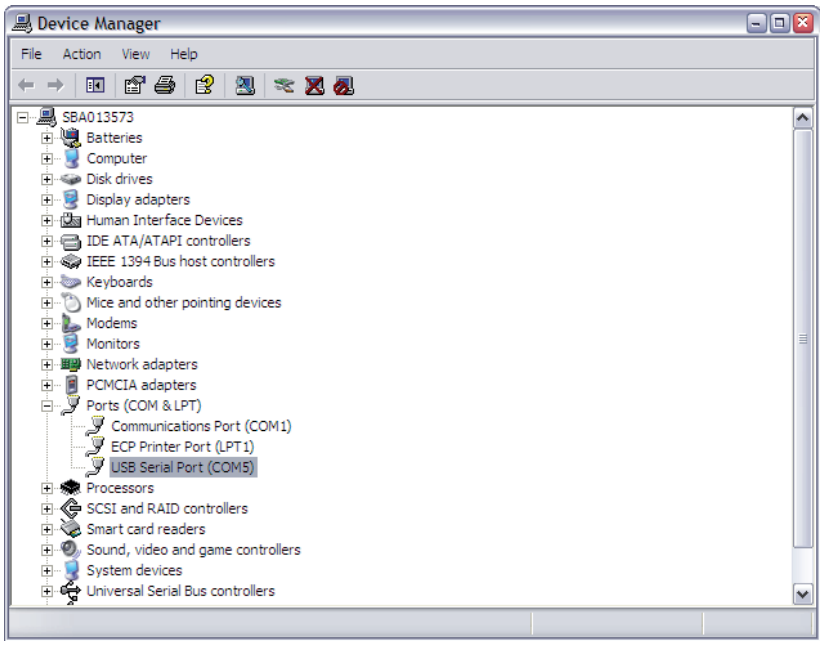



Fig. 14 Windows Device manager

3. Note down the number of the COM port shown (USB Serial Port) and then start the SAUTER CASE VAV tool.

4. In the menu bar under **Tools**, open the **Options** dialogue and select the **Communication** tab.

5. Set the relevant COM port via the pull-down menu.

➲ For example, COM ports nos. 1 and 3 are available. However, this may vary from one computer to another due to the individual configuration and hardware equipment.

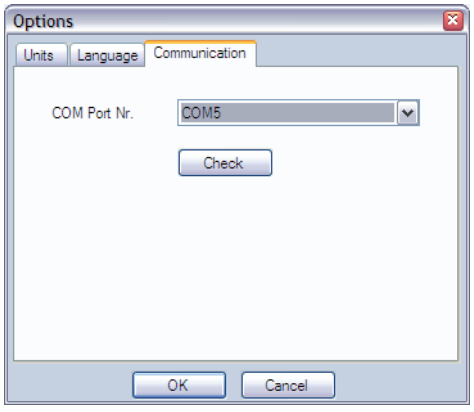



Fig. 15 Dialogue box: setting for COM port

6. Check the setting by connecting an ASV115 to the PC, as described in MV_P100001127 B.

7. Verify the communication of your connection. To do so, carry out one of the following two steps:
   - Verifying the communication of a point-to-point connection (only one device is connected): in the **Options** dialogue box click **Check**.
     ➲ SAUTER CASE VAV tries to communicate with the device and verifies that data can be sent and received. If communication with the device is successful, the system will report back the device type and firmware version.
   - Verifying the communication of a network connection (a number of devices are connected):
     1. Click **OK** to close the **Options** dialoge box.
     2. Click **Configure device** on the start page.
     3. Select the device to be tested in the **Select device** dialogue box.
     4. Select the option **Communication address**.
     5. Enter the network address of the device that you want to verify.
     6. Click **Check**

     ➲ SAUTER CASE VAV tries to communicate with the device and verifies that data can be sent and received. If communication with the device is successful, the system will report back the firmware version and the network address.

➲ If correct communication could be established, the field **Communication** in the status bar turns green.

8. Press **OK** to close the options dialogue box.

These system messages may appear:

| Message | Meaning / action |
|---|---|
| **GetIdentification returned: {} with address {}**<br><br>**Identification returned with: {}** | All settings are OK and parameterisation can proceed. |
| **GetIdentification returned with error-code: TimeoutError on port COM {}.** | The connection settings are OK but no device could be found at the connection.<br>► Please connect a device, check the COM port settings, the type of connection (point to point or network) or check the connection cables. |
| **GetIdentification returned with error-code: Port Open Error on port COM {}.** | 1. Wrong COM port number selected.<br>► Set the COM port number as described in „6.1.1 Setting the COM port“ on page 24.<br>2. The COM port of your computer could not be addressed.<br>► Another application is using the COM port with the selected address. Check the addresses in the Device Manager and modify the COM port if necessary. |

| Message | Meaning / action |
|---|---|
| **GetIdentification returned with error-code: CrCError for communication address: {}.** | 1. The connection settings are OK, but two or more devices are using the same connection address.<br>▶ Check the addresses in the network settings and adapt the device's connection addresses so that no address is assigned twice.<br>2. The wrong connection type was selected when verifying communication.<br>▶ Verify communication as follows:<br>1. Click **Configure device** on the start page.<br>2. Select the device to be tested in the **Select device** dialogue box.<br>3. Select one of the following options:<br>• **Point to point connection (PP)** option if you have set up a point-to-point connection.<br>• **Communication Address** option if you have set up a network and additionally enter the network address of the device you want to check.<br>4. Click **Check**. |
| **GetIdentification returned with error-code: TimeoutError for communication address: {}.** | The connection settings are correct, however no device corresponding to the selected address has been found. Please check that this address exists:<br>1. Click on **Network settings** on the start page<br>2. Click on **Scan network** to find the devices connected to the network.<br>3. Note the communication address of the device to configure |

Tab. 2 System messages, connection test

## 6.2 End parameterisation

After parameterisation is completed, disconnect the volume-flow compact controller from the PC and close the lock on the cover so that the original IP protection is restored.

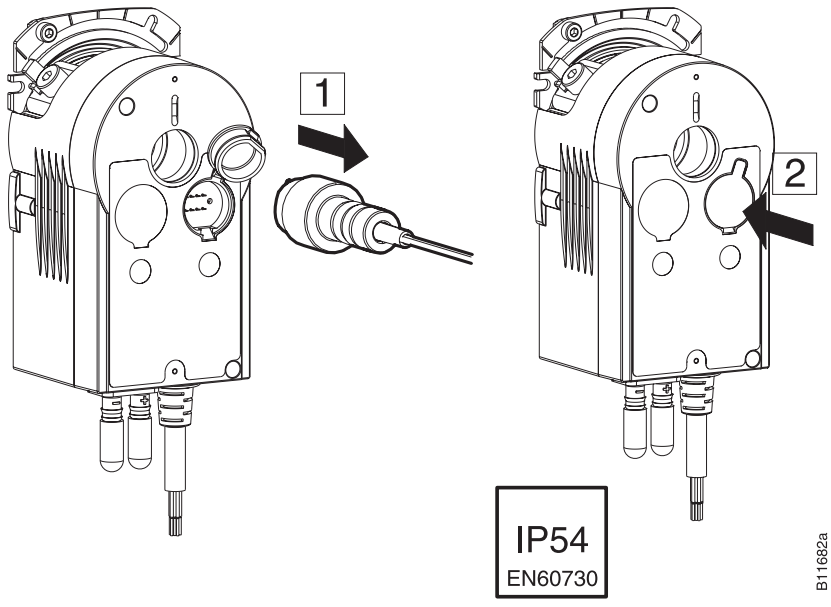



Fig. 16 Disconnect ASV115 from PC

## 6.3 Extras

### 6.3.1 Select communication address

You can establish a connection to the device of your choice. This can be useful if you want to:

- Read the parameters of a device located in the network
- Adopt parameters that are identical for all devices for each device

**NOTICE**

The network address that you have entered always refers to the device type displayed in the information bar. To communicate with the network address of a different device type, you must first enter the device type. To do so, click **Configure device** on the start page.

Carry out the following steps in order to establish communication with a device:

1. Select the menu item **Tools → Select Communication Address**

2. Select one of the following options:
   - Select the **Point to point connection (PP)** option if you want to set up connection to a device in a point-to-point scenario.
   - Select the **Communication address** option and additionally enter the network address of the device if you want to establish communication with a device in a network.

3. Click OK.

➲ SAUTER CASE VAV establishes communication with the selected network address or device.


Fig. 17 Dialogue box: Select communication address

### 6.3.2 Options

You can make country-specific adjustments and set the COM port via the menu item **Tools → Options**.

### 6.3.2.1 Units

On the **Units** tab, you can adjust the units to be used by the software to your personal circumstances.

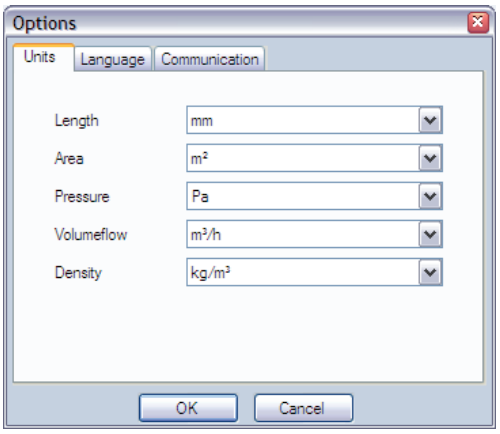



Fig. 18 Dialogue box: Options → Units

The following options are available here.

| Physical unit | Adjustable units |
|---|---|
| Length | mm, inch, ft |
| Area | $m^2$, $inch^2$, $ft^2$ |
| Pressure | Pa, psi |
| Volume flow | $m^3/h$, l/s, cfm, cim |
| Density | $kg/m^3$, pci, pcf |

Tab. 3 Adjustable units

### 6.3.2.2 Language

The **Language** settings menu enables you to change the programme language. You can choose between English, French and German.

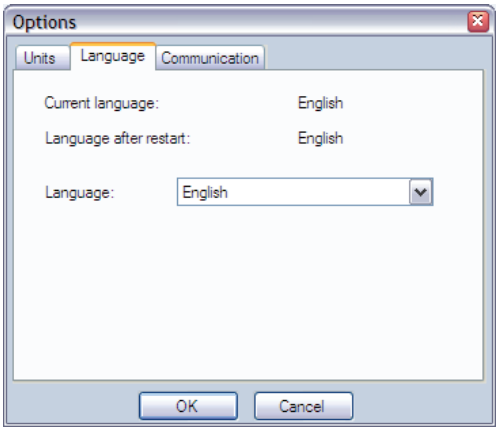



Fig. 19 Dialogue box: Options → Language

### 6.3.2.3 Communication

The **Communication** tab shows the available COM ports. Here you can enter the COM port number that SAUTER CASE VAV should use to communicate with the devices and verify point-to-point communication. Set the COM port number as described in “6.1.1 Setting the COM port“ on page 24.

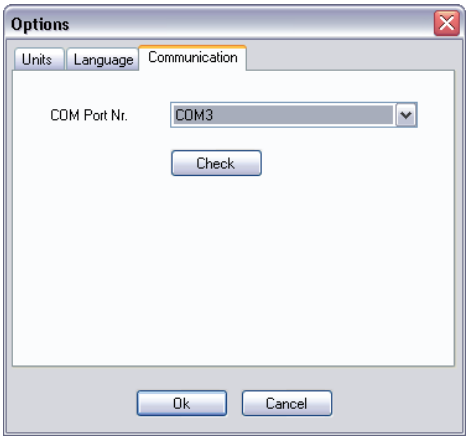



Fig. 20 Dialogue box: Options → Communication

# 7 User interface

The programme is designed so that simple and structured user guidance is ensured. After starting the programme, the Start page is called. This page serves to call up the configuration points **Network Settings** and, in the event of initial configuration, the access to device configuration, **Configure device**.

You have two options for reconfiguring a configured device:

- The function **Change device parameterisation** allows you to the change the parameters of a device. The application remains the same (see also “Tab. 7 Supported applications for the ASV115CF132“ on page 43 or “Tab. 8 Supported applications for the ASV115CF152“ on page 43.
- The function **Reconfigure existing device application** allows you to assign a new function to the selected device. In this case, you will also have to parameterise the device again.

For more information on the functions described on the start page, see “Tab. 4 Start Page functions“ on page 35.

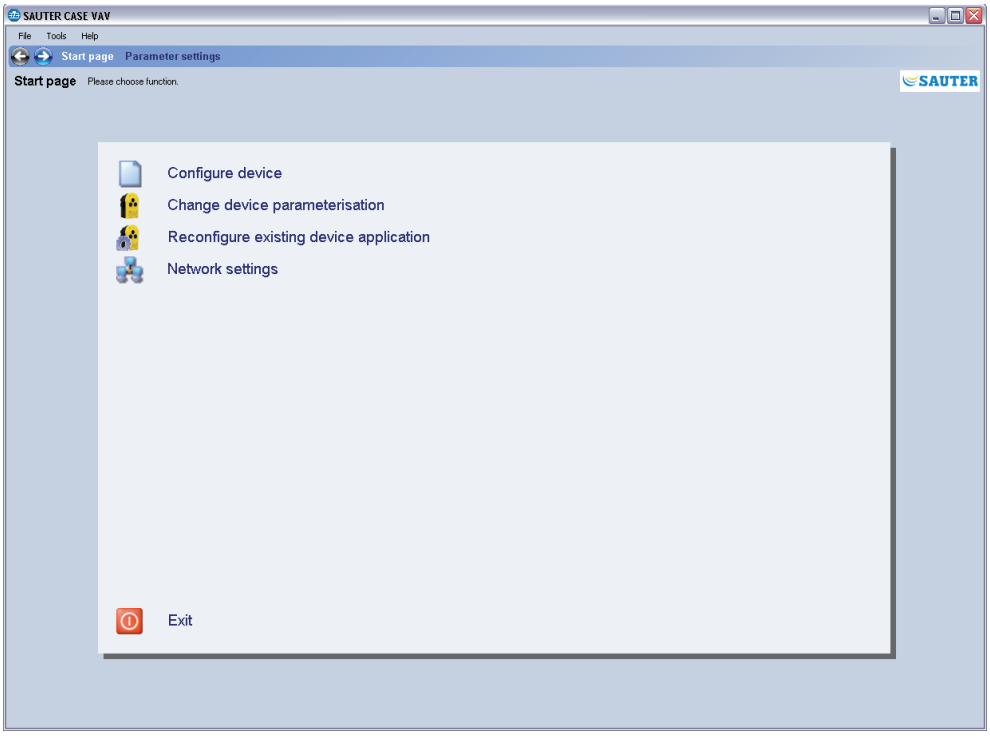



Fig. 21 GUI: SAUTER CASE VAV start page

## 7.1 General structure of user interface

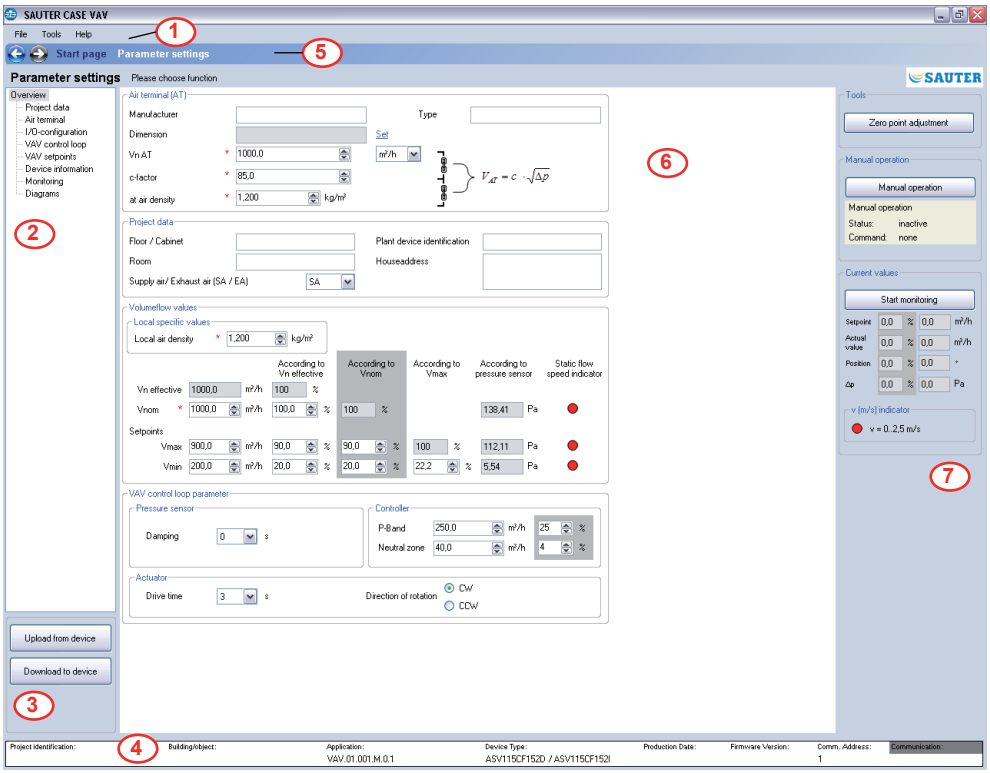



Fig. 22 GUI: User interface, SAUTER CASE VAV

| | |
|---|---|
| 1 | Menu bar |
| 2 | Navigation tree |
| 3 | Upload and download control |
| 4 | Information line |
| 5 | Navigation bar |
| 6 | Input mask |
| 7 | Service functions |

The user interface is divided into different areas. Basically, these can be separated into the information and navigation areas, and the areas for data entry.

**Menu bar** The menu bar contains basic functions for parameter printing or application configuration and to provide information about how the individual functions work. The product documentation can also be accessed from the Help area.

**Navigation bar** Navigation buttons in the navigation bar allow you to move between the Start page and the area for device parameterisation.

**Navigation tree** The navigation tree shows all the pages that are available to configure the volume-flow compact controller in a clear form. Click on the relevant page to activate it.

**Information line** The information line and status bar provide the most important data about the connected volume-flow compact controller in a clear form.

**Service functions** Special functions such as sensor calibration, manual mode or current values to support commissioning are provided in the service area.

User interface

# 8 ASV115 parameterisation

The following section gives a step-by-step description of the functions available within the SAUTER CASE VAV software to parameterise a VAV volume-flow compact controller. Before parameterisation, an ASV115 must first be physically connected and configured as described in section 5.

## 8.1 Starting the programme

You can call up the programme from the Start menu at **Start → Programmes → Sauter → CASE Tools → CASE VAV** in order to start it. A Welcome screen appears briefly at first, and then the Start page is displayed.

## 8.2 Start page

The following functions are available for you to choose from the Start page.

| Icon | Function | Description |
|---|---|---|
|  | **Device configuration** | Click on the function to configure a device that is not yet configured, or to change the configuration of a parameterised device. Directly after the overview page appears, you can select the Upload from device function to do this; the data stored in the device will then be loaded. After selecting the function, the Parameter settings – Overview page is shown. |
|  | **Change device parameterisation** | The device application is maintained; only the parameters can be changed. A click on the function calls up a dialogue box where you can select the network address of the device that you want to reparameterise. The device parameters will be uploaded when you have selected the network address. |
|  | **Reconfigure existing device application** | This function allows you to assign a new application to a device. The data of the menus **Projekt Data** and **Air Terminal Data** are maintained for the new application. A click on the function calls up a dialogue box where you can select the network address of the device to which you want to assign a new application. When you select the network address, you will see a message asking you to select the new application. Once you have selected the application, the data of the menus **Air Terminal Data** and **Projekt Data** are uploaded and the user interface for parameterisation opens. |
|  | **Network settings** | The Network settings can be used to read in a section of the network automatically in order to determine which devices are available in the network segment. In the event of an address collision, it is possible to configure the network addresses in the Network settings area. |
|  | **Exit** | Select this function to end the programme. |

Tab. 4 Start Page functions

## 8.3 Export configuration

You can export and save the configuration of the ASV115 to a file to back up the device configuration or to document the project. When you do so, you can choose which configuration data you want to save (the default selection is all data):

- Data of the following menus:
  - **Project Data**
  - **Air Terminal Data**
  - **I/O-configuration, VAV control loop, VAV setpoints** and **Device information**
- As well as the application code and device type

Carry out the following steps to export the data to a file:

1. Select **File → Export configuration**.

2. You can add a description of the export file in the **Description** and the **Name** fields to enable unambiguous identification. The default name consists of the entries of the air terminal fields **Typ**, **Vmin** and **Vmax**.

3. Click **Browse** and select the directory where you want to save the file. Change the file name if needed.

4. Click **Details** if you want to select individual data for export. The default setting is to export all of the data in a file.

5. Click **Export** to export the selected data to a file.

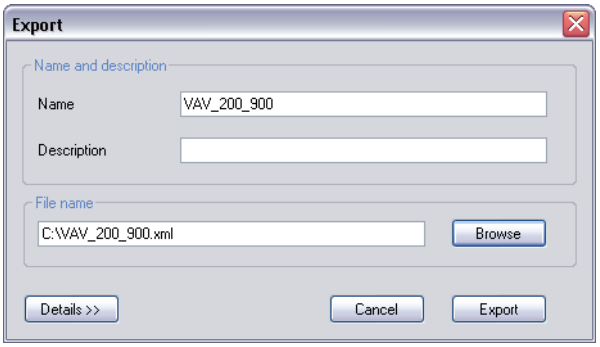



Fig. 23 Dialogue box: export the configuration to a file

## 8.4 Import configuration

The function **Import configuration** allows you to import the configuration from a file into SAUTER CASE VAV. This function can be useful for uploading or restoring a previously-saved device configuration, for instance.

Carry out the following steps to import a configuration into CASE VAV:

1. Select **File → Import configuration**.
2. Click **Browse** to locate the directory where the file is archived.
3. In the **Select file** table, select the line with the file that you want to import.
4. Click **Details** if you want to select individual data for import. The default setting is to import all of the data in a file.
5. Click **Import** to import the selected data from the file.

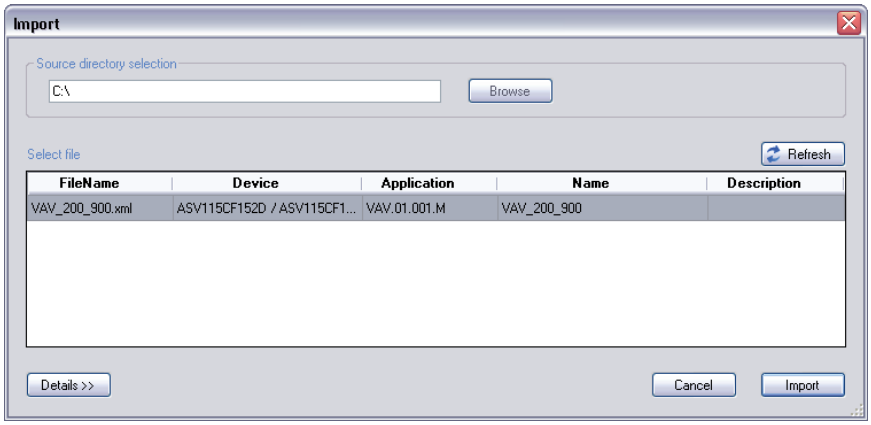



Fig. 24 Dialogue box: import the configuration from a file

## 8.5 Create set-up protocol

All configuration data can be printed to a file using the Print function: go to the **File** menu **Create set-up protocol**. After calling up the function, you first see an input dialogue where you can add a comment.

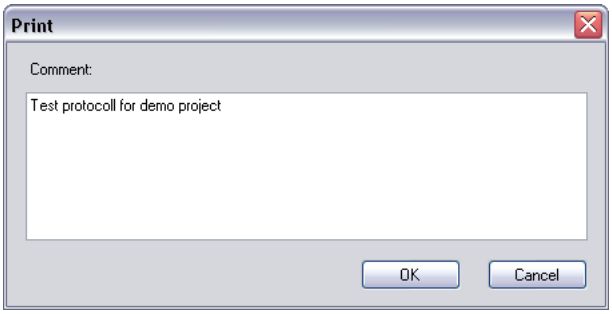



Fig. 25 Dialogue box: print configuration

Confirm the dialogue with OK and the protocol is generated, with all the available data. To store or continue processing the data, or to print them out later on, you are offered a large number of different formats.

## 8.6 Network Settings

In the **Network Settings** function, the devices connected in the network are shown and configured if necessary.

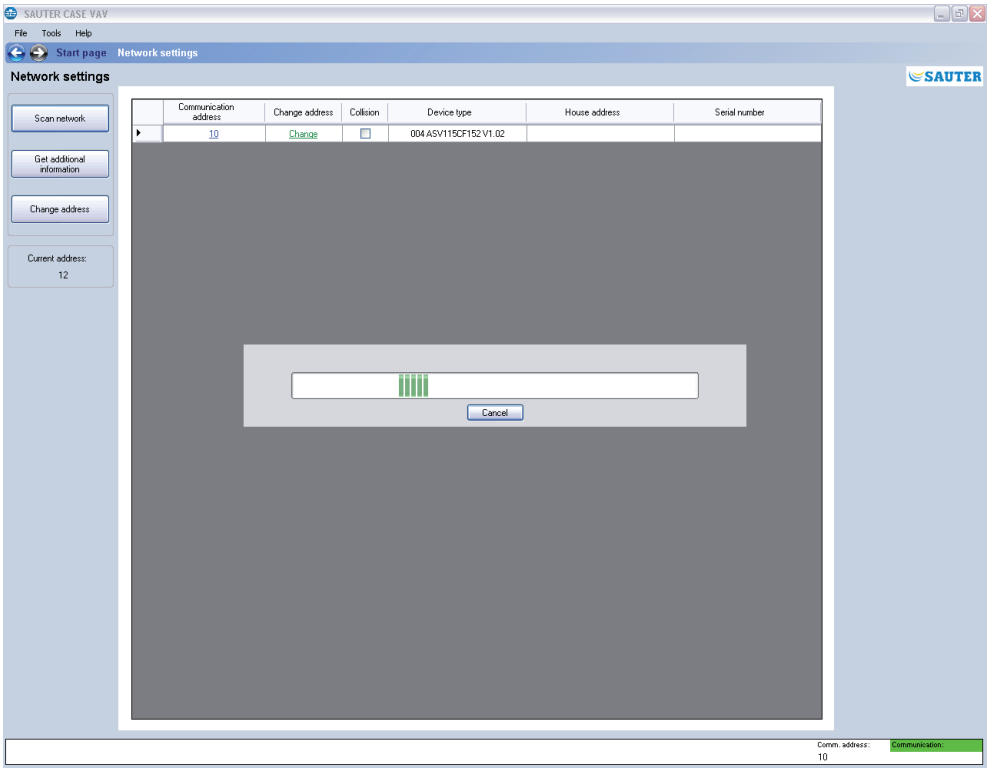



Fig. 26 GUI: network settings

To configure connected devices, you must first click on the Scan **network** button to start a search. To do so, carry out the following steps:

1. Select **Network Settings** on the start page.

2. Click **Scan network**.

➲ The programme then checks whether there are any devices in the network and lists them in table form, after a timeout of 30 s. at most. During the search, the searched address appears in the **Current address** field with the network address of the device in the list.

3. Once all the devices in the network segment have been listed, you can terminate the search by clicking **Abort**.

The following information is shown:

| Parameter | Description |
|---|---|
| Communication address | On delivery, every device has been given an individual network address in the range from 1….200. |
| Change address | Click on the address shown to reconfigure it in the menu. |
| Address collision | If two or more devices attempt to communicate on one address, there will be an ‚address collision'. This is shown by a red symbol. |
| Device type | The device type is shown as per the labelling on the nameplate |
| Houseaddress | The house address is shown, if it is parameterised. The house address is displayed after pressing the **Get additional information** button. |
| Serial number | The serial number uniquely identifies a particular device. It is issued by the factory. On clicking the ‚Additional information' button, it is read in via the network. |

Tab. 5 Parameters for network configuration

If a device is explicitly selected, you can press the **Change address** button to call up the Change communication address dialogue.

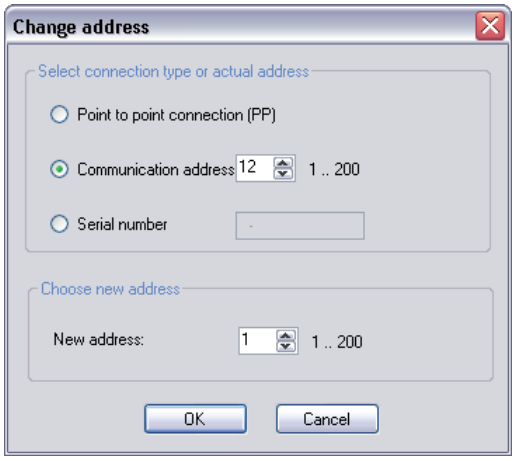



Fig. 27 Dialogue box: change address

The following options are available:

- If only one device is connected, it is mandatory to select the **Point to point connection (PP)** function. The volume-flow compact controller is then addressed directly.
- If two or more devices are present in the network, the address of the desired device must be selected via the **Communication address** function.
- If you know the device‘s serial number, you can enter it in the **Serial field** field. This makes it possible to differentiate between two devices with the same address (collision) and to assign a new unique address to one of the devices without having to disconnect it from the network.
- The **New address** function allows manual assignment of a new network address. This may be selected from the 1…200 range.

## 8.7 Configure device

To configure a new device, please select the **Configure** device menu item. Then you can choose the device you want by selecting the type designation. In general, device types with a 150Pa and 300Pa sensor are available for this purpose.

Once you have selected the device, you must then select the application you want to assign to it. The corresponding default parameters are loaded into the parameter setting area depending on the selected application.

### 8.7.1 Selecting the device

**NOTICE** Please make sure that the correct device is selected here. An incorrect assignment can cause an error message when downloading the parameters into the device, because the software does not allow parameterisation of devices with values that do not match the sensor’s measuring range.

| Device type | Sensor‘s measuring range | Running time of volume-flow compact controller | Halogen-free cable |
|---|---|---|---|
| ASV115CF152D | 150 Pa | 3-15 s | |
| ASV115CF152I | 150 Pa | 3-15 s | x |
| ASV115CF152E | 300 Pa | 3-15 s | |
| ASV115CF152K | 300 Pa | 3-15 s | x |
| ASV115CF132D | 150 Pa | 30-120 s | |
| ASV115CF132I | 150 Pa | 30-120 s | x |
| ASV115CF132E | 300 Pa | 30-120 s | |
| ASV115CF132K | 300 Pa | 30-120 s | x |

Tab. 6 Available device types

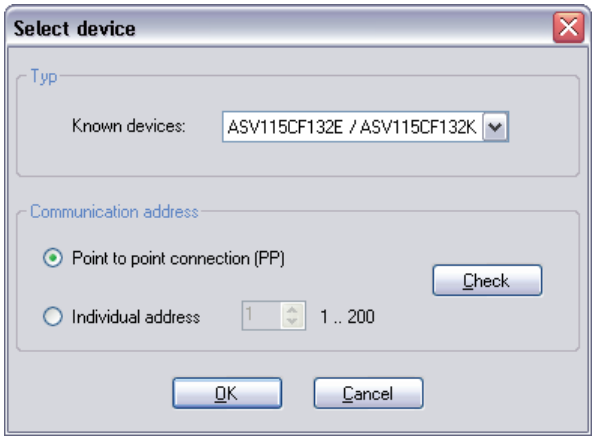



Fig. 28 Dialogue box: device selection

In the ‘Change address’ area, you can select the Point-to-point connection PP or Individual address functions. The individual address can be determined in the Network settings area. After setting the address, you can test communication with the **Check** button.

If only one device is connected, the Point-to-point function must be selected.

If more than one device is present in the network, the Point to point PP connection function must not be used. The valid address in each case must be set at Individual address so that the desired device is addressed directly.

### 8.7.2 Selecting the application

Various applications are available, depending on the device type. The default parameters in the applications are defined in a way that prevents incorrect configurations in the field. The Tab. 7 and Tab. 8 show the available applications and their varying default parameters for the corresponding devices.

You have two options for selecting an application:

- Select the option **Selection by application-code** and enter the application code in the fields provided.
- Select the option **Selection by application** and select the application from the selection fields.

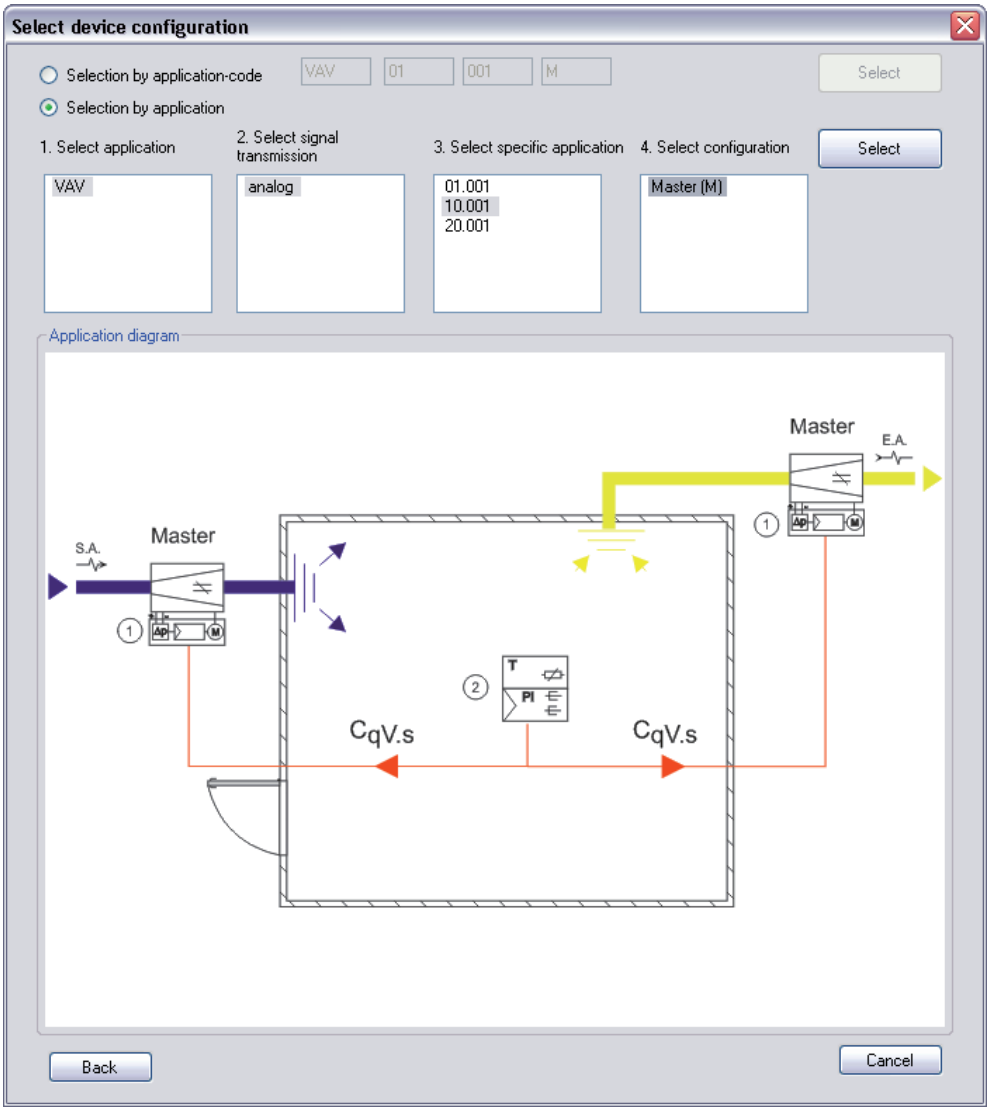



Fig. 29 Dialogue box: device configuration selection

Supported applications for the ASV115CF132:

| Application Code/Definition | I/O configuration | Setpoints |
|---|---|---|
| **VAV.01.001.M**<br>Volume flow control | AI01: Command variable signal<br>AI02: Setpoint shift<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 90 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 50 % |
| **VAV.10.001.M**<br>Demand-led ventilation in individual room master-master control | AI01: Command variable signal<br>AO02: Damper position*<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 90 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 50 % |
| **VAV.20.001.M**<br>Demand-led ventilation in individual room master-slave control (Master controller) | AI01: Command variable signal<br>AO02: Damper position*<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 10 %<br>$V_{int}$ = 40 % |

| Application Code/Definition | I/O configuration | Setpoints |
|---|---|---|
| **VAV.20.001.Sxi**<br>Demand-led ventilation in individual room master-slave control (Slave controller) | AI01: Command variable signal<br>AO02: Damper position*<br>AO3: Volume flow – actual value<br>DI04: Schliesser<br>DI05: Schliesser | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 10 %<br>$V_{int}$ = 40 % |

Tab. 7 Supported applications for the ASV115CF132

* Function for devices with firmware version 1.10 and higher

Supported applications for the ASV115CF152:

| Application Code/Definition | I/O configuration | Setpoints |
|---|---|---|
| **VAV.01.001.M**<br>Volume flow control | AI01: Command variable signal<br>AI02: Setpoint shift<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 90 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 40 % |
| **RPC.20.001.M**<br>Demand-led ventilation in individual rooms with room pressure control through set-point shift for return air. (Master controller) | AI01: Command variable signal<br>AO02: Control deviation<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 40 % |
| **RPC.20.001.Sxi**<br>Demand-led ventilation in individual rooms with room pressure control through set-point shift for return air. (Slave controller) | AI01: Command variable signal<br>AO02: Setpoint shift<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 40 % |
| **FCC.10.001.M**<br>Volume flow control for laboratory fume cupboards Setpoint specification as per switch contacts | AI01: Command variable signal<br>AO02: Control deviation<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 40 % |
| **FCC.10.002.M**<br>Volume flow control for laboratory fume cupboards Setpoint specification as per sash sensor | AI01: Command variable signal<br>AO02: Control deviation<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 20 %<br>$V_{int}$ = 40 % |
| **FCC.20.001.M**<br>Volume flow control for laboratory fume cupboards Setpoint specification as per flow sensor | AI01: Command variable signal<br>AO02: Control deviation<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 15 %<br>$V_{int}$ = 40 % |
| **FCC.20.020.M**<br>Volume flow control for laboratory fume cupboards Setpoint specification as per flow and sash sensor | AI01: Command variable signal<br>AO02: Control deviation<br>AO3: Volume flow – actual value<br>DI04: NO contacts<br>DI05: NO contacts | $V_{nom}$ = 100 %<br>$V_{max}$ = 100 %<br>$V_{mid}$ = 50 %<br>$V_{min}$ = 15 %<br>$V_{int}$ = 40 % |

Tab. 8 Supported applications for the ASV115CF152

**NOTICE** The application schemas are described in PDS 52.100, 52.150 and 43.160

## 8.8 Overview page

The Overview page concentrates the most important parameters for the configuration of the ASV115. Entering the parameters flagged with a red * performs the minimum configuration of the volume flow controller for which the basic function is guaranteed.

All the parameters provided on this page can be reached on the respective detail pages, via the navigation tree; however, they only need to be entered once. The programme automatically copies the parameters. For the same reason, these parameters are also described twice in the manual, with more in-depth information on the detail pages as necessary or appropriate.

### 8.8.1 Air terminal data

In the top section of the Overview page, you can enter the most important data regarding the volume flow box that is used.

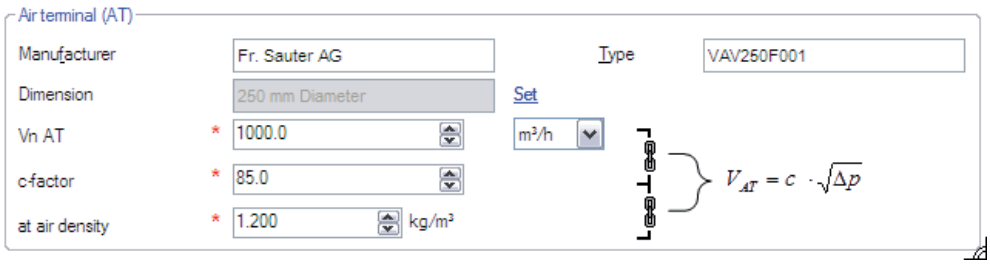



Fig. 30 GUI: data for volume flow box - overview

| Parameter | Description |
|---|---|
| Manufacturer | Supplier of the volume flow box; max. 32 characters |
| Type | Type designation of the volume flow box as used by the manufacturer. This information is usually shown on the nameplate. Max. 32 characters. |
| Dimension | Select the **Set** link to go to the Volume flow box input mask. Values for the diameter or length x width of the volume flow box can be entered here. The values are used to calculate the air velocities for a given volume flow. |
| $V_n$ AT | Enter the nominal volume flow (rated volume flow) for the volume flow box. This is usually a value indicated by the volume flow box manufacturer, representing the maximum volume flow value over the volume flow box in relation to its respective size. The emphasis is on considerations of acoustics or energy here.<br>The maximum value that can be set is 54,000 m³/h, corresponding to 15,000 l/s. |
| unit $V_n$ AT | Change the unit for the indicated volume flow. By default, the unit used is the one set in the Options menu. |
| c-factor | Enter the value indicated by the volume flow box manufacturer. This is a constant defined for the size of the volume flow box. Make sure that the constant is used in the same units as the volume flow. |
| at air density | By default, the air density is defined as 1.2 kg/m³. If the c-factor indicated by the manufacturer is shown with a different air density, this must be entered at Air density. |

Tab. 9 Data on volume flow box - overview

### 8.8.2 Project data

The Project data section enables you to enter information that will clearly locate the volume flow controller in the building. Additional information can be entered in the separate Project data mask.

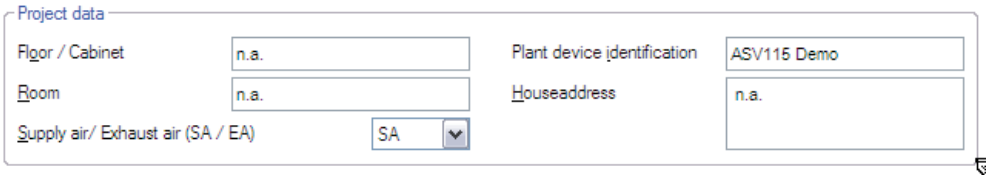



Fig. 31 GUI: General project data - overview

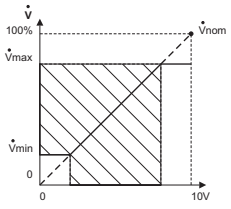
| Parameter | Description |
|---|---|
| Floor / Cabinet | Input field for floor designation or number, max. 12 characters |
| Plant device identification | Input field for the device designation, max. 12 characters |
| Room | Input field for the room designation, max. 12 characters |
| Houseaddress | Enter the house address, maximum 64 characters |
| Supply air / Exhaust air (SA / EA) | Dropdown box to select the installation location; supply air (SA) or exhaust air (EA). |

Tab. 10 General project data - overview

### 8.8.3 Project-based volume flow data

To set the project-based volume flow data, the following data must be specified as the minimum. The following definitions apply here:

- The air density at the installation location can vary greatly, compared to the air density at set-up in the factory, due to the height above sea level, causing intolerable deviations in the air volumes. This can be avoided by entering the air density at the installation location. The correction is made directly in the programme.
- The design value $V_n$ AT of the volume flow box becomes effective with the correction of the air density for $V_n$. For example, $V_n$ AT represents the nominal volume flow over the volume flow box which is attained at a dp of approx. 250Pa and which corresponds to an air velocity of approx. 12 m/s. These values may differ depending on the various manufacturers of volume flow boxes, and they correspond to the value for the volume flow box in the manufacturer's catalogue.
- $V_{n\ effective}$ corresponds to the $V_{nominal}$ effective which is parameterised when calibrating the volume flow box at the manufacturer's factory. The effective air density is integrated into this value at the time of parameterisation.
- $V_{nom}$ corresponds to the nominal volume flow in the plant. The sensor is calibrated to this value so that the measuring range corresponds to 100% of the plant volume flow.




- $V_{max}$ limits the command variable signal to the maximum desired volume flow in the plant. According to choice, the value can be entered as an absolute value or a percentage, in relation to $V_n$ effective or $V_{nom}$.

Calculation of $V_{max}$ in % $V_{max}(\%) = \frac{\left(\dot{V}_{max}\left(\frac{m^3}{h}\right)\right)}{\left(\dot{V}_{nom}\left(\frac{m^3}{h}\right)\right)} * 100\%$

- $V_{mid}$ is a freely paramaterisable value between $V_{max}$ and $V_{min.}$ The following rule is applicable: $V_{max} \geq V_{mid} \geq V_{min}$
- $V_{min}$ limits the command variable signal to the minimum desired volume flow in the plant. According to choice, the value can be entered as an absolute value or a percentage, in relation to $V_{n\ effective}$ or $V_{nom}$.

Calculation of Vmin in %: $V_{min}(\%) = \frac{\left(\dot{V}_{min}\left(\frac{m^3}{h}\right)\right)}{\left(\dot{V}_{nom}\left(\frac{m^3}{h}\right)\right)} * 100\%$

- $V_{int}$ is an additional internal setpoint which can be used for different functions. $V_{int}$ is only limited by $V_{nom}$. Hence, $V_{nom} \geq V_{int}$
- The setpoints for the air volume flows are entered directly in $m^3/h$ or per cent and relate to $V_n$ effective or Vnom.
- The coloured display for a rapid visual check of air velocity (and hence the design data) follows generally used conventions:
    - Red → air velocities > 10 m/s
    - Yellow → air velocities from 8 m/s to 10 m/s
    - Green → air velocities between 3 m/s and 8 m/s
    - Yellow → air velocities from 2.5 m/s to 3 m/s
    - Red → air velocities < 2.5 m/s

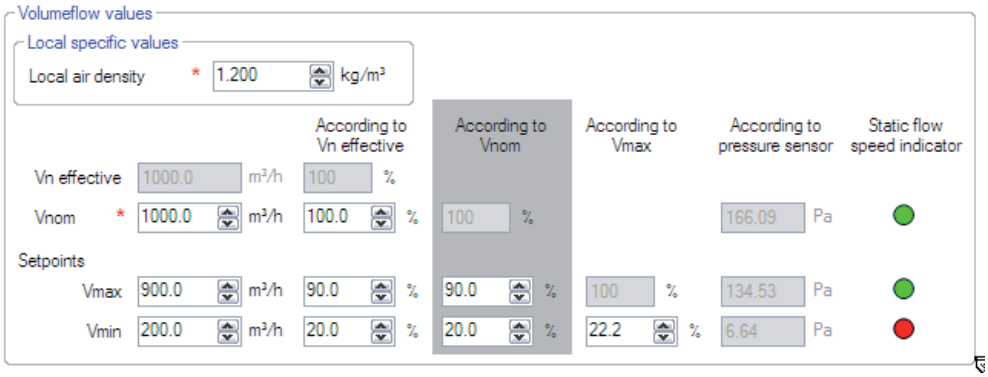



Fig. 32 GUI: volume flow setpoints - overview

| Parameter | Description |
|---|---|
| Local air density | Correction of air density if the installation varies greatly from the factory calibration by the volume flow box supplier. If this value diverges significantly, e.g. due to the installed height above sea level, these variables can be changed to correct the c-factor and the nominal volume flow. |
| $V_{n\ effective}$ | Maximum volume flow over the volume flow box, corrected by the air density at the installation location. |
| $V_{nom}$ | Volume flow to which the internal pressure sensor is automatically set. $V_{nom}$ therefore corresponds to the signal range in relation to 100% for the maximum controllable volume flow in the plant. |
| Setpoint $V_{max}$ | Maximum permitted volume flow for the application. Values are determined on a project-specific basis.<br>Adjustable range: $V_{1Pa}$…$V_{nom}$. |
| Setpoint $V_{min}$ | Minimum permitted volume flow for the application. Values are determined on a project-specific basis.<br>Adjustable range: $V_{1Pa}$…$V_{max}$. |

Tab. 11 Volume flow setpoints - overview

All values can be set as absolute values or percentage values in relation to the nominal value.

Additional information on volume flow control, the design of volume flow boxes and application-specific aspects is given in the section on Volume flow control. The exact method of determining the air density is also shown there, in the Calculation formulas section.

All volume flow parameters indicated in per cent in relation to the nominal plant volume flow are given with grey background to improve overall clarity.

### 8.8.4 VAV control loop parameter

Basic parameters to configure the volume flow control loop can be entered in the ‘VAV control loop parameter’ area.

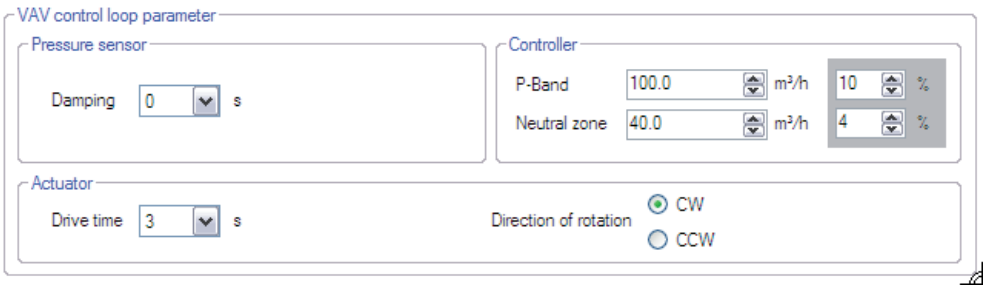



Fig. 33 GUI: settings for control loop – overview

| Parameter | Description |
|---|---|
| Pressure sensor: Damping | Sets the internal signal damping on the pressure sensor. If the pressure signal fluctuates, the damping can be increased to avoid vibration of the volume-flow compact controller.<br>Setting range:<br>• 0.000 s<br>• 0.010 s<br>• 0.020 s<br>• 0.041 s<br>• 0.082 s<br>• 0.163 s<br>• 0.326 s<br>• 0.650 s<br>• 1.300 s<br>• 2.600 s<br>• 5.220 s |
| Controller: P-band | According to choice, the P-band can be entered in m3/h or %. The reference variable is Vnom. |
| Controller: Neutral zone | The neutral zone can be entered in m3/h or in % as chosen. The reference variable is Vnom. |
| Volume-flow compact controller: Drive time | Setting for the volume-flow compact controller drive time for a 90° angle of rotation.<br><br>Setting range: |

| ASV115CF152 | ASV115CF132 |
|---|---|
| 3 s | 30 s |
| 4 s | 45 s |
| 5 s | 60 s |
| 6 s | 75 s |
| 8 s | 90 s |
| 10 s | 105 s |
| 12 s | 120 s |
| 15 s | |

| | |
|---|---|
| Volume-flow compact controller: Direction of rotation | CW → damper opens clockwise<br>CCW → damper opens anti-clockwise |

Tab. 12 GUI: control parameters - overview

## 8.9 Project data

All the important data for clear location of the device in the field can be entered or changed on the Project data page. The data are stored directly in the volume-flow compact controller and can be read out again or changed as necessary. If the 'GAMP-conform Test Report' function is selected, entries for a name, abbreviation and configuration date are forced.

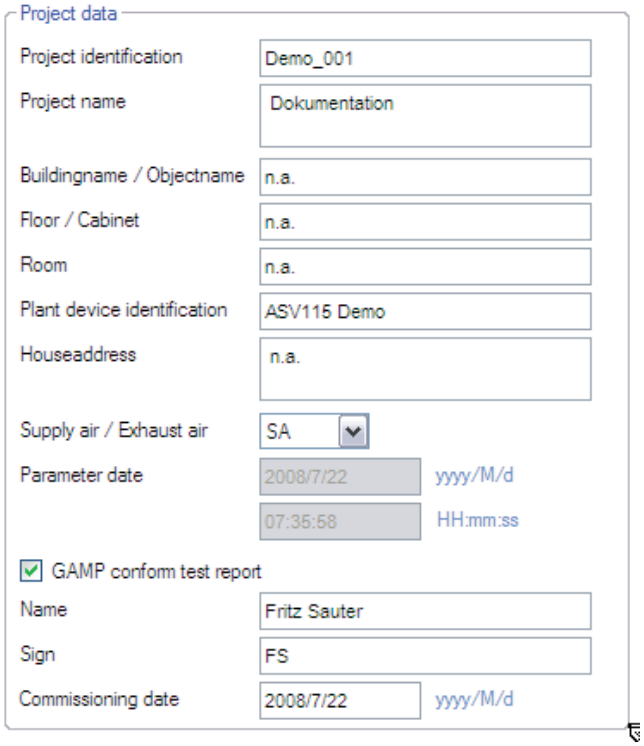



Fig. 34 GUI: Project data

| Parameter | Description |
|---|---|
| Project identification | Enter a nine-digit alphanumeric project number for identification |
| Project name | Enter the project name with a maximum of 64 characters |
| Building / Objectname | Identification of the building with a maximum of 12 characters |
| Floor / Cabinet | Input field for floor designation or number, max. 12 characters |
| Plant device identification | Input field for device designation, max. 12 characters |
| Room | Input field for room designation, max. 12 characters |
| Houseaddress | Enter the house address, maximum 64 characters |
| Installation location: Supply air / Exhaust air | Dropdown box to select the installation location; supply air (SA) or exhaust air (EA). |
| Parameterised date | Date and time of the last download are set automatically and stored. Data are taken from the PC. |
| Checkbox: GAMP-conform test report | Entries are forced for user name, abbreviation and date. The data must be in the defined format. Name: at least 5 characters, maximum 32 characters. Date must be in the mm/dd/yyyy format. |

Tab. 13 Project data

## 8.10 Data for Air terminal

All data entered on this page are automatically transferred into the identical fields on other pages, so there is no need for double entry of parameters.

### 8.10.1 Manufacturer's data for Air terminal (AT)

To optimise the project documentation, the key design-specific data of the VAV box can be entered and stored directly in the volume-flow compact controller.


Fig. 35 GUI: General data for the volume flow box

| Parameter | Description |
|---|---|
| Manufacturer | Enter the manufacturer‘s code for the volume flow box. Maximum 32 characters |
| Type | Manufacturer-specific type designation for the volume flow box. Maximum 32 characters |
| Material | Material specification for the volume flow box. Maximum 32 characters. |
| Geometry: Dimension | The programme automatically enters the volume flow box dimension. This is governed by the data that were entered in the input fields for **Circular AT** volume flow boxes - Diameter (duct diameter entry) - or **Rectangular AT** (box height and width entry). The dimension data are needed to calculate the flow speed in the volume flow box, among other purposes. |

Tab. 14 General data for volume flow box

## 8.11 Mandatory data for the volume flow box

The area for entering technical air data for volume flow boxes is used to enter the basic information used for all subsequent calculations.

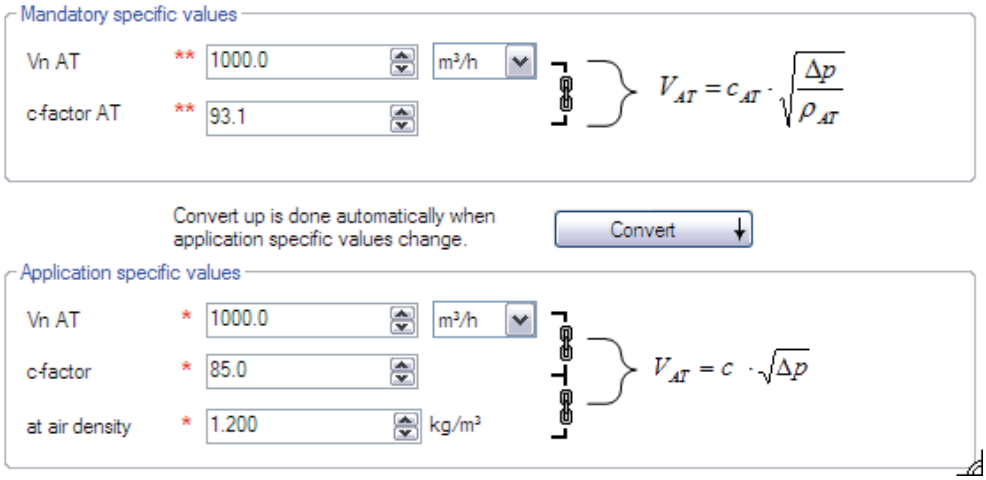



Fig. 36 GUI: Technical air data for the volume flow box

These data are entered on the basis of the data available for the volume flow box. The information is generally provided via the c-factor for the volume flow box at an air density of $\rho$ = 1.2 kg/m$^3$. This air density is already pre-set for this reason. If the available c-factor and the maximum volume flow $V_n$ AT are now entered in the Basic data area, the programme will convert the c-factor to the value adjusted for the air density (c-factor for $\rho$ = 1 kg/m$^3$) for further internal processing. If a standardised c-factor is available, it can be used directly in the upper section of the input mask.

The Convert button allows direct adaptation of the c-value on the basis of the various air densities. The conversion has to be triggered manually, and is then performed from the Mandatory typical values area to the Application specific values area. If values in the Application specific values area are changed, the conversion takes place automatically.

It is possible to use plant-specific data by enabling the function to Overwrite AT values. As a result, the typical values that were entered are saved, but it is possible to carry out a special correction locally in the plant. The functionality is the same as described above, but in this case the values are in relation to $V_{n\ effective}$. With the Convert button, the adaptation can take place in both directions.

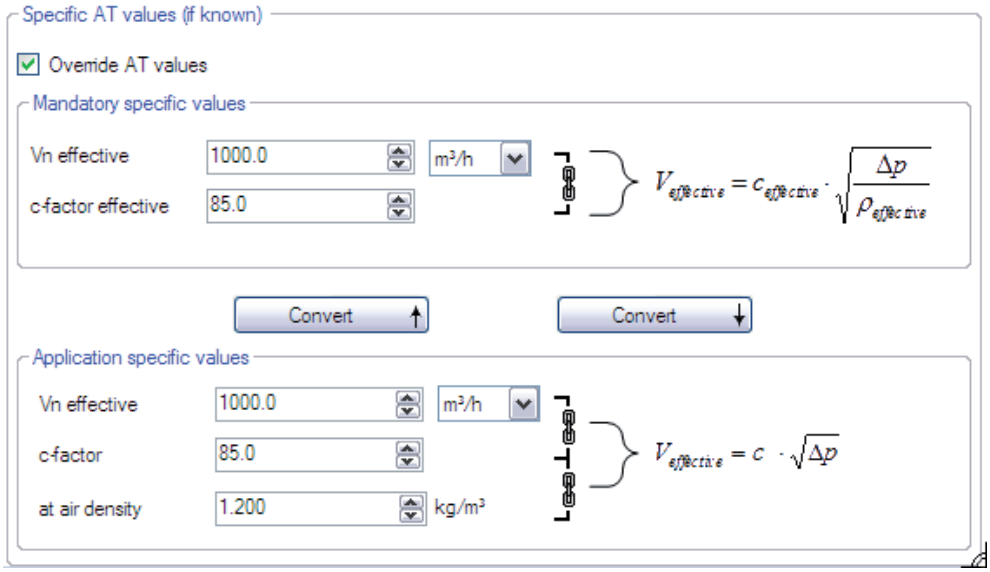



Fig. 37 GUI: Override original values

## 8.12 I/O configuration

The I/O configuration page is available for detailed parameterisation of the inputs and outputs. Each input or output can be set separately, so the volume-flow compact controller can be adapted individually to a wide variety of application cases.

### 8.12.1 Analogue input, Terminal 01

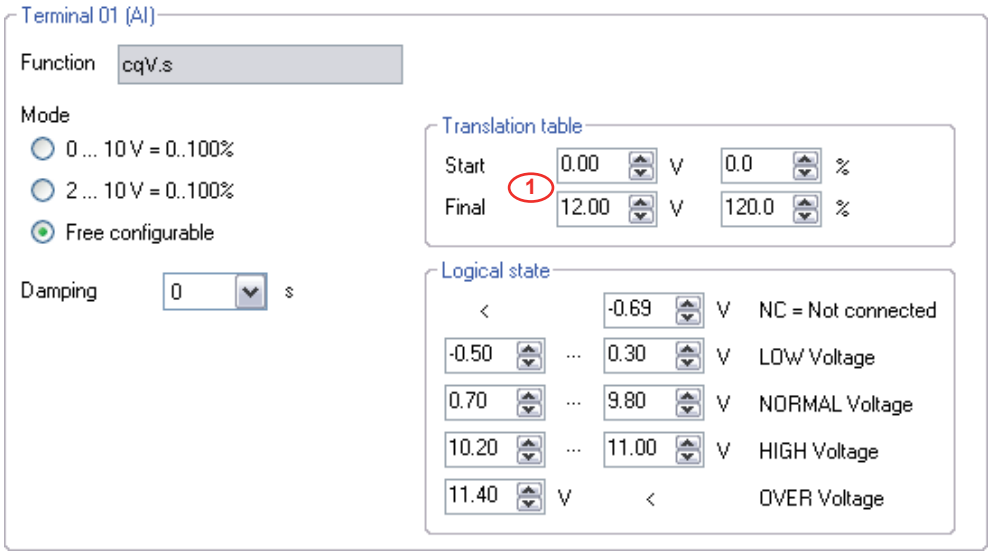
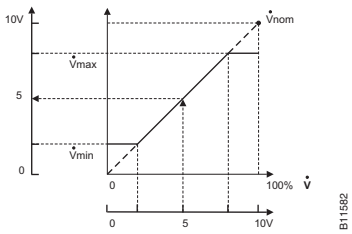



Fig. 38 GUI: parameter AI 01

(1) results in e.g. an overrun of the signal 0...10 V = 0...100% to 0...12 V = 0...120%.




| Parameter | Description |
|---|---|
| Function | The Function field is used to identify the function for the analogue input. The technical control function is shown here.<br>**Factory setting: setpoint for volume flow $c_{qv.s}$** |
| Mode | Mode switchover is used to change the input range for the input manually. The factory setting is 0…10V. To change over to other ranges, click on the radio button. In addition to the 0…10V range, a 2…10V range and a freely configurable range can generally be selected. The free configuration function allows reversal of the signal range to 10…0V, for example. |
| Input: Damping | In case of severely fluctuating signals or electronic interference signals, the adjustable input damping can present oscillation of the control loop. The following parameters are available for damping.<br>Setting range:<br>• 0.000 s<br>• 0.10 s<br>• 0.20 s<br>• 0.41 s<br>• 0.82 s<br>• 1.63 s<br>• 3.26 s<br>• 6.50 s<br>• 13.00 s<br>• 26.00 s<br>• 52.20 s |
| Adjust range: Logical State | The analogue inputs have automatic signal recognition. The threshold values for the functional assignment of the input in case of insufficient or excess voltage are set by entering parameters. These parameters can be used in conjunction with the **Priority command (AI01)** function to define which function the volume-flow compact controller should execute when the parameterised values are attained.<br>The factory settings for the value ranges are shown in Table 14 and they differ in 0…10V and 2…10V mode. |

Tab. 15 Description of parameters for analogue input

| Designation | Value range 0..10V | Value range 2..10V |
|---|---|---|
| NC = open | -0.69 V | -0.69 V |
| LOW Voltage | -0.5 – 0.3 V | - 0.5 – 2.2 V |
| NORMAL Voltage | 0.7 – 9.8 V | 2.2 – 9.8 V |
| HIGH Voltage | 10.2 – 11 V | 10.2 – 11 V |
| OVER voltage | > 11.4 V | > 11.4 V |

Tab. 16 Factory settings: value ranges for input recognition

### 8.12.2 Analogue Input and Analogue Output, Terminal 02

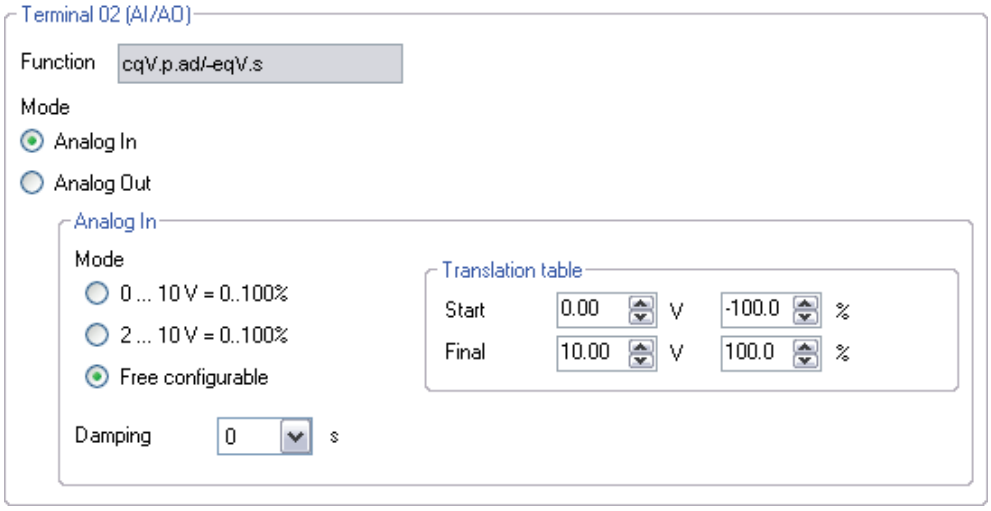
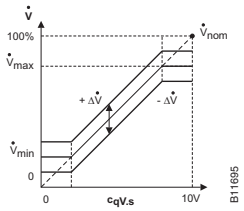
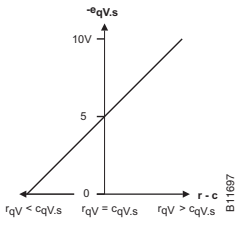



Fig. 39 GUI: parameters AI/AO 02




| Parameter | Description |
|---|---|
| Function | The function for the input is selected automatically in the Function field. In case of configuration as an input or output, the entry in the function field shows the technical control function.<br>**Factory setting for input: $c_{qV.p.ad}$ (Δw), room pressure correction shift from room pressure controller RLE150F100**<br>After switching the connection over as an analogue output, it makes the setpoint deviation 0…10V available. In this case, 5V corresponds to a control deviation between setpoint and actual value (the command variable without priority control) of 0% volume flow. In terms of control technology, this corresponds to $-e_{qv.s}$ (dw). This function is mainly used for generating an alarm at a fume cupboard control panel like the SAUTER FCCP100Fxxx. |
| Mode | Switchover mode is used to change over terminal 02. The connection can generally be switched as an analogue input (factory setting) or an analogue output. |
| Mode: Analogue in | If the connection is enabled as an analogue input, the same functions as for terminal 01 are available. The factory setting is 0…10V. To switch over to other ranges, click on the radio button. In addition to the 0…10V range, a 2…10V range and a freely configurable range can generally be selected. The free configuration function allows reversal of the signal range up to 10…0V, for example. As for analogue input 01, input damping and the logical state of the input can also be selected. |
| Mode: Analogue out | If terminal 02 is enabled as an analogue output, function ranges 0…10V, 2…10V and freely configurable characteristics are available. If the free characteristic is selected, the start and finish points for the characteristic can be selected freely, as for the analogue input. |

Tab. 17 Description of parameters - analogue input

NOTICE

**Restrictions for 24V DC operation**

Not connected analog inputs will be interpreted as 0V. The nominal volume-flow compact controller torque will be obtained within specified tolerances (see PDS 52.100, PDS 52.150). Terminal 02 can be used only as an analogue input.

### 8.12.3 Analogue output, Terminal 03

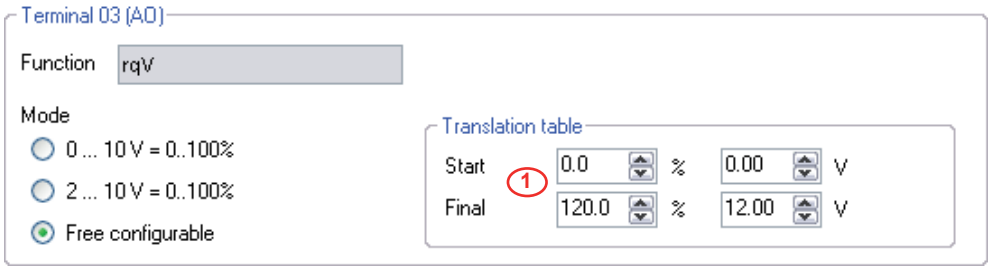
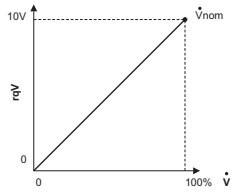



Fig. 40 GUI: parameter AO 03

(1) Therefore Xi Values > 100% are transferred.




| Parameter | Description |
|---|---|
| Function | The output's function is entered automatically in the Function field. The technical control function of the output is shown here. **Factory setting: $r_{qv}$ ($X_i$), actual value for volume flow in relation to the set values for 0% to 100% of volume flow, corresponding to $V_{nom}$. The $r_{qv}$ signal is scaled between these values**. |
| Mode | Function ranges 0…10V, 2…10V and a freely configurable characteristic are available. If the free characteristic is selected, the start and finish points for the characteristic can be selected freely, as for the analogue input. |
| Mode: 0…10V = 0…100% | The output signal is scaled to 0…10V and it represents the effective actual volume flow value in relation to $V_{nom}$ ≙ 100%. |
| Mode: 2…10V = 0…100% | The output signal is scaled to 0…10V and it represents the effective actual volume flow value in relation to $V_{nom}$ ≙ 100%. |
| Mode: Freely configurable | The output signal can be freely configured. In this case, scaling is based on the set parameters and represents the effective actual value for volume flow in relation to the parameterised $V_{nom}$. |

Tab. 18 Parameter description, analogue output 03

### 8.12.4 Digital Inputs, Terminal 04 and Terminal 05

Digital inputs 04 and 05 are generally used for priority control of the ASV115. Special operating statuses can be controlled on a defined basis in this way.

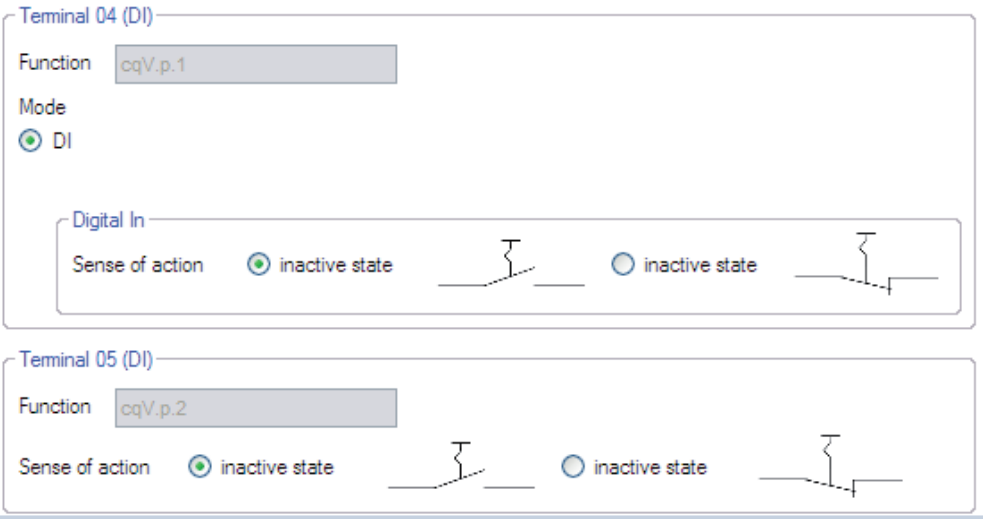
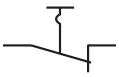



Fig. 41 GUI: parameters DI 04 and DI 05

| Parameter | Function |
|---|---|
| Sense of action  | A make contact must be connected at the input. Operating the contact triggers the parameterised function. **Factory setting** |
| Sense of action  | A break contact must be connected at the input. Operating the contact triggers the parameterised function. |

Tab. 19 Parameter description: DI 04 and DI 05

Factory settings can be replaced by project specific functions by using the VAV-setpoints page (see chapter 8.12.4)

## 8.13 Settings for VAV control loop

On the VAV control loop page, all the parameters required for commissioning and optimising the control loop are grouped together.

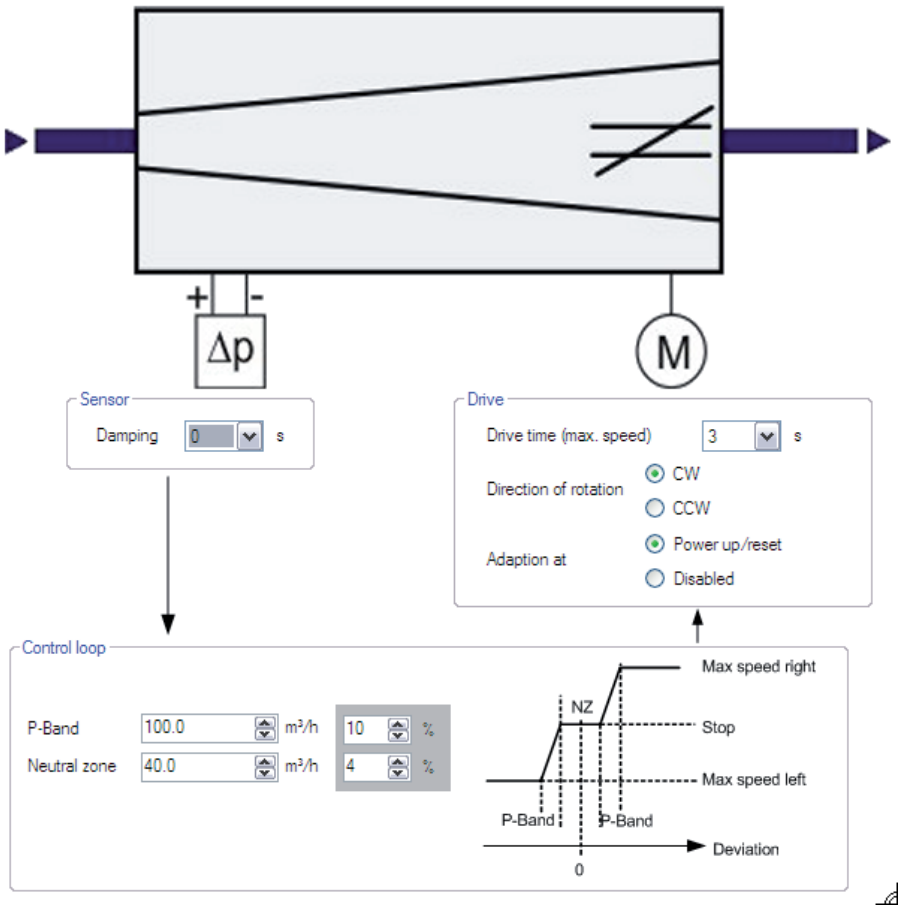



Fig. 42 GUI: Parameterisation for control loop

All data entered are automatically transferred to the overview page.

| Parameter | Description |
|---|---|
| Sensor: Damping | Setting for internal signal damping on the pressure sensor. If the pressure signal fluctuates greatly, the damping can be increased to avoid vibration of the volume-flow compact controller.<br>Setting range:<br>• 0.000 s<br>• 0.010 s<br>• 0.020 s<br>• 0.041 s<br>• 0.082 s<br>• 0.163 s<br>• 0.326 s<br>• 0.650 s<br>• 1.300 s<br>• 2.600 s<br>• 5.220 s |
| Control loop: P-band | According to choice, the P-band can be entered in m³/h or %. The reference variable is $V_{nom}$ . |

| Parameter | Description |
|---|---|
| Control loop: Neutral zone | According to choice, the neutral zone can be entered in $m^3/h$ or %. The reference variable is $V_{nom}$ . |
| Drive: Drive time (max. speed) | Setting for the maximum volume-flow compact controller running time for a 90° angle of rotation.<br><br>Setting range:<br>**ASV115CF152**: 3 s, 4 s, 5 s, 6 s, 8 s, 10 s, 12 s, 15 s<br>**ASV115CF132**: 30 s, 45 s, 60 s, 75 s, 90 s, 105 s, 120 s |
| Direction of rotation | CW →damper opens clockwise<br>CCW → damper opens anti-clockwise |
| Adaptation at | Two options are available for automatic adaptation of the angle of rotation:<br>When the power supply is applied or when it returns after an interruption, the volume-flow compact controller moves to both stops for the angle of rotation limitation and re-adjusts the internal position feedback signal.<br>Automatic adaptation of the angle of rotation is switched off. |

Tab. 20 Parameters for volume-flow compact controller and control loop

The slower the selected volume-flow compact controller running time, the less the control loop will tend to oscillate.

The volume-flow compact controller switches off automatically when the end position is reached. At regular intervals, the volume-flow compact controller starts up repeatedly to retain the definition of the end position for the damper.

## 8.14 VAV-setpoints

The VAV-setpoints parameterisation page groups together all the parameters for possible settings of volume flow setpoints. In addition, a wide range of parameters can be set for priority control and setpoint shift, and for desired behaviour in case of malfunctions.

### 8.14.1 Volume flow values

The following definitions apply to project-related input of volume flow parameters:

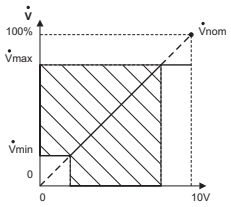
- The air density at the installation location can vary greatly due to the height above sea level, causing intolerable deviations in the air volumes. This can be avoided by entering the air density at the installation location. The correction is made directly in the programme, and the necessary differential pressures

at the measuring point are recalculated so that the controller uses these new values for volume flow control.

- The design value $V_n$ AT of the volume flow box becomes effective with the correction of the air density for Vn. For example, $V_n$ AT represents the nominal volume flow over the volume flow box which is attained at a $\Delta$p of approx. 250Pa and which corresponds to an air velocity of approx. 12 m/s. These values may differ depending on the various manufacturers of volume flow boxes, and they correspond to the value for the volume flow box in the manufacturer‘s catalogue.
- $V_{n\ effective}$ corresponds to the $V_{nAT}$ effective which is parameterised when calibrating the volume flow box at the manufacturer’s factory. The effective air density is integrated into this value at the time of parameterisation.
- $V_{nom}$ corresponds to the nominal volume flow in the plant. The sensor is calibrated to this value so that the measuring range corresponds to 100% of the plant volume flow.
- $V_{max}$ limits the command variable signal to the maximum desired volume flow in the plant. According to choice, the value can be entered as an absolute value or a percentage, in relation to $V_{n\ effective}$ or $V_{nom}$.

Calculation of $V_{max}$ in %: $V_{max}\,(\%) = \frac{\left(\dot{V}_{max}\left(\frac{m^3}{h}\right)\right)}{\left(\dot{V}_{nom}\left(\frac{m^3}{h}\right)\right)} * 100\%$

- $V_{mid}$ is a freely paramaterisable value between $V_{max}$ and $V_{min}$. The following rule is applicable: $V_{max} \geq V_{mid} \geq V_{min}$
- $V_{min}$ limits the command variable signal to the minimum desired volume flow in the plant. According to choice, the value can be entered as an absolute value or a percentage, in relation to $V_{n\ effective}$ or $V_{nom}$.




Calculation of $V_{min}$ in %: $V_{min}\,(\%) = \frac{\left(\dot{V}_{min}\left(\frac{m^3}{h}\right)\right)}{\left(\dot{V}_{nom}\left(\frac{m^3}{h}\right)\right)} * 100\%$

- $V_{int}$ is an additional internal setpoint which can be used for different functions. $V_{int}$ is only limited by $V_{nom}$. Hence, $V_{nom} \geq V_{int}$
- The setpoints for the air volume flows are entered directly in $m^3/h$ or per cent and relate to $V_{n\ effective}$ or $V_{nom}$.
- The coloured display for a quick visual check of air velocity (and hence the design data) follows generally used conventions:
    - Red → air velocities > 10 m/s and < 2.5 m/s
    - Yellow → air velocities from 8 m/s to 10 m/s
    - Green → air velocities between 3 m/s and 8 m/s
- In the differential pressure column, the differential pressure in pascal is calculated over the measuring point; this can be used as the basis for the control measurement on the connections of the volume flow box.

To avoid extensive conversions of volume flows, the programme shows the dependencies directly in the various columns. The absolute volume flow values in the set unit are entered directly in the first column and the relative data in per

cent are entered in the following columns. For this purpose, you are advised to set $V_{nom}$ as equal to the $V_{max}$ value. This allows the percentage setting for the volume flow values to be made directly in the column with the grey background ('According to $V_{nom}$').

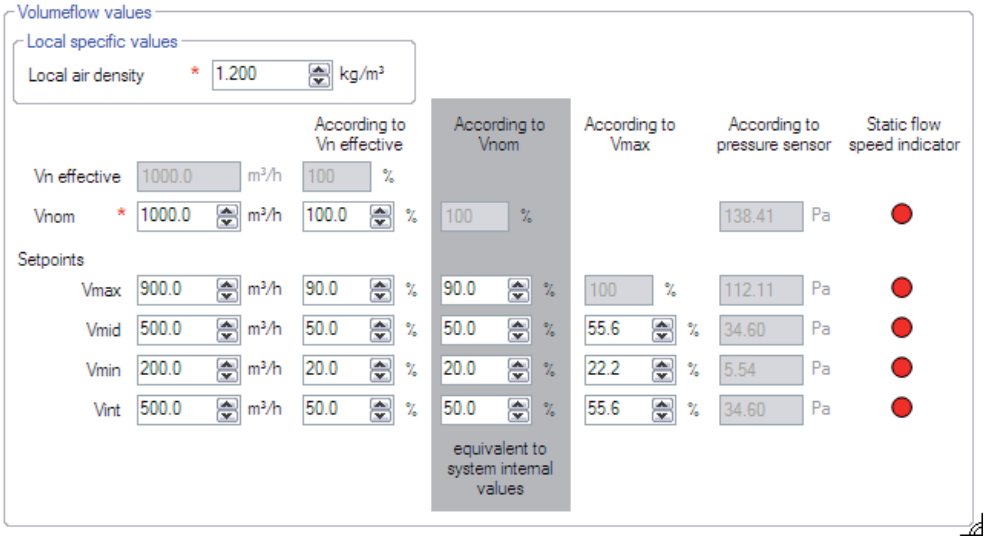



Fig. 43 GUI: available VAV setpoints

| Parameter | Function Description |
|---|---|
| Local air density | By default, the air density is defined as 1.2 kg/m$^3$, and it is indicated by the manufacturers of the volume flow boxes together with the c-factor. If the air density at the installation location diverges from this value, the **Local air density** parameter can be used to make a correction. All dependent values are automatically corrected in the programme. |
| $V_{n\ effective}$ | Maximum volume flow over the volume flow box, referring to the manufacturer's design data for the volume flow box. |
| $V_{nom}$ | Volume flow to which the internal pressure sensor is automatically set. $V_{nom}$ therefore corresponds to the calibration to a range of 100% for the maximum possible volume flow over the volume flow box. |
| Setpoint: $V_{max}$ | Maximum permitted volume flow for the application. Values are determined on a project-specific basis.<br>Adjustable range: $V_{1Pa}$…$V_{nom}$. |
| Setpoint: $V_{mid}$ | $V_{mid}$ represents a value between $V_{max}$ and $V_{min}$ which can be freely selected. $V_{mid}$ cannot be greater than $V_{max}$ or smaller than $V_{min}$. |
| Setpoint: $V_{min}$ | Minimum permitted volume flow for the application. The value is determined on a project-specific basis.<br>Adjustable range: $V_{1Pa}$…$V_{max}$. $V_{min}$ cannot be set greater than $V_{max}$. |
| Setpoint: $V_{int}$ | The internal setpoint is an additional setpoint which can be selected independently of all other setpoints and inputs.<br>Adjustable range: $V_{1Pa}$…$V_{nom}$. $V_{int}$ cannot be set to a value that is larger than $V_{nom}$. |

Tab. 21 Description of parameters for VAV setpoints

Factory setting → If there is no external setpoint specification, the set $V_{min}$ value is used as the active setpoint. This setpoint can be changed by assigning a further setpoint for the status NC=open in the "Forced operation" section.

### 8.14.2 Behaviour in case of malfunctions

In this section, you can define how the volume-flow compact controller should behave when an error occurs in the system.

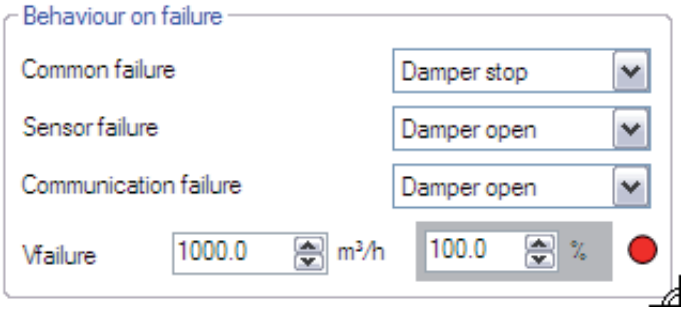



Fig. 44 GUI: Behaviour on failures

- In general, the following functions are available to parameterise an emergency position. For the indicated volume flow values, these are the parameterised volume flow setpoints.
    - Volume-flow compact controller stop; the volume-flow compact controller remains in its current position.
    - Damper open; the volume-flow compact controller moves the damper to the end position, (open).
    - Damper closed; the volume-flow compact controller moves the damper to the end position, (closed).
    - Control to $V_{failure}$
    - Control to $V_{min}$
    - Control to $V_{mid}$
    - Control to $V_{max}$
    - Control to $V_{int}$
    - Control to $V_{var}$

| Parameter | Function |
|---|---|
| Common failure | If an error occurs on the system which cannot be explicitly shown as a sensor or communication error, e.g. a fault on the motor, a defined function can be selected for it here. |
| Sensor failure | If an error occurs on the integrated sensor such as loss of data connection or overload if incorrect pressure is applied, the set parameter is approached by the device. |
| Communication failure | If communication with other devices in the network is broken off due to connection faults or interruption, the set parameter is approached by the device. |
| $V_{failure}$ | If a defined volume flow is also required in an emergency, it can be parameterised independently of all other setpoints. This value cannot be controlled for a sensor error. |

Tab. 22 GUI: parameters for setpoint shift

### 8.14.3 Setpoint shifting, ΔV (AI02)

If terminal 02 is configured as an input, it can be used for setpoint shift. For example, this occurs when a room pressure controller is connected to the volume flow controller and a parallel shift of the setpoint is required to correct the room pressure. In general, the shift is always defined as +/- 5V. For a 5V input, the setpoint shift is always 0.

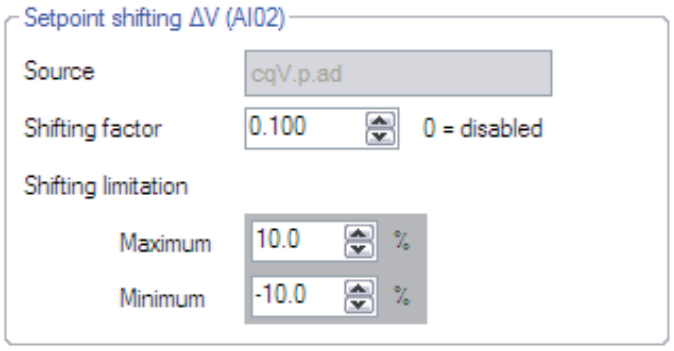
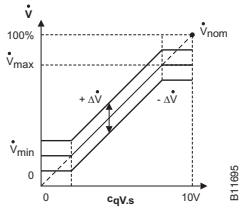


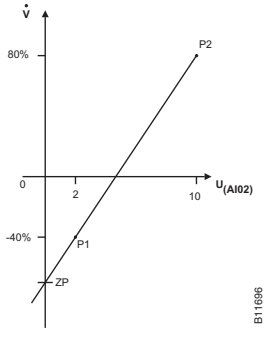

Fig. 45 GUI: Parameter Setpoint shifting,

The following parameters are available:




| Parameter | Description |
|---|---|
| Source | The field shows the designation for the connection to which the function relates. |
| Shifting factor | The setpoint shift factor represents an amplification factor of the signal which is present at the analogue input. This enables you to choose how much the external signal should be amplified.<br>The following applies:<br>Value = 0: shift is inactive<br>Value ≠ 0: shift is active |
| Shifting limitation | The limitation is defined in % of volume flow of $V_{nom}$. The highest and lowest permitted values can be entered. |

Tab. 23 Parameters for setpoint shift




Example for calculating the resultant setpoint shift

In order to obtain the value for the resultant setpoint shift as a percentage of the air volume, the configuration of connection AI02 should also be taken into account. If, for example, the input has been freely configured, and you have chosen 2.00 V (= -40%) as the start, 10.00 V (= 80%) as the end and 0.25 as the factor for the shift, then a voltage of 3 V applied to connection AI02 will cause the following percentage setpoint shift.

First identify the slope m

$$m = \frac{80\% - (-40\%)}{10.00V - 2.00V} = +15\%/V$$

Then calculate the voltage zero crossing ZP

$$ZP = -40\% - m * 2 = -40 - 30 = -70\%$$

The caused setpoint shift is

$$shift[\%] = 0.25 * (ZP + 3V * m)$$

$$shift[\%] = 0.25 * (-70 + 45) = -6.25\%$$

Or all in one:

$$\text{shift}\,[\%] = 0.25 * \left( (3\text{V} - 2\text{V}) * \frac{80\% - (-40\%)}{10.00V - 2.00V} + (-40\%) \right) = -6.25\%$$

### 8.14.4 Forced operation, (DI 04 / DI05)

Digital inputs DI04 and DI05 can be used to parameterise up to four independent control positions or damper positions.

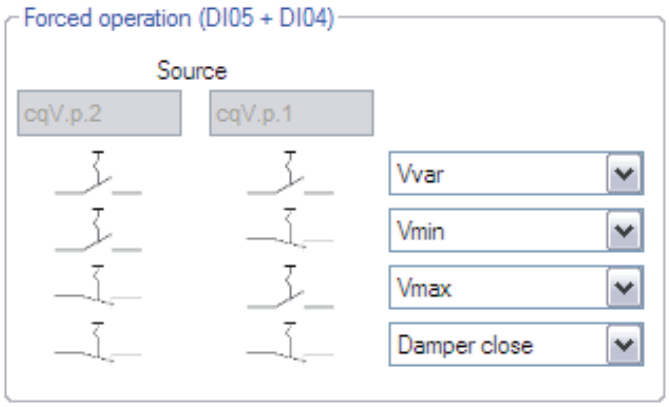



Fig. 46 GUI: priority control via digital input

- The fields for the connection designation (Source) describe the connection terminal associated with the switch position.
- Depending on the combination shown for the switch position on the user interface, the desired function can be parameterised freely in the adjacent pulldown box.
  The following functions are available:
  - Volume-flow compact controller stop; the volume-flow compact controller remains in its current position.
  - Damper open; the volume-flow compact controller moves the damper to the end position, (open).
  - Damper closed; the volume-flow compact controller moves the damper to the end position, (closed).
  - Control to $V_{min}$
  - Control to $V_{mid}$
  - Control to $V_{max}$
  - Control to $V_{int}$
  - Control to $V_{var}$; the volume-flow compact controller controls to the setpoint in relation to the 0…10V command variable signal

If multi-stage operation is parameterised via the forced operation command, the external contacts must be reciprocally locked.

To enable the VAV control system, at least one combination should be set on the $V_{var}$.

The functioning of the relevant input is directly related to its parameterisation, as described in section 8.10.4. The factory settings are summarised in the Table.

| Connection configuration | | Function with factory setting | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DI 05 (cqv. prim.2) | DI04 (cqv.prim.1) | $V_{var}$ | | $V_{min}$ | | $V_{max}$ | | Klappe zu | |
| ⎍/⎍ | ⎍/⎍ | n. o. | n. o. | n. o. | o. | o. | n. o. | o. | o. |
| ⎍/⎍ | ⎍⎍ | n. o. | o. | n. o. | n. o. | o. | o. | o. | n. o. |
| ⎍⎍ | ⎍/⎍ | o. | n. o. | o. | o. | n. o. | n. o. | n. o. | o. |
| ⎍⎍ | ⎍⎍ | o. | o. | o. | n. o. | n. o. | o. | n. o. | n. o. |

Tab. 24 Logic table for digital inputs

| | |
|---|---|
| n. o. | Connected switch or contact is **not operated**, i.e. make contact is open and break contact is closed. |
| o. | Connected switch or contact is **operated**, i.e. make contact is closed and break contact is open. |

### 8.14.5 Priority command, (AI01)

As for the digital inputs, it is also possible to implement a defined priority command via analogue input 01. The same functions are basically available via the pulldown box as for forced operation control via the digital inputs.

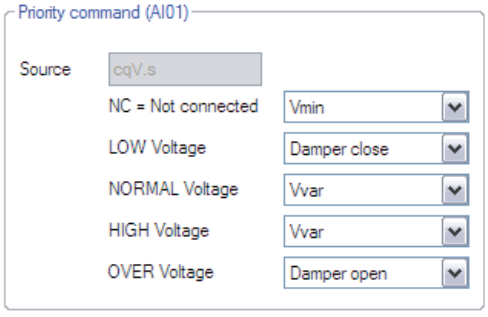



Fig. 47 GUI: priority control via analogue input

By default, the following functions are specified by the factory setting:

| Designation | Value range 0..10V | Value range 2..10V | Function |
|---|---|---|---|
| NC = Not connected | < -0.69 V | < -0.69 V | $V_{min}$ |
| LOW voltage | -0.5 – 0.3 V | - 0.5 – 2.2 V | Damper closed |
| NORMAL Voltage | 0.7 – 9.8 V | 2.6 – 9.8 V | Control range $V_{var}$ |
| HIGH Voltage | 10.2 – 11 V | 10.2 – 11 V | Control range $V_{var}$ |
| OVER Voltage | > 11.4 V | > 11.4 V | Damper open |

Tab. 25 Priority control via analogue input 01

## 8.15 Device information

In cases where support is needed, the device information should be read out from the volume-flow compact controller and communicated. This information is also used to identify the device uniquely within the project.

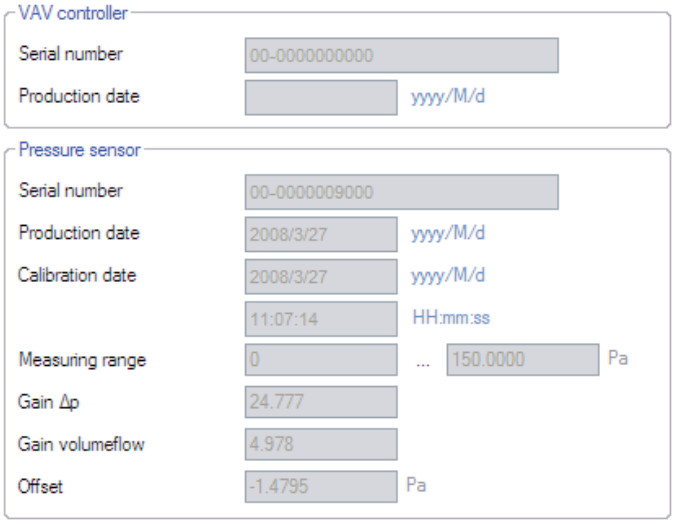



Fig. 48 GUI: device identification

The data cannot be changed.

| Parameter | Description |
|---|---|
| VAV controller: Serial number | Unique device number, assigned during manufacture of the volume-flow compact controller and used for tracing back to production. |
| VAV controller: Production date | Production date of the device as shown on the volume-flow compact controller nameplate. |
| Pressure sensor: Serial number | Unique device number, assigned during manufacture of the sensor and used for tracing back to production. |
| Pressure sensor: Production date | Production date of the sensor, may differ from the production date of the volume-flow compact controller. |
| Pressure sensor: Calibration date | Date of last calibration; may differ significantly from the production date, as recalibration in the field is possible. This does not refer to a possible zero point adjustment. |
| Pressure sensor: Measuring range | Measuring range (fs) of the sensor used in Pa. |
| Pressure sensor: Gain Δp | $Gain\Delta p = \frac{p_{\max .Sensor}}{\Delta p(V_{nom})}$<br>The value is internally calculated and verified.<br>It must be between 1 and 3 and may be influenced by a change in the c-value or in $V_{nom}$.<br>If the value is not between 1 and 3, there will be an error message during the download. |
| Pressure sensor: Gain volume-flow | $Gain\dot{V} = \sqrt{GainP}$<br>The value is internally calculated and verified. |

| Parameter | Description |
|---|---|
| Pressure sensor: Offset | Adjusted offset of the sensor in Pa. This is only influenced by the zero point adjustment function. The offset is recalculated and stored in the device. |

Tab. 26 Parameter device information

## 8.16 Monitoring

The area **Monitoring** shows the volume flow setpoint value and actual value, the operating pressure and the damper position in graphical and numerical form. Before you start a visualisation, we recommend that you save the current device configuration by uploading it.

To display the values in the area **Current values** and start a visualisation, click **Start monitoring** in the right-hand column of the GUI in the **Current values** area.

You can view the measurement values for two volume flow controllers in parallel. To do so, you must first select a second controller by entering the network address and selecting the device type (F variant). Displaying two volume flow controllers simultaneously allows you to collect valuable information and other aspects relating to the following processes during commissioning:

- Volume flow control for supply air and return air
- Fluctuations in room air pressure in conjunction with fluctuations in the pressure or volume flow of supply air or return air

To visualise a secondary device, select the option **Visualize a second VAV Controller** in the section **Graph settings**

**NOTICE** It is not possible to visualise two volume flow controllers for a point-to-point connection.

Adjust the settings for the visualisation display in the **Graph settings** section.

You can adjust the colour for the displayed parameters of a device under **Primary VAV Controller**. You can also define the parameter colours for a second controller if you have selected the option **Visualize a second VAV Controller**.

You can adjust the time interval for recording measurement values under **Timing settings**. The number of entries is limited to 32,000.

You can save the graphic data in a .csv file under **Log settings** and use the data for further plant diagnosis purposes.

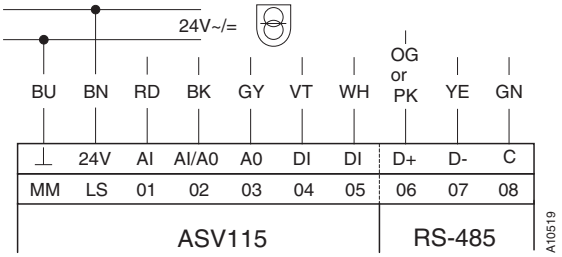
The following additional functions are also available for the visualisation display:

- Zoom-in/zoom-out: left-click in the visualisation area and simultaneously scroll with the mouse.

- Editing the visualisation: right-click in the visualisation area. You have the following options:
    - **Copy**: Copy the visualisation to the clipboard.
    - **Save Image As**: Save the current visualisation to a data carrier.
    - **Page Setup**: Show the print settings for the visualisation.
    - **Print…**: Print the visualisation (with prior selection of the target printer).
    - **Show Point Value**: Hover the mouse cursor over a curve to display the measurement values.
    - **Un-Zoom**: Zoom out one level.
    - **Undo all Zoom/Pan**: Restore the original size of the visualisation and scale after zooming.
    - **Set scale to default**: Display recorded measurement values over the entire recording period.

## 8.17 Diagrams

The Connection diagram area is purely for information purposes and is intended to give on-the-spot support for installation or troubleshooting. The diagrams shown indicate the control signal flow in the application (Application diagram) and the assignment of cable connections (Wiring diagram).




| BU | BN | RD | BK | GY | VT | WH | OG or PK | YE | GN |
|---|---|---|---|---|---|---|---|---|---|
| blau | braun | rot | schwarz | grau | violett | weiss | orange oder pink | gelb | grün |
| blue | brown | red | black | grey | purpel | white | orange or pink | yellow | green |
| bleu | brun | rouge | noir | gris | pourp-re | blanc | orange ou rose | jaune | vert |

Fig. 49 Cable connections ASV115

# 9 Service functions

## 9.1 Manual operation

For commissioning or troubleshooting purposes, the volume-flow compact controller can be operated manually. To do this, the Manual operation function should be selected in the Service functions area. The illustrated functions are available. You can select the function you want and enable it by clicking on the Set mode button. If the Manual operation dialogue box is closed, the current status is shown under the button in the Service area.

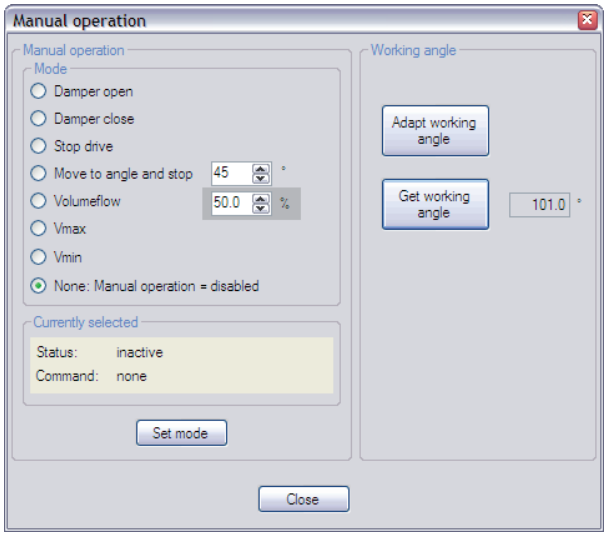



Fig. 50 Dialogue box: Manual mode

| Function | Description |
|---|---|
| Mode: Damper open | The volume-flow compact controller opens the damper as far as the limitation on the angle of rotation |
| Mode: Damper closed | The damper is closed as far as the angle of rotation limitation. |
| Mode: Stop drive | The control and the volume-flow compact controller are stopped in the current position. |
| Mode: Move to angle and stop | The angle of rotation entered in the field is approached. The volume-flow compact controller remains stationary on reaching this point. |
| Mode: Volumeflow | Any desired volume flow, indicated in per cent, is set and held. |
| Mode: $V_{min}$ | The minimum set volume flow is approached. |
| Mode: $V_{max}$ | The maximum set volume flow is approached. |
| Mode: None: Manual operation = disabled | Factory setting: the volume-flow compact controller is reset to the normal operating mode. |
| Working angle: Adapt working angle | The volume-flow compact controller performs the adaptation of the angle of rotation by automatically moving to the angle of rotation limitations, and then it resets the positioner. |
| Working angle: Get working angle | The angle of rotation currently set is read out. |

Tab. 27 Parameters for manual mode

If the connection to SAUTER CASE VAV is interrupted, the volume-flow compact controller automatically changes back to control mode after 30 s.

## 9.2 Zero point adjustment

Mouse-click on the Zero point adjustment button to force a sensor adjustment. First, you see a window indicating that the two measuring connections must be removed. After confirming with Proceed, a sensor adjustment is performed. Only the zero point of the sensor is reset in this case, i.e. the offset of the sensor is changed.

**NOTICE** This procedure is not a calibration.

## 9.3 Current value

On starting the online query (by clicking the **Start monitoring** button), the main operating parameters are continually read out from the actuator and displayed. All values are shown in relative form in per cent, or in absolute form in the respective physical units. The values are updated as per timing setting.

The following information is available:

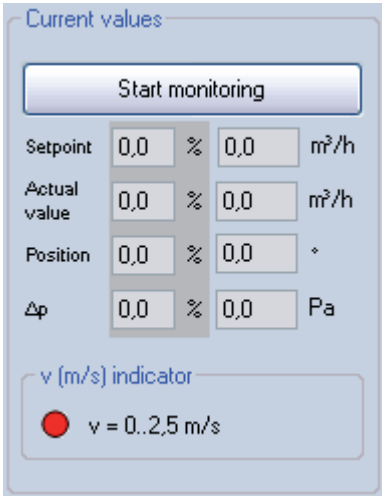



Fig. 51 GUI: Current value

| Parameter | Description |
|---|---|
| Setpoint | Setpoint as currently set, may be an internal or external value. The displayed value is limited by the $V_{min}$ and $V_{max}$ setpoint (The display does not include any setpoint shift). |
| Current value | Current actual value feedback by the volume flow measurement. |
| Damper position | Current value for position feedback from volume-flow compact controller as angle of rotation. |
| Δp | Current differential pressure feedback by the sensor. |

Tab. 28 Parameters for online values

# 10 Volume flow control

## 10.1 General information

Recommended values or factory settings which have been automatically loaded during the configuration of the VAV compact controller have been tried and tested, but they do not necessarily represent the optimal solution for every plant. For this reason, no liability is assumed for the values indicated.

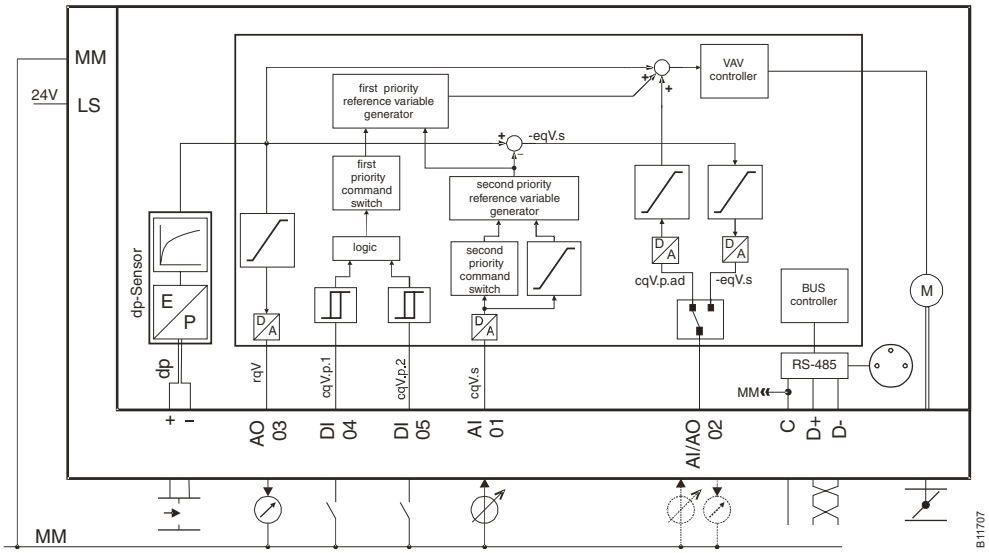



Fig. 52 Block circuit diagram of the ASV115

## 10.2 Area of application

For air-conditioning plants, a distinction is drawn between constant-volume flow and variable volume flow plants; the former are controlled via the supply air temperature and the latter via the supply air quantity, while the supply air temperature remains almost constant. For secondary air treatment, increasingly frequent use is made of plants with variable volume flow (VAV) in conjunction with intelligent unitary control, in order to cut energy costs while maintaining the required high level of comfort in the rooms.

The VAV controller is used to measure the air quantity for each room and to compare it with the signal from the room temperature controller as the setpoint. Suitable setpoint limiters in the VAV controller can fix the minimum and maximum volume flow as desired. The VAV controller then controls the damper until the correct volume flow is present, regardless of the channel pressure and the damper characteristic.

A channel pressure control which reduces the fan power accordingly will suffice to ensure that pressure in the channel does not rise with small volume flows.

The ASV115CF152 VAV compact controller with 3 s running time was specially developed to control critical applications with fast control loops in laboratory and pharmaceutical environments. It is suitable for plants with variable and

constant air volume flows. A large number of practically tested standard solutions are available, and these can be configured on commissioning with SAUTER CASE VAV.

The VAV compact controller can generally be used for the following applications:

- control of constant air volume flows
- control of variable air volume flows
- supply air / exhaust air cascade control
    - for open or closed rooms with overpressure/underpressure control
- control of laboratory fume hood systems (ASV115CF152)
- supply and exhaust air control in laboratories

Depending on the version of the firmware for the volume flow controller, various configurations are supported by the device.
The CASE – VAV PC software can be used to read out the firmware version loaded in the device.

### 10.3 Functioning of the volume flow controller

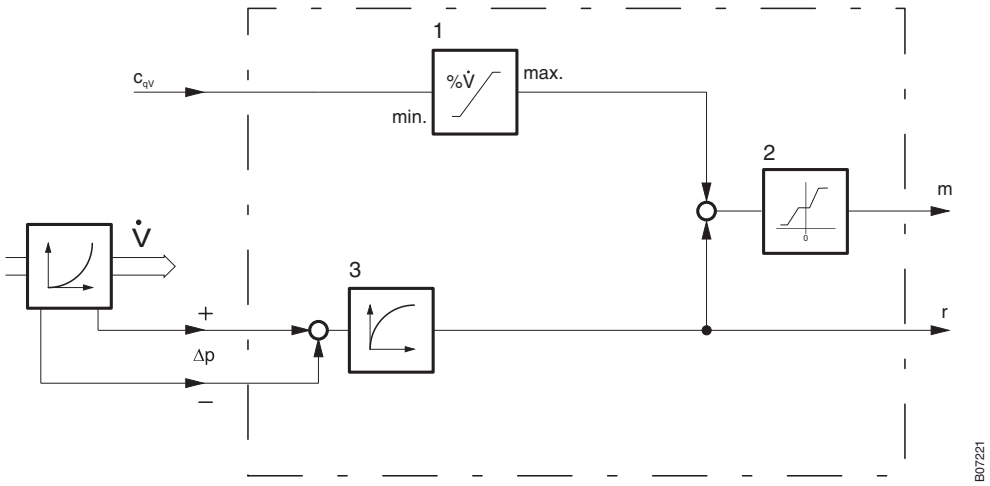



Fig. 53 Block circuit diagram for volume flow control

The pressure difference created at the orifice plate or at a dynamic pressure sensor is converted into a linear flow signal by a root-extracting transducer (3). The command variable signal $c_{qV}$ (e.g. from a temperature controller) is limited by the minimum and maximum adjuster (1) and is compared with the actual volume flow value $r_{qV}$. The control deviations are levelled out by the controller (2) with no remaining errors. The output signal m of the controller is specified for the internal volume-flow compact controller, whereby the volume flow over the damper is adjusted according to the setpoint/actual value deviation until the setpoint is reached.

As can be seen from the block circuit diagram, the command variable signal $c_{qV}$ is trimmed at the top and bottom, and is only used between the setpoints for the Vmin and Vmax adjusters. If there are volume flow boxes of different sizes in the same room, it is important that the setting for the plant-specific maximum

volume flow, for a setting value of 100 %, is made on the Vmax adjuster via the gain setting, i.e. that the measuring range of the differential pressure sensor is calibrated to the maximum volume flow. It follows that for all the volume flow controllers for each room, the minimum volume flow must be set as a percentage of the maximum volume flow value, i.e. all $V_{min}$ and $V_{max}$ adjusters have the same set value for each room.

NOTICE **Planning and installation errors**

A well-designed ventilation plant is required to ensure that a CAV or VAV plant functions perfectly. For this purpose, appropriate upstream pressure must be guaranteed in the duct system as well as a sufficiently long flow distance upstream of the volume flow controller. If the upstream pressure is not adequate, the control damper will remain in the open position. Poor installation conditions and consequently unfavourable flow conditions for the measuring equipment encourage volume-flow compact controller vibration, leading to unstable control or, in the worst-case scenario, early failure of the damper drive due to increased wear.

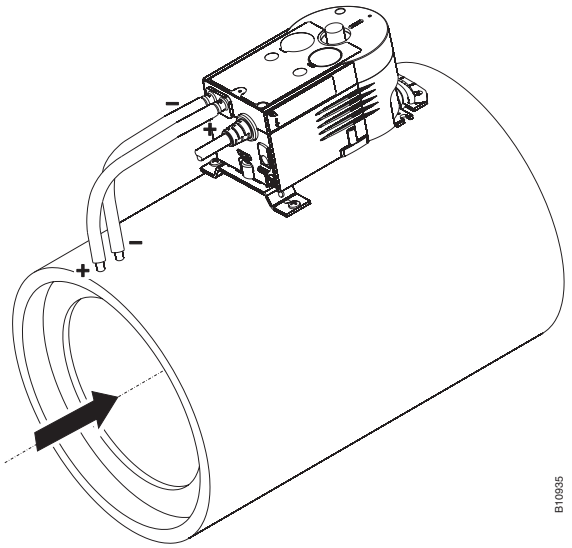
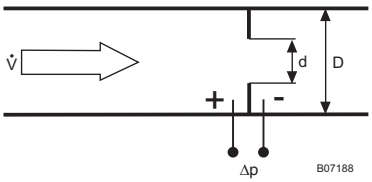
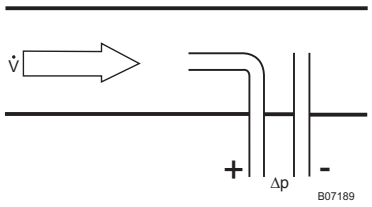
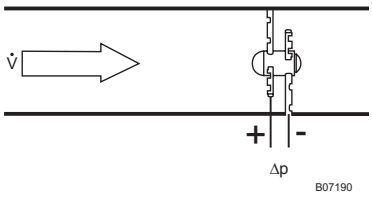
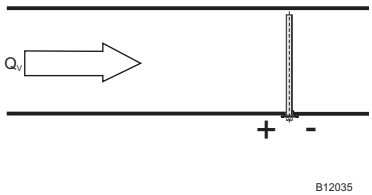
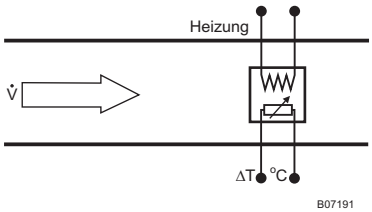


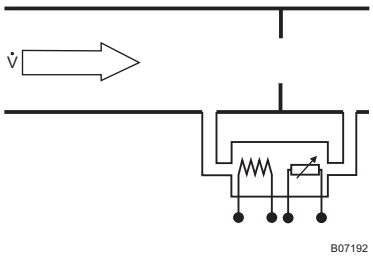
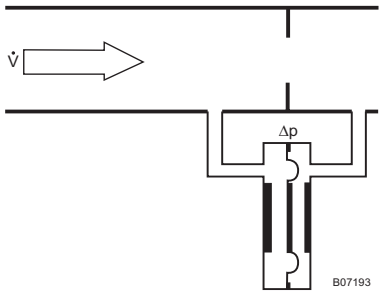

Fig. 54 Volume flow controller installed on VAV box

## 10.4 General information on volume flow measurement

### 10.4.1 Measuring principles

There is no direct measuring method for volume flow. Of the large number of indirect methods, those using the pressure differential and air velocity principles have mainly become established in the air-conditioning sector.

| Measuring principle | Technical features |
|---|---|
| **Orifice, baffle, Venturi nozzle** | |
|  | • Non-linear Δp signal<br>• Integral measurement<br>• Remaining pressure loss, flow resistance<br>• Not very sensitive to contamination and aggr. gases<br>• Pressure difference (operating pressure)<br>$\Delta p = 2.3 \times \rho/2 \times v^2$ for an orifice d/D = 0.87 |
| **Pitostatic tube after Pitot and Prandtl** | |
|  | • Non-linear Δp signal<br>• Point measurement<br>• Low pressure signal for low air velocities<br>• Not very sensitive to contamination<br>• Negligible pressure loss, almost no flow resistance<br>• Differential pressure (operating pressure)<br>$\Delta p = \rho/2 \times v^2$ |
| **Measuring cross, differential pressure sensor** | |
|  | • Non-linear Δp signal<br>• Integral measurement<br>• For low air velocities, more than 2× greater pressure signal than with pitostatic tube<br>• Not very sensitive to contamination<br>• Negligible pressure loss, almost no flow resistance<br>• Pressure difference (operating pressure)<br>$\Delta p \approx 2.3 \times \rho/2 \times v2$<br>$\rho$ = spec. weight of air [kg/m3]<br>v = av. air velocity in duct [m/s] |
| **Air-flow probe XAFP100** | |
|  | • Non-linear Δp signal<br>• Integral measurement<br>• For low air velocities, more than 2× greater pressure signal than with pitostatic tube<br>• Not very sensitive to contamination<br>• Negligible pressure loss, almost no flow resistance<br>• Pressure difference (operating pressure)<br>$\Delta p \approx 2.1 \times \rho/2 \times v2$<br>$\rho$ = spec. weight of air [kg/m3]<br>v = av. air velocity in duct [m/s] |
| **Sensor principles**<br>**Heat transfer principle Δt** | |
|  | • Non-linear resistance signal<br>• Point measurement<br>• High measuring signal even for low air velocities<br>• Sensitive to contamination<br>• Low flow resistance<br>• Low long-term stability |
| **Dynamic pressure measurement Δp** | |

| Measuring principle | Technical features |
|---|---|
|  | • Non-linear resistance signal<br>• Bypass measurement<br>• Low flow<br>• Not very sensitive to contamination<br>• Average long-term stability |
| **Static pressure measurement Δp** | |
|  | • Non-linear Δp signal<br>• Membrane pressure sensor<br>• Insensitive to contamination<br>• High long-term stability<br>• High accuracy |

Tab. 29 Measuring principles for volume flow

## 10.5 Design of volume flow boxes

The flow chart shows a recommendation how a VAV-box sizing can be performed

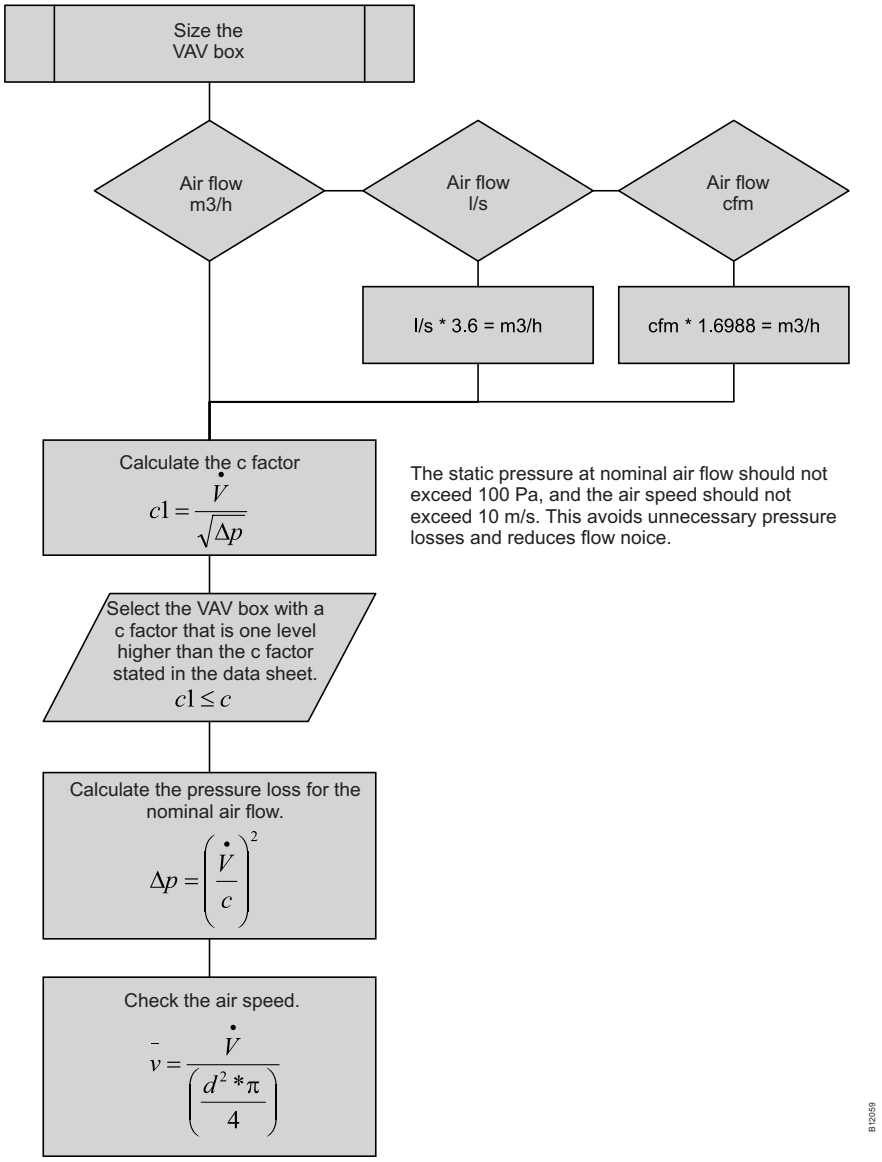



Fig. 55 Flow chart – sizing of a VAV - Box

## 10.6 Calculation formulas

### 10.6.1 Volume flow calculation

Volume flow is generally described by the following formula:

$$\dot{V} \approx \sqrt{p_v} \quad (1)$$

where pv is the dynamic pressure which is usually measured with a Pitot (pitostatic) tube. The relationship between dynamic pressure and differential pressure can be established by introducing a Pitot factor PF hence,

$p_d = PF * p_v$ (2).

Combining formulas (1) and (2) gives the equation for a volume flow calculation when the differential pressure is recorded using a Pitot tube measuring point:

$\dot{V} = \sqrt{\frac{p_d}{PF}}$ (3).

Manufacturers of volume flow boxes usually indicate a flow coefficient – c-factor – for their boxes. This value is used for the calculation according to the following formula:

$\dot{V} = c * \sqrt{\frac{p_d}{\rho}}$ (4) bzw. $p_d = \rho * \left(\frac{\dot{V}}{c}\right)^2$ (5).

Attention should be paid here to the unit (l/s or $m^3/h$), and the air density for which the c-factor is stated. Appropriate corrections may be required.

In general, c-factors are indicated for air density $\rho$ = 1.2 kg/$m^3$.

The SAUTER CASE VAV tool offers these corrections when entering the values in the Overview and Volume flow box areas.

The volume flow in the duct is generally calculated with:

$\dot{V}[m^3/h] = (A[m^2] * v[m/s] * 3600$ (6)

The flow velocity can therefore generally be calculated with

$v = \frac{\dot{V}}{r^2 * \Pi}$ (7) for round cross-sections and

$v = \frac{\dot{V}}{h * b}$ (8) for rectangular duct cross-sections.

### 10.6.2 Air density

A precise determination of the air density requires consideration of the air humidity, because this changes the gas constant of the air. After adjustment of

the gas constant, the equation $\rho = \frac{p}{R_f * T}$ is used.

The gas constant of humid air is calculated with:

$$R_f = \frac{R_l}{1-(\varphi * p_d / p) * (1 - R_l / R_d)}$$, where

$R_l = 287.05 \frac{J}{kg * K}$ is the gas constant of dry air,

$R_d = 461 \frac{J}{kg * K}$ is the gas constant of water vapour,

φ is the relative air humidity (e.g. 0.76 corresponding to 76 %) and p is the ambient pressure in pascal. pd is the saturation vapour pressure of water in air and is calculated empirically with the help of the Magnus formula, with sufficient accuracy for applications in air-conditioning technology:

$$p_d = 611.213 Pa^{\left(\frac{17.5043 * \vartheta}{241.2°C + \vartheta}\right)}$$

where the ambient temperature in °C between -30°C and +70°C is inserted for ϑ. This equation supplies the vapour pressure in pascal. Alternatively, this formula may be used:

$$p_d = 611.213 Pa^{\left(17.2799 - \left(\frac{4102.99}{(\vartheta + 273.15) - 35.719}\right)\right)}$$

Particularly accurate values can be read from steam charts.

### 10.6.3 Conversion of units

| Target unit | Conversion |
|---|---|
| l/s | m³/h / 3.6 |
| Cfm | m³/h / 1.6990107955 |
| m³/h | l/s * 3.6 |
| Cfm | l/s * 2.1188800033 |
| m³/h | Cfm * 1.6990107955 |
| l/s | Cfm / 2.1188800033 |
| 1 mmH2O | 9.80665 Pa |
| 1 bar | 100,000 Pa |

Tab. 30 Conversion of units

| Einheit | | bar | mbar | Pa | kPa | mWs |
|---|---|---|---|---|---|---|
| 1 bar | ≡ | 1 | 1000 | 100000 | 100 | 10.1971 |
| 1 mbar | ≡ | 0.001 | 1 | 100 | 0.1 | 0.0101971 |
| 1 Pa | ≡ | 0.00001 | 0.01 | 1 | 0.001 | 0.000101971 |
| 1 kPa | ≡ | 0.01 | 10 | 1000 | 1 | 0.101971 |
| 1 mWs | ≡ | 0.0980665 | 98.0665 | 9806.65 | 9.80665 | 1 |

Tab. 31 Conversion Table for Pressure

# 11 Customer service

Address of your local SAUTER service points in Europe:

| | |
|---|---|
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| | |
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Tab. 32 Contact information SAUTER subsidiaires Europe

Please refer to www.sauter-controls.com for additional contact information worldwide.

# 12 Rectifying problems

The following table lists typical problems that may occur during installation, configuration or commissioning.

| Fault | Cause | Rectification |
|---|---|---|
| Damper stays open | Insufficient air pressure in duct system | Switch on ventilation |
| | Air pipes incorrectly connected | Check the + and – connections on the air volume box and on the drive |
| | No power supply | Apply power |
| | Control damper is jammed or incorrectly fitted | Check that damper moves freely or adjust damper position by loosening the drive linkage and re-positioning the damper. |
| Drive oscillates | Poor flow admission at the differential pressure sensor | Re-fit VAV box, ensuring that the flow admission is sufficiently long and calm. Alternatively, utilise a flow rectifier. |
| | Command signal not constant | Check size of cable. Increase the input attenuation. |
| | P-band and neutral zone are incorrectly set | Set control parameters correctly. |
| | Pre-pressure in duct system not constant | Check and reset the duct pressure control system. |
| Drive does not regulate | Drive is incorrectly mounted on the damper | Loosen the drive and turn the damper through 90°. Alternatively, change the direction of rotation on the drive. |
| Inexplicable control deviation | Shift at input AI02 is active. | Either deactivate the shift or configure terminal 2 as an analogue output. |

Tab. 33 Rectifying problems

# List of Abbreviations

| Abbreviation | Definition |
|---|---|
| $\Delta$ p | Differential pressure in Pascal |
| AI | Analog input |
| AO | Analog output |
| c | Control signal (Setpoint) IEC 60050-351 |
| CAV | Constant Air Volume Flow |
| ccw | Counter clock wise |
| $c_{qV.p.ad}$ | Setpoin shift IEC 60050-351 (old $\Delta$V) |
| $c_{qV.prim.1}$ | Setpoint switch 1 IEC 60050-351 (DI04) |
| $c_{qV.prim.2}$ | Setpoint switch 2 IEC 60050-351 (DI05) |
| $c_{qV.s}$ | Setpoint signal IEC 60050-351 (old $X_s$) |
| cw | Clock wise |
| DI | Digital Input |
| e | Control deviation IEC 60050-351 |
| $-e_{qv.s}$ | Control deviation IEC 60050-351 (old $\Delta$w) |
| Fs | Full span |
| m | Output signal controller IEC 60050-351 |
| NI | NI 1000 |
| OEM | Original Equipment Manufacturer |
| r | Actual value IEC 60050-351 |
| $r_{qV}$ | Actual Value IEC 60050-351 (old $X_i$) |
| VAV | Variable Air Volume Flow |
| $V_{int}$ | Internal Volumenflow |
| $V_{max}$ | Maximal Volumeflow |
| $V_{mid}$ | Volumeflow within the range of $V_{max}$ and $V_{min}$ |
| $V_{min}$ | minimal Volumeflow |
| $V_n$ | $V_{nominal}$ |
| $V_n$ AT | $V_{nominal}$ Air Terminal |
| $V_{n\ effectiv}$ | $V_{nominal}$ effectiv |
| $V_{nom}$ | $V_{nominal}$ at site |
| $V_{var}$ | Continuous setpoint, equivalent to e.g. 0…10V command variable |

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