

# avibialine

**avibialine 5.0**

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2021

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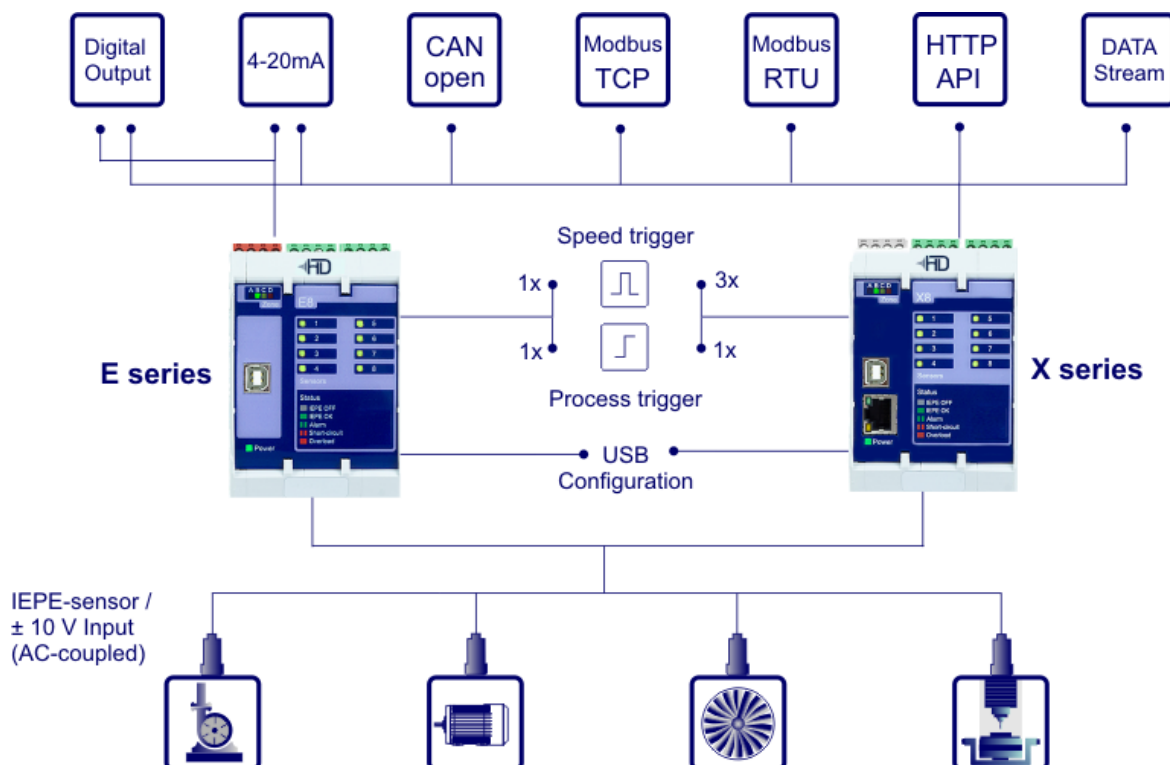
## avibialine - Intended use

The condition monitoring devices of the avibialine series are designed for continuous vibration monitoring and analysis on machines and facilities. For this purpose, vibration signals as well as speed and process information are evaluated. For monitoring, characteristic values of vibration acceleration, velocity and displacement are formed channel by channel. The X devices can output the sensor signal in raw format. Current machine conditions are evaluated with an alarm management. The following device variants are available with the following interfaces for data transfer:

| Interface            | AVLX HD | AVLE HD |
|----------------------|---------|---------|
| Digital output       | yes     | yes     |
| 4-20 mA current loop | yes     | yes     |
| CANopen              | yes     | -       |
| Modbus TCP           | yes     | -       |
| Modbus RTU           | yes     | -       |
| HTTP API             | yes     | -       |
| DataStream           | yes (*) | -       |

(\*) Device option

### Setup



Possible applications are for instance:

- 
- Vibration parameter monitoring according to DIN ISO 10816 / DIN ISO 20816
  - Condition-oriented maintenanceUnbalance monitoring
  - Order characteristic value monitoring
  - Tool breakage/crash detection (when using the impact characteristics)
  - Continuous bearing monitoring (4 bearing characteristics available)
  - Vibration measurement on EOL test benches
  - Vibration measurement for quality assurance

With predefined parameter sets or your own specifications, the devices can be set up quickly and easily for the measuring tasks. The devices are addressed by a configuration software via the USB interface.

The freely parameterizable monitoring parameters can be combined in four groups:

- **Total characteristic values**
- **Order characteristic**
- **Impact characteristics**
- **Rolling bearing characteristics**

Order and bearing characteristics with components rotating at different speeds are formed with three speed trigger inputs. The process trigger allows the selective starting and stopping of vibration monitoring from remote.

The alarm management includes the four zone classification according to ISO 20816. Furthermore, two alarms can be freely defined per channel. Different alarm modes and switch-on and switch-off delays (holding time) can be set.

The digital outputs and the change-over relay (AVLE HD only) signal alarm and error conditions. The currently formed characteristic values and error states are provided per channel as a 4-20 mA current loop. The same applies to the three bus interfaces (CAN open, Modbus RTU/TCP and HTTP API). For the X HD devices the raw signal of the connected vibration sensors can furthermore be output via a **DataStream** interface. With the **DataInspect** option, it is possible to evaluate the raw data with the VibroMatrix software suite from Avibia GmbH.

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## Safety information

- This manual must be read and understood in full before installation and operation.
- This device may only be installed and adjusted by skilled and competent personnel. This includes in particular persons who have sufficient knowledge of the EMC and low-voltage directives.
- Changes to the electrical connections may only be made to the de-energized device. This also includes output load circuits.
- The protection against accidental contact according to IP20 only exists after all terminals have been completely plugged in.
- The device may only be operated under the conditions specified in the data sheet.
- All peripheral devices (sensors, devices at the interfaces to digital and relay outputs) must be designed for operation with avibialine devices. The responsibility for this lies with the operator.
- Any unauthorized modification of the VL devices (e. g. opening of the housing, repair or replacement of components or PCBs) will void the warranty.
- The manufacturer accepts no liability for damage caused by non-observance of this manual.
- If there are any uncertainties or malfunctions, please contact the manufacturer.

---

## Installation, connection and start-up

Installation and start-up may only be carried out by qualified personnel.

All avibialine devices are designed for mounting on DIN-rail systems. For mounting, the devices are placed on top of the DIN rail and locked in place with a rotary movement and light pressure downwards. The upper and lower sides of the unit must be left at least 5 cm free space to ensure the necessary air circulation. For disassembly, pull the metal tab on the underside of the device downwards and turn the device upwards. It can then be detached from the DIN rail.

After installation, the following steps should be carried out according to the [connection diagram](#):

- Connection of the sensors (green connectors, max. cable length 250 m)
- Connection of the speed input (grey connector)
- Connection of the current loop outputs (orange connector, 12..30 V voltage source required to supply the current sink, max. cable length 1000 m)
- Connection of digital outputs 1+2 (red connector) and change-over relay (grey connector), only VL-devices
- Connection of the bus interface (blue connectors or RJ45 connector)
- Connection of the 24 V power supply and digital output (red plug connector)

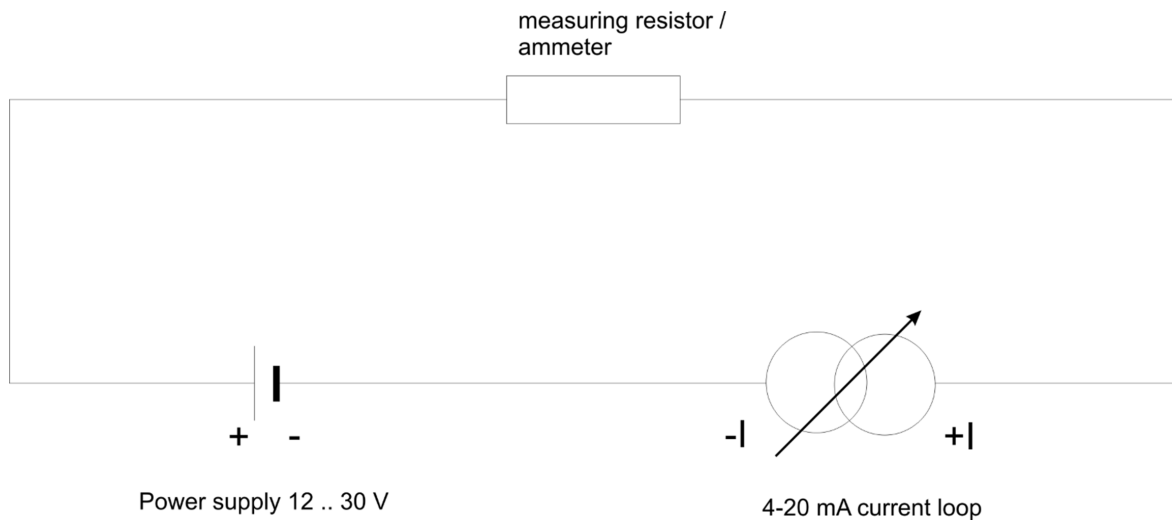
The individual inputs and outputs are protected against polarity reversal. The device can be destroyed if the connectors are interchanged.

**Before switching on the power supply, the correct cabling must be checked.**

## Connection of the 4-20 mA current loop

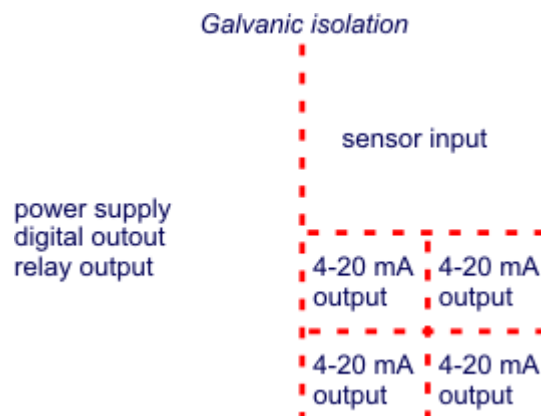
The 4-20 mA current loop is passive, i.e. operates as a current sink. An external supply with 12 ... 30 V DC voltage is required. The 4-20 mA output terminals of the avibialine devices must be supplied with > 12 V (consider voltage drop via measuring resistors!).

The following scheme illustrates the correct connection of peripherals to the current loop outputs of the avibialine devices:



## Galvanic concept

In order to prevent earth loops, all avibialine devices have a galvanic isolation between the *voltage supply / digital outputs / relays* and the *sensor inputs*. Furthermore, each *current output* is electrically isolated from the rest of the circuitry. The following figure illustrates the mass concept of the avibialine devices:



The following also applies to 6 and 8 channel devices: The sensors 6, 7 and 8 are also galvanically isolated from the rest of the circuitry.

---

## Start-up

After installation and connection, the device is first started up. For this purpose, the device must be connected to a computer via the enclosed USB cable. The computer is equipped with the supplied software avibialine Configurator and the device driver for the avibialine devices. After starting the software, the device can be parameterized accordingly. Parameterization is described in the [Configuration](#) section. Once all configuration parameters have been defined, the device operates autonomously and reports the current machine status.

## Electrical and mechanical data

### Electrical data:

| n=number measurement channel               | Xn                                                    | En                                                    |
|--------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| Variant                                    | HD                                                    | HD                                                    |
| Measuring input                            |                                                       |                                                       |
| measuring range                            | ± 10 V AC, IEPE supply selectable                     |                                                       |
| number of channels                         | 1, 2, 4, 6, 8                                         |                                                       |
| gain (switchable)                          | 1, 25                                                 |                                                       |
| noise (0,1 .. 40000 Hz / 13333 Hz), RMS    | < 250 µV (gain 1), < 15 µV (gain 25)                  |                                                       |
| noise (10 .. 1000 Hz), RMS                 | < 60 µV (gain 1), < 5 µV (gain 25)                    |                                                       |
| measuring error                            | < 4 %                                                 |                                                       |
| Digital trigger input                      |                                                       |                                                       |
| standard configuration                     | input for speed signals (3x),<br>process trigger (1x) | input for speed signals<br>(1x), process trigger (1x) |
| level                                      | 0 .. 24 V                                             |                                                       |
| number                                     | 4                                                     | 2                                                     |
| switching threshold High-Low               | 0.5 .. 24 V selectable                                |                                                       |
| minimum pulse length                       | 12 µs                                                 |                                                       |
| Signal processing (channelwise selectable) |                                                       |                                                       |
| A/D conversion                             | 24 Bit, 96.000 Hz                                     | 24 Bit, 96.000 Hz                                     |
| filtering                                  | Butterworth, 40/60 dB/Dekade                          |                                                       |
| frequency range                            | 0,1 .. 40000 Hz                                       | 0,1 .. 40000 Hz                                       |
| order filter                               | whole und fractional orders                           |                                                       |
| measurand                                  | acceleration, velocity, displacement                  |                                                       |
| characteristics                            | RMS-, peak-, peak-peak-value                          |                                                       |
| alarmmanagement                            | 2 alarms and 4 zones per channel                      |                                                       |
| cycle time                                 | 8 ms (0,333 ms für crash detection)                   |                                                       |
| Digital output                             |                                                       |                                                       |
| outout High                                | 24 V, 100 mA                                          |                                                       |
| output Low                                 | high impedance                                        |                                                       |
| number                                     | 1                                                     | 3                                                     |
| tripping and hold delay                    | 0,0 .. 60,0 s                                         |                                                       |
| Analog output                              |                                                       |                                                       |
| curren loop (isolated)                     | 4-20 mA                                               |                                                       |
| number                                     | 1, 2, 4, 6, 8                                         |                                                       |
| Relay output                               |                                                       |                                                       |
| type                                       | -                                                     | changeover contact                                    |
| max. switching voltage                     | -                                                     | 60 V                                                  |
| max. switching current                     | -                                                     | 2 A                                                   |
| number                                     | -                                                     | 1                                                     |
| tripping and hold delay                    | -                                                     | 0,0 .. 60,0 s                                         |
| Display                                    |                                                       |                                                       |

|             |                                             |
|-------------|---------------------------------------------|
| per channel | 1x power supply and 4x zone                 |
| per device  | IEPE OK, short circuit, no sensor, overload |

**Interface**

|             |         |   |
|-------------|---------|---|
| USB 2.0     | yes     |   |
| CAN open    | yes     | - |
| Modbus RTU  | yes     | - |
| Modbus TCP  | yes     | - |
| HTTP API    | yes     | - |
| DATA STREAM | yes (*) | - |

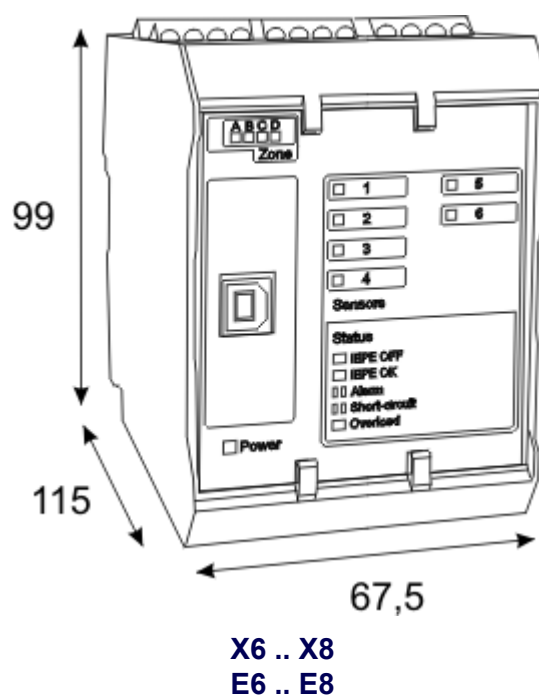
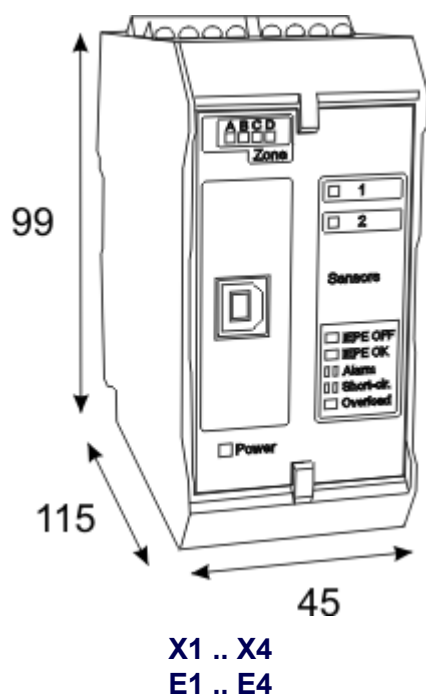
**Power supply**

|         |                    |
|---------|--------------------|
| voltage | 24 V DC $\pm$ 20 % |
| current | max. 500 mA        |

(\*) Device Option

**Mechanical data:**

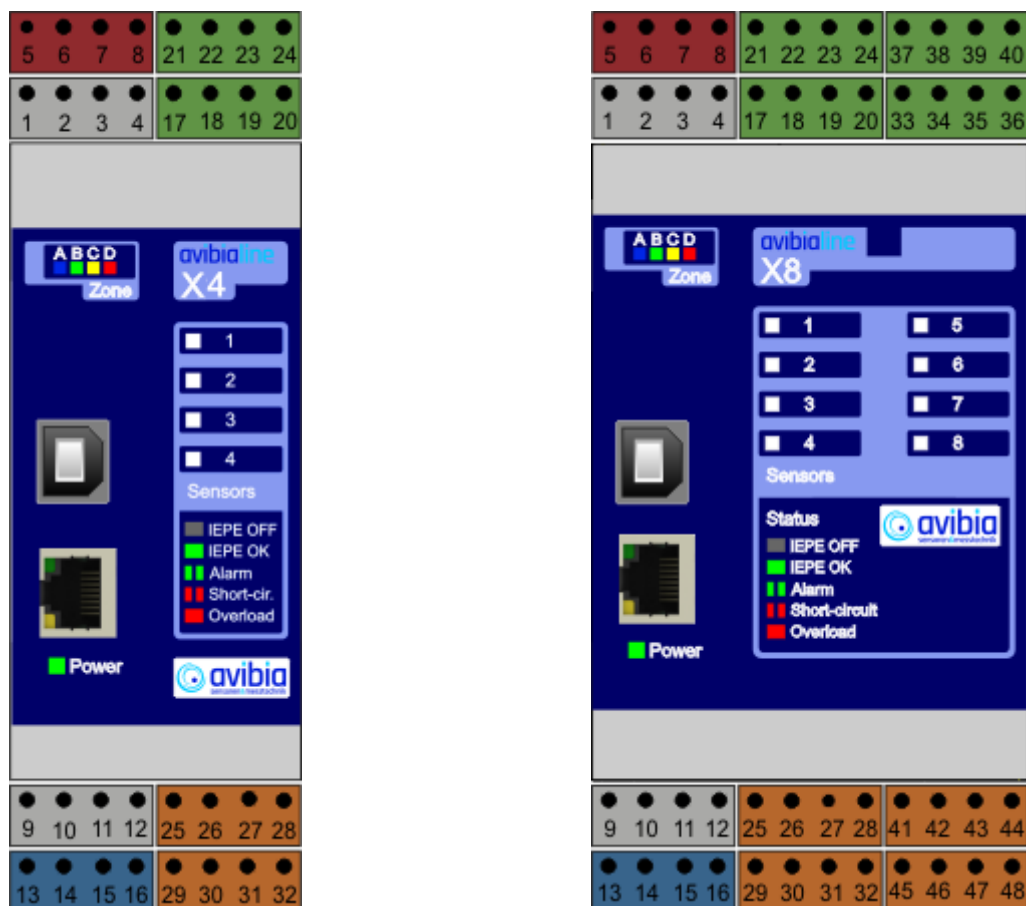
| n=number of measuring channels              | Xn / En                                                              |
|---------------------------------------------|----------------------------------------------------------------------|
| <b>Mechanical Data</b>                      |                                                                      |
| enclosure material                          | polyamide                                                            |
| color                                       | grey                                                                 |
| flammability class according to UL94        | V0                                                                   |
| dimensions (W x D x H, in mm)               | 45 x 114,5 x 99 (1 - 4 channel)<br>67,5 x 114,5 x 99 (6 - 8 channel) |
| mass                                        | 250 g (1 - 4 channel)<br>380 g (6 - 8 channel)                       |
| mounting                                    | DIN rail                                                             |
| <b>Environmental conditions / standards</b> |                                                                      |
| protection grade                            | IP20                                                                 |
| ambient temperature during operation        | -20 ..60 °C                                                          |
| relative humidity, no condensation          | 5..95 %                                                              |
| certification                               | CE                                                                   |

**enclosure dimensions (in mm):**

## Connection diagram

The electrical connections of the avibialine devices are located on the upper and lower side of the housing. The individual terminals can be removed from the avibialine devices for easy connection.

**X devices:**

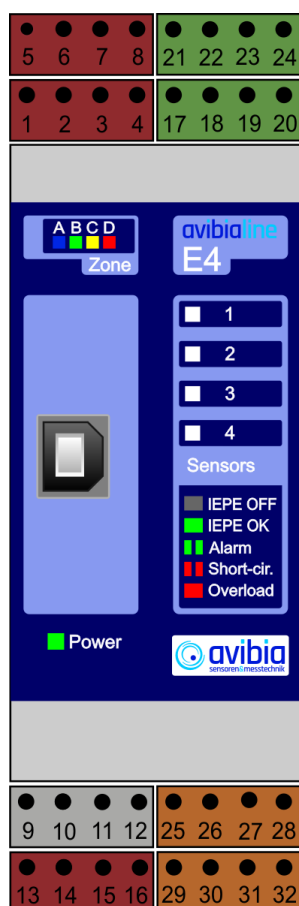


The numbering indicates the following connections:

- |    |                                 |    |                                                              |
|----|---------------------------------|----|--------------------------------------------------------------|
| 1  | <a href="#">Speed trigger 1</a> | 25 | Positive 4-20 mA <a href="#">current loop</a> S1             |
| 2  | GND Trigger 1                   | 26 | Negative 4-20 mA <a href="#">current loop</a> S1             |
| 3  | <a href="#">Speed trigger 2</a> | 27 | Positive 4-20 mA <a href="#">current loop</a> S2             |
| 4  | GND Trigger 2                   | 28 | Negative 4-20 mA <a href="#">current loop</a> S2             |
| 5  | <a href="#">Digital output</a>  | 29 | Positive 4-20 mA <a href="#">current loop</a> S3             |
| 6  | GND DO                          | 30 | Negative 4-20 mA <a href="#">current loop</a> S3             |
| 7  | Power supply 24 V               | 31 | Positive 4-20 mA <a href="#">current loop</a> S4             |
| 8  | GND                             | 32 | Negative 4-20 mA <a href="#">current loop</a> S4             |
| 9  | <a href="#">Speed trigger 3</a> | 33 | <a href="#">Measuring input</a> Sensor 5 (IEPE / $\pm 10$ V) |
| 10 | GND Trigger 3                   | 34 | GND S5                                                       |
| 11 | <a href="#">Process</a> trigger | 35 | <a href="#">Measuring input</a> Sensor 6 (IEPE / $\pm 10$ V) |
| 12 | GND process trigger             | 36 | GND S6                                                       |

- |    |                                                              |    |                                                              |
|----|--------------------------------------------------------------|----|--------------------------------------------------------------|
| 13 | <a href="#">RS485 A (Modbus RTU)</a>                         | 37 | <a href="#">Measuring input</a> Sensor 7 (IEPE / $\pm 10$ V) |
| 14 | <a href="#">RS485 B (Modbus RTU)</a>                         | 38 | GND S7                                                       |
| 15 | <a href="#">CAN LOW</a>                                      | 39 | <a href="#">Measuring input</a> Sensor 8 (IEPE / $\pm 10$ V) |
| 16 | <a href="#">CAN High</a>                                     | 40 | GND S8                                                       |
| 17 | <a href="#">Measuring input</a> Sensor 1 (IEPE / $\pm 10$ V) | 41 | Positive 4-20 mA <a href="#">current loop</a> S5             |
| 18 | GND S1                                                       | 42 | Negative 4-20 mA <a href="#">current loop</a> S5             |
| 19 | <a href="#">Measuring input</a> Sensor 2 (IEPE / $\pm 10$ V) | 43 | Positive 4-20 mA <a href="#">current loop</a> S6             |
| 20 | GND S2                                                       | 44 | Negative 4-20 mA <a href="#">current loop</a> S6             |
| 21 | <a href="#">Measuring input</a> Sensor 3 (IEPE / $\pm 10$ V) | 45 | Positive 4-20 mA <a href="#">current loop</a> S7             |
| 22 | GND S3                                                       | 46 | Negative 4-20 mA <a href="#">current loop</a> S7             |
| 23 | <a href="#">Measuring input</a> Sensor 4 (IEPE / $\pm 10$ V) | 47 | Positive 4-20 mA <a href="#">current loop</a> S8             |
| 24 | GND S4                                                       | 48 | Negative 4-20 mA <a href="#">current loop</a> S8             |

### VLE devices:



The numbering indicates the following connections:

- |   |                                  |    |                                                  |
|---|----------------------------------|----|--------------------------------------------------|
| 1 | <a href="#">Digital output</a> 1 | 25 | Positive 4-20 mA <a href="#">current loop</a> S1 |
| 2 | GND DO1                          | 26 | Negative 4-20 mA <a href="#">current loop</a> S1 |

---

|    |                                                              |    |                                                              |
|----|--------------------------------------------------------------|----|--------------------------------------------------------------|
| 3  | <a href="#">Digital output 2</a>                             | 27 | Positive 4-20 mA <a href="#">current loop</a> S2             |
| 4  | GND DO2                                                      | 28 | Negative 4-20 mA <a href="#">current loop</a> S2             |
| 5  | <a href="#">Digital output 3</a>                             | 29 | Positive 4-20 mA <a href="#">current loop</a> S3             |
| 6  | GND DO3                                                      | 30 | Negative 4-20 mA <a href="#">current loop</a> S3             |
| 7  | Voltage supply (24 V)                                        | 31 | Positive 4-20 mA <a href="#">current loop</a> S4             |
| 8  | GND                                                          | 32 | Negative 4-20 mA <a href="#">current loop</a> S4             |
| 9  | <a href="#">Speed trigger</a>                                | 33 | <a href="#">Measuring input</a> Sensor 5 (IEPE / $\pm 10$ V) |
| 10 | GND speed trigger                                            | 34 | GND S5                                                       |
| 11 | <a href="#">Process trigger</a>                              | 35 | <a href="#">Measuring input</a> Sensor 6 (IEPE / $\pm 10$ V) |
| 12 | GND process trigger                                          | 36 | GND S6                                                       |
| 13 | <a href="#">Changeover</a> contact NO (Normally open)        | 37 | <a href="#">Measuring input</a> Sensor 7 (IEPE / $\pm 10$ V) |
| 14 | COM                                                          | 38 | GND S7                                                       |
| 15 | <a href="#">Changeover</a> contact NC (Normally closed)      | 39 | <a href="#">Measuring input</a> Sensor 8 (IEPE / $\pm 10$ V) |
| 16 | COM                                                          | 40 | GND S8                                                       |
| 17 | <a href="#">Measuring input</a> Sensor 1 (IEPE / $\pm 10$ V) | 41 | Positive 4-20 mA <a href="#">current loop</a> S5             |
| 18 | GND S1                                                       | 42 | Negative 4-20 mA <a href="#">current loop</a> S5             |
| 19 | <a href="#">Measuring input</a> Sensor 2 (IEPE / $\pm 10$ V) | 43 | Positive 4-20 mA <a href="#">current loop</a> S6             |
| 20 | GND S2                                                       | 44 | Negative 4-20 mA <a href="#">current loop</a> S6             |
| 21 | <a href="#">Measuring input</a> Sensor 3 (IEPE / $\pm 10$ V) | 45 | Positive 4-20 mA <a href="#">current loop</a> S7             |
| 22 | GND S3                                                       | 46 | Negative 4-20 mA <a href="#">current loop</a> S7             |
| 23 | <a href="#">Measuring input</a> Sensor 4 (IEPE / $\pm 10$ V) | 47 | Positive 4-20 mA <a href="#">current loop</a> S8             |
| 24 | GND S4                                                       | 48 | Negative 4-20 mA <a href="#">current loop</a> S8             |

---

## Configuration



The avibialine devices are parameterized by means of the configuration software. All parameters required for operation can be set. In addition, it is possible to display the current vibration signal in order to define input amplifications, alarms and process variable outputs (4-20 mA) appropriately ([test measurement](#)). All settings can be collected and saved individually as [templates](#) for further parameterization. In addition to these user-defined templates, there are also templates created by the manufacturer to simplify parameterization in accordance with DIN ISO 10816/20816.

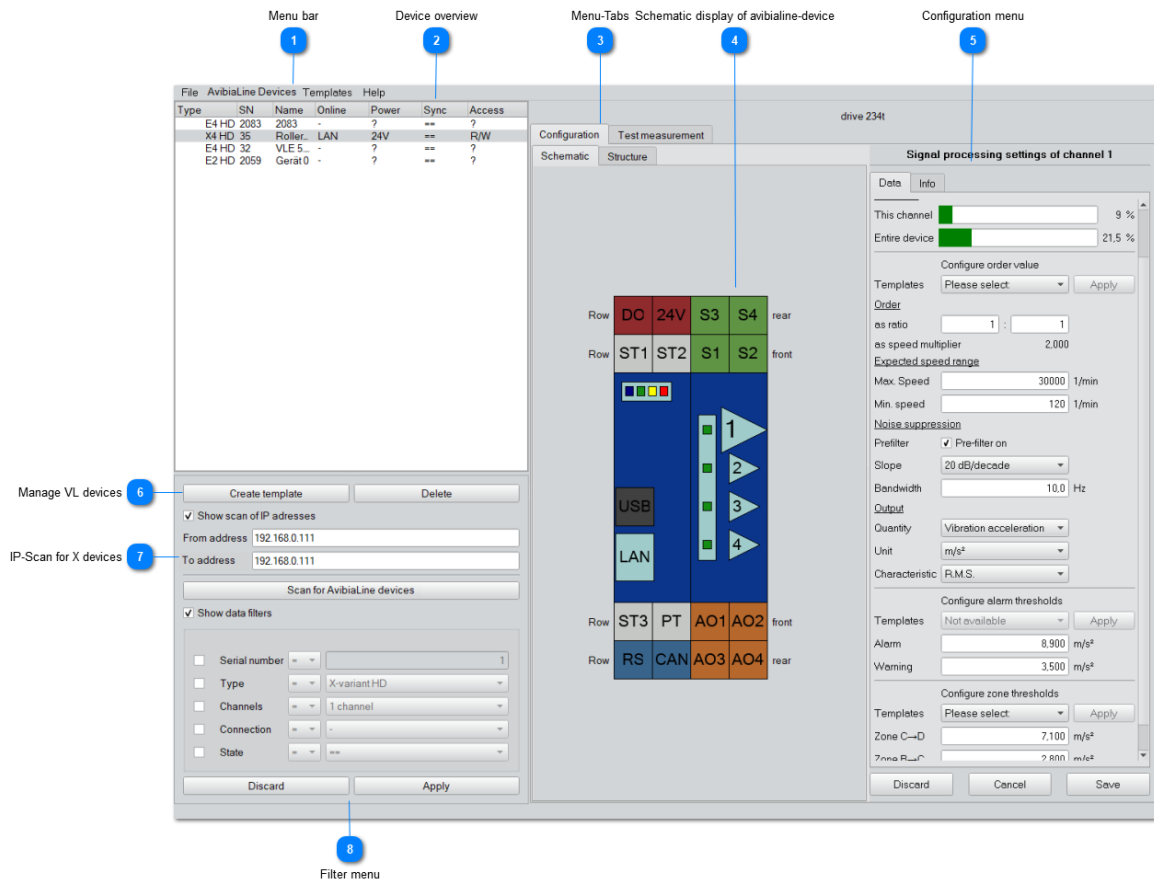
The configuration software is described in detail below:

- [Overview](#)
- [Device overview and status](#)
- [Device configuration](#)
- [Test measurement](#)
- [Template creation and management](#)

## Overview

After starting the program, the avibialine Configurator opens as shown below. The program window is divided into three areas:

- avibialine [device overview](#) with data filter function (left)
- [Schematic display](#) of the avibialine device (central)
- Configuration menu for all device properties (right).





## Menu bar

File AvibiaLine Devices Templates Help

All program menus can be selected in the menu bar. The following submenus can be selected by clicking on the individual items:

### File

Settings

- Open [Settings](#)

Close

- End software

### avibialine devices

Configuration

- [avibialine configuratio](#)

### Templates

Complete devices

- [Template management](#)

Sensor inputs

Trigger input

Analog outputs

Analog error output

Digital outputs

Relay

Bandpass filter (general)

Bandpass filter (impact)

Order filter

Overall values

Order characteristics

Impact characteristics

Alarm thresholds

Zone thresholds

### Help

Show Help F1

- Show software manual
- Show software information

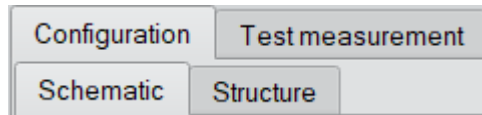
About ...

## 2 Device overview

| Type  | SN   | Name    | Online | Power | Sync | Access |
|-------|------|---------|--------|-------|------|--------|
| E4 HD | 2083 | 2083    | -      | ?     | ==   | ?      |
| X4 HD | 35   | Roller_ | LAN    | 24V   | ==   | R/W    |
| E4 HD | 32   | VLE 5_  | -      | ?     | ==   | ?      |
| E2 HD | 2059 | Gerät 0 | -      | ?     | ==   | ?      |

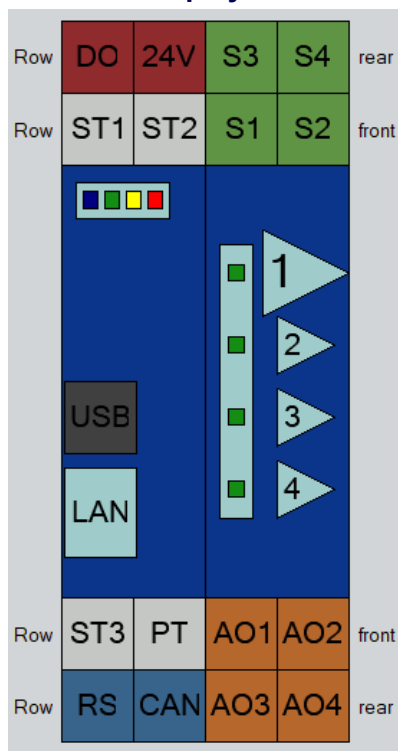
The device overview on the left side of the window lists all avibialine [devices](#) in the program database and their communication status.

## 3 Menu-Tabs



The configuration can be done by means of the [schematic display](#) of the avibialine device or in the [structure view](#). A live measurement function can also be selected ([test measurement](#)).

## 4 Schematic display of avibialine-device



A schematic display of the avibialine device selected from the device overview is shown centrally. For configuration, click on the respective input/output (or device property) in the display. The corresponding properties menu opens. At the same time, the positioning of the inputs and outputs on the avibialine device can be taken from the illustration.

5

## Configuration menu

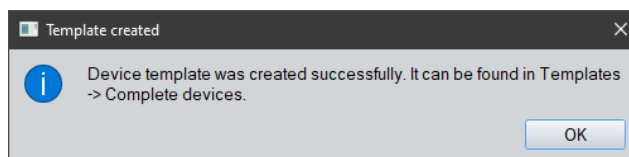
Setting options related to the content are arranged in separate configuration menus. These are oriented to the right edge of the window. The menu content change depending on the selected device properties. All configuration menus are explained in the section "[Device Configuration](#)".

6

## Manage VL devices

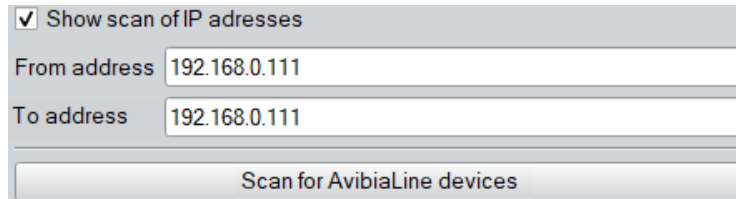
Devices in the list can be deleted. Depending on the connection status, the devices then reconnect themselves after a few seconds.

A device template can be created from existing devices. This contains the complete device settings. The created device templates can be found in the template menu:



7

### IP-Scan for X devices

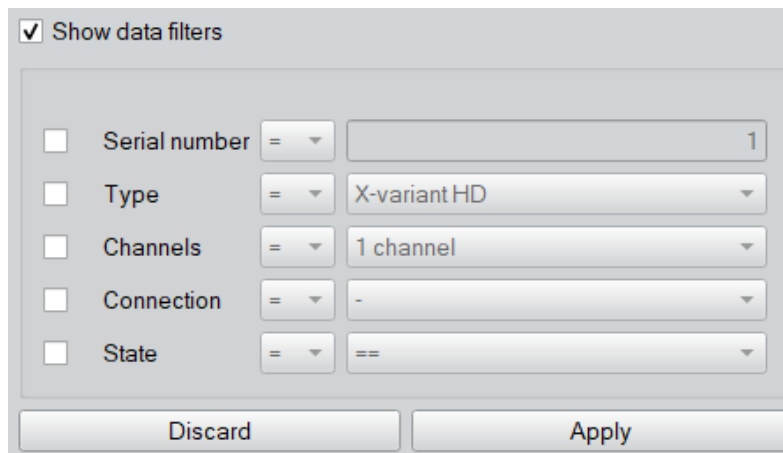


A dialog box titled "IP-Scan for X devices". It has a checked checkbox labeled "Show scan of IP addresses". Below this are two text input fields: "From address" with the value "192.168.0.111" and "To address" with the value "192.168.0.111". At the bottom is a button labeled "Scan for AvibiaLine devices".

avibialine devices of the type X can also be connected and parameterized via an Ethernet (LAN) connection. To search for available X devices, an IP range can be entered here. By clicking **Scan for avibialine devices**, the X devices found in the entered range are displayed. The [activation](#) of this function in the LAN menu is a condition.

8

### Filter menu



A dialog box titled "Filter menu". It has a checked checkbox labeled "Show data filters". Below this are five filter criteria, each with an unchecked checkbox, a label, a comparison operator dropdown, and a value input field or dropdown:

| Checkbox                 | Label         | Operator | Value        |
|--------------------------|---------------|----------|--------------|
| <input type="checkbox"/> | Serial number | =        | 1            |
| <input type="checkbox"/> | Type          | =        | X-variant HD |
| <input type="checkbox"/> | Channels      | =        | 1 channel    |
| <input type="checkbox"/> | Connection    | =        | -            |
| <input type="checkbox"/> | State         | =        | ==           |

At the bottom are two buttons: "Discard" and "Apply".

A selection of all listed avibialine devices can be reached with the filter menu. The desired filter category is activated by checking the box and the desired criterion and a comparison operator are selected. Clicking on **Apply** sets the filter, **Discard** resets the filter selection.

## Device overview and status

The device overview shows all avibialine devices in the program database. This includes currently connected devices as well as previously connected devices. Important device and status information is displayed for the avibialine devices.

The screenshot shows the AvibiaLine device overview window. It features a table of devices and a control panel below. Numbered callouts (1-11) point to specific elements:

- 1: Device type (Type column)
- 2: Power status (Power column)
- 3: Serial number (SN column)
- 4: Device name (Name column)
- 5: Communication-status (Online column)
- 6: Data synchronisation (Sync column)
- 7: access permissions (Access column)
- 8: Create device template (Create template button)
- 9: Delete device (Delete button)
- 10: IP-Scan for X device (From address and To address fields)
- 11: Data filter (Show data filters checkbox and filter options)

| Type     | SN   | Name      | Online | Power | Sync | Access |
|----------|------|-----------|--------|-------|------|--------|
| AVLE4 HD | 2083 | 2083      | -      | ?     | ==   | ?      |
| AVLX4 HD | 35   | Roller... | LAN    | 24V   | ==   | R/W    |
| AVLE4 HD | 32   | VLE 5...  | -      | ?     | ==   | ?      |

Buttons: Create template, Delete

Form fields: Show scan of IP addresses, From address (192.168.0.111), To address (192.168.0.111), Scan for AvibiaLine devices

Form fields: Show data filters, Serial number (= 1), Type (= X-variant HD), Channels (= 1 channel), Connection (= -), State (= ==)

Buttons: Discard, Apply

### 1 Device type

Type  
AVLE4 HD

The device type is displayed. The name is given according to the pattern:

AVLX6 HD = avibialine X version HD + 6 measuring channels.

Depending on the number of channels AVLX1, AVLX2, AVLX4, AVLX6 or AVLX8 and according AVLE1, AVLE2, AVLE4, AVLE6 or AVLE8 is displayed.

### 2 Power status

Power  
?

The avibialine units can be parameterized with supply via USB. However, the 24V supply voltage must be connected to obtain measurement functionality. The current device supply type is displayed here.

**3****Serial number**

|      |
|------|
| SN   |
| 2083 |

Serial number of the avibialine device assigned by the manufacturer.

4

**Device name**

Name  
2083

User selectable [description](#) of the avibialine device.

5

**Communication-status**

Online  
-

Depending on the communication status, "**USB**" (connected via USB) or "-" (not connected) is displayed here.

6

**Data synchronisation**

Sync  
==

The status of the data synchronisation between the device and the program database is displayed:

- PW     The parameter set in the device is password-protected (not readable).
- Def!   The parameter set in the device is faulty.
- Ver!   The version of the parameter set in the device is newer than it can be processed by the software. Configuration cannot be read out.
- ==     The parameter set in the database and device is the same.
- <>     The parameter set in the database and device is different.
- 0       Empty parameter set in database (e. g. if there are no reading rights due to password protection).

Note: The data synchronization between database and device includes all settings made. The following applies to passwords: The selected status (password use or not) is compared, but for security reasons the assigned passwords are excluded from the comparison.

7

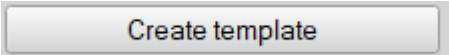
**access permissions**

Access  
?

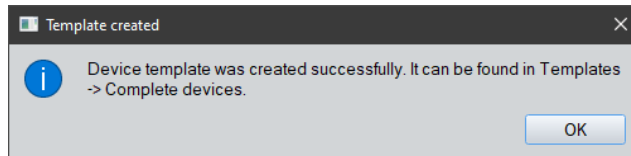
The access permission level is displayed:

- no access permissions, password invalid
- ?       Device not connected, rights status unknown
- R       Read-only rights
- R/W    read and write permissions

8

**Create device template**


The entire configuration of the selected avibialine device can be saved as a template by clicking on "**Create template**". The [template creation and management](#) section describes the subject of templates in more detail. The created device templates can be found in the template menu:



9

**Delete device**


The selected device can be deleted from the program database. If it is reconnected at a later time, all set parameters are reconstructed from the avibialine device. (=, >, <, >=, <=, <>)

10

**IP-Scan for X device**

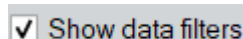

☒ Show scan of IP addresses

From address

To address

avibialine devices of the type X can also be connected and parameterized via an Ethernet (LAN) connection. To search for available X devices, an IP range can be entered here. By clicking **Scan for avibialine devices**, the X devices found in the entered range are displayed. The [activation](#) of this function in the LAN menu is a condition.

11

**Data filter**


A data filter can be set to obtain a selection of the displayed avibialine devices. To do this, check the box **Show data filter**. The filter criteria (see picture) can be provided with comparison operators (=, >, <, >=, <=, <>). To perform filtering, select **Apply**. Reset the filter by clicking **Discard**.

Create templateDelete

☒ Show data filters

☒ Serial number>25

☐ Type=E-E-Variant

☒ Channels=4 channels

☐ Connection=-

☐ State==

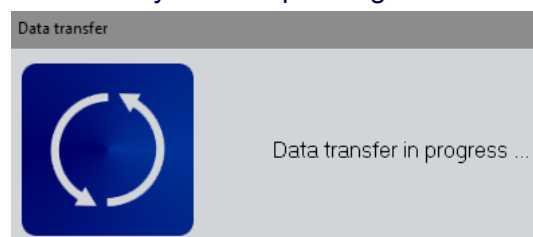
DiscardApply

## Device configuration

The avibialine devices can be comprehensively configured. The configuration is possible in the following ways:

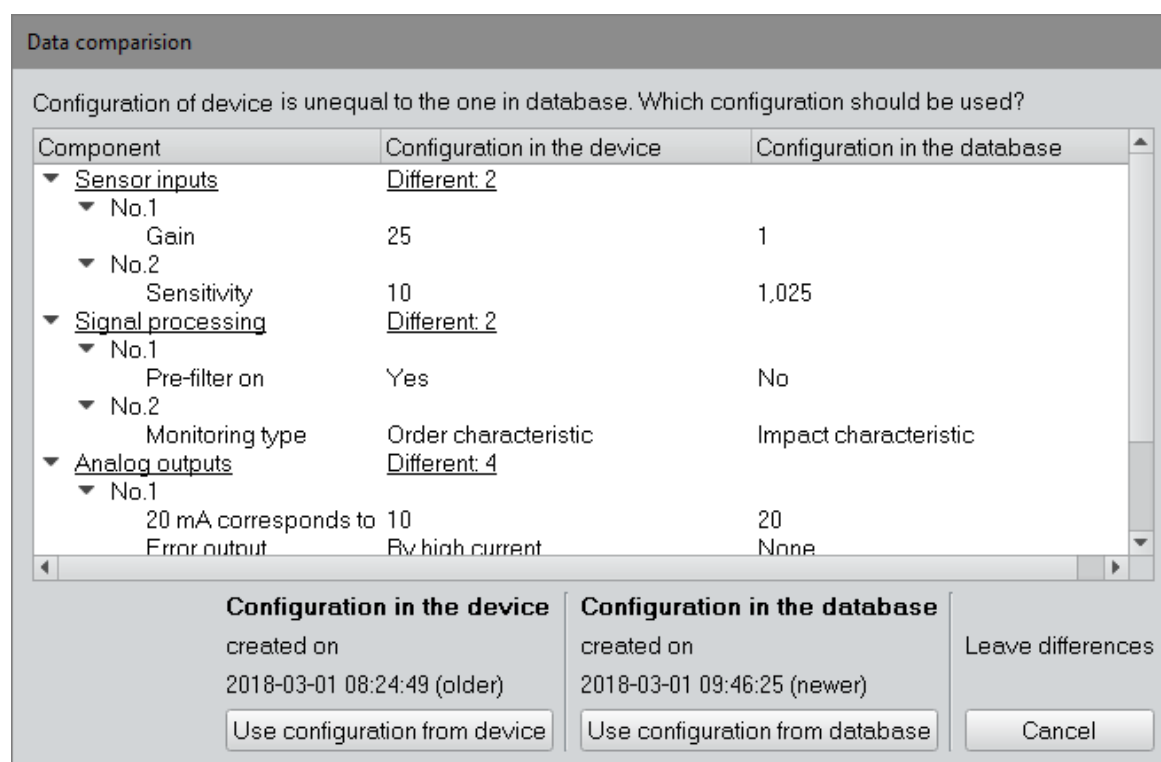
### Configuration of connected devices

Here, changed parameters are written directly to the connected device. The writing process is indicated by a corresponding window.

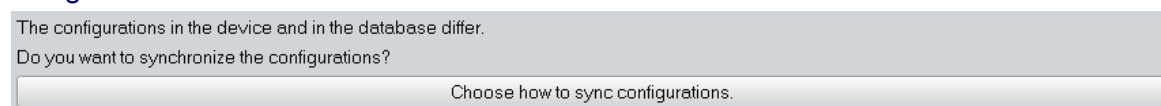


### Configuration of disconnected devices

Here, the changed parameters are first saved in the software database. If the corresponding device is connected, a dialog box appears in order to select between the configuration from the *device* and the configuration from *database*. All differences are clearly listed.



If Cancel is selected, the differences remain. The data synchronization dialog can be reopened by using the button under Information text at the bottom of the window:

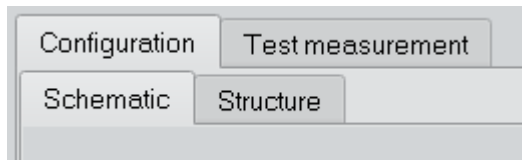


## Executing the configuration

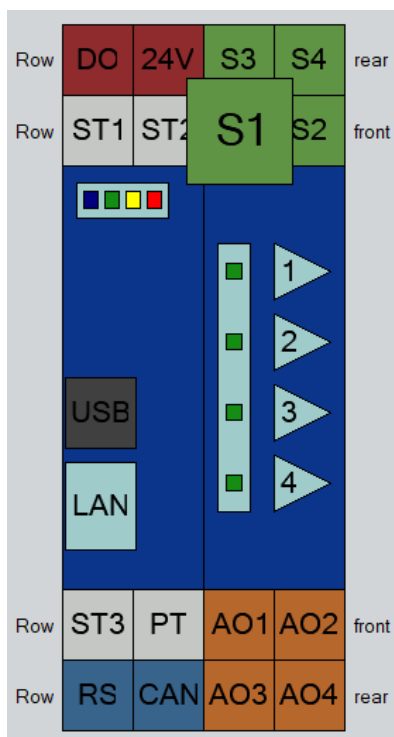
Parameters of the avibialine device can be changed in three different ways:

### 1. Schematic display of the avibialine device

To do this, select the "Configuration" tab and then the "Schema" tab:

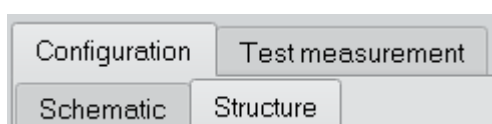


The device properties and parameters of the individual inputs and outputs can be selected by clicking on the schematic representation of the avibialine devices. The property currently being edited is highlighted:



### 2. Structure view of the avibialine device

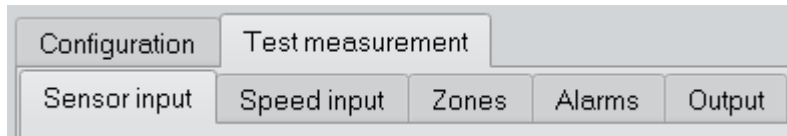
To do this, select the "Configuration" tab and then the "Structure" tab:



All device parameters can be modified from the [structure view](#).

### 3. Test measurement

To do this, select the "Test measurement" tab:



The [test measurement](#) can be used to change the measurement gain, zone and alarm limits, and the 4-20 mA scaling of the analog output.

The following describes the parameterization options of the device using the schematic display of the avibialine device:

- [Device properties](#)
- [Measurement input](#)
- [Triggerinput](#)
- [Signalprocessing](#)
- [LAN Interface](#)
- [RS485 Interface](#)
- [CAN Interface](#)
- [Analog output](#)
- [Digital output](#)
- [Relay output](#)
- [Sensor-Status-LED](#)
- [Zone-Status-LED](#)

Each dataset is provided with information on the creation/change date and access level. For details, refer to the section [dataset information](#).

## Device properties

The device properties can be edited by clicking on the blue area of the displayed avibialine device. The active editing option is indicated by the yellow frame.

All device settings are also listed in the [structure view](#) and can be edited from there.

The screenshot shows the 'Vib-Monitor / Setup\_300rpm' window. The 'Settings of device' panel is active, showing various configuration options. Numbered callouts point to specific features:

- 1: Device name (Vib-Monitor)
- 2: Device type and firmware version (AVLX4 HD = X-variant HD + 4 channels, 2.1.1373 (Date: 2021-06-29))
- 3: Load new firmware button
- 4: Overview and adding licenses/options (Licenses table)
- 5: Device templates (Please select dropdown)
- 6: Manage device configuration (Active configuration dropdown)
- 7: Read/write password (Read/write password section)
- 8: Configuration of the unit decibel (Signal processing section)
- 9: Resetting the device (Reset section)
- 10: Action buttons (Discard, Close, Save)

The 'Licenses' table shows the following data:

|   | Licenses                  | Channel |
|---|---------------------------|---------|
| 1 | MultiMode                 | all     |
| 2 | DataStream                | all     |
| 3 | DataInspect               | all     |
| 4 | VibroMatrix InnoMeter Pro | 1       |

### 1 Device name

Name

The device name can be entered here. Up to 40 characters are available.

**2****Device type and firmware version**

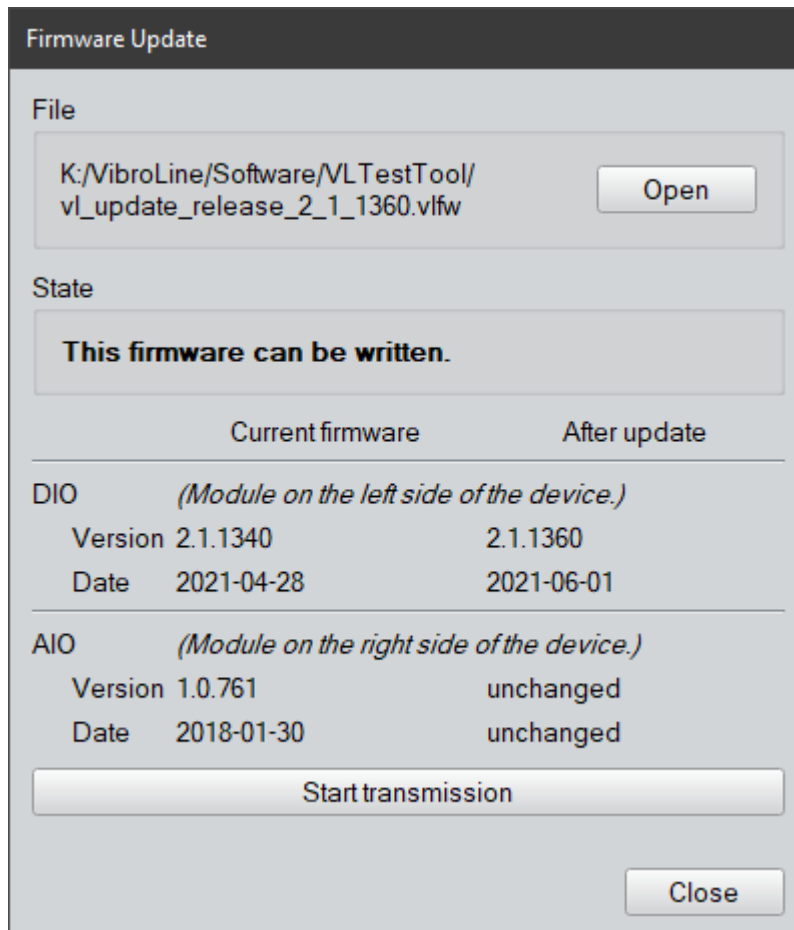
|          |                                      |
|----------|--------------------------------------|
| Type     | AVLX4 HD = X-variant HD + 4 channels |
| Firmware | 2.1.1373 (Date: 2021-06-29)          |

Display of the device type and the currently used firmware version.

3

**Load new firmware**A rectangular button with a light gray gradient and a thin border, containing the text "Load new firmware ...".

The devices can be provided with a new firmware via USB or LAN connection. The following dialog opens:



The previous firmware versions of all installed modules are displayed. Also, whether an update is necessary. If the update is to be carried out, click on Start transfer. After a few seconds, a message appears confirming the successful firmware update.

New firmware versions must be requested from the manufacturer and are provided in the form of a firmware file (\*.vfw).

#### 4 Overview and adding licenses/options

Number of licenses: 38 items ☒ Show details ...

|   | Licenses                  | Channel |
|---|---------------------------|---------|
| 1 | MultiMode                 | all     |
| 2 | DataStream                | all     |
| 3 | DataInspect               | all     |
| 4 | VibroMatrix InnoMeter Pro | 1       |

Add licenses ...

The avibialine devices can be equipped with options, e.g.

- Multimode** Define up to 3 characteristic values per channel, running simultaneously and in real time. Define up to 8 overall configurations and switch via fieldbus (CANopen, Modbus, HTTP API).
- DataStream** Real-time data stream of the sensor signals. High quality digitization with 24 bit, 96 kHz for each channel. API for connection to own applications.
- DataInspect** Log real-time data stream in ids file. Analyze ids file with VibroMatrix Replay. No own software for the analysis necessary.

The subsequent activation of the options is done via license file (\*.vlkey). With a click on Add licenses... this license file can be selected in the file dialog. The addition of the license is acknowledged accordingly.

Simply call Avibia GmbH for additional information and prices for available options and extensions.

#### 5 Device templates

Templates Please select

Apply template now

Complete device configurations can be saved in a template. If templates are available, they can be selected from the selection field ("Please select"). The transfer of a device template to the connected device is confirmed by clicking Apply template now.

If no template is available, "None available" is displayed in the selection field.

#### 6 Manage device configuration

Configurations

Active configuration: 1 - Setup\_300rpm [ + ] [ - ]

Change Name: Setup\_300rpm

This feature requires the *MultiMode* option.

Up to 8 different device configurations can be stored in the avibialine device. A device configuration includes all settings made, except for the communication settings. This means that different measurement configurations can be kept ready for different applications and can be changed immediately without the need for time-consuming reconfiguration.

The change of the measuring configuration is done by configuration software or automated via the interfaces [Modbus TCP](#), [Modbus RTU](#), [CANopen](#) or the [HTTP API](#).

Applications are e.g:

- Use in the test field. Different DUTs are tested according to different specifications. The test software selects the correct measurement configuration depending on the DUT.
- Depending on the operating condition (e.g. speed or running product) a different measuring configuration can be used.

Note: After changing the **number** of available configurations in the device, a device restart is necessary.

Communication settings were changed. A restart of the device is necessary to apply them.  
Please note: During device restart, the connection will be lost for a couple of seconds.

Restart device

**Loading** a new configuration is done without restarting.

## 7 Read-/write password

Read/write password ☐ Use

Read password ☐ Use

The devices can be equipped with a read/write or read password to prevent unauthorized access and manipulation. To use the respective password you have to set the corresponding check mark and enter a password.

When using the password, the following dialog box appears when you connect the device to your computer:

Password for reading device configuration

Password saved in device is not equal to password saved in database.

Full access by read-/write password

Read access only by read password

☐ Save working passwords in database.

Try again Cancel

After entering a read/write or read password, all device parameters can be either edited or only read. For easier handling, the passwords can be saved in the (encrypted) software database. Authentication is then performed automatically. If the device is used on an empty database (other computer, empty database), the password must be re-entered.

You can change the access level in the following ways:

- New registration of the device (disconnect and reconnect USB connection or [delete device](#)).
- Enter and save the corresponding password when the device is connected.

Read-/write password ☐ Use

Read password ☐ Use

As long as the device is connected, there is authorized access. After disconnecting the device, the respective password must be re-entered.

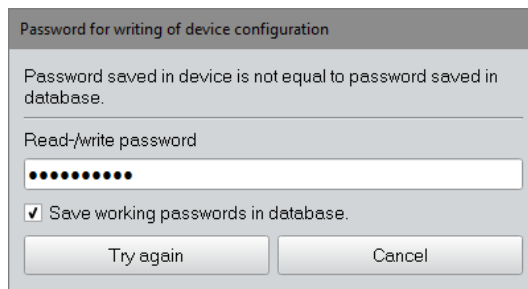
- If only a read password has been entered and data in the device is to be changed, a message appears indicating that the access rights are insufficient:

Transmission error

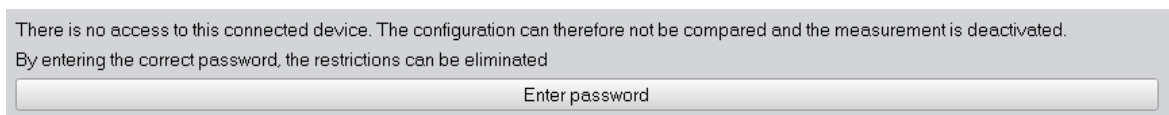
Due to the missing read / write password, no data could be written into the device.

OK

Clicking on **OK** opens a password dialog to enter the corresponding read/write password:



- If **Cancel** is selected, the previous access level (read only) is retained.
- If no password was entered when connecting the device (**Cancel** button), an entry can be made using the **Enter Password** button underneath the schematic display. It also informs you of the current access status:



8

## Configuration of the unit decibel

☒ Configure unit dB

For overall characteristic values, order characteristic values and bearing characteristic values the unit decibel (dB) can be selected. Decibel is a relative unit, i.e. it is related to a reference level. The reference level is defined for each measured variable in the following input mask:

|                        |       |                   |         |
|------------------------|-------|-------------------|---------|
| Vibration acceleration | 1,000 | $\mu\text{m/s}^2$ | Default |
| Vibration velocity     | 1,000 | nm/s              | Default |
| Vibration displacement | 1,000 | pm                | Default |

Click on the "ISO" button to set the default reference levels.

9

## Resetting the device

☒ Show reset methods

The avibialine devices can be reset using the configuration software. This can be particularly useful in cases such as password not found, invalid device configuration or in the case of a desired device reset. Two methods are offered:

Reset to feactory defaults:

**Reset device to factory defaults**

*If you reset the device, all settings - including the passwords - inside of the device are deleted. The device can then be reconfigured with settings from the database.*

Note: This reset method is only possible in USB connection mode, as the network settings are also deleted during deletion.

Reset password only:

**Reset passwords only. preserve device data**

*For this you need a reset file from your supplier. It is individual for one serial number and can also be applied only once.*

To request such a password reset file, please contact Avibia GmbH.

**10****Action buttons**

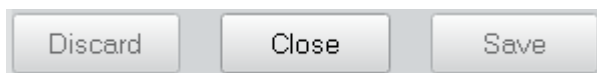
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

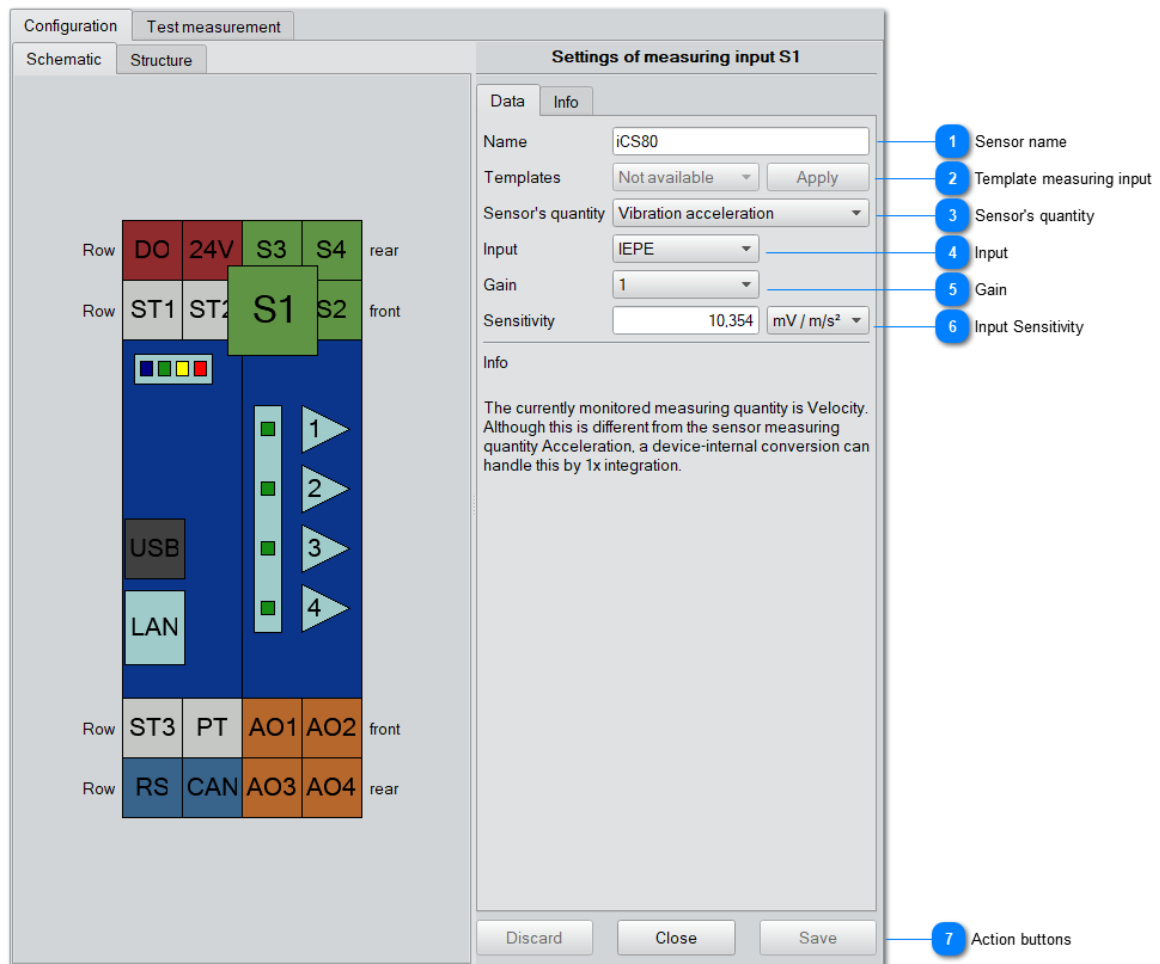
If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Measurement input

The properties of the sensor and the measuring input can be changed by clicking on a measuring input (S1 .. S8, green). The displayed configuration is carried out for each measuring channel individually.

All measurement input settings are also listed in the [structure view](#) and can be edited from there.



### 1 Sensor name

Name

The name of the sensor and, if necessary, its serial number can be entered here. For triaxial transducers, the measuring direction can be made clear by adding -X, -Y, -Z. Up to 40 characters are available.

### 2 Template measuring input

Templates

Sensor configurations can be saved in a template. If templates are available, they can be selected from the selection box ("Please select"). The selection of a sensor template is confirmed by clicking **Apply**. If the selected template is to be transferred to the device,

the button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

3

### Sensor's quantity

Sensor's quantity Vibration acceleration

Here the actual (physical) measurement quantity of the sensor can be selected. Vibration acceleration, velocity and displacement are available.

**Note:** The desired monitoring measurement type is selected during configuration of the [signal processing](#). If, for example, an accelerometer is connected and the vibration velocity is to be monitored, the sensor data are integrated once. A message summarizes the respective situation between sensor and monitoring measurement type:

#### Info

The currently monitored measuring quantity is Velocity. Although this is different from the sensor measuring quantity Acceleration, but is converted in the device by 1x integration.

Only integrated or directly used monitoring quantities can be used. Differentiation (e. g. vibration displacement to vibration velocity) is currently not supported. In order to keep the data consistent, the monitoring measurement type is then adjusted. A message appears:

#### Attention!

The currently monitored measuring quantity is Velocity. The device can not convert into this quantity from the sensor measuring quantity Displacement. Therefore, also the monitored measuring quantity will be set to Displacement when this data is saved.

4

### Input

Input IEPE

The avibialine devices support IEPE (also called ICP® or Deltatron®) and a +/- 10 V AC input. The current status of the sensors is indicated by the [sensor status LED](#).

5

### Gain

Gain 1

For each measuring channel the internal gain can be increased from 1 to 25. This increases the digitizing quality for permanently small signals. By increasing the gain, naturally the dynamic range of the measuring channel decreases, also by a factor of 25. The [Test measurement](#) of the input can also be used to determine the appropriate gain factor.

6

**Input Sensitivity**The interface shows a label 'Sensitivity' followed by a text input field containing the value '10,354' and a dropdown menu showing 'mV / m/s²' with a downward arrow.

The sensor sensitivity indicates which electrical voltage corresponds to an acceleration value of 1 m/s<sup>2</sup> (or 1 g) and is thus the conversion between mechanical and electrical quantities. The sensitivity value is usually given in the sensor data sheet.

*Note:* Please note the correct unit (mV/m/s<sup>2</sup> or mV/g). The following applies: 1 mV/m/s<sup>2</sup> = 9.81 mV/g.

The sensitivity value should be checked at regular intervals (calibration). Please contact the sensor manufacturer.

7

**Action buttons**The interface shows three buttons: 'Discard', 'Cancel', and 'Save'.

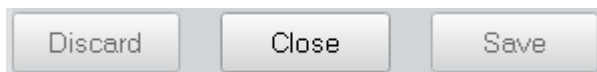
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

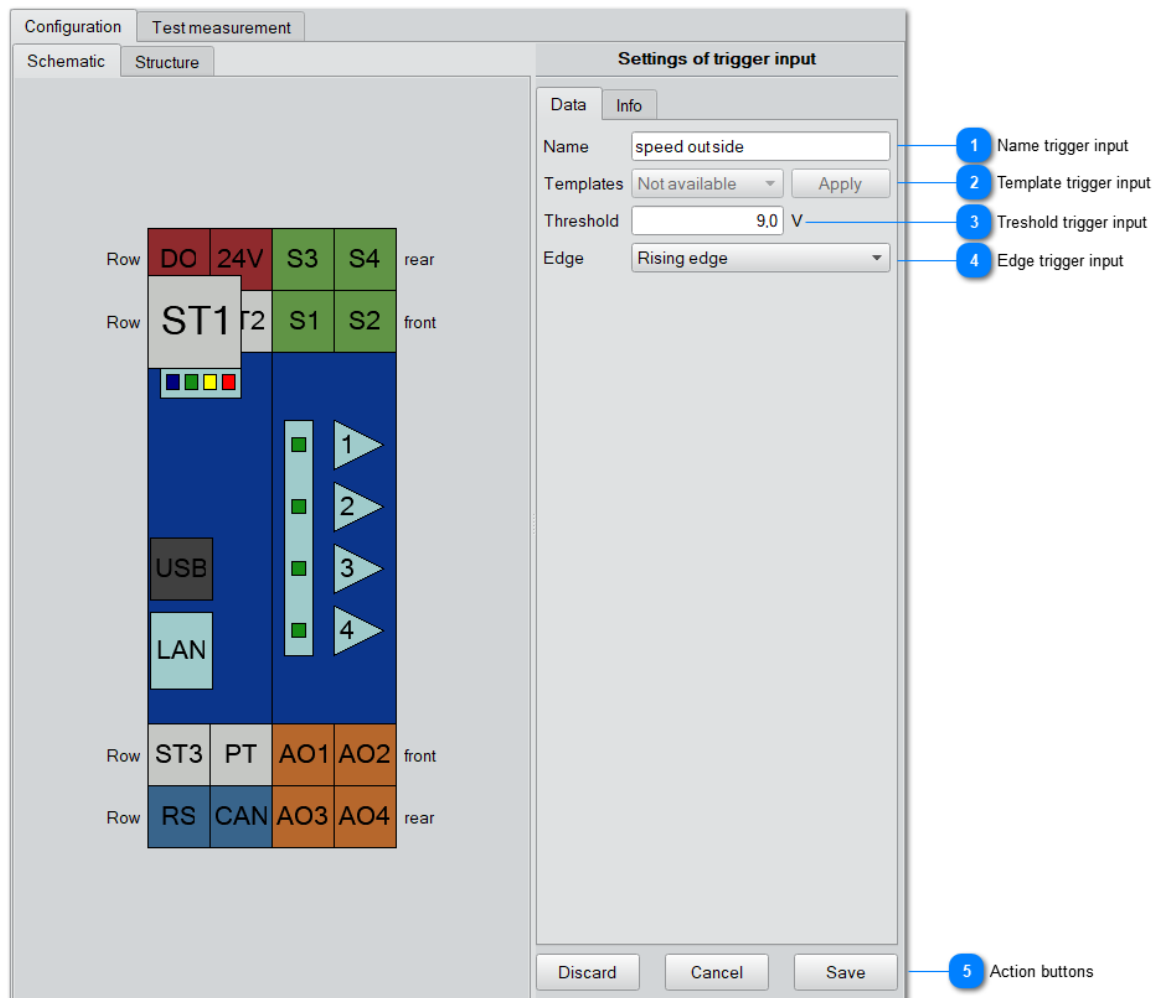
If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

The interface shows three buttons: 'Discard', 'Close', and 'Save'.

## Speed trigger input

The menu for editing the settings of the trigger inputs is accessed via the grey ST1 .. ST3 buttons (E devices only one speed trigger input ST1). A speed signal can be fed in via the trigger input. This is, for example, the basis for the order characteristic.

All settings are also listed in the [structure view](#) and can be edited from there.



1

### Name trigger input

Name

The trigger input configured here can be named accordingly. Up to 40 characters are available.

2

### Template trigger input

Templates

Trigger input settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal trigger template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the

action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

3

**Threshold trigger input**

Threshold  V

Input of the trigger input threshold. For the change from *low* to *high*, values of 0.5... 24V can be specified. The hysteresis of the trigger input is approx. 0.5 V.

4

**Edge trigger input**

Edge

The trigger input can switch with *rising* or *falling edge*. The selection is made here.

5

**Action buttons**

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

## Process trigger input

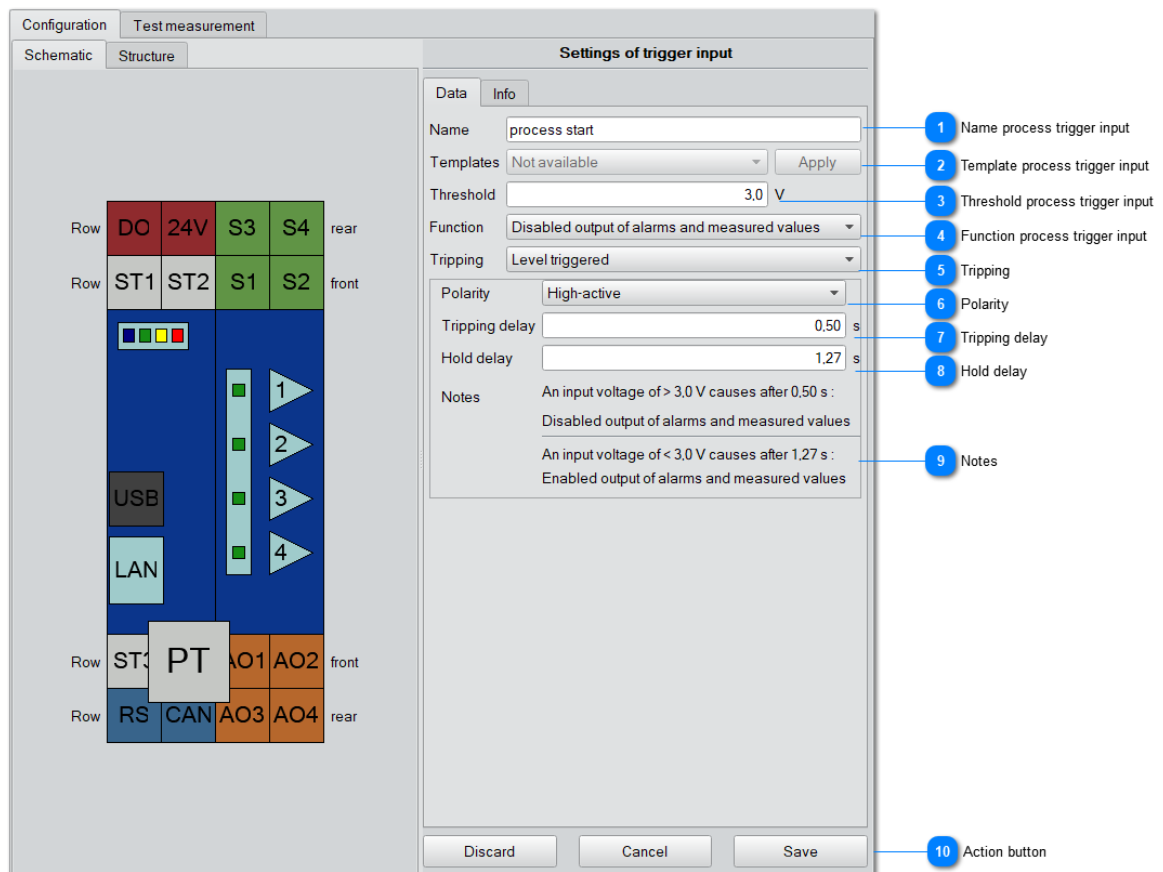
The menu for editing the settings of the process trigger input is reached via the grey PT button. The avibialine units have a process trigger input. This can be used to enable or disable alarms and/or measured value transmission via an external control signal. When this function is activated, the alarm and/or measurement value transmissions on the following interfaces become inactive or active:

- Digital output
- 4-20 mA current loop
- Changeover relay (only E device)

additionally for X:

- CAN Bus
- Modbus TCP
- Modbus RTU
- HTTP API
- DATA STREAM

All settings are also listed in the [structure view](#) and can be edited from there.



**1 Name process trigger input**

Name

The process trigger input configured here can be named accordingly. Up to 40 characters are available.

**2 Template process trigger input**

Templates

Process trigger input settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a process trigger template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

**3 Threshold process trigger input**

Threshold  V

Input of the switching threshold of the trigger input. For the change from low to high, values from 0.5 ... 24V can be defined. The hysteresis of the trigger input is approx. 0.5 V.

**4 Function process trigger input**

Function

Folgende Funktionen können ausgewählt werden:

|                                               |                                                                                             |
|-----------------------------------------------|---------------------------------------------------------------------------------------------|
| Normal operation                              | The process trigger is not evaluated.                                                       |
| Disabled output of alarms                     | When the switching threshold is reached, the alarm outputs are disabled.                    |
| Disabled output of measured values            | When the switching threshold is reached, the measured value outputs are disabled.           |
| Disabled output of alarms and measured values | When the switching threshold is reached, the alarm and measured value outputs are disabled. |
| Enabled output of alarms and measured values  | When the switching threshold is reached, the alarm outputs are enabled.                     |
| Enabled output of measured values             | When the switching threshold is reached, the measured value outputs are enabled.            |
| Enabled output of alarms                      | When the switching threshold is reached, the alarm and measured value outputs are enabled.  |

**5 Tripping**

Tripping

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| Level triggered | When the switching threshold is reached, the selected function is processed.           |
| Edge triggered  | If the voltage rises above the switching threshold, the selected function is executed. |

#### 6 Polarity

Polarity

The switching logic can be inverted. This means that if the logic is positive, the function is activated when it is exceeded. For the negative logic the same applies when the value falls below the limit.

For the triggering condition edge-triggered, a **rising** or **falling** edge can be selected accordingly.

#### 7 Tripping delay

Tripping delay  s

The activation of the function can be delayed by a time interval if a triggering condition exists. This is defined here. Values between 0s and 60s can be specified.

#### 8 Hold delay

Hold delay  s

After the trigger condition is over, the function can still be active for a selected period of time. This time period can be entered here with values between 0 s and 60 s.

#### 9 Notes

|       |                                                                                                    |
|-------|----------------------------------------------------------------------------------------------------|
| Notes | An input voltage of > 3,0 V causes after 0,50 s :<br>Disabled output of alarms and measured values |
|       | An input voltage of < 3,0 V causes after 1,27 s :<br>Enabled output of alarms and measured values  |

The selected triggering conditions, delays and actions are summarized here.

#### 10 Action button

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

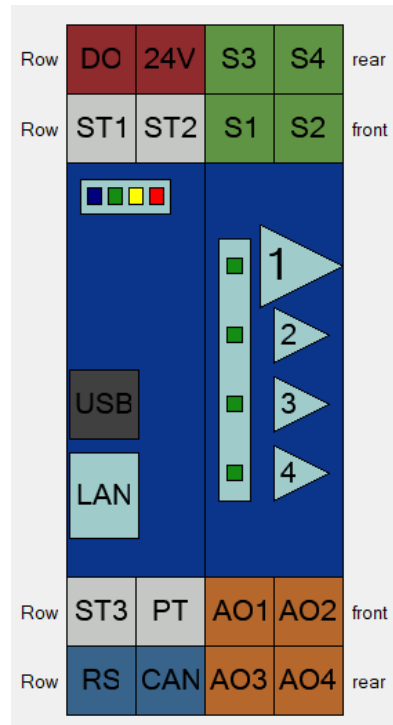
**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

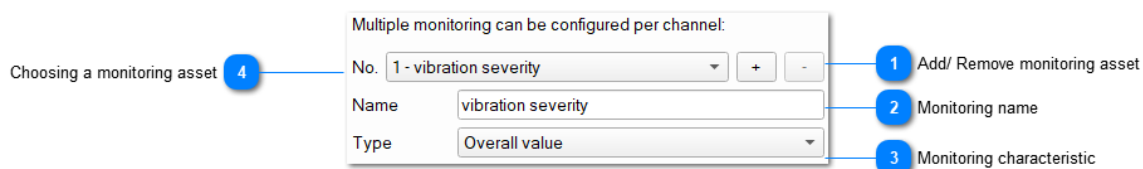
## Signal processing

By clicking on signal processing (1... 8, triangles) the properties of the signal processing can be specified. The displayed configuration is carried out for each measuring channel individually.

All signal processing settings are also listed in the [structure view](#) and can be edited from there.



With the *MultiMode* option it is possible to monitor up to three characteristic values on one measuring channel at the same time. For this purpose, monitoring assets can be added in the respective settings of the signal processing of a measuring channel:



### 1 Add/ Remove monitoring asset



Click on + to add another monitoring on the measuring channel. The currently selected monitoring is duplicated.

Clicking on - deletes the currently selected monitoring.

### 2 Monitoring name

vibration severity

The monitoring configured here can be named accordingly. Up to 40 characters are available.

Note: The name assigned here is also used to name the monitoring in the Vison Cloud.

3

### Monitoring characteristic

Overall value

The characteristic value type can be set individually for each monitoring.

The selection is made via the menu. The configuration options for the characteristic values are explained in subsections:

- [Overall value](#)
- [Order characteristic](#)
- [Impact characteristic](#)
- [Bearing characteristic](#)
- [None](#)

Depending on the number of characteristic values and settings, the digital signal processing (DSP) of the avibialine device is more or less required. The current utilization of the selected measuring channel as well as the total utilization of the device are displayed. If the utilization value of the entire device reaches > 100%, deviating settings must be made in individual channels (e.g. less steep filters, less fast response time, switch off pre-filtering for order characteristic values, ...). If configurations with > 100% utilization are to be written to the device, a message appears which indicates that data transfer has not taken place. The appearance of the message can be suppressed. The message can be reactivated in the settings.

4

### Choosing a monitoring asset

1 - vibration severity

Switching between the configured monitoring is done using the selection menu.

|      |                        |   |   |
|------|------------------------|---|---|
| No.  | 1 - vibration severity | + | - |
| Name | 2 - bearing monitoring |   |   |
| Type | Overall value          |   |   |

Note: After making changes to individual monitoring, save them, otherwise the changes are discarded.

Discard

Cancel

Save

## Overall value

Overall values enable monitoring of vibrations over a wide frequency range. This may allow different machine errors to be detected at the same time. Monitoring in accordance with ISO 10816/20816 includes the monitoring of unbalance, misalignments, coupling errors, and much more. If free monitoring is configured, high-frequency shocks, such as those occurring in the case of rolling bearing faults, can be detected (frequency range e. g. 10 - 20 kHz).

1

### Name signal processing

Name

Channel 1

The signal processing configured here can be named accordingly. Up to 40 characters are available.

2

### DSP load

This channel 19.2 %

Entire device 80.5 %

Depending on the vibration characteristic settings, the digital signal processing (DSP) of the ViboLine device is more or less requested. The current load of the selected measurement channel and the total load of the device are displayed. If the load value of the entire device reaches > 100%, different settings must be made in individual channels (e. g. lower filter slope, less fast response time, switch off pre-filtering for order characteristic values,...). If

configurations with > 100% load are to be written into the device, a message will appear indicating that no data transfer has been carried out. The occurrence of the message can be suppressed. The message can be reactivated in the [settings](#).

### 3 Type

Type

Selection of the characteristic value to be monitored. Here it is the overall value.

With the *MultiMode* option it is possible to monitor up to three characteristic values on one measuring channel at the same time. For this purpose, monitoring assets can be added in the respective settings of the signal processing of a measuring channel:

No.

Name

Type

### 4 Template overall value

Templates

Overall values can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

For many parts of ISO 10816, the required monitoring measurement variables are already included in the software, so that a fast and convenient selection of the measurement variables conforming to standards can be made.

### 5 Filter frequency Highpass

Highpass  Hz

The vibration signal to be monitored can be limited to a frequency range. The high pass is used to set the lower frequency limit. The minimum value is 0.1 Hz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB.

*Note:* The combination of very small high-pass values (< 1 Hz) with correspondingly integrated measurement variables (vibration velocity, vibration displacement) leads to longer filter transient times, which can be quite a few seconds depending on the setting. The settling process can be observed in the [test measurement](#).

*Note:* Also note the (physically caused) 1/f noise at very low frequencies and integrated measurands. Particularly when using a low filter slope (e. g. 40 dB/decade) the noise levels can exceed the expected measurement signal. For these applications, the noise levels should be compared with the signal levels actually expected using the test measurement.

**6 Filter frequency Lowpass**

Low pass  Hz

The vibration signal to be monitored can be limited to a frequency range. The low pass is used to set the higher frequency limit. The minimum value is 40 kHz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB.

**7 Filter slope**

Slope

The filter slope of the specified high and low pass filter can be selected. You can choose between 40 dB/decade and 60 dB/decade (filter order 2 or 3). The steeper the filter is (higher filter order) the fewer contributions apart from the set filter limits are considered:



flat filter



steep filter

*Note:* If low-frequency vibrations are to be monitored, it is recommended to use the 60 dB/decade filter slope. Thus noise contributions of the 1/f noise are suppressed more efficiently.

**8 Monitoring quantity**

Quantity

Vibration acceleration, vibration velocity and displacement can be selected as the monitoring measurement variable. Depending on the sensor measurement type used, the signal is integrated accordingly (e. g. double integration of vibration acceleration after displacement).

**9 Monitoring unit**

Unit

The unit of the monitoring measurement quantity can be defined here. Metric and non-metric units are available.

**10 Monitoring characteristic**

Characteristic

The following characteristics can be selected for the monitoring measured variable:

|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
| RMS         | Formation by means of squaring, averaging and root extraction (square mean value, True RMS) |
| Peak        | Peak value from the maximum of the amounts of plus and minus peak value                     |
| Peak - Peak | Maximum from the values of positive and negative peak values                                |

**11 Time window**Time window  s

Time span in seconds over which the characteristic value is formed. A minimum of 0.1 s and a maximum of 100 s can be specified.

**12 Template alarm thresholds**Templates  

Alarm thresholds can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

*Note:* Only templates of alarm thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

**13 Alarm treshhold**Alarm  mm/s

Setting a limit value for the alarm. This value must be determined individually for each machine. In many parts of ISO 20816 it is suggested that the switch-off value should not be higher than 1.25 x zone C/D limit value.

**14 Warning treshhold**Warning  mm/s

Setting a limit value for warning. This value must be determined individually for each machine. In many parts of DIN ISO 20816 it is suggested to determine the alarm value according to the following rule:

Alarm = baseline +  $p$  x threshold Zone B/C.

Note:  $0 < p < 1$ .

The baseline depends on the respective machine, the measuring location and the measuring direction. It must be determined individually for each monitoring channel. A determination can be made conveniently via the level deviation displayed in the [alarm test measurement](#) for a "run-in" machine.

In general, the alarm value should not be higher than 1.25 zone limit B/C.

15

**Template zone thresholds**

Templates

Not available

Apply

Zone thresholds can be saved in a [template](#) too. If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "None exists" is displayed in the selection field.

For many parts of DIN ISO10816, the corresponding zone limits are included in the software upon delivery and can thus be selected quickly and conveniently.

*Note:* Only templates of zone thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

16

**Threshold Zone C/D**

Zone C→D

7,100

mm/s

Entering the zone boundary between zones C and D. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

17

**Threshold Zone B/C**

Zone B→C

2,800

mm/s

Entering the zone boundary between zones B and C. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

18

**Threshold Zone A/B**

Zone A→B

1,120

mm/s

Entering the zone boundary between zones A and B. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

19

**Action buttons**

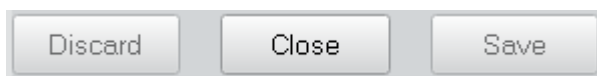
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Order characteristic

Ordering characteristic are narrow-band characteristic which measures the vibrations at speed or at multiples of rpm. To measure order characteristic, a speed signal must be present at the [trigger input](#) of the avibialine device. In particular for unbalance monitoring (vibration at speed, order 1:1) or transmission monitoring (vibration at speed multiplied by the number of teeth  $x$  of a gear wheel, order  $[f_n \cdot x]$ ). 1) order characteristics are very helpful.

**Signal processing settings of channel 1**

**Data** | **Info**

Name: horizontal

DSP load: This channel 30.2 %, Entire device 94.6 %

Data source: iCS80 1548

Multiple monitoring can be configured per channel:

No. 3 - Unbalance

Name: Unbalance

Type: Order characteristic

Configure order value

Templates: Not available

Order: as ratio 1 : 1

as speed multiplier 1,000

Expected speed range

Max. speed 30000 1/min

Min. speed 120 1/min

Speed source: Triggereingang 1

Noise suppression

Prefilter: ☐ Pre-filter on

Slope: 20 dB/decade

Bandwidth: 10.0 Hz

Output

Quantity: Vibration velocity

Unit: mm/s

Characteristic: R.M.S.

Configure alarm thresholds

Templates: Not available

Alarm: 8.900 mm/s

Warning: 3.500 mm/s

Configure zone thresholds

Templates: Not available

Zone C→D: 7.100 mm/s

Zone B→C: 2.800 mm/s

Zone A→B: 1.120 mm/s

**Structure**

|     |     |     |     |     |       |
|-----|-----|-----|-----|-----|-------|
| Row | DO  | 24V | S3  | S4  | rear  |
| Row | ST1 | ST2 | S1  | S2  | front |
|     |     |     |     |     |       |
| Row | ST3 | PT  | AO1 | AO2 | front |
| Row | RS  | CAN | AO3 | AO4 | rear  |

1 Name signal processing

2 Type

3 DSP load

4 Template Order characteristic

5 Input Order ratio

6 Speed range

7 Noise suppression

8 Monitoring quantity

9 Monitoring unit

10 Monitoring characteristic

11 Template alarm thresholds

12 Alarm threshold

13 Warning threshold

14 Template zone thresholds

15 Threshold Zone C/D

16 Threshold Zone B/C

17 Threshold Zone A/B

18 Action buttons

### 1 Name signal processing

Name

The signal processing configured here can be named accordingly. Up to 40 characters are available.

### 2 Type

Type

Selection of the characteristic value to be monitored. Here it is the order characteristic.

With the *MultiMode* option it is possible to monitor up to three characteristic values on one measuring channel at the same time. For this purpose, monitoring assets can be added in the respective settings of the signal processing of a measuring channel:

Multiple monitoring can be configured per channel:

No.

Name

Type

### 3 DSP load

DSP load

|               |                        |        |
|---------------|------------------------|--------|
| This channel  | <div><div></div></div> | 30,2 % |
| Entire device | <div><div></div></div> | 94,6 % |

Depending on the vibration characteristic settings, the digital signal processing (DSP) of the ViboLine device is more or less requested. The current load of the selected measurement channel and the total load of the device are displayed. If the load value of the entire device reaches > 100%, different settings must be made in individual channels (e. g. lower filter slope, less fast response time, switch off pre-filtering for order characteristic values,...). If configurations with > 100% load are to be written into the device, a message will appear indicating that no data transfer has been carried out. The occurrence of the message can be suppressed. The message can be reactivated in the [settings](#).

### 4 Template Order characteristic

Templates

Order characteristics can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

## 5 Input Order ratio

as ratio  :   
 as speed multiplier 1,000

The avibialine devices can monitor arbitrary orders. Multiples and broken orders can be defined

|             |        |
|-------------|--------|
| First Order | 1 : 1  |
| Thrid Order | 3 : 1  |
| Half Order  | 1 : 2  |
| 13/5 Order  | 13 : 5 |

## 6 Speed range

Max. speed  1/min  
 Min. speed  1/min  
 Speed source

In principle, the avibialine devices are able to detect speeds from 6 rpm. However, it will then take up to 10 seconds to detect standstill. If faster detection is desired, the minimum speed can be increased. For example, at 30 rpm the detection is given after 2 seconds. However, speeds below 30 rpm are then not detected. By entering the maximum available speed, the calculation effort for the DSP is reduced because the maximum possible speed (4500 Hz) does not have to be expected.

**If the valid speed window is left, "0" is output as measured value to signal that no meaningful result can be calculated. In addition, an error can be output when leaving the speed range ("Signal measurement problem").**

## 7 Noise suppression

Noise suppression  
 Prefilter ☐ Pre-filter on  
 Slope   
 Bandwidth  Hz

The order signal is filtered in such a way that it indicates the oscillations at speed or the selected speed order. If an even sharper delimitation to adjacent frequency ranges is required, the pre-filter can be activated. This may be necessary, for example, if strong amplitudes occur at nearby frequencies, but the characteristic order value is to be measured with the correct amplitude.

The **slope** of the pre-filter can be defined by means of the selection field. You can choose between 20, 40 and 60 dB/decade.



flat filter      steep filter

The bandwidth determines how wide the pre-filter is applied around the selected speed order. At e. g. 5 Hz bandwidth, the pre-filter extends by 2.5 Hz to lower or higher frequencies around the selected order. The bandwidth can be adjusted from 2 to 100 Hz.

*Note:* The activated pre-filter (especially with high slope) results in high [DSP load](#) for the avibialine device. For multi-channel applications, the total load of the device should therefore be taken into account when configuring the pre-filters.

## 8 Monitoring quantity

Quantity

Vibration acceleration, vibration velocity and displacement can be selected as the monitoring measurement variable. Depending on the sensor measurement type used, the signal is integrated accordingly (e. g. double integration of vibration acceleration after displacement).

## 9 Monitoring unit

Unit

The unit of the monitoring measurement quantity can be defined here. Metric and non-metric units are available.

## 10 Monitoring characteristic

Characteristic

The following characteristics can be selected for the monitoring measured variable:

|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
| RMS         | Formation by means of squaring, averaging and root extraction (square mean value, True RMS) |
| Peak        | Peak value from the maximum of the amounts of plus and minus peak value                     |
| Peak - Peak | Maximum from the values of positive and negative peak values                                |

## 11 Template alarm thresholds

Templates

Alarm thresholds can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

*Note:* Only templates of alarm thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

**12 Alarm threshold**

Alarm  mm/s

Setting a limit value for the alarm. This value must be determined individually for each machine..

**13 Warning threshold**

Warning  mm/s

Setting a limit value for the warning. This value must be determined individually for each machine.

**14 Template zone thresholds**

Templates

Zone thresholds can be saved in a [template](#) too. If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "None exists" is displayed in the selection field.

*Note:* Only templates of zone thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

**15 Threshold Zone C/D**

Zone C→D  mm/s

Entering the zone boundary between zones C and D. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

**16 Threshold Zone B/C**

Zone B→C  mm/s

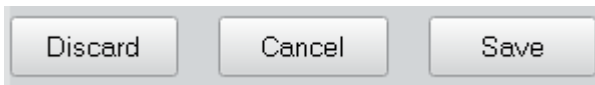
Entering the zone boundary between zones B and C. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

**17 Threshold Zone A/B**

Zone A→B  mm/s

Entering the zone boundary between zones A and B. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

18

**Action buttons**

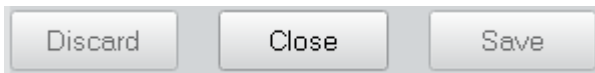
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Impact characteristic

Impact characteristic values are overall values with a very fast response time of up to  $< 0.666$  ms of the digital and relay outputs. Especially in applications such as tool breakage or crash detection, shock parameters can be used for very fast shut-off of the machine. Tool breakages, for example, generate a wide frequency signal extending into the kHz range (see Diraq shock). By monitoring this high-frequency range, unwanted machine states can be detected and stopped very quickly.

**Signal processing settings of channel 3**

**Data** | **Info**

Name: Crash detection

DSP load: This channel 12.7 %, Entire device 73.8 %

Data source: KS95

Multiple monitoring can be configured per channel:

No. 1 - spindle 21B

Name: spindle 21B

Type: Impact characteristic

Configure impact value

Templates: Not available | Apply

Filter

Highpass: 1000 Hz

Low pass: 5000 Hz

Slope: 60 dB/decade

Output

Quantity: Vibration acceleration

Unit: m/s<sup>2</sup>

Characteristic: Peak value

Time window: 0.125 s

Maximum response time: 2.000 ms

Configure alarm thresholds

Templates: Not available | Apply

Alarm: 8.900 m/s<sup>2</sup>

Warning: 3.500 m/s<sup>2</sup>

Configure zone thresholds

Templates: Not available | Apply

Zone C→D: 7.100 m/s<sup>2</sup>

Zone B→C: 2.800 m/s<sup>2</sup>

Zone A→B: 1.120 m/s<sup>2</sup>

Discard | Close | Save

1

### Name signal processing

Name: Crash detection

The signal processing configured here can be named accordingly. Up to 40 characters are available.

**2 Type**

Type

Selection of the characteristic value to be monitored. Here it is the impact characteristic.

With the *MultiMode* option it is possible to monitor up to three characteristic values on one measuring channel at the same time. For this purpose, monitoring assets can be added in the respective settings of the signal processing of a measuring channel:

Multiple monitoring can be configured per channel:

No.

Name

Type

**3 DSP load**

This channel  12.7 %

Entire device  73.8 %

Depending on the vibration characteristic settings, the digital signal processing (DSP) of the ViboLine device is more or less requested. The current load of the selected measurement channel and the total load of the device are displayed. If the load value of the entire device reaches > 100%, different settings must be made in individual channels (e. g. lower filter slope, less fast response time, switch off pre-filtering for order characteristic values,...). If configurations with > 100% load are to be written into the device, a message will appear indicating that no data transfer has been carried out. The occurrence of the message can be suppressed. The message can be reactivated in the [settings](#).

**4 Template Impact characteristic**

Templates

Impact characteristics can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

**5 Filter frequency Highpass**

Highpass  Hz

The vibration signal to be monitored can be limited to a frequency range. The high pass is used to set the lower frequency limit. The minimum value is 100 Hz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB.

6

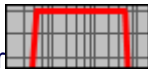
**Filter frequency Lowpass**Low pass  Hz

The vibration signal to be monitored can be limited to a frequency range. The low pass is used to set the higher frequency limit. The minimum value is 40 kHz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB.

7

**Slope**Slope 

The filter slope of the specified high and low pass filter can be selected. You can choose between 40 dB/decade and 60 dB/decade (filter order 2 or 3). The steeper the filter is the fewer contributions apart from the set filter limits are considered:

flat filter  steep filter 

8

**Monitoring quantity**Quantity 

Vibration acceleration, vibration velocity and displacement can be selected as the monitoring measurement variable. Depending on the sensor measurement type used, the signal is integrated accordingly (e. g. double integration of vibration acceleration after displacement).

*Note:* Impact characteristic values can only be measured from 100 Hz. Frequency ranges in the kHz range are required for many applications (e. g. tool breakage detection). Therefore, for such high-frequency measurements it is essential to use vibration acceleration as a monitoring measurement parameter, otherwise the high-frequency components will be [underestimated](#).

9

**Monitoring unit**Unit 

The unit of the monitoring measurement quantity can be defined here. Metric and non-metric units are available.

10

**Monitoring characteristic**Characteristic 

The peak value (amount peak value from the maximum of the amounts of plus and minus peak value) is defined for the monitoring measurement quantity, since the fast response times of < 0.66 ms can only be achieved by means of peak value detection.

11

**Time window**Time window  s

Time span in seconds over which the characteristic value is formed. A minimum of 0.1 s and a maximum of 100 s can be specified.

12

**Maximum response time**

Maximum  
response  
time

2.000 ms

The impact characteristics have been developed for very fast detection of peak values. This makes it possible, for example, to detect crash- or breakage of tools. The dropdown box sets the response time of the [digital outputs](#) and the [relay output](#). 0.666, 1, 2 or 4 ms can be selected.

13

**Template alarm thresholds**

Templates

Not available

Apply

Alarm thresholds can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

*Note:* Only templates of alarm thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

14

**Alarm threshold**

Alarm

8,900 m/s<sup>2</sup>

Setting a limit value for the alarm. This value must be determined individually for each machine.

15

**Warning threshold**

Warning

3,500 m/s<sup>2</sup>

Setting a limit value for the warning. This value must be determined individually for each machine.

16

**Template zone thresholds**

Templates

Not available

Apply

Zone thresholds can be saved in a [template](#) too. If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "None exists" is displayed in the selection field.

*Note:* Only templates of zone thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

17

**Threshold Zone C/D**

Zone C→D

 m/s<sup>2</sup>

Entering the zone boundary between zones C and D. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

18

**Threshold Zone B/C**Zone B→C  m/s<sup>2</sup>

Entering the zone boundary between zones B and C. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

19

**Threshold Zone A/B**Zone A→B  m/s<sup>2</sup>

Entering the zone boundary between zones A and B. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

20

**Action buttons**

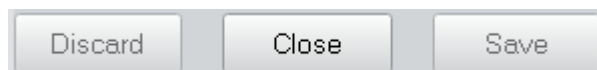
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



---

## Bearing characteristic

Rolling bearings can be monitored with wideband characteristic values. If a defect develops in the rolling bearing, e.g. damage to the running surface in the outer ring (pitting), each rolling element experiences an impact as it passes through this defect and generates a wide excitation band in the surrounding area of the bearing (see Diraq impact). Due to this very wide excitation band, e.g. natural frequencies of nearby components are present or the natural frequency of the sensor itself is excited.

Since bearing damage is usually represented in amplitudes in the high frequency range, vibration acceleration is used as the measured variable. Vibration velocity and displacement would be [underestimated](#).

Characteristic values on a wide frequency band measure these excessive values caused by bearing damage. The frequency range from 1000 Hz upwards is considered as a preference in order to remove speed-proportional components.

For the bearing characteristics, higher amplitudes mean a higher extent of damage in the rolling bearing. It can only be determined whether damage has occurred. Which rolling bearing component is exactly affected (outer ring, inner ring, rolling element, retainer) requires in-depth analysis with other measuring tools (e.g. [envelope curve analysis](#) with [VibroMatrix](#)). Detailed information on rolling bearing diagnosis on machines can be found in VDI [3832](#) "Measurement of structure-borne sound of rolling element bearings in machines and plants for evaluation of condition.

The **bearing characteristics** implemented in avibialine are regarded as **relative values**. This means that the current measured value is always compared with an initial or reference value. The initial value corresponds to the undamaged condition of the bearing. The actual measured **value** represents a unitless **deviation from the reference value**. This procedure is useful (and suggested by VDI 3832) because the characteristic values of bearings can be very different and therefore the good condition must always be known for the good/bad evaluation (initial value). Furthermore, bearing characteristic values can be strongly dependent on the speed, therefore a speed band can be specified in the avibialine devices in which the bearing characteristic value is determined.

The following bearing characteristics are available:

- relative r.m.s value
- relative peak value
- $1/k(t)$
- Bearing condition characteristic (BCC)

A detailed explanation of the characteristics is given [below](#).

To measure the bearing characteristics, "screw connection" should be used for the accelerometer in order to minimize the disturbing influence of coupling resonances.

**Signal processing settings of channel 1**

**Data** **Info**

Name: horizontal

DSP load: This channel: 32.1 % Entire device: 83 %

Data source: iCS80 1548

Multiple monitoring can be configured per channel:

No. 2 - bearing monitoring

Name: bearing monitoring

Type: Bearing characteristic

Set bearing characteristic

Templates: Not available Übernehmen

Filter

Highpass: 13000 Hz

Low pass: 40000 Hz

Slope: 60 dB/decade

Output

Characteristic: Bearing Condition Char.

Unit:

Time window: 100 s

Speed monitoring

Permitted speed deviation: 20 %

Speed source: Speed spindle 21B

Reference value

BCC: 2,000

Speed: 3000 1/min

Configure alarm thresholds

Templates: Not available Apply

Alarm: 8,900

Warning: 3,500

Configure zone thresholds

Templates: Not available Apply

Zone C→D: 8,000

Zone B→C: 2,800

Zone A→B: 1,120

Discard Close Save

1 Name Signal processing

2 Type

3 DSP load

4 Template Bearing characteristic

5 Filter frequency Highpass

6 Filter frequency Lowpass

7 Slope

8 Bearing characteristic

9 Unit

10 Time window

11 Speed deviation

12 Initial / Reference value

13 Template alarm thresholds

14 Alarm threshold

15 Warning threshold

16 Threshold zone C/D

17 Template Zone thresholds

18 Threshold zone B/C

19 Threshold zone A/B

20 Action buttons

1

**Name Signal processing**

Name

horizontal

The signal processing configured here can be named accordingly. Up to 40 characters are available.

2

**Type**

Type

Bearing characteristic

Selection of the characteristic value to be monitored. Here it is the bearing characteristic.

With the *MultiMode* option it is possible to monitor up to three characteristic values on one measuring channel at the same time. For this purpose, monitoring assets can be added in the respective settings of the signal processing of a measuring channel:

Multiple monitoring can be configured per channel:

No.

Name

Type

### 3 DSP load



Depending on the vibration characteristic settings, the digital signal processing (DSP) of the ViboLine device is more or less requested. The current load of the selected measurement channel and the total load of the device are displayed. If the load value of the entire device reaches > 100%, different settings must be made in individual channels (e. g. lower filter slope, less fast response time, switch off pre-filtering for order characteristic values,...). If configurations with > 100% load are to be written into the device, a message will appear indicating that no data transfer has been carried out. The occurrence of the message can be suppressed. The message can be reactivated in the [settings](#).

### 4 Template Bearing characteristic

Templates

Bearing characteristics can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

### 5 Filter frequency Highpass

Highpass  Hz

The vibration signal to be monitored can be limited to a frequency range. The high pass is used to set the lower frequency limit. The minimum value is 1000 Hz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB.

### 6 Filter frequency Lowpass

Low pass  Hz

The vibration signal to be monitored can be limited to a frequency range. The low pass is used to set the higher frequency limit. The minimum value is 40 kHz. Butterworth filters are used, so the specified frequency corresponds to a signal drop of -3 dB. For the characteristic value Bearing Condition Characteristic (BCC), the low-pass filter is permanently set to 40 kHz.

7

**Slope**

Slope

60 dB/decade ▼

The filter slope of the specified high and low pass filter can be selected. You can choose between 40 dB/decade and 60 dB/decade (filter order 2 or 3). The steeper the filter is the fewer contributions apart from the set filter limits are considered.

8

**Bearing characteristic**

Characteristic

Bearing Condition Char. ▼

The avibialine devices have 4 characteristic values for rolling bearing monitoring. The selection is made here.

The characteristic values mean in detail:

| Characteristic                              | Formation                                                                                                                                                                                                                                                                                                                                                                                               | Behavior                                                                                                                                                                                                                          |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>relative r.m.s value</b>                 | The relative r.m.s of the vibration acceleration usually measured in the linear frequency range of the sensor. Reference is made to the <a href="#">initial r.m.s value</a> .                                                                                                                                                                                                                           | If there is bearing damage, the general signal level rises (see above resonance increase) and thus the r.m.s.                                                                                                                     |
| <b>relative peak value</b>                  | Peak value of the vibration acceleration usually measured in the linear frequency range of the sensor. Reference is made to the <a href="#">initial peak value</a> .                                                                                                                                                                                                                                    | In the event of bearing damage, the signal becomes more peak-containing due to the shocks that occur. This peaking quality is determined by the relative peak value.                                                              |
| <b>1/k(t)</b>                               | <p>The 1/k(t)-Value is calculated as follows:</p> $\frac{1}{k(t)} = \frac{a_{rms}(t) \cdot a_{peak}(t)}{a_{rms}(0) \cdot a_{peak}(0)}$ <p>So the products of the r.m.s and peak values of the vibration acceleration are used. In each case at the current time t and the reference measurement (t= 0).</p> <p>The r.m.s or peak values are determined in the linear frequency range of the sensor.</p> | <p>The amplitudes for the r.m.s. and peak values increase with bearing damage (see above). This results in increasing values for the product as well..</p> <p>The 1/k(t) value thus has higher values in the event of damage.</p> |
| <b>Bearing Condition Characteristic BCC</b> | The bearing condition characteristic BCC is determined in the resonance range of the sensor (typically > 13 kHz). However, the component-related                                                                                                                                                                                                                                                        | With increasing severity of the damage, the intensity of the shocks increases. The BCC value then shows higher values.                                                                                                            |

|  |                                                                                                                                                                                                                                                                                                                       |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | <p>resonances &lt; 13 kHz can also be included in the calculation.</p> <p>The shocks caused by the bearing damage are measured amplified by the resonance(s) present</p> <p>The <b>Bearing Condition Characteristic BCC</b> (with 13 kHz high pass) behaves similarly to the <b>Bearing Condition Unit (BCU)</b>.</p> |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

## 9 Unit

Unit

The measured value (deviation of the current value from the reference or initial value) can be specified in absolute quantities percent or in dB.

Example:

| Initial value      | Measured value      | Actual value |
|--------------------|---------------------|--------------|
| 5 m/s <sup>2</sup> | 15 m/s <sup>2</sup> | 3            |
| 5 m/s <sup>2</sup> | 15 m/s <sup>2</sup> | 300 %        |

The unit set here must be considered in particular for the correct definition of the alarm and zone limit values.

## 10 Time window

Time window

 s

Time span in seconds over which the characteristic value is formed. A minimum of 1 s and a maximum of 3600 s can be entered. For fluctuating characteristic values (e.g. peak values, 1/k(t)) it is recommended to keep the standard 100s.

## 11 Speed deviation

Permitted speed deviation

Speed source

Bearing characteristic values can only be compared with values under the same operating conditions, i.e. at the same speed. Therefore, the deviation by which the current speed may deviate from the speed when the initial values are recorded can be defined here.

**If the valid speed window is left, "0" is output as measured value to signal that no meaningful result can be calculated. In addition, an error can be output when leaving the speed range ("Signal measurement problem").**

If measured values are also to be calculated at any speed, the selection "ignore" can be made (not recommended).

12

**Initial / Reference value**

BCC

Speed  1/min

The initial/reference values are entered in this input field. Depending on the selected characteristic value, r.m.s., peak values, the product of effective value and peak value or BCC values must be entered.

The speed during the acquisition of the initial values should also be logged.

The test measurement function can also be used to simplify the definition of reference values.

*Notes on defining the initial values:*

The initial values should be obtained in the OK state of the bearing at operating speed. This OK state is usually present after the running-in phase following bearing assembly. In the running-in phase, the vibration behaviour of the bearing can temporarily degrade, but this does not necessarily indicate bearing damage (assuming correct mounting and grease distribution).

If no data on the OK state of the bearing is available, typical values for the bearing characteristic values can be collected for identical machines. It is important to collect several data sets or to examine several other machines.

After defining the reference value, this value is left unchanged for the lifetime of the bearing and current measured values are normalized to the reference value (quotient = bearing characteristic value).

13

**Template alarm thresholds**

Templates

Alarm thresholds can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

*Note:* Only templates of alarm thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

14

**Alarm threshold**

Alarm

Enter a limit value for the alarm. The deviation from the initial value is entered in absolute values (multiples) or in percent, depending on the [selection](#).

---

Setting a limit value for the alarm. This value must be determined individually for each machine.

**15 Warning threshold**

Warning

Enter a limit value for the warning. The deviation from the initial value is entered in absolute values (multiples) or in percent, depending on the [selection](#).

Setting a limit value for the alarm. This value must be determined individually for each machine

**16 Threshold zone C/D**

Zone C→D

Entering the zone boundary between zones C and D. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

**17 Template Zone thresholds**

Templates

Zone thresholds can be saved in a [template](#) too. If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "None exists" is displayed in the selection field.

*Note:* Only templates of zone thresholds are displayed whose assigned overall value corresponds to the overall value selected above. If this is not the case, the selection field of the alarm limit value templates is greyed out.

**18 Threshold zone B/C**

Zone B→C

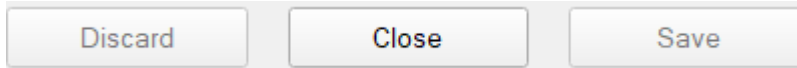
Entering the zone boundary between zones B and C. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

**19 Threshold zone A/B**

Zone A→B

Entering the zone boundary between zones A and B. The zone system proposed in ISO 20816 is used for this purpose. The zone corresponding to the current machine status is indicated by a coloured [LED](#) on the front of the housing.

20

**Action buttons**

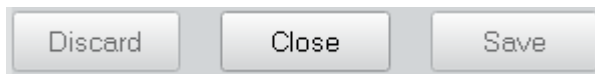
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

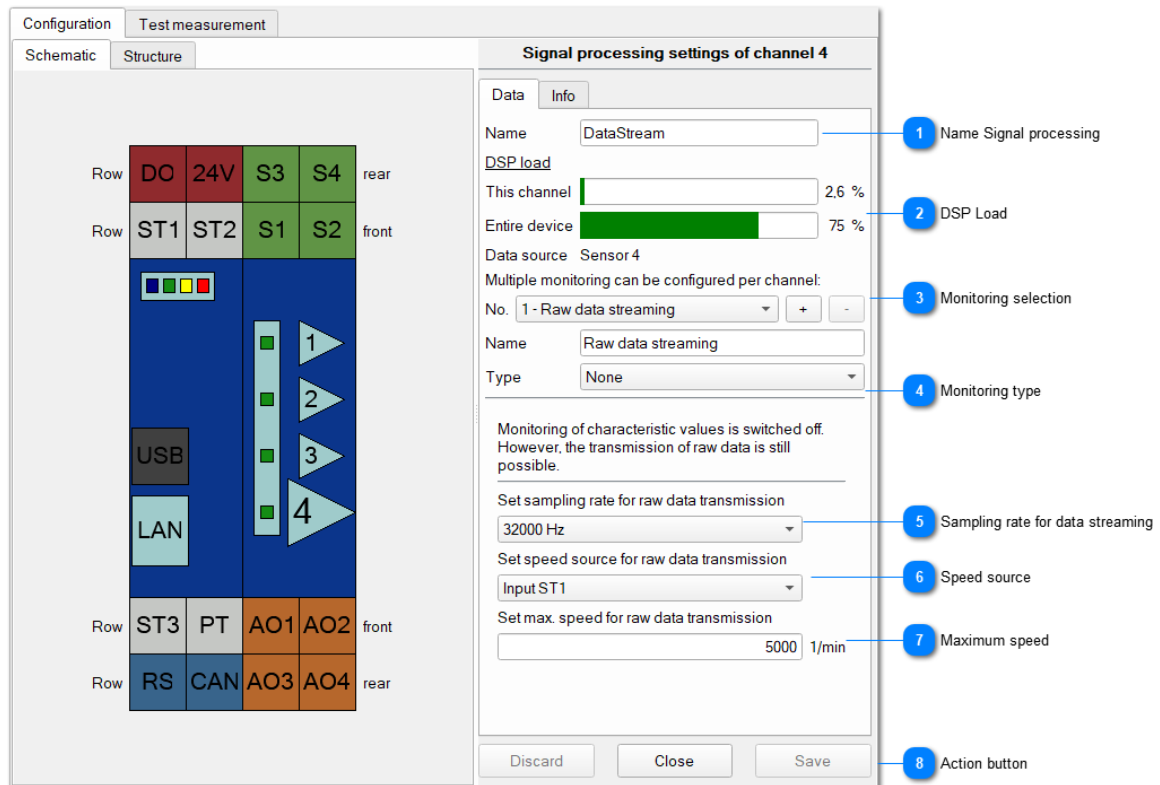
**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## No signal processing

Instead of computing a characteristic value, signal processing on individual measuring channels can also be switched off completely. This reduces e.g. the processor load by unused measuring channels. Furthermore the avibialine can be used for exclusive transmission of raw data (option: DataStream). If monitoring is deactivated, the transmitted raw data can be configured with regard to sampling rate and speed detection. Note: The signal processing can only be deactivated if no other monitoring measurand is active on the same measuring channel anymore.



### 1 Name Signal processing

Name

The signal processing configured here can be named accordingly. Up to 40 characters are available.

### 2 DSP Load

This channel   
 Entire device

Depending on the vibration characteristic settings, the digital signal processing (DSP) of the ViboLine device is more or less requested. The current load of the selected measurement channel and the total load of the device are displayed. If the load value of the entire device reaches > 100%, different settings must be made in individual channels (e. g. lower filter slope, less fast response time, switch off pre-filtering for order characteristic values,...). If configurations with > 100% load are to be written into the device, a message will appear

indicating that no data transfer has been carried out. The occurrence of the message can be suppressed. The message can be reactivated in the [settings](#).

3

### Monitoring selection

Multiple monitoring can be configured per channel:

No.

Name

In order to deactivate the signal processing, no other monitoring measured quantity may be active on the same measuring channel any more. To delete any existing monitoring, press the - key. The deactivated monitoring can be named accordingly.

4

### Monitoring type

Type

In the selection box, the entry None is selected to deactivate signal processing. Thereby the input possibilities for characteristic value parameterizations disappear and the raw data output can be configured.

5

### Sampling rate for data streaming

Set sampling rate for raw data transmission

For raw data transmission with the DataStream option, the used sampling rate of the vibration signals can be defined. This is done individually for each measuring channel.

The following options are available:

- Off
- 32 000 Hz
- 48 000 Hz
- 96 000 Hz.

However, the configuration program uses this setting only as a recommendation. If, for example, other channels require a higher sampling rate, channels for which a lower value was initially set here will also be set to the higher value. In order to reliably obtain a low sampling rate, this low sampling rate must be defined for all channels of a channel group. Channels 1 to 4 form one channel group and channels 5 to 8 form a second group.

Reducing the sampling rate also effectively reduces the amount of data during raw data transmission. The sampling rate can also be set completely to zero (Off). Then no more computing load is requested from this channel. The setting can be used, for example, to completely deactivate the fourth channel for triaxial measurements.

**6 Speed source**

Set speed source for raw data transmission

In addition to the vibration signals, a speed signal can also be transmitted in the raw data. The selection (or deselection) of the speed source is done via this drop-down menu.

**7 Maximum speed**

Set max. speed for raw data transmission

 1/min

In order to save computing load and to keep the amount of data during transmission as low as possible, the maximum occurring speed can be defined here. Speeds above this value are no longer recognized and transmitted. The maximum speed is 180 000 rpm.

**8 Action button**  

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

---

## Digital communications interfaces

The communication interfaces LAN, Modbus RTU/TCP and CANopen are only available in the X device version.

In detail, the following functionalities are available with the bus protocols:

- Transfer of device information
- Transfer of characteristic values calculated for all measuring channels
- Transfer of alarms
- Transfer of errors (sensor, device, ...)

The HTTP API interface provides a possibility to read out characteristic values and device information via http.

The optional DataStream interface provides a VLDAQ API which is used to transfer sensor data in raw format, i.e. without further signal processing (filtering, integration, ...), sensor information (e.g. sensitivity) as well as trigger signals ([speed trigger 1-3](#)).

The following sections describe the device-side settings of the interfaces:

- [LAN](#) (Modbus TCP, HTTP API, DataStream)
- [Modbus RTU](#)
- [CAN open](#)

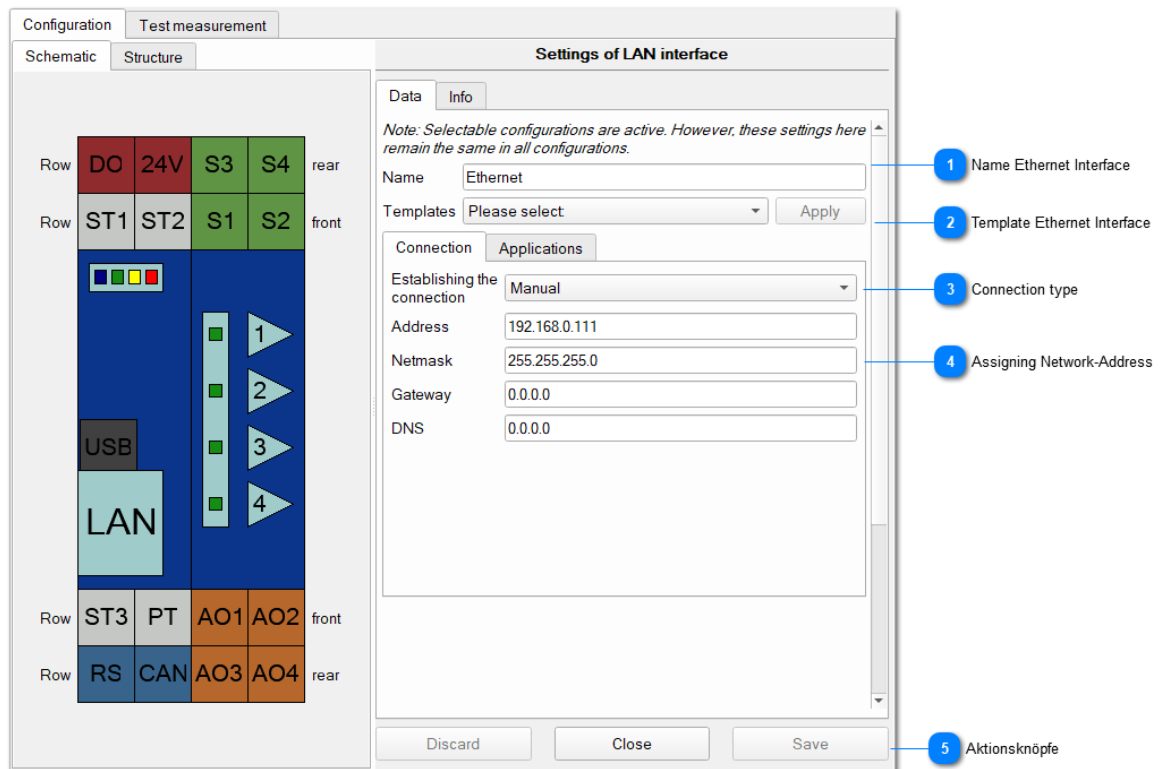
A detailed description of the bus protocols (e.g. implemented functions, registers used, program examples, ...) is given in the section [Documentation Bus Interfaces](#).

The following applies to the use of the bus interfaces: Only one protocol can be used at a time, i.e. the simultaneous use of several buses (e.g. CAN + Modbus) is not possible. Parallel to the bus protocols, however, the use of DataStream is possible.

## LAN-Interface

The LAN interface is used to implement the communication types Modbus TCP, HTTP API, DataStream. This enables the transfer of characteristic values or raw data to following processes/ systems.

All settings are also listed in the [structure view](#) and can be edited from there.



### 1 Name Ethernet Interface

Name

The ethernet interface configured here can be named accordingly. Up to 40 characters are available.

### 2 Template Ethernet Interface

Templates

Ethernet interface settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a ethernet interface template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

### 3 Connection type

Establishing the connection

The network address of the device can be assigned automatically (Dynamic Host Configuration Protocol, DHCP) or set manually.

4

**Assigning Network-Address**

|         |                                            |
|---------|--------------------------------------------|
| Address | <input type="text" value="192.168.0.111"/> |
| Netmask | <input type="text" value="255.255.255.0"/> |
| Gateway | <input type="text" value="0.0.0.0"/>       |
| DNS     | <input type="text" value="0.0.0.0"/>       |

For the manual definition of the network address, the IP address, netmask and gateway can be entered here. If DHCP is selected, the input field is locked.

5

**Aktionsknöpfe**

|                                        |                                      |                                     |
|----------------------------------------|--------------------------------------|-------------------------------------|
| <input type="button" value="Discard"/> | <input type="button" value="Close"/> | <input type="button" value="Save"/> |
|----------------------------------------|--------------------------------------|-------------------------------------|

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

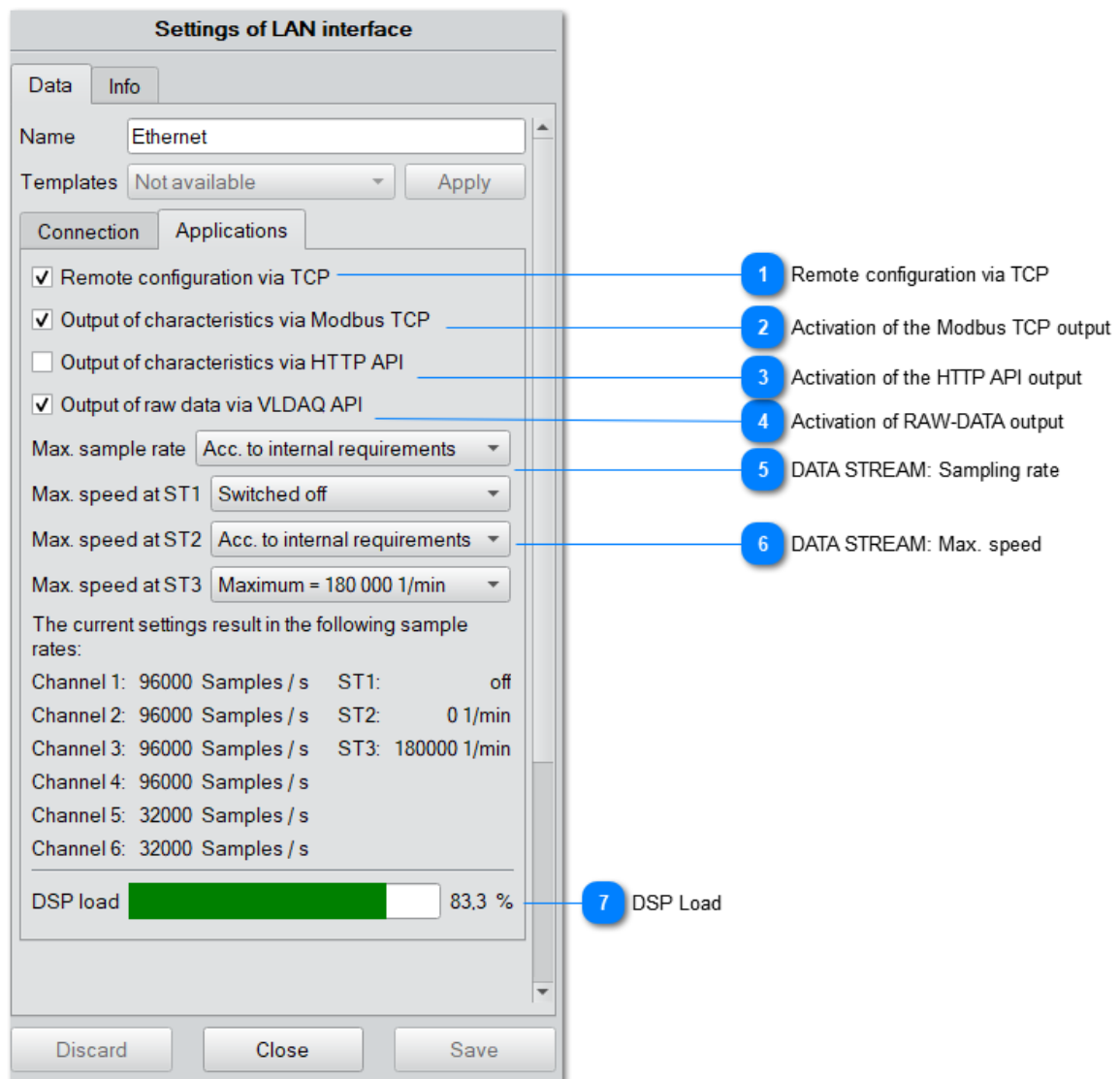
**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

## Application LAN

The following outputs can be configured via the LAN interface:



### 1 Remote configuration via TCP

☒ Remote configuration via TCP

The avibialine X devices can be configured via TCP. Activating/deactivating this setting is only possible with the device connected via USB. The configuration program then searches for devices connected via TCP and connects automatically. If the device is also connected via USB in addition to the TCP connection, the USB connection is preferred.

### 2 Activation of the Modbus TCP output

☒ Output of characteristics via Modbus TCP

Here, the calculated characteristic values are transmitted from all available measuring channels. The Modbus TCP protocol is described in detail in the section [Documentation Bus](#)

[interfaces](#). The characteristic value output can be controlled externally with the help of the [process trigger](#) (also reporting of error states).

By setting the check mark, the parameter output is activated via Modbus TCP. If a parameter output via another interface is already active, the selection is deactivated and a corresponding note appears:

*Only one of the bus protocols CAN/Modbus RTU/Modbus TCP can be active at a time. The protocol currently active is: CAN*

☐ Output of characteristics via Modbus TCP

3

### Activation of the HTTP API output

☐ Output of characteristics via HTTP API

The output of characteristic values and device information via the HTTP API interface is activated here. The HTTP API protocol is described in detail in the [Bus interfaces documentation](#) section. The output can be controlled externally using the [process trigger](#) (also reporting of error states).

4

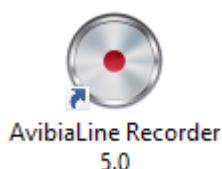
### Activation of RAW-DATA output

☒ Output of raw data via VLDAQ API

The output of the raw data via VLDAQ API is activated here. The raw data output is possible simultaneously to a selected bus protocol.

Here the raw data of the connected sensors are transmitted via a UDP protocol without further signal processing. In addition, the signals of the [trigger inputs 1-3](#) are transmitted. With the help of the raw data, signal evaluations and analyses can be carried out in external systems. The user does not need to handle the UDP protocol. He conveniently uses an API provided by the manufacturer in the form of a DLL. A description of this is available in the section [Documentation Bus Interfaces](#).

To use the DataInspect option for analysis of vibration data in [VibroMatrix](#), the raw data output via VLDAQ API must also be activated. The subsequent logging of the raw data into a \*.ids file is done with the avibialine software VLRecorder.



5

### DATA STREAM: Sampling rate

Max. sample rate    Acc. to internal requirements ▼

avibialine executes both processes - monitoring in real time and raw data output - simultaneously. For this purpose, it is necessary to clarify how the sampling rate is to be set, because the internal signal processing is still active so that bus protocols, digital outputs and current loops can still be used.

The maximum internal sampling rate can be set as follows:

|                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>According to internal sampling rate</p> <ul style="list-style-type: none"> <li>This setting provides the lowest processor load. If the user considers the internally specified sampling rate to be sufficient for his raw data, this setting is optimal.</li> </ul> | <p>The sampling rate is dynamically adapted to the selected <a href="#">signal processing</a>. The current values are displayed in the list:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Channel 1: 48000 Samples / s</p> <p>Channel 2: 48000 Samples / s</p> <p>Channel 3: 48000 Samples / s</p> <p>Channel 4: 48000 Samples / s</p> </div> <p>Minimally, the sampling rate can also be 0 measured values/s (monitoring switched off, sampling deactivated).</p> <p>If <a href="#">None</a> is selected as signal processing, the raw data transmission selected sampling rate is used.</p> |
| <p>Maximum on all channels</p> <ul style="list-style-type: none"> <li>This setting causes a high processor load.</li> </ul>                                                                                                                                            | <p>The maximum sampling rate of 96000 samples / s is used on all measuring channels.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

6

#### DATA STREAM: Max. speed

|                   |                               |
|-------------------|-------------------------------|
| Max. speed at ST1 | Switched off                  |
| Max. speed at ST2 | Acc. to internal requirements |
| Max. speed at ST3 | Maximum = 180 000 1/min       |

For raw data output, the maximum speed is related to the internal signal processing. Although only raw data is transferred via the DATA STREAM interface, the internal signal processing is still active so that bus protocols, digital outputs and current outputs can still be used.

The maximum expected speeds of the individual speed inputs can be defined as follows:

|                                    |                                                                                                                                                                                                                                                                                           |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| According to internal requirements | <p>The maximum speed is dynamically adapted to the selected <a href="#">signal processing</a>. In the list, the actual values are displayed:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>ST1: off</p> <p>ST2: 180000 1/min</p> <p>ST3: 0 1/min</p> </div> |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

---

|                         |                                                            |
|-------------------------|------------------------------------------------------------|
| Maximum = 180 000 1/min | The speed input detects speeds up to 180 00 rpm (3000 Hz). |
|-------------------------|------------------------------------------------------------|

## 7 DSP Load

DSP load  83,3 %

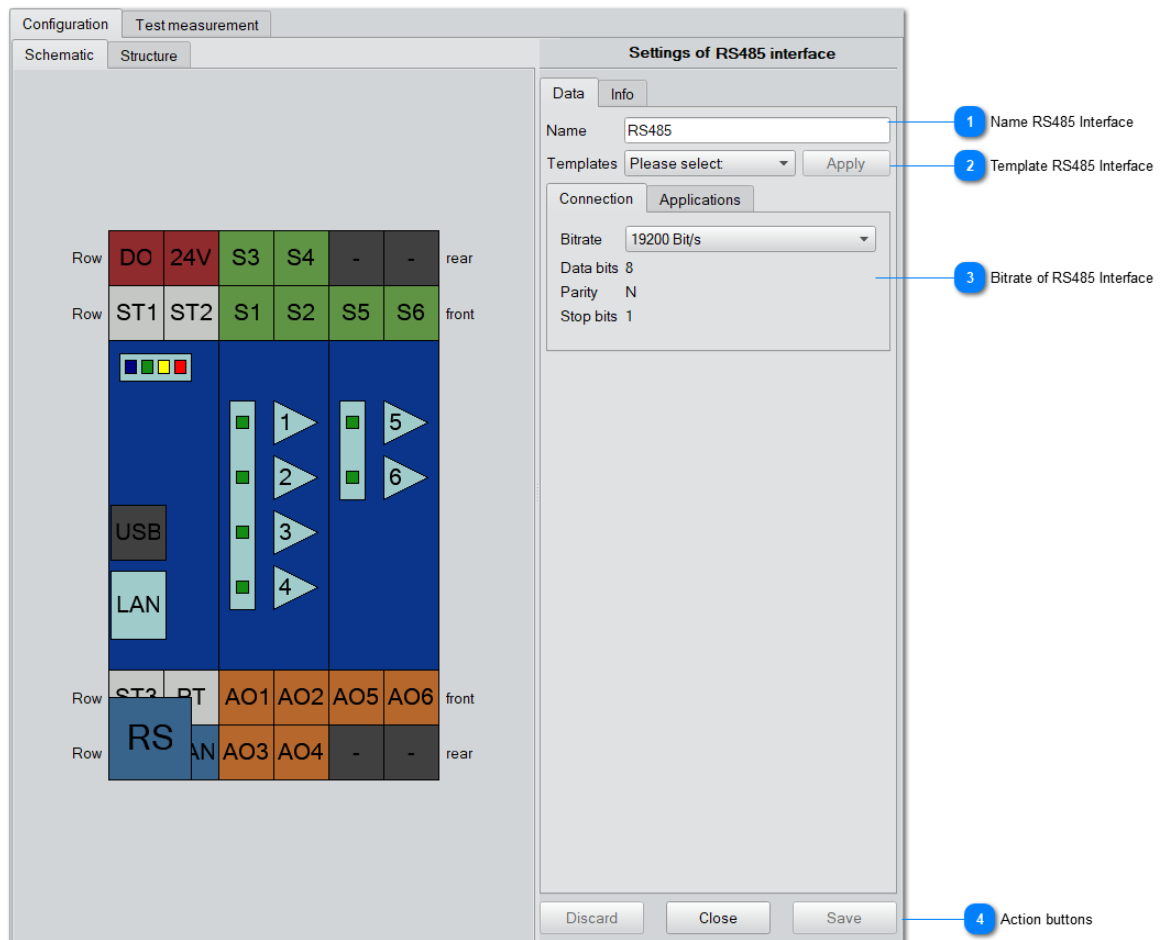
Depending on the characteristic value settings plus settings for data transmission, the digital signal processing (DSP) of the ViboLine unit is more or less required. The current load of the device is displayed. If the load value of the entire device reaches > 100%, different settings must be made. As a measure, for example, the sampling rate can be changed from maximum to internal sampling rate or different settings can be made in the signal processing of the individual measuring channels.

If configurations with > 100% utilization are to be written to the device, a message appears indicating that such a configuration will not be transferred to the device. The appearance of the message can be disabled. The message can be reactivated in the [settings](#).

## RS485 Interface

The Modbus RTU bus protocol can be used via the RS485 interface. With the use of this protocol, characteristic values, alarms and status messages calculated according to [signal processing](#) can be read from the device.

All settings are also listed in the [structure view](#) and can be edited from there.



1

### Name RS485 Interface

Name

The RS485 interface configured here can be named accordingly. Up to 40 characters are available.

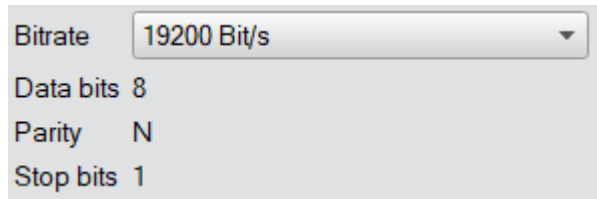
2

### Template RS485 Interface

Templates

RS485 interface settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a RS485 interface template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

3

**Bitrate of RS485 Interface**

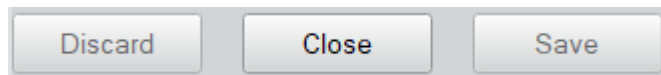
Bitrate 19200 Bit/s  
Data bits 8  
Parity N  
Stop bits 1

The bit rate of the serial interface can be set here. The following are available:

- 9600 Bit/s
- 19200 Bit/s
- 38400 Bit/s
- 57600 Bit/s

Fixed is 8 data bits, no parity and 1 stop bit (8, N, 1).

4

**Action buttons**

Discard Close Save

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

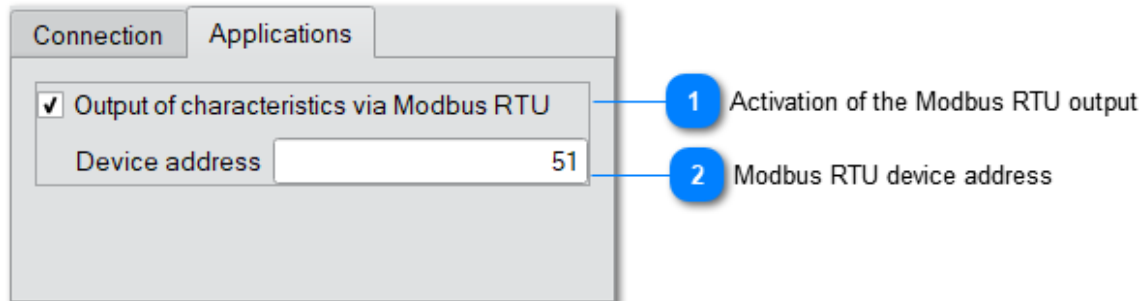
**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

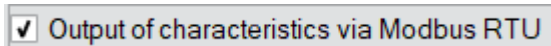
If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

## RS485 Application

The characteristic values calculated are transmitted from all available measuring channels. The Modbus RTU protocol is described in detail in the section [Documentation Bus Interfaces](#). The characteristic value output can be controlled externally using the [process trigger](#) (as well as error notification).



### 1 Activation of the Modbus RTU output



If the box is checked, the output of the characteristic values is activated via Modbus RTU. If a output via another interface is already active, the selection is deactivated and a corresponding message appears:

*Only one of the bus protocols CAN / Modbus RTU / Modbus TCP can be active at a time. The protocol currently active is: Modbus TCP*

### 2 Modbus RTU device address

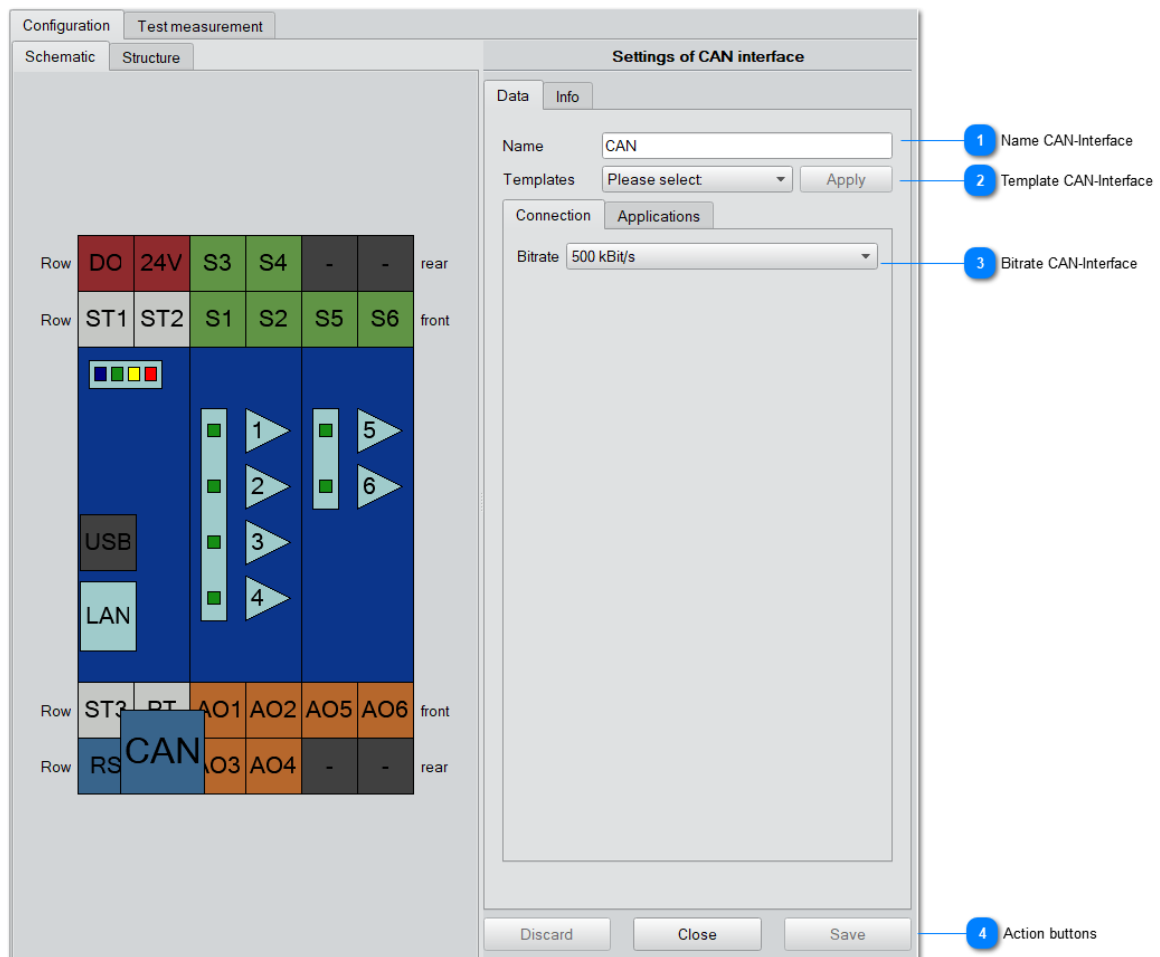


Enter the Modbus slave address. Values from 1 ... 247 are valid.

## CAN Interface

The CANopen bus protocol can be used via the CAN interface. With the use of this protocol, characteristic values, alarms and status messages calculated according to [signal processing](#) can be read from the device.

All settings are also listed in the [structure view](#) and can be edited from there.



### 1 Name CAN-Interface

Name

The CAN interface configured here can be named accordingly. Up to 40 characters are available.

### 2 Template CAN-Interface

Templates

CAN interface settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a CAN interface template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the

action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

3

### Bitrate CAN-Interface

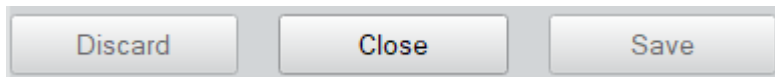
A screenshot of a software interface showing a dropdown menu for 'Bitrate'. The menu is open, and '500 kBit/s' is selected. The dropdown is light gray with a dark gray border and a small downward arrow on the right.

The bit rate of the serial interface can be set here. The following are available:

- 50 kBit/s
- 125 kBit/s
- 250 kBit/s
- 500 kBit/s
- 1 MBit/s

4

### Action buttons

A screenshot of a software interface showing three buttons: 'Discard', 'Close', and 'Save'. The buttons are light gray with dark gray borders and are arranged horizontally.

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

## CAN Application

Here, the calculated characteristic values and alarm states can be transmitted from all available measuring channels. On the protocol layer avibialine follows the CANopen standard. The CAN protocol is described in detail in the section [Documentation Bus Interfaces](#). The settings available here control the transmission of values via TPDOs. These Transmission Process Data Objects are very fast and can be transmitted in real-time.

In addition to transmission via TPDOs, many other values can be queried with SDOs, the Service Data Objects. The manufacturer supplies a complete EDS (Electronic Data Sheet) for avibialine

The output of characteristic values and alarm states can additionally be externally disabled or enabled by means of the [process trigger](#).

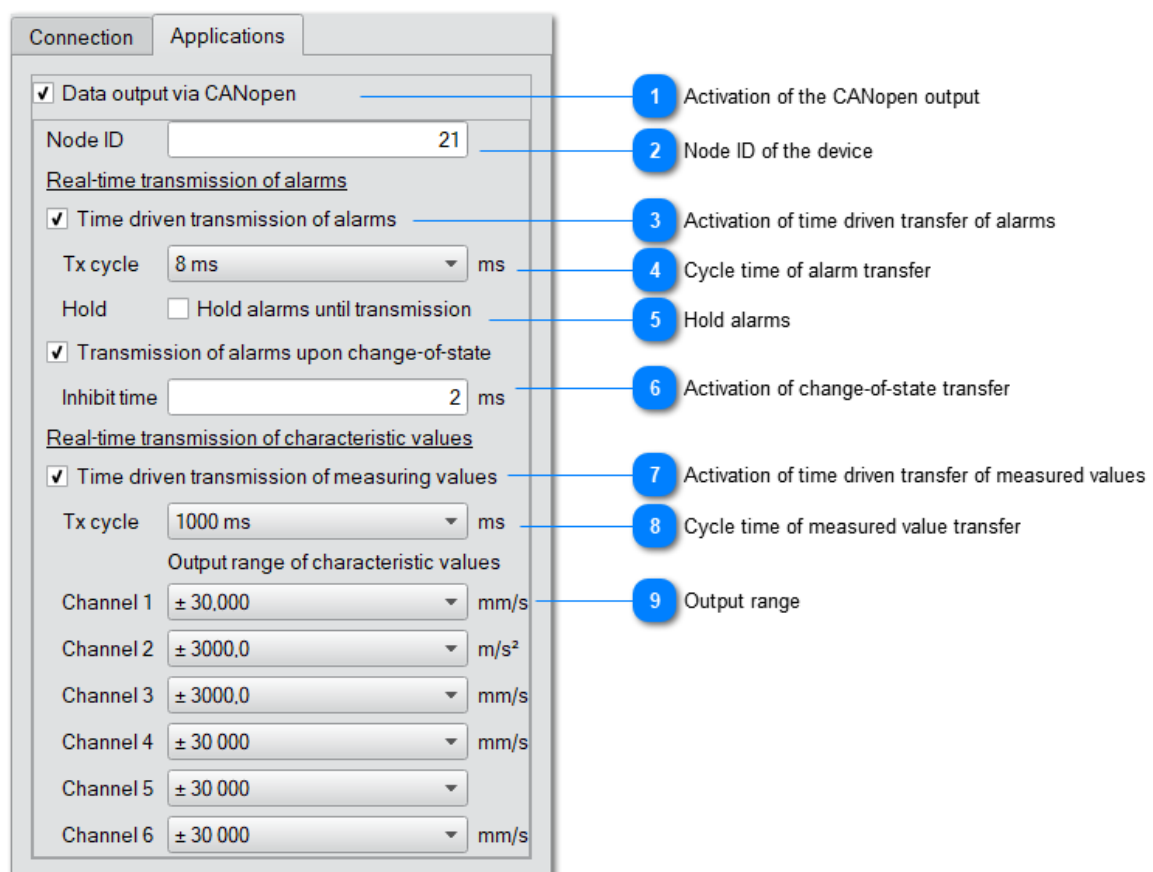
Two modes are available for data transmission via TPDOs:

### 1. Time driven transmission

Here a transmission of measured values or pending alarms is executed in selectable, fixed time intervals.

### 2. Change-of-state transmission

Only when the alarm statuses are changed will a transmission be performed.



1

**Activation of the CANopen output**☒ Data output via CANopen

If the box is checked, the output of the characteristic values is activated via CAN Bus. If a output via another interface is already active, the selection is deactivated and a corresponding message appears:

*Only one of the bus protocols CAN / Modbus RTU / Modbus TCP can be active at a time. The protocol currently active is: Modbus TCP*

2

**Node ID of the device**Node ID 

The Node ID of the device is defined here. The ID must be selected from the range 1 ... 127.

3

**Activation of time driven transfer of alarms**☒ Time driven transmission of alarms

The time-driven alarm is activated here. At the defined time interval, occurring alarms are sent.

4

**Cycle time of alarm transfer**Tx cycle  ms

The transmission cycle (time interval) of the time-controlled alarm transmission is defined here. The following are available:

- 8 ms
- 40 ms
- 80 ms
- 200 ms
- 400 ms
- 1000 ms
- 2000 ms
- 4000 ms
- 8000 ms

5

**Hold alarms**Hold ☐ Hold alarms until transmission

If an alarm is present within the transmission cycle, this information can be held until the next scheduled transmission of the alarm status. This function is activated here.

6

**Activation of change-of-state transfer**

☒ Transmission of alarms upon change-of-state

Inhibit time  ms

The change-of-state transmission of alarms is activated here. An alarm is sent immediately if the alarm condition is met. To reduce the dispatch volume in case of frequently changing alarm conditions, a blocking time can be defined (flutter prevention). The next transmission of alarm messages will then only take place after the blocking time has expired. The blocking time can have values between 0 ... 10000 ms.

7

**Activation of time driven transfer of measured values**

☒ Time driven transmission of measuring values

The time-driven measured value transmission is activated here. The measured values configured in [signal processing](#) are sent at the specified time interval.

8

**Cycle time of measured value transfer**

Tx cycle  ms

The transmission cycle (time interval) of the time-controlled measured value transmission is defined here. The following are available:

- 8 ms
- 40 ms
- 80 ms
- 200 ms
- 400 ms
- 1000 ms
- 2000 ms
- 4000 ms
- 8000 ms

9

**Output range**

Output range of characteristic values

Channel 1  mm/s

TPDOs are fast and work in real time. However, their number is limited and therefore only 16-bit integer values are available for the transmission of measured values. How the measured values are represented within these 16 bit integers can be set here:

- |            |            |
|------------|------------|
| +/- 30 000 | = 0 digits |
| +/- 3000,0 | = 1 digits |
| +/- 300,00 | = 2 digits |
| +/- 30,000 | = 3 digits |

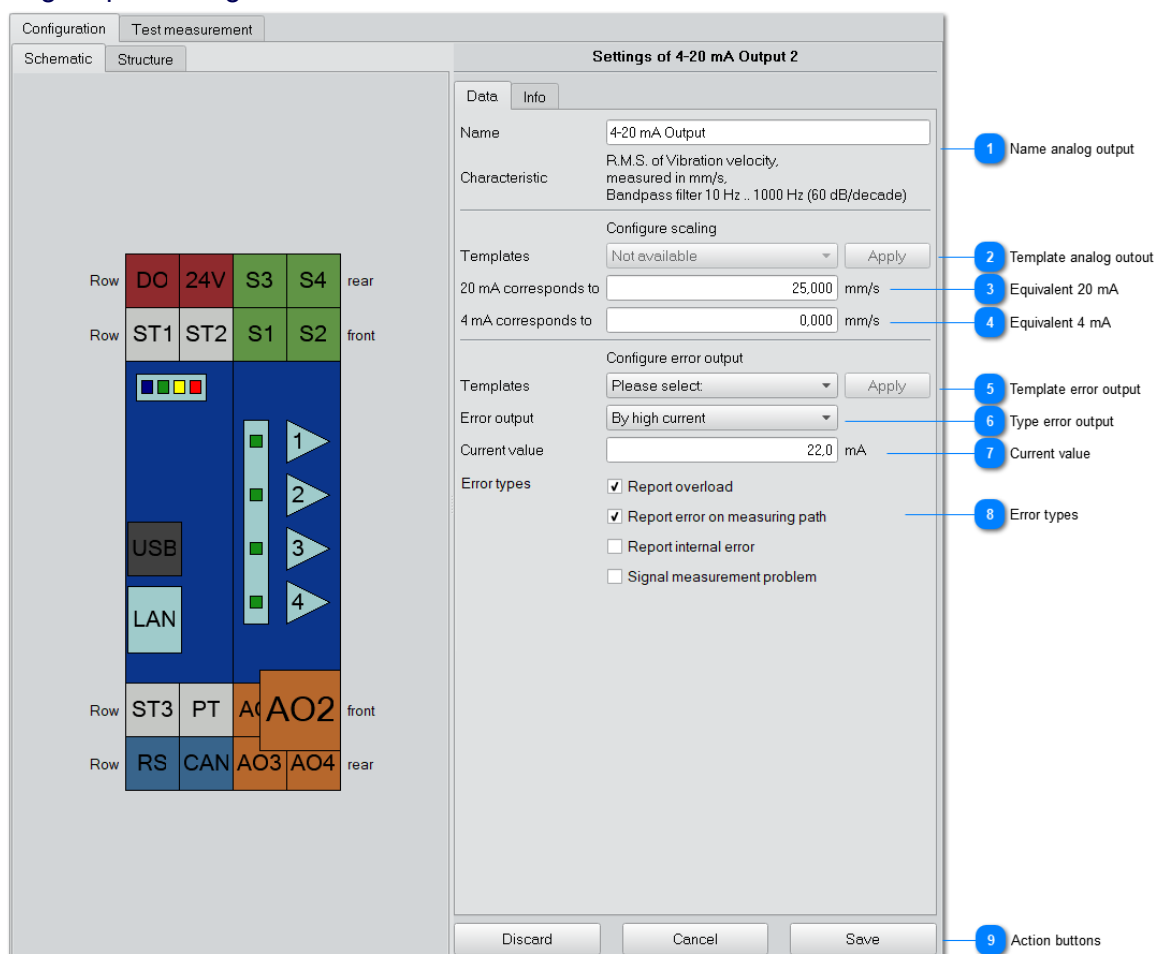
## Analog output

To configure the 4-20 mA analog outputs, the orange AO1... AO8 fields are selected. The displayed configuration is performed individually for each analog output channel.

A voltage source is required to operate the 4-20 mA current loops, as the outputs represent a current sink. As a supply voltage, voltages between 12 and 30 V can be used. The analog outputs are updated at the cycle time.

Using the **MultMode** option, several characteristic values can be configured per measuring channel. However, the 4-20 mA analog output can only map one characteristic value. The 4-20 mA current output is therefore permanently set to the output of the **1st characteristic value of the respective measuring channel**.

All analog output settings are also listed in the [structure view](#) and can be edited from there.



1

### Name analog output

|                |                                                                                                       |
|----------------|-------------------------------------------------------------------------------------------------------|
| Name           | 4-20 mA Output                                                                                        |
| Characteristic | R.M.S. of Vibration velocity,<br>measured in mm/s,<br>Bandpass filter 10 Hz .. 1000 Hz (60 dB/decade) |

Each configuration can be named accordingly. Up to 40 characters are available. The currently used vibration characteristic is displayed.

**2 Template analog output**

|           |               |       |
|-----------|---------------|-------|
| Templates | Not available | Apply |
|-----------|---------------|-------|

Analog output configurations can be saved in a template. If templates are available, they can be selected from the selection box ("Please select"). The selection of an analog output template is confirmed by clicking **Apply**. If the selected template is to be transferred to the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

**3 Equivalent 20 mA**

|                      |        |      |
|----------------------|--------|------|
| 20 mA corresponds to | 25,000 | mm/s |
|----------------------|--------|------|

The scaling of the analog output can be set. The value of the measured quantity set in [signal processing](#) is determined, which corresponds to a current of 20 mA.

**4 Equivalent 4 mA**

|                     |       |      |
|---------------------|-------|------|
| 4 mA corresponds to | 0,000 | mm/s |
|---------------------|-------|------|

The scaling of the analog output can be set. The value of the measured quantity set in [signal processing](#) is determined, which corresponds to a current of 4 mA.

**5 Template error output**

|           |                |       |
|-----------|----------------|-------|
| Templates | Please select: | Apply |
|-----------|----------------|-------|

Error output configurations can be saved in a template. If templates are available, they can be selected from the selection box ("Please select"). The selection of an error output template is confirmed by clicking **Apply**. If the selected template is to be transferred to the device, the action button **Save** must be pressed. If no template exists, "None exists" is displayed in the selection field.

**6 Type error output**

|              |                 |
|--------------|-----------------|
| Error output | By high current |
|--------------|-----------------|

In addition to the 4-20 mA current loop, faults can be reported to the subsequent evaluation electronics by means of low or high current. The selection is made via the selection field.

**7 Current value**

|               |      |    |
|---------------|------|----|
| Current value | 22,0 | mA |
|---------------|------|----|

In the event of an error, the low or high current value specified here is used. The output currents can be freely selected within the following limits:

Low current    2,0 .. 3,5 mA

High current 20,5 .. 24 mA

8

### Error types

|             |                                                                    |
|-------------|--------------------------------------------------------------------|
| Error types | <input checked="" type="checkbox"/> Report overload                |
|             | <input checked="" type="checkbox"/> Report error on measuring path |
|             | <input type="checkbox"/> Report internal error                     |
|             | <input type="checkbox"/> Signal measurement problem                |

The following error types can be reported by means of the high or low current output (multiple selection possible):

|                                   |                                                                                                                                                                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Overflow</b>                   | The input level exceeds the specified range. Analog-to-digital conversion cannot be performed with precision. A reduction of the <a href="#">gain</a> must be checked (alternatively: use of a sensor with lower sensitivity). |
| <b>Error on measuring path</b>    | Only for IEPE sensors. Short circuit or cable breakage in the sensor cable is detected.                                                                                                                                        |
| <b>Internal error</b>             | Error of the avibialine device. An inspection and diagnosis by the manufacturer may be necessary.<br>Note: If an internal error occurs, the <a href="#">zone LEDs</a> all flash simultaneously.                                |
| <b>Signal measurement problem</b> | Relevant for <a href="#">order characteristic</a> and <a href="#">bearing characteristic</a> . Error is activated when the valid speed window is left.                                                                         |

9

### Action buttons

|         |        |      |
|---------|--------|------|
| Discard | Cancel | Save |
|---------|--------|------|

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

|         |       |      |
|---------|-------|------|
| Discard | Close | Save |
|---------|-------|------|

## Digital output

The digital outputs can be accessed by clicking on the red DO1.. DO3 fields. Each digital output is parameterized individually.

All settings are also listed in the [structure view](#) and can be edited from there.

The screenshot shows the 'Settings of digital output 1' dialog box. On the left is a schematic diagram of a device with various components labeled (DO, S1, S2, S3, S4, ST1, ST2, ST3, PT, RS, CAN, AO1, AO2, AO3, AO4, USB, LAN). On the right is the settings panel with the following elements:

- 1** Name digital output: A text field containing 'Warning DO'.
- 2** Template digital output: A dropdown menu showing 'Not available' and an 'Apply' button.
- 3** Switching function: A dropdown menu showing 'Limit 1'.
- 4** Error types: Three checked checkboxes: 'Report overload', 'Report error on measuring path', and 'Report internal error'.
- 5** Tripping delay: A text field with '5.0' and a unit 's'.
- 6** Hold delay: A text field with '0.0' and a unit 's'.
- 7** Switching logic: A dropdown menu showing 'Negative logic' and a note 'On = 0V, Off = 24V'.
- 8** Effect of settings: A graph titled 'Measured value' showing three horizontal bars: a red bar at the top labeled '0 V', a yellow bar in the middle labeled '0 V', and a green bar at the bottom labeled '24V'. The yellow bar is between 'Limit 2' and 'Limit 1'.
- 9** Action buttons: Three buttons at the bottom: 'Discard', 'Cancel', and 'Save'.

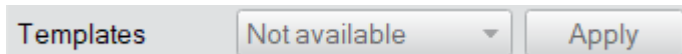
1

### Name digital output

Name

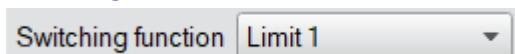
The digital output configured here can be named accordingly. Up to 40 characters are available.

## 2 Template digital output



Digital output settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

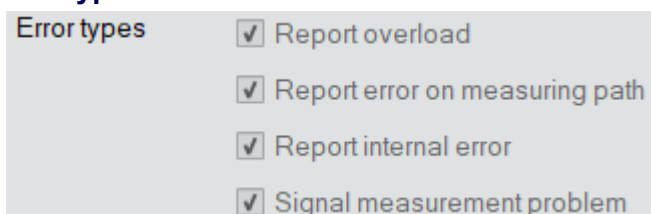
## 3 Switching function



Each digital output can be used for different switching functions:

|             |                                                                                                                      |
|-------------|----------------------------------------------------------------------------------------------------------------------|
| Always OFF  | The digital output is permanently switched to OFF (can be used as an alive signal depending on the switching logic). |
| Always ON   | The digital output is permanently switched to ON (can be used as an alive signal depending on the switching logic).  |
| Zone A      | When values are within zone A, it is switched to ON.                                                                 |
| Zone B      | When values are within zone B, it is switched to ON.                                                                 |
| Zone C      | When values are within zone C, it is switched to ON.                                                                 |
| Zone D      | When values are within zone D, it is switched to ON.                                                                 |
| Zone A -> B | The transition from zone A to B switches to ON.                                                                      |
| Zone B -> C | The transition from zone B to C switches to ON.                                                                      |
| Zone C -> D | The transition from zone C to D switches to ON.                                                                      |
| Limit 1     | When the warning level is reached, it switches to ON.                                                                |
| Limit 2     | When the alarm level is reached, it switches to ON.                                                                  |
| Outside     | When values are outside the range from Limit 1 to Limit 2, it is switched to ON.                                     |
| Error       | In the event of an error, it switches to ON.                                                                         |

## 4 Error types



If an error is to be reported via the digital output, the following error types are available (multiple selection possible):

|                                   |                                                                                                                                                                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Overflow</b>                   | The input level exceeds the specified range. Analog-to-digital conversion cannot be performed with precision. A reduction of the <a href="#">gain</a> must be checked (alternatively: use of a sensor with lower sensitivity). |
| <b>Error on measuring path</b>    | Only for IEPE sensors. Short circuit or cable breakage in the sensor cable is detected.                                                                                                                                        |
| <b>Internal error</b>             | Error of the avibialine device. An inspection and diagnosis by the manufacturer may be necessary.<br>Note: If an internal error occurs, the <a href="#">zone LEDs</a> all flash simultaneously.                                |
| <b>Signal measurement problem</b> | Relevant for <a href="#">order characteristic</a> and <a href="#">bearing characteristic</a> . Error is activated when the valid speed window is left.                                                                         |

5

**Tripping delay**

Tripping delay  s

The switching of the digital output can be delayed by a definable period of time after the switching condition has been reached. Values between 0.0 and 60 s can be set. With a delay value of 0.0 s, the switching process depends on the cycle and reaction time. The minimum switch-on delay for overall values and order characteristics is 12 ms and the maximum switch-on delay is 20 ms. If shock parameters are used, the minimum switch-on delay can be reduced to 0.666 ms.

6

**Hold delay**

Hold delay  s

The switching of the digital output can also be delayed after the switching condition has expired. Values between 0.0 and 60 s can also be set here. With a delay value of 0.0 s, the switch-off process is carried out after the cycle time.

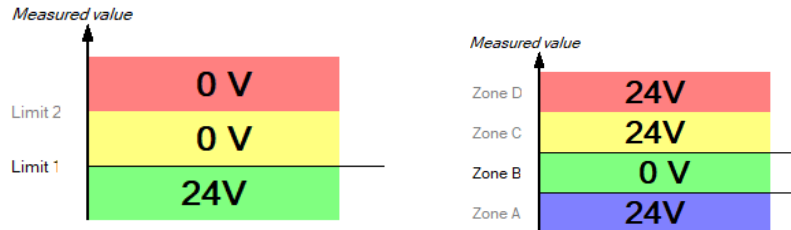
7

**Switching logic**

Switching logic    
On = 0V, Off = 24V

The switching logic of the digital output can be selected. It can be selected whether HIGH is 24 V or 0 V (for LOW correspondingly inverted).

8

**Effect of settings**

The different switching functions are displayed graphically for a better overview. This makes it clear at a glance to which limits the ON or OFF condition is assigned.

9

**Action buttons**

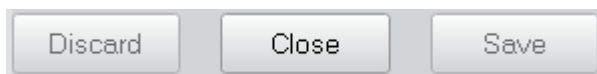
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

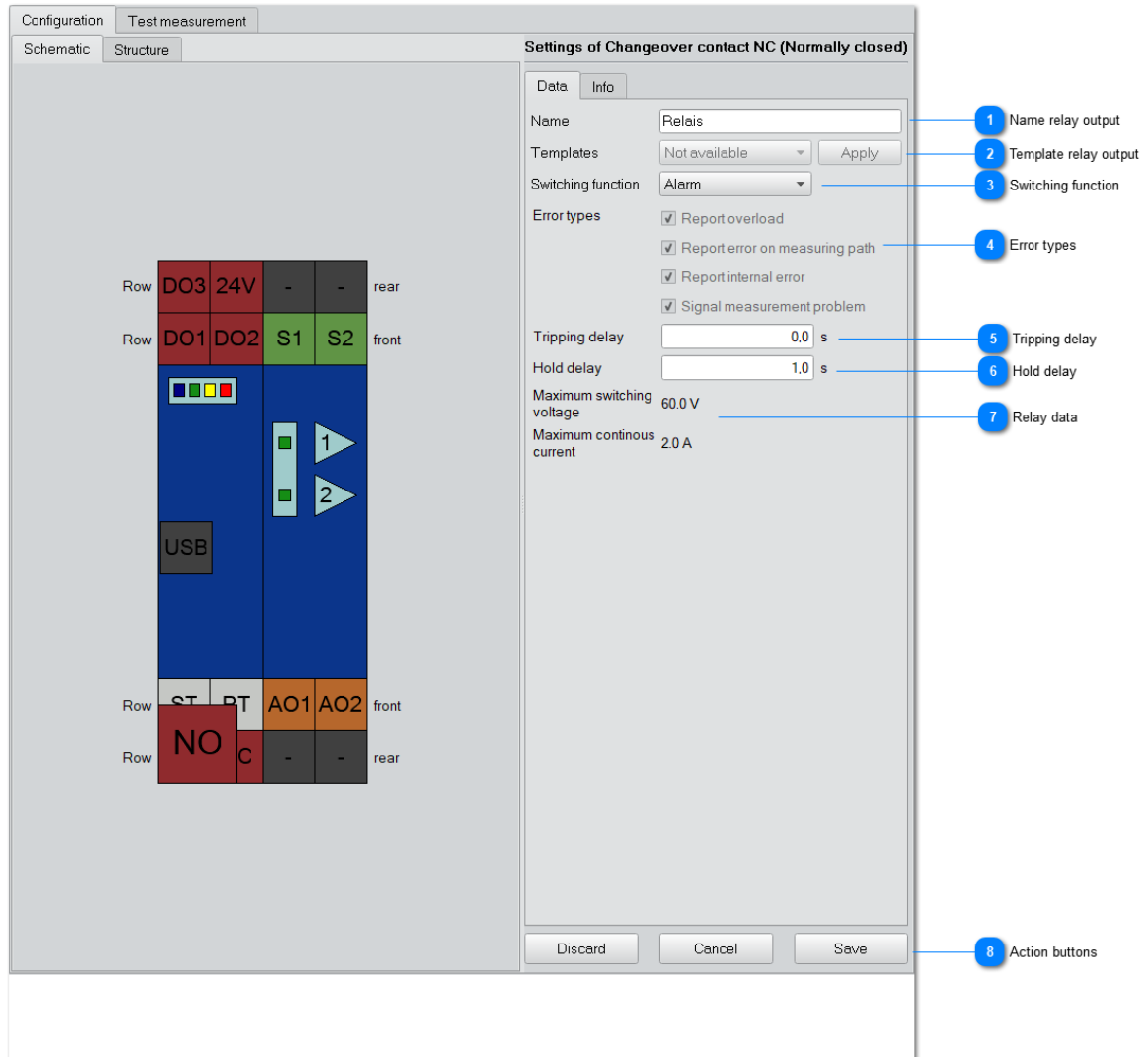
If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Relay output

The settings of the changeover relay can be selected via the grey NC or NO fields. Due to the changeover relay character, the settings for the other contact are adopted.

All settings are also listed in the [structure view](#) and can be edited from there.



### 1 Name relay output

Name

The NC- and NO relays output configured here can be named accordingly. Up to 40 characters are available.

### 2 Template relay output

Templates

Relay output settings can be saved in a [template](#). If templates are available, they can be selected from the selection box ("Please select"). The selection of a signal processing

template is confirmed by clicking **Apply**. If the selected template is to be written into the device, the action button **Save** must be pressed. If no template exists, "Not available" is displayed in the selection field.

3

### Switching function

Switching function Alarm

The NC and NO output of the changeover relay can be used for various switching functions:

|             |                                                                                                              |
|-------------|--------------------------------------------------------------------------------------------------------------|
| Always OFF  | The output is permanently switched to OFF (can be used as an alive signal depending on the switching logic). |
| Always ON   | The output is permanently switched to ON (can be used as an alive signal depending on the switching logic).  |
| Zone A      | When values are within zone A, it is switched to ON.                                                         |
| Zone B      | When values are within zone B, it is switched to ON.                                                         |
| Zone C      | When values are within zone C, it is switched to ON.                                                         |
| Zone D      | When values are within zone D, it is switched to ON.                                                         |
| Zone A -> B | The transition from zone A to B switches to ON.                                                              |
| Zone B -> C | The transition from zone B to C switches to ON.                                                              |
| Zone C -> D | The transition from zone C to D switches to ON.                                                              |
| Limit 1     | When the warning level is reached, it switches to ON.                                                        |
| Limit 2     | When the alarm level is reached, it switches to ON.                                                          |
| Outside     | When values are outside the range from Limit 1 to Limit 2, it is switched to ON.                             |
| Error       | In the event of an error, it switches to ON.                                                                 |

*Note:* Due to the change-over relay character, the switching functions are inverted on the other contact.

4

### Error types

Error types

- ☒ Report overload
- ☒ Report error on measuring path
- ☒ Report internal error
- ☒ Signal measurement problem

If an error is to be reported via the digital output, the following error types are available (multiple selection possible):

|                                |                                                                                                                                                                                                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Overflow</b>                | The input level exceeds the specified range. Analog-to-digital conversion cannot be performed with precision. A reduction of the <a href="#">gain</a> must be checked (alternatively: use of a sensor with lower sensitivity). |
| <b>Error on measuring path</b> | Only for IEPE sensors. Short circuit or cable breakage in the sensor cable is detected.                                                                                                                                        |

|                                   |                                                                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Internal error</b>             | Error of the avibialine device. An inspection and diagnosis by the manufacturer may be necessary.<br>Note: If an internal error occurs, the <a href="#">zone LEDs</a> all flash simultaneously. |
| <b>Signal measurement problem</b> | Relevant for <a href="#">order characteristic</a> and <a href="#">bearing characteristic</a> . Error is activated when the valid speed window is left.                                          |

#### 5 Tripping delay

Tripping delay  s

The switching of the relay output can be delayed by a definable period of time after the switching condition has been reached. Values between 0.0 and 60 s can be set. With a delay value of 0.0 s, the switching process depends on the cycle and reaction time. The minimum switch-on delay for overall values and order characteristics is 12 ms and the maximum switch-on delay is 20 ms. If shock parameters are used, the minimum switch-on delay can be reduced to 0.666 ms.

#### 6 Hold delay

Hold delay  s

The switching of the relay output can also be delayed after the switching condition has expired. Values between 0.0 and 60 s can also be set here. With a delay value of 0.0 s, the switch-off process is carried out after the cycle time.

#### 7 Relay data

Maximum switching voltage 60.0 V  
Maximum continuous current 2.0 A

The built-in relay is a wear-free and very fast solid-state changeover relay. The NC and NO contacts can be loaded up to 60 V and 2 A.

*Note:* Due to the SSR character of the changeover relay, both contacts are deenergized open.

#### 8 Action buttons

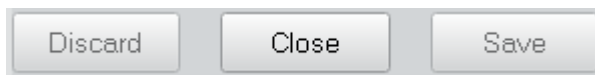
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



Status Sensor LED

To call up the information about the status LEDs of the measurement inputs, click on the LEDs shown in the schematic view. In addition to information on colour- and flashing codes, it can be specified whether a pre- or alarm limit is to be signalled as a flashing green sensor LED. The setting is made for all measuring channels at the same time.

All settings are also listed in the [structure view](#) and can be edited from there.

Configuration

Test measurement

Schematic

Structure

Row

DO

24V

S3

S4

rear

Row

ST1

ST2

S1

S2

front

Row

ST3

PT

AO1

AO2

front

Row

RS

CAN

AO3

AO4

rear

USB

LAN

1

2

3

4

LEDs for sensor input

Data

Info

| LED | IEPE Input               | ±10V Input        |
|-----|--------------------------|-------------------|
|     | Cable and sensor ok      | -                 |
|     | Cable break or no sensor | -                 |
|     | Overload at input        | Overload at input |
|     | Short circuit            | -                 |

Flash mode of green LED

Flash on alarm state

Discard

Close

Save

1

Status Sensor LED

2

Flashing Sensor LED

3

Action buttons

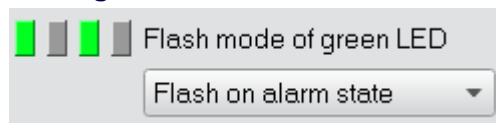
1

Status Sensor LED

| LED | IEPE Input               | ±10V Input        |
|-----|--------------------------|-------------------|
|     | Cable and sensor ok      | -                 |
|     | Cable break or no sensor | -                 |
|     | Overload at input        | Overload at input |
|     | Short circuit            | -                 |

The sensor LED indicates the current status of the sensor. Depending on whether the input is used as an IEPE input or +/- 10 V input, errors on the measuring section can be signalled by the LED.

## 2 Flashing Sensor LED



The sensor LED can also be used to detect the measuring channel with a warning or alarm violation. This setting is made for all measuring channels at the same time. In this way, exceeding a limit value can be immediately assigned to a sensor and thus to a measuring point.

If the flashing mode is not to be used, "No flashing" can be selected.

## 3 Action buttons



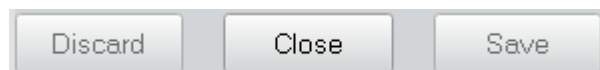
The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database and - if connected - immediately transferred to the device. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Zone-LEDs

The current settings of the zone LEDs of all channels can be called up by clicking on the coloured LED series. The display is for information purposes only. No changes can be made.

The machine status represented by the zone LEDs represents the maximum value of all channels. All zone LEDs flash at the same time when

- a data transfer from the configuration program to the device takes place
- a transient process occurs
- an internal error (e. g. overload, faulty DSP configuration).

Configuration

Test measurement

Schematic

Structure

Row

DO

24V

-

-

rear

Row

ST1

ST2

S1

S2

front

USB

LAN

1

2

Row

ST3

PT

AO1

AO2

front

Row

RS

CAN

-

-

rear

LEDs for operating status

Data

Info

Explanations for zone LEDs

D

To at least one channel applies

Measured value  $\geq$  Threshold C $\rightarrow$ D

Show C $\rightarrow$ D

C

To all channels applies

Measured value  $<$  Threshold C $\rightarrow$ D

Show C $\rightarrow$ D

AND to at least one channel applies

Measured value  $\geq$  Threshold B $\rightarrow$ C

Show B $\rightarrow$ C

B

To all channels applies

Measured value  $<$  Threshold B $\rightarrow$ C

Show B $\rightarrow$ C

AND to at least one channel applies

Measured value  $\geq$  Threshold A $\rightarrow$ B

Show A $\rightarrow$ B

A

To all channels applies

Measured value  $<$  Threshold A $\rightarrow$ B

Show A $\rightarrow$ B

Configured zone thresholds

|                            | A $\rightarrow$ B | B $\rightarrow$ C | C $\rightarrow$ D |
|----------------------------|-------------------|-------------------|-------------------|
| Ch1: a in m/s <sup>2</sup> | 3                 | 4                 | 7                 |
| Ch2: v in mm/s             | 1,800             | 3                 | 8                 |

Discard

Close

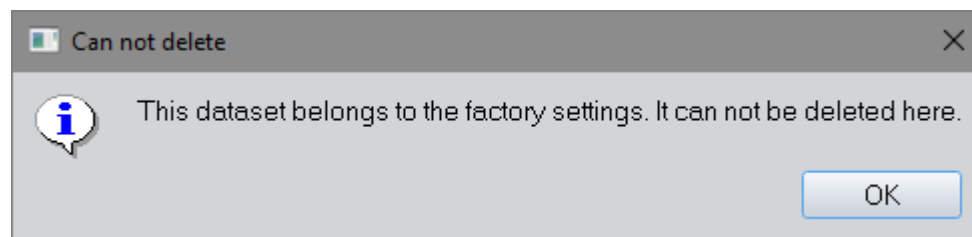
Save

## Data set information

Each properties menu contains a tab **Info**. This contains information on the creation date, change date, and the current access level of the user or dataset.

|                          |                     |
|--------------------------|---------------------|
| Created                  | 2021-09-03 10:12:55 |
| Modified                 | 2021-09-03 10:12:55 |
| My access level          | User                |
| Access level of data set | User                |

Data records can have the access levels **User** and **Manufacturer**. You cannot change or delete data records of type **Manufacturer** with access level **User**. This applies to the factory settings of the templates for filters, characteristic values and zone limits saved in the program. The program indicates this accordingly:



|                                                 |                     |
|-------------------------------------------------|---------------------|
| Data                                            | Info                |
| Created                                         | 2017-06-07 13:24:45 |
| Modified                                        | 2017-06-07 13:25:04 |
| My access level                                 | User                |
| Access level of data set                        | Manufacturer        |
| Access rights do not allow saving of this data. |                     |

## Structure view

All the settings made can be clearly shown in the structure view. The current settings are displayed for each configuration menu (sensor inputs, signal processing, analog outputs, etc.). In this way, the parameterization of many channels can be compared or controlled at a glance.

| Configuration    Test measurement   |                        |                      |                                 |                       |
|-------------------------------------|------------------------|----------------------|---------------------------------|-----------------------|
| Schematic    Structure              |                        |                      |                                 |                       |
| VL-Devices                          | Type                   | Serial number        | Use read password               | Use RW password       |
| Name                                | Quantity               | Unit                 | Input                           | Gain                  |
| Sensor 1                            | Vibration acceleration | m/s <sup>2</sup>     | IEPE                            | 1                     |
| Sensor 2                            | Vibration acceleration | m/s <sup>2</sup>     | IEPE                            | 1                     |
| Name                                | Monitoring type        | DSP load             | Filter                          | Characteristic        |
| Crash Detection spindle 21B         | Impact characteristic  | 16                   | Bandpassfilter                  | Peak value            |
| Signalverarbeitung 2                | Order characteristic   | 28,1                 | Ordnungsfilter                  | R.M.S.                |
| Name                                | 4 mA corresponds to    | 20 mA corresponds to | Error output                    | Current value [mA]    |
| 4-20 mA Ausgang 1                   | 0,000                  | 10                   | By high current                 | 22                    |
| 4-20 mA Ausgang 2                   | 0,000                  | 100                  | None                            | -                     |
| Name                                | Edge                   | Threshold            |                                 |                       |
| Triggereingang                      | Rising edge            | 7,5                  |                                 |                       |
| Name                                | Switching function     | Report overload      | Report error in measuring chain | Report internal error |
| Digitalausgang 1                    | Zone A→B               | -                    | -                               | -                     |
| SPS output                          | Error                  | Yes                  | Yes                             | Yes                   |
| Digitalausgang 3                    | Zone C→D               | -                    | -                               | -                     |
| Name                                | Switching function     | Report overload      | Report error on measuring path  | Report internal error |
| Wechselrelaiskontakt NO (Schließer) | Error                  | No                   | No                              | Yes                   |
| Wechselrelaiskontakt NC (Öffner)    | Error                  | No                   | No                              | Yes                   |
| Name                                |                        |                      |                                 |                       |
| LEDs für Betriebszustand            |                        |                      |                                 |                       |
| LEDs für Sensoreingang              | Flash on alarm state   |                      |                                 |                       |

You can also change settings directly from the structure view. The line to be changed is selected and the corresponding configuration menu opens. The individual menus are explained in the sub-sections of the [device configuration](#).

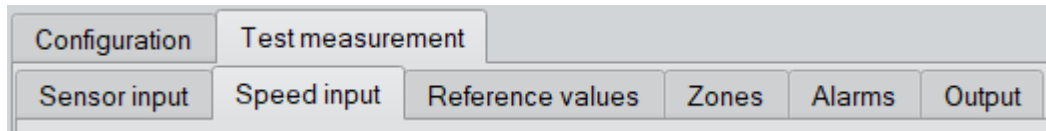
| Configuration    Test measurement   |                                             | Settings of measuring input S1                                                                                         |      |
|-------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------|
| Schematic    Structure              |                                             | Data                                                                                                                   | Info |
| VL-Devices                          | Type                                        | Name: iCS80                                                                                                            |      |
| IDS Test                            | VLE2                                        | Templates: Please select    Apply                                                                                      |      |
| Name                                | Quantity                                    | Sensor's quantity: Vibration acceleration                                                                              |      |
| iCS80                               | Vibration acceleration                      | Input: IEPE                                                                                                            |      |
| Sensor 2                            | m/s <sup>2</sup>                            | Gain: 1                                                                                                                |      |
| Name                                | Monitoring type                             | Sensitivity: 10,458 mV / m/s <sup>2</sup>                                                                              |      |
| Crash Detection spindle 21B         | DSP load                                    | Info<br>The currently monitored measuring quantity is Acceleration and corresponds to the sensor measurement quantity. |      |
| Signalverarbeitung 2                | Impact characteristic                       |                                                                                                                        |      |
| Name                                | Order characteristic                        |                                                                                                                        |      |
| 4-20 mA Ausgang 1                   | 28,1                                        |                                                                                                                        |      |
| 4-20 mA Ausgang 2                   | 4 mA corresponds to    20 mA corresponds to |                                                                                                                        |      |
| Name                                | 0,000    10                                 |                                                                                                                        |      |
| Triggereingang                      | 0,000    100                                |                                                                                                                        |      |
| Name                                | Edge    Threshold                           |                                                                                                                        |      |
| Digitalausgang 1                    | Rising edge    7,5                          |                                                                                                                        |      |
| SPS output                          | Switching function    Report overload       |                                                                                                                        |      |
| Digitalausgang 3                    | Zone A→B    -                               |                                                                                                                        |      |
| Name                                | Error    Yes                                |                                                                                                                        |      |
| Wechselrelaiskontakt NO (Schließer) | Zone C→D    -                               |                                                                                                                        |      |
| Wechselrelaiskontakt NC (Öffner)    | Switching function    Report overload       |                                                                                                                        |      |
| Name                                | Error    No                                 |                                                                                                                        |      |
| LEDs für Betriebszustand            | Error    No                                 |                                                                                                                        |      |
| LEDs für Sensoreingang              |                                             | Flash on alarm state                                                                                                   |      |

Discard    Close    Save

## Test measurement

With the help of the avibialine Konfigurator it is possible to obtain a live display of the currently measured vibration values. Prior to the autonomous operation of the avibialine devices, the measuring channel amplifications, speeds or trigger states, zone and alarm limits as well as the scaling of the 4-20 mA analog output can be checked and, if necessary, adapted. During operation, the current vibration values can be displayed by means of the test measurement function.

The test measurement function is selected by selecting the "Test measurement" tab:

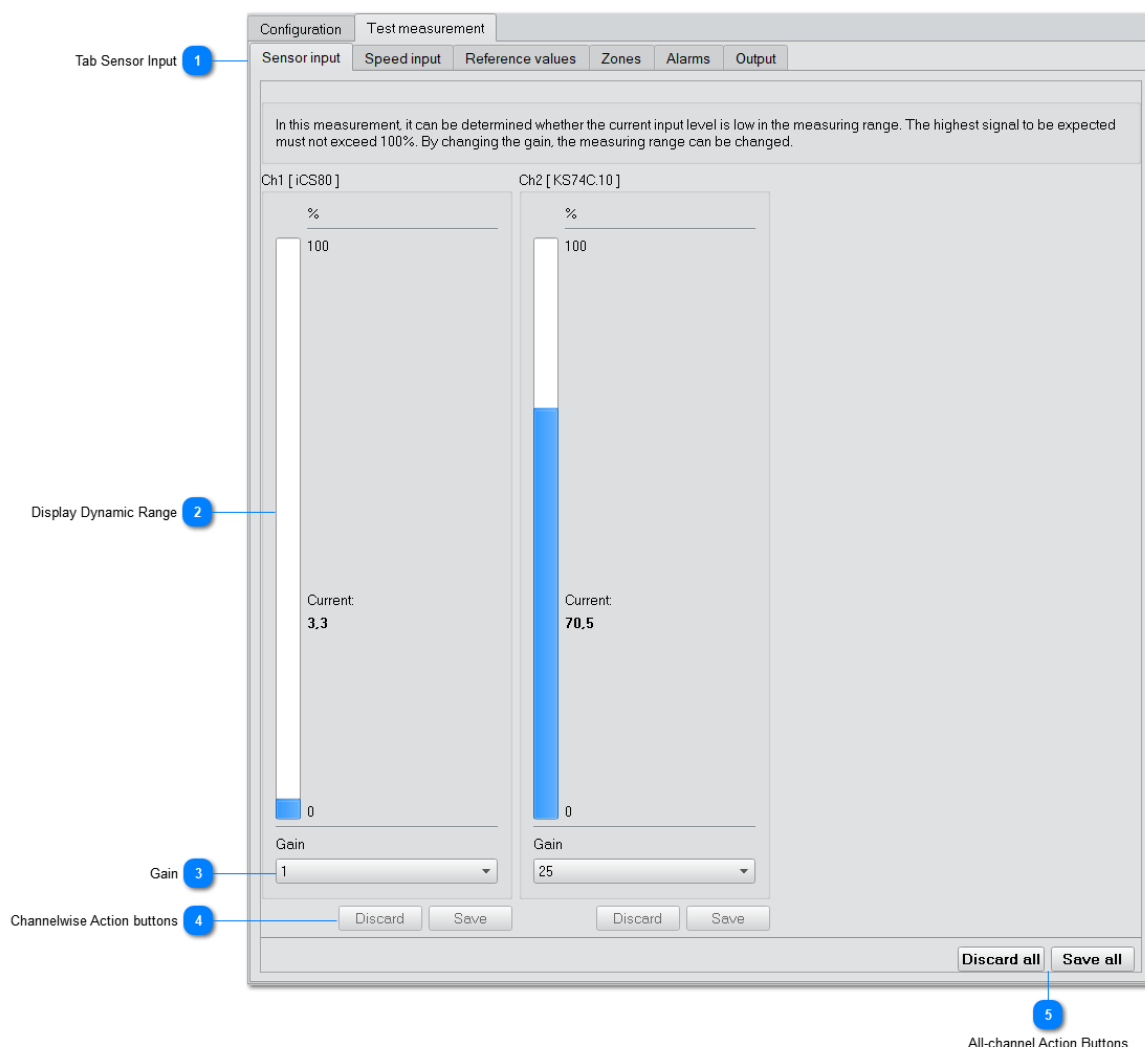


The following options are possible:

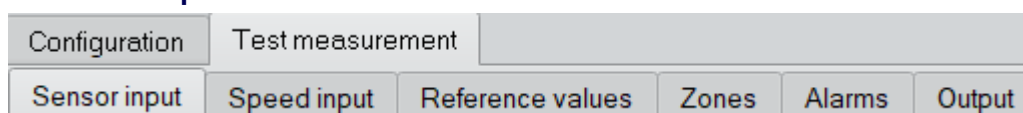
- [Sensor input](#)
- [Speed input](#)
- [Reference values](#)
- [Zones](#)
- [Alarms](#)
- [Output](#)

## Sensor input

The suitability of the currently selected gain factor can be checked quickly and easily via the level indicators. The current input level is displayed for all measuring channels. If the level is too low or too high despite a change in gain, a sensor with higher or lower sensitivity should be used. The amplification can be determined individually for each measuring channel.



### 1 Tab Sensor Input



The "Sensor Input" tab is selected to display the current level of all measurement channels.

## 2 Display Dynamic Range



The bar graph display shows the current level taking into account the selected gain of each measuring channel. This corresponds to 100% of the maximum voltage level of each input channel. The display sets this to 0.1. 40000 Hz band limited input signal (= maximum frequency range of the avibialine devices). If very high (> 95%) or very small (< 1%) values are continuously displayed during operation, it is advisable to adjust the gain. If this is not possible, a sensor with lower or higher sensitivity should be used.

## 3 Gain

For each measuring channel the internal gain can be increased from 1 to 25. This increases the digitizing quality for very small signals. By increasing the gain, the dynamic range of the measuring channel decreases naturally, also by a factor of 25.

## 4 Channelwise Action buttons

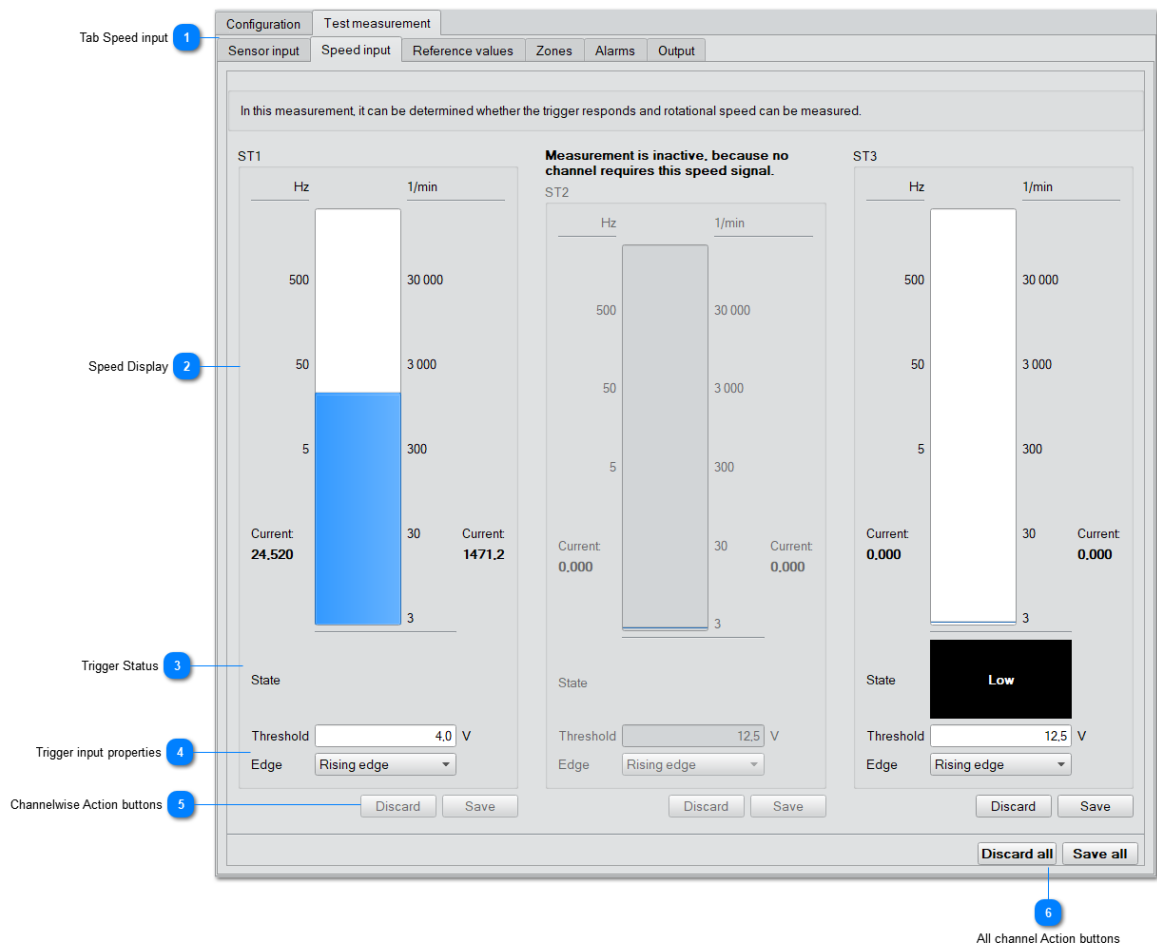
For each measuring channel, the change of the gain can be stored individually. If you want to cancel the change, you can choose Discard.

## 5 All-channel Action Buttons

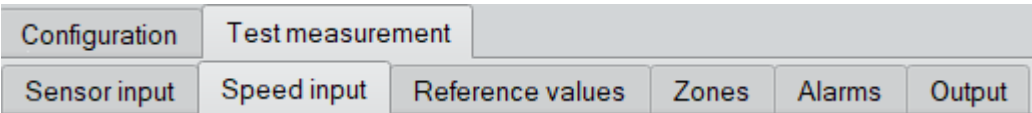
To save or discard the changes for all channels at the same time, the all-channel action buttons are used.

## Speed input

The current speed or trigger state is displayed here together with the setting options of the trigger input on the avibialine device.

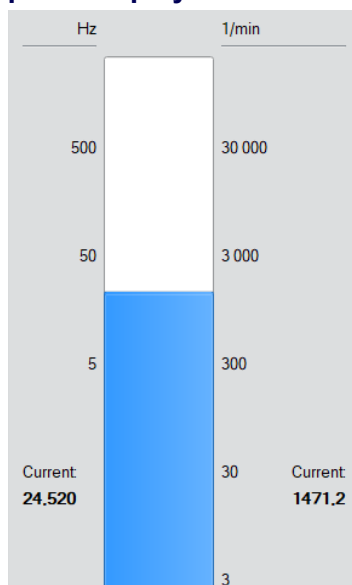


### 1 Tab Speed input



The "Speed input" tab is selected to display the current speed.

## 2 Speed Display



In the bar graph, the current speed is displayed numerically and as level. The speed is output in Hertz (Hz, left) and revolutions per minute (1/min, right). Please note that the bar graph is logarithmically scaled.

## 3 Trigger Status

If RPM are detected, the status field is empty. If no speed is detected, the current status of the trigger input is displayed (High - Low according to [switching threshold](#)):



## 4 Trigger input properties

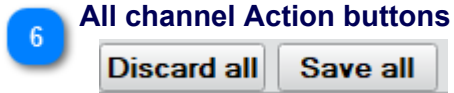
The figure shows the configuration interface for the trigger input. It includes a "Threshold" field set to 4.0 V and an "Edge" dropdown menu set to "Rising edge".

The trigger input can be configured for different digital signals, so that the [switching threshold](#) or the [switching edge](#) can be easily adjusted in the measuring menu.

## 5 Channelwise Action buttons

The figure shows two buttons: "Discard" and "Save".

Saves the settings. If you want to cancel the change, you can choose Discard.

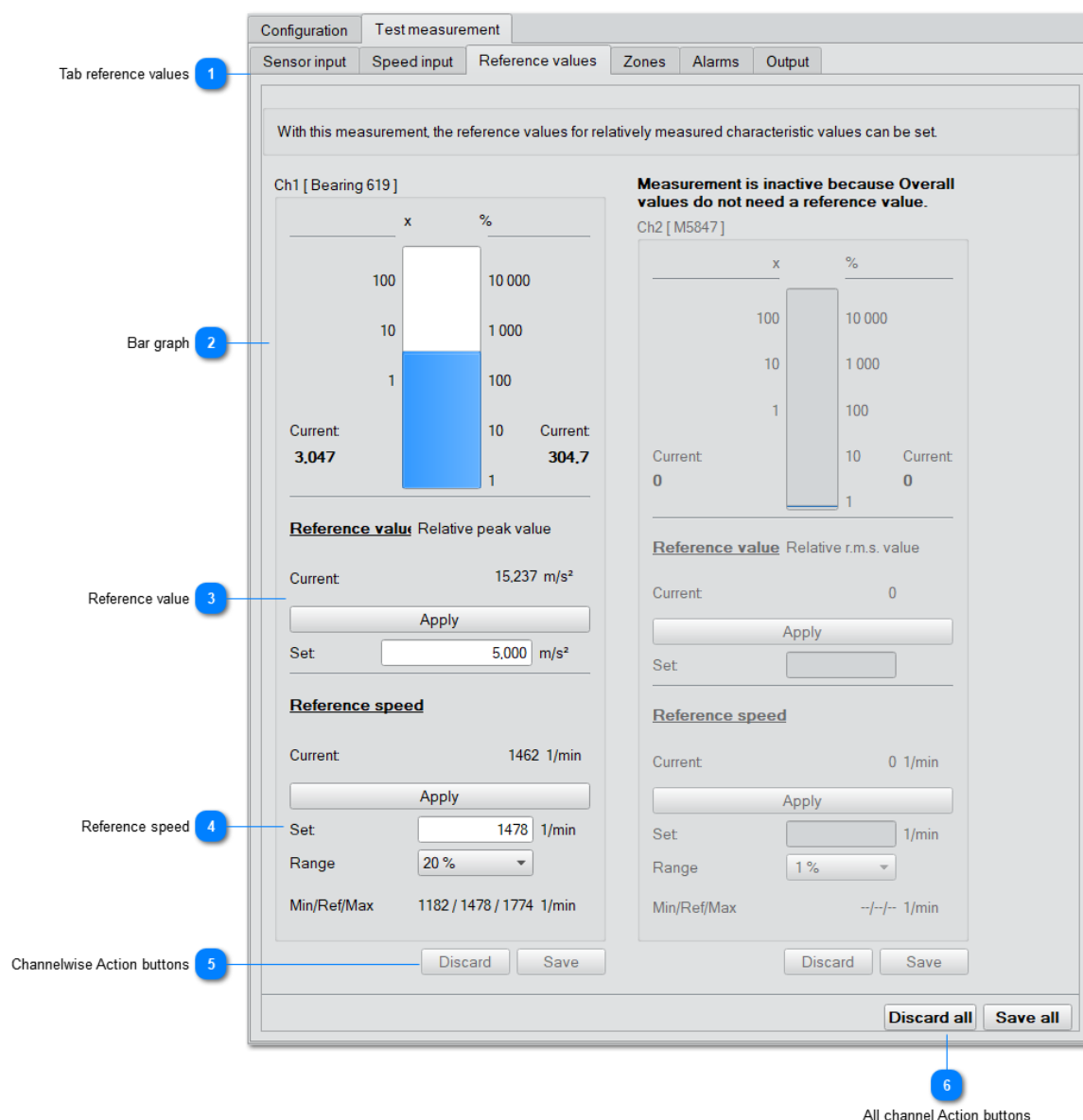


To save or discard the changes for all channels at the same time, the all-channel action buttons are used.

## Reference values

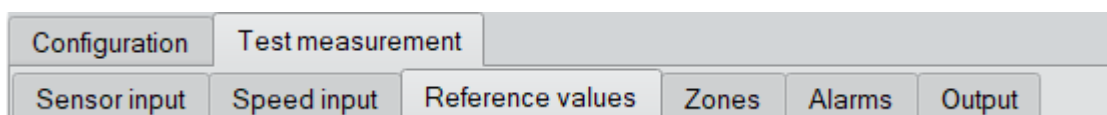
Rolling bearing values are set in relation to initially set or measured values. The test measurement function "Reference values" enables the practical measurement of these values. The measurement procedure should be carried out with the bearing run in and undamaged. The reference speed can also be saved at the same time as the reference value is acquired (rolling bearing characteristic values can only be compared under the same operating conditions).

The bar graph also serves to graphically display the current rolling bearing characteristics.



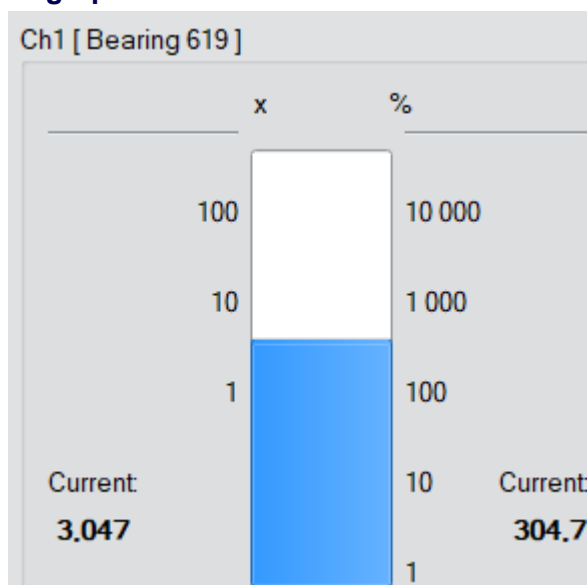
1

### Tab reference values



The "Reference value" tab is selected to display the current reference values.

2

**Bar graph**

The bar graph shows the current value of the bearing characteristic. Here a triple increase (304%) of the reference value would be present. The absolute value is shown on the left and the value in % on the right. Note that the axis scaling is logarithmic.

3

**Reference value**

**Reference value** Relative peak value

Current 15,237 m/s<sup>2</sup>

Apply

Set  m/s<sup>2</sup>

Bearing characteristics are always referred to one value (reference value). The display shows the type of the current bearing characteristic (here relative peak value) and its current measured value (here 15.24 m/s<sup>2</sup>). If the OK state of the bearing is to be aligned with the current measured value, only click on *Apply*. The input box *Set* then accepts the current measured value. Of course, a reference value can also be entered numerically.

After defining the reference value, this value is left unchanged for the lifetime of the bearing and current measured values are normalized to the reference value (ratio = bearing characteristic value).

4

**Reference speed**

**Reference speed**

Current: 1462 1/min

Set:  1/min

Range:

Min/Ref/Max: 1182 / 1478 / 1774 1/min

The formation of the bearing characteristic ( that is, the comparison of the current values with the reference value) only makes sense if both values were recorded under the same operating conditions (speed, load, ...). For the avibialine devices the parameter speed is saved. The value is saved either numerically in the input field *Set* or in the [signal processing](#) or via the test measurement function shown here. To do this, just click on the *Apply* button after entering the reference value (see [above](#)). The current speed is taken.

Since speeds are not arbitrarily constant, a speed range (in percent around the nominal speed) can be defined.

**If the valid speed window is left, "0" is output as measured value to signal that no meaningful result can be calculated. In addition, an error can be output when leaving the speed range ("Signal measurement problem").**

If measured values are also to be calculated at any speed, the selection "ignore" can be made (not recommended).

5

**Channelwise Action buttons**

Saves the settings. If you want to cancel the change, you can choose Discard.

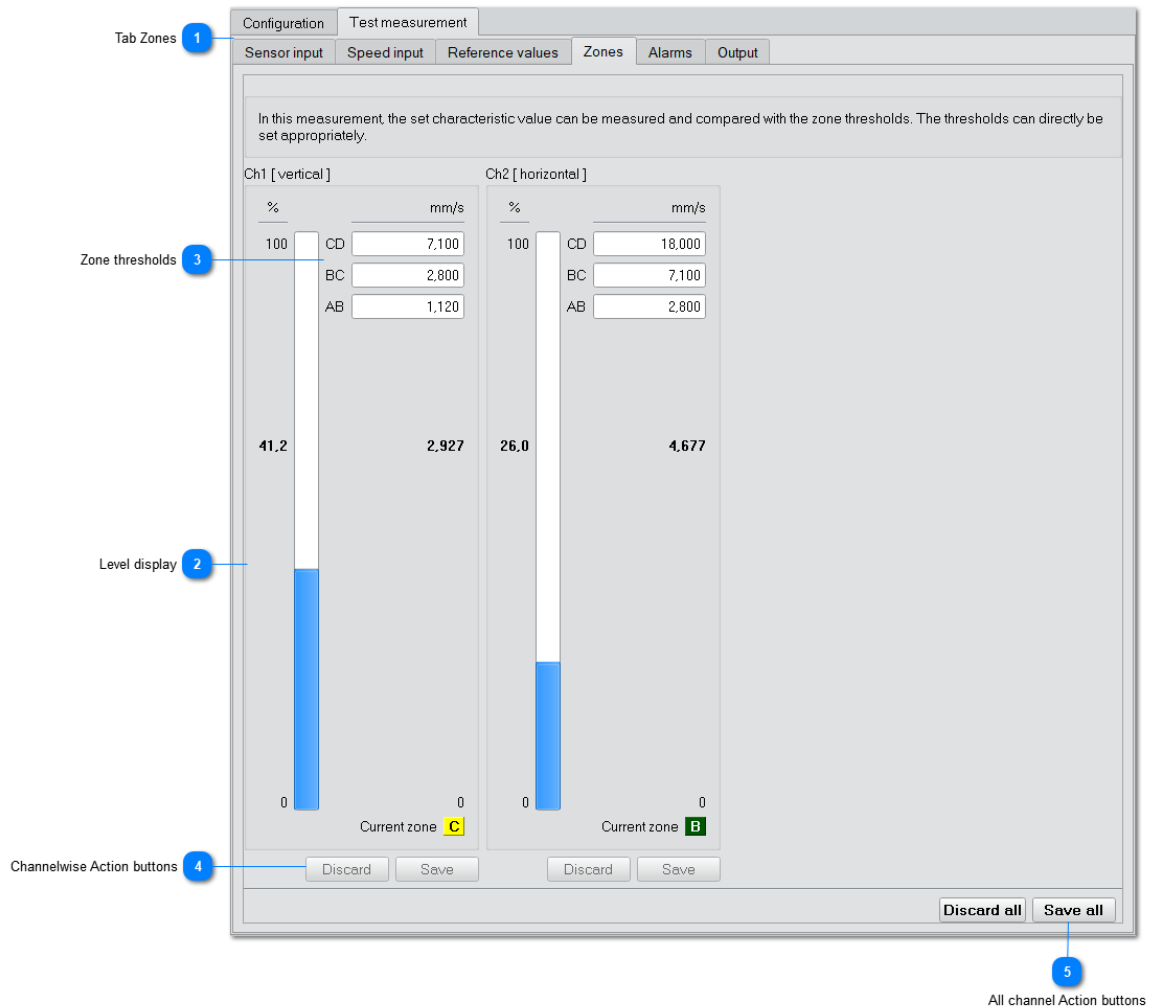
6

**All channel Action buttons**

To save or discard the changes for all channels at the same time, the all-channel action buttons are used.

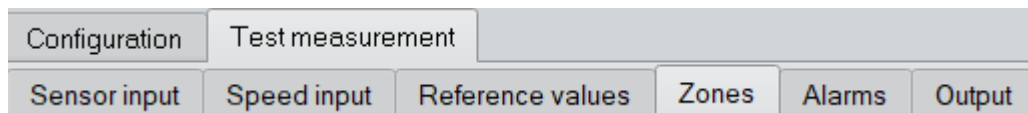
## Zones

The zone limits are displayed here together with the current vibration level. In this way, zone classification can be done at a glance. If necessary, the zone limits can be adjusted. Individual zone limits can be defined for each measuring channel.

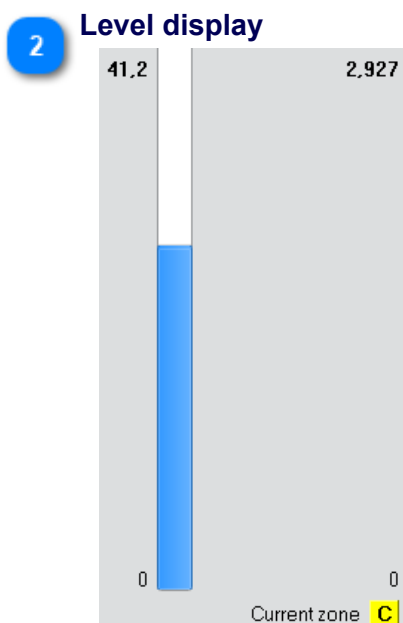


1

### Tab Zones



The "Zones" tab is selected to display the current vibration level of all measurement channels.



The level display shows the currently measured value of the characteristic value of the configured [signal processing](#). On the left the value is given in %, on the right in the unit of the selected characteristic value. 100% correspond to the zone transition C/D. The evaluation zone corresponding to the current amplitude is displayed at the bottom right.

**3 Zone thresholds**

|    |       |
|----|-------|
| CD | 7,100 |
| BC | 2,800 |
| AB | 1,120 |

The currently set zone limits are shown here. For machine classes outside the relevant standards (e. g. ISO 10816 / 20816) or if free zone limits are selected, the values can be adjusted here with regard to the current vibration levels.

**4 Channelwise Action buttons**

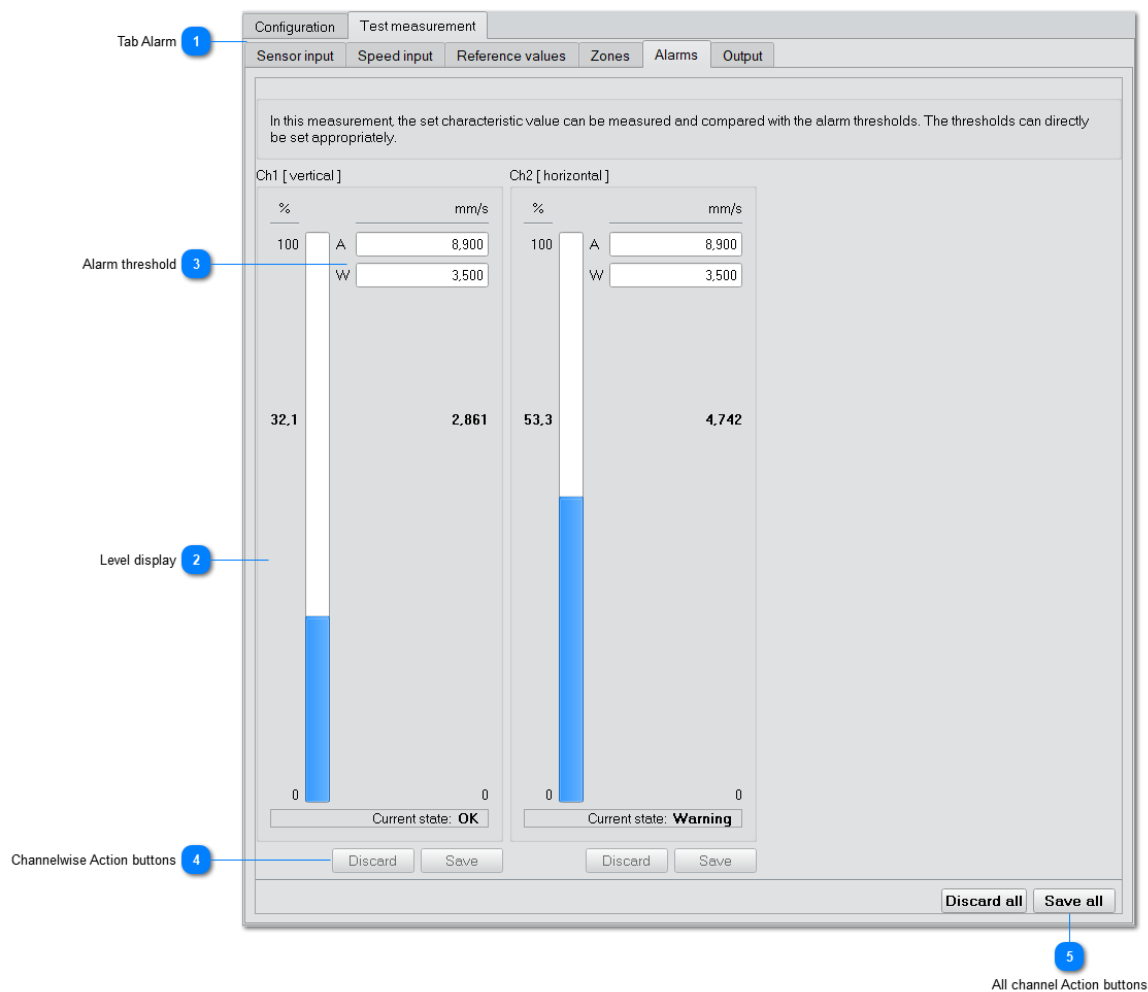
For each measuring channel, the change of the zone limits can be saved individually. If you want to cancel the change, you can choose Discard.

**5 All channel Action buttons**

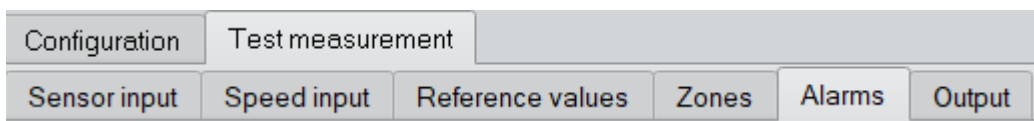
To save or discard the changes for all channels at the same time, the all-channel action buttons are used..

## Alarms

The currently occurring vibration level is displayed in the alarm calibration menu together with the defined alarm limits. In this way, the determination of the baseline (see below) which is necessary for determining the alarm can easily take place. Individual alarm limits can be set for each channel.

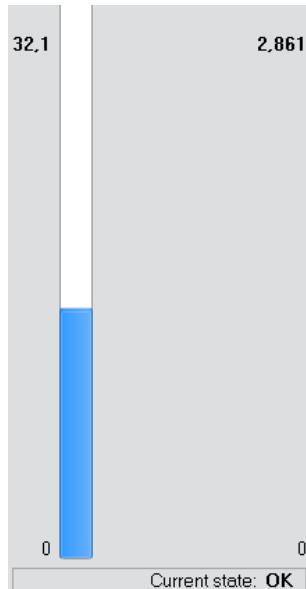


### 1 Tab Alarm



The "Alarms" tab is selected to display the current vibration levels of all measurement channels.

2

**Level display**

The level display shows the currently measured value of the characteristic value of the configured [signal processing](#). On the left the vibration level is given in %, on the right in the unit of the selected characteristic value. 100% corresponds to the value of the main alarm (HA). The alarm assignments corresponding to the current amplitude are displayed in the lower area.

3

**Alarm threshold**

|   |       |
|---|-------|
| A | 8,900 |
| W | 3,500 |

The values for the warning (W) and the alarm (A) can be adjusted here with regard to the current vibration levels.

**Alarm:**

This value must be determined individually for each machine. In many parts of ISO 10816 it is suggested that the switch-off value should not be higher than 1.25 x zone C/D limit value.

**Warning:**

This value must be determined individually for each machine. In many parts of DIN ISO 10816 it is suggested to determine the alarm value according to the following rule:

Alarm = baseline +  $p \times$  threshold Zone B/C.

Note:  $0 < p < 1$ .

The baseline depends on the respective machine, the measuring location and the measuring direction. It must be determined individually for each monitoring channel.

In general, the alarm value should not be higher than 1.25 zone limit B/C.

4

**Channelwise Action buttons**

For each measuring channel, the changes of the alarm values can be stored individually. If you want to cancel the change, you can choose Discard.

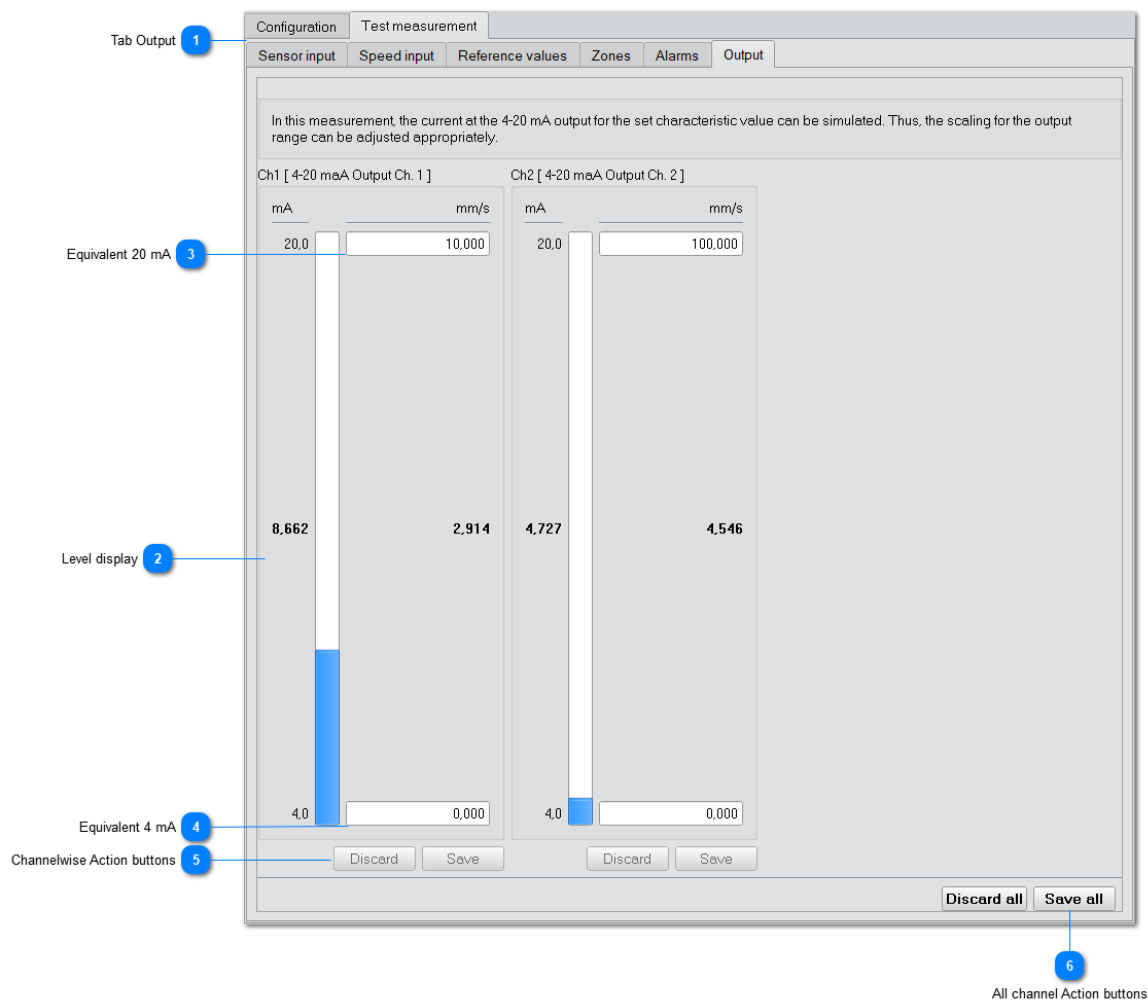
5

**All channel Action buttons**

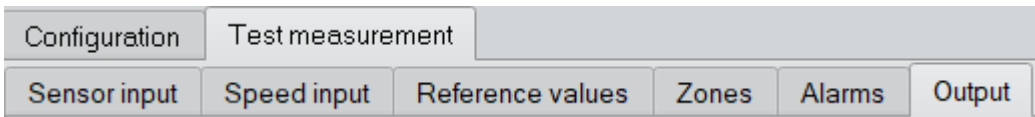
To save or discard the changes for all channels at the same time, the all-channel action buttons are used.

## Output

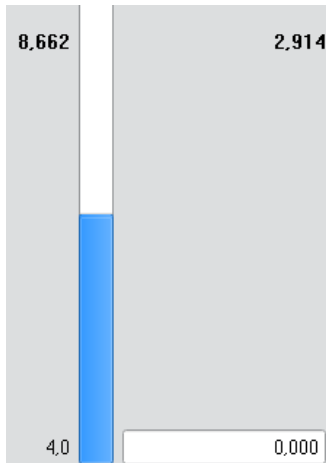
The scaling of the 4-20 mA analog output can be adapted to the available vibration values. The level indicator allows you to quickly and easily determine the 4 or 20 mA equivalents of the vibration signal. The scaling can be carried out individually for each measuring channel.



### 1 Tab Output



The "Output" tab is selected to display the current vibration levels and the 4-20 mA scaling of all measuring channels.

**2 Level display**

The level display shows the currently measured value of the characteristic value of the configured [signal processing](#). On the left the deflection is given in mA, on the right in the unit of the selected characteristic value.

**3 Equivalent 20 mA**

The scaling of the analog output can be set. The value of the measured variable set in [signal processing](#) is defined, which corresponds to a current of 20 mA.

**4 Equivalent 4 mA**

The scaling of the analog output can be set. The value of the measured variable set in [signal processing](#) is defined, which corresponds to a current of 4 mA.

**5 Channelwise Action buttons** 

The change of the current outputs can be saved individually for each measuring channel. If you want to cancel the change, you can choose Discard.

**6 All channel Action buttons** 

To save or discard the changes for all channels at the same time, the all-channel action buttons are used.

---

## Template creation and management

All settings of avibialine devices can be saved as a template. This allows often used parameter sets to be quickly and easily transferred to new devices. The following parameter sets can be saved in detail:

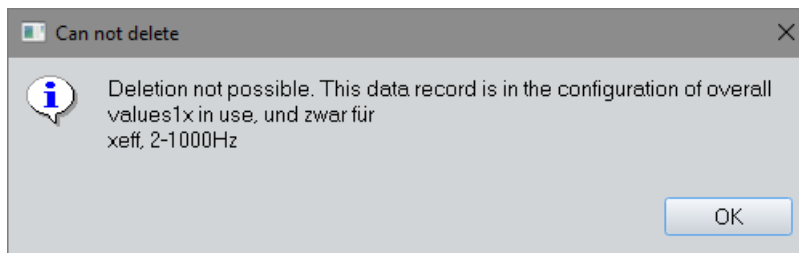
- Complete devices
- Sensor inputs
  - Trigger input
  - Analog outputs
  - Analog error output
  - Digital outputs
  - Relay
- Bandpass filter (general)
- Bandpass filter (impact)
- Bandpass filter (Bearings general)
- Bandpass filter (Bearings BCC)
- Order filter
- Overall values
- Order characteristics
- Impact characteristics
- Bearing characteristics
- Alarm thresholds
- Zone thresholds
- RS485
- CAN
- Ethernet

In addition, complete device templates can also be exported and imported. This means that a compiled data set can be quickly integrated into another program database.

Note: Passwords are not included in the export.

The [device templates](#) and examples of the [sensor input](#) and [zone threshold](#) templates are explained below. All other templates have a very similar processing principle.

Some templates refer to other templates. For example, overall value templates require the specification of a bandpass filter template. If you want to delete the underlying bandpass filter template, this is prevented by an indication of the actual usage:

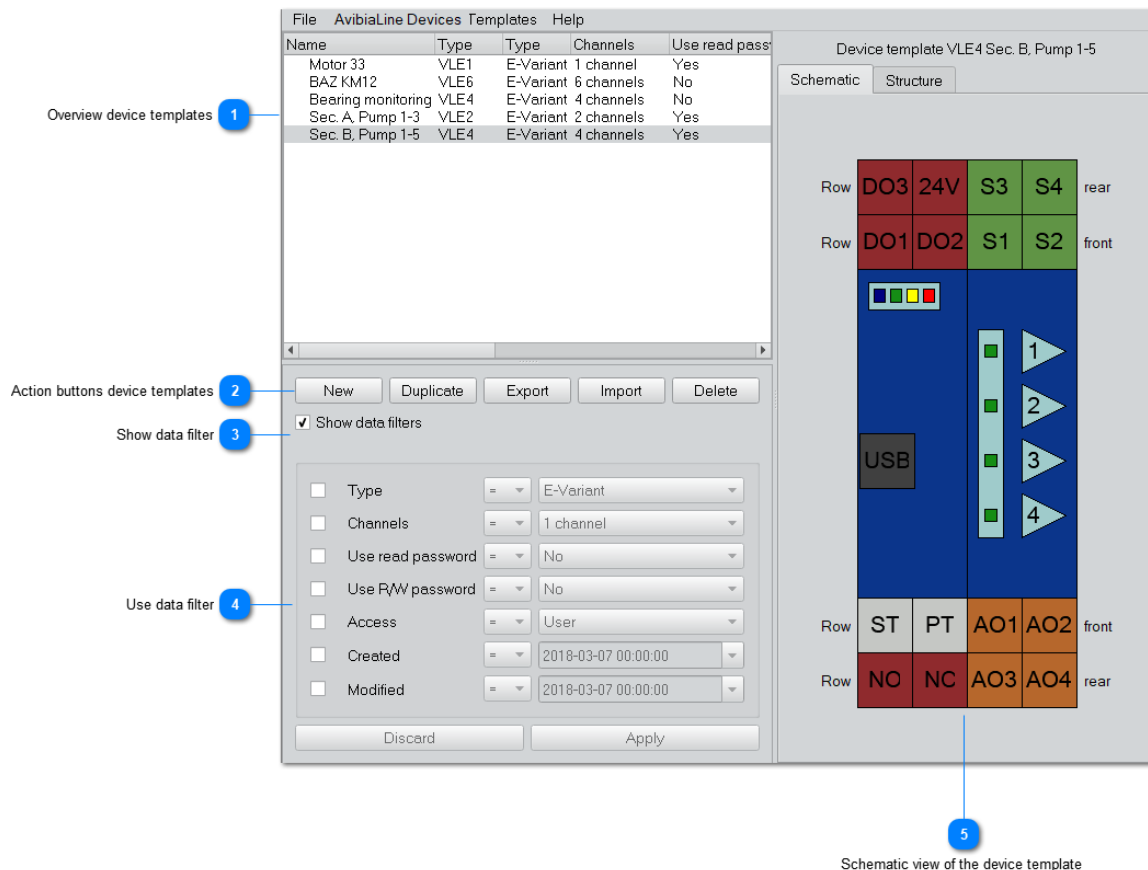


The overall value template must first be deleted.

## Device Templates

Device templates reflect the complete image of a avibialine device. For example, a consistent configuration can be quickly transferred to other avibialine devices. All device parameters can be individually adjusted in the template.

When writing device templates to connected devices, the communication parameters ([LAN settings](#)) are not transferred. As a result, the device can still be reached on the network.



### 1 Overview device templates

| Name               | Type | Type      | Channels   | Use read pass |
|--------------------|------|-----------|------------|---------------|
| Motor 33           | VLE1 | E-Variant | 1 channel  | Yes           |
| BAZ KM12           | VLE6 | E-Variant | 6 channels | No            |
| Bearing monitoring | VLE4 | E-Variant | 4 channels | No            |
| Sec. A, Pump 1-3   | VLE2 | E-Variant | 2 channels | Yes           |
| Sec. B, Pump 1-5   | VLE4 | E-Variant | 4 channels | Yes           |

The overview contains all created device templates. For this purpose, the assigned name, type, number of channels and password protection are listed.

## 2 Action buttons device templates



New device templates can be created as follows:

- Create device template from the [device overview](#)
- Create a new (empty) device template using the **NEW** action button
- Multiply an existing device template using the **Duplicate** action button.

A device template is removed (without confirmation) after clicking on **Delete**.

To export a device template, select the corresponding action button (**Export**). A file dialog appears in which the file name and path of the device template file (\*. vldbr) can be defined. For an import (**Import**) with the file dialog a template file is selected and opened.

## 3 Show data filter



To control the selection of displayed device templates a data filter can be set by activating the check mark.

## 4 Use data filter

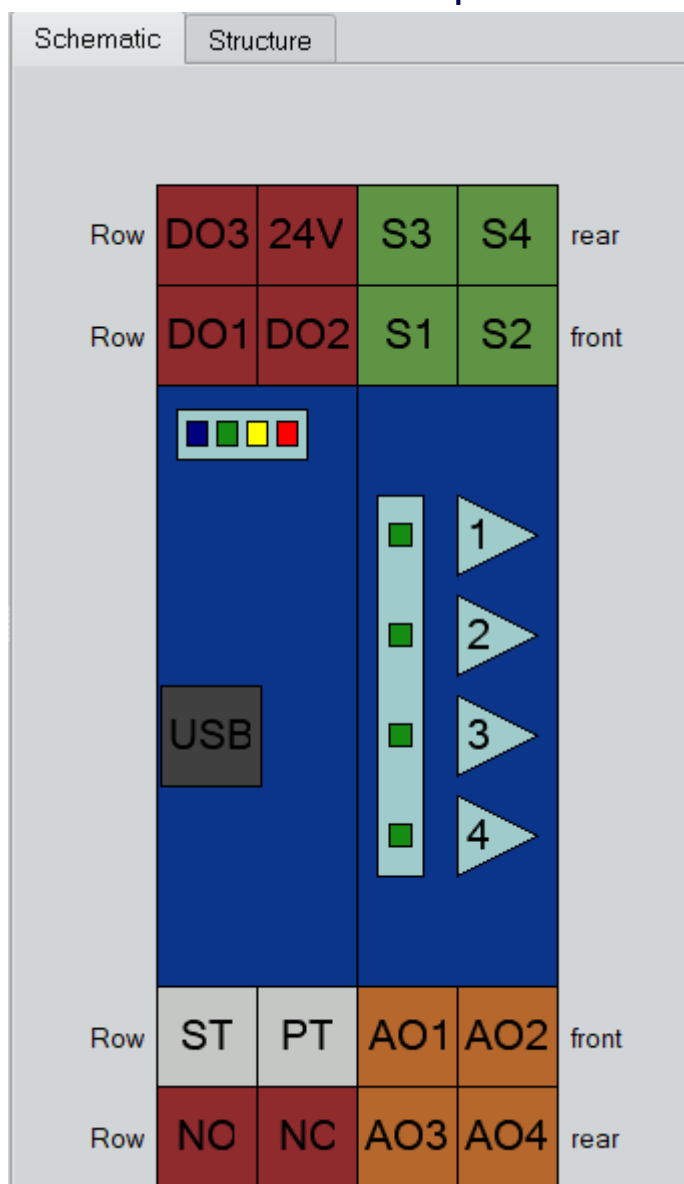
|                          |                   |   |                     |
|--------------------------|-------------------|---|---------------------|
| <input type="checkbox"/> | Type              | = | E-Variant           |
| <input type="checkbox"/> | Channels          | = | 1 channel           |
| <input type="checkbox"/> | Use read password | = | No                  |
| <input type="checkbox"/> | Use R/W password  | = | No                  |
| <input type="checkbox"/> | Access            | = | User                |
| <input type="checkbox"/> | Created           | = | 2018-03-07 00:00:00 |
| <input type="checkbox"/> | Modified          | = | 2018-03-07 00:00:00 |

Buttons: Discard, Apply

The existing device templates can be filtered according to various criteria (see picture). The desired filter category is activated by checking the box and the desired criterion and a comparison operator are selected (=, >, <, >=, <=, <>). Clicking on **Apply** sets the filter, **Discard** resets the filter selection.

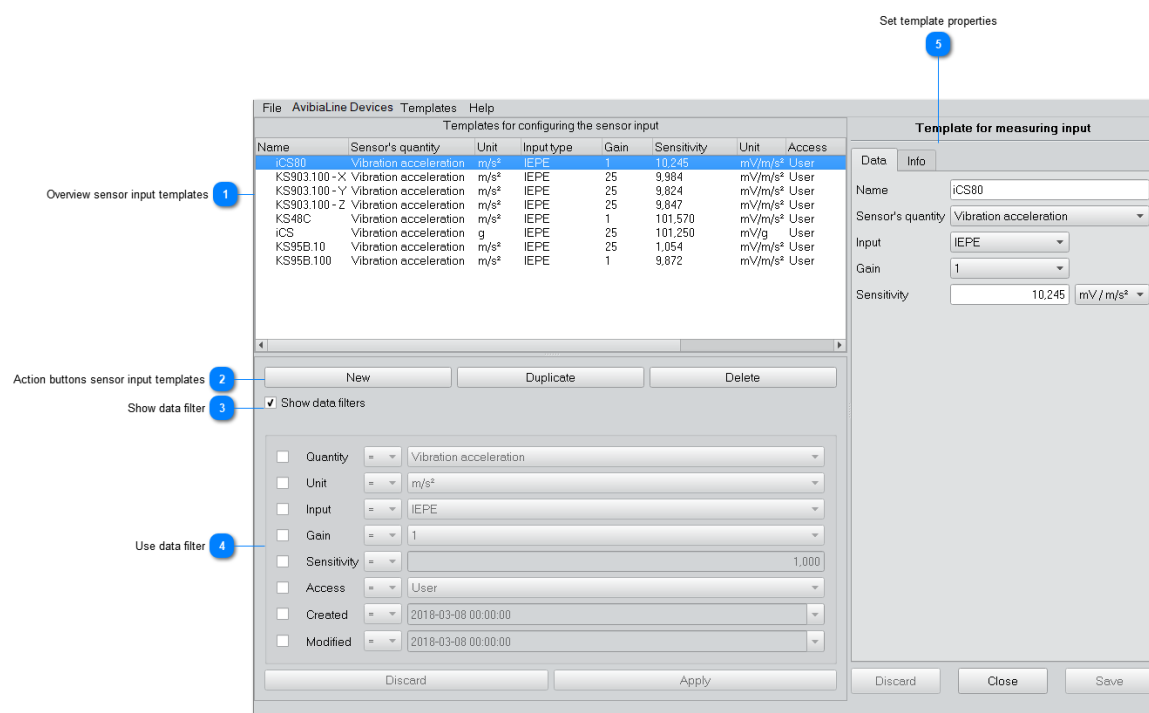
5

## Schematic view of the device template



The device template can be adapted by the schematic representation of the avibialine device (similar to the [device configuration](#)). The [structure view](#) can also be used for viewing and editing parameters.

## Example Sensor input



1

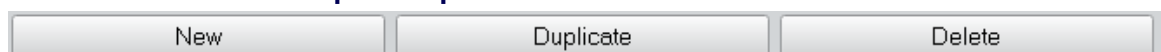
### Overview sensor input templates

| Name          | Sensor's quantity      | Unit             | Input type | Gain | Sensitivity | Unit                | Access |
|---------------|------------------------|------------------|------------|------|-------------|---------------------|--------|
| iCS80         | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 1    | 10,245      | mV/m/s <sup>2</sup> | User   |
| KS903.100 - X | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 25   | 9,984       | mV/m/s <sup>2</sup> | User   |
| KS903.100 - Y | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 25   | 9,824       | mV/m/s <sup>2</sup> | User   |
| KS903.100 - Z | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 25   | 9,847       | mV/m/s <sup>2</sup> | User   |
| KS48C         | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 1    | 101,570     | mV/m/s <sup>2</sup> | User   |
| iCS           | Vibration acceleration | g                | IEPE       | 25   | 101,250     | mV/g                | User   |
| KS95B.10      | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 25   | 1,054       | mV/m/s <sup>2</sup> | User   |
| KS95B.100     | Vibration acceleration | m/s <sup>2</sup> | IEPE       | 1    | 9,872       | mV/m/s <sup>2</sup> | User   |

The overview contains all created sensor input templates. For this purpose, the most relevant data (name, measurement type, sensitivity,...) are given.

2

### Action buttons sensor input templates



New sensor input templates can be created as follows:

- Create a new (empty) sensor input template using the **NEW** action button
- Multiply an existing sensor input template using the **Duplicate** action button.

A sensor input template is deleted (without confirmation) after clicking on **Delete**.

### 3 Show data filter

☒ Show data filters

To control the selection of displayed device templates a data filter can be set by activating the check mark.

### 4 Use data filter

|                          |             |   |                        |
|--------------------------|-------------|---|------------------------|
| <input type="checkbox"/> | Quantity    | = | Vibration acceleration |
| <input type="checkbox"/> | Unit        | = | m/s <sup>2</sup>       |
| <input type="checkbox"/> | Input       | = | IEPE                   |
| <input type="checkbox"/> | Gain        | = | 1                      |
| <input type="checkbox"/> | Sensitivity | = | 1,000                  |
| <input type="checkbox"/> | Access      | = | User                   |
| <input type="checkbox"/> | Created     | = | 2018-03-08 00:00:00    |
| <input type="checkbox"/> | Modified    | = | 2018-03-08 00:00:00    |

Discard Apply

The existing templates can be filtered according to various criteria (see picture). The desired filter category is activated by checking the box and the desired criterion and a comparison operator are selected (=, >, <, >=, <=, <>). Clicking on **Apply** sets the filter, **Discard** resets the filter selection.

### 5 Set template properties

Data Info

Name iCS80

Sensor's quantity Vibration acceleration

Input IEPE

Gain 1

Sensitivity 10,245 mV / m/s<sup>2</sup>

New or existing sensor input templates can be edited using this menu.

The action buttons can be used to change the configuration:

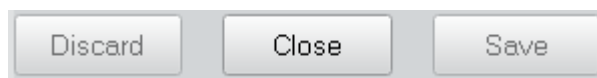
**Discard** - Restores the previous state (call up the configuration view).

**Cancel / Close** - All changes made are ignored and the configuration view is closed.

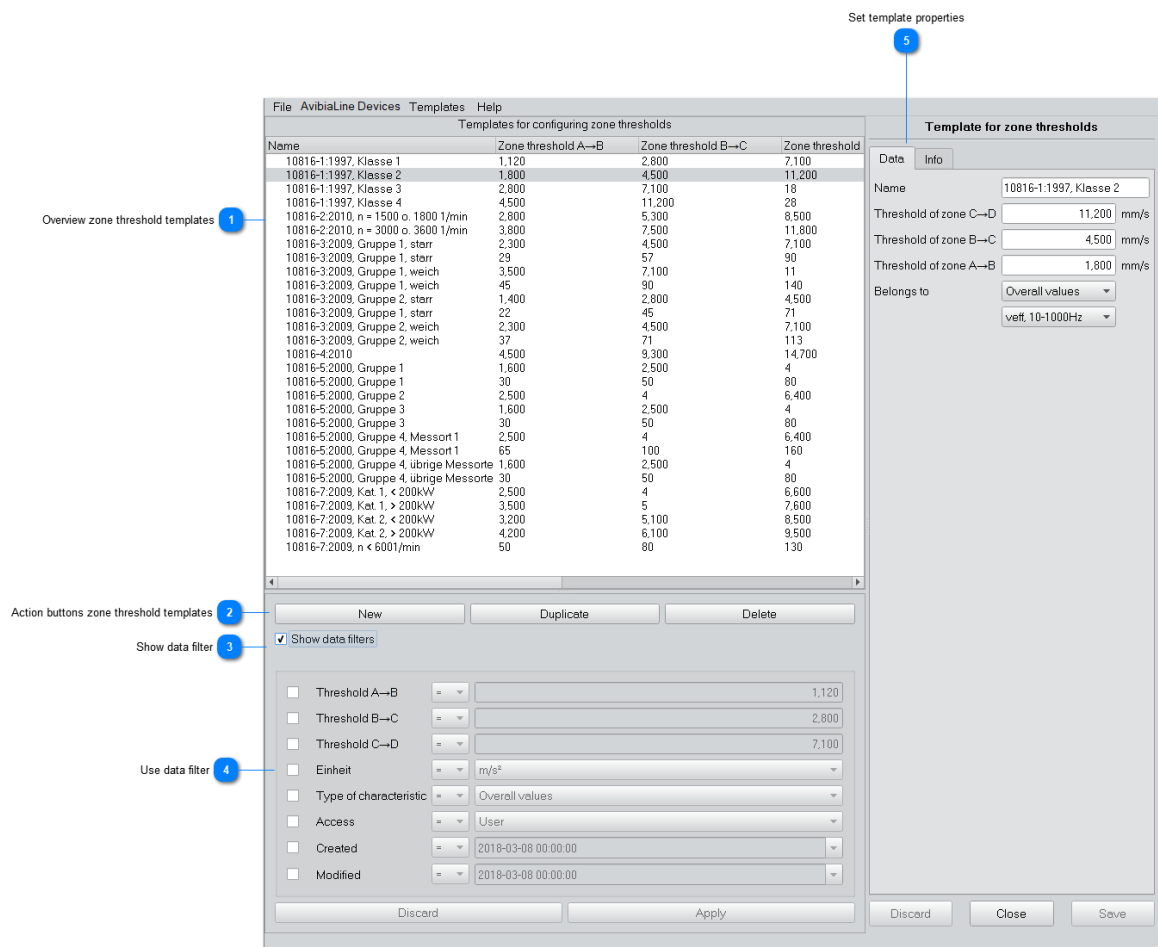
**Save** - The changes made are saved in the database. The configuration view closes.

---

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.



## Example Zone thresholds



1

### Overview zone threshold templates

| Name                                 | Zone threshold A→B | Zone threshold B→C | Zone threshold |
|--------------------------------------|--------------------|--------------------|----------------|
| 10816-1:1997, Klasse 1               | 1,120              | 2,800              | 7,100          |
| 10816-1:1997, Klasse 2               | 1,800              | 4,500              | 11,200         |
| 10816-1:1997, Klasse 3               | 2,800              | 7,100              | 18             |
| 10816-1:1997, Klasse 4               | 4,500              | 11,200             | 28             |
| 10816-2:2010, n = 1500 o. 1800 1/min | 2,800              | 5,300              | 8,500          |
| 10816-2:2010, n = 3000 o. 3600 1/min | 3,800              | 7,500              | 11,800         |
| 10816-3:2009, Gruppe 1, starr        | 2,300              | 4,500              | 7,100          |
| 10816-3:2009, Gruppe 1, starr        | 29                 | 57                 | 90             |
| 10816-3:2009, Gruppe 1, weich        | 3,500              | 7,100              | 11             |
| 10816-3:2009, Gruppe 1, weich        | 45                 | 90                 | 140            |
| 10816-3:2009, Gruppe 2, starr        | 1,400              | 2,800              | 4,500          |
| 10816-3:2009, Gruppe 1, starr        | 22                 | 45                 | 71             |
| 10816-3:2009, Gruppe 2, weich        | 2,300              | 4,500              | 7,100          |
| 10816-3:2009, Gruppe 2, weich        | 37                 | 71                 | 113            |

The overview contains all created zone threshold templates. The template name and the zone limits are listed.

## 2 Action buttons zone threshold templates

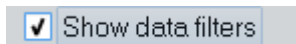


New zone threshold templates can be created as follows:

- Create a new (empty) zone threshold template using the **NEW** action button
- Multiply an existing zone threshold template using the **Duplicate** action button.

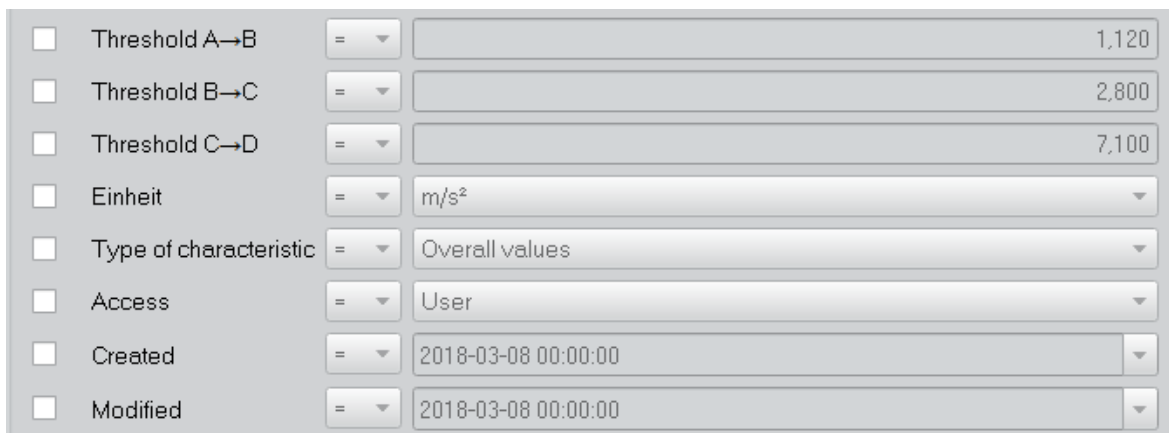
A zone threshold template is deleted (without confirmation) after clicking on **Delete**.

## 3 Show data filter



To control the selection of displayed device templates a data filter can be set by activating the check mark.

## 4 Use data filter



|                          |                        |   |                     |
|--------------------------|------------------------|---|---------------------|
| <input type="checkbox"/> | Threshold A→B          | = | 1,120               |
| <input type="checkbox"/> | Threshold B→C          | = | 2,800               |
| <input type="checkbox"/> | Threshold C→D          | = | 7,100               |
| <input type="checkbox"/> | Einheit                | = | m/s <sup>2</sup>    |
| <input type="checkbox"/> | Type of characteristic | = | Overall values      |
| <input type="checkbox"/> | Access                 | = | User                |
| <input type="checkbox"/> | Created                | = | 2018-03-08 00:00:00 |
| <input type="checkbox"/> | Modified               | = | 2018-03-08 00:00:00 |

The existing templates can be filtered according to various criteria (see picture). The desired filter category is activated by checking the box and the desired criterion and a comparison operator are selected (=, >, <, >=, <=, <>). Clicking on **Apply** sets the filter, **Discard** resets the filter selection.

5

**Set template properties**

The screenshot shows a software window titled 'Set template properties'. It has two tabs: 'Data' and 'Info'. The 'Data' tab is selected. Inside the 'Data' tab, there are several input fields and dropdown menus. The 'Name' field contains the text '10816-1:1997, Klasse 2'. Below it, there are three threshold fields: 'Threshold of zone C→D' with the value '11,200', 'Threshold of zone B→C' with the value '4,500', and 'Threshold of zone A→B' with the value '1,800'. Each threshold field has a unit 'mm/s' to its right. At the bottom, there are two dropdown menus for the 'Belongs to' property. The first dropdown is set to 'Overall values' and the second is set to 'veff, 10-1000Hz'.

New or existing zone threshold templates can be edited using this menu. Since zone thresholds are a unit-linked variable, a reference value template must be assigned (**Belongs to**).

The action buttons can be used to change the configuration:

**Discard** - Restores the previous state (call up the configuration view).

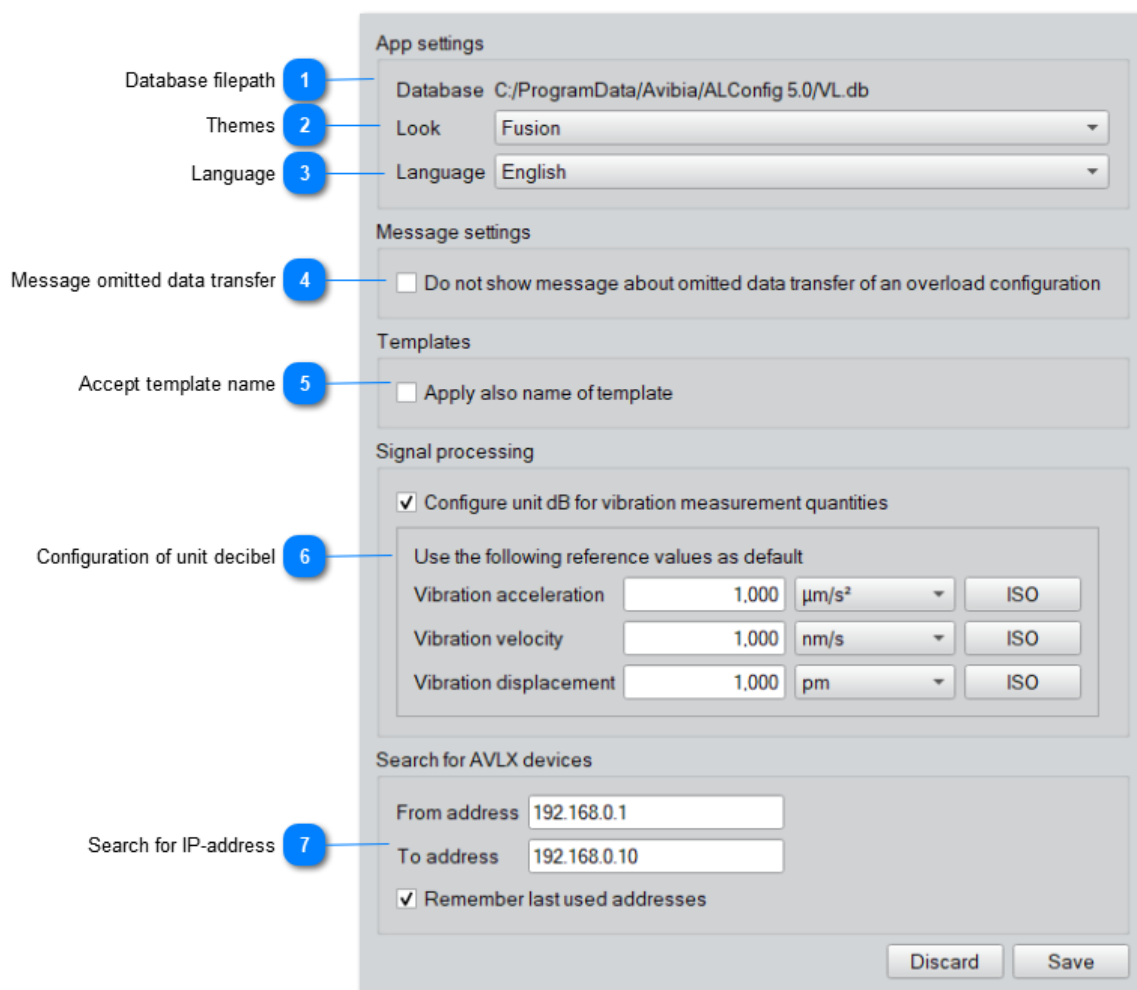
**Cancel / Close** - All changes made are ignored and the configuration view is closed.

**Save** - The changes made are saved in the database. The configuration view closes.

If the entries do not mean a change in the properties stored so far, only the **Close** action is offered.

The screenshot shows three buttons arranged horizontally: 'Discard', 'Close', and 'Save'. The 'Close' button is highlighted with a darker background.

## Program settings



### 1 Database filepath

Database C:/ProgramData/Avibia/ALConfig 5.0/VL.db

The currently used database and its file path are displayed. Access to the database with third-party programs is not possible due to encryption.

### 2 Themes

Look Fusion

The appearance of the avibialine configuration program can be adjusted. The themes *Classic*, *Fusion* and *Stone* are available. The appearance is changed after pressing the OK button.

Look Classic:

VLE2 11 IDS TestUSB\*\*R/W

Configuration

Test measurement

Schematic

Structure

DO324V--rear

Row

DO1DO2S1S2front

Row

NC--AO1AO2front

Row

NOTRIG--rear

Row

USB

1

2

Signal processing settings of channel 1

NameCrash Detection spindle 21B

TypeImpact characteristic

DSP load

This channel16 %

Entire device66.5 %

Configure impact value

TemplatesNot available

Filter

High pass1000 Hz

Low pass10000 Hz

Slope60 dB/decade

Output

QuantityVibration acceleration

Unitm/s²

CharacteristicPeak value

Time window0.100 s

Maximum response time1.000 ms

Configure alarm thresholds

TemplatesNot available

Alarm8.000 m/s²

Warning4.000 m/s²

Configure zone thresholds

TemplatesNot available

Zone C→D7.000 m/s²

Zone B→C4.000 m/s²

Zone A→B3.000 m/s²

Create template

Delete

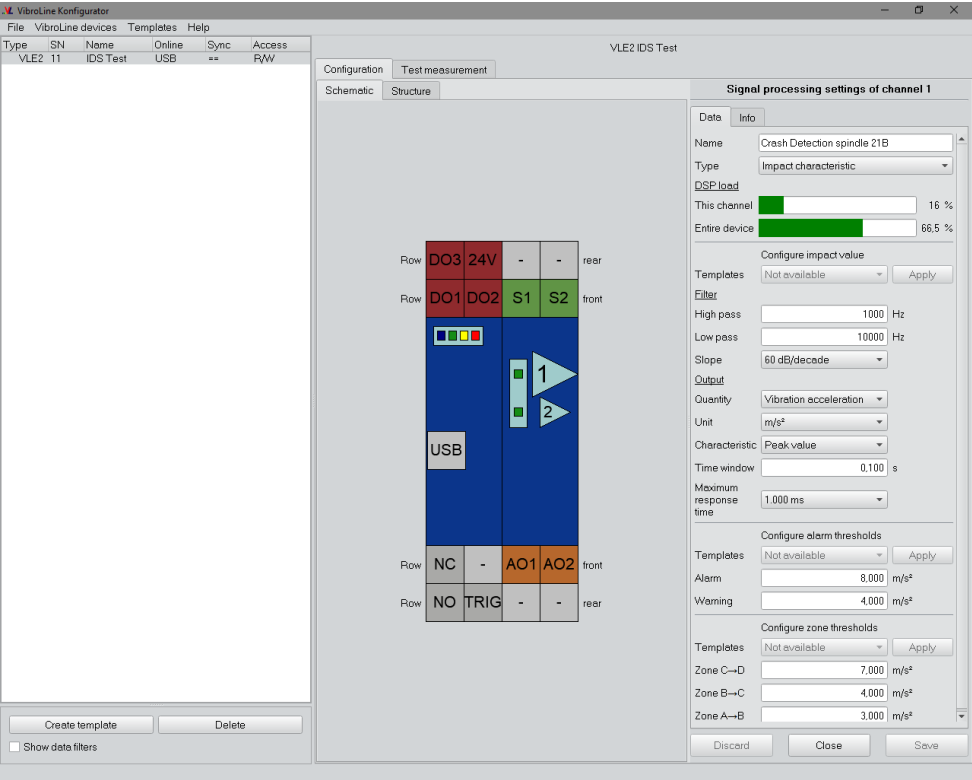
Show data filters

Discard

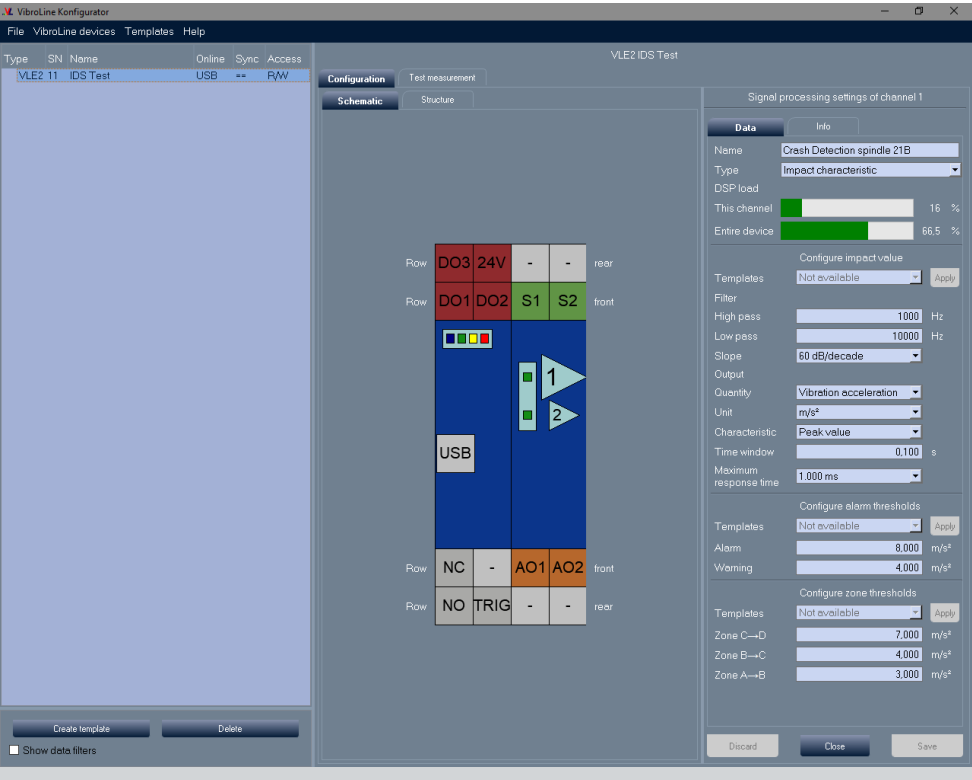
Close

Save

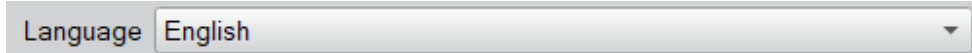
Look Fusion:



Look Stone:



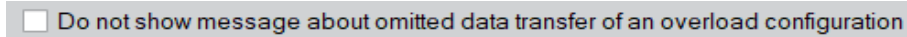
### 3 Language



Language English

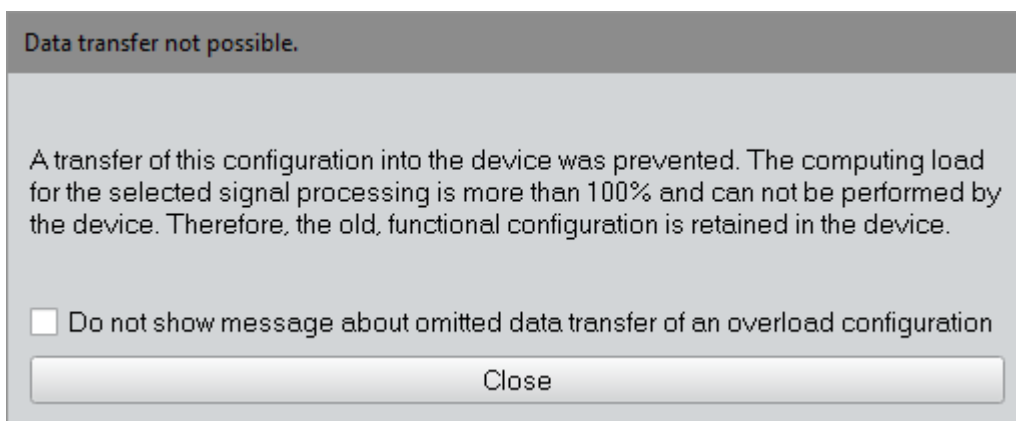
The avibialine configurator is available in German and English. Switching is done via the dropdown box.

### 4 Message omitted data transfer



☐ Do not show message about omitted data transfer of an overload configuration

If a signal processing is selected that exceeds the permissible DSP load of the entire device (> 100%), a message appears that the data transfer cannot be carried out. The appearance of this message can be suppressed by setting the check mark.



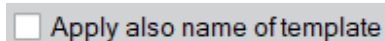
Data transfer not possible.

A transfer of this configuration into the device was prevented. The computing load for the selected signal processing is more than 100% and can not be performed by the device. Therefore, the old, functional configuration is retained in the device.

☐ Do not show message about omitted data transfer of an overload configuration

Close

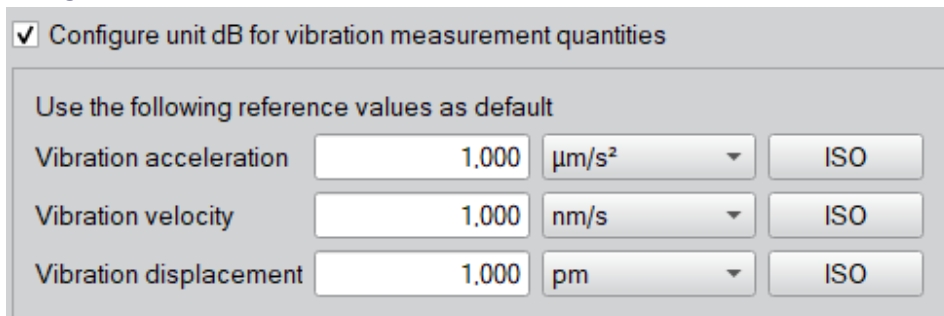
### 5 Accept template name



☐ Apply also name of template

When using templates, the template name can be transferred to the active configuration.

### 6 Configuration of unit decibel



☒ Configure unit dB for vibration measurement quantities

Use the following reference values as default

|                        |       |       |     |
|------------------------|-------|-------|-----|
| Vibration acceleration | 1,000 | μm/s² | ISO |
| Vibration velocity     | 1,000 | nm/s  | ISO |
| Vibration displacement | 1,000 | pm    | ISO |

The unit decibel (dB) can be selected for overall characteristic values, order characteristic values and bearing characteristic value. Decibel is a relative unit, i.e. it is related to a reference level. The reference level is defined for each measured variable in the following input mask.

Click on the "ISO" button to set the default reference levels.

7

**Search for IP-address**

|                                                                  |                                           |
|------------------------------------------------------------------|-------------------------------------------|
| From address                                                     | <input type="text" value="192.168.0.1"/>  |
| To address                                                       | <input type="text" value="192.168.0.10"/> |
| <input checked="" type="checkbox"/> Remember last used addresses |                                           |

The X devices can be addressed via Ethernet (LAN) for configuration and data transfer. To find the devices in the network, a search range can be defined in the following input mask.

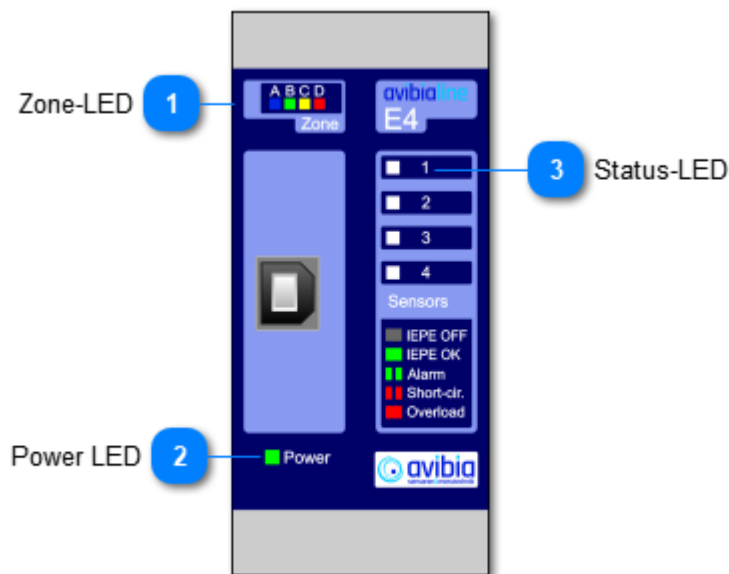
If the checkmark "Remember last used addresses" is set, the search entries in the IP scan of the [device configuration](#) are automatically transferred to the present settings menu.

## Operation

When the operating voltage is switched on, the transient response of the digital filters is indicated by a fast flashing of the zone LEDs. The transient response depends on the selected [high pass filter frequency](#) value. For this period, all outputs are also deactivated to prevent false alarms (except for internal errors). However, the transient response can be monitored by means of the test measurement. **The ready-to-operate status of the avibialine device is indicated by a single zone LED.**

During operation, all sensor inputs are analyzed and evaluated in parallel. Alarms are sent to the 3 digital outputs and/or the change-over relay in accordance with the specified limit values. The process variable outputs provide an individually configurable 4-20 mA current loop signal.

The current status of the vibration monitoring is signalled by the VL device as follows:



The [zone LEDs](#) indicate the vibration state of the machine according to the set zone limits. The maximum of all connected channels is displayed. If all LEDs flash at the same time, the configuration is transferred to the device, a transient settling process takes place or there is an internal error (e. g. DSP configuration faulty).



Indicates active power supply.

### 3 Status-LED



The [status LED](#) indicates the state of the sensor input:

|                       | IEPE Mode                                                             | $\pm 10$ V Mode |
|-----------------------|-----------------------------------------------------------------------|-----------------|
| <b>OFF</b>            | No IEPE-sensor connected or cable breakage                            | -               |
| <b>Green</b>          | IEPE-sensor connected                                                 | -               |
| <b>Green flashing</b> | Warning or alarm on respective channel ( <a href="#">adjustable</a> ) |                 |
| <b>Red</b>            | Input overload                                                        |                 |
| <b>Red flashing</b>   | Short circuit                                                         | -               |

Also for channels 2-8.

---

## Accessories

The avibialine devices can be upgraded with accessories, e.g. to enhance the comfort of displaying the current vibration level (4-20 mA display) or to be used in hazardous areas by using ATEX accessories.

On the following pages, accessories are presented and their use described:



## Displays for 4-20 mA current loop

The avibialine devices have one 4-20 mA output per measuring channel. This output can be used to forward the process variables to other peripherals (PLC, control room, ...) and/or as an output for displays showing the current vibration level. A 4-20 mA display is required for each measuring channel. The characteristic value set in the avibialine Configurator is shown.

Avibia GmbH offers the following 4-20 mA displays as avibialine accessories:

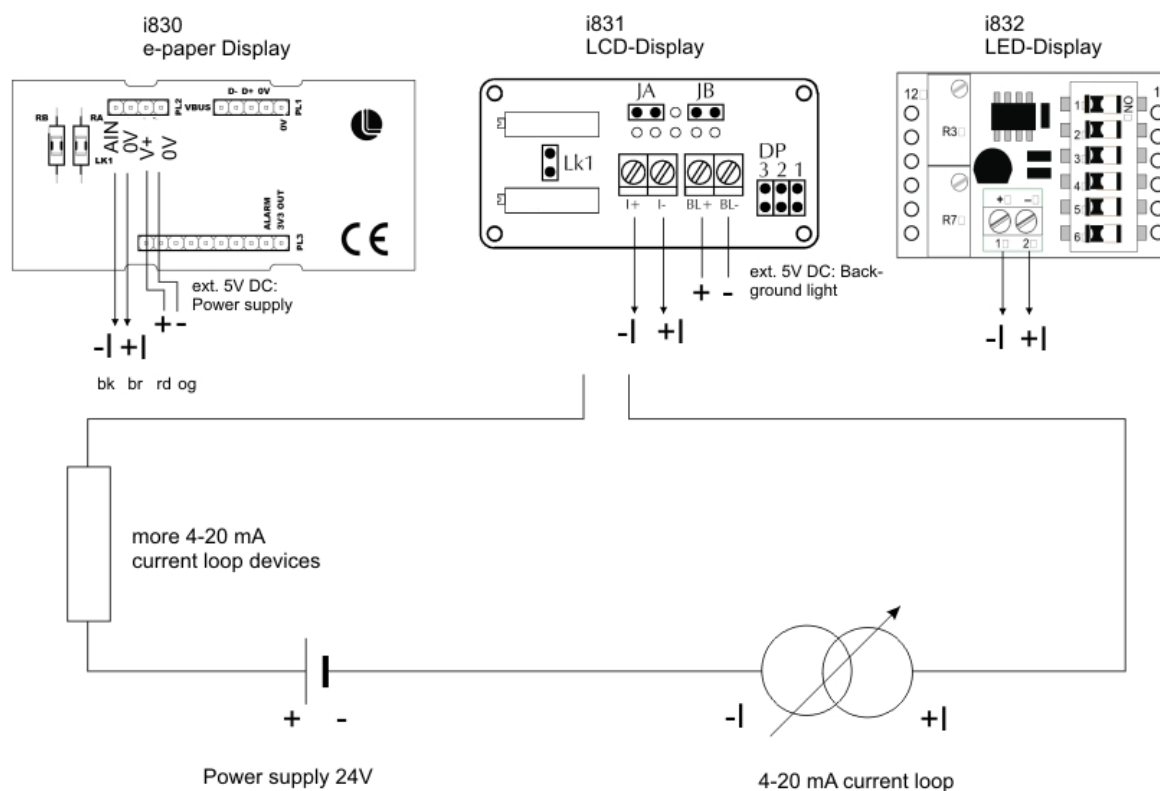
|      |                      |                    |
|------|----------------------|--------------------|
| i830 | 2.1" E-paper Display | individual Scaling |
| i831 | 12,7 mm LCD Display  | individual Scaling |
| i832 | 9,4 mm LED Display   | individual Scaling |

The displays are designed for front panel mounting/panel mounting. The delivery includes a pre-configured display (scaling see above) and mounting material. After connection, the displays are immediately ready for use.

| Item | Picture                                                                             |          | dimensions<br>(LxHxD in mm)                              | Power supply                                                                                                         |
|------|-------------------------------------------------------------------------------------|----------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| i830 |   | Design 1 | housing:<br>73,8 x 37,5 x 17<br>cut area:<br>70 x 34     | <ul style="list-style-type: none"> <li>5 V DC as power supply</li> </ul>                                             |
|      |  | Design 2 |                                                          |                                                                                                                      |
| i831 |  |          | housing:<br>64,5 x 34,5 x 20,7<br>cut area:<br>62 x 32   | <ul style="list-style-type: none"> <li>from 4-20 mA current loop</li> <li>optional 5V DC for backlighting</li> </ul> |
| i832 |  |          | housing:<br>35,1 x 24,1 x 22,4<br>cut area:<br>33 x 20,3 | <ul style="list-style-type: none"> <li>from 4-20 mA current loop</li> </ul>                                          |

**Wiring:**

The following diagram describes the correct wiring of the 4-20 mA displays to the avibialine devices:



---

## LED signalling light

The current machine status can be displayed by means of a signal light. The lamp has several segments which can be individually parameterised in colour and flashing rhythm/continuous light. The connection is made directly to the [digital outputs](#) of the avibialine devices. As an option, the lamp has an 85 dB acoustic alarm signal.

The devices are parameterised according to customer requirements.

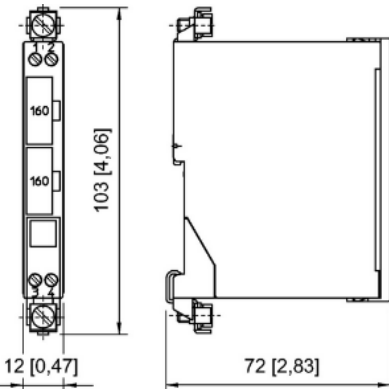
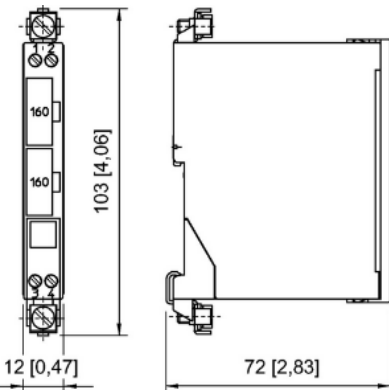
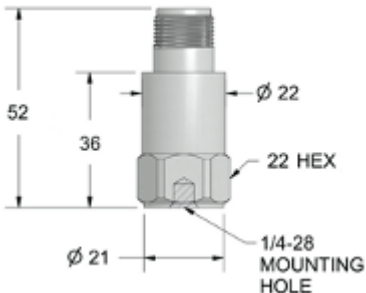


| Item        | Description                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>i835</b> | 5-segment signal lamp, supply from avibialine device, incl. connection cable and parameterisation.                    |
| <b>i836</b> | 5-segment signal lamp (+ acoustic alarm), supply from avibialine device, incl. connection cable and parameterisation. |

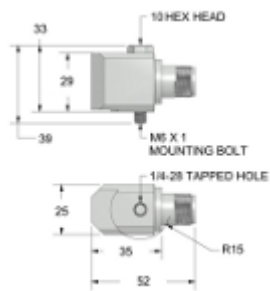
## Use in ATEX areas

Accessories are required for monitoring machines in hazardous areas (ATEX zones). A specially protected accelerometer operates in the ATEX zone. Outside this zone, the sensor signal is directed through a safety barrier to intercept voltage peaks. Only then is the sensor signal transmitted to the avibialine devices. The avibialine devices themselves must not be operated in ATEX zones.

The following accessories are available for operation in ATEX zones:

| Item           | Picture                                                                             | Dimensions                                                                           | Description                                                                                                                                                                                                                                                                         |
|----------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| i821           |    |    | Single-channel safety barrier,<br>28 V, 100 mA<br>DIN rail mounting (TS35)                                                                                                                                                                                                          |
| i822           |   |   | Two-channel safety barrier,<br>28 V, 93 mA<br>DIN rail mounting (TS35)                                                                                                                                                                                                              |
| M/<br>AC915-1A |  |  | <ul style="list-style-type: none"> <li>• With ATEX approval Zone 0</li> <li>• Insulated housing to avoid ground loops</li> <li>• Intrinsically safe sensor</li> <li>• IEPE output: Low susceptibility to interference in harsh environments; long cable lengths possible</li> </ul> |

**M/  
AC915-1A**



- With ATEX approval Zone 0
- Insulated housing to avoid ground loops
- Intrinsically safe sensor
- IEPE output: Low susceptibility to interference in harsh environments; long cable lengths possible

---

## Power supply

The avibialine devices must be supplied with 24 V (+/- 5%) DC voltage. We offer the following power supplies as accessories:

| Item | Description                                                           |
|------|-----------------------------------------------------------------------|
| i811 | Plug-in power supply 24 V, 1.5 A,<br>for up to 3 avibialine devices   |
| i812 | DIN rail power supply 24 V, 1.25 A,<br>for up to 2 avibialine devices |

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## Documentation Bus Interfaces

The following sections provide information about the implemented functions and used registers for the bus protocols and interfaces available in the X devices:

- [Modbus TCP / Modbus RTU](#)
- [CANopen](#)
- [HTTP API](#)
- [DATA STREAM](#)(device option)

---

## Modbus TCP / Modbus RTU

The protocol variants *Modbus RTU* (serial interface RS485) and *Modbus TCP* (TCP/IP) are supported.

- Modbus RTU: The avibialine units are addressed with the addresses 1..247. The addresses of the Slaves in a network must not be identical. Standard baud rate is 19200 bit/s.
- Modbus TCP: The avibialine units are addressed via the IP address. The transmission speed is 100 Mbit/s. The port number is usually and also for the avibialine units defined with: 502.

### Funcions

Implemented is the function: **0x03: Read Holding Registers**.

The register 200 can be read and written: **0x06: Write Holding Registers**.

### Register

Preliminary notes

1. The **addressing** in the avibialine units is zero-based and the following documentation also starts at address "0". If necessary, a 40 000, 40 001, 400 000 or 400 001 must be added to the address documented here on the side of the other Modbus device, so that the parameter "address" is correctly understood on both sides.
2. The **byte order** in the avibialine device is Little-Endian. Since Modbus only defines the transmission order of the bytes of a 16-bit holding register, but not for data types with a bit width beyond that, different views for the transmission order have been established. avibialine provides a test value at address 100: 01020304 (hex), i.e. 16,909,060 decimal. Due to the little-endian byte order (least significant byte is at the start address) the value in avibialine's memory is represented as follows.

| Modbus address 100 |    | Modbus address 101 |    |
|--------------------|----|--------------------|----|
| 04                 | 03 | 02                 | 01 |

The value thus extends over two 16-bit holding registers. According to Modbus conventions, the higher byte of a holding register is always transmitted first. This results in the transmission sequence: 03 04 01 02. If a 32-bit value of 01020304 (hex) is read back on the side of the receiving Modbus device, the byte sequence is interpreted as intended.

Device data:

| Meaning        | Address | Notes                                                      |
|----------------|---------|------------------------------------------------------------|
| Device address | 0       | UNSIGNED32<br>- RTU: Device address<br>- TCP: IPv4 address |
| Baudrate       | 2       | UNSIGNED32<br>- RTU: Bit/s<br>- TCP: MBit/s                |
| Serial number  | 4       | UNSIGNED32, avibialine serial number                       |
| Type           | 6       | UNSIGNED32, avibialine type number                         |
| Product Code   | 8       | UNSIGNED32, avibialine product code                        |

Sensor / analog Input:**AI\_Sensor\_Type** UNSIGNED16):

- 10 000 for accelerometer
- 10 001 for velocity sensor
- 10 002 for displacement sensor

| Channel | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------|------|------|------|------|------|------|------|------|
| Address | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 |

**AI\_ADC\_Sample\_Rate** UNSIGNED32, Sample rate of ADC, Value in Hz

| Channel | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------|------|------|------|------|------|------|------|------|
| Address | 1016 | 1018 | 1020 | 1022 | 1024 | 1026 | 1028 | 1030 |

**AI\_Scaling\_Factor** REAL32, Sensitivity mV/AI\_Physical\_Unit (see below)

| Kanal   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------|------|------|------|------|------|------|------|------|
| Address | 1048 | 1050 | 1052 | 1054 | 1056 | 1058 | 1060 | 1062 |

**AI\_Physical\_Unit** UNSIGNED32, Phys. Unit as follows (hex)

|                  |             |
|------------------|-------------|
| m/s <sup>2</sup> | 00 55 00 00 |
| g                | 00 00 00 A0 |
| mm/s             | FD 01 03 00 |
| inch/s           | 00 00 00 A3 |
| µm               | FA 01 00 00 |
| mil              | FD 00 00 A5 |
| Ratio 1          | 00 00 00 A6 |
| %                | FE 00 00 A6 |
| Ration dB        | 00 00 00 A7 |

| Channel | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------|------|------|------|------|------|------|------|------|
| Address | 1080 | 1082 | 1084 | 1086 | 1088 | 1090 | 1092 | 1094 |

**AI\_Status** UNSIGNED16,

Bit 0 = 0: IEPE off

Bit 0 = 1: IEPE on

Bit 1 = 0: IEPE no short circuit error

Bit 1 = 1: IEPE short circuit error

Bit 2 = 0: IEPE no cable failure error

Bit 2 = 1: IEPE cable failure error

Bit 3 = 0: Gain 1

Bit 3 = 1: Gain 25

Bit 4 = 0: No overload error

Bit 4 = 1: Overload error

Bit 5..15: Reserved

| Channel | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|---------|------|------|------|------|------|------|------|------|
| Address | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 |

Analog output = Output for process values (PV)

**AI\_Physical\_Unit** UNSIGNED32, Phys. Unit as follows (hex)

|                  |             |
|------------------|-------------|
| m/s <sup>2</sup> | 00 55 00 00 |
| g                | 00 00 00 A0 |
| mm/s             | FD 01 03 00 |
| inch/s           | 00 00 00 A3 |
| µm               | FA 01 00 00 |
| mil              | FD 00 00 A5 |
| Ratio 1          | 00 00 00 A6 |
| %                | FE 00 00 A6 |
| Ration dB        | 00 00 00 A7 |

| Channel    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|------------|------|------|------|------|------|------|------|------|
| Charact. 1 | 2000 | 2002 | 2004 | 2006 | 2008 | 2010 | 2012 | 2014 |
| Charact. 2 | 2100 | 2102 | 2104 | 2106 | 2108 | 2110 | 2112 | 2114 |
| Charact. 3 | 2200 | 2202 | 2204 | 2206 | 2208 | 2210 | 2212 | 2214 |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

**AO\_Process\_Value** (REAL32, Calculated characteristic in AO\_Physical\_Unit)

| Channel    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|------------|------|------|------|------|------|------|------|------|
| Charact. 1 | 2032 | 2034 | 2036 | 2038 | 2040 | 2042 | 2044 | 2046 |
| Charact. 2 | 2132 | 2134 | 2136 | 2138 | 2140 | 2142 | 2144 | 2146 |
| Charact. 3 | 2232 | 2234 | 2236 | 2238 | 2240 | 2242 | 2244 | 2246 |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

**AO\_Process\_Value** (INTEGER32, Calculated characteristic in AO\_Physical\_Unit)

Address : Pre-comma value

Address+1: Decimal value (part of 65536)

| Channel    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|------------|------|------|------|------|------|------|------|------|
| Charact. 1 | 2064 | 2066 | 2068 | 2070 | 2072 | 2074 | 2076 | 2078 |
| Charact. 2 | 2164 | 2166 | 2168 | 2170 | 2172 | 2174 | 2176 | 2178 |
| Charact. 3 | 2264 | 2266 | 2268 | 2270 | 2272 | 2274 | 2276 | 2278 |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

## Alarm

Bit 0 to 10 concern alarms that result from the comparison of the characteristic value with limit values.  
Bit 11 to 15 concern alarms resulting from self-monitoring.

**AL\_State** (UNSIGNED16, 16 Alarm Bits):

Bit 0 = Limit 1 (Warning) exceeded

Bit 1 = Limit 2 (Alarm) exceeded

Bit 2 = Outside Limit 1 and 2

Bit 3 = Below Limit 1

Bit 4 = Inside Limit 1 und 2

Bit 5 = Zone limit A/B exceeded

Bit 6 = Zone limit B/C exceeded

Bit 7 = Zone limit C/D exceeded (Zone D)

Bit 8 = Zone A

Bit 9 = Zone B

Bit 10 = Zone C

Bit 11 = IEPE short circuit

Bit 12 = IEPE open

Bit 13 = Overload

Bit 14 = Overflow internal or at output

Bit 15 = No speed for values that require speed

| Channel    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    |
|------------|------|------|------|------|------|------|------|------|
| Charact. 1 | 3000 | 3001 | 3002 | 3003 | 3004 | 3005 | 3006 | 3007 |
| Charact. 2 | 3100 | 3101 | 3102 | 3103 | 3104 | 3105 | 3106 | 3107 |

|                   |      |      |      |      |      |      |      |      |
|-------------------|------|------|------|------|------|------|------|------|
| <b>Charact. 3</b> | 3200 | 3201 | 3202 | 3203 | 3204 | 3205 | 3206 | 3207 |
|-------------------|------|------|------|------|------|------|------|------|

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

### Switching the measuring configuration

The active measuring configuration in the device can be switched over via Modbus. Up to 8 measuring configurations are available. The [measuring configurations](#) are created with the avibialine Configurator.

**ActiveConfig** (UNSIGNED16, Active device configuration, read/write): **200**

**NumberOfConfig** (UNSIGNED16, Available device configurations, read only): **201**

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

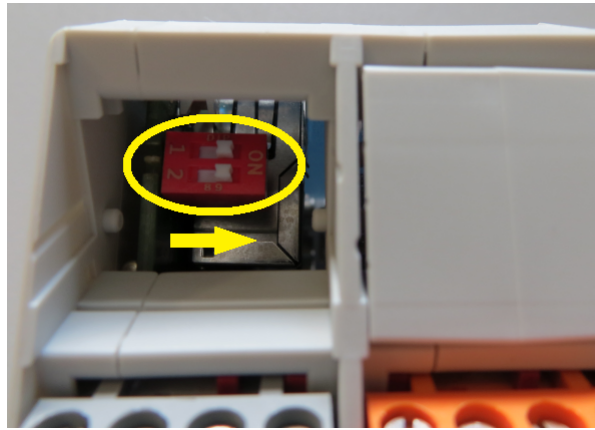
### Termination

The Modbus RTU (RS485) should be terminated at the first and last device (120 Ohm resistor between RS485A and RS485B). This termination can be done on the avibialine unit as follows:

- Remove the plastic cover on the lower left side ( in front of connections 9-12



- Set dipswitch 1 to "ON".
- Put the plastic cover back on.



## CANopen

avibialine works according to CANOpen standards.

- The Vendor ID for avibialine devices assigned by the CiA is 0x4BB.
- The device addressing for CANopen is done with the node IDs 1 ... 127.

For the transmission rates can be used: 10, 20, 50, 125, 250, 500 kBit/s or even 1 MBit/s.

A suitable device profile for condition monitoring devices is currently not standardized within CANopen. The device profile is therefore stored with 0x0. However, following the profile for measuring instruments described in CiA 404, the addresses and objects suggested there were used if they made sense for the avibialine device. A complete EDS for avibialine devices is available, which shows the addressing of all objects. The EDS file can be found in the avibialine program directory in the sub-directory "CANopen".

In particular, TPDOs (Transmit Process Data Objects) are also supported. The timing is set to "manufacturer specific" and can be [parameterized](#) via the configuration. The following transfers are available:

- Time-driven transmission of measured values
- Time-driven transmission of alarms
- Change-of-state transmission of alarms (incl. hold function)

For measured value transmission via TPDOs, the measured value range and thus the number of decimal digits after the decimal point can be defined.

### Units of physical quantities

The CiA303/2 has recommendations for the notation of SI units using a 32 bit integer, divided into 4 fields of 8 bits each. avibialine also follows these recommendations.

No procedure is described for non-SI units - which, however, are also used in the field of Condition Monitoring. However, the field "profile-specific" is available for each unit within the 32 bit integer. avibialine therefore notes various non-SI units using this field. For the units used in avibialine the following concrete assignment results:

| Unit             | Assignment (hex) |
|------------------|------------------|
| m/s <sup>2</sup> | 00 55 00 00      |
| g                | 00 00 00 A0      |
| mm/s             | FD 01 03 00      |
| inch/s           | 00 00 00 A3      |
| µm               | FA 01 00 00      |
| mil              | FD 00 00 A5      |
| Ratio 1          | 00 00 00 A6      |
| %                | FE 00 00 A6      |
| Ratio dB         | 00 00 00 A7      |

## avibialine Data Objects

### Sensor / analog Input:

| Meaning            | Address | Notes                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AI sensor type     | 0x6110  | UNSIGNED16: Subindex for each channel (1..8):<br>( custom definition)<br>- 10 000 for accelerometers<br>- 10 001 for velocity sensors<br>- 10 002 for displacement sensors                                                                                                                                                                                                                                         |
| AI ADC sample rate | 0x6114  | UNSIGNED32: Subindex for each channel (1..8): Value in Hz                                                                                                                                                                                                                                                                                                                                                          |
| AI scaling factor  | 0x6126  | REAL32: Subindex for each channel (1..8): Sensitivity in mV/AI_Physical_unit (s. next column)                                                                                                                                                                                                                                                                                                                      |
| AI physical unit   | 0x6131  | UNSIGNED32: Subindex for each channel (1..8): Phys. Unit with notation acc. to <a href="#">CiA303/2*</a>                                                                                                                                                                                                                                                                                                           |
| AI status          | 0x6150  | UNSIGNED8: Subindex for each channel (1..8):<br>( Custom definition)<br>Bit 0 = 0: IEPE off<br>Bit 0 = 1: IEPE on<br>Bit 1 = 0: IEPE no short circuit error<br>Bit 1 = 1: IEPE short circuit error<br>Bit 2 = 0: IEPE no cable failure error<br>Bit 2 = 1: IEPE cable failure error<br>Bit 3 = 0: Gain 1<br>Bit 3 = 1: Gain 25<br>Bit 4 = 0: No overload error<br>Bit 4 = 1: Overload error<br>Bit 5..15: Reserved |

### Analog Output = Output for process values (PV)

| Meaning             | Address | Notes                                                                                                                                                                                                                                 |
|---------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AO output PV        | 0x6300  | REAL32: Subindex for each channel:<br><br>1..8: Characteristic 1 on channel 1-8<br>9-16: Characteristic 2 on channe 1-8<br>17-24: Characteristic 3 on channe 1-8<br>Calculated characteristic in AO_Physical_unit_PV (s. next column) |
| AO physical unit PV | 0x6301  | UNSIGNED32: Subindex for each channel:<br><br>1..8: Characteristic 1 on channel 1-8<br>9-16: Characteristic 2 on channe 1-8<br>17-24: Characteristic 3 on channe 1-8<br>Phys. Unit with notation acc. to <a href="#">CiA303/2*</a>    |

|               |        |                                                                                                                         |
|---------------|--------|-------------------------------------------------------------------------------------------------------------------------|
| AO decimal PV | 0x6302 | UNSIGNED8: Subindex for each channel (1..8):<br>Number of decimal digits of the integer representation (s. next column) |
| AO output PV  | 0x7300 | INTEGER16: Subindex for each channel (1..8):<br>Calculated characteristic in AO_Physical_unit_PV                        |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

## Alarm

Bit 0 to 10 concern alarms that result from the comparison of the characteristic value with limit values.  
Bit 11 to 15 concern alarms resulting from self-monitoring.

**AL\_State** (UNSIGNED16, 16 Alarm Bits):

Bit 0 = Limit 1 (Warning) exceeded  
 Bit 1 = Limit 2 (Alarm) exceeded  
 Bit 2 = Outside Limit 1 and 2  
 Bit 3 = Below Limit 1  
 Bit 4 = Inside Limit 1 und 2  
 Bit 5 = Zone limit A/B exceeded  
 Bit 6 = Zone limit B/C exceeded  
 Bit 7 = Zone limit C/D exceeded (Zone D)  
 Bit 8 = Zone A  
 Bit 9 = Zone B  
 Bit 10 = Zone C  
 Bit 11 = IEPE short circuit  
 Bit 12 = IEPE open  
 Bit 13 = Overload  
 Bit 14 = Overflow internal or at output  
 Bit 15 = No speed for values that require speed

| Meaning        | Address | Notes                                                                                                                                                                   |
|----------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AL 1..8 state  | 0x6600  | UNSIGNED8, 8 Sub-indexes for the channels<br><br>1..8: Characteristic 1 on channel 1-8<br>9-16: Characteristic 2 on channe 1-8<br>17-24: Characteristic 3 on channe 1-8 |
| AL 9..16 state | 0x6601  | UNSIGNED8, Sub-indexes for the channels<br><br>1..8: Characteristic 1 on channel 1-8<br>9-16: Characteristic 2 on channe 1-8<br>17-24: Characteristic 3 on channe 1-8   |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

## Switching the measuring configuration

The active measuring configuration in the device can be switched over via Modbus. Up to 8 measuring configurations are available. The [measuring configurations](#) are created with the avibialine Configurator.

| Meaning                         | Adresse | Notes                                                                                                      |
|---------------------------------|---------|------------------------------------------------------------------------------------------------------------|
| Active device configuration     | 0x6f70  | UNSIGNED8, Active device configuration (0 .. 7 / number of existing device configurations), read and write |
| Available device configurations | 0x6f71  | UNSIGNED8, number of existing device configurations, read only                                             |

Note: Multiple characteristic values per channel are only possible with the "MultiMode" option.

## TPDO Mapping

The TPDO mapping is shown in the EDS. Specifically, the following addresses were set up:

- In TPDO 0 the characteristic values of channels 1 to 4 are transmitted as 16-bit values. These are the values of AO output PV at address 0x7300 with the subindices 01 to 04.
- In TPDO 1, the characteristic values of channels 5 to 8 are transmitted as 16-bit values. These are the values of AO output PV at address 0x7300 with the sub-indexes 05 to 08.
- In TPDO 2, the alarm states AL1 to AL8 of channels 1 to 8 are transmitted as 8-bit values. These are the values of AL 1..8 state at address 0x6600 with the sub-indexes 01 to 08.
- In TPDO 3, the alarm states AL9 to AL16 of channels 1 to 8 are transmitted as 8-bit values. These are the values of AL 9..16 state at address 0x6601 with the sub-indexes 01 to 08.

Note: Only the first characteristic value of a measuring channel can be retrieved via TPDOs

## Termination

The CAN Bus should be terminated at the first and last device (120 Ohm resistor between CAN LOW and CAN High). This termination can be done on the avibialine unit as follows:

- Remove the plastic cover on the lower left side ( in front of connections 9-12



- Set dipswitch 2 to "ON".
- Put the plastic cover back on.



---

## DataStreaming via VLDAQ API

The DATA STREAM interface provides a VLDAQ API which is used to transfer sensor data in raw format, i.e. without further signal processing (filtering, integration, ...). In addition, data such as sensor information (e.g. sensitivity) and trigger signals ([speed trigger 1-3](#)) are provided.

The VLDAQ API can be found in the avibialine program directory in the sub-directory "VLDAQ\_API".

The directory contains

- APIs for Windows and Linux
- An example program for C++
- A comprehensive documentation of all functionalities of the VLDAQ API

---

## HTTP API

Current characteristic values and device information can be accessed using the HTTP API. The interface uses common HTTP methods (`GET`, `POST`, etc.) and resource oriented URLs. All responses use the JSON format.

The host address is the IP address of the device. All IDs use zero-based indexing (channel 1 corresponds to `channel_id` 0 for example).

All example requests use the command line tool `curl` but any program that is able to send HTTP requests would be suitable. The `GET` requests can be sent by opening the URL in a browser for example.

### Available Endpoints

#### Device

- [GET /api/info](#): Request general device information.
- [GET /api/availableConfigurations](#): Request available configurations.
- [GET /api/activeConfiguration](#): Request active configuration.
- [POST /api/activeConfiguration](#): Switch to a different configuration.

#### Channels

- [GET /api/channels](#): Request channel information for all channels.
- [GET /api/channels/{channel\\_id}](#): Request channel information for a single channel.

#### Characteristic Values

- [GET /api/channels/{channel\\_id}/cvs](#): Request all characteristic values of a channel..
- [GET /api/channels/{channel\\_id}/cvs/{cv\\_id}](#): Request a single characteristic value of a channel.
- [GET /api/channels/{channel\\_id}/cvs/{cv\\_id}/statistics](#): Request the statistics of one characteristic value.

#### Speeds

- [GET /api/speeds](#): Request speed information for all speed trigger inputs.
- [GET /api/speeds/{speed\\_id}](#): Request speed information for a single speed trigger input.

### Attributes

Most attributes are numbers or strings that do not require an additional explanation. But some attributes can only take on certain values. Those attributes are described here.

#### IEPE

The attribute `IEPE` reflects the IEPE status of a channel:

| Value | Description                                                                                                             |
|-------|-------------------------------------------------------------------------------------------------------------------------|
| ok    | IEPE is active and there is no error.                                                                                   |
| off   | IEPE is disabled.                                                                                                       |
| open  | No sensor is attached or the connection to the sensor is severed (due to a loose connector or cable break for example). |
| short | The sensor is short-circuited.                                                                                          |

### status

The attribute `status` represents the status of a characteristic value:

| Value      | Description                                                                                                                                            |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| ok         | The characteristic value is working.                                                                                                                   |
| IEPEError  | There is an error with the IEPE sensor.                                                                                                                |
| no24V      | The device is not supplied with 24V power. It is possible to configure the device if it is only powered via USB but the measurement will not function. |
| overload   | The characteristic value is overloaded.                                                                                                                |
| speedError | The characteristic value is missing necessary speed data or the speed is outside of the tolerance range.                                               |
| error      | Some other error occurred.                                                                                                                             |

### unit

The attribute `unit` contains the unit of a value:

| Value  | Description                |
|--------|----------------------------|
| m/s^2  | Meter per second squared   |
| g      | Gravitational acceleration |
| mm/s   | Millimeter per second      |
| imch/s | Inch per second            |
| um     | Micrometer                 |
| mil    | Thousandth of an inch      |
| dB     | Decibel                    |
| %      | Percent                    |
| 1      | Ratio                      |
| rpm    | Revolutions per minute     |

---

## GET /api/info

### Request:

GET /api/info

### Response:

A JSON object containing information about the device.

| Attribute       | Data Type | Description             |
|-----------------|-----------|-------------------------|
| apiVersion      | string    | Version of the HTTP API |
| type            | string    | Device type             |
| firmwareVersion | string    | Version of the firmware |
| serialNumber    | number    | Serial number           |

### Example Request:

```
curl http://192.168.0.123/api/info
```

### Example Response:

```
{
  "apiVersion":      "1.0",
  "type":            "VLX4 HD",
  "firmwareVersion": "2.1.1366",
  "serialNumber":    20
}
```

---

## GET /api/availableConfigurations

**Request:**

GET /api/availableConfigurations

**Response:**

A JSON object containing information on the available configurations in the device.

| Attribute               | Data Type    | Description                                                  |
|-------------------------|--------------|--------------------------------------------------------------|
| availableConfigurations | number array | An array containing the IDs of the available configurations. |

**Example Request:**

```
curl http://192.168.0.123/api/availableConfigurations
```

**Example Response:**

```
{
  "availableConfigurations": [0, 1]
}
```

---

## GET /api/activeConfiguration

### Request:

GET /api/activeConfiguration

### Response:

A JSON object containing information about the active configuration of the device.

| Attribute           | Data Type | Description                    |
|---------------------|-----------|--------------------------------|
| activeConfiguration | number    | ID of the active configuration |

### Example Request:

```
curl http://192.168.0.123/api/activeConfiguration
```

### Example Response:

```
{
  "activeConfiguration": 0
}
```

---

## POST /api/activeConfiguration

This endpoint can be used to switch the active configuration of the device. `configuration_id` is the ID of the configuration that will be activated.

### Request:

POST /api/activeConfiguration  
using Content-Type: application/json  
and the following data:

```
{
  "activeConfiguration": configuration_id
}
```

### Response:

A JSON object containing information about the new active configuration of the device.

| Attribute           | Data Type | Description                         |
|---------------------|-----------|-------------------------------------|
| activeConfiguration | number    | ID of the new active configuration. |

### Example Request:

```
curl --header "Content-Type: application/json" --request POST --data
"{\"activeConfiguration\":1}" 192.168.0.113/api/activeConfiguration
```

### Example Response:

```
{
  "activeConfiguration": 1
}
```

## GET /api/channels

### Request:

GET /api/channels/

### Response:

An array of JSON objects that contain information about every channel on the device. Each object corresponds to one channel and has the attributes:

| Attribute | Data Type    | Description                                                                          |
|-----------|--------------|--------------------------------------------------------------------------------------|
| channel   | number       | Channel ID                                                                           |
| IEPE      | string       | IEPE status                                                                          |
| cvs       | number array | An array containing the IDs of the available characteristic values for this channel. |

A channel will not show up if it is completely disabled.

### Example Request:

```
curl http://192.168.0.123/api/channels
```

### Example Response:

```
[
  {
    "channel": 0,
    "IEPE":    "ok",
    "cvs":     [0, 1]
  },
  {
    "channel": 1,
    "IEPE":    "ok",
    "cvs":     [0]
  },
  {
    "channel": 3,
    "IEPE":    "open",
    "cvs":     [0]
  }
]
```

---

## GET /api/channels/{channel\_id}

### Request:

GET /api/channels/{channel\_id}

### Response:

A JSON object containing information about the channel with ID `channel_id`.

| Attribute | Data Type    | Description                                                                          |
|-----------|--------------|--------------------------------------------------------------------------------------|
| channel   | number       | Channel ID                                                                           |
| IEPE      | string       | IEPE status                                                                          |
| cvs       | number array | An array containing the IDs of the available characteristic values for this channel. |

### Example Request:

```
curl http://192.168.0.123/api/channels/0
```

### Example Response:

```
{
  "channel": 0,
  "IEPE":    "ok",
  "cvs":     [0, 1]
}
```

## GET /api/channels/{channel\_id}/cvs

### Request:

GET /api/channels/{channel\_id}/cvs

### Response:

An array of JSON objects containing information about all characteristic values of the channel with ID `channel_id`. Each object corresponds to one characteristic value and has the attributes:

| Attribute | Data Type | Description                                |
|-----------|-----------|--------------------------------------------|
| channel   | number    | Channel ID                                 |
| cv        | number    | Characteristic value ID                    |
| value     | number    | Current characteristic value               |
| unit      | string    | Unit of the characteristic value           |
| status    | string    | Current status of the characteristic value |

### Example Request:

```
curl http://192.168.0.123/api/channels/0/cvs
```

### Example Response:

```
[
  {
    "channel": 0,
    "cv": 0,
    "value": 9.990212e-01,
    "unit": "m/s^2",
    "status": "ok"
  },
  {
    "channel": 0,
    "cv": 1,
    "value": 1.018718e-01,
    "unit": "g",
    "status": "ok"
  }
]
```

---

## GET /api/channels/{channel\_id}/cvs/{cv\_id}

### Request:

GET /api/channels/{channel\_id}/cvs/{cv\_id}

### Response:

A JSON object containing information about the characteristic value with ID `cv_id` on the channel with ID `channel_id`.

| Attribute | Data Type | Description                                |
|-----------|-----------|--------------------------------------------|
| channel   | number    | Channel ID                                 |
| cv        | number    | Characteristic value ID                    |
| value     | number    | Current characteristic value               |
| unit      | string    | Unit of the characteristic value           |
| status    | string    | Current status of the characteristic value |

### Example Request:

```
curl http://192.168.0.123/api/channels/0/cvs/1
```

### Example Response:

```
{
  "channel": 0,
  "cv": 1,
  "value": 1.019581e-01,
  "unit": "g",
  "status": "ok"
}
```

## GET /api/channels/{channel\_id}/cvs/{cv\_id}/statistics

### Request:

GET /api/channels/{channel\_id}/cvs/{cv\_id}/statistics

### Response:

A JSON object containing statistical information about a the characteristic value with ID `cv_id` on the channel with ID `channel_id`. The statistic only takes values into account that were measured in the time between the last statistics request and the current statistics request for this characteristic value.

| Attribute | Data Type | Description                                                         |
|-----------|-----------|---------------------------------------------------------------------|
| channel   | number    | Channel ID                                                          |
| cv        | number    | Characteristic value ID                                             |
| duration  | number    | Duration in milliseconds during which the statistics were gathered. |
| avg       | number    | Average of the characteristic value                                 |
| min       | number    | Minimum of the characteristic value                                 |
| max       | number    | Maximum of the characteristic value                                 |
| unit      | string    | Unit of the characteristic value                                    |

### Example Request:

```
curl http://192.168.0.123/api/channels/0/cvs/1/statistics
```

### Example Response:

```
{
  "channel": 0,
  "cv": 1,
  "duration": 5624,
  "avg": 1.018815e-01,
  "min": 1.018260e-01,
  "max": 1.019429e-01,
  "unit": "g"
}
```

---

## GET /api/speeds

### Request:

GET /api/speeds/

### Response:

An array of JSON objects that contain information about every speed trigger input on the device. Each object corresponds to one speed trigger input and has the attributes:

| Attribute | Data Type | Description               |
|-----------|-----------|---------------------------|
| speed     | number    | Speed trigger input ID    |
| value     | number    | Current speed             |
| unit      | string    | Unit of the current speed |

A speed trigger input will not show up if it is not active.

### Example Request:

```
curl http://192.168.0.123/api/speeds
```

### Example Response:

```
[
  {
    "speed": 0,
    "value": 3.356255e+03,
    "unit": "rpm"
  },
  {
    "speed": 2,
    "value": 0.000000e+00,
    "unit": "rpm"
  }
]
```

---

## GET /api/speeds/{speed\_id}

### Request:

GET /api/speeds/{speed\_id}

### Response:

A JSON object containing information about the speed trigger input with ID `speed_id`.

| Attribute | Data Type | Description               |
|-----------|-----------|---------------------------|
| speed     | number    | Speed trigger input ID    |
| value     | number    | Current speed             |
| unit      | string    | Unit of the current speed |

### Example Request:

```
curl http://192.168.0.123/api/speeds/0
```

### Example Response:

```
{
  "speed": 0,
  "value": 3.356231e+03,
  "unit": "rpm"
}
```

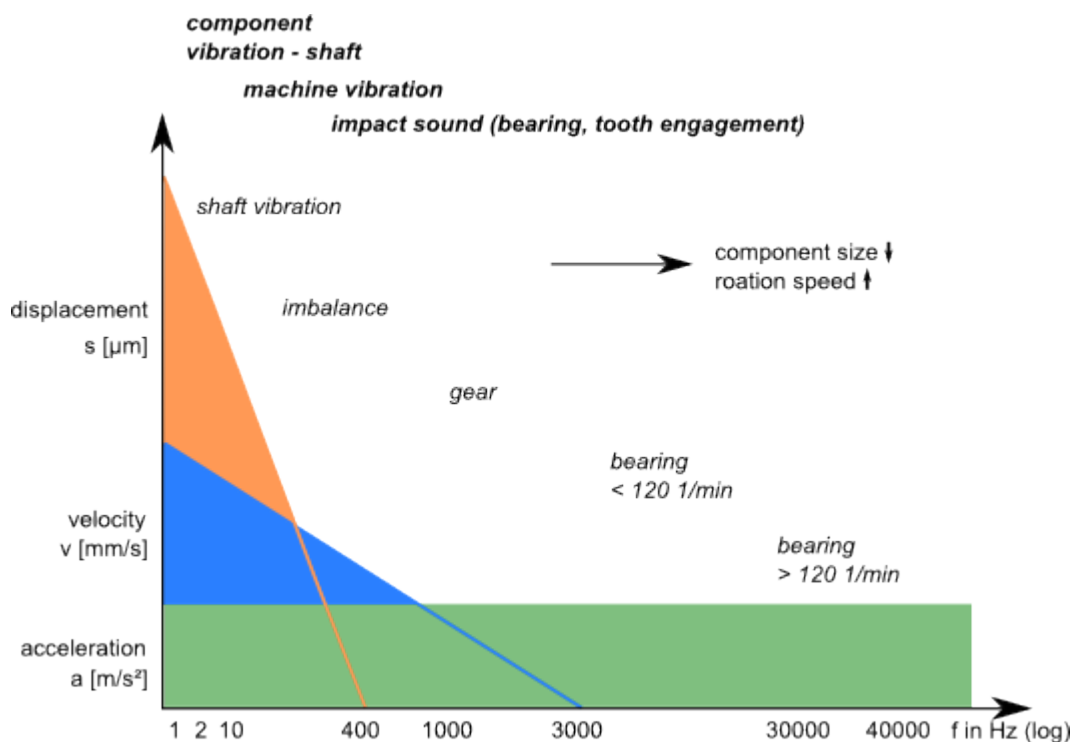
## Vibration on machines

Machines are devices with moving parts. Movement generates vibrations. Such vibrations can be unintentional or intentional in machines.

- Unwanted vibrations affect the lifetime of machines, generate noise and impair manufacturing quality.
- Vibrations are intended, for example, in vibrating screens or vibratory conveyors.

Machine vibrations extend over a wide frequency range. Vibrations from a few Hertz to 40 kHz and more can occur. The vibrations generated by machines can be roughly divided into different areas: Shaft vibrations and imbalances typically occur at low frequencies ( $< 1000$  Hz). Interference frequencies of gearwheels and shock impulses of slow-speed gears or rolling bearings are usually found in the range up to 20 kHz, faster-speed rotating machines generate impacts at frequencies above 20 kHz.

The selection of the vibration measurement variable also depends on the frequency range to be investigated: vibration displacement of up to several hundred hertz and vibration velocities of up to approx. 2000 Hz can only be measured meaningfully; vibrations at higher frequencies must be measured as vibration acceleration. The following figure illustrates the frequency ranges.



Various characteristic values have become established for the detection of machine vibrations. In addition to [vibration characteristic](#) values (oscillation on a wide frequency band) it is also possible to measure [order characteristic values](#) (oscillations at speed or multiples thereof).

It is established to use the ISO 10816 and ISO 20816 series of standards for the measurement of vibration characteristic values for machine monitoring.