User Manual

ASCO-DAQ2

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Revision Record

Date	Changes
July 2023	Chapter 1: describe spotWave as alternative product. Remove no more supported variants. Add chapter with remark to sample rate. Move chapter for crimping application from FAQ in own chapter before FAQ, add screenshots in this chapter. Add UKCA chapter. Update redemption information and EULA.

Safety Notices

Only power supplies recommended by Vallen (see section “accessories”) shall be used and instructions provided by the manufacturers of recommended power supplies must be followed.

Do not use described product in any manner not specified by Vallen.

Do not install substitute parts or perform any unauthorized modification to the product. In case of malfunction the product shall be returned to Vallen for service and repair.

In case technical maintenance or service is advised by Vallen to the equipment user only qualified, service-trained personnel shall remove the cover from the instrument after unplugging the product from wall outlet, removing power cord and assuring a power free status of the equipment.

Contents/Inhalt:

1 Overview and AE Applications

1.1 Overview of ASCO-DAQ2

Acoustic Emission (AE) testing is a powerful method for examining the behavior of materials deforming under load. Materials emit sound when they are stressed. The ASCO-DAQ2 AE-instrument listens to these sounds which can be caused by crack growth, phase transitions, leakage, friction, yielding, fiber-breakage, debonding, corrosion, wear, capacitive (or partial) discharge, cavitation, impact, etc and makes sound levels visible.

Everyone is familiar with AE as heard from wood cracking or glass breaking; however, AE equipment as the ASCO-DAQ2 can monitor many more useful non-audible emission phenomena. The ASCO-DAQ2 possesses the ability to detect all these AE sources with high sensitivity using state-of-the-art software tools. It measures burst – and continuous acoustic emission.

AE activity is detected when a mechanical wave is picked up by an AE sensor. AE-activity is typically monitored above the audible frequency range (often 100-1000 kHz) with a resonant piezo-electric sensor. The ASCO-DAQ2 can work with many Vallen AE sensor types and is available in three different frequency ranges in the overall range from 90 kHz to 1300 kHz. The sensor is an important part of the measurement chain since it transforms the mechanical wave into an electrical signal. In contrast to audible AE, the measured AE-signal can be displayed by use of an oscilloscope or a transient recorder display. Typically, AE-activity is of burst type and can be characterized as a wave packet (burst) that increases, reaches one or more peak amplitudes and then decreases. Alternatively, AE-activity can be caused by a continuous signal without discernible start or end.

The ASCO-DAQ2 is an easy to operate and versatile, single-channel Acoustic Emission (AE) system. ASCO-DAQ2 is controlled by software running on any PC/laptop with Windows 10 or Windows 11 operating system via an USB interface. The main features of the ASCO-DAQ2 are

- Low cost & easy to use
- Robust design for industrial applications
- Threshold independent
- For continuous and burst AE
- Can discriminate up to 1000 hits/s

The ASCO-DAQ2 is ideal for applications where low cost, small form factor and simplicity is essential. The main application nowadays it the monitoring of crimping processes (crimping metallic end fittings onto fiber glass rods in the production of high voltage line insulators).

The ASCO-DAQ2 consists of two components:

1) an analog signal conditioner (same component as it is used in our product ASCO-P, therefore this signal conditioner component is named in the following often just “ASCO-P”) which extract from the high frequency signal of the AE-sensor two slower changing signals, the last peak amplitude of the signal stretched to 50 ms (ASCO-DAQ2-PH3 0.5 ms) and an average signal level. For details see section 2.1
2) A data acquisition unit digitizing the two output signals of the signal conditioner and two optional inputs which can be connected to the ASCO-DAQ2 to measure e.g. the pressure, force, or temperature.

ASCO-DAQ2 is available in three variants which are listed in the next chapter.

ASCO-DAQ2 comes with a 2m USB cable and the ASCO-DAQ2 software (on USB flash drive) including sample data files and documentation.

The following additional items are required to operate the ASCO-DAQ2:

- Computer with Microsoft Windows operating system with USB interface
- Vallen AE sensor with interface cable. It is recommended to use Vallen AE-sensors to ensure that pyroelectric discharge does not damage the ASCO-DAQ2. For details of available sensors see document reference [1].
- Standard power supply (e.g. ASCO-NTE)

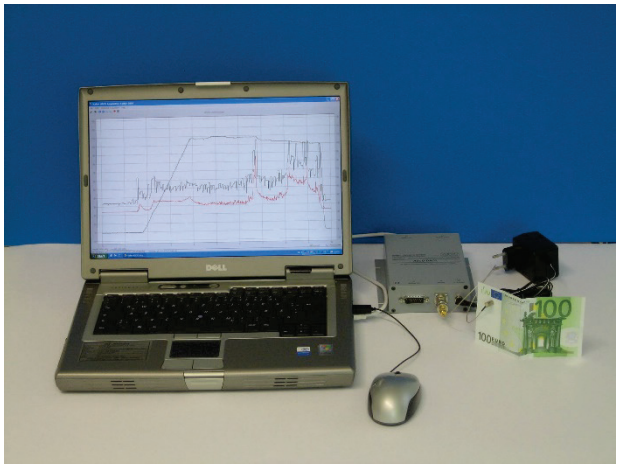


Figure 1: Complete ASCO-DAQ2 measurement system

Figure 2: ASCO-DAQ2 measurement system without PC

Figure 1 shows ASCO-DAQ2 connected to the laptop with power supply ASCO-NTE and the small VS700-D sensor clamped to a banknote. Figure 2 shows the ASCO-DAQ2 with power supply and sensor, only.

1.2 Difference between ASCO-DAQ2 device and spotWave device

The single channel ASCO-DAQ2 device was released in 2006. The software contains now especially features to support the quality assurance for serial production of crimping processes in the fabrication of high-voltage insulators. The ASCO-DAQ2 software is maintained but not developed for additional applications.

The single channel spotWave device was released in 2022. It is a fully featured AE measurement device compliant with EN 13554, EN 13477-1 and EN 13477-2. It can be used with the Vallen AE Suite software but is not compatible with the ASCO-DAQ2 software. The special software features and some hardware features of the ASCO-DAQ2 device which support quality control during serial production are not available with the spotWave device.

Features	ASCO-DAQ2	spotWave
Compliant with EN 13554	No	Yes
Compliant with EN 13477	No	Yes
No of AE channels	1	1
No of parametric channels	2	0
Internal pulser	No	Yes (CCT)
Sampling rate	48 kHz multiplexed to 4 channels	2 MHz
Peak stretcher (50 ms)	Yes	No
Waveform recording	No	Yes
Frequency range	20-1300 kHz	20-500 Hz
Power supply	28 VDC	5 VDC (USB on the Go)
Analog outputs	4	No
Connectivity	USB 2.0	USB 3
Crimping Monitoring SW	Yes	No
PRIDB and TRADB support	No	Yes
Compliant with Vallen AE Suite SW	No	Yes

Consequently, the ASCO-DAQ2 device is mainly used for the application of monitoring crimping processes in serial production, while the spotWave device can be used in AE testing applications that require only one AE channel.

For more information about the spotWave device, see our internet page https://www.vallen.de

Please get in touch with the sales team of Vallen Systeme if you need more information about the differentiation of the different AE-systems (see “Contact” on our internet page).

2 Description

The ASCO-DAQ2 consists of an acoustic signal conditioner (ASCO-P module) and an USB-data acquisition unit (USB-DAQ). Both parts are fitted into a rugged box (splash water resistant, classified IP54) for industrial applications.

The ASCO-P module converts the peak amplitude of a short AE-burst (µs-range) to a voltage pulse. This output signal is called APK. An additional output, ASL, represents the average of the logarithm of the AE signal over a certain time window and is an indicator for background noise and the signal strength of a burst.

The USB-DAQ module samples APK and ASL as well as two external measurement parameters (e.g. pressure and elongation) at a programmable sampling rate. Measurement data is transferred to PC by USB-bus and stored to file.

The ASCO-DAQ2 software has a graphical user interface (GUI). Every aspect of data acquisition, monitoring and data display is controlled easily and conveniently by use of the GUI.

In recording mode, the ASCO-DAQ2 software allows for a threshold independent data acquisition. The recording mode can be configured in different ways and enables a single-file, single-trigger measurements up to a recording mode where measurement data and results are classified and archived automatically for each measurement separately.

The monitoring feature can be used to classify the measurement based on the classification results of up to the 4 measurement channels. Classification results are shown online in a colored bar on the screen and sound actions can be associated to each result. The classification result is also available at certain pins of the external connector labeled J4.

The diagram can be configured to the needs of the user by use of macros, legend, header and footer. All measurement results and all classification limits can be displayed. Graphs of measurement results can be toggled easily via the toolbar. Screenshots of the diagram can be made manually or stored automatically with predefined dimension and resolution.

2.1 Functional description of the ASCO-P module

The ASCO-P module converts the peak amplitude of a short AE-burst (µs-range) to a voltage pulse of 40mV/dB$_{AE}$ amplitude. The pulse width (peak stretch time PST) is set to 50 or 0.5ms depending on the ASCO-Pxy module. This output signal is called APK.

Note on dB$_{AE}$: The dB scale is a logarithmic expression for a factor or ratio according to the equation:

$$A[\mathrm{dB}] = 20 \cdot \log\left(\frac{U_{out}}{U_{in}}\right)$$

Usually, the maximum amplitude of an AE burst is given in dB$_{AE}$ by defining the reference voltage (U_{in}) as 1µV. Therefore 0 dB$_{AE}$ corresponds to 1 µV; 20 dB$_{AE}$ to 10 µV, 40 dB$_{AE}$ to 100 µV, 60 dB$_{AE}$ to 1mV, etc.

An additional output of the ASCO-P module is called ASL. It represents the average of the logarithm of the AE signal over a certain time window and is an indicator for background noise and the signal strength of AE bursts.

APK and ASL are scaled to 25dB$_{AE}$/V. 0dB$_{AE}$ corresponds to 1µV peak at the AE-sensor output.

The ASCO-P module employs three connectors on the front panel of the ASCO-DAQ2:

- “J1 Analog Out”: male 15pole D; resembles the analog output of the ASCO-P for signal analysis,
- “J2 Sensor”: BNC female; is used for AE sensor connection,
- “J3 7…15V$_{DC}$”: Jack 5.5mm; is used to feed-in 12V (100mA) power supply, e.g. from ASCO-NTE.

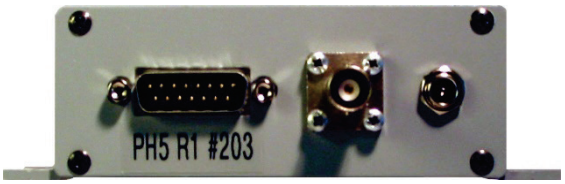


Figure 3: image of the front panel of the ASCO-DAQ2. On the left-hand side is the connector J1 located- Then central connector is a BNC connector for the AE-sensor. The connector on the right-hand side is used for the power supply.

Different ASCO-DAQ2 variants are available dedicated to specific applications. They differ only in the frequency range and the peak stretching time of the built in signal conditioner board (ASCO-P).Each ASCO-P module derivative is identified by a suffix xy (ASCO-Pxy). Which ASCO-Pxy derivative used within the delivered ASCO-DAQ2 can be seen from the sticker below the J1 connector.

The following table shows the available ASCO-DAQ2 variants and sensor configurations for different applications as recommended by Vallen:

ASCO-DAQ2 variant	**Application**	**Freq.[kHz]**	**PST [ms]** **Peak stretch time**	**Sensor** **(recommended)**
ASCO-DAQ2-PN1	Scratch Testing	90-290	51	VS150-M
ASCO-DAQ2-PH3	Crimping Monitoring	240-710	51	VS600-A2
ASCO-DAQ2-PH5	Paper Tensile Testing	90-1300	0,5	VS700-D

Table 1: list of ASCO-DAQ2 variants and typical applications.

2.1.1 Block diagram of ASCO-P module

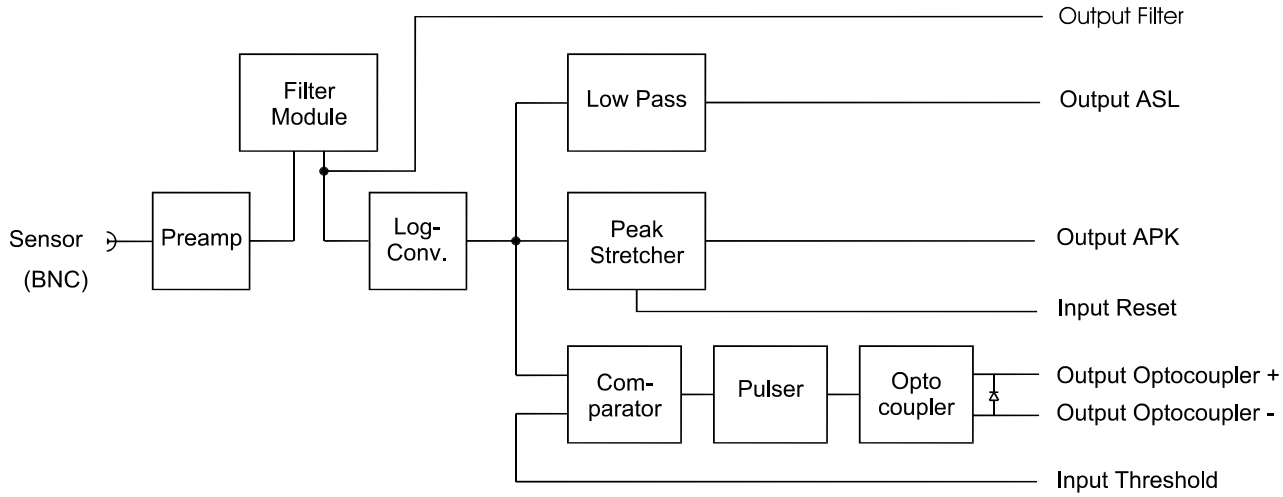


Figure 4: block diagram of the ASCO-Pxy module.

The AE signal (delivered by a piezo-electrical AE-sensor) is fed-in over a BNC-connector and amplified by a low noise preamplifier. A filter module rejects undesired frequency components. The filtered AE-signal is rectified, and the logarithm is obtained. This logarithmic signal is smoothened by a low pass filter and output as ASL (average signal level). In parallel a peak-stretcher stretches even short peaks of the logarithmic signal for a certain amount of time and outputs it as APK (AE peak amplitude). A comparator compares the logarithmic signal against a threshold fed-in as analog voltage. When the logarithmic signal exceeds the threshold, a pulse is generated, and is output over an optocoupler at J1 (see below). Depending on the

application this can trigger e.g., an alarm, or an image record, an event counter, or a more detailed analysis of the incoming data.

2.2 Functional description of the DAQ2 module

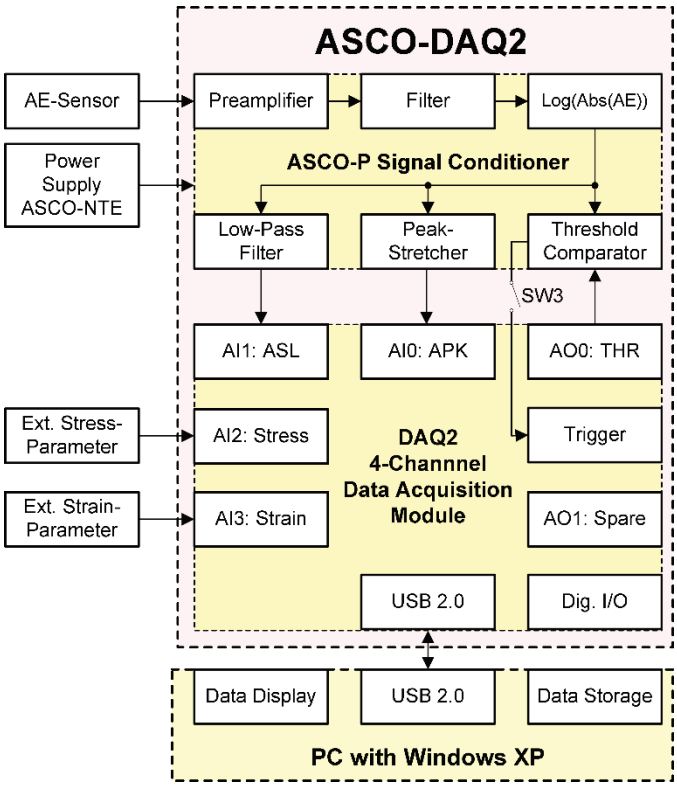


Figure 5: ASCO-DAQ2 Block Diagram

The DAQ2 module is based on the USB- data acquisition module:
National Instruments USB-6009 OEM.
The USB bus is located at the rear panel connector J5 (type B female). For connecting with a PC, the supplied USB cable can be used.

The DAQ2 module features 4 analog input channels, two of which are reserved for APK and ASL. The remaining two input channels can be used for external parametric signals.

In addition, 2 analog output channels and 12 digital input and output channels are available.

All input and output signals are fed through connector J4 at the rear panel.

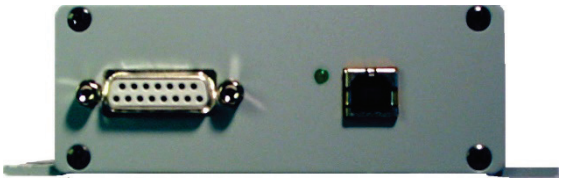


Figure 6: image of the ASCO-DAQ2 back panel. To the left-hand side is connector J4, to the right-hand side is USB interface

Analog input channels (see specification 4.2.3)

Item	Description
Number of available channels	4 (AI0, AI1, AI2, AI3)
Sampling resolution	14 bit
Input range	-5 to +5V
Channel assignments	AI0 = APK; AI1 = ASL (both signals from ASCO-P module in dB_{AE});
	AI2 and AI3 = external parametric channels (e.g.: elongation, pressure, temperature etc.)
	A parametric conversion (linear conversion) to physical units can be made by use of the ASCO-DAQ2 software

Analog output channels (see specification 4.2.4)

Item	Description
Number of available channels	2 (AO0, AO1)
Input range	-5 to +5V
Channel assignments	AO0 delivers the threshold signal which can be set by the user within the ASCO-DAQ2 software. It is connected to the analog threshold input of the ASCO-P module. AO0 can be used to trigger the optocoupler output (pin 3 and pin 10 of connector J1) if the APK signal (before peak stretcher) exceeds the defined threshold. AO1 is reserved for future usage and currently without function. The output is available at pin 7 of connector J4.

Digital channels

Item	Description
Number of available channels	12 channels which can be used for input and output. By default P1.* are output channels while P0.* are input channels.
P1.1	Available at J4 and reserved for a digital warning output (see chapter 3.2.5)
P1.2	Available at J4 and reserved for a digital alarm output (see chapter 3.2.5)
P0.2	Available at J4 and reserved for digital good output (see chapter 3.2.5)
P0.3	Available at J4 and reserved for digital invalid output (see chapter 3.2.5)
P0.7	Available at J4 and can be used as external trigger to start the data acquisition.

Note:

Up to software version 2010.0712 the active alarm and warning output were driven high. All later software versions drive the active output low (/Invalid, /Good, /Warning, /Alarm).

USB driver LED

The LED next to the USB port at the rear panel indicates the status of the USB device. It will flash at a frequency of 2Hz, if the DAQ2 module is properly detected by the PC (i.e., correctly enumerated, configured and not suspended). A constantly on LED indicates that the USB device is not properly detected by the PC. In this case see section 3.5 “Trouble Shooting”.

Power supply

The DAQ2 is powered by the USB bus.

2.3 Accessories

Vallen offers the following accessories:

Item	Description
ASCO-NTE	Power supply (for 230V ONLY!)
CBL-2-1M5-V8	Cable D-Sub15pol. to 2*BNC for analyzing analog APK, ASL signals

Item	Description
CBL-2-1M5-V22	Special cable: 2 BNC to 15pole Sub-D (J4) at ASCO-DAQ2; 1,5m long (for feeding 2 additional parametric signals like pressure, temperature…)
CBL-4-2M-V25	USB cable 2m, type B / type A (for connecting ASCO-DAQ2 with PC).
Vallen AE sensors	For an overview of available sensors see document reference [1]
MAGXY	Magnetic holders for Vallen AE sensors (for details see document reference [2]).
SIK	Silicon adhesive couplant, 100g
SCA-SI	Sensor coupling agent, silicon grease, 80 ml tube, -40°C to 180°C.

Feel free to ask Vallen sales (sales@vallen.de) for your specific needs.

3 Operation Manual

3.1 Getting Started

This section describes the ASCO-DAQ2 hard- and software setup for performing AE measurements in 4 steps.

3.1.1 Step 1: ASCO-DAQ2 software installation

The ASCO-DAQ2 software consists of two separate items:

- acquisition and analysis software
- the National Instruments USB driver which is needed for the communication of the ASCO-DAQ2 with the PC via the USB interface.

ASCO-DAQ2 software comes on a USB FLASH DRIVE and can be found in the subdirectory: ascodaq2.

Copy the folder ascodaq2 from USB FLASH DRIVE to c:\vallen (create this folder if it does not exist). This installs ascodaq2.exe, documentation, wave files and sample data.

After completing this step an offline analysis can already be done, i.e. opening and analyzing existing data files.

For data acquisition the National Instrument driver needs to be installed.

3.1.2 Step 2: National Instruments driver installation

Before starting “setup.exe” make sure, that no other version of NI-DAQ driver is already installed; otherwise, it must be de-installed. Start setup.exe of folder \NIDAQ* on CD (“*” is placeholder for most current release identifier). Confirm all dialogues. No options need changes. At the end of the installation, the installer wants to reboot the system. Please do so; otherwise, the USB device is not identified correctly

NI-DAQ driver software “remembers” the serial number of each USB-6009 ever attached and assigns a unique name “Dev x” to each of them. ASCO-DAQ2 software automatically identifies the currently attached “Dev x” device.

Note: Only one ASCO-DAQ2 unit can be operated by one PC at a time.

Note: In case the NIDAQ driver (NIDAQ922f0Core) is used with Win 7 32bit or 64bit operating systems there may occur limitations when ASCO-DAQ2 is connected via USB-hub or port replicator to a laptop or PC. Data acquisition may not start again and the error message “Onboard device memory overflow” appears. In such a case make sure that the ASCO-DAQ2 is directly connected to an USB port of the laptop or PC.

3.1.3 Step 3: Hardware Setup

1. Connect the power supply to the ASCO-DAQ2.
2. Connect the USB port of the ASCO-DAQ2 (connector J5), to a USB port of the PC by using the supplied USB cable. The operating system will search for a driver of the new USB device. This may take some time and finally it will tell that a new USB device has been detected and is ready for usage. Once the operating system recognizes the USB device the green LED on the ASCO-DAQ2 starts flashing. A flashing LED indicates that the USB device is ready for data transfer. A permanent on LED indicates that the USB device has not been properly recognized.
3. Connect the Vallen Systeme AE-sensor via the BNC connector (labeled J2) to the ASCO-DAQ2.
4. Mount the sensor to the object that shall be monitored. For hints on how to mount AE sensors please see document reference [1].

3.1.4 Step 4: Starting the measurement

1. Browse to the folder C:\Vallen\ASCODAQ and start the ascodaq.exe by double clicking on it.
2. In the dialog “Welcome to Vallen ASCO-DAQ2” choose the “default.xml” file and press the “Start recording” button.
3. Confirm the message that the “Default.log” data file will be overwritten.
   Note: This message is not shown when the ASCO-DAQ2 is operated for the first time!

The measurement starts automatically showing the ASL and APK signal. It can be stopped by pushing the Stop-button or <F10>.

Now the measurement setup can be changed using the Configuration dialog which is accessible via the menu bar→Edit→Configuration.

3.2 Software Overview

3.2.1 Main window

The main window consists of:

- menu bar (A)
- toolbar (B)

- diagram plane (C)
- monitoring result line (D)
- status line (E).

The elements: menu bar, toolbar and status line are explained in detail in section 3.3.1. The diagram plane is described in detail in section 3.2.1.1 below.

3.2.1.1 Diagram plane

The results of the analog input channels (APK, ASL, AI2 and AI3) are graphically displayed in a diagram. APK and ASL refer to the peak signal and average signal respectively. AI2 and AI3 are parametric input channels that can be used to record process parameters such as load, pressure, elongation, temperature etc. APK and ASL refer to the left vertical axis, whereas AI2 and AI3 refer to the right vertical axis. Above the diagram is the “Heading” area. A user defined header can be displayed there.

Below the diagram is the legend, depicting the graph style and its label as well as unit. Below the legend is the “Footer” area. User defined footer can be displayed there.

Only if “Monitoring” (see section 3.2.5, “Process monitoring with ASCO-DAQ2”) is enabled, the monitoring limits for each enabled channel are displayed in addition and monitoring results (Warning, Alarm) are displayed below the footer area.

3.2.2 Operating modes

There are two basic operating modes called “Direct data recording” and “Post processed data recording”.

Direct data recording

The measurement data will be stored without any further post processing or evaluation.

Only one data file will be created, and each subsequent measurement overwrites the data of the preceding one. Therefore, the operator must back up the data file for each individual measurement if this is required.

This mode is useful if data files need not be archived (e.g., online process control performed by a worker).

For direct data recording uncheck the “Enable post processing” checkbox in the “Data” tab of the configuration setting dialog (see chapter 3.3.3.4 Data Settings).

Post processed data recording

This mode automatically performs actions after the measurement has been stopped. The following actions are provided:

- Archiving measurement data: data of each measurement is stored into a separate data file (previous measurement files are not overwritten).
- Creating and storing screen shots of the diagram plane
- Generating a report file

This mode is useful if measurement data, screenshots of diagrams or reports shall be archived separately for each individual measurement (e.g. data of each crimped item are archived for quality management purposes).

To distinguish the different files a counter value is assigned to each measurement. This is done automatically in Voltage Controlled Mode or manually before each measurement. The counter value is used as filename for screenshots, measurement data and reports.

Warning: The counter is not checked for uniqueness; a wrong initialization value may overwrite already existing files!

For post processed data recording check the “Enable post processing” checkbox in the “Data” tab of the configuration settings dialog (see section 3.3.3.4, “Data Settings”).

Both measurement modes can be triggered manually (i.e., by pushing the record button of the toolbar) or by a voltage applied to channel AI2 or AI3. The second way of triggering a measurement is called “Voltage Controlled Mode”, VCM (see section 3.2.4.1, “Voltage Controlled Mode (VCM)”).

3.2.3 Generated files and file storage

3.2.3.1 Measurement data file

Measurement data is stored in <xml> plain text to files with “.log” extension. In single file recording mode the standard filename is “Default.log”. A different data file can be specified via the menu bar→File→New Acquisition File … (see section 3.2.3.6 “Changing the storage location”). However, after restarting the ASCO-DAQ2 software the data output file is “Default.log” again.

In post processed data recording mode there are two possibilities:

- “Archive recording data” is disabled: measurement data will be written to file “Default.log”
- “Archive recording data” is enabled: data files will be written to the “Data” subfolder on the path specified by the user. The filename is headed by the counter value.

3.2.3.2 Report file

A report file is only generated if the “Enable post processing” checkbox has been enabled (menu bar→Edit→Configuration… →Data tab; see section 3.3.3.4, “Data Settings”) i.e. post processed data recording mode is active.

The report file contains the results of each measurement per line, called report line. The user may specify the results which are stored by using macros. Macros are containers for the results of the measurement. A complete list of macros can be found in section 3.3.4 “List of Macros”.

The report line is defined in menu bar→Edit→Configuration…→Data tab: „Report line field” (see section 3.3.3.4 “Data Settings”) and may contain macros as well as strings.

3.2.3.3 Screenshot file

The screenshot of the diagram of one measurement after the end of data recording is generated only if the “Enable post processing” checkbox has been checked (menu bar→Edit→Configuration… →Data tab; see section 3.3.3.4, “Data Settings”) i.e. post processed data recording mode is active and if “Create PNG images” is enabled (menu bar→Edit→Configuration… →Data tab; see section 3.3.3.4 „Data Settings”).

3.2.3.4 Configuration file

Configuration files contain the selected configuration parameters (menu bar→Edit→Configuration). To create a new configuration file first open an existing configuration file. Apply the intended changes to the configuration and store the edited configuration as new configuration file (menu bar→File→Save configuration as…).

3.2.3.5 Storage location of files

Data – and configuration files are stored by default to predefined directories.

Recorded data files

- Direct data recording mode: “c:\vallen\ascodaq\data” by default
- Post processed data recording mode: c:\vallen\ascodaq\data\<subfolder>\<data>

Report files

- c:\vallen\ascodaq\data\<subfolder>. This folder contains the “report.txt” file which is the user defined list of results of one specific measurement.

Screenshot files

- c:\vallen\ascodaq\data\<subfolder>\<images>

Configuration data files

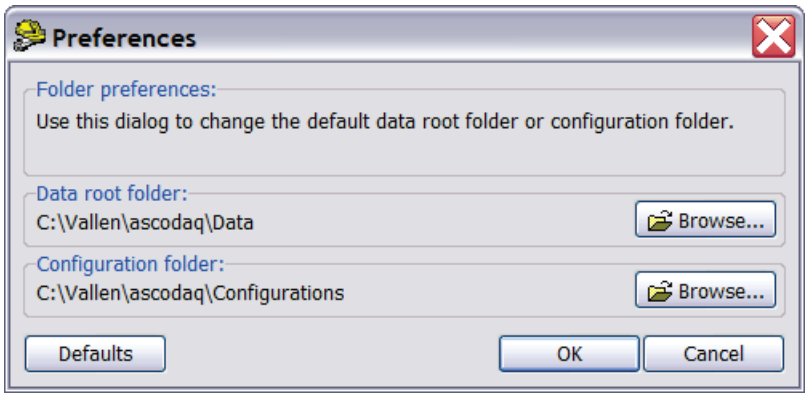
- “c:\vallen\ascodaq\configurations” by default.

<subfolder> is a placeholder for the “Configuration ID” which has to be set in “Data” tab of the Configuration dialog (see section 3.3.3.4 “Data Settings”) and is used as name for the subfolder.

<data> and <images> are placeholders for the data and screenshot files. Their filenames are made up of the Counter ID which identifies consecutive measurements.

3.2.3.6 Changing the storage location

The storage location of data files and configuration files can be changed via menu bar→File→Preferences…



Menu item	Description
Data root folder	The data root folder defines the folder to which data files are written.
Configuration folder	The configuration folder defines the folder to which configuration data are written.
Defaults	This button restores the default settings again.

3.2.4 Trigger for recording

There are three possibilities to trigger the start of recording:

- manually by clicking the start button.
- by applying voltage to the analog input channels AI2 or AI3 (Voltage Controlled Mode (VCM)). The applied voltage must exceed a predefined threshold.
- by using the digital trigger at pin14 of connector J4.

3.2.4.1 Voltage Controlled Mode (VCM)

VCM is enabled if either input channel, AI2 or AI3, is selected for VCM.

In VCM the trigger is defined by either of the analog input channels AI2 or AI3. The measured voltage is compared to an upper threshold and a lower threshold. The recording starts if the input signal exceeds the upper threshold and stops if it drops below the lower threshold. The recording will last at least for the “Minimum recording time” once the measurement is started.

3.2.4.2 Digital Trigger

Data recording can also be started by setting the digital trigger at pin 14 of the connector J4.

3.2.5 Process monitoring with ASCO-DAQ2

Note: The following is a general description of process monitoring with ASCO-DAQ2. For monitoring crimping processes see section 0.

Monitoring

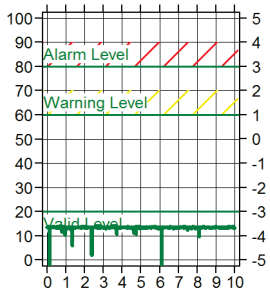
Throughout the following context monitoring means that one to four input signals AI0 to AI3 (AI0 is predefined to APK and AI1 is predefined to ASL; AI2 and AI3 are parametric channels) are compared against individually defined limits and yield individual channel states. The states of up to 4 channels are combined to yield an overall classification result (at the end of a measurement).

Channel states

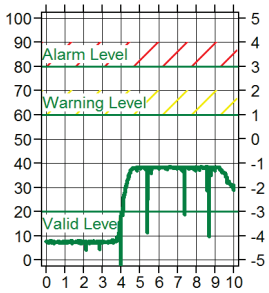
Each channel has a state based on the comparison of its signal with the predefined channel state condition. A channel state condition is defined by a level and a minimum time the signal has to exceed the level. Possible channel states are:

- Invalid = signal has not exceeded valid level for predefined minimum time.
- Valid = signal exceeded valid level for predefined minimum time.
- Warning = signal exceeded warning level for predefined minimum time.
- Alarm = signal exceeded alarm level for predefined minimum time.

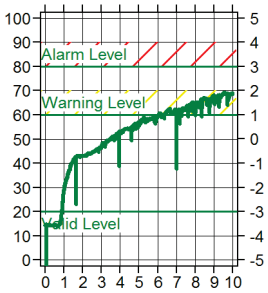
For a better understanding of the following section all possible channel states are illustrated below.



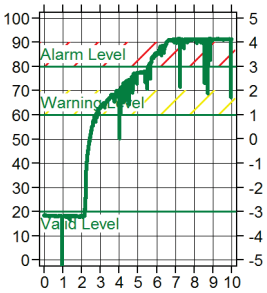
Invalid



Valid



Warning



Alarm

Monitoring conditions

Four monitoring conditions are defined:

- Invalid
- Valid
- Warning
- Alarm

Trigger requirement for monitoring conditions

Each of the monitoring conditions can combine the individual channel states in two ways to derive a monitoring condition:

- all selected channels must fulfill a monitoring condition to yield the according result e.g. all channel states must be Warning to yield a “Warning” result.
- only one channel must fulfill a monitoring condition to yield the according result, e.g. only one channel state needs to be Alarm to yield an “Alarm” result.

Results of monitoring conditions

- if the Valid condition is fulfilled the result will be “valid” otherwise it will be “invalid”.
- if the Warning condition is fulfilled the result will be “warning” otherwise it will be “no warning”.
- If the Alarm condition is fulfilled the result will be “alarm” otherwise it will be “no alarm”

Each of the results has a priority assigned to it the following way.

1. “no alarm” and “no warning” have priority 0
2. “invalid” has priority 1

3. “valid” has priority 2
4. “warning” has priority 3
5. “alarm” has priority 4

Online monitoring states

The online monitoring state supports the operator during the measurement, i.e., to provide indication that something is going wrong.

Two monitoring states are displayed online:

- Warning: if the monitoring condition Warning is fulfilled but not the Alarm condition and
- Alarm: if the monitoring condition Alarm is fulfilled.

In addition, acoustical output signals can be configured separately for each of the online monitoring states and different electrical outputs are provided.

Measurement classifications

The measurement classification is designed to support the operator to evaluate the success of the applied process. After finishing a measurement, it is classified into one of four classes: Invalid, Good, Warning or Alarm.

The classification is based on the results of the monitoring conditions by applying the following classification rules:

- Rule 1 – Priority Rule

  The result with the highest priority is used for classification.

- Rule 2 – Mapping Rule:

  An “alarm” result is mapped to Alarm.

  A “warning” result is mapped to Warning.

  A “valid” result is mapped to Good.

  An “invalid” result is mapped to Invalid.

Based on these two rules the following situations may occur (this is not a complete list):

- During the measurement no online monitoring state has been triggered: classification can be Good if the valid condition has been fulfilled or Invalid otherwise.
- During measurement the online monitoring state Warning is triggered, then Alarm: the measurement is classified Alarm.
- During a measurement individual (but not all) channel states are “warning” or “alarm”. The appropriate online monitoring state will not be triggered if the combination of channel states is set to “all channels”.

The next table displays the possible channel states in the first major column called Channel States. The channel state is indicated for each channel number 1, 2, 3 or 4. Each row resembles a potential measurement result. The following major column summarizes the way the monitoring conditions (valid, warning or alarm) combine the channel state results listed in the same row. The column Class lists the result of the classification for each row. Finally, an explanation of why the classification yielded what result can be found in the column Comment.

Channel States can be Invalid, Valid, Warning and Alarm				Combination of channel states Combination can be: One channel, All channels or it has no influence (n/i)			Class	Comment
Channel numbers				monitoring conditions				
1	2	3	4	Valid	Warn.	Alarm		
I	I	I	I	n/i	n/i	n/i	Invalid	
V	V	V	V	n/i	n/i	n/i	Good	
W	W	W	W	n/i	n/i	n/i	Warning	
A	A	A	A	n/i	n/i	n/i	Alarm	
I	(V, W, A)[1]			All	All	All	Invalid	Possible online monitoring states are not triggered because all channels are needed to trigger it. Instead, the result "I" leads to a result "Invalid"
V	(V, W, A)[1]			All	All	All	Good	At the end of the measurement, the valid condition is fulfilled for all channels (all are above valid level).
V	(I, V, W, A)[1]			One	All	All	Good	
W	(I, V, W, A)[1]			n/i	One	All	Warning	At least one channel state is "warning" and not all channel states are "alarm". Therefore, classification is Warning since warning result have higher priority than results from the Valid condition
A	(I, V, W, A)[1]			n/i	n/i	One	Alarm	

[1] Parenthesis "()" indicate that any of the channel states can occur, no matter how often.

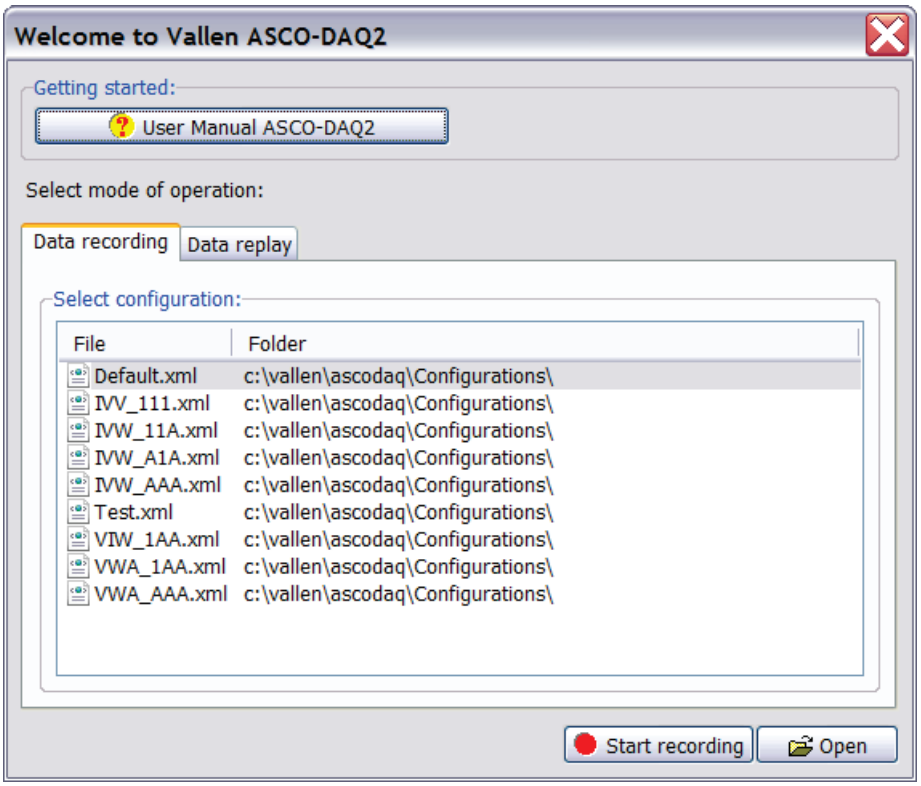
3.3 Complete Reference to ASCO-DAQ2 Software

3.3.1 Starting the Software

The software can be started in recording- or data replay mode. In recording mode data can be acquired. In data replay mode previously acquired data can be replayed for analysis purposes. The first step after starting the software is to decide whether ASCO-DAQ2 software shall be used in replay- or recording mode.

3.3.1.1 Data recording

For data recording the operator must select a configuration file, which initializes the ASCO-DAQ2. A default configuration is provided by Vallen Systeme.



Getting Started

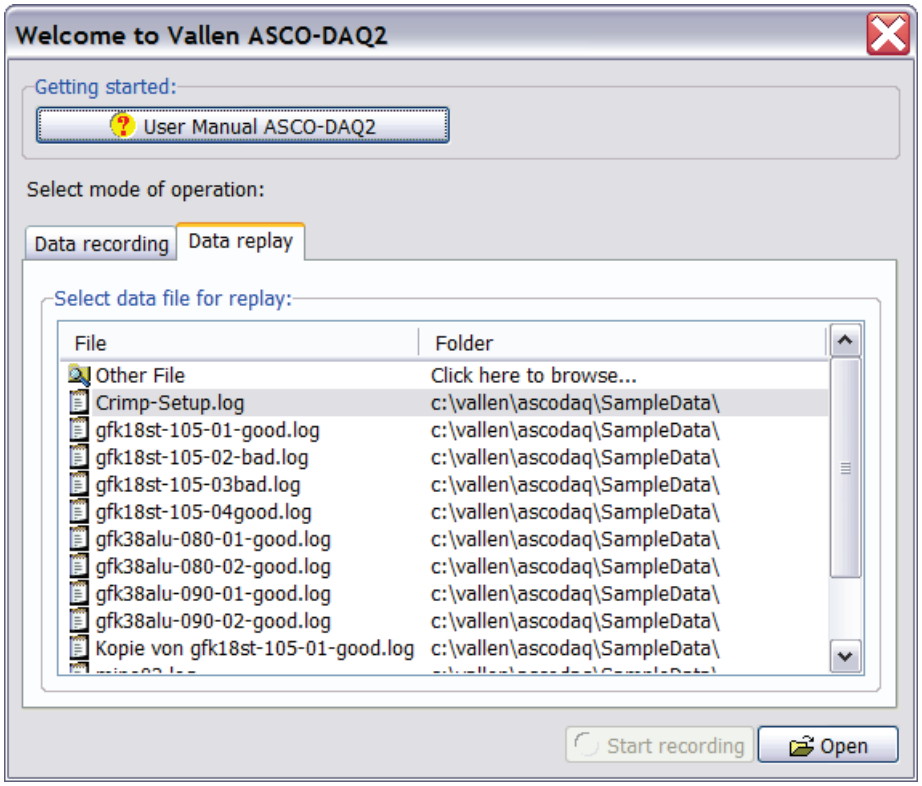
The buttons of this box link to documents, which are helpful for reference and for developing an ASCO-DAQ2 application.

Select Configuration

In this group all available configurations are listed. Configuration files are automatically stored to the folder c:\vallen\ascodaq\configurations and all available files will be shown. To start the recording mode a configuration file has to be chosen (selected file is highlighted).

The default.xml is provided by Vallen and can be used for a quick start of the ASCO-DAQ2. It must be used as initial set-up in order to change configuration settings which are then stored as a new configuration file.

3.3.1.2 Data replay



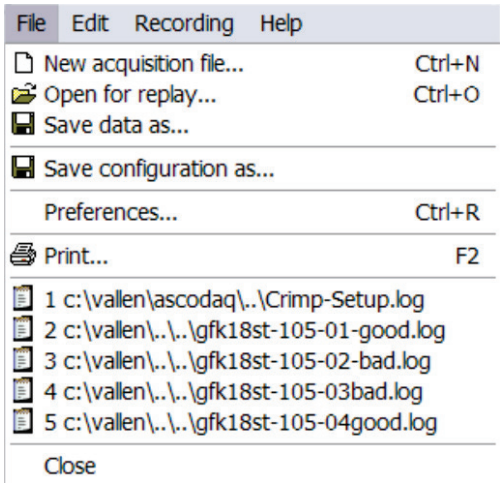
In data replay mode data files are analyzed offline. To choose a data file for offline analysis double click a file in the list or browse the file system by selecting the top entry “Other File”. When selecting a data file, the according configuration is also loaded. While the configuration can be changed during off line analysis, the changes are not stored to the initial configuration file.

3.3.2 Elements of the main window

3.3.2.1 Menu Bar

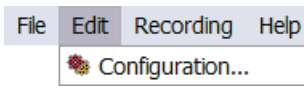
The menu bar presents a File, Edit, Recording and Help menu. For a description of the menu items see the sections below.

3.3.2.2 File Menu



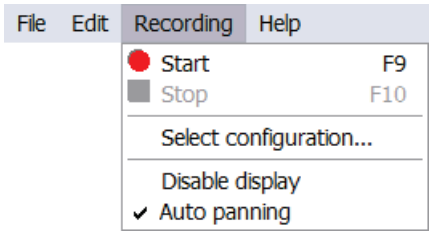
Menu item	Description
New acquisition file…	Creates a new acquisition file by opening the “Save File” dialog where a name for the new acquisition file can be specified.
Open for replay…	Opens a file for replay by opening an “Open File” dialog where a recorded measurement file can be opened for replay. The selected file will open with the configuration settings that were used when it was recorded.
Save data as…	Saves the current measurement data to file.
Save configuration as…	Saves a configuration file that has been changed by opening a “Save File” dialog where a name for the new configuration file can be specified.
Preferences…	Opens a dialog where a path and folder can be specified to which files generated in auto rearm mode are saved.
Print…	Opens the “Print” dialog.
Close	Exits the software.

3.3.2.3 Edit Menu



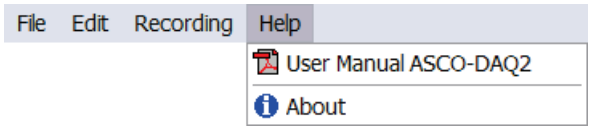
Menu item	Description
Configuration…	Opens the configuration settings dialog.

3.3.2.4 Recording



Menu item	Description
Start	Starts a recording. In data replay mode (see section 3.3.1, Starting the Software) a dialog will open to select a configuration file before recording starts.
Stop	Stops the recording
Select configuration…	Selects a configuration file for recording by opening the “Select Configuration” dialog.
Disable display	Disables the diagram display. If data post processing is enabled (see section 3.2.2, Operating modes) and archiving of diagram screenshots is enabled, screenshots will be saved to the specified directory (see section 3.2.3.6, Changing the storage location) also the diagram will not be displayed!
Auto panning	Toggles auto panning.

3.3.2.5 Help



Menu item	Description
User Manual ASCO-DAQ2	Open the ASCO-DAQ2 user manual

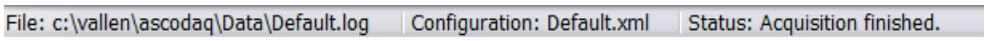
3.3.2.6 Tool bar

The toolbar presents quick link buttons to various functions regarding file management, setup, display and recording.

Symbol	Description
	Opens the file open dialogue for selecting a measurement file for display and analysis
	Opens the print dialogue for printing diagrams
	Opens the settings dialogue
	Jumps to the beginning of the recording. Use this function in cases time axis scaling does not accommodate the entire plot to jump to the beginning of the measurement.
	Scrolls backwards
	Scrolls forward
	Jumps to the end of the recording. Use this function in cases when time axis scaling does not accommodate the whole plot to jump to the end of the measurement.
	Zooms in

Symbol	Description
	Zooms out
	Starts recording in recording mode. In display mode a dialogue will open for selecting a setup file before recording can start
	Stops recording
	Toggles the APK (peak amplitude) graph
	Toggles the ASL (slow average) graph
	Toggles the AI2 (analog input 2) graph
	Toggles the AI3 (analog input 3) graph

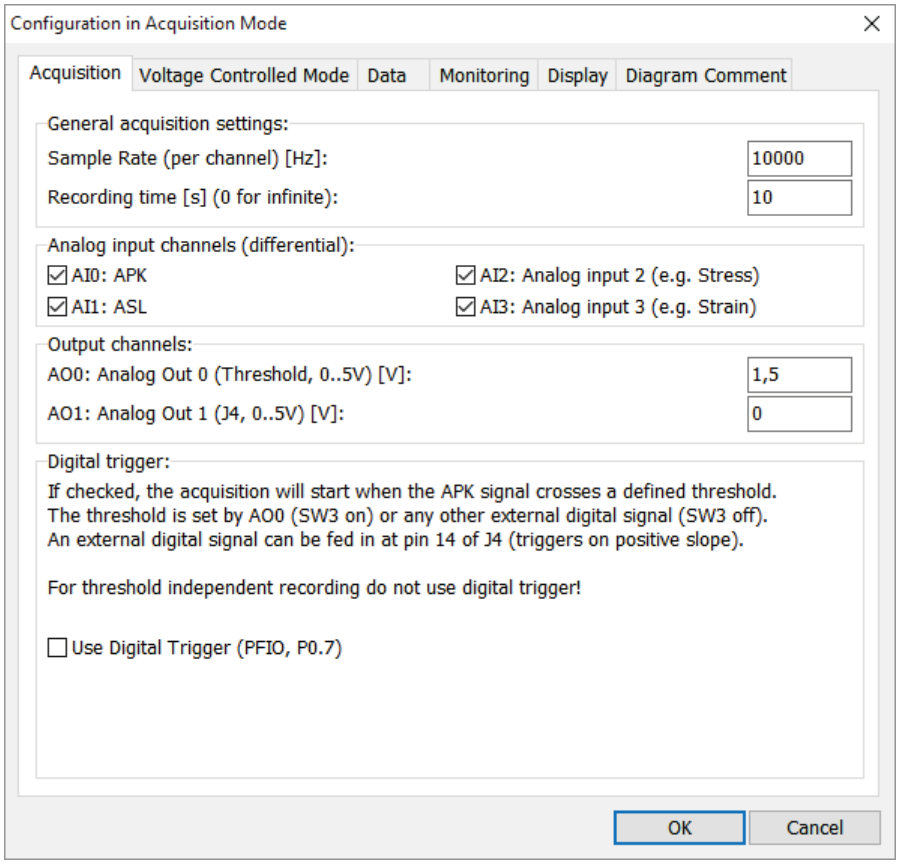
3.3.2.7 Status bar



Item	Description
File	File to which data are recorded. Data in this file will be overwritten
Configuration	Configuration file which is in usage for recording
Status	Status of the acquisition software

3.3.3 Recording Setup

3.3.3.1 Acquisition Settings



General Acquisition Settings

Sample Rate (per channel) [Hz]:

Applied sample rate to each input channel. Sample rate can be up to 40 kHz. A useful sample rate in case of the ASCO-PH3 is 50Hz (because of the 50ms of peak stretching, the sample interval should be approximately half of it).

Recording time [s] (0 for infinite)

This sets the maximum recording time. If recording should be terminated by user only set this parameter to 0. This setting has no influence in case of the VCM or batch mode.

Analog Input Channels (differential)

Analog Input AI0: APK

The analog input channel 0 is hardwired to the APK signal of the ASCO module. The APK signal is the converted peak amplitude of an AE-burst to a voltage pulse of 40mV/dB$_{AE}$ amplitude and 50ms pulse width. Check AI0 if input channel should be available in diagram.

Analog Input AI1: ASL

The analog input channel 1 is hardwired to the ASL signal of the ASCO module. The ASL signal represents the average of the logarithm of the AE signal over a certain time window and is an indicator for background noise. Check AI1 if input should be available in diagram.

Analog Input AI2: e.g., stress

This analog input channel can be used to acquire an external process parameter which can be used to correlate AE-data to process data. Check AI2 if input should be available in diagram and stored to HDD.

Analog Input AI3: e.g., strain

This analog input channel can be used to acquire an external process parameter which can be used to correlate AE-data to process data. Check AI3 if input should be available in diagram and stored to HDD.

Output Channels

Analog out AO0

This output channel is internally connected to the analog threshold input of the ASCO unit. AO0 can be used to trigger the optocoupler output (connector J1, pin 3 and pin 10) if the APK signal (before peak stretcher) exceeds the defined threshold. By default, this is set to 1.5V.

Analog out AO1

This output is available at pin 7 of connector J4 and is reserved for future usage. It can be set to a voltage (0 to 5V), the setting has no influence on the acquisition or the analysis software. By default, it is set to 0V.

Digital Trigger

The digital trigger can be used to start the measurement by use of an external trigger. By default (factory setting) the AO0 is connected to the threshold comparator of the ASCO-P via the internal switch SW3 (set to on). The measurement will start when the APK-signal exceeds the voltage setting of AO0, i.e. the measurement is triggered by a threshold crossing.

Alternatively, any other external digital trigger can be used to start the measurement. A digital trigger signal can be fed in over pin 14 of J4 (see section 4.2.2.4 J4 – Parametric Input). In this case the recording is started when the positive slope of the trigger signal is detected. To enable the external digital trigger the SW3 switch must be set to off.

3.3.3.2 Remark on Sample Rate

The following figures show graphs which result of pencil lead breaks (short signal) recorded with an ASCO-DAQ2-PH3 device with different sample rates.

Due to the peak stretching time of 50 ms for the APK, the peak amplitude is well recognized also for low sample rates down to 50 Hz (sample interval 20 ms).

In the case of the ASL the sample rate influences the result when the AE burst is short in duration. The ASL is calculated for a fixed number of samples. In case of slow sampling the number of low amplitudes, i.e., noise, samples dominate, while in case of faster sampling the samples with amplitudes higher than noise dominate. One can see an effect of sample rates on the ASL in the graphs below. At sample rates of 1 kHz and above, the difference in ASL becomes very small.

For longer burst signals the described averaging effect for the ASL will be smaller also for lower sample rates.

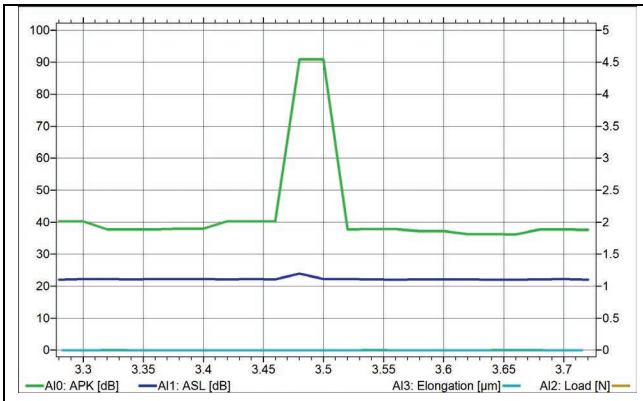


Figure 7: Signal of pencil lead break recorded with sample rate 50 Hz

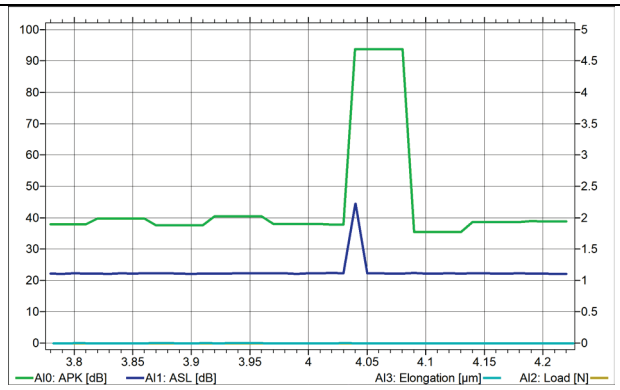


Figure 8: Signal of pencil lead break recorded with sample rate 100 Hz

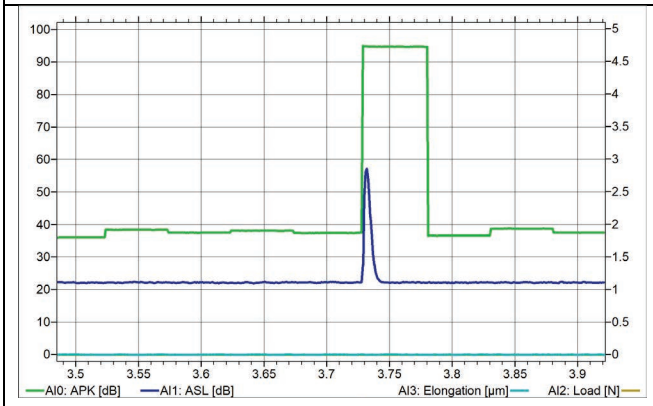


Figure 9: Signal of pencil lead break recorded with sample rate 1000 Hz

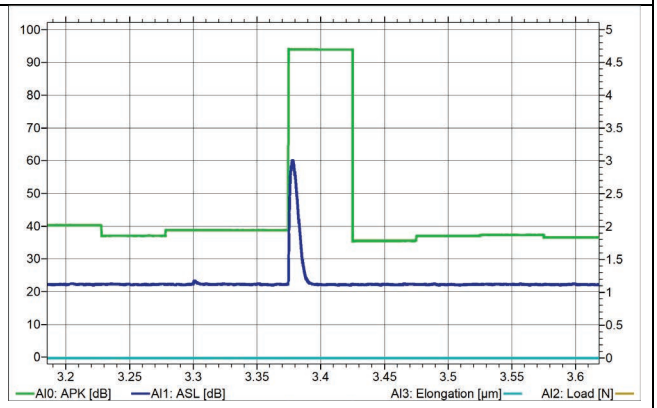
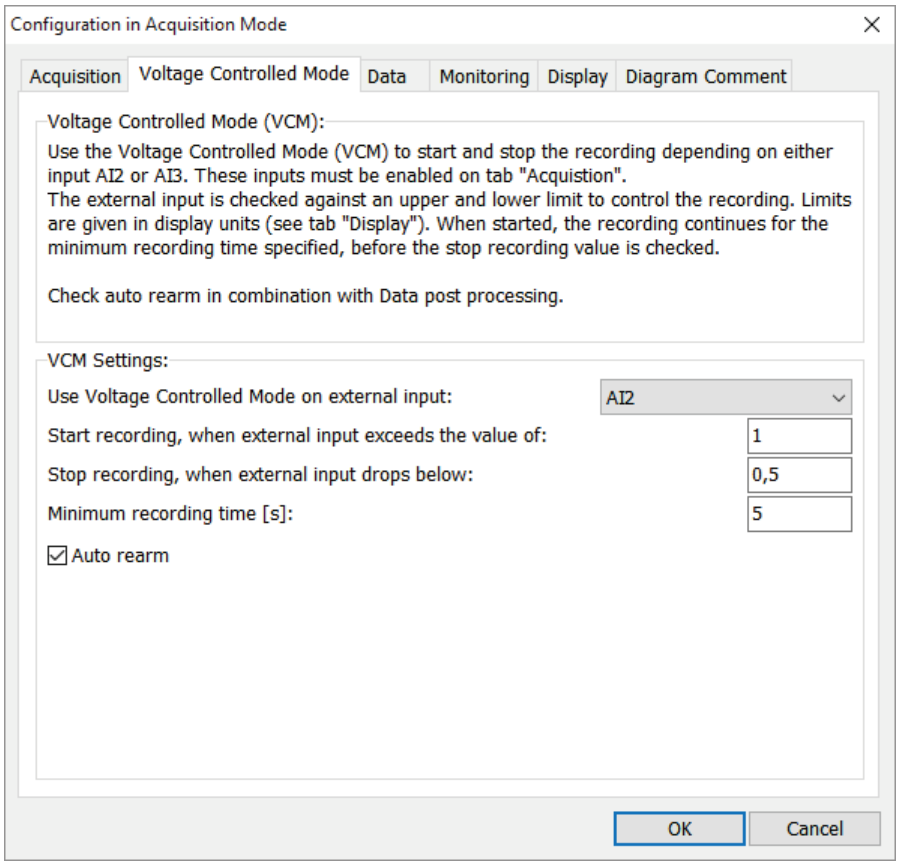


Figure 10: Signal of pencil lead break recorded with sample rate10000 Hz

3.3.3.3 Voltage Controlled Mode (VCM)

The VCM is used to start and stop the recording depending on the external parameter of the selected input channel: AI2 or AI3. The start criterion is triggered if the signal of the selected channel exceeds a predefined level. The measurement is stopped if the signal drops below a predefined second level.



VCM Settings

Use Voltage Controlled Mode on external input

Select which external parameter (either AI2 or AI3) should be used to trigger the measurement. Only the external parameter channels can be used to trigger the measurement.

Start recording when external input exceeds the value of

The recording will start if the external parameter of the selected input channel exceeds the defined limit. The limit is given in units defined by the parametric conversion selected within the “**Display**”-tab.

Stop recording when the external input drops below:

The recording will stop if the external parameter of the selected input channel falls below the defined limit. The limit is given in units defined by the parametric conversion within the “**Display**”-tab.

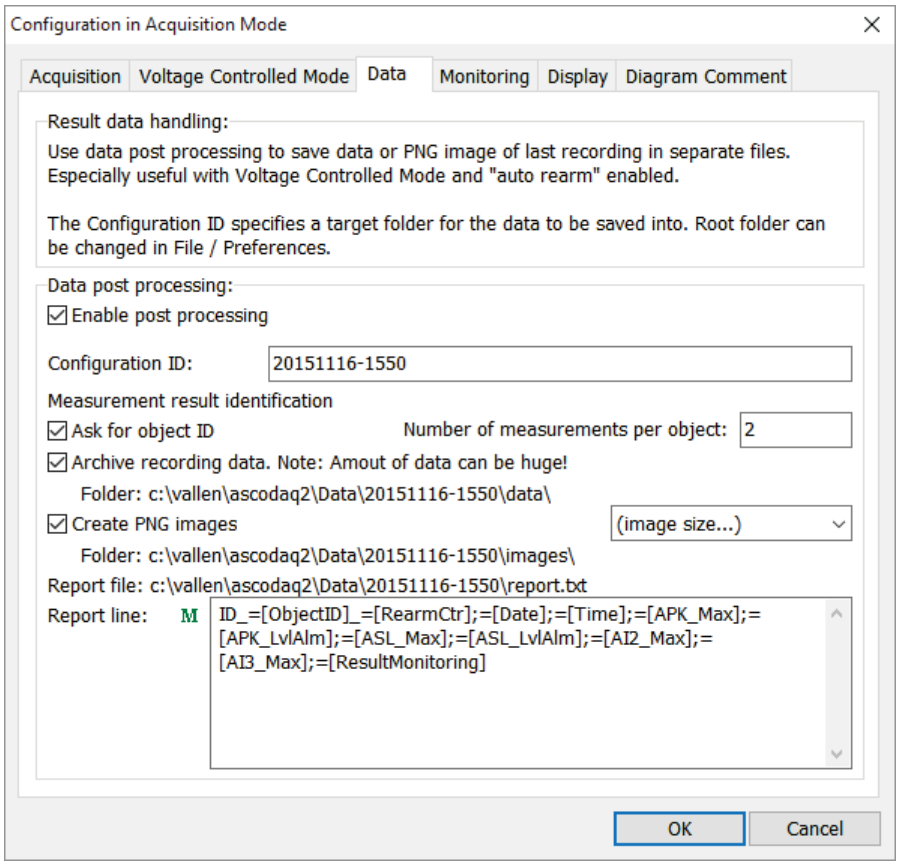
Minimum recording time [s]

The recording lasts at least as long as specified with this parameter. The unit is seconds.
After starting the recording continues till the minimum recording time is reached. Then the minimum recording time will be checked for termination.

Auto rearm

Check this box to enable the batch mode. The batch mode is suitable for processing (e.g., crimping) a whole batch. Data for each individual process are displayed in a diagram and stored to HDD.

3.3.3.4 Data Settings



Data post processing

Enable post processing

Check this box to enable the data post processing. Data post processing summaries the actions which are performed after the recording has stopped. These actions can be archiving measurement data and/or creating screenshots of the diagram and/or writing data to a report file.

Configuration ID

Configuration ID is an identifier of the measurement configuration. This name will be used to create a folder to which data is stored during post processing.

Ask for object ID

Check this box if the program shall ask for an object ID before a measurement run starts. The object ID is used as file name for storing measurement data. Data will be overwritten after confirming a warning dialog, if a file exists with the identical object ID as filename.

Number of measurements per object

Enter the number of measurements per measurement run (see “Ask for object ID”). The specified number of measurements will be done before the program asks for an object ID again. E.g. in case of crimping two end

fittings onto an insulator rods: if the object is identified by the serial number of a rod, then two measurements shall be done per measurement run / measurement object.

Archive recording data

Check this box to archive the measurement data. If checked a measurement file will be stored to hard disk for each recording. Since measurement data are stored in plain text xml format these files can become very large if the measurement time is long.

Create PNG images

Check this box to generate a png file of the diagram when the measurement has terminated. The image size can be specified by using the right pull down bar.

Report file

In data post processing mode a report file will be generated automatically. The report file contains user specified data of each measurement (see section Report line below).

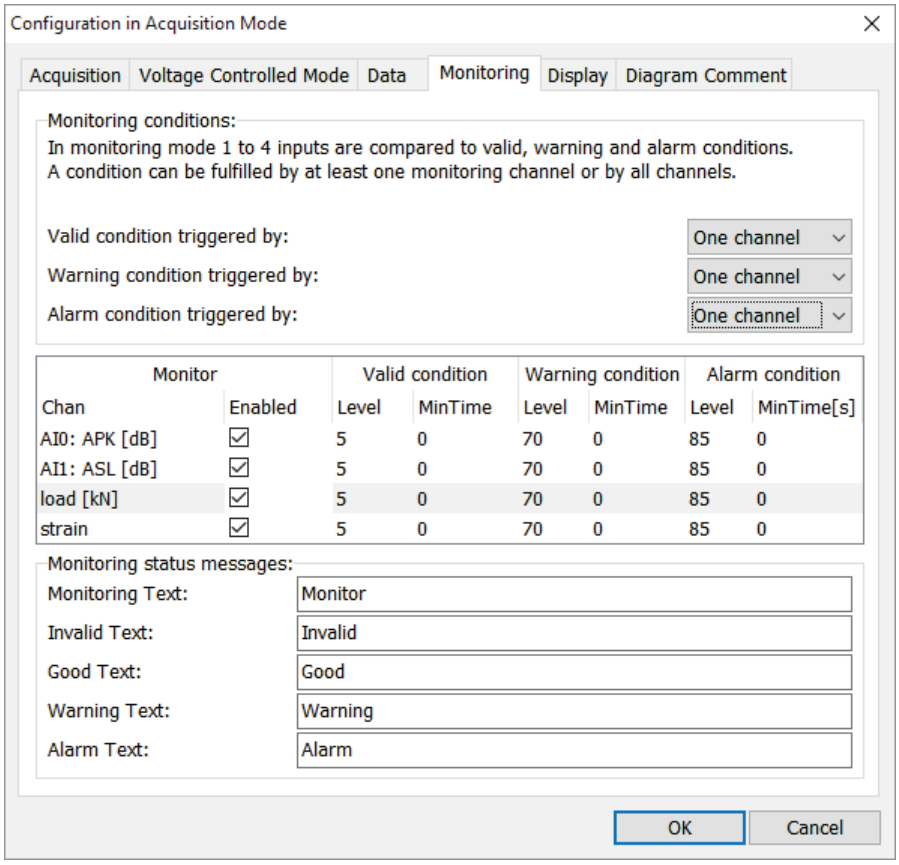
The result of each measurement process is written to a separate line.

Report line

In this field macros and user text can be entered. Based on the selected macros, selected data and text will be written in a line to the report file for each measurement.

For the detailed list of macros see: 3.3.4

3.3.3.5 Monitoring



Monitoring Conditions

Valid condition triggered by:

Defines whether the valid condition is triggered by just one channel or by all channels.

Note: the valid condition is evaluated at the end of the measurement.

Warning condition triggered by: / Alarm condition triggered by:

These settings specify whether the warning / alarm condition is triggered by just one channel or by all channels.

The settings for valid-, warning- and alarm conditions are governed in a table. Clicking in a cell of this table selects and highlights it for editing.

Menu Item	Description
Enabled	check to use the channel for monitoring purposes
Valid condition level	The level which the signal of the channel has to exceed to fulfill the valid condition. The unit of this parameter is given in the parametric conversion settings in the “Display”-tab. The valid condition is checked at the end of the measurement only if a warning or alarm has not been triggered. Only if the minimum condition is fulfilled the measurement result will be classified as “Good**”**.
Valid condition MinTime	The minimum time specifies the minimum time period the signal has to exceed the limit in order to fulfill the condition.
Warning condition level	The level which the signal of the channel has to exceed in order to trigger the “Warning”. The unit of this parameter is given in the parametric conversion settings in the “Display”-tab.
Warning condition MinTime	The minimum time specifies the minimum time period the signal has to exceed the limit in order to fulfill the condition.
Alarm condition level	The level which the signal of the channel has to exceed in order to trigger the “Alarm”. The unit of this parameter is given in the parametric conversion settings in the “Display”-tab.
Alarm condition MinTime	The minimum time specifies the minimum time period the signal has to exceed the limit in order to fulfill the condition.

Monitoring Status Messages (all messages are user defined)

Monitoring Text

This text will be shown during a measurement.

Invalid Text

This text will be shown if the classification result is “Invalid”.

Good Text

This text will be shown if the classification result is “Good”.

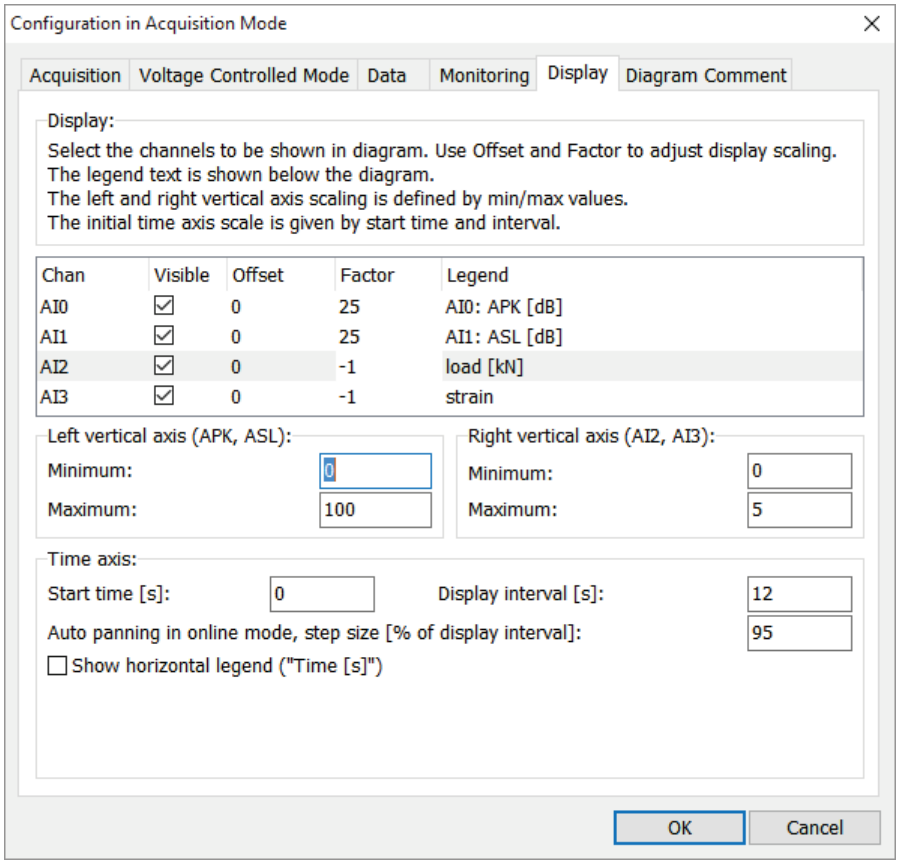
Warning Text

This text will be shown if the classification result is “Warning”

Alarm Text

This text will be shown if the classification result is “Alarm”

3.3.3.6 Display



The “Display” settings tab controls:

- which input channels are shown in the diagram
- the parametric conversion of the input channels
- the limits (scaling) of the x- and y-axis of the main diagram

Input channels can be added to the diagram by checking the checkbox in the “Visible” column. The cells of “Offset”, “Factor” and “Legend” column can be selected and highlighted for editing by clicking. “Factor” defines the slope of the parametric conversion. “Offset” controls the shift parallel to the y-axis:

$$y(x) = (x - \text{Offset}) \cdot \text{Factor}$$

$y(x)$ is the converted parameter, x the input signal in Volt, “Offset” and “Factor” are user provided attributes. The standard Factor and Offset setting is 0 and 25, respectively for APK and ASL. Please use the factor of 25 for AI0 and AI1 to get the result of APK and ASL in units of dB_{AE} which is the commonly used logarithmic unit used in acoustic emission testing.

Legend defines the labels that appear in the legend for the graphs.

Left vertical axis (APK, ASL) / Right vertical axis (AI2, AI3)

The APK and ASL signals are always correlated with the units of the left vertical axis. The signals AI2 and AI3 are always correlated with the units of the right vertical axis.

Minimum / Maximum

These values define the minimum / maximum of the left / right vertical axis.

Time axis

The physical attribute of the horizontal axis is always the time and the time axis settings controls the attributes of the horizontal axis.

Start time [s]:

This value defines the minimum of the horizontal axis.

Display interval [s]

This value defines the maximum of the horizontal axis.

Auto panning in online mode, step size [% of display interval]

Auto panning is automatically enabled if a “step size” greater 0% has been selected.
When auto panning is enabled the values of the x-axis are automatically shifted to the left when the measurement time has reached the limit of the “Display interval”.

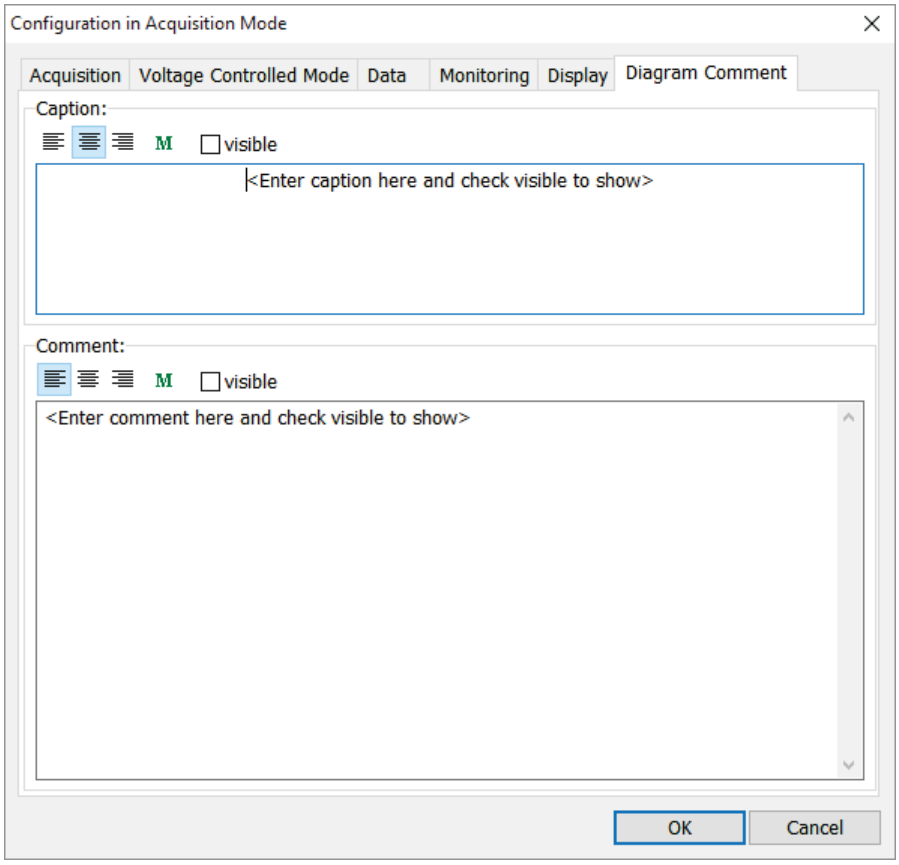
Example: Start time = 1s; display interval = 10s; step size = 80%

In this case the x-axis will show 0s to 10s till the measurement time reaches 10s. At 10s the values are shifted by 80% (=8s) to the left and the x-axis will show: 8s to 18s. At 18s the x-axis will show 16 s to 26s and so on.

Show horizontal legend (“Time [s]”)

Check the box to display the legend of the x-axis, uncheck the box to hide it.

3.3.3.7 Diagram Comment



Caption

The caption appears as heading in the diagram and in the bitmap that is stored to hard disk drive. The caption can be made up of alphanumeric strings and macros. Crimping results are made available by macros. For the detailed list of macros see: 3.3.4

visible: check to make the caption visible in the diagram. If unchecked no caption will be displayed in the diagram.

M: button shows a list of available macros (see section 3.3.4).

Comment

The comment appears as footer within the diagram and may be part of the documentation if “Post processing” has been enabled and “Create PNG images” has been selected. The comment can be made up of alphanumeric strings and macros. Crimping results are made available by macros.

visible: check to make the comment visible in the diagram. If unchecked no comment will be displayed in the diagram.

M: button shows a list of available macros (see section 3.3.4).

3.3.4 List of Macros

Macros are used to display interactive results. The can be inserted either in the Caption or Comment (see 3.3.3.7 Diagram Comment) or in the report line (see 3.3.3.4 Data Settings).

Macro Name	Description
=[Date]	Current date: day, month and year are given in numbers. Output is according to operating system format options.
=[LongDate]	Current date: name of the day, numeral of the day, name of the month and year. Output is according to operating system format options.
=[Time]	Current time in hours and minutes (hh:mm)
=[LongTime]	Current time in hours, minutes and seconds (hh:mm:ss)
=[ConfigID]	Identifier for the configuration. The identifier is chosen during the setup of the configuration file. It is only available in VCM auto rearm mode.
=[ObjectID]	Identifier for the measurement object. The identifier is entered before a measurement run. It is only available in VCM auto rearm mode.
=[RearmCtr]	Rearm counter: counter for the number of batch processes. It is only available in VCM auto rearm mode.
=[ResultMonitoring]	Container for the monitoring result of the process.
=[FileNameConfig]	Container for the configuration file name that is used.
=[APK_LvlMin]	Current setting for the minimum level of APK
=[APK_LvlWrn]	Current setting for the warning level of APK
=[APK_LvlAlm]	Current setting for the alarm level of APK
=[APK_TimeLvlMin]	Current setting for the time period the APK signal has to be above the minimum level to fulfil the minimum condition.
=[APK_TimeLvlWrn]	Current setting for the time period the APK signal has to be above the warning level to fulfil the warning condition.
=[APK_TimeLvlAlm]	Current setting for the time period the APK signal has to be above the alarm level to fulfil the alarm condition.
=[APK_Max]	Container for the maximum APK value during the monitored process.
=[ASL_LvlMin]	Current setting for the minimum level of ASL
=[ASL_LvlWrn]	Current setting for the warning level of ASL
=[ASL_LvlAlm]	Current setting for the alarm level of ASL
=[ASL_TimeLvlMin]	Current setting for the time period the ASL signal has to be above the minimum level to fulfil the minimum condition.
=[ASL_TimeLvlWrn]	Current setting for the time period the ASL signal has to be above the warning level to fulfil the warning condition.
=[ASL_TimeLvlAlm]	Current setting for the time period the ASL signal has to be above the alarm level to fulfil the alarm condition.

Macro Name	Description
=[ASL_Max]	Container for the maximum ASL value during the monitored process.
=[AI2_LvlMin]	Current setting for the minimum level of AI2
=[AI2_LvlWrn]	Current setting for the warning level of AI2
=[AI2_LvlAlm]	Current setting for the alarm level of AI2
=[AI2_TimeLvlMin]	Current setting for the time period the AI2 signal has to be above the minimum level to fulfil the minimum condition.
=[AI2_TimeLvlWrn]	Current setting for the time period the AI2 signal has to be above the warning level to fulfil the warning condition.
=[AI2_TimeLvlAlm]	Current setting for the time period the AI2 signal has to be above the alarm level to fulfil the alarm condition.
=[AI2_Max]	Container for the maximum AI2 value during the monitored process.
=[AI3_LvlMin]	Current setting for the minimum level of AI3
=[AI3_LvlWrn]	Current setting for the warning level of AI3
=[AI3_LvlAlm]	Current setting for the alarm level of AI3
=[AI3_TimeLvlMin]	Current setting for the time period the AI3 signal has to be above the minimum level to fulfil the minimum condition.
=[AI3_TimeLvlWrn]	Current setting for the time period the AI3 signal has to be above the warning level to fulfil the warning condition.
=[AI3_TimeLvlAlm]	Current setting for the time period the AI3 signal has to be above the alarm level to fulfil the alarm condition.
=[AI3_Max]	Container for the maximum AI3 value during the monitored process.

3.3.5 Error Messages

Error number	Description
1000	The NIDAQ driver is not properly installed. The NIDAQ driver is needed for the OS to recognize the ASCO-DAQ2. Please refer to the NIDAQ driver installation in section 3.1.2
1001	The ASCO-DAQ2 unit is not connected to the PC. Check the USB cable for loose connection.
1002	An unexpected error occurred during recording.
1004	An error occurred during reading of a data file. A line ended unexpectedly.
1005	An error occurred during reading a data file. An illegal character was found and could not be converted.
1100	The selected pdf file has not been found in the given directory. Please contact sales@vallen.de to get the document.
1101	An unknown pdf file has been selected. Please contact sales@vallen.de to get the document.

Error number	Description
1200	No configuration files have been found in c:\vallen\ascodaq\configurations. Please store your configuration files into this folder since the software requires at least one configuration file in this folder. **Note**: In case all configuration files have been deleted by mistake, the default.xml configuration file must be copied from the Vallen ASCO-DAQ2 USB FLASH DRIVE.
1201	An unexpected error occurred when trying to save configuration file. Most probably the folder or file is write protected and/or the current user does not have the permission to write to the selected folder.

3.3.6 Paths

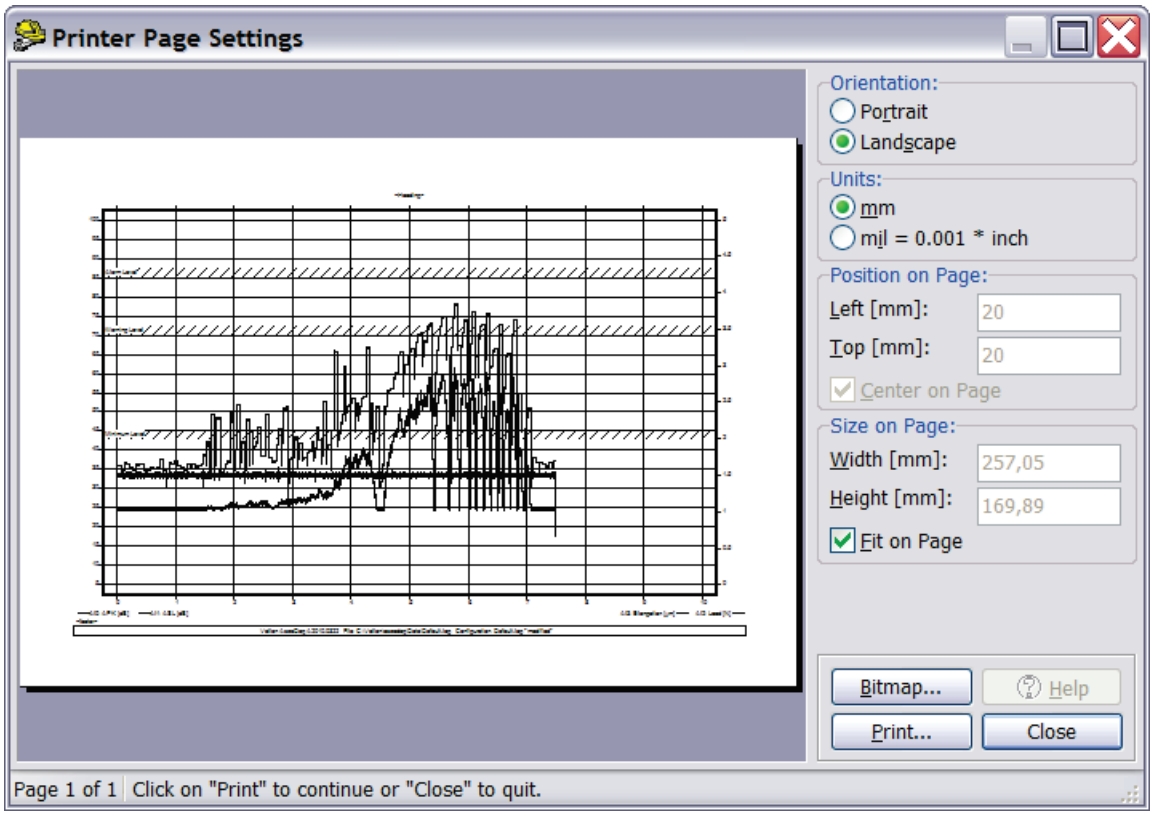
Important note: The ASCO-DAQ2 software has to be installed into C:\vallen\ascodaq!

See table below for a list of paths that are used by the ASCO-DAQ2 software.

Path	Description
C:\vallen\ascodaq\	Root directory of the ASCO-DAQ2 software installation.
C:\vallen\ascodaq\Configurations	Directory which contains the configuration files. At least one configuration file has to be in this folder. If no configuration file is in this folder a default configuration file is generated automatically.
C:\vallen\ascodaq\SampleData	Directory which contains the sample data provided by Vallen.
C:\vallen\ascodaq\Docu	Directory which contains the ASCO-DAQ2 documentation.
C:\vallen\ascodaq\Data	Directory to which measurement data is written.

3.3.7 Printing a page

Print dialog is available via menubar→File→Print…



Item	Description
Orientation	The print out orientation can either be Portrait or Landscape.
Units	Select either mm or mil (milliinch). This setting will have influence if “Fit on Page” is disabled.
Position on Page	Defines the position of the print out with respect to the upper left corner. This setting will only available if “Fit on Page” is disabled.
Size on Page	Defines the size of the print out on the page. This setting will only available if “Fit on Page” is disabled.
Fit on Page	If checked the diagram is fitted on page (default). In this case “Position on Page” and “Size on Page” settings have no influence.

3.3.8 File format of raw data file

The raw data file consists of two parts, an XML section and a data section. The XML section is separated from the data section by the EOF (char 26, hex #1A). The XML section contains the settings while the data section contains the measurement data.

The data section is pseudo-XML and headed by “[Setup]” section followed by a “[Data]” section. The ASCO-DAQ2 setup is briefly summarized in the “[Setup]” section. The measurement data is organized in a table where the rows resemble the sample interval. The number of columns depends on the enabled channels. The data is given in units of Volt.

The following sample code is a shortened example of the data file:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Vallen_XML>
  <DocumentProperties>
    <Title>ASCODAQ Setup</Title>
    <Version>01.10</Version>
  </DocumentProperties>
  <ASCODAQ_Settings>
    <Recording>
      …
    </Recording>
    <VCM>
      …
    </VCM>
    <Monitoring>
      …
    </Monitoring>
    <Batch>
      …
    </Batch>
    <Display>
      …
    </Display>
  </ASCODAQ_Settings>
</Vallen_XML>

[Setup]
AO0=1,500
AO1=0,000
SamplingRate=10000
InitialAcquisitionDuration=1,0
ChannelTimeOffset=1/48000
StartTime: 06.04.2010 13:43:39
Enabled Channels: AI0, AI1, AI2, AI3
Data layout:
AI0,   AI1,  AI2,  AI3
[/Setup]
[Data]
14478E-4     09868E-4    -00137E-4   -00013E-4
14478E-4     09868E-4    -00112E-4   00012E-4
…
[/Data]
```

3.4 Using the ASCO-DAQ2 for monitoring crimp processes

3.4.1 Introduction

The ASCO-DAQ2 can be used to monitor crimping process e.g., the crimping of end fittings to glass fiber rods of high voltage insulators.

Figure 11: High Voltage Insulator

Figure 12: Fitting on bare fiber glass rod

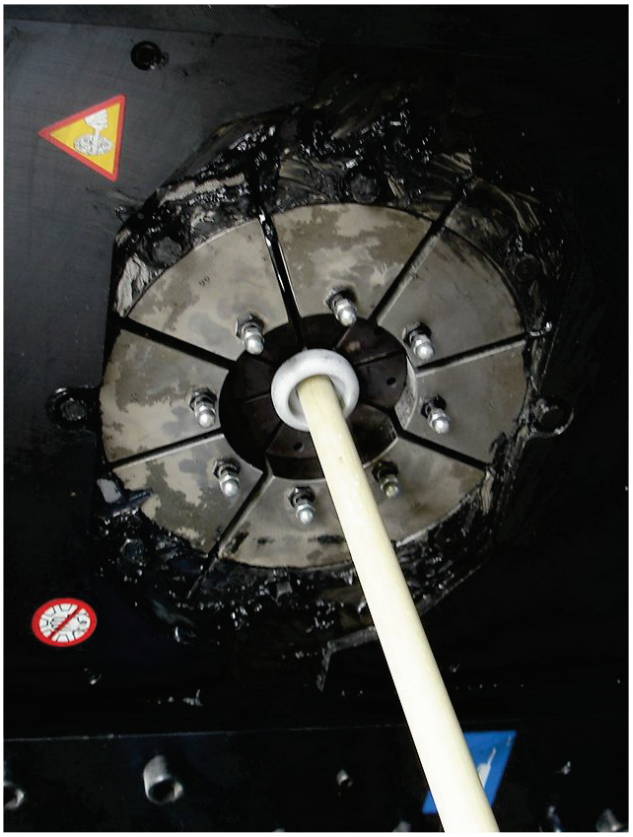


Figure 13: Joining a fitting and a fiber glass rod by a crimping process

To produce high voltage insulators (Figure 11) that shall carry heavy overhead power lines, a metallic fitting is crimped onto a fiber glass rod (Figure 12). This crimping process (Figure 16) must be well adjusted. Most important process parameters are hydraulic pressure and duration of pressurization. If the crimping pressure is too low, the mechanical joint might fail under tension. If pressure is too high, the brittle fiber glass rod might become damaged and fail under tension.

Monitoring the acoustic emission during a crimping process will detect any damaging of the fiber glass rod in real time. The ASCO-DAQ2 is the most efficient solution for this application: simple to use, highly accurate, and reasonably priced.

The ASCO-DAQ2 software can be configured in the way that a whole batch of insulators can be crimped without making adjustments to the hard- or software. A classification of the results can be done automatically telling the operator whether the crimping process was good, undefined or bad.

Figure 14: Example for sensor placement

The classification can be done depending on the conditioned AE-signal (APK or ASL) and up to two process parameter (e.g. crimping pressure, etc.). For example, the measurement classification can be:

- “Invalid” if the crimping process is considered invalid because e.g., minimum crimping pressure is not reached.
- “Good” for insulators that have been crimped without damaging the fiber glass rod.
- “Bad” if the crimping process damaged the fiber glass rod.
- “Undefined” if a clear classification cannot be made.

For this special production process Vallen provides the product “ASCO-Crimp” which consists of the following components:

- AE-sensor (VS600-A2)
- Magnet holder for the AE-sensor (MAG4A1)
- Sensor cable (CBL-1-1M2-V15)
- ASCO-DAQ2-PH3, ASCO-DAQ2 software, USB cable and ASCO-DAQ2 Operation Manual
- power supply (ASCO-NTE)
- CBL-2-2M5-V21, a special cable from ASCO-DAQ2 to two external sensors e.g. pressure transducer (2.5m, 15-pole SubD connector (male) on ASCO-DAQ2 side, two free wires on transducer side, 4-20mA, max. 5V)
- coupling agent for mounting the AE-sensor onto the crimp-jaws (HVF)
- Special sample data files for illustration

3.4.2 Setting up the data recording

The main objective is to configure the ASCO-DAQ2 software in such a way that it is most suitable to be used when crimping a batch of insulator rods. This includes setting up a suitable operation mode (see section 3.2.2 Operating modes) such as the “Post processed data recording mode” and a suitable recording trigger (see section 3.2.4 Trigger for recording), such as VCM.

In most cases the data recording has to be monitored in order to classify the crimped insulator rods.

The first step in setting up the data recording is to configure the recording trigger or VCM. Afterwards the classification criteria, i.e., channel state conditions, have to be defined. Finally, the operation mode has to be set.

3.4.3 Step 1: Starting and stopping the data recording in Voltage Controlled Mode (VCM)

In VCM a voltage signal in channel AI2 or AI3 can be used to trigger the recording. Whether using a simple electric switch or a pressure sensor, the trigger levels for start and stop of a measurement have to be set correctly. In both cases it is recommended to make some trial runs to determine the trigger levels and to prove correct function.

Connecting the external parametric input

Two external parametric inputs are available. A pressure sensor or electrical contact can be connected by use of the two-wire cable “CBL-2-2M5-V21”. This cable is part of the ASCO-Crimp-Package. For example, the reference output of a pressure sensor (usually the negative pole) should be connected to the blue wire of the CBL-2-2M5-V21and the positive pole of the pressure sensor with the brown wire. The voltage is measured in differential-mode. The blue wire is grounded over 1kOhm via the ASCO-DAQ2. Connection of external parametric inputs is a prerequisite step to use VCM.

To check the parametric input AI2 and AI3 must be activated by checking the “Visible” checkbox of AI2 and AI3 on the “Display”-tab (see section 3.3.3.6 Display). Also, please make sure that the right vertical axis-scaling is correct to show the measurement range.

Using a switch to control the recording

In this case a neutral electrical contact (e.g., a switch) can be used between the two wires of CBL-2-2M5-V21. The input channel will observe a voltage of about 1.3V, when the contact is open and 0V, when the contact is closed.

Using a pressure sensor to control the recording

The output of the pressure sensor can be transformed to physical units by setting “Factor” and “Offset” in the “Display”-tab (see section 3.3.3.6 Display). Set “Offset” to the voltage of the pressure sensor at pressure=0. For “Factor” the change of pressure per 1V is needed.

$$y[\text{pyhsical units}] = (u[\text{V}] - Offset[\text{V}]) \cdot Factor[\tfrac{\text{physical units}}{\text{V}}]$$

By evaluating a test measurement, the start and stop level for the recording can be determined.

The start and stop levels for a measurement are set in the “Voltage Controlled Mode”-tab (menubar→Edit→Configuration…: Voltage Controlled Mode, VCM Settings group) in the fields “Start recording, when the external input exceeds the value of:” and “Stop recording, when external input drops below:” respectively. These values must be given in physical units according to the parametric conversion defined.

Setup Example: using a switch

To start the recording by closing an electrical contact connected to AI2 (pins 1 and 2 of J4, see section 4.2.2.4 J4 – Parametric Input) the following settings apply to

- “Use Voltage Controlled Mode on external input:”: AI2,
- “Start recording, when the external input exceeds the value of”: 0.5V and
- “Stop recording, when external input drops below”: 0.5V

Afterwards make sure that AI2 is displayed in the diagram:

- In the “Display” tab check the “Visible” checkbox of AI2.
- Make sure that the right vertical axis limits are set to -2V to +2V

Confirm the changes and start the data acquisition by a click on the record button of the tool bar (see section 3.3.2 Elements of the main window) or by pushing <F9>. Since VCM is enabled, the input channels are scanned but data recording and display is not started as long as AI2 is below its start recording level. When the contact is closed the recording starts and the measured signals are shown in the diagram. The measurement ends if the contact is open again and the minimum recording time has been exceeded.

3.4.4 Step 2: Setting up monitoring

The ASCO-DAQ2 Software can classify the results of a measurement according to the results of the channels AI0, AI1, AI2 and AI3. This mode for classification is called “Monitoring Mode” (see sections 3.2.5 Process monitoring with ASCO-DAQ2, and 3.5.5 How to set up the monitoring of a channel).

AI0, also labeled APK, represents a signal that is proportional to the peak amplitude of the AE-signal in dB_{AE}. AI1, also labeled ASL, is a floating average of the logarithm of the rectified AE-signal, obtained by an 86Hz low pass filter. While APK represents the peak amplitudes, ASL is more sensitive to the continuous signal levels. Thus, it is sensitive to the background noise.

Single crack events in the specimen will be visible in APK. Steadily ongoing damage can be seen in a rise of ASL.

Determination of the appropriate monitoring levels

Test measurements with good and bad crimping results must be carried out to define appropriate limits. For this kind of test measurement, it is a good practice to disable VCM. Recording should be started and stopped manually. Disabling VCM is done by selecting “None (disabled)” from the drop-down list in the VCM Settings group of the Voltage Controlled Mode tab (see 3.3.3.3 Voltage Controlled Mode (VCM)).

The test measurements may yield results like the ones shown in the diagrams of Figure 15 to Figure 17. Figure 15 shows an example of a good crimping process whereas Figure 16 shows the result of a bad crimping process. Figure 17 shows the result of a reference measurement with a steel rod, where no damage at all can be induced by crimping. The measured AE-signal shown in Figure 17 is related to the background noise produced by crimping.

The brown curve shows the crimping pressure in bar in each diagram.

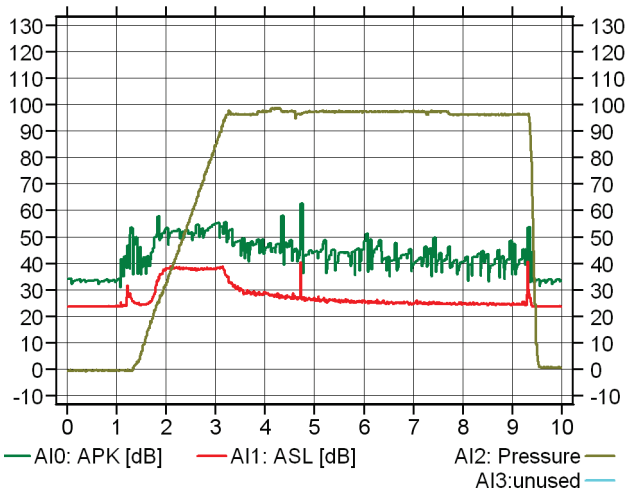


Figure 15: Good crimping example.

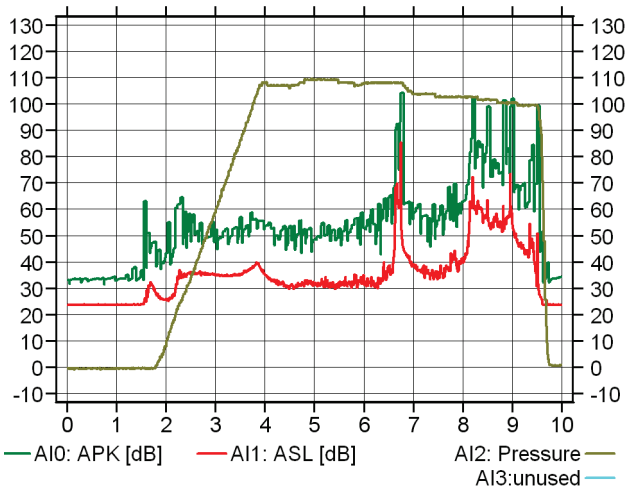


Figure 16: Rod that is damaged during crimping.

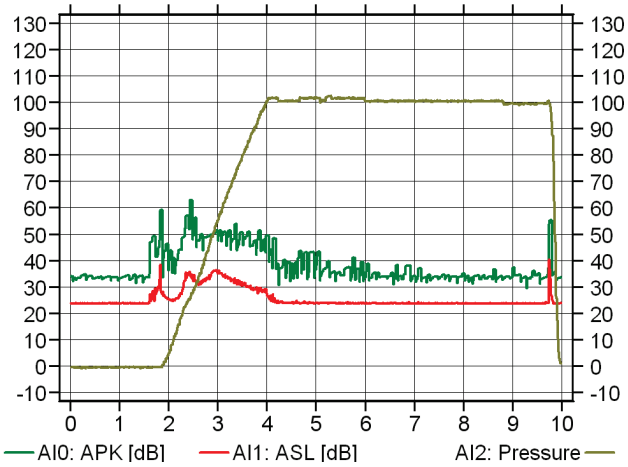


Figure 17: Results from crimping on steel.

From these measurements the channel state levels for Valid, Warning and Alarm must be determined. By combining the results of more than one channel very complex classification conditions can be utilized.

The channel state conditions are defined in the “Monitoring”-Tab (menu bar→Edit→Configuration…, Monitoring tab). A valid, warning and alarm level can be defined for each input channel AI0, AI1, AI2 and AI3. If more than one channel is used for classification, the channel states have to be combined in an appropriate way to yield a classification results (see section 3.2.5 Process monitoring with ASCO-DAQ2).

Additionally, a time limit can be defined after which the according channel state condition is fulfilled.

3.4.5 Step 3: Setting up the operation mode

The final step is setting up a suitable operation mode (see section 3.2.2 Operating modes and 3.3.3.4.Data Settings). The recommended operation mode is “Post processed data recording”. This is set by checking the “Enable post processing” checkbox on the “Data”-tab.

Check “Auto rearm” on the “Voltage Controlled Mode”-tab.

for an automatic rearm of the measurement, i.e., VCM is rearmed after each crimping process.

The configuration is saved by selecting menu bar→File→Save configuration as… The configuration file is stored to the “Configurations” folder by default.

3.4.6 Screenshots of the configuration

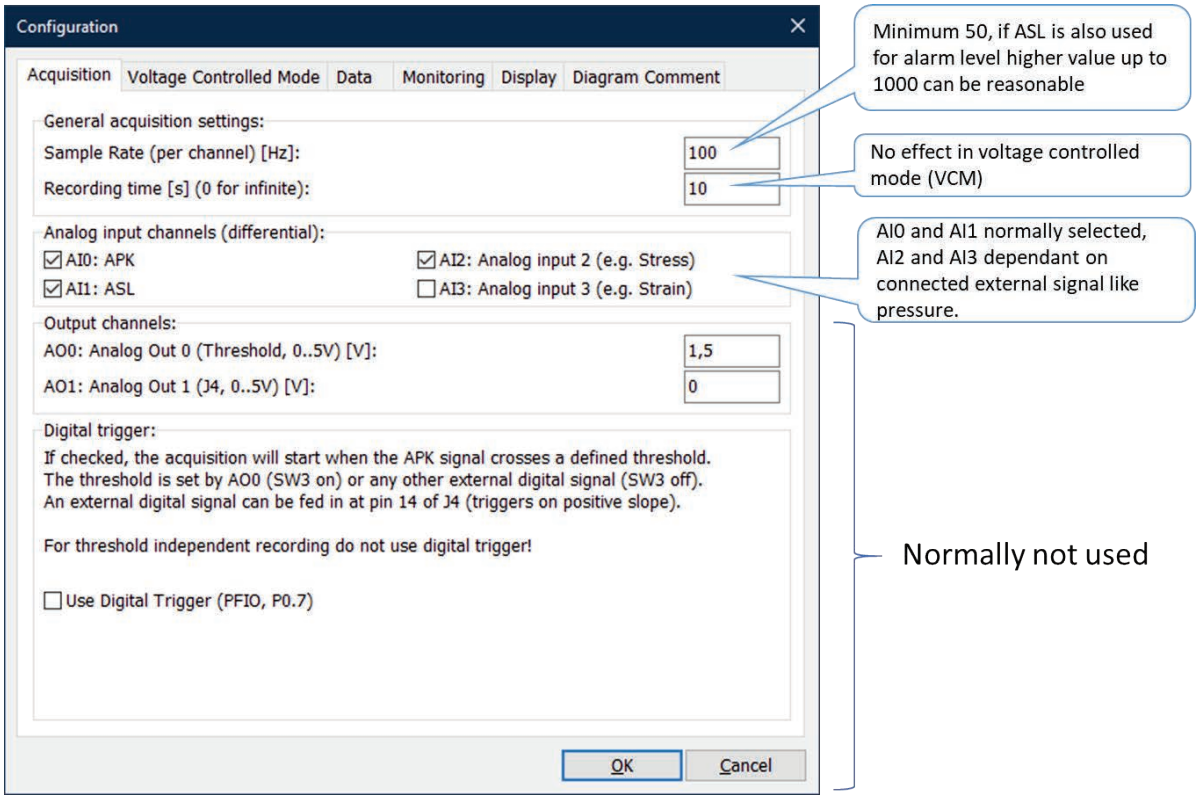


Figure 18: General Acquisition settings

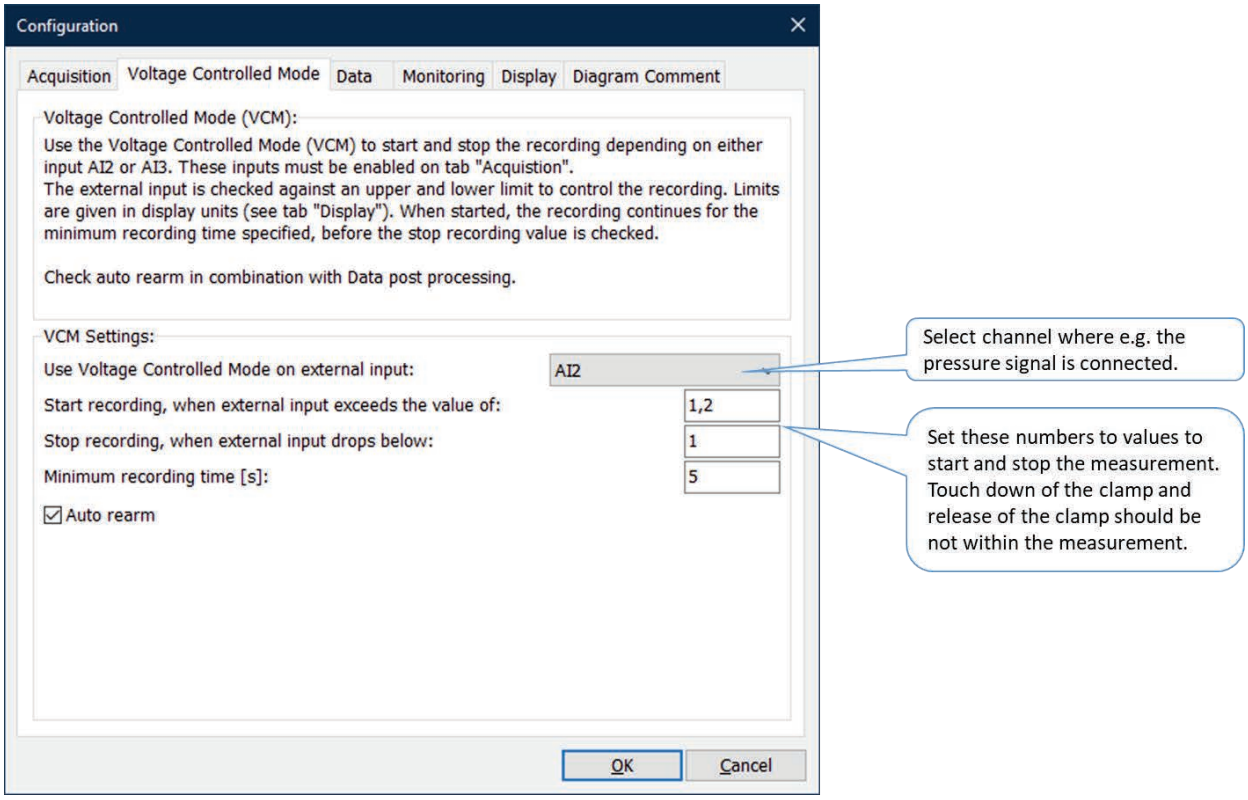


Figure 19: settings for voltage-controlled mode

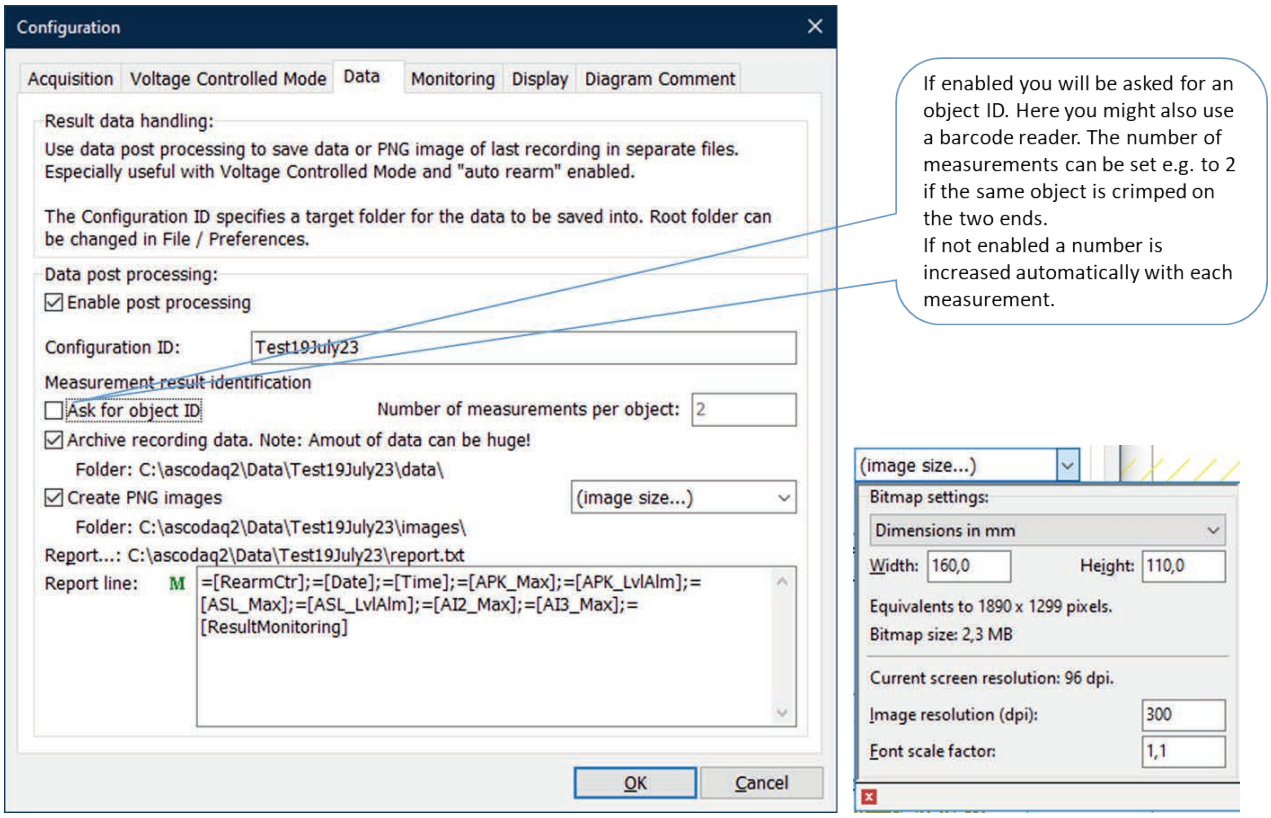


Figure 20: Settings of the data tab

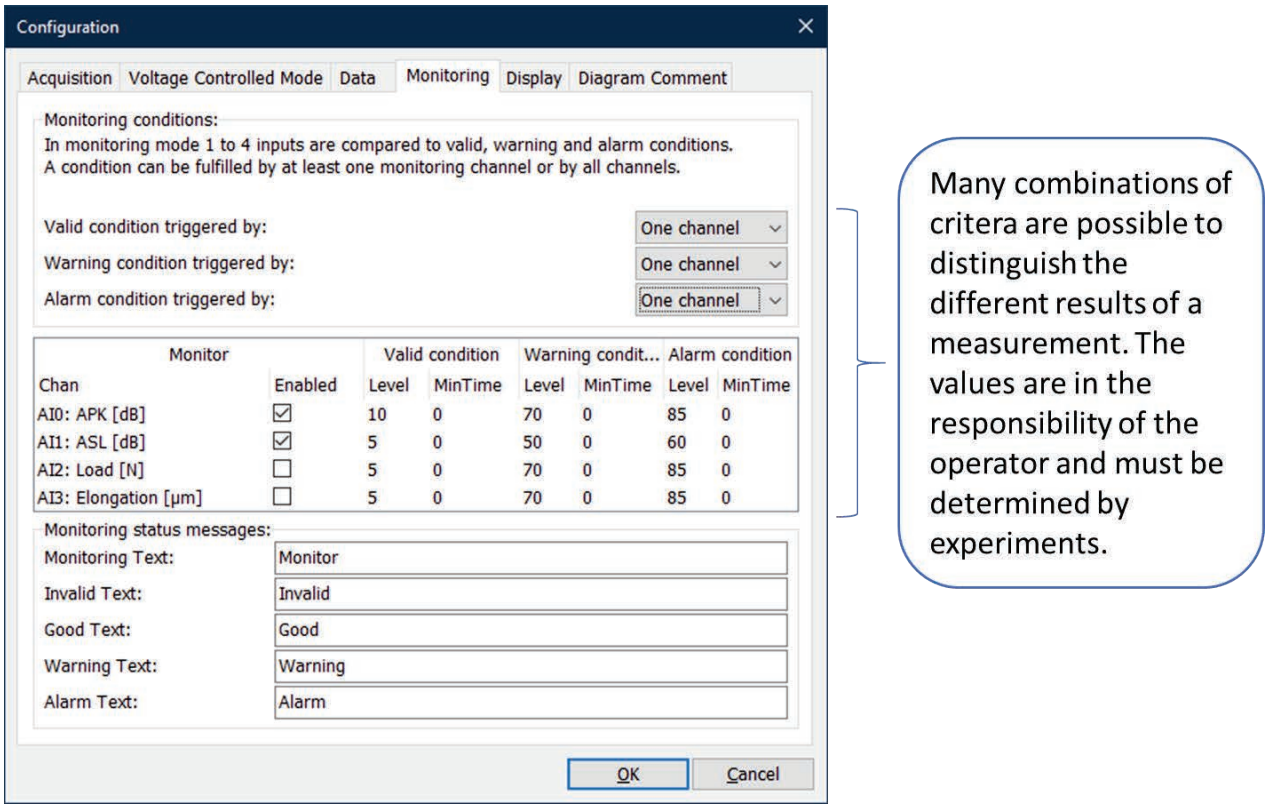


Figure 21: settings of the monitoring criteria.

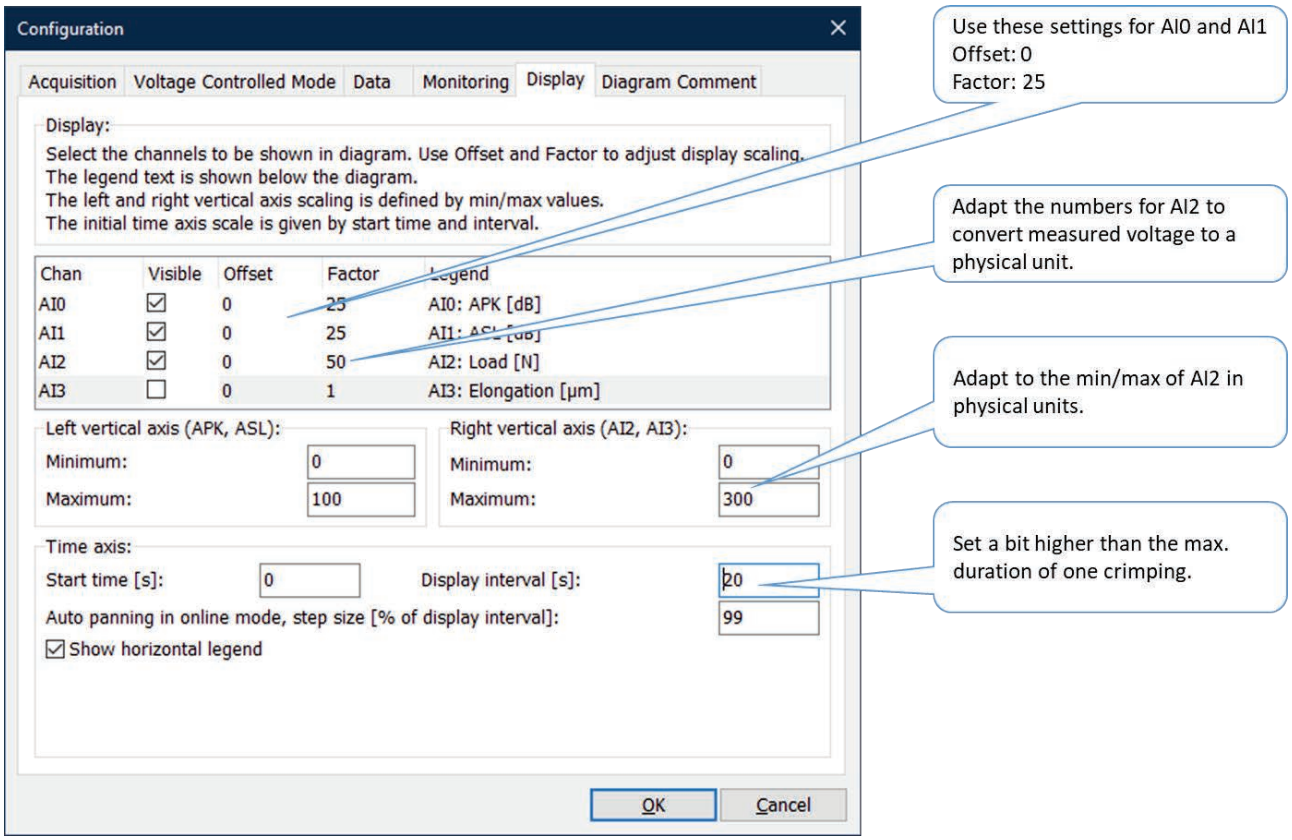


Figure 22: Display settings to convert measured voltage to physical units and setting of the axis.

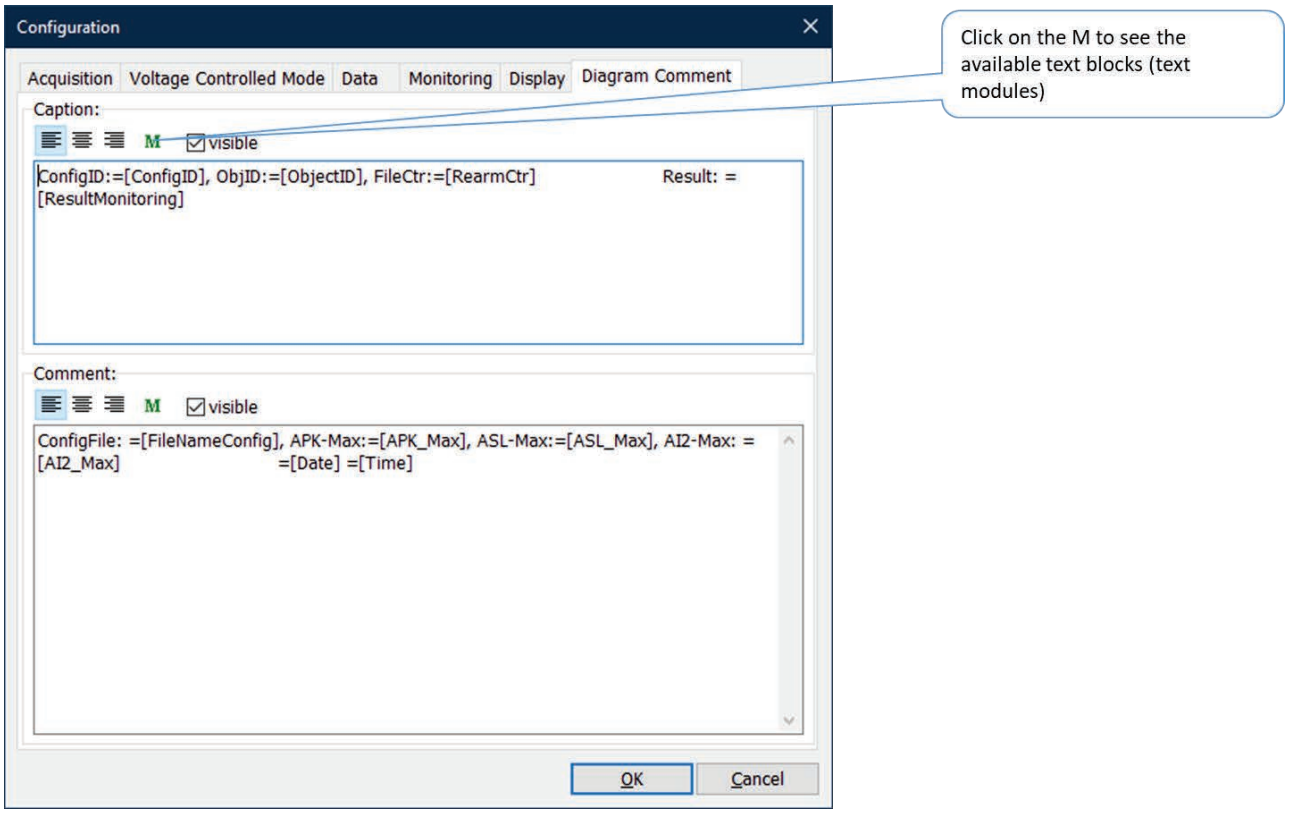


Figure 23: setting text for caption and comment.

3.5 Frequently Asked Questions

3.5.1 How to create a configuration file?

The settings of a measurement are specified by a configuration file. At the beginning there is just the Default.xml configuration file provided by Vallen. To add new ones, open the Default.xml file. Edit the settings according to your measurement setup. If you are done save the configuration file via menu bar→File→Save Configuration as…

Configuration files will be written to the folder c:\Vallen\ascodaq\Configurations or to the folder specified in the “Preferences settings” (see section 3.2.3.6, Changing the storage location).

3.5.2 How to protect a configuration file from being overwritten?

In industrial operations it might be desirable, that machine/process operators cannot change the configuration files developed by the process engineers. Configuration files can be protected by setting their write protect attribute: right click on the file, choose properties and check write protection. To make this an effective protection an administrator must define an appropriate user group which is allowed to change directory/file attributes.

3.5.3 How to set up the Voltage Controlled Mode (VCM)?

In VCM mode a voltage applied to one of the analog inputs AI2 or AI3 controls the recording. Recording will automatically start if the voltage in the selected input channel exceeds a defined upper threshold. The recording stops automatically if the voltage in the selected input channel drops below a defined lower threshold.

To setup the VCM mode one need to know:

- which analog channel shall be used to control the recording
- what shall be the upper threshold (start recording)
- what shall be the lower threshold (stop recording).

This data (especially the upper – and lower threshold) is obtained in trial runs of the measurement setup. For trial runs it is favorable to disable the VCM and data post processing and to display all input channels.

To disable VCM go to menu bar→Edit→Configuration…→Voltage Controlled Mode: Use voltage-controlled mode on external input: select “None”.

To disable data post processing go to menu bar→Edit→Configuration…→Data: uncheck “Enable post processing”.

To display all input channels, go to menu bar→Edit→Configuration…→Acquisition: in the group “Analog input channels (differential)” check all channels AI0 to AI3. Then go to “Display” tab and enable all channels for display. In the “Displa**y**” tab one can adjust the axis limits for the measurement.

Once the upper – and lower thresholds are known VCM can be enabled. To do so go to menu bar→Edit→Configuration…→Voltage Controlled Mode:

- Select the appropriate channel which controls the recording (AI2 or AI3). The same channel has to be selected in the “Acquisition” tab, “Analog input channels (differential)” group. A message will be prompted if the input channel is not selected in the “Acquisition” tab.
- Edit the field “Start recording, when external input exceeds the value of”. In this field enter the upper threshold which governs when a recording starts.

- Edit the field “Stop recording, when external input drops below”. In this field enter the lower threshold which governs when a recording stops.
- Check the “Auto rearm” checkbox if VCM shall not terminate once a measurement stops. If checked the software waits for a new trigger signal to start the recording.

The “Auto rearm” option is usually meaningful in conjunction with data post processing. Please refer to the “How to setup multiple file recording” for instructions of how to set up the data post processing.

3.5.4 How to set up multiple file recording?

Multiple file recording is used when:

- measurement data shall not be overwritten;
- screenshots of the diagrams shall be saved to hard disk;
- a report file shall be generated.

Multiple file recording makes especially sense if VCM and “auto rearm” are enabled (please see 3.5.3 for more information). Multiple file recording is set up in the “Data”-tab of the Configuration dialog (menubar→Edit→Configuration…→Data tab):

- Check “Enable post processing”;
- Choose a “Configuration ID”. The configuration ID will be used to create a subfolder in the data root path;
- Check “Archive recording data” if measurement data shall be saved.
- Check “Create PNG images” if screenshots of the diagrams shall be saved.
- Generate a “Report line” by using macros and string text. A complete list of macros can be obtained by clicking the “M” button or by referring to section 3.3.4.
- Click OK to confirm the settings.

3.5.5 How to set up the monitoring of a channel?

Monitoring requires specifying the channel state conditions and the monitoring conditions. The channel state conditions are defined for each channel individually and consist of limits for are valid, warning and alarm level. Additionally, the signal must exceed the level for a certain time period (minimum time or MinTime) in order to trigger the result of the level.

Finally, the monitoring conditions combines the results of the channels to yield a classification result which can be “Invalid”, “Good”, “Warning” or “Alarm”.

Therefore, the operator has the possibility for each channel to define three individual limits (valid, warning and alarm) and a minimum period for each level.

To monitor an input channel, click the “Enabled” checkbox in the “Monitoring”-tab of the configuration settings dialog (menubar→Edit→Configuration…→Monitoring). Then edit the minimum level -, minimum level MinTime, warning level, warning level MinTime, alarm level and alarm level MinTime setting. The level settings refer to converted units (for details see: 3.5.6).

To disable a monitoring channel, uncheck the “Enabled” checkbox.

If more than one channel shall be used for monitoring, it must be specified if just one channel must fulfill the monitoring conditions or if all monitoring channels must fulfill them.

The classification result will be displayed at the bottom of the diagram. The message that is displayed can be edited by the operator via the “monitoring text”, “invalid text”, “good text”, “warning text” and “alarm text” input fields.

Click the “OK” button to confirm the settings.

3.5.6 How to do a parametric conversion of the input channels?

Input channels AI2 and AI3 can be used to measure external parameters such as load, pressure, elongation, etc. The signal that is recorded is the voltage of the according external sensor. The voltage signal is proportional to the physical units of the measured parameter. The ASCO-DAQ2 software provides the means of a linear conversion from voltage to physical units such as stress, elongation, pressure, etc.

The linear conversion is controlled by an “Offset” and “Factor” parameter. The “Factor” parameter defines the slope of the linear conversion. The “Offset” governs the shift of the conversion.

$$y(x) = (x - \text{Offset}) \cdot \text{Factor}$$

Where *y(x)* is the converted parameter in physical units, *x* is the input signal in Volt, Offset and Factor are user provided attributes.

Usually the “Offset” and “Factor” parameters are given in the data sheet of the external sensor.

3.5.7 How to set up the automatic generation of a report file / screenshots / data files?

The ASCO-DAQ2 software provides the possibility to automatically generate a report file and/or screenshots of the diagram and/or save the data files. This procedure is generally called data post processing.

Data post processing can be enabled (and disabled) in the menu bar→Edit→Configuration…→Data tab. To enable data post processing check the “Enable post processing” checkbox.

Please specify a Configuration ID which will be used as the root folder for the report file, the image – and data folder. The root folder for the measurement is created on the path specified by the menu bar→File→Preferences… settings.

Two more checkboxes let you specify whether the measurement data shall be stored (checkbox “Archive recording data”) or PNG images shall be created (checkbox “Create PNG images”).

A report file is always created if data post processing is enabled. In the Report line field, you can specify which results should be logged by using macros (for the detailed list of macros see: 3.3.4).

3.5.8 How to exchange the ASCO-Pxy module?

The ASCO-DAQ2 consists of an ASCO-Pxy module and a data acquisition unit. The ASCO-Pxy modules can be exchanged to cover a different frequency range.

Prerequisite

An exchange ASCO-Pxy module is needed. Disconnect the ASCO-DAQ2 from power (i.e. unplug the USB and power supply) before starting. Make sure that you are properly grounded before opening the ASCO-DAQ2.

Remove top cover

Remove the 4 top screws. Afterwards remove the cover by lifting it up.

Remove Bridge board

There is a Bridge board connecting the ASCO-Pxy to the USB unit. The bridge board is secured by a screw. Remove the screw and lift the bridge board. The USB driver LED is connected to the bridge board and needs gentle handling in order not to break.

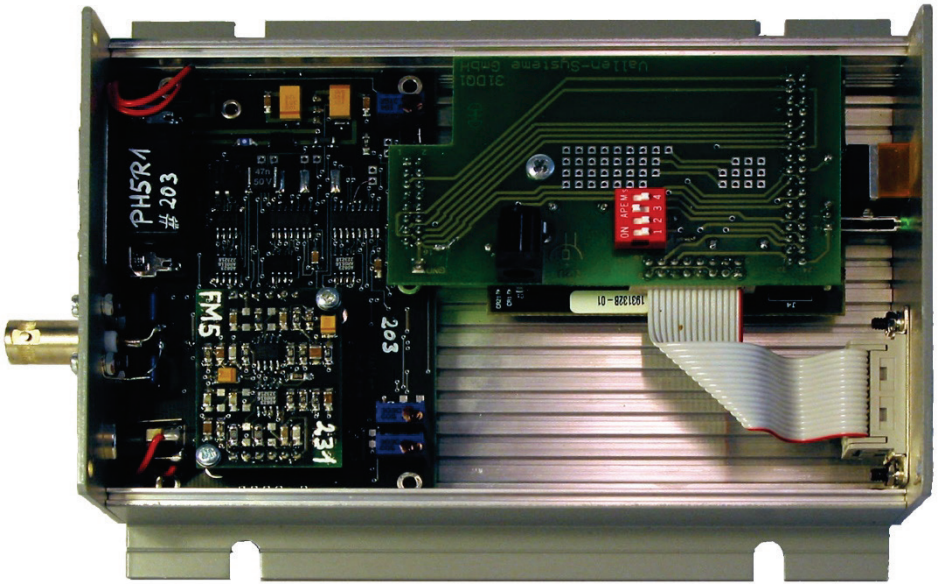


Figure 24: ASCO-DAQ2 with the top cover removed. The PCB on the left-hand side is the ASCO-Pxy. The bridge board is the PCB with the red switch on it. Underneath lies the PCB of the USB DAQ unit.

Exchange ASCO-Pxy

To exchange the ASCO-Pxy module remove the last two screws which join the front plate to the housing. Insert the new ASCO-Pxy module and screw it onto the housing.

Mount Bridge board

First fit in the LED and gently plug in the board into the according counter parts of the DAQ unit and ASCO-Pxy module. Secure the Bridge board by use of the screw.

Mount top cover

Finally mount the top cover. Because of spigot and socket of the interface there is only one way the top cover can be mounted. After fitting it in, secure the top cover by use of 4 screws.

3.5.9 How to change sound Output?

There is a sound output associated to each classification result. With each classification result the according sound file is executed. Classification result can be invalid, good, warning or alarm (class3).

To change the sound output simply copy a wav-file to the ascodaq2 folder and rename it to the according class: invalid.wav, good.wav, warning.wav or alarm.wav.

If you do not want sound output move the wav files to a different directory.

3.6 Trouble Shooting

If you are experiencing troubles with the ASCO-DAQ2 and its software, contact the Vallen support team via e-mail (sales@vallen.de) or call 0049 8171 38391 0. Our office hours are 09:00 to 17:00 CET.

4 Specification

4.1 Signal conditioner ASCO-Pxy

AE-Preamplifier integrated in ASCO-Pxy (sensor-connector)

Item	Description
Input impedance	>10MOhm parallel 10pF
Measurement range	±100 mV_{PK} = 100dB_{AE}
Gain	20dB
Noise (Inp.50R)	PN1: 24dB_{AE} PHy: 34dB_{AE}
Freq. range [kHz]	PN1: 90-290 PH3:240-710 PH5: 90-1300
Filter roll-off	high-pass 24dB/Octave, low-pass 12dB/Octave
Characteristic	Butterworth
Threshold-Input	40mV/dB_{AE} , Ri = 10kOhm
Filter output voltage	approx. 2V_{PP} @ 100dB_{AE} equals 0.2V_{PP} @ sensor
Filter output max. load	5mA

APK-Output: (Peak-Amplitude)

Item	Description
Voltage	4,0V @ 100$dB_{AE,}$ 200kHz 40mV/dB_{AE},<10mA
Rise time (-3dB):	PNy: 25µs, PHy: 7µs (sine burst excitation)
Peak-Stretching	51ms of last amplitude increase (ASCO-DAQ-PH5: 0.5 ms)
Error	±1dB (40-95dB_{AE}, PHx:45-100)

ASL-Output: (Average Signal Level)

Item	Description
Voltage	40mV/dB_{AE} <10mA
APK-ASL-Offset	PN1: 0/0.7dB @200/100kHz PH3, PH5: 0.6/2.2@500/250kHz

Item	Description
Smoothing low-pass	PNy, PHy: 86Hz 6dB/Octave
Error	±1dB (35-95dB$_{AE}$)

Reset Input

Item	Description
2-5V or open	Peak Stretching: normal
0V	Peak Stretching: off

Opto-Output

Item	Description
normal	open (5V max)
activated	at threshold-crossing
Pulse duration	52-62ms, no post-trigger

4.2 ASCO-DAQ2

4.2.1 Dimension and weight

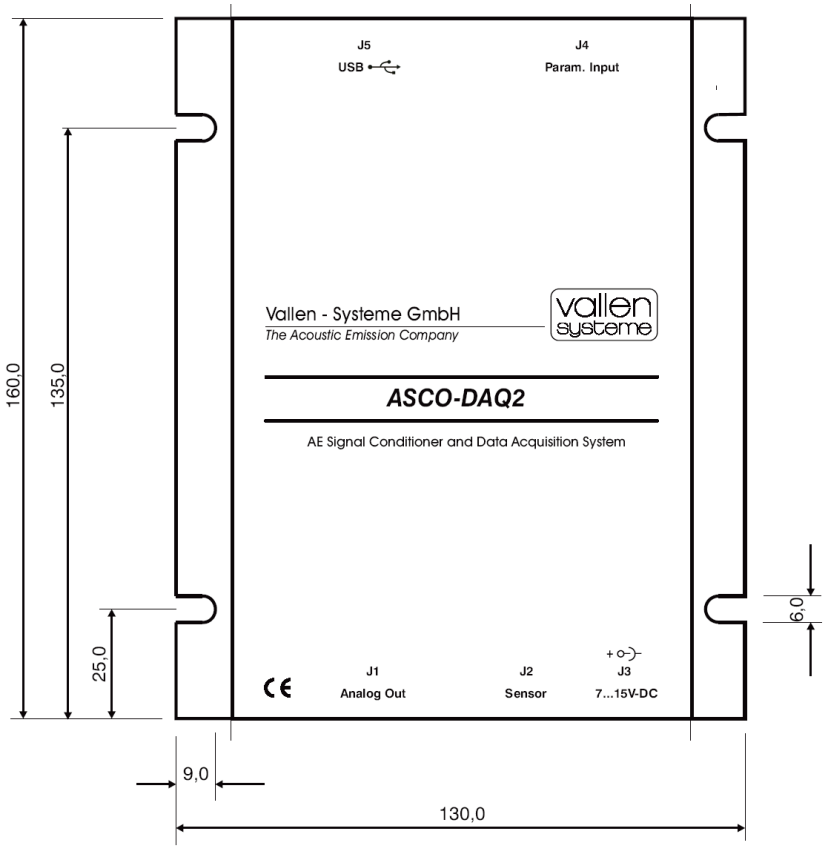


Figure 25: all dimensions in mm.

Item	Description
Dimension (l x w x h)	164mm x 104mm x 39mm (housing) Width of mounting plate: 130mm Overall length (including connectors): 185mm
Weight:	636g

4.2.2 External Connectors

4.2.2.1 J1 – Analog output (D-Sub, male)

Signal	*J1*	*J1*	*Signal*
Power +(7-15V)	1	9	Power -
Internal Pull up 2.2k to +5V	2	10	Output Opto-
Output Opto+	3	11	GND
Output APK	4	12	GND
Input Threshold	5	13	GND
Input Reset	6	14	GND
reserved	7	15	Output Filter
Output ASL	8		

For more information see the ASCO-P manual.

4.2.2.2 J2 – Sensor connector

Item	Description
Input impedance	>10MOhm parallel 10pF
Meas.range:	±100mV$_{PK}$ = 100dB$_{AE}$

4.2.2.3 J3 – Power supply for ASCO-P

Item	Description
Voltage	7-15V$_{DC}$ Low Noise!
Power consumption	max. 100mA
Alternative power feed in	Pin1 (+7-15V) and Pin 9 (Power -) of J1
Control	internal to +5V

4.2.2.4 J4 – Parametric Input (D-Sub, female)

For a description of the signals associated to each pin see the according description of analog input channels (AI2, AI3), analog output channels (AO1) as well as digital channels (P0.x and P1.x).

Signal	*J4*	*J4*	*Signal*
AI2- (Stress param.)	1	9	P0.2: good out (/Good)

Signal	*J4*	*J4*	*Signal*
AI2+ (Stress param.)	2	10	P1.1: warning out (/Warning)[1]
AnaGND	3	11	5V/100mA from USB
AI3+ (Strain param.)	4	12	P1.2: alarm out (/Alarm)
AI3- (Strain param.)	5	13	reserved
P0.3: invalid out (/Invalid)	6	14	P0.7 (trigger in, PFI0)
AO1 (spare an. out.)	7	15	DigGND
AnaGND	8		

4.2.2.5 J5 – USB port

Item	**Description**
USB Specification	USB 2.0 full speed
USB bus speed	12Mb/s
Power requirements	4.10 – 5.25V_{DC}: 80mA typical, 500mA max USB suspend: 300µA typical, 500µA max
Connector	USB series B receptacle

4.2.3 Analog input channels

Item	**Description**
Input type	differential
Input resolution	14 bit
Maximum sampling rate	48kS/s
Input range	±5V
Input impedance	144kΩ
Over voltage protection	±35V
AI0	APK [dB_{AE}]: stretched peak signal, internally connected. For a detailed despriction see the ASCO-P manual
AI1	ASL [dB_{AE}]: slow moving average signal, internally connected. For a detailed despriction see the ASCO-P manual
AI2	Free to be used. Available at J4, pins 1 and 2
AI3	Free to be used. Available at J4, pins 4 and 5

[1] In R2010.0712 software version high state is active

4.2.4 Analog output channels

Item	Description
Converter Type	Successive Approximation
Number of outputs	2 (AO0 and AO1)
Output resolution	12 bit
Maximum update rate	150Hz
Output range	±5V
Output impedance	50Ω
Output current drive	5mA
Slew rate	1V/µs
Short circuit current	50mA
Absolute accuracy (no load)	7mV typical, 36.4mV maximum
AO0	Internally connected to analog threshold input of the ASCO-P.
AO1	Externally available at J4, pin 7, can be set by software to a certain voltage.

4.2.5 Digital channels

Item	Description
Bidirectional channels	P0.0…P0.7, P1.0…P1.3
Output driver type	open drain
Pull-up resistor	4.7kΩ to 5V External pull up >672Ω for max 8.5mA drain current
Compatibility	TTL, LVTTL, CMOS
Absolute maximum voltage range	-0.5 to 5.8V with respect to GND
P0.2	Good output at pin 9 of J4
P0.3	Invalid output at pin 6 of J4
P0.7	External trigger to start data acquisition. By default driven from ASCO-P module (see 4.2.6 Internal switches, SW3) Available at pin 14 of J4
P1.1	Warning output at pin 10 of J4
P1.2	Alarm output at pin12 of J4

4.2.6 Internal switches

The internal switches are only available if the top cover has been removed. For a description of how to remove the top cover refer to section 3.5.8 How to exchange the ASCO-Pxy module? Please contact Vallen support team (sales@vallen.de) if you are unsure of what to do.

Item	Description
SW1	On: connect the threshold comparator output with AI3+. This switch setting is only used for functional verification test. By default, SW1 is set to off.
SW2	On: connect minus-input of J9 with AI3-. This switch setting is only used for functional verification test. By default, SW2 is set to off.
SW3	On: connect the trigger input P0.7 with the threshold output of the ASCO-P. By default, SW3 is set to on.
SW4	On: connect +5V of ASCO-P with AI2-. This is only used for functional verification test. By default, SW4 is set to off.

4.2.7 USB driver LED

The LED next to the USB port indicates the status of the USB device. It will flash at a frequency of 2Hz, if the device is properly detected by the PC. The flashing LED indicates that the device is correctly enumerated, configured and not suspended. A LED that is constantly on indicates that the USB device is not enumerated, not configured or is suspended.

4.2.8 DAQ2 Power supply

The DAQ2 is powered by the USB bus.

4.2.9 PC requirements

Computer Requirements:

- Free USB 2 or USB 3controller
- OS: Microsoft Windows 10 or 11

5 References

1 Acoustic Emission Sensors and Preamplifiers, Specification and Description by Vallen Systeme GmbH

2 Accessories for Acoustic Emission systems by Vallen Systeme GmbH

These documents are available at https://www.vallen.de/quote-ref/.

6 Abbreviations

AE Acoustic Emission

AIx Analog input channel x; refers to the input channels of the DAQ unit of the ASCO-DAQ2. There are four input channels available (AI0 to AI3). AI0 and AI1 are reserved for APK and ASL output of ASCO.

AOx Analog output channel x; refers to the output channels of the DAQ. Only AO0 is used and is internally connected to the ASCO

APK output of ASCO; peak signal stretched for 50 ms

ASCO Acoustic Signal Conditioner. Converts the sensor signal into a peak signal (APK) and a slow average signal (ASL)

ASCO-NTE power supply of ASCO

ASCO-Pxy abbreviation for one of the ASCO modules which can be ASCO-PN1, ASCO-PH3, ASCO-PH5.

ASL output of ASCO; amplitude of average signal

DAQ Data Acquisition. Used in context with ASCO as ASCO-DAQ2

SW3 abbreviation for internal switch, only accessible if the top cover of the ASCO-DAQ2 unit is removed.

7 Warranty Conditions for ASCO-DAQ2

The warranty period is two years from the date of its delivery for ASCO-DAQ2 hardware and software. This warranty does not cover the repair of any damage to the products generated by accident or improper handling. For warranty conditions for consumables such as sensors and cables see our documents “AE Sensor Overview” and “Accessories for AE Systems”.

We warrant that the goods as delivered will conform to the given specifications. We do not warrant that software is totally free from errors (See the End User License Agreement hereafter). If notified during the warranty period that the delivered ASCO-DAQ2 system contains defects such that it does not conform to the specifications, we will make it operate as specified by providing replacement parts or software updates as determined by us, free of costs, and within a reasonable time. If transportation should become necessary, the customer must provide the permits for export and re-import of replacement parts and bear the costs of transportation.

Except as expressed before, we disclaim all other warranties.

The ASCO-DAQ2 is especially designed to work with AE-sensors of Vallen Systeme GmbH. Using AE-sensors which are not approved by Vallen Systeme will terminate the warranty.

8 Conformity UKCA (UK Conformity Assessed)

The ASCO-DAQ2 device is UK Conformity Assessed (UKCA).

9 Redemption and Disposal Information of Used Vallen Equipment

- Equipment labelled with the symbol shown left must be disposed separately from unsorted municipal waste within the European Union.
- Owners of old instruments request our agreement to return old electronic equipment. The goods to be returned must be described unambiguously and identified by serial and/or identification number. You can fill in our contact form (https://www.vallen.de/contact/) or send us an email to sales@vallen.de.
- Upon our approval owners may ship the goods free of costs to us.
- We will dispose the goods according to the relevant laws and regulations on our costs.
- Goods returned without our approval will not be accepted and returned to the owner on his account.
- We explicitly point out that according to § 19a ElektroG3 you are responsible to delete any personal data on the appliances considered for disposal.
-

More information can be found under www.vallen.de/products/services/.

10 End User License Agreement

Last Updated: June 2022

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