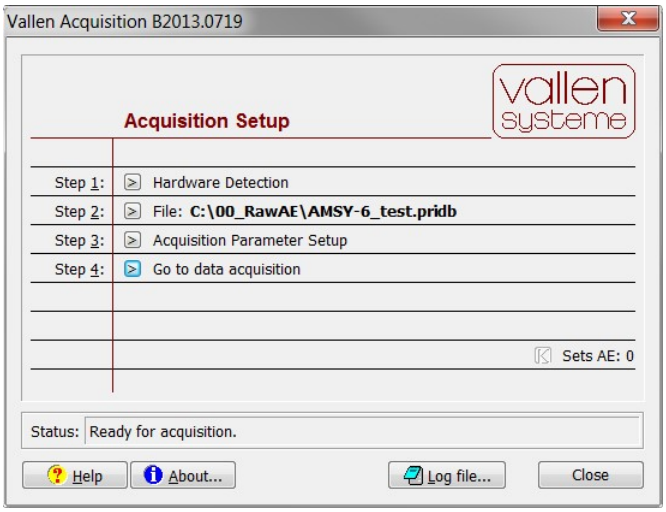
Acquisition, Overview and Startup

Data recording is done with the Acquisition program (see picture below). The Acquisition captures data sets with AE-features (PRIDB file) and if TR modules are installed and TR recording is enabled it also stores full waveforms (TRADB file).

Acquisition is the data acquisition program for the acoustic emission measurement system from **Vallen Systeme GmbH,** Germany. The main features at a glance:

- supports up to 254 AE-channels in a multiple chassis setup
- determines the installed hardware options like squarer, transient recorder, number of parametric inputs, revision status of the installed hardware and draws the user's attention to any possible conflict.
- provides user-friendly setup menus for all acquisition parameters
- offers comment fields to report the type and Id-numbers of sensors, preamplifiers and filters
- offers improved parameter/data structure:
  Parameters, comments, labels, markers, etc., are stored in the primary data file (PRIDB).
  AE-data are stored on *.PRIDB-files (PRIDB = Primary data file),
  TR-data are stored on *.TRADB-file (Transient recorder data file).
- provides optimized disk space allocation for AE- and TR-data files
- supports sectioning of data files and holds a set of all parameters for each section
- enables the change of any acquisition parameter during the test
- includes a scheduler which manages the information exchange between simultaneously active acquisition and analysis tasks running on the same PC.
- the optional **Vallen Sensor Tester (VST)** provides users the means to combine a function generator with AMSY-6/5 for easy generation of sensors frequency response.

After starting Acquisition the following window appears:



Acquisition Setup

The items in this menu guides the user through the usual steps for setting up data acquisition:

Step 1

Starts a determination and evaluation of the hardware configuration of connected chassis. This step is performed automatically.

Step 2

The currently selected primary data file is shown here. Clicking the ›| button calls a dialog where either another existing file can be selected or a new file can be created.

Step 3

Calls the Acquisition Parameter Setup (consisting of several menu pages).

Step 4

Opens the Record Control Window.

Sets AE / TR

Indicates the number of AE-data sets and TR-pages already stored to the selected file.

Buttons

Status: Status messages are shown here.

Help: Calls this help text.

About: Shows the revision of the program and the licensee according to the KeyFile used during installation.

Log file...: Displays a window showing the DSP commands. This command is intended for maintenance purposes only.

Close: Terminates the program.

Title: ACQ32-1: Acquisition Overview and Startup
Link: AESuite/Acq32/Acq32_OverviewAETR.htm

Hardware Detection Overview

Acquisition software requires a proper mapping of logical channel numbers to physical AE processors. The logical channel numbers are user defined and will be used in the analysis programs to identify the AE-channel. The physical AE processor constitutes a channel of an ASIP-2.

When the program Acquisition is launched, it first analyses the chassis configuration connected to the PC and compares it with the previously stored hardware configuration file. The result of the hardware detection can be one of the following:

- No change in hardware configuration detected. For more information see HW Detection Results: Edit Mode and HW Detection Results: View Mode.
- Very first connection of a PC to a chassis. For more information see HW Detection Results: Edit Mode - very first connection.
- Change in hardware configuration detected. For more information see HW Detection Results: View Mode - changes detected.
- PC moved from one chassis to another one. For more information see HW Detection Results: View Mode - Import HW Configuration.

Input devices

An input device simplifies selection of a correct configuration for an AE-channel, i.e.: correct supply voltage for a preamplifier, correct gain setting and correct input impedance setting. For each Vallen preamplifier and sensor with integral preamplifier a dedicated input device setting exists.

Log file handling

A log file is stored (to c:\vallen\log\y5acq32.log) whenever the acquisition program is closed. The log file is copied to the path of the current PRIDB file. The log-filename is **prifile**.y5acq32.log. If file with identical filename already exists a consecutive number will be appended to the file name (e.g. **prifile**.y5acq32(2).log). These files are useful for trouble shooting.

Title: HWDetect-1: Hardware Detection Overview
Link: AESuite/Acq32/HWDetect/Acq32_Detection_Start.htm

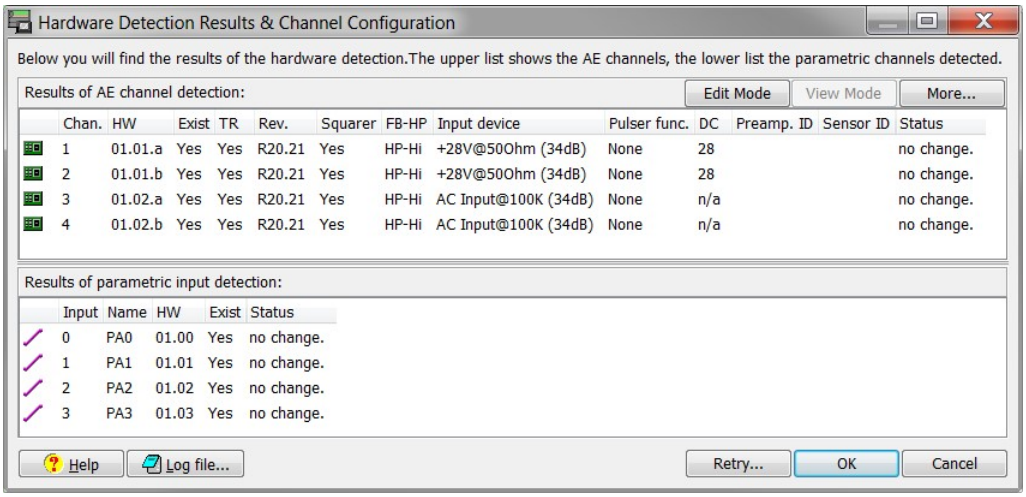
View Mode of Hardware Detection Results

The Hardware Detection Results & Channel Configuration window can be viewed in View Mode or Edit Mode. The window in View Mode shows information only about each channel. A complete description of the columns can be found in the following text.

If you connected your system to a PC for the very first time you want to take a look at HW Detection Results: Edit Mode - very first connection.

If you use one PC/laptop and switch between different units you want to take a look at HW Detection Results: View Mode - Import HW Configuration.

If you have changed the hardware configuration the Detection Results & Channel Configuration window shows different information. Take a look at HW Detection Results: View Mode - changes detected for more information.



Results of AE channel detection

Chan.

This column shows:

- an icon indicating the status of the channel (channel enabled, channel disabled, channel added, channel removed; compare this info also with the last column "Status"),
- the unique logical channel number,
- an optional "T" following the logical channel number which indicates that the channel's ASIPP/ASIP-2 (ASIPP = Acoustic Signal Pre-Processor) board is equipped with a transient recorder module TR-4M

HW

The number in this column indicates the channel number configured by the address switch on the ASIPP-board. (Note: each HW channel number must exist only once per system). There are two different numbers, depending on the channel type (ASIPP or ASIP-2), e.g.:

- Number 01.10: Type=ASIPP; Rad-Adr.=01; Channel-Adr.=10 (hex)
- Number 01.02.a: Type=ASIP2; Rad-Adr.=01; Board-Adr.=02 (hex); Channel-Adr. = 3
- Number 01.02.b: Type=ASIP2; Rad-Adr.=01; Board-Adr.=02 (hex); Channel-Adr. = 4

Exist

Shows usually "yes". After the removal of a channel from the system, a "no" would appear in this column.

Rev.

Shows the firmware revision number of the ASIPP board.

- Rev. 0 to 4: channel type is ASIPP
- Rev. >20.00: channel type is ASIP-2

Squarer

Informs whether the option "ASP-SQ" is installed ("yes") or not ("no"). The ASP-SQ option is needed for the True Energy calculation. In case of ASIP-2 signal processors this option is enabled by default.

FB-HP

This column shows which analog high pass filter is selected on the filter board of the ASIP-2. It can be either HP-Hi or HP-Lo which corresponds to 18kHz or 1.6kHz, respectively. As a factory default the HP-Hi high pass filter is selected. The high pass filter is used to block low frequencies which would saturate the ADC.

In case of an ASIPP a "n/a" appears.

Input device

Shows selected input device as it was specified during hardware detection routine.

Pulser func.

This column informs about the status of the pulse-through function of the channel. If "Pulse-through" is selected a voltage pulse (up to 400Vpp) is passed from the ASMY-5 to the sensor (via the preamplifier) if pulsing is selected in the Acquisition menu. All preamplifier and sensors with integrated preamplifier of Vallen Systeme support the pulse-through functionality. "None" indicates that the pulse through functionality of the channel is disabled. In case of a pulsing run no pulse is fed into this channel.

Attention: Activation of pulse-through for sensors or preamplifier without Vallen Systeme “Pulse-through” support can damage the device!

DC

Indicates the supply voltage for the preamplifier. The supply voltage is put out at the front BNC connector. The DC supply voltage can be set in the AE-channel setup menu. It can be disabled if desired.

Preamp. ID / Sensor ID

These cells are for information purposes only. The preamp ID and sensor ID can be entered during the channel setup (AE-channel setup).

Filter 1 (High) / Filter 2 (Low)

In case of ASIPP signal processor boards these two column show the band pass filter configuration of the ASIPP. However, the corner frequencies of the filter have to be specified by the user in Edit Mode of the Hardware Detection. Since the frequency is specified by the user it has to be checked against the actual installed filter boards on the ASIPP.

Status

Shows the status of the channel. "OK." indicates no changes while "channel added/removed" or "squarer added/removed" indicate according changes change since the last determination of the hardware configuration.

Results of parametric input detection

This table shows the result of the parametric channel detection. There can be up to 8 parametric channels.

Imput.

Indicates the logical number of the parametric input.

Exists

This column has similar meaning as in the AE channel detection results. It simply indicates that the parametric input exists.

Name

In this column the name of the parametric input (as it is referred to in VisualAE) is shown.

Status

Indicates the status of the parametric input: OK if no changes were detected. The message "Channel added/removed" appears if according changes have been made.

Description of buttons

Help: Shows this help text.

Log file...: Opens log file with current result of the hardware detection.

Retry...: Retries hardware detection.

OK: Proceed to the next step (usually to acquisition settings).

Cancel: Prevents the storage of this hardware detection sequence to the PRIDB file. Returns to the AE Acquisition menu.

Edit Mode: Changes to Edit Mode

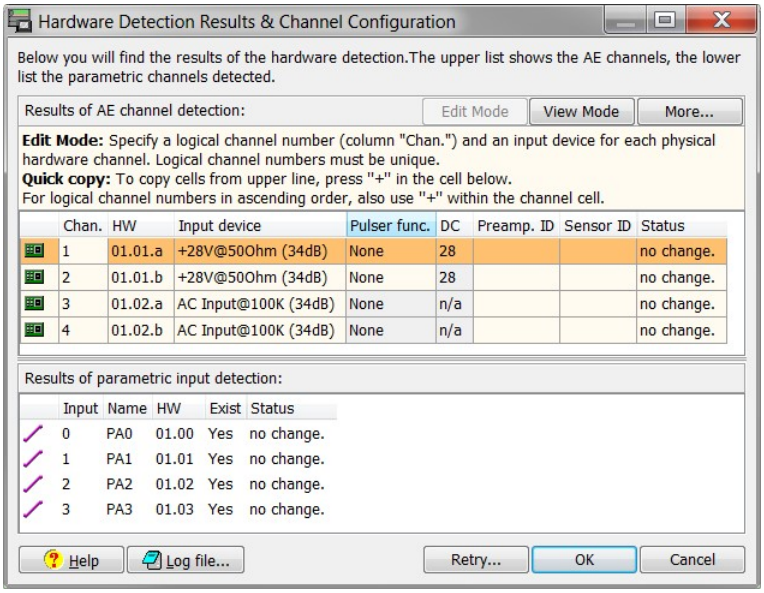
More...: Opens up a menu for more options such as import or export of hardware configuration files.

Title: HWDetect-2: HW Detection Results: View Mode
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_ViewMode_NoChanges.htm

Edit Mode of Channel Configuration

In Edit Mode changes to the settings of AE-channels can be made. Upon the most important settings are the logical channel number (first column), the input device (third column) and the pulse function (fourth column). In case of an ASIP-2/A a DC supply voltage can be specified by selecting one of the following input devices: +8-28V@R or +8-28V@200R. For information and documentation purposes a Preamp. ID and Sensor ID can be set per channel. For a detailed description of columns see the text below.

The Hardware Detection Results & Channel Configuration window can also be viewed in View Mode. Simply click the View Mode button to change the mode.



Description of columns

Chan

This column shows:

- an icon indicating the status of the channel (channel present, channel added, channel removed; also shown as text in the last column "Status"),
- the unique logical channel number.

HW

The number in this column indicates the channel number configured by the address switch on the ASIP-2/ASIPP-board. (Note: each board number must exist only once per system). There are two different address types, depending on the channel type (ASIPP or ASIP-2), e.g.:

- Address of type 01.10: Type=ASIPP; Rad-Adr.=01; board address=10(hex), channel number=16(dec)
- Address of type 01.02.a: Type=ASIP2; Rad-Adr.=01; board address.=02 (hex); channel number= 3(dec)
- Address of type 01.02.b: Type=ASIP2; Rad-Adr.=01; board address=02 (hex); channel number= 4(dec)

Input device

In this column the appropriate input device for the channel is specified. This is done by clicking into a cell and expanding the selection window. Input devices can be a

pre-amplifier such as AEP4 or AEP3, sensors with integrated preamplifiers such as the VS150-RIC or devices such as AC Input@100K, +28V@50R with or without pulse bypass, or special ASIP-2/A input devices.

Note: The default input device is "AC Input@100K". Please select this input device if no preamplifier or sensor with integrated preamplifier is connected to the according AE-channel.

Pulser func.

In this column the pulse-through function of the channel is set. The user can select “Pulse-through” or “None”. "Pulse-through" can be used with any Vallen equipment. If this is selected a pulse up to 400Vpp can be passed through to the sensor of the channel (when the chassis is pulsing). If "None" is selected, no pulse will be passed to the sensor of the channel. Use this setting if preamplifier or sensor of different brand than Vallen is used.

Attention: Activation of pulse-through for sensors or preamplifier without Vallen Systeme “Pulse-through” support can damage the device!

DC

If possible a DC supply voltage can be chosen. This is only available with an ASIP-2 /A signal processor and input device of type “+8-28V@50R” or “+8-28V@200R”. Then an appropriate DC voltage for the device connected to the AE-channel can be chosen(see for example channel 4 in picture above).

Preamp. ID

For information and/or documentation purposes the preamplifier ID of the preamplifier connected to the channel can be entered in this column. It has no effect on the measurement.

Sensor ID

For information and/or documentation purposes the ID of the sensor connected to the channel can be entered in this column. It has no effect on the measurement.

ASIPP only: Filter 1 (High) /Filter 2 (Low)

In this column enter the Filter 1 / Filter 2 description of ASIPP board. This is for documentation and information purposes only. It has no effect on the measurement.

Status

This columns indicates changes concerning the channel since the last determination of the hardware configuration.

Results of parametric input detection

Please see the description in HW Detection Results: View Mode

Description of buttons

Help: Shows this help text.

Log file...: Opens log file with current result of the hardware detection.

Retry...: Retries hardware detection.

OK: Proceeds to the next step (usually to acquisition settings).

Cancel: Prevents the storage of this hardware detection sequence to the PRIDB file and in c:\vallen\biny5\Y5DETECT.VHW. Returns to the AE Acquisition menu.

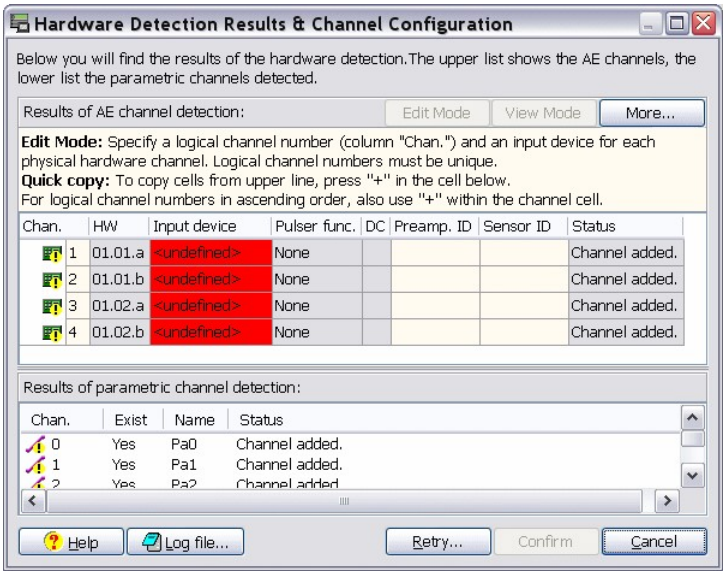
View Mode: Changes to View Mode.

More...: Opens up a menu for more options such as import or export of hardware configuration files.

Title: HWDetect-3: HW Detection Results: Edit Mode
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_EditMode_NoChanges.htm

Edit Mode - The very first connection of a chassis to a PC

When the AMSY6/-5 is started for the very first time Acquisition can initiate a proper channel mapping but cannot find any assignment of input devices to AE signal processors. As a result the Hardware Detection Result & Channel Configuration window will pop up (it will look like the picture shown below). The first and the last column indicate that channels have been added. The cells in the column labelled "Input device" are colored in red indicating that input devices have to be specified before continuing. Once an input device has been specified the cell changes its color to light yellow and indicating the selected input device.



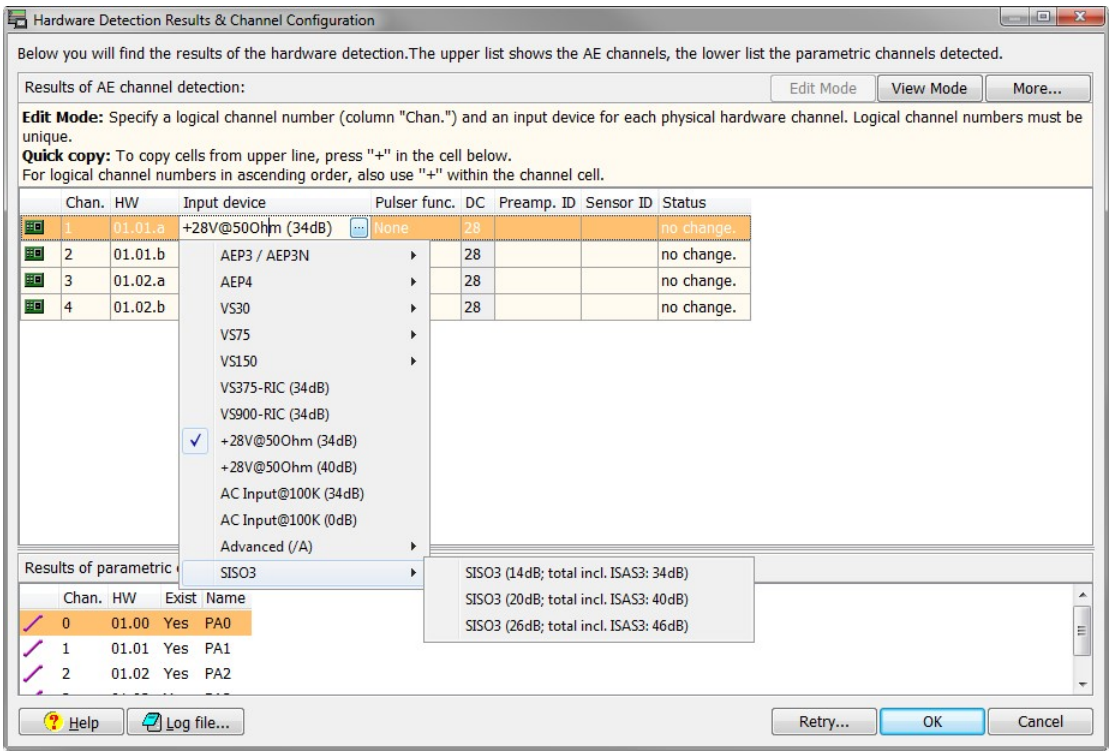
For information about the columns please see the description in HW Detection Results: Edit Mode.

By clicking on a cell in the column "Input Device" and expanding the list an input device can be selected. For copying the same input device to the following channel, press the <+> when the focus is on the target cell. By keeping the <+>-key pressed, all channels of the same signal processor model get the same input device assigned.

With the selection of the input device, other parameters, like preamplifier gain and supply voltage, signal processor input impedance, pulsing options, programmable gain options, etc., are initiated in a correct manner. If input devices not listed in the selection are connected to the channel, then one of the generic devices, like '28V@50R' should be selected as input device.

For connecting devices that do not allow a DC voltage on the signal line, the generic device 'AC-input@100K' can be selected. This is also the correct selection for a signal processor that is paralleled to one that supplies a preamplifier. Any number of signal processors with 'AC-input@100KΩ' can be paralleled without disturbing the accuracy.

The next figure illustrates the input device selections offered for an ASIP-2/A (with '.a' or '.b' behind the HW-channel number).



Note: if you do not want to specify a device for a channel because you do not connect a preamplifier or sensor with integrated preamplifier to it, then please select "AC Input@100K".

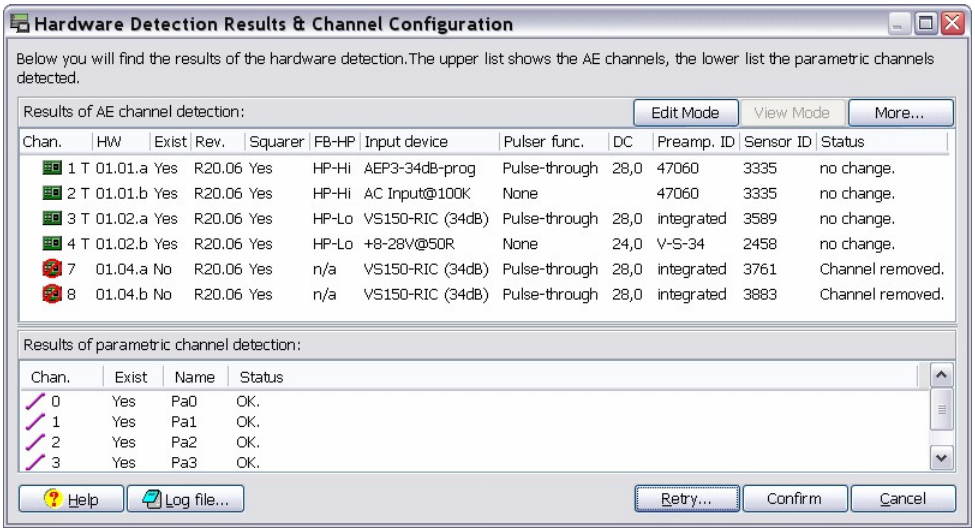
If the system configuration is properly initiated and displayed, the user may click on "Confirm" to store the hardware configuration to a file.

Title: HWDetect-4: HW Detection Results: Edit Mode - very first connection
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_EditMode_FirstConnection.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Hardware Detection > Changes in configuration detected

View Mode - changes in hardware configuration detected

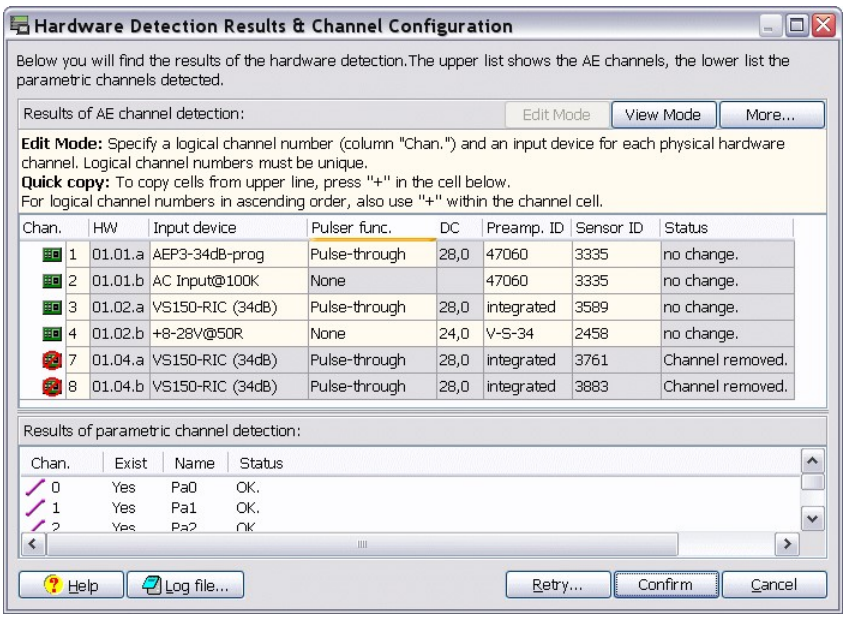
When your hardware configuration has changed (features have been added or removed) since the last time you operated your AMSY-6/-5, this will be indicated in the Hardware Detection Result & Channel Configuration window that follows the hardware detection routine. The first and last column indicate changes, such as in this example (see picture below): the removal of a AE channel.



If two systems are combined to form a larger system with more AE channels, the user has to decide about a meaningful channel mapping, so he is aware which unique logical channel number (in the data analysis) is assigned to which unique hardware channel.

When new channels were added or channels were removed, the software always tries to keep the channel mapping as initiated before and adds new assignments when it detects additional channels. If the result is confusing or not to your desire, click on ‘more.../default mapping’ to initiate a new mapping.

Below the Hardware Detection Result & Channel Configuration window is shown in Edit Mode. In Edit Mode the hardware configuration can be changed. Cells in the table that are colored light yellow can be manipulated by the user. Cells with grey background cannot be modified by the user.



If the system configuration is properly displayed, the user may click on ‘Confirm’ to store the current configuration to file. The saved configuration will be used for the comparison with future configurations.

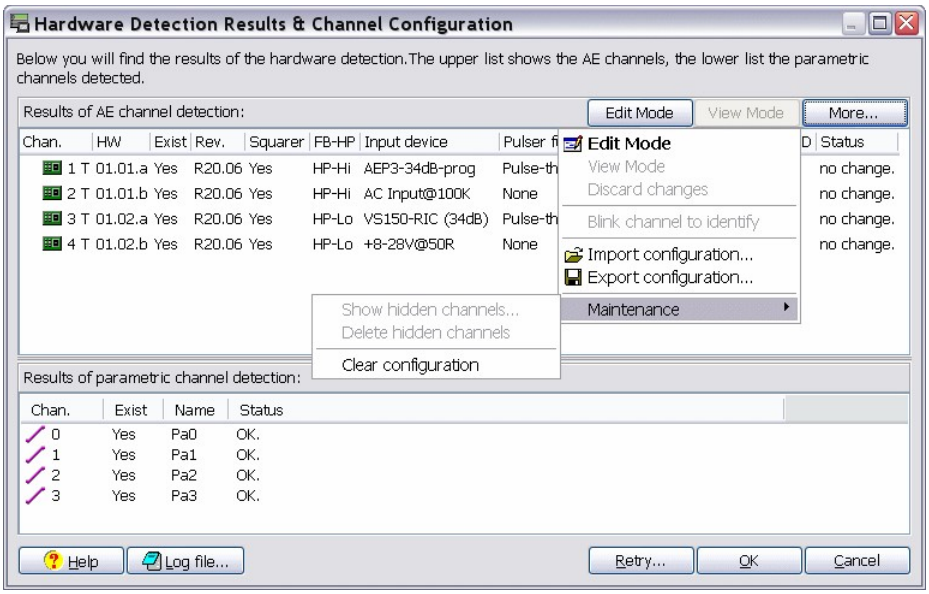
Note for ASIPP user: This information applies only if you have the squarer module on your ASIPP. The hardware detection of ADC test and VST cannot detect the squarer modules. You will get the status "Squarer added", if you run the ADC test or VST before the Acquisition even though squarer module was not actually added.

Title: HWDetect-5: HW Detection Results: View Mode - changes detected
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_ViewMode_ChangesDetected.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Hardware Detection > The "More..." Options

Hardware Detection Results & Channel Configuration: "More..." Button

In the upper right corner you will find a button labelled "More...". It offers you options for import and export of configuration files and maintenance options. A description of options is described in the table below.



Edit Mode: Toggles screen to Edit Mode

View Mode: Toggles screen to View Mode

Discard Changes: Discards any changes you have made to hardware configuration and restore the settings before you made changes.

Restore default channel mapping: Restores the channel mapping to default channel mapping

Note: Only available in Edit Mode

Blink Channel: If a channel is selected, this command will let the Thr. and Selected LED of the according channel blink alternately. Use this feature to allocate the physical ASIP-2 board to the correct channel number/board address.

Note: This feature is only available in View Mode for ASIP-2 after a successful hardware detection.

Import configuration...: Lets you import a hardware configuration file. See the topic Import HW Configuration.

Export Configuration...: Lets you export your hardware configuration file.

Maintenance: Offers more options, see the three rows below.

Show hidden channels...: Shows the hidden channels in this menu. Hidden channels are channels that are not physically present (the ASIP-2 or ASIPP board has been removed) but still have unique board - and logical address (=channel number) and therefore are still present in hardware configuration file.

Delete hidden channels...: Deletes the hidden channel from the hardware configuration file.

Clear Configuration: Clears the hardware configuration, so that all input devices, channel mapping and comments are deleted. This results in a state as if the AMSY-6/-5 is operated for the very first time (see very first connection).

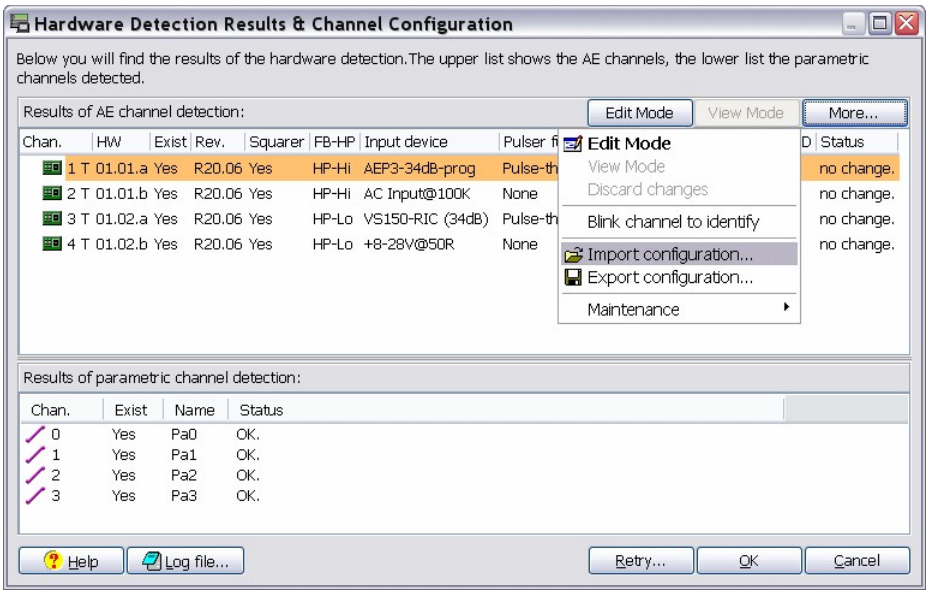
Title: HWDetect-6: HW Detection Results: More Options
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_MoreOptions.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Hardware Detection > Import HW Configuration

View Mode - import a hardware configuration

Many users own multiple systems, and individual staff members own their individual acquisition PC, so they move their PC from one system to another one, as the needs arise.

In such cases we recommend that each user stores on his PC the configuration of each chassis he works with, using the ‘Export configuration’ function. Define a meaningful file name. e.g. the Id-number of the chassis. Whenever you come to that system again, you can import the channel configuration quickly and conveniently.



Title: HWDetect-7: HW Detection Results: View Mode - Import HW Configuration
Link: AESuite/Acq32/HWDetect/Acq32_HWDetection_ViewMode_ImportConfig.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Hardware Detection > Hardware Configuration File

Hardware Configuration File - trouble shooting

The results of the Hardware Detection are stored in a Hardware Configuration File c:\vallen\biny5\y5detect.vhw. This file contains the results of the latest Hardware Detection and is used to analyze the differences between the current hardware detection process and the previous one.

This file contains a single section with additional hardware information. All configuration details of the last acquisition setup (section) are stored to the file. Also all of the comments that might have been entered for filters, sensor, preamplifier and so on as well as channel mapping information are stored.

This file is created automatically when the Acquisition is started for the first time and is updated with each Hardware Detection process. So this file is not created during installation and therefore is not removed during uninstall.

If you detect any trouble during Hardware Detection, this file can safely be deleted. It will be re-created next time during Hardware Detection; then all channels found will be shown as "added" and all previously defined text items (e.g. serial number of preamplifiers etc.) are lost.

If this file has been deleted for any reason and you want to restore your settings, then start a new acquisition based on an earlier Acquisition (click on Browse in Select Acquisition Settings). All the settings from this previous Acquisition will then be restored.

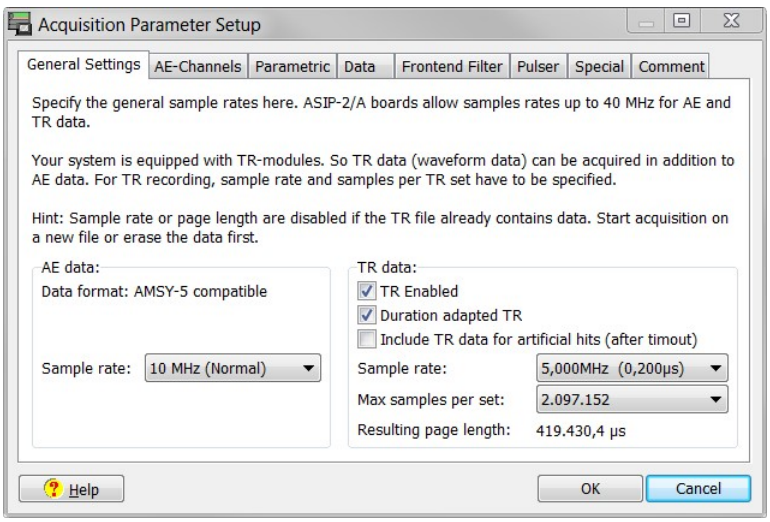
Title: HWDetect-8: Hardware Detection: Configuration File
Link: AESuite/Acq32/HWDetect/Acq32_Detection_ConfigurationFile.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > General Settings

General Settings - General AE and Transient Recorder Setup

This menu appears after a click on "Setup.." in the Structure Menu or after confirming a default acquisition setting.

The tabs at the top indicate the different groups of acquisition setup parameters administered by this program.



AE data

Sample Rate

Specifies the sample rate and thus the time resolution of AE-data (**ASIP-2/A only**). With the ASIP-2/A the AE sample rate can be 10, 20 or 40MHz. This influences the number of available bandpass filters (application specific filters).

Any of about 500 standard filters can be used with AE sample rates up to 20MHz. Each bandpass consists of an 8th order high-pass and an 8th order low-pass filter, each providing a filter roll-off of 48dB/octave.

At 40MHz sample rate only bandpass filters of 4th order are available.

The performance of the AMSY-6/-5 is optimized for 10MHz AE sample rate. Higher sample rates decrease the maximum acquisition speed, when a large number of channels is in use.

TR data

TR Enabled

To acquire TR-data in parallel to the traditional AE-data, check the box "TR Recording enabled". By doing so TR is enabled for all channels. The values for "Sample Rate" and "Samples per Set" have to be specified. If this general setting is enabled, the acquisition of TR-data can be enabled/disabled individually for each channel. Additionally a hardware switch at the front panel allows one to disable/enable the acquisition of TR-data and AE-data as well (see your AMSY-6 System Description).

Duration adapted TR

When this box is checked transient data is recorded in duration adapted mode. This means that a transient is recorded from first threshold crossing to last threshold crossing plus surplus samples from pretrigger and post duration (both parameters are set in AE-channel Setup). As a result TR page length is not fixed but variable. Its length is "adapted" to the length of a hit, hence the name: duration adapted TR. When a hit lasts longer than indicated by the resulting page length (is a result of sample rate and max. samples per set setting) transient recording is terminated after reaching the maximum samples per set limit, irrespective whether the hit has ended or still continues.

If this checkbox is unchecked, then transient data is recorded in conventional fixed TR page length mode. This means that the length of a TR-page is given by the "max samples per set" setting. Transient recording is stopped automatically when the predefined number of samples has been recorded.

Include TR data for artificial hits (after timeout)

Check this box when TR data of artificially started hits (hit-flag "T") shall be acquired as well. If enabled post duration samples will be set to 0 for a "T" flagged hit (time out). An "A"-flagged hit will be recorded without pre trigger samples.

Sample Rate

Specifies the sample rate of TR-data from a drop down list. For the ASIP-2/S the sample rates range from 625kHz to 10MHz. In case of an ASIP-2/A sample rates of 20MHz and 40MHz are additionally available. For up to 20MHz sample rates the Data Select option can be FIR, IIR4 or IIR5. At 40MHz sample rate only Data Select option FIR is available (see Channel Setup). The Data Select settings specifies the data source for TR data. It can be one of the following sources:

- **FIR**: anti-aliasing filter after ADC. Use this setting if you want to record unfiltered waveform data (e.g. as used for modal AE).
- **IIR4**: last filter stage of the bandpass filter. Use this setting if you do not want that a notch filter is applied to TR data.
- **IIR5**: notch filter. Use this setting if you want to make sure that the exact same filters are applied to TR data as are applied to AE data.

Generally, the TR sample rate can be selected independently from the AE sample rate.

Samples per TR-Set (fixed page length recording)

Specifies the number of samples that shall be stored per trigger: from 256 (28) to 1,048,576 (220) samples. The more samples per set, the larger the amount of data acquired. In case of duration adapted TR this number indicates the maximum number of samples that will be recorded.

Note: for AE-data a hit is timed-out after approximately 104ms. A new hit data set is automatically started right after time out (artificially started hit). For artificially started hits not transient data is recorded.

Max. samples per set (duration adapted transient recording)

Specifies the number of maximum samples that are recorded to a TR-page. The maximum number of samples is 1,097,152 (221) samples.

Resulting page length

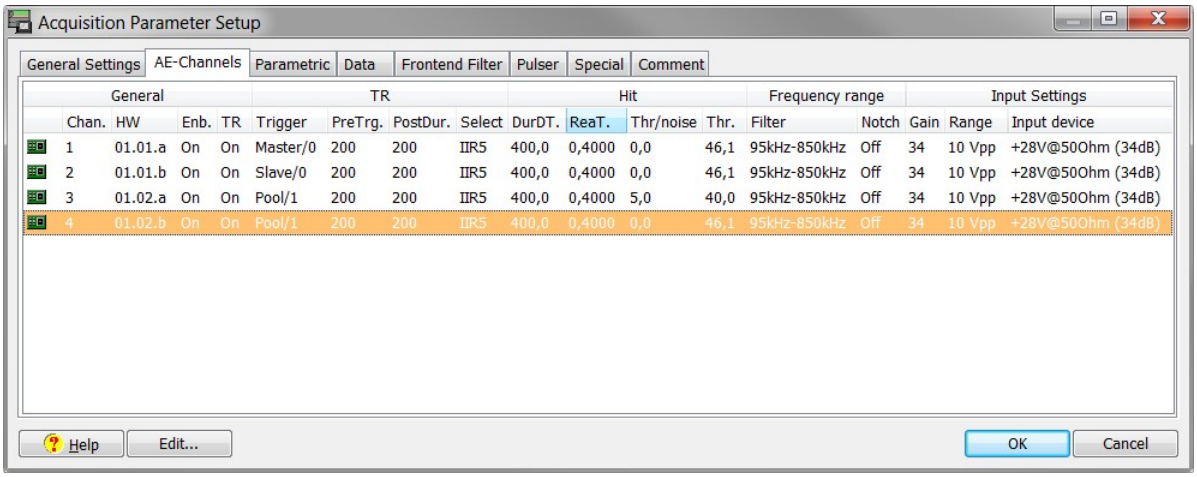
Shows the recording time per TR-page.

Title: AcqSetup-01: General AE and Transient Recorder Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabGeneral.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > AE-Channels Overview

AE-Channels - AE-Channel Summary

This menu indicates the current settings for each AE-channel. To change a parameter, double click on the corresponding channel line.



Description of columns:

Chan

Logical channel number as defined by the channel mapping specified in Hardware Detection Results and Channel Configuration.

HW

(hexadecimal) hardware channel number, defined by the rack-adress (first two digits) and address switch on board (last two digits) "a" or "b" specify upper or lower channel on ASIP-2.

Enb.

"On" if channel is enabled to acquire AE-data, otherwise "Off". Disabled channels show a channel icon (on the left) in white (e.g. channels 9 to 12). The icon for enabled channels is green (e.g. channels 1 to 8). A single AE-channel can be enable/disable in the AE-Channel Settings tab.

TR

"On" if TR is enabled for the channel or "Off" if TR is disabled. TR can be enabled/disabled for single AE-channels in the AE-Channel Settings tab. TR is enabled/disabled globally in the General-Settings tab.

Trigger

Trigger modes for transient recording are not confined to channels of the same chassis. Trigger modes can be Normal, Master, Slave, or Pool.

Note: a "/0" or generally a "/x" where x can be an integer number between 0 and 255 appended to the trigger mode indicates the pool group.

PreTrg.

Indicates the number of samples on the file before the hit was triggered. The pre-trigger time in microseconds can be calculated by number of pre-trigger samples divided by the Sample Rate in MHz.

PostDur

Note: applies only in duration adapted transient recording (see General Settings)

Indicates the number of samples that are recorded after the last threshold crossing. Is empty ("n/a") when duration adapted transient recording is not enabled.

Select:

Shows the Data Select option which specifies the source where TR-data is collected. It can be one of the following sources:

- FIR: anti-aliasing filter after ADC. Use this setting if you want to record unfiltered waveform data (e.g. as used for modal AE).
- IIR4: last filter stage of the bandpass filter. Use this setting if you do not want that a notch filter is applied to TR data.
- IIR5: notch filter. Use this setting if you want to make sure that the exact same filters are applied to TR data as are applied to AE data.
- n/a: older signal processors that do not support Data select

DurDT.

The Duration Discrimination Time (DDT) setting is used to separate individual hits from each other that occur in the same channel. It defines a time period in which no threshold crossing must occur in order that an end of hit is determined.

The DDT starts when the signal falls below threshold and, if not expired resets with the next threshold crossing. If expired, the channel stores the time of the last threshold crossing. The hit duration is calculated by "Time of the last threshold crossing" subtracted by the "Time of the first threshold crossing" of the hit.

Continuous Mode:

When running the system in this special mode, the Duration Discrimination Time has a different meaning. For more details see Continuous Mode.

ReaT.

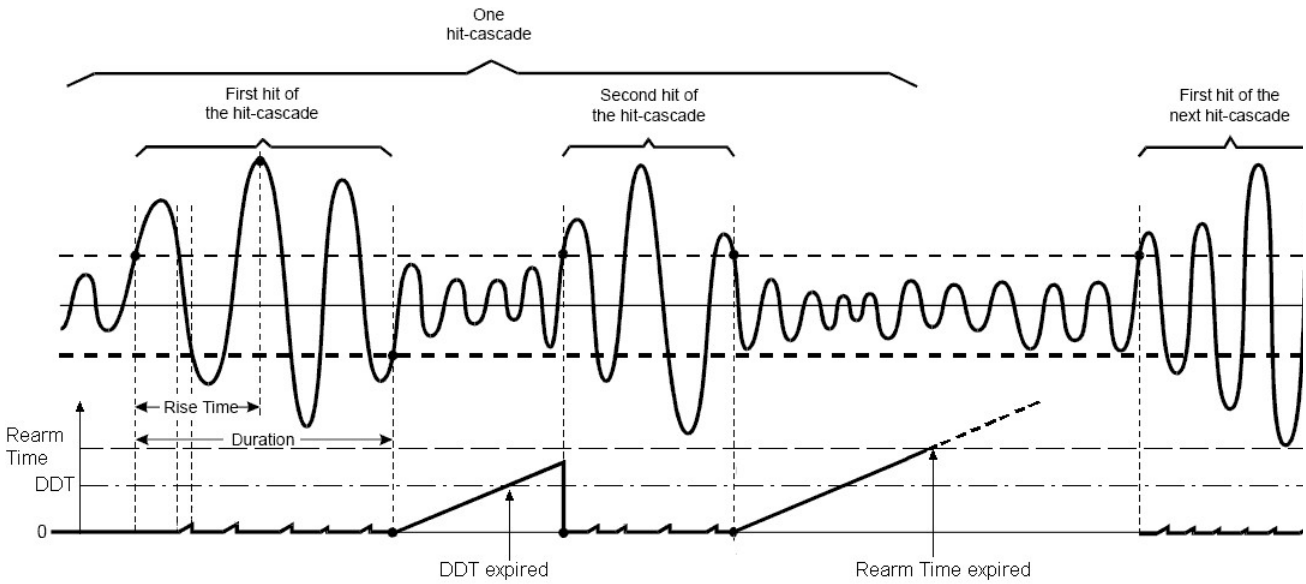
The Rearm Time (RAT) defines when the channel shall be ready to generate a new hit data set:

- Rearm Time starts, when the signal falls below threshold.

- The RAT expires, when no threshold crossing has been detected during its duration. When the RAT expired, the hit data set is closed, and the next threshold crossing starts the processing of a new hit, perhaps a hit cascade.
- The RAT is reset if a threshold crossing occurs while RAT has not expired.

If a threshold crossing is detected during the Rearm Time, rearm time starts again.

If a threshold crossing occurs after expiry of the Duration Discrimination Time but during the Rearm Time, information about this signal will be accumulated in the Cascaded Parameters: "Cascaded Hits", "Cascaded Counts", and "Cascaded Energy." The end of each hit within the hit cascade is determined by Duration Discrimination Time.



Thr/noise

Usually 0, if greater than 0, the threshold is floating with RMS according to following formula: THR=MAX(Threshold; 20xLOG(RMS[µV] x Thr/noise)). RMS integration time is fixed to 50ms. Hit-signal is not considered for RMS calculation.

Thr.

This value is the threshold referred to the input of the preamplifier.

Filter:

- with ASIP-2: shows the currently selected bandpass filter (e.g. 95-300kHz).
- with ASIPP: Shows "1-(Hi)" or "2-(Lo)", depending on which of the two software selectable high-pass filters (hardware) is selected.

Hint (ASIPP only): If there is only one high pass filter installed, selecting the filter slot with no filter installed will not produce meaningful measurement results.

Notch:

Shows the settings of the notch filter

Gain:

This value is usually indicated as "calculated gain" in menus. It is used to scale the results peak amplitude, RMS and energy, and the parameter threshold, to the input of the preamplifier. The value is initiated by the preamplifier gain, when an input device is assigned to the channel. It can be modified by the user , e.g. to compensate different sensor sensitivities.

A change of this parameter also modifies the parameter threshold!

Range

Usually 10 VPP, with ASIP-2/A the user can select 10 VPP, 5VPP,or 2.5 VPP,alternatively.

Input device

See, Hardware Detection Results and Channel Configuration

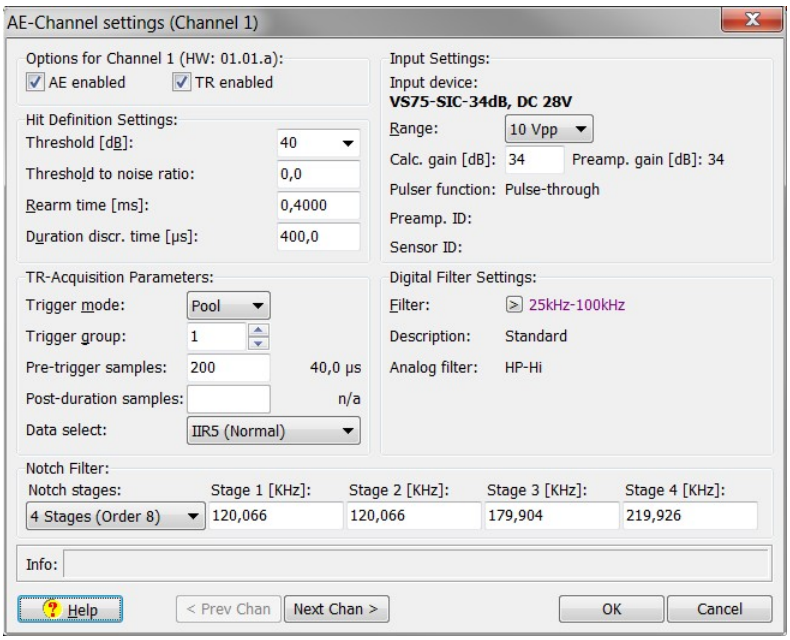
Title: AcqSetup-02: AE-Channel Summary
Link: AESuite/Acq32/AcqSetup/Acq32_TabAEChannels.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > AE-Channel Settings

AE-Channel Settings for ASIP-2

This section applies to ASIP-2. For explanation and help on channel settings of an ASIPP see ASIPP AE-Channel settings, please.

The settings for each channel can be specified using the channel settings dialog. It is opened by selecting a channel on the AE-Channel tab and pressing "Edit" (or double click on the channel or perform a right mouse click and choose "Edit" from the context menu).



Options for channel *X*

AE enabled / TR enabled

Checkboxes to enable or disable AE - or TR acquisition. Check the "AE enabled" box to enable the channel. Uncheck this box to disable the AE and TR recodring of this channel. Check the "TR enabled" box to enable TR-data recording of channel; (uncheck to disable TR data recording of channel).

Threshold [dB]

Select threshold in dB_{AE}. The threshold value depends on the selected "Calc. gain"!

Threshold to noise ratio

Set the Threshold to noise ratio (Thr/Noise) to zero for a fix threshold. Set Thr/Noise to a value other than 0 to obtain a floating threshold. The floating threshold is always equal or greater than the value selected for "Threshold[dB]" (THR).

The RMS based threshold (THRRMS) is the result of RMS value multiplied by threshold to noise ratio converted to logarithmic scale (dBAE). The detection threshold (THR_{DET}) is the maximum of RMS based threshold (THRRMS) and threshold setting (THR)

Example: Threshold = 40dB, Threshold to noise ratio = 5

- case a) RMS = 100µV, THRRMS = 20*log(5*RMS) => THRRMS = 54dBAE => THRDET = max(54dBAE,40dBAE) = 54dBAE
- case b) RMS = 10µV, THRRMS = 20*log(5*RMS) => THRRMS = 34dBAE =>THRDET = max(34dBAE,40dBAE) = 40dBAE (the user-defined minimum)

Hint: The Threshold to noise ratio was previously known as the Crestfactor in the MainMenu.

Hit definition settings

Rearm time

The Rearm Time is described in AE-Channel Summary.

Limit of Rearm time is 50µs to 98ms. Decreasing the RAT below the current DDT will adjust DDT to the same value as DDT

Duration discr. time:

The Duration Discrimination Time is describe in AE-Channel Summary.

Limits of Duration Discrimination time are from minimum of 50µs to a maximum of 98ms. Increasing the DDT beyond the current RAT setting will adjust the RAT to the same value as DDT.

TR-Acquisition Parameters

Pool ID / Trigger mode

Pool ID refers to the edit field. Trigger mode refers to the drop down menu.

The edit field Pool ID is only activated when a trigger mode other than "Normal" has been selected. The Pool ID indicates to which pool group a channel belongs. Pool groups are identified by positive integer numbers in the range from 0 to 255. A channel can belong only to one pool group.

A pool defines a group of channels to which the set trigger modes are applied. Trigger modes can be Normal, Master, Slave or Pool:

- Normal: the transient recorder of a channel is triggered by the first threshold crossing of a hit in the channel itself.

- Master: the first threshold crossing at this channel triggers its own transient recorder as well as all transient recorders configured as "Slave" or "Pool." The transient recorder of a "Master" can't be triggered by any other channel.
- Slave: a "Slave" can NOT trigger it's TR recorder nor that of any other channel. The transient recorder of a "Slave" can be triggered by the first threshold crossing in a "Master" or a "Pool" channel.
- Pool: If this channel´s signal exceeds the threshold prior to all other channels of the pool, it triggers its own transient recorder as well as all transient recorders configured as "Slave" or "Pool." With Pool trigger, the first-hit channel is the "Master" and all other channels of the pool are "Slaves." The transient recorder of a channel configured as "Pool" can be triggered by the first threshold crossing in a "Master" or any "Pool" channel.

Pretrigger sample

Defines the number of samples recorded before the first threshold crossing.

Pretrigger samples will be set to 0 if option "Include TR data for artificial hits (after timeout)" is selected (see General Settings) and hit is artificially started.

Post duration samples

Note: can only be set when duration adapted transient recording is enabled (see General Settings)

Defines the number of samples recorded after the last threshold crossing.

Post duration samples are set to 0 if "Include TR data for artificial hits (after time out)" is selected (see General Settings) and hit is timed out and not having an "R"-flag.

No transient recorder page will be generated if the number of post duration samples spans a longer period than DDT and a new hit occurs while post duration samples are recorded. Hence number of post duration samples should be chosen in such a way that their time period is smaller than DDT.

Data select

Defines the data source for storage of waveform data in Acquisition. The complete digital filter chain (see also AMSY-6 System Description) consists of a FIR, IIR1, IIR2, IIR3, IIR4 (short IIR1...4) and IIR5 filter stages. The IIR1...4 filter stages realize the digital bandpass filter which can be selected by the Digital Filter Settings. The IIR5 filter stage defines the Notch Filter (ASIP-2/A only).

Possible data sources are:

1. IIR5 (normal), (=notch filter): data for waveform storage is taken after the complete digital filter chain

2. IIR4 (=bandpass filter): data for waveform storage is taken after the last bandpass filter block (IIR4), but before the Notch Filter (IIR5 filter stage).

3. FIR(=anti aliasing filter after ADC): data for waveform storage is taken after FIR filter stage. For largest bandwidth of 18kHz to 2.4MHz recording.

AC Test only:

4. ADC: 40MSPS, 16bit signed, no digital filter, higher noise, offset compensated.

Preamplifier Options

Input device:

For information purposes only: selected input devices (e.g. AEP4-40dB) and DC voltage on BNC (e.g. 28V). For more information see Hardware Detection Results and Channel Configuration.

Calc. gain [dB]

This setting determines which gain is used by the software to calculate results.

Preamp. gain [dB]

For information purposes only. Preamplifier gain is determined by selected input device in Hardware Detection Results and Channel Configuration.

Range

In case of an ASIP-2/A an amplification of the input signal can be selected. 10Vpp corresponds to amplification 1 (input signal is in the range of +/-10V). 5Vpp and 2.5Vpp corresponds to an amplification of 2 and 4, respectively (input signal is in the range of +/-5V and +/-2.5V, respectively).

- ASIP-2/A: 10Vpp, 5Vpp, 2.5Vpp
- ASIP-2/S: 10Vpp

Pulser function

For information purpose only. Shows whether pulse through ability is activated or not.

Preamp. ID

For information purpose only. User can edit this information in Hardware Detection Results tab (e.g. preamp number or preamp name).

Sensor ID

For information purpose only. User can edit this information in Hardware Detection Results (e.g. Sensor type).

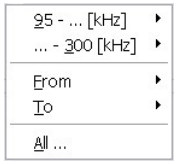
Digital Filter Settings

Filter

For each channel you can select a the digital band pass filter from a list of filters. The filter selection pop up window (see left hand side) lets you specify the corner frequencies of the filter.

1. XX-...[kHz]: specify the corner frequency of the low-pass filter

2. ...-YYY[kHz]: specify the corner frequency of the high pass filter
3. From: select a high-pass filter frequency for a given low-pass filter frequency.
4. To: select a low-pass filter frequency for a given high-pass filter frequency.
5. All...: select a filter from a matrix of all available filters.



Note: When working with frequencies less than 18kHz the analog hardware filters (one per channel) of the ASIP-2 need to set to 1.6kHz. be changed. Depending on the analog filter board revision 1 switch or 4 dip switches have to be set accordingly.

Signal processing of frequencies below 12kHz requires input device AC@100K. With this setting no DC supply for the preamplifiers is available. A separate power supply is required.

For more information about which filters are available please refer to Available Digital Filter.

Description

For information purpose only. The user can edit this information in “Hardware Detection Results” (e.g. 95-850kHz)

Analog Filter

For information purpose only. Shows which analog filter is selected (HP-Hi: 18kHz; HP-Lo: 1.6kHz).

Attention: If you have selected 40MHz sample rate for AE-data you can only choose bypass or 100kHz for high-pass filter and 1800, 2000 or 2200 for low-pass filter. Each of the filters being of 4th order.

Notch Filter

The notch filter can be used to block certain frequencies from the AE spectrum. The notch filter can consist of 1, 2 or 4 stages for AE sample rates of 40MHz, 20MHz or 10MHz, respectively. A notch filter stage is switched off if 0kHz is entered. A one stage notch filter provides approximately 26dB attenuation at the notch frequency. For higher attenuation use 2, 3 or 4 stages. 2nd, 3rd and 4th stage can also be used to reject harmonics of the lowest notch frequency. The available notch filter stages depend on the digital filter settings as well as on the AE sample rate. In case of 40MHz sample rate only 1 stage notch filter is available. At lower sample rate up to 4 notch stages are available.

Notch stages

The notch filter can be used to block up to 4 frequencies from the AE spectrum. Each of the up to 4 stages resembles an IIR filter of 2nd order. For each stage one frequency can be specified in kHz that will be blocked from the AE spectrum. Entering 0kHz switches a notch filter stage off.

Notch Filter Settings

According to your AE-data sample rate you can select 1 to 4 filter stages. Each filter stage being of 2nd order.

1. 10MHz AE-data sample rate: up to 4 filter stages available.
2. 20MHz AE-data sample rate: up to 2 filter stages available.
3. 40MHz AE data sample rate: only 1 filter stage available.

The maximum filter frequency is 1000kHz, 500kHz or 250kHz with 1, 2 or 4 filter stage(s), respectively.

Hint: 4th order bandpass filters, (HP: 100kHz, LP: 1800, 2000, 2200kHz) or bypass filter lets you select just 1 filter stage.

Stage 1...Stage 4

Specify the frequency of the notch filter, i.e. the frequency to be attenuated. Each stage is a filter of 2nd order. You can specify same or different frequencies in the input fields.

Buttons

Help: show help file (this file).

< Prev Chan: jump to previous channel.

Next Chan >: jump to next channel.

OK: accept changes.

Cancel: discard changes.

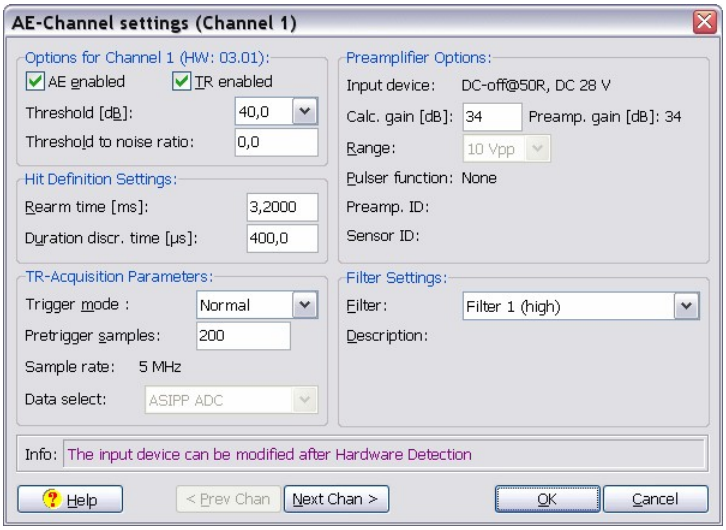
Title: AcqSetup-03: AE-Channel Setup
Link: AESuite/Acq32/AcqSetup/Acq32_AEChannelSettings.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > AE-Channel Settings for ASIPP

AE-Channel Settings for ASIPP

This document applies to ASIPP. For explanation and help on channel settings of an ASIP-2 follow the link to ASIP-2 AE-Channel settings.

The settings for each channel can be specified using the channel settings dialog. It is entered by selecting a channel on the AE-Channel tab and pressing "Edit" (or double click on the channel or perform a right mouse click and choose "Edit" from the context menu).



Options for channel *X*

AE enabled

Check this box to enable the channel. Unchecking disables the channel (AE-data recording as well as TR-data).

TR enabled

Check this box to enable TR-data recording of channel. Uncheck the box to disable TR data recording of channel.

Threshold [dB]

Select threshold in dB_{AE}. The threshold value depends on the selected "Calc. gain"!

Threshold to noise ratio

Set the Threshold to noise ratio (Thr/Noise) to zero for a fix threshold. Set Thr/Noise to 5 to obtain a floating threshold of (5 x RMS value [in µV]) converted to dB. The floating threshold is always equal or greater than the value selected next to "Threshold[dB]".

Example: Fix Threshold 40dB, Thr. to noise ratio = 5

- case a) RMS = 100µV, 20*log(5*100) => 54dB, => Thr = 54dB
- case b) RMS = 10µV, 20*Log(50) => 34dB, Thr = 40dB (the user-defined minimum)

Hint: The Threshold to noise ratio was previously known as the Crestfactor in the MainMenu.

Hit definition settings

Rearm time, Duration disc. time

For explanation of the Rearm time (RAT) and Duration discrimination time (DDT) go to section AE-Channels - AE-Channel Summary

TR-Acquisition Parameters

Trigger mode

Select the Trigger Mode for the acquisition of TR-data and the number of pre-trigger samples. Only available if TR-Acquisition is enabled.

Pretrigger sample

Defines the number of samples recorded before the first threshold crossing (before the AE channel is triggered).

Sample rate

For information purposes only. Set the sample rate in TR Setup tab

Data select

For information purpose only: always set to "ASIPP ADC" for ASIPP

Preamplifier Options

Input device

For information purposes only: selected input devices (e.g. AEP4-40dB) and DC voltage on BNC (e.g. 28V). For more information see Hardware Detection Results and Channel Configuration.

Calc. gain [dB]

This setting determines which gain is used by the software to calculate results.

Preamp. gain [dB]:

For information purposes only. Preamplifier gain is determined by selected input device in Hardware Detection Results and Channel Configuration.

Range

For ASIPP it is always fixed to 10Vpp

Pulser function

For information purpose only. Shows whether pulse through ability is activated or not.

Preamp. ID

For information purpose only. User can edit this information in Hardware Detection Results tab (e.g. preamp number or preamp name).

Sensor ID

For information purpose only. User can edit this information in Hardware Detection Results (e.g. Sensor type).

Filter Settings

Filter

Maximum of two analogue filters selectable (Filter 1 (High), Filter 2 (Low)).

Description

For information purpose only. The user can edit this information in Hardware Detection Results (e.g. 95-850kHz).

Hint: If only one high-pass filter installed and the other one selected, no meaningful measurements can be made with this channel.

Buttons

Help: show help file (this file).

< Prev Chan: jump to previous channel.

Next Chan >: jump to next channel.

OK: accept changes.

Cancel: discard changes.

Title: AcqSetup-05: AE-Channel Setup for ASIPP
Link: AESuite/Acq32/AcqSetup/Acq32_AEChannelSettings_ASIPP.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > AE-channel copy options

AE-Channel Copy Options

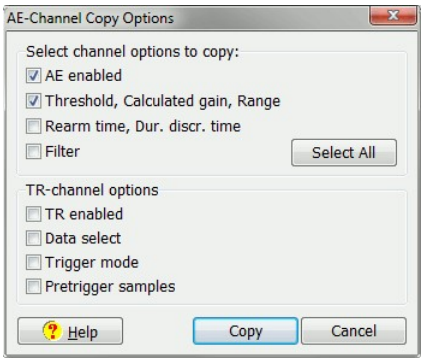
A context menu is shown if the right mouse button is clicked on a channel. This context menu has three items:

Edit: Displays the appropriate dialog window to adjust the settings.

Copy: Calls a dialog window that species which of the settings of the current channel shall be copied (see the image below).

Paste: Pastes the previously copied settings into the currently selected channel.

There are several options of copying settings of a channel to the clipboard. The dialog below shows these options.



CAUTION: one can NOT copy filter settings from ASIPP to ASIP-2 or vice versa! In case you use a 'mixed' system with both ASIPP and ASIP-2 installed make sure to verify the filter settings before starting data acquisition.

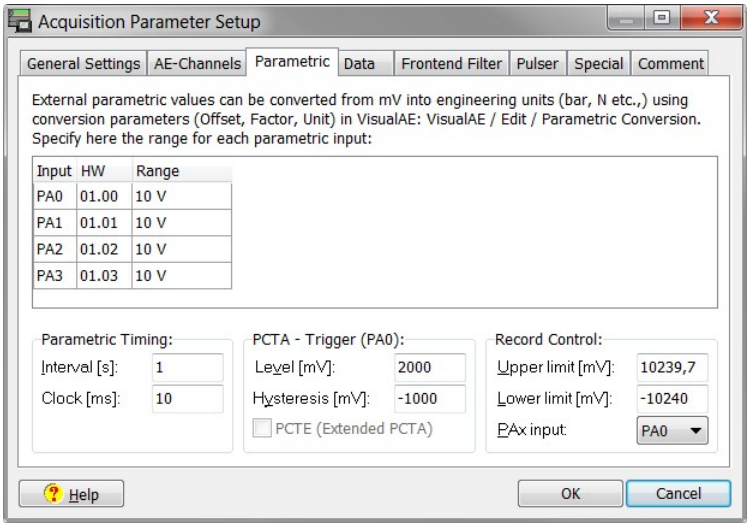
Hint: These procedures provide quick and easy means of assigning the same settings to many channels.

Title: AcqSetup-04: AE-Channel Copy Options
Link: AESuite/Acq32/AcqSetup/Acq32_AEChannelCopy.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Acquisition Parameter Setup > Parametric Channel Settings

Tab: Parametric

If you want to calculate engineering units (e.g. kN, bar, and others) from the measured voltage please use the Parametric Conversion implemented in **VisualAE**.



Range of parametric input channels can be selected by software (+/-10V or +/-1V) for each parametric input channel individually.

Parametric Timing

Interval

This value specifies the time interval between stored parametric data sets during time periods in which no hits are detected. The data sets generated in this time interval (0.2ms..600s) are called time driven parametric data. Parametric data sets are stored more often while hits are detected. (See “clock”). These data sets are called hit driven parametric data.

Clock

The parameter Clock defines the parametric sampling interval (0,1 to 10ms).

Note: Lower clock values than 1ms should be avoided for large channel applications.

PCTA-Trigger (PA0)

Level and Hysteresis

The settings of Level and Hysteresis are used for cycle counting. PCTA is a counter that increases by one every time the voltage at the parametric input PA0 has passed through the hysteresis band from Level + Hysteresis to Level.

Example as shown in the image of setup menu above: PCTA increments, if the voltage at PA0 changes from 1000 mV (Level 2000 + Hysteresis -1000) to 2000mV. It does not change, if the PA0 voltage comes from greater 2000mV, goes to 1010mV and up again over 2000mV. It must pass through the full hysteresis band. In this example the signal has to come from below 1000mV to higher than 2000mV in order to increment the PCTA.

PCTD

This is a digital counter accessible via specific pins in the "Externals" connector on the rear of the chassis (see AMSY-6 Getting Started Manual for a detailed description of the pin usage). If pin 14 of the "Externals" connector is high (or open), then PCTD is set to 0, if pin 14 is low PCTD stores the current value.

Hint: Once you started acquisition using PCTD and then remove the connector (or set pin 14 to high) PCTD is set to 0 immediately.

With acquisition software releases prior to R2006.0808 : on each resume PCTD was always reset to 0.

From acquisition software release R2006.0808 on: on each resume PCTD is initialized with the last stored value. This can be different from 0 only if pin 14 (reset line) is low.

Record Control

Upper limit [mV]

Recording is disabled if the voltage at the parametric input specified by "PAx input" exceeds the upper limit.

Lower limit [mV]

Recording is disabled if the voltage at the parametric input specified by "PAx input" is below the lower limit.

PAx input

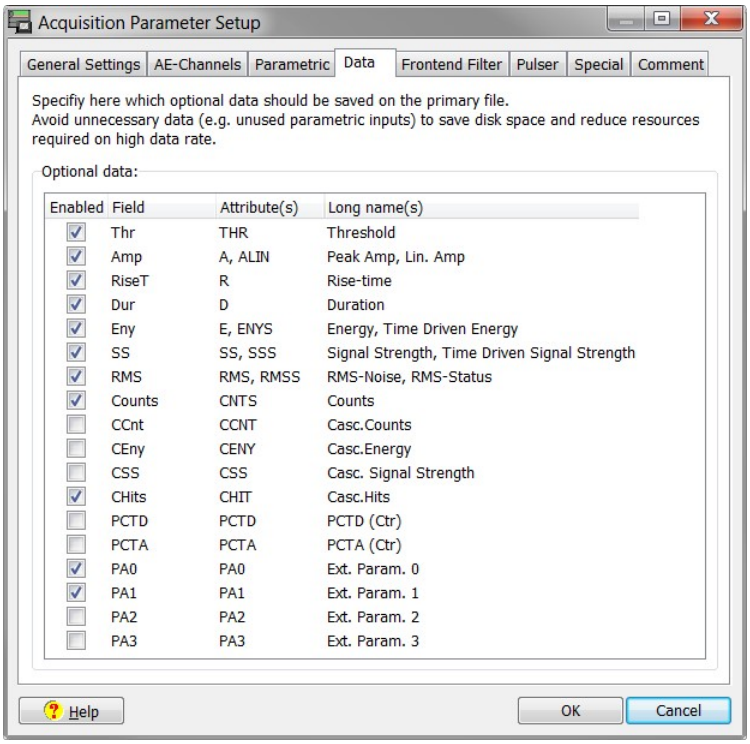
Parametric input to which the upper and lower limit for record control is applied.

Hint: In case you use the +/-1V setting at the switch just below the PAx input connector, the voltage at that PAx input will be multiplied by a factor of 10 (to make use of the full resolution of the ADC). During analysis this results in parametric readings that are too high (by a factor of 10). Please use the **Parametric Conversion in VisualAE™** in order to compensate for this.

Title: AcqSetup-07: Parametric Channel Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabPaxChannels.htm

Tab: Data

Define AE-features that shall be stored to the primary data file.



Optional data

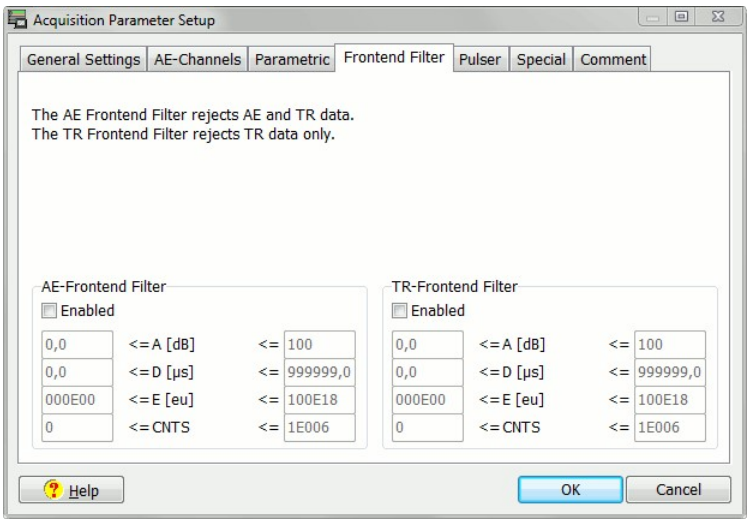
The field displays all AE-features which can be stored to a primary data file in a table. Checking the "Enabled" box selects this feature for storage. Not all features may be necessary for data analysis. Therefore by reducing the number of features to be stored the size of a primary data file can be effectively reduced.

Note: The column "Field" contains the names of the column header of the table to which Acquisition data is stored. The field name does not match the VAE Result variable (e.g. compare field name "Amp" to VAE result "A", etc.)

Title: AcqSetup-13: Data Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabData.htm

Tab: Frontend Filter - Frontend Filter Setup

This menu shows the current Frontend Filter settings.



AE-Frontend Filter

To enable the AE-frontend filter check the box "Enabled". AE-data and the corresponding TR-data are rejected, when the features of the AE-data do not match the conditions defined for Amplitude (A), Duration (D), Energy (E) and Counts (CNTS). Any data that is rejected from the frontend filter is not stored to the PRIDB-file (and tra-file) and thus not available for analysis.

TR-Frontend Filter

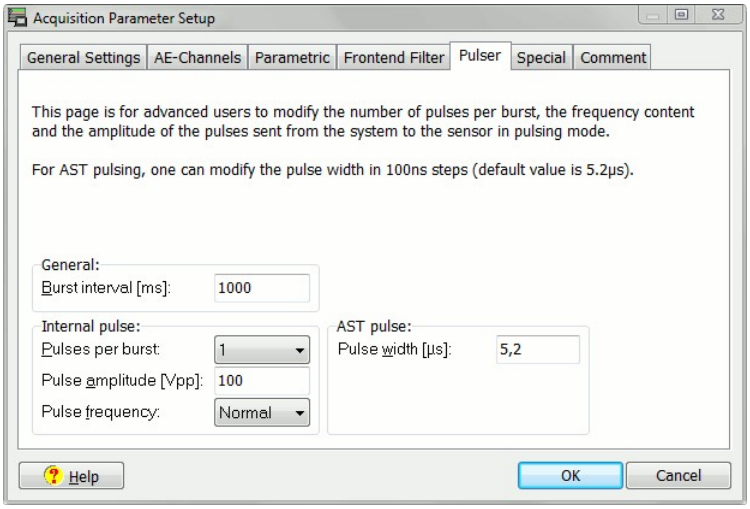
To enable the TR-frontend filter check the according box "Enabled". The TR-frontend filter works similar to the AE-Frontend Filter, however it rejects TR-data, only. AE-data will be recorded.

Note: Filtering is not possible with the 2 trigger modes "Master-Slave" or "Pool". Filtering is of course possible when "Normal" trigger mode is selected while using the Master-Slave configuration.

Title: AcqSetup-06: Frontend Filter Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabOnlineFilter.htm

Tab: Pulser - Pulser Settings

Puls settings as generated with internal pulser chassis module and AST (Automatic Sensor Tester) settings are defined in this tab.



Pulsing of a channel can be started in acquisition menu. Each pulsing channel will emit 4 - 5 bursts before switching to next pulsing channel or ending pulsing mode. Time between two bursts of a channel is set by "Burst interval". Shape of a burst is set by "Internal pulse" parameters.

General

Burst interval

Defines the interval between successive bursts. Allowed interval settings are between 10ms and 3200ms in steps of 4ms. Burst interval setting defines pulsing time of a channel, i.e. the time it takes for one channel to complete pulsing. Pulsing time is approximately 4 hits * burst interval. Switching time from channel which finished pulsing to next pulsing channels is approximately 330ms. In case of AEP3 preamplifiers set to programmable gain switching time is approximately 400ms longer.

Internal pulse

Pulses per burst

Determines the number of pulses per burst (between 1 and 16 pulses). The frequency of pulses forming a burst is approximately 150kHz when pulse frequency is set to normal, approximately 30kHz when pulse frequency is set to low.

Pulse amplitude [Vpp]

Determines the peak-to-peak amplitude of the pulses. Voltage selection between 1V to 450V.

In case of AMSY-5 front switch on the system has to be set to "remote". If the switch is set to "local" the settings of the "Amp." knob on the front panel are used.

Normal / Low

Pulses are available in 2 different frequency ranges. The Normal pulses (default) are from 90-210kHz (-12dB points), the Low pulses are from 30-210kHz (-12dB points).

AST pulse (ASIP-2/A only)

Pulse width [µs]

Width of initiation pulse emitted by ASIP-2, which triggers AST pulsing. Length of pulse width is proportional to AST pulse amplitude (i.e. the shorter the pulse width the smaller the AST-pulse amplitude). This dependency is not linear!

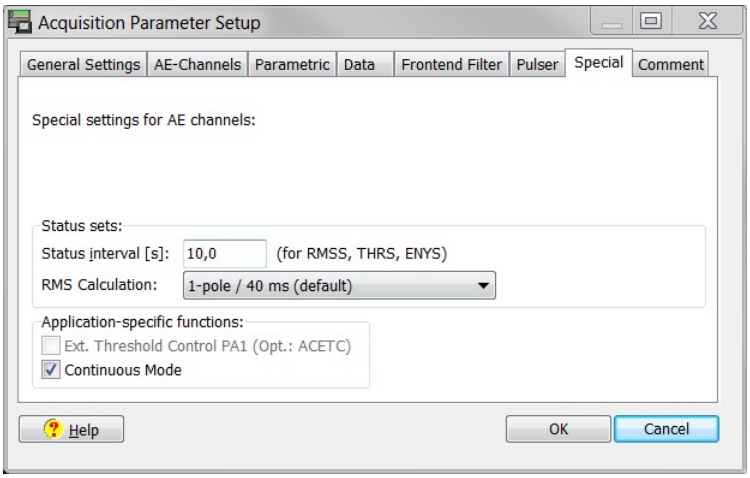
Each pulse is not only emitted through the appropriate channel but also through a BNC connector ("Pulse out") on the back panel of the system.

Note: For release later than May 2006 it is possible to perform scheduled pulsing runs.

Title: AcqSetup-08: Pulser Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabPulser.htm

Tab: Special - Special Settings

The special menu defines setting parameters which are valid for all channels: the selection of type of energy measurement and rate of generation of RMS-status data sets.



Status Sets

Status Interval [s]

Definition of timing interval for time driven recording of status data sets. The status data sets store the values RMSS (RMS-Status data at the preamplifier input), THRS (Threshold Status) and ENYS (energy per status interval) for each channel. The Status interval can be selected between 0.1 and 600 seconds. It is internally handled in multiples of 52.4288ms.

Example: If a Status interval of 1s is specified a status data set is written every 1.048576 seconds (20 x 52.4288ms).

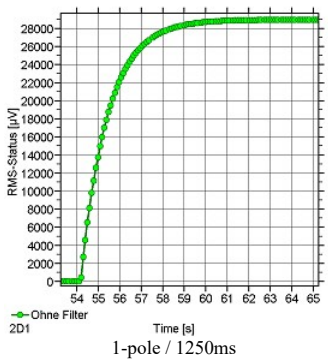
RMS Calculation (only selectable with AMSY-6/-5)

This box lets one select different low pass characteristics for the RMS calculation.

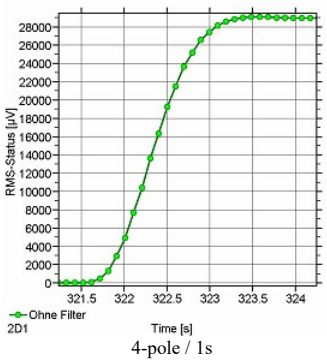
The time selected is the time needed after a stepwise change of the RMS input to approach 63% of the output change.

- 1-pole / 40ms is the default for AMSY-6/-5
- 1-pole / 1250ms is the default for AMSY4
- 4-pole / xx ms are additional options for AMSY-6/-5 users only.
  (xx: 250ms, 500ms, 1s, 2s, 5s, 10s)

The figure below shows the different timing behaviour of the 1-pole and 4-pole low pass filter.



1-pole / 1250ms



4-pole / 1s

Application-specific Functions

These are implemented to suit special requirements for some applications.

External Threshold Control (PA1) (only available with AMSY4)

If checked, the threshold for all channels will be adjusted according to the voltage fed into PA1. This enables online threshold modification by an external potentiometer without interrupting the acquisition.

The threshold THR is modified according to the following formula:

THR = 20*log(PA1[µV]/16) - (30+preamp.gain) (PA1 in 10V range)

The threshold value entered defines the minimum threshold (which can be increased according to the voltage at PA1).

Example:

PA1 [mV] THR [dB_{AE}]

10,000 76

1,000 56

100 36

Continuous Mode

Special mode for threshold independent triggering. See chapter Continuous Mode for detailed information.

Time-Processing-Mode

Absolute date/time of acquisition

The absolute time (up to 325 days with 100ns resolution) is stored on file in every data set.

Recording Time

The acquisition starts with time zero. If the acquisition is interrupted and resumed later, the time on the file continues with the last time on file plus an offset of about 10 seconds. This is the default selection.

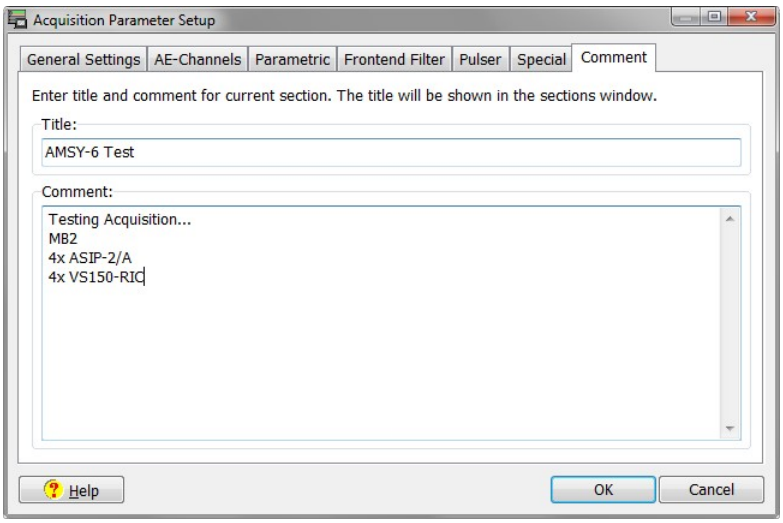
Hint: The recording time is useful if you have long breaks between data acquisition sessions in one file, e.g. due to modification of your sample or because the test is halted during night-time. Example: you have 2 hours test, then 2 days modification work/break, and then again 2 hours test, a diagram with the time as horizontal axis is difficult to read when Absolute date/time was selected. Because less than 10% of the overall time (more than 50 hours) were acquisition sessions (4 hours). Therefore 90% of the diagram show no data. Recording Time would help: then 100% of the time on file is acquisition time.

The time-processing mode is set before the acquisition is started. It can be changed from one section to the next, but cannot be changed after the test. E.g. you could start the first section on your file with absolute time (in order to have the date of your test written to file) and change to recording time for subsequent sections.

Title: AcqSetup-11: Special Settings
Link: AESuite/Acq32/AcqSetup/Acq32_TabSpecial.htm

Tab: Comment - Acquisition Comment Setup

In this field you can enter a title for the current acquisition section (see Acquisition section for more information) and a description/comment for the current section.



Note: These texts are independent from the **Acquisition Comment** that is valid for the whole acquisition.

Title: AcqSetup-10: Comment Setup
Link: AESuite/Acq32/AcqSetup/Acq32_TabComment.htm

Available Digital Filters

Coming from the factory, there are 8 filters plus the filter bypass option available for the ASIP-2/S. For the ASIP-2/A there are over 500 filters selectable (as of May, 2012). A table of all available filters can be found in c:\vallen\bin\ASP2DigitalFilters.htm.

The 8 standard filters are

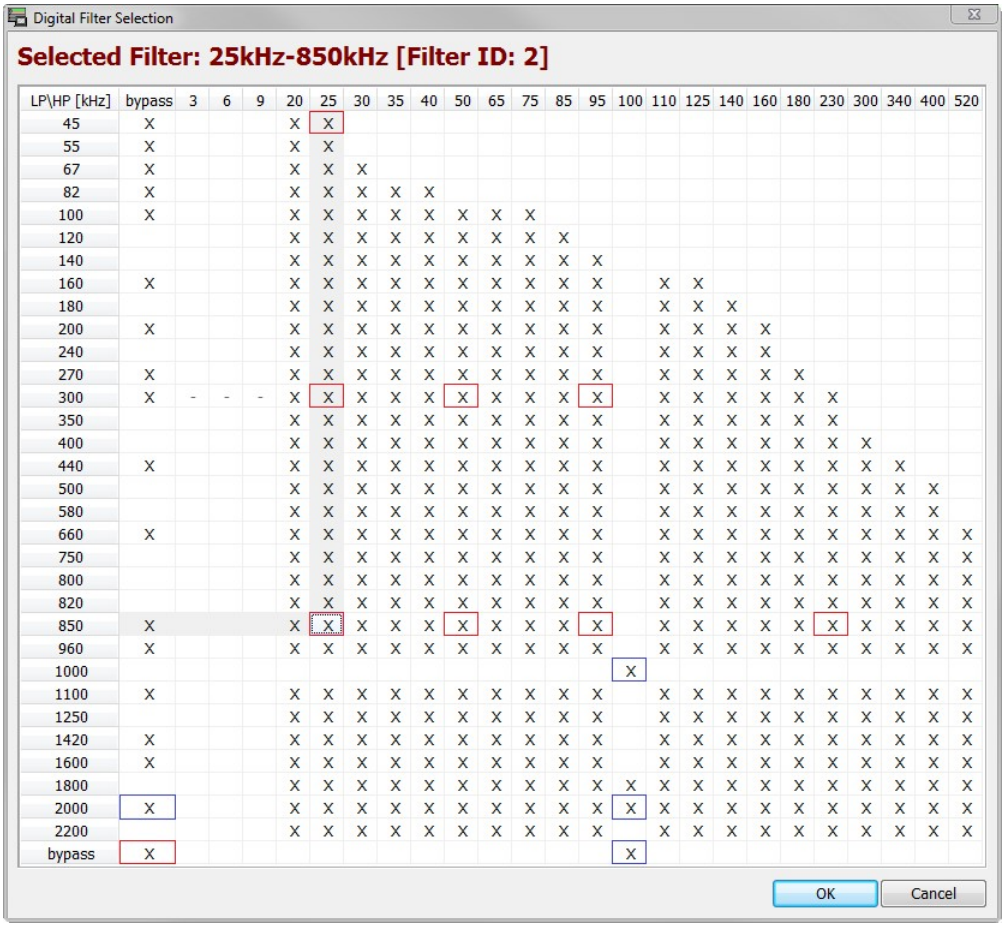
- 25kHz - 45kHz, 25kHz - 300kHz, 25kHz - 850kHz
- 50kHz - 300kHz, 50kHz - 850kHz
- 95kHz - 300kHz, 95kHz - 850kHz
- 230kHz - 850kHz

There are three special filter categories:

1. bypass: bypass either for LP or HP or both: no low-pass or high-pass filter is applied.
2. filters of 4th order: HP: 100kHz: LP: 1800kHz, 2000kHz, 2200kHz (only available with ASIP-2/A)

3. filters of 8th order: all filters exclusive the previous mentioned ones.

The columns and rows shown in the image below show the available high-pass and low-pass filters, as shown in the filter selection dialog. Filters highlighted by a red rectangle are available with ASIP-2/S. Filters highlighted by a solid blue rectangle are filters of 4th order. All other filters (including the ones highlighted by a red rectangle) are filters of 8th order - except for the bypass filters.



LP\HP [kHz]	bypass	3	6	9	20	25	30	35	40	50	65	75	85	95	100	110	125	140	160	180	230	300	340	400	520
45	X				X	X																			
55	X				X	X																			
67	X				X	X	X																		
82	X				X	X	X	X	X																
100	X				X	X	X	X	X	X	X	X													
120					X	X	X	X	X	X	X	X	X												
140					X	X	X	X	X	X	X	X	X	X											
160	X				X	X	X	X	X	X	X	X	X	X		X	X								
180					X	X	X	X	X	X	X	X	X	X		X	X	X							
200	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X						
240					X	X	X	X	X	X	X	X	X	X		X	X	X	X						
270	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X					
300	X	-	-	-	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				
350					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				
400					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X			
440	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		
500					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	
580					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	
660	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
750					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
800					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
820					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
850	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
960	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
1000															X										
1100	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
1250					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
1420	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
1600	X				X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
1800					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2000	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2200					X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
bypass	X														X										

Note: The image above is for demonstration purposes only and may differ from the actually installed list of filters. For a current list of filters available with your installation, please refer to c:\vallen\bin\ASP2DigitalFilters.htm.

Title: AcqSetup-12: Available Digital Filters
Link: AESuite/Acq32/AcqSetup/Acq32_DigitalFilter.htm

Continuous Mode, Threshold independent triggering

When continuous mode is selected, data sets are triggered when a timer (can be adjusted by the Duration Discrimination Time of the channels) expires instead of when a threshold crossing is detected for the first time. When the timer expires, the currently acquired data set is closed and a new data set is opened. Each data set contains features of equally spaced time slices. The threshold is only used for determining the number of threshold crossings (similar to ring down count).

Each AE data set includes the following main features:

- Start Time
- Peak Amplitude
- Rise Time (time between start of hit an peak amplitude)
- Counts (number of threshold crossings)
- Signal Strength and True Energy, if selected

The time slice period can be programmed for each channel individually from 50µs to 98ms in steps of 3.2µs. Shorter time slice periods generate higher AE-data rates.

In parallel to the feature extraction, the optional transient recorders can be triggered once per time slice. The number of samples per trigger (page length) and the sampling rate (multiple of 100ns sample time) is also programmable. If desired, a relatively short page of waveform data per time slice can be acquired. Additionally one can achieve gap-free waveform capture with ASIP-2 (until the memory runs full on each channel). Data acquisition can be controlled by the two external "disable" switches for AE and TR as usual. Frontend filtering is supported, so that only AE data of time slices is stored that contains e.g. a user-defined minimum energy. For efficient use of the TR-front end filter in continuous mode at least 256MB per channel is recommended.

Example: ASIP-2, continuous mode (streaming)

Settings

- Sampling rate: 10MHz

- Page length in samples: 32,768 samples
- Page length in µs: 32,768 x 0.1µs = 3,276.8µs
- Duration discrimination time: 3,276.8µs (= page length)

Description

When acquisition has been started and the front panel switch "AE" is on "enable", the AE-channel will produce an AE-dataset once every 3.2768ms (this corresponds to about 305 data sets per second).

The channel will also trigger the transient recorder once every 3.2768ms and store waveform data for 3.2768ms without any gap in between them.

Using the optional TR-Module TR-2/2GB and 10MHz sampling rate, there is enough memory to store more than 53 seconds of gap-less waveforms on each channel.

Streaming length with TR-Module at 10MHz sampling rate:

- TR-2/512MB: at least 13 seconds
- TR-2/2GB: at least 53 seconds

Hint: AE-data acquired in **Continuous Mode** can be analyzed and visualized by **VisualAE™** and **VisualTR™** just as easily as threshold based AE. Continuous mode waveforms can be automatically classified with **VisualClass™**.

Note: Since **Continuous Mode** is completely threshold independent, it extends the prospects of successful AE-applications tremendously, especially when applications are encountered that suffer from a (fast) changing background noise.

Title: AcqSetup-09: Continuous Mode
Link: AESuite/Acq32/AcqSetup/Acq32_ContinuousMode.htm

What exactly is the result RMS and how is it obtained?

The result **RMS** (**R**oot **M**ean **S**quare) represents the RMS-value in [µV] BEFORE the respective hit. The RMS-value of the signal between two hits (the time period from end of hit detection to next start of hit detection) is continuously evaluated and stored with the next hit as result RMS. It provides information about the continuous AE-signal level below the threshold.

The RMS-value is also stored in the time driven Status Data Sets as result **RMSS**. RMSS can be used to monitor the background noise, even when there are no hits at all.

Though the signal level during the hit does not influence the RMS value, the decay of the burst signal, after the last threshold-crossing, can cause an increase of the RMS-value. An increase of the RMS-value also happens, when burst signals rise out of the noise and cross the threshold a few microseconds later.

The threshold setting influences the maximum RMS-value one can obtain. The lower the threshold the lower the RMS-value can get. A signal component above threshold is always part of a hit. Only signal components between hits can be below threshold and influence the RMS-value.

At a 34 dB (=50µV) threshold, the RMS value cannot get much above 20µV.

The following formula is applied:

True energy

$$RMS_{\text{True Energy}} = \sqrt{\frac{1}{T}\int_0^T U(t)^2\,dt}$$

with:

U(t):	Voltage as a function of time of the signal at sensor output
T:	6.5ms (constant)

The sampling rate for RMS measurement is 5 MHz. 32,768 samples represent an integration time of about 6.5ms.

In order to obtain the (true) RMS-value, the channel calculates the square root of the average of 32768 squared ADC values. This requires the squarer option (ASP-SQ) in the AE-channel.

In order to obtain the Signal Strength result, the channel calculates the average of 32768 absolute-value converted ADC-samples.

In both cases, the internal RMS / Signal Strength result is used for floating threshold calculation (if selected) and runs through a digital low-pass filter of selectable time constant and order. The RMS value stored in the data set is taken from the output of that low-pass filter.

How relates the RMS-value to the peak amplitude of a signal?

This depends very much on the shape of the signal:

Example

For a sine wave the following is valid:

True energy RMS = 0.707*peak amplitude, (this corresponds to –3dB relative to the peak amplitude)

Signal strength RMS = 0.637*peak amplitude

True Energy / Signal Strength = 1.11 or 0,92dB (0,92dB = 20 * log[1.11])

Usually, AC-measurement devices are calibrated to the RMS-value of a sine wave, even if the measurement is based on non-squared averaging. This requires the consideration of the correction factor of 1.11, as shown by the formula above. The RMS value of a sine wave is 3dB below the peak amplitude, independent of whether true energy mode or signal strength mode is selected.

The calculation of the floating threshold from back ground noise (when Threshold/Noise > 0) does not consider this correction factor.

Title: FAQ-03: What exactly is the result RMS and how is it obtained?
Link: AESuite/FAQ/faq_RMS.htm

Acquisition Software Overview

The purpose of data acquisition software is to acquire data, perform preprocessing like feature extraction and/or front-end filtering, and store data to disk. The analysis software is separate and may be run online (simultaneously with the acquisition) or off-line after the test. Data acquisition can be done in a hit based mode (standard way of AE-measurement) or in Continuous Mode. In Continuous Mode data is recorded in predefined time slices. This mode extends the AMSY-6/-5 capabilities in order to investigate continuous acoustic emission.

An additional software module for data acquisition is the Vallen Sensor Tester (VST). With the VST sensitivity of sensors can be measured and compared to previous measurements (for verification that sensitivity of sensor has not changed). The VST uses a function generator to excite an emitter while the VST measures the response of the sensor under test.

Title: AcqDat-1: Acquisition Software Overview
Link: AESuite/Acq32/AcqDat/Acq32_Programs.htm

Opening an Existing or Creating a New File for Acquisition

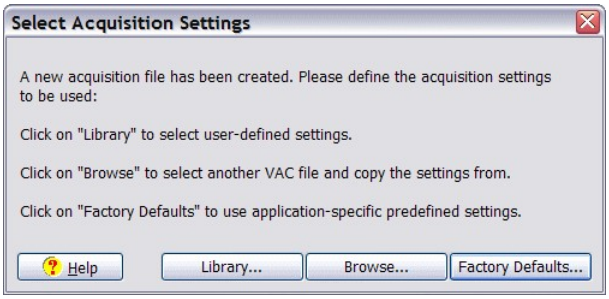
Opens a dialog window where an existing file with Acquisition settings (threshold-, filter-, gain-, etc. settings) can be opened in order to add more data. A new primary data file and new folders can be specified as well. The software asks for confirmation of the new name. Upon confirmation, the file will be created in the selected directory.

A list of all file extensions used by the Vallen Software can be found in the section Vallen File Extensions.

Title: AcqDat-2: Acquisition File
Link: AESuite/Acq32/AcqDat/Acq32_BrowseHelp.htm

Application-Specific Default Settings

When a new acquisition file is created, acquisition settings have to be initialized. Three possible sources for settings exist:



Library:

In the library customized Acquisition setups contained in PRIDB-files (comparable to e.g. Word templates) are stored. The library is filled by the operator/user of the system. By selecting customized Acquisition setup from the library, its settings are imported to the newly created primary data file. All settings that are copied can be changed afterwards.

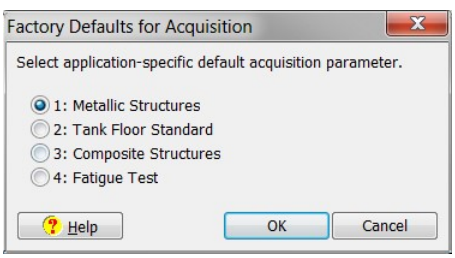
Hint: In order to put a custom made PRIDB-file into the library: copy the (empty, i.e. free of AE-data) PRIDB-file into c:\vallen\acquilib\ and give it a useful name.

Browse:

Browse will open a file dialog, where the operator can browse to a primary data file containing Acquisition settings of choice. The settings contained in the selected primary data file will be imported to the newly created primary data file. Any settings that are imported can be changed afterwards.

Factory Defaults

Factory defaults offer some predefined acquisition settings of frequently used measurement setups. Factory defaults are provided by Vallen Systeme. Factory default settings are reasonable acquisition settings for the described measurement setup. It is recommended to use these Factory Defaults to initialize the acquisition settings. Afterwards these settings can be customized to specific setups. The primary data file can be copied to library once a customized setup has been created. See hint above for where to store library files.



The Factory Default settings were developed for specific application from our experience and costumer feedback. If your specific application is not one of our factory

defaults you can still be used them as a template for the acquisition parameter setup. In general, the acquisition parameter for

• Metallic Structures can be used for all metallic test objects;

• Tank Floor Standard can be used when the acoustic wave travels through liquid (e.g. water or oil). Therefore it is a good starting point for pipeline inspections as well.

• Composite Structures should be used for all plastics and composites (e.g. CFRP).

• Fatigue Test is a special setting for tests if parametric data has to be recorded with the AE data.

This dialog offers predefined hardware settings for different applications. According to the specific application (materials properties, structure behavior,...) some modifications might be required. It is highly recommended to store individual Acquisition setups to your library (see above).

Channel setup of factory default settings

Acquisition Parameter	Metallic Structures:	Tank Floor Standard	Composite Structures	Fatigue
Default VAE: c:\vallen\VisualAE\Default	DefaultMPV	DefaultTFS	DefaultPPV	DefaultFTG
TR-Settings:				
Enable TR Recording	off	off	off	off
Sample Rate	5 MHz	2 MHz	5 MHz	5 MHz
Samples per TR-Set	2048	8192	1024	1024
AE-Channel Settings				
Gain (Prog., Calc.)	34 dB	46 dB	34 dB	34 dB
Threshold	40 dB	30 dB	34 dB	34 dB
Threshold to noise ratio	0	0	0	0
RMS time constant	40 ms	40 ms	40 ms	40 ms
Rearm time	3.2 ms	1.0 ms	0.4 ms	3.2 ms
Duration discr. time	400 us	250 us	200 us	400 us
Filter ASIPP	1 (high)	2 (low)	1 (high)	1 (high)
Filter ASIP-2	95-850kHz	25-45kHz	95-850kHz	95-850kHz
TR-Trigger Mode	Normal	Normal	Normal	Normal
Pretrigger samples	200	1024	200	200
Parametric Settings				
Interval	1 s	1 s	1 s	0.2 s
Clock	10 ms	10 ms	10 ms	1 ms
PCTA Trigger Level	2000 mV	2000 mV	2000 mV	2000 mV
PCTA Trigger Hysteresis	-1000 mV	-1000 mV	-1000 mV	-1000 mV
PCTE	off	off	off	off
Rec. Ctrl. PA0 (Upper)	10239.7 mV	10239.7 mV	10239.7 mV	10239.7 mV
Rec. Ctrl. PA0 (Lower)	-10240 mV	-10240 mV	-10240 mV	-10240 mV
Pulser Settings				
Burst Interval	1000 ms	1000 ms	1000 ms	1000 ms
Pulses per burst	1	1	1	1
Pulse amplitude	100 Vpp	100 Vpp	100 Vpp	100 Vpp
Max. amplitude (not changed)	(450 Vpp)	(450 Vpp)	(450 Vpp)	(450 Vpp)
Pulse frequency	Normal	Low	Normal	Normal
Frontend Filter Setup				
AE-Frontend Filter	off	off	off	off
TR-Frontend Filter	off	off	off	off
Special Settings				
Energy Calculation	True Energy	True Energy	True Energy	True Energy
Status Interval	10 s	10 s	10 s	10 s
RMS Calculation	1-pole / 40 ms	1-pole / 40 ms	1-pole / 40 ms	1-pole / 40 ms
External Threshold Control	off	off	off	off
Continuous Mode	off	off	off	off
Time-Processing Mode	Recording time	Recording time	Recording time	Recording time

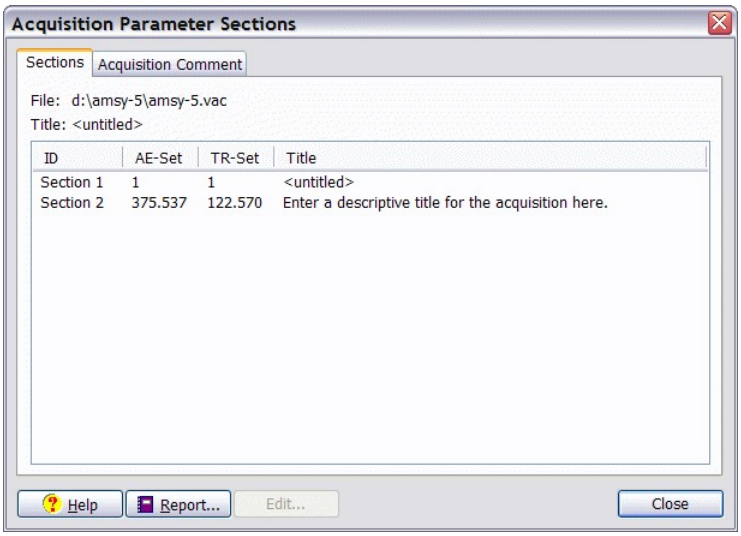
Data tab (Acquistion parameter setup) setting for default setups

Data Tab Attribute	Metallic Structures:	Tank Floor Standard	Composite Structures	Fatigue
Threshold	enabled	enabled	enabled	enabled
Burst signal peak amplitude	enabled	enabled	enabled	enabled
Burst signal rise time	enabled	enabled	enabled	enabled
Burst signal duration	enabled	enabled	enabled	enabled
Burst signal energy	enabled	enabled	enabled	enabled
Burst signal strength	disabled	disabled	disabled	disabled
RMS	enabled	enabled	enabled	enabled
Ring down count	enabled	enabled	enabled	enabled
Cascaded counts	disabled	disabled	disabled	disabled
Cascaded energy	disabled	disabled	disabled	disabled
Cascaded signal strength	disabled	disabled	disabled	disabled
Cascaded hits	enabled	disabled	enabled	enabled
parametric counter digital clock	disabled	disabled	disabled	enabled
parametric counter analogue clock	disabled	disabled	disabled	disabled
parametric input PA0	enabled	disabled	enabled	enabled
parametric input PA1	enabled	disabled	enabled	enabled
parametric inputs PAx	disabled	disabled	disabled	disabled

Title: AcqDat-4: Application-Specific Default Settings
Link: AESuite/Acq32/AcqDat/Acq32_DefaultParams.htm

Acquisition Sections

Opening and closing the Record Control Menu defines a section. The section description contains the acquisition parameters which were used for acquiring the data in that section.



The acquisition file can have a descriptive title which can be specified on the **Comment** from the Acquisition Parameter Sections shown above.

The **ID** specifies the internal ID of each section which simply is a continuous number.

The **AE-Set** and **TR-Set** show the set number the section is beginning with. If a section doesn't contain TR-data the TR-Set number is given as **N/A**.

A section can have a descriptive **title** if specified by the user in the field "Title" of the tab "Comment" from the Acquisition Parameter Setup. The text entered there is the description for the section which is started with the next acquisition on the same file.

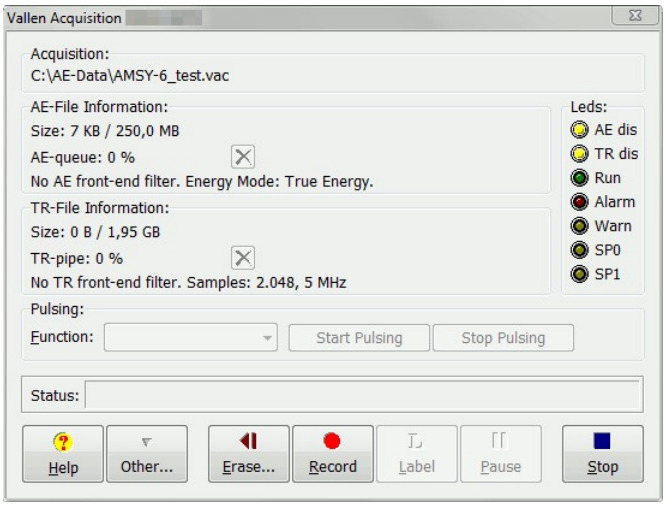
The button **Report** creates a document containing all acquisition parameters of all sections. It is presented in the **Print Preview** dialog. Use the <Page-Up> and <Page-Down> keys to show successive pages of the report.

Hint: VisualAE™ uses the settings of each section (e.g. gain) to analyze the corresponding data of that section. MultiPlot uses the settings of the last section to analyze all data in the PRIDB-file.

Title: AcqDat-5: Acquisition Parameter Sections
Link: AESuite/Acq32/AcqDat/Acq32_Sections.htm

Acquisition Control, Record Control Menu

Below is the record control menu ("Acquisition"). This menu appears after clicking on the OK in the disk space allocation menu.



Acquisition

The top most panel show the acquisition setup file name. The data files which are created in the course of setting up the acquisition have the same name but different

extensions.

AE-File Information

This section contains two pairs of numerical and bar-indicators concerning the primary data file (extension .PRIDB). There is also information about whether the Frontend Filter is in use and which Energy mode has been selected in this part of the window.

The upper pair of indicators show the amount of the data stored in file in comparison to the total space allocated for AE data. The bar grows to the right and when full, no more space is left for AE-data acquisition so AE and TR acquisition will halt.

The numbers either show the size or the number of data sets. This can be switched in a context popup menu, which is available on right mouse click in the lower area of the dialog where the control buttons are located.

The AE-Queue indicators the status of the transfer buffers on ASyC card are transferred by DMA.

TR-File Information

This section contains two pairs of numerical and bar-indicators concerning the transient data file (extension .TRADB). There is also information about whether the Frontend Filter is in use and TR-data specifications of samples per data set and sampling rate.

The upper pair of indicators (numerical and bar) in this section show how much data has been stored in comparison to the space allocated for TR-data.

The lower pair of indicators (numerical and bar) in this section display how much space of the TR-Pipe is currently in use. The TR-Pipe is a temporary storage containing information which TR-pages shall be read from which AE-channel and stored to disk. The TR-Pipe allows for faster transfer of AE-data than TR-data while simultaneously allowing the TR-data to be transferred later.

However, if the TR-Pipe becomes full the TR-data acquisition becomes temporarily disabled and TR-data can be lost. AE-channels can be equipped with large buffers,so that there is sufficient time for the operator to react before these buffers become full.

Options for the user to control the TR-data transfer when running at high rates include:

- The TR-disable switch on the front panel can be used to disable the recording of undesired TR-data.
- The Clear button clears the TR-pipe (and TR-buffers) without writing the data to disk, thereby omitting the data still in the buffer. This button is enabled only when the acquisition is halted.
- Before starting acquisition: enable a suited frontend filter to save only the waveforms of most interest.

Pulsing

- The acquisition must already be running for any pulser function to operate.
- Single cycle, Iterative cycles or Single channel: xx, where xx is to be replaced by a channel number, are selectable.
- If you want a single channel to send pulses, the desired channel number has to be chosen.
- If you want the program to send automatically a pulse through each (enabled) channel once, select Single cycle.
- If you want to send pulses through each channel in a sequence repeatedly, select Iterative cycles.
- Start Pulsing starts sending pulses. Pulsing can be stopped at any time by a click on Stop Pulsing.

Note: For release later than Mai 2006 it is possible to perform scheduled pulsing runs.

Acquisition Control

Record

Starts the data acquisition. The newly acquired data is appended to the last recorded data set (if any). A new section is also opened if this is the first Record after a Stop.

Erase

Deletes all existing data sets in the pri- and/or tra-files. Deleting AE-data deletes TR data, also. can be deleted independently from AE-data.

Pause

Halts the data acquisition.

Stop

Closes the current section after the data acquisition has been halted. The unused data in the PRIDB- and TRA-file is released.

Label

While data is being acquired clicking on the L-(Label)-button or entering <ALT+L> **inserts a Label.**

Other

Online Threshold Control and Online Pulser/Audio control is available through this button.

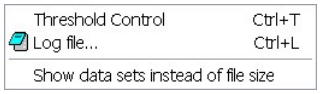
Note: For release later than August 2008 it is possible to perform certain operations during acquisition using the AcqCmd standalone tool, with a command line interface.

Hint: Recording can also be enabled/disabled by voltage fed into PA0. See record control in AcqSetup-07: Parametric Channel Setup.

More Commands

There is a context menu available on right mouse click in the lower area of the dialog where the control buttons are located.

This menu access to the log file and allows to display the numbers for file size display in either size or data sets.



Group LEDs (AMSY-6/-5 only)

This group shows the status of the LEDs on the Front Panel.

Note: The Alarm, Warning, SP0 and SP1 LEDs can be toggled during running acquisition by clicking on those in the dialog shown above.

The LEDs for Warning, Alarm, SP0, and SP1 can be controlled by the Alarm Manager to indicate user defined Warning / Alarm conditions.

Since version 2005.0504 the Warning and Alarm LEDs are also used to indicate PC response time delays:

If LED Alarm on and Warning flashes: The ASyC indicates that there was no request from the Windows PC for 5 seconds. This is not a critical situation as no data is lost. It just shows that the PC was busy for an exceptional long time, which might need further analysis.

This indication is confirmed by the user by switching the "AE disable" switch shortly from enabled to disabled and back to enabled. The flashing of the Warning disappears and the Alarm LED turns off.

Such delays are out of the control of the PC based AE software and can be detected only by the ASyC as it runs a PC independent real-time operating system. The indications are also reported in the LOG-file with their time of occurrence.

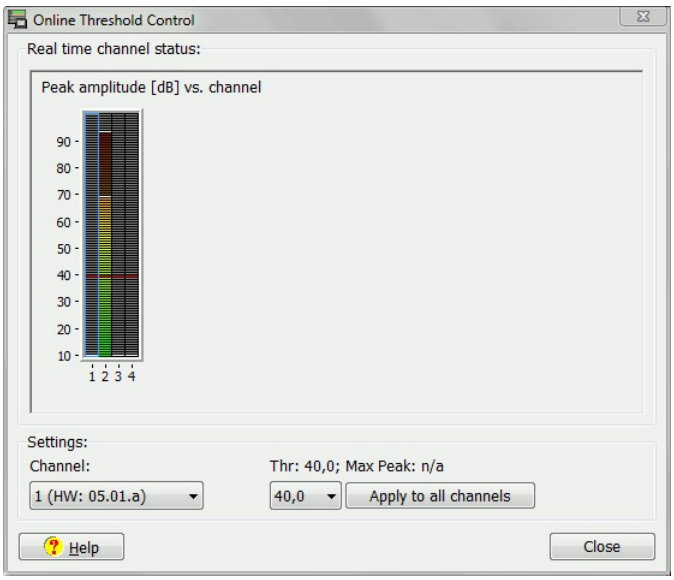
Typical reasons for such delays are either hardware problems (e.g. access to an absent floppy disk, slow CD-ROM, MAGMA cable problem, network delay problems) or caused by third-party device drivers or virus scanners or by applications requiring huge amount of memory, like all Office programs. Also some programs continuously create and release memory buffers, which causes a fragmentation of the memory and/or overall memory resources decrease. Earlier or later, sometimes after hours or days, Windows has to defrag the memory. This process can occupy the CPU for seconds and can lead to an indication as described.

To determine the reason for such delays during long-term measurements can be difficult. At least the flashing LEDs shall draw a users attention to an upcoming potential risk of PC instability.

Title: Use-3: Using Acquisition Control
Link: AESuite/Acq32/Use/Acq32_UseControlStart.htm

Online Threshold Control

The record control dialog of Acquisition contains a button called "Other". Clicking this button brings up a dialog in which one can select "Threshold Control" to open appropriate dialog. You can call this dialog by right click on the record control window and selecting "Threshold Control" from the pop-up menu. Alternatively, you can also type <Ctrl>+<T> to open the online Threshold control dialog.



Real time channel status

The real-time status of the channels (horizontal axis) are displayed. The red marker indicates the current threshold. The bar indicates the amplitude of the current hits (if above threshold). The dimmed bar indicates the maximum amplitude of the last two seconds. Clicking on the bar selects the channel (see: Channel X (HW: address) group).

Settings

Channel

Select a channel to which the threshold setting shall be applied.

Thr: *X*; Max Peak: n/a

Select a new threshold from the drop down menu. Once selected the new threshold immediately applies to the measurement. If the acquisition is paused or stopped the new threshold settings are written to the PRIDB file. In VisualAE you can only track online threshold changes by using the THR attribute e.g. of the listing.

Apply to all channels

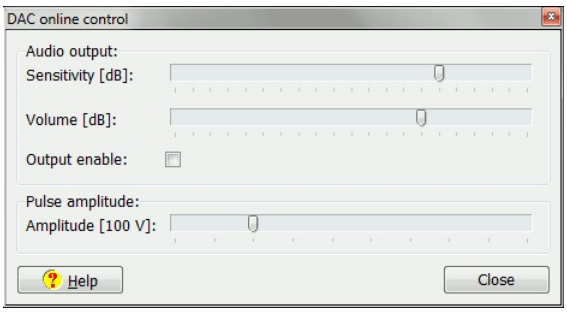
Push this button to apply the current threshold setting of active channel to all other channels as well.

Note: the new threshold value may be assigned to hits in FIFO memory that were acquired with different threshold setting. You will notice this especially in listings when a hit´s amplitude is less than the threshold setting. In this case the hit was measured with lower threshold and written to FIFO. Before the data is transferred to HDD the threshold has been changed and the new threshold value is attributed to the hit in the FIFO.

Title: Use-7: Online Threshold Control
Link: AESuite/Acq32/Use/Acq32_OnlineThresholdControl.htm

Online Audio & Pulser Control

The record control dialog of Acquisition contains a button called "Other". Clicking this button brings up a dialog in which one can select "Autio/Pulse Control" to open appropriate dialog. You can call this dialog by right click on the record control window and selecting "Audio/Pulser Control" from the pop-up menu. Alternatively, you can also type <Ctrl>+<A> to open the online Audio and Pulser control dialog.



Audio output

These settings govern the audio output settings

Sensitivity [dB]:

Threshold level the signal has to exceed in order to be put out at speaker. Move the slider to the right to increase sensitivity (decrease threshold)

Volume [dB]:

Sound volume of signal. Mover the slider to the right to increase sound volume

Output enable:

Check box to enable the audio output

Pulse amplitude

Amplitude [<voltage> V]

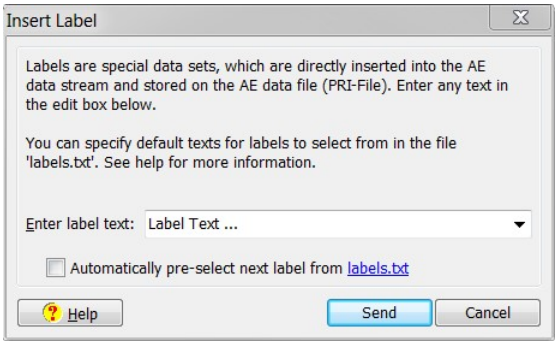
Slider that changes output amplitude of pulser. Move slider to the right to increase pulser amplitude. Current pulser amplitude is displayed in the brackets of slider title.

Title: Use-8: Online Pulser & Audio Control
Link: AESuite/Acq32/Use/Acq32_OnlineAudioAndPulserControl.htm

Acquisition Control, Inserting Labels

Labels are special data sets that are inserted into the data stream with a timestamp. Labels shall help organize data. They can be used for storing additional information during an AE-test and as start and stop criterion for playback of data in off-line and on-line analysis. Labels are inserted into the data stream when the **Send** button is selected.

A label can be generated and sent to Acquisition when it is in recording mode but not yet recording. In this case the label is in a "pending" state and will be stored to file after enabling recording. Only one label can be put into the queue, the last one overwriting the previous one. A label in the queue can be deleted by sending a blank/space to Acquisition as label.



Enter label text

Field for entering user specific labels. The text field contains also a drop down list which entries are read from a pre-defined labels.txt file.

Automatically pre-select next label from labels.txt

Check this box to select the next label in the labels.txt file. This is especially helpful when preparing labels for different steps of a test procedure and storing them into the labels.txt file

Send

Click this button to insert the label into the data stream. Generates a time stamp and a labels data set.

Customized Labels

Note: You can pre-define texts for labels, which are available by opening the combo box.

These texts are read from a text file "labels.txt" which is located in c:\vallen\amsy\labels.txt

These files have a generic text format without formatting and show one line per label text. The "#" indicates a comment line. Lines starting with "#" will be ignored and are not shown in the combo box and are not automatically selected.

Example:

User Label Text 1

Comment...

User Label Text 2

The number of label texts in the file is limited to 32000, but should be kept in a reasonable range for efficient usage.

The 'Labels.txt' file is created, if not already existing, when opening this dialog to send a label for the very first time. So it is not overwritten by the installation procedure when applying an update.

Title: Use-1: Acquisition Control: Inserting Labels
Link: AESuite/Acq32/Use/Acq32_UseInsertLabel.htm

Acquisition API

The Acquisition API provides an ActiveX interface to the controls of the Acquisition program. The Acquisition API is similar to acqcmd.exe command line tool. With the Acquisition API, the acquisition can be externally controlled using a dedicated API (application programming interface).

The API provides the same functionality as the acqcmd.exe tool via Dynamic Link Libraries (dll´s) and ActiveX access (both in one binary file - acqcmdapi.dll).

The functions of the API are grouped by functionality:

- All but two functions invoke a specific acquisition command (see the list and descriptions in the section External Control of Acquisition) and return a long integer (32 bit) which indicates whether the call was successful or not (one of the AcqCmdResult values)
- "AcqCmdLastErrorMsg" function is the only one which does not have a corresponding command. It returns a (wide) string describing the result of the last command. The string is statically allocated by the library, and is not valid between calls. It must be copied if needed for later use.
- "AcqCmdGetStatus" returns one of the AcqCmdStatus values.

DLL interface

The dll interface uses "stdcall" calling convention for all functions.

Listing of function signatures (Pascal style)

function AcqCmdLastErrorMsg: PWideChar; stdcall;

function AcqCmdGetStatus: Longint; stdcall;

function AcqCmdStartPulseSingleCycle: Longint; stdcall;

function AcqCmdStartPulseIterative: Longint; stdcall;

function AcqCmdStopPulsing: Longint; stdcall;

function AcqCmdSendLabel(const ALabelText : PWideChar): Longint; stdcall;

function AcqCmdRecord: Longint; stdcall;

function AcqCmdRecEnable(AEandTR: LongBool): Longint; stdcall;

function AcqCmdRecDisable(TROnly: LongBool): Longint; stdcall;

function AcqCmdPause: Longint; stdcall;

function AcqCmdClearPipe: Longint; stdcall;

function AcqCmdStop: Longint; stdcall;

function AcqCmdLoadAcq: Longint; stdcall;

function AcqCmdEraseData: Longint; stdcall;

function AcqCmdNewFile: Longint; stdcall;

function AcqCmdSetThreshold(AChannel: Longint; AThreshold : Single): Longint; stdcall;

function AcqCmdLoadFile(const AFile : PWideChar): Longint; stdcall;

function AcqCmdQuit: Longint; stdcall;

Note: the function AcqCmdLoadFile accepts only PRIDB files. In pervious versions of Vallen AE-Suite software it accepted VAC files. If an VAC file setup shall be used, then first convert it to PRIDB. Conversion of VAC to PRIDB can be done by opening Acquisition and creating a new acquisition file. Instead of initiating it with factory defaults choose "browse..." and select the according VAC file.

ActiveX interface

The ActiveX interface can be used in a programming environment / automation controller that supports the ActiveX interface.

It registers a type library containing a dual interface (both vtable interface for early binding and dispatch interface for late binding), and it implements the same functions as the dll interface above.

- type library name: "VallenAcqCmdAPI"
- automation server name: "AcqCommands"
- vtable interface name: "IAcqCommands"

The automation server can be instantiated by an automation controller using the ProgID "VallenAcqCmdAPI.AcqCommands".

ActiveX example

An example of how to use the ActiveX interface is available in an Excel tutorial file (file location: <path to Vallen directory>\API\AcqCmdAPI.xls). You can control the acquisition from within Excel by pushing buttons which control the acquisition in a very similar way to the acquisition program itself. To see it in action, start the acquisition program, load/create a setup then open the XLS file and use the buttons.

Commandline example

An example batch file can be found at <path to Vallen directory>\API\AcqCmd_autoStart.bat. The batch file illustrates an example of how to automatically start the Acquisition software from command line. The batch file can be used for example to start Acquisition automatically after powering up the PC. To do so simply copy the batch file to the Autostart folder of your Windows OS.

Title: API-1: Acquisition API
Link: AESuite/Acq32/API/Acq32_AcqCmdAPI.htm

External control of Acquisition: acqcmd.exe

The AcqCmd.exe lets you control the acquisition externally from the command line. For example, AcqCmd.exe can be invoked from batch files or as a scheduled task. It helps to simplify remote or automatic acquisition control.

The AcqCmd.exe is located at c:\vallen\api\

The command line tool provides a simplified and easy to use interface to the acquisition software. AcqCmd accepts two command line parameters, **[CMD]**, which is mandatory and **[PARAM]**, which is required for specific commands. Its usage is as follows from folder c:\vallen\api:

AcqCmd.exe [CMD] [PARAM]

For each command to be successfully executed, the acquisition software must be in a specific state. An overview is given in the table below (see column "Required state").

Commands are not case sensitive. Arguments that contain spaces must be quoted (e.g. "new label text").

The following commands, **[CMD]**, and parameters, **[PARAM]**,are available. For each command, the table also shows the required state (when the command can be performed) and the target state (after successful execution).

Additionally, there is also an Application Programming Interface of Acquisition (dll and ActiveX) which exposes most commands as standalone functions.

AcqCmd.exe Command Parameters	Required State	Resulting State	Description
GetStatus	any	-	Returns the status of the acquisition software
StatusTest	any	-	Continuously report acquisition status; Terminate this mode with <Ctrl>+<c>
NewFile	ready	ready	Create new acquisition. new filename is same as old one with increasing number added to filename: filename.PRIDB changed to filename(2).PRIDB.
LoadFile [path-to-vac-file]	undefined / ready	ready	loads an already existing acquisition setup. Data is appended to existing PRIDB-file

GotoAcquisition	ready	suspended	Go to data acquisition
Record	suspended	running	start recording
SetThreshold [channel] [THR]	running / pulsing	running / pulsing	changes the threshold of specified channel. If channel parameter is set to 0 threshold of all active channels is changed.
RecDisableTR	running / pulsing	running / pulsing	disables transient recording
RecDisableAETR	running / pulsing	running / pulsing	disables AE- and transient recording. Time counter continues
RecEnableAE	running / pulsing	running / pulsing	enables AE-recording only
RecEnableAETR	running / pulsing	running / pulsing	enables AE- and transient recording
StartPulsingCycle	running	pulsing	start pulsing, single cycle
StartPulsingIterative	running	pulsing	start pulsing, iterative cylcles
StopPulsing	pulsing	running	stop pulsing
SendLabel [label text]	running	running	Insert text with up to 22 characters as label. Be sure to enclose the text with quotation marks if it includes spaces/blanks.
Pause	running / pulsing	suspended	pause acquisition. Time counter does not continue
ClearPipe	downloading	suspended	Clear the AE/TR pipe (after pausing, if downloading)
Stop	suspended	ready	stop acquisition
Erase	suspended	suspended	Erase all data from current file
Sleep [time]	any	-	Short sleep (delay) of t milliseconds
RandomSleep [min max]	any	-	Short random sleep in the range of min milliseconds to max milliseconds
Quit	undefined, ready		close acquisition
Help	any		call online help

Note: AcqCmd.exe accepts PRIDB files only. Previous versions R20012.0509.4 and older accepted VAC files only. This is important for command line parameter "LoadFile"!

Hint: use the SetThreshold command when Acquisition software is running and AE-data recording is enabled (on chassis). In corner case of Acquisition software running, AE-data recording disabled and no data in PRIDB-file (is the case when AE-data recording is disabled prior to starting Acquisition recording of a new file), SetThreshold command is executed but has only effect after AE-data recording is enabled for the very first time.

Command Parameter	API function name
GetStatus	AcqCmdGetStatus
StatusTest	n/a
NewFile	AcqCmdNewFile
LoadFile	AcqCmdLoadFile
GotoAcquisition	AcqCmdLoadAcq
Record	AcqCmdRecord
SetThreshold	AcqCmdSetThreshold
RecDisableTR	AcqCmdRecDisable(TRUE)
RecDisableAETR	AcqCmdRecDisable(FALSE)
RecEnableAE	AcqCmdRecEnable(FALSE)
RecEnableAETR	AcqCmdRecEnable(TRUE)
StartPulsingCycle	AcqCmdStartPulseSingleCycle
StartPulsingIterative	AcqCmdStartPulseIterative
StopPulsing	AcqCmdStopPulsing
SendLabel	AcqCmdSendLabel
Pause	AcqCmdPause
ClearPipe	AcqCmdClearPipe
Stop	AcqCmdStop
Erase YES	AcqCmdEraseData
Sleep	n/a
RandomSleep	n/a
Quit	AcqCmdQuit
Help	

Please note that all commands (acqcmd.exe execution or API function) are defined as synchronous (the target state is reached). However, the internal implementation uses a time-out of 5 seconds; if the invoked command is not finished, the return value is AcqCmdResult_Timeout (see list of results in the next table). While most of the commands should finish within this time, it can happen that some commands (specifically "GotoAcquisition" and "Record") might need a lot more (6-7s to more than 20s) to finish, depending on several factors like number of channels, size of data file to allocate. In this case, the calling application (or script) must check / wait for the command to complete by polling the acquisition status before starting a new command (otherwise it can be rejected).

Two example batch files are provided in C:\Vallen\api\:

Sample 1: acqcmd_Sample.bat

This example shows how to basically use AcqCmd to go to data acquisition and to change recording from one file to another.

Sample 2: acqcmd_AutoStart.bat:

This sample shows how to start the acquisition program from command line, how to go to acquisition, how to start recording and how to enter a label. This batch file can be used to automatically start the data recording on a certain trigger, if the acquisition program was not running already.

With the new AcqCmd.exe, the older CmdAutoCal utility is obsolete. It is still kept for compatibility reasons but should be replaced, since its maintenance was stopped with release (R2007.0907). CmdAutoCal can be easily replaced with

AcqCmd.exe StartPulsingCycle

The program outputs the result of the issued command to the console for user feedback. Additionally the program exit code is also set, in order it can be used in simple batch files (see included example).

The following exit codes/ results are defined (including ActiveX constant names):

Constant name	Value / exit code	Description
AcqCmdResult: results from acquisition commands:		
AcqCmdResult_OK	1	Command successfully executed
AcqCmdResult_InvalidCmd	-1	Invalid or unknown command
AcqCmdResult_NotRunning	-2	Acquisition software not running
AcqCmdResult_InvalidState	-3	Command rejected (invalid status)
AcqCmdResult_CommandFailed	-4	Command failed
AcqCmdResult_ParamMissing	-5	Required parameter missing
AcqCmdResult_InvalidFile	-6	Acquisition setup not valid (or missing)
AcqCmdResult_NewFileFailed	-7	Switching to new data file failed
AcqCmdResult_Timeout	-8	Acquisition did not reply to the last command
AcqCmdStatus: results of "GetStatus" command (acquisition status)		
AcqCmdStatus_stUndefined	1000	Undefined: Program started, but hardware configuration not completed or VAC file not loaded.
AcqCmdStatus_stReady	1001	Ready: VAC file loaded -> can go to data acquisition.
AcqCmdStatus_stSuspended	1002	Suspended: acquisition can be started.
AcqCmdStatus_stPreparing	1003	Preparing: temporary state when starting recording; preparing hardware parameters.
AcqCmdStatus_stStarting	1004	Starting: temporary state when starting recording; hardware ready, starting recording.
AcqCmdStatus_stRunning	1005	Running: data acquisition running.
AcqCmdStatus_stPulsing	1006	Pulsing: pulsing started.
AcqCmdStatus_stDownloading	1007	Downloading: after pause, this state is active as long as the program is downloading buffered data. This can take quite some time, especially for TR data (AE buffers are relatively small). Use "ClearPipe" if you want to discard buffered data.
AcqCmdStatus_stTerminating	1008	Terminating: temporary state when acquisition is closing (after "Stop").

Use this tool for e.g. scheduled pulsing.

Title: ACQCmd-1: ACQCmd
Link: AESuite/Acq32/API/Acq32_AcqCmd.htm

Scheduled Pulsing

Since May 2006 it is possible to run pulsing at predefined times and/or intervals (CmdAutoCal). Since September 2008 this command line tool has been replaced with **AcqCmd.** Scheduled pulsing is useful for:

a. Long term monitoring (e.g. to have a pulsing run every day) to proof that sensor coupling didn't change.

b. Acousto-ultrasonic applications where you -want to monitor changes in attenuation and/or speed of sound.

There is a **AcqCmd** utility included, that triggers Acquisition to perform a pulsing run according to the defined settings. Use the "Scheduled Tasks" feature offered by Windows to run the utility at the times and/or intervals you want the pulsing to start.

Attention: as of Release R2008.0828 use AcqCmd.exe instead of **CmdAutoCal**. This utility will not be maintained in future releases. **AcqCmd** offers greater flexibility and possibilities.

Step by Step set up of scheduled pulsing:

1. Define the desired settings for the Pulser in the Acquisition Parameter Setup.
2. To open Scheduled Tasks: click Start, click All Programs, point to Accessories, point to System Tools, and then click Scheduled Tasks.
   For more info about how to define Scheduled Tasks see either the Windows help or the knowledge base article ID-No. 308569 on Microsoft Support (http://support.microsoft.com/kb/308569/en-us).
3. Set Scheduled Tasks to launch C:\vallen\AMSY\AcqCmd.exe StartPulsingCycle at the desired times/intervals (you can have several entries in Scheduled Tasks).
4. Start AE data acquisition by clicking "Record" and make sure the Pulsing Type is set to "SingleCycle"
5. Now the pulsing-run is started at the times/intervals specified in "Scheduled Tasks".

Important Note: When opening Scheduled Tasks during data acquisition you are likely to get a Warning and/or Alarm because the PC is not responding for more than 3 to 5 seconds while the list of available programs is put together.

Solution: Set up scheduled tasks BEFORE starting data acquisition.

Title: ACQCmd-2: Scheduled Pulsing
Link: AESuite/Acq32/API/Acq32_CmdAutoCal.htm

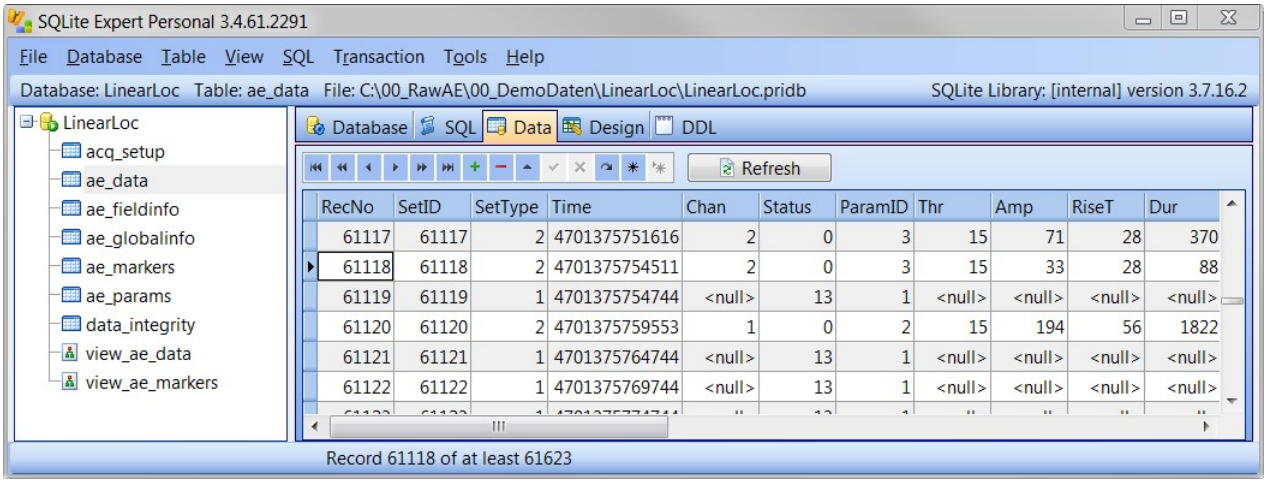
Primary data file (PRIDB)

Primary data files store acoustic emission (AE) feature data. AE-feature data consists of a set of AE-features. AE-features are a set of measurement values that are suitable in describing the detected burst signal. Most prominent AE-features are burst signal peak amplitude, burst signal energy, burst signal duration, ring down counts and burst signal risetime.

A burst signal that exceeds the detection threshold is designated a hit since it triggers the feature extraction process. As a result the burst signal is measured and a set of AE-features are generated. An AE-feature data set can be efficiently stored because it is small in size and of fixed length no matter the duration of the burst signal transient.

AE-feature data is stored to a file with extension PRIDB which is the abbreviation for PRImary data Data Base. The PRIDB file format is based on and compatible to SQLite3 specification. Therefore any program or application that supports SQLite3 standard can access data from PRIDB file.

Attention:
Do not manipulate PRIDB data file. Any changes to file compromise integrity and can be detected!
While any program that supports SQLite3 can read data, they can also write, overwrite or delete data from file. Data file integrity can be checked any time and will make any external changes evident!



Screenshot of SQLite Export Personal edition SQLite3 viewer with an PRIDB file loaded and displayed. Currently table ae_data is displayed

Structure of PRIDB file

Currently a PRIDB file consists of 7 tables: acq_setup, ae_data, ae_fieldinfo, ae_globalinfo, ae_markers, ae_params and data_integrity; and 2 views: view_ae_data, view_ae_markers.

Hint: It is recommended to work with views when extracting data from the database, because for views measurement values are converted to correct engineering units.

acq_setup

Table that contains the acquisition setup parameters. This data was formerly stored to an extra data file with extension VAC. Data is stored encrypted.

ae_data

Table that contains measurement data, i.e. the AE-features.

Attention:
Measurement data is not stored in engineering units! E.g. time (arrival time, duration, risetime) is stored in ticks and amplitude, energy is stored in ADC steps.

ae_fieldinfo

Table that contains a lists of the fields (=columns) used in the table ae_data. Units and conversion factors are stored with every field name

ae_globalinfo

Table that stores file information valid for the whole file, e.g. time base information (sample frequency), version number, number of data sets, etc.

ae_markers

Table that stores the text of labels and technical information such as the time stamp of a recording

ae_params

Table that contains the conversion factors for parametric inputs for each section of a recording/data acquisition

data_integrity

Table that contains information that is used for checking integrity of data.

view_ae_data

A view that contains the data of table ae_data but converted to engineering units (e.g. time to seconds, burst signal peak amplitude to mV, energy to [eu], etc.)

view_ae_markers

A view that contains the data of table ae_markers and additionally the time stamps of markers (i.e. labels).

Title: ACQFiles-2: Primary data file (PRIDB)
Link: AESuite/Acq32/AcquisitionFiles/ACQFiles-2__Primary_data_file_(PRIDB).htm

Extracting data from PRIDB

PRIDB

After opening a connection to PRIDB file by the use of an SQLite API, one can execute SQL commands. For example getting the data of a certain row is done the following way

SELECT * FROM view_ae_data WHERE SetID = *n*

Having a look at the SQL statement: **SELECT**, *, **FROM** and **WHERE** are keywords of SQL. The interested reader is referred to reference manuals of SQL or the published documents of ISO, IEC or ANSI. SQLite documentation can be found at www.sqlite.org.

view_ae_data is a view (i.e. a virtual table) that contains AE-feature data converted into engineering units.

SetID is a column name of **view_ae_data**. It is a unique index. Every data set gets a unique **SetID** .

n is the representation of a number identifying the data set that a user wants to extract.

This SQL statement returns following fields as result

SetID

unique ID of each data set

SetType

an identifier for the type of dataset.

SetType = 0: no AE-data

SetType = 1: parametric data set

SetType = 2: hit data set

SetType = 3: status data set

SetType = 4: a label

SetType = 5: datetime data set, as it is inserted whenever recording is started by software

SetType = 6: a section start marker. E.g. new sections are introduced, whenever acquisition settings are changed.

Time

time in seconds of occurrence of data set. In case of hit data this field stores the arrival time, i.e. the time of occurrence of the first threshold crossing. It starts with 0 in the first section, when Acquisition is started.

CHAN

in case of hit data this refers to the channel in which a hit occurred. For other set types this field is {null}

Status

contains an undocumented value that is not used in VisualAE or any other analysis routine of the Vallen AE-Suite software

THR

in a hit data set this contains the actual threshold

AMP

In a hit data set this contains the burst signal peak amplitude

RiseT

In a hit data set this contains the burst signal's rise time

Dur

In a hit data set this contains the duration of a burst signal

Eny

in a hit data set this contains the burst signal energy in units of eu

SS

in a hit data set this contains the signal strength of an burst signal in units of ssu

RMS

in a hit data set this contains the RMS of noise that was measured before the first threshold crossing

Counts

in a hit data set this contains the number of positive threshold crossings

TRAI

in a hit data set this contains the transient record index that associates a transient with a certain hit.

CCNT

in a hit data set this field contains the counts of the whole hit cascade

CENY

in a hit data set this field contains the energy of all burst signals in a hit cascade

CSS

in a hit data set this field contains the signal strength of all burst signals in a hit cascade

Chits

in a hit data set this field contains the total number of burst signals in a hit cascade

PCTD

this field is NULL in a hit data set. In a parametric data set it contains the value of the digital parametric counter

PAx

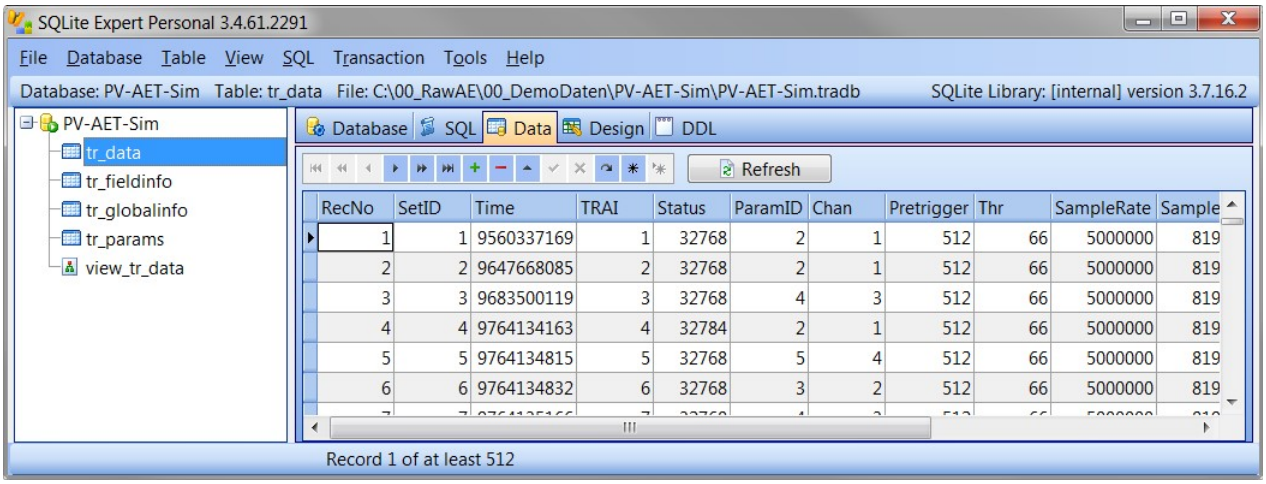
whereby "x" is the identifier for a parametric channel. These fields are NULL in a hit data set. In a parametric data set they contain the measured value in mV of the x-th parametric channel.

Title: ACQFiles-3: Extracting data from PRIDB
Link: AESuite/Acq32/AcquisitionFiles/ACQ32_DBStructureOfViews.htm

Transient data file (TRADB)

The sampled signal of a hit can be stored to a so called transient data file. File extension of a transient data file is TRADB. The TRADB file format is based on and compatible to SQLite3 specification. Therefore any program or application that supports SQLite3 standard can access data from TRADB file.

Attention:
Do not manipulate TRADB data file. Any changes to file compromise integrity and can be detected!
While any program that supports SQLite3 can read data, they can also write, overwrite or delete data from file. Data file integrity can be checked any time and will make any external changes evident!



Screenshot of SQLite Export Personal edition SQLite3 viewer with an PRIDB file loaded and displayed. Currently table ae_data is displayed

Structure of TRADB file

Currently a TRADB file consists of 4 tables: tr_data, tr_fieldinfo, tr_globalinfo and tr_params; and 1 view: view_tr_data.

Hint: It is recommended to work with views when extracting data from the database, because for views measurement values are converted to correct engineering units.

tr_data

Table that contains the samples signal as a BLOB in a field called Data.

Attention:
Measurement data is not stored in engineering units! E.g. time (arrival time) is stored in ticks and amplitude is stored as BLOB in ADC steps.

tr_fieldinfo

Table that contains a lists of the fields (=columns) used in the table tr_data. Units and conversion factors are stored with every field name

tr_globalinfo

Table that stores file information valid for the whole file, e.g. time base information (sample frequency), version number, number of data sets, etc.

tr_params

Table that contains the conversion factors for converting ADC steps into Volt for each section of a recording/data acquisition

view_tr_data

A view that contains the data of table tr_data but converted to engineering units (e.g. time to seconds, samples to mV)

Title: ACQFiles-4: transient data file (TRADB)
Link: AESuite/Acq32/AcquisitionFiles/ACQFiles-4__transient_data_file_(TRADB).htm

Extracting data from TRADB

TRADB

After opening a connection to TRADB file by the use of an SQLite API, one can execute SQL commands. For example getting the data of a certain row is done the following way

SELECT * FROM view_tr_data WHERE TRAI = **n**

view_tr_data is a view (i.e. a virtual table) that contains TR-data.

TRAI is a column name of view_ae_data. It is a unique index. Every transient gets a unique TRAI.

n is the representation of a number identifying the transient that a user wants to extract.

This SQL statement returns following fields as result

SetID

id of a transient data set

Time

arrival time of the transient, i.e. the time of occurrence of the first threshold crossing

TRAI

transient record index, linking the transient to a specific AE-feature data set

Status

contains an undocumented value that is not used in VisualAE or VisualTR or any other analysis routine of the Vallen AE-Suite software

CHAN

number of the channel that recorded the transient

Pretrigger

number of pretrigger samples

THR

detection threshold that was used

SampleRate

sample rate in Hz

Samples

number of samples of the transient record page

DataFormat

not used. a future implementation will use this as a flag for un-/compressed data in the Data field.

Data

contains the waveform as a BLOB object

Title: ACQFiles-5: Extracting data from TRADB
Link: AESuite/Acq32/AcquisitionFiles/ACQFiles-5__Extracting_data_from_TRADB.htm

Accessing data from other applications

Any program or application that supports SQLite3 can access data from PRIDB and TRADB files. What follows is a short overview of how this can be achieved in different development environments.

The basic steps of interacting with a database are

1. establishing a connection to the database

2. send a query to the database

3. retrieve data

4. close the connection to the database

MATLAB

MATLAB is a registered trademark of The MathWorks with HQ in Natick, MA (USA)

In order to access data in SQLite3 database a module called mksqlite is required. mksqlite is an open source project to implement an interface between MATLAB and SQLite. The module can be downloaded from the berliOS.de homepage at developer.berlios.de/projects/mksqlite/. A binary file for Windows platforms and the source code is available there.

The webpage offers a description of how to use mksqlite. A short introduction is given below

Usage of mksqlite

establishing a connection to the database:

dbid = mksqlite(0, 'open', 'databasefile')

sending a query to the database:

res = mksqlite(dbid, 'SQL statement')

closing a connection to the database

mksqlite(dbid, 'close')

Converting a BLOB

establish a connection to the database:

dbid = mksqlite(0, 'open', 'databasefile')

send a query and retrieve data

sqlquery = "Select Data, TR_mV, SampleRate FROM view_tr_data WHERE TRAI=1"

res = mksqlite(dbid, sqlquery)

Convert the BLOB into a type single

vecSamples = **single**(typecast(res.Data,'**int16**'))

finally convert data into engineering units

vecTR = vecSamples * res.TR_mV

vecT = (1: **length**(vecTR))/res.SampleRate

plot(vecT,vecTR)

R (GNU S)

R is 'GNU S', a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. For more information see http://cran.r-project.org/.

Two packages are required in order that R can interact with SQLite3 databases: DBI and RSQLite. Both packages are available from the R-project homepage at cran.r-project.org. Manuals for usage are available at the website.

Usage

establishing a connection to the database:

con <- dbConnect(dbDriver("SQLite"), dbname="databasefile")

sending a query to the database:

row <- dbGetQuery(con,"SQL statement")

row is a list object

Converting a BLOB

How a BLOB is converted in R is demonstrated in the following example.

Establish a connection to the database:

```
con <- dbConnect(dbDriver("SQLite"), dbname="database file")
```

sending a query to database and retrieve information

```
sqlquery <- "Select Data, TR_mV, SampleRate FROM view_tr_data WHERE TRAI=1"
result <- dbGetQuery(con,sqlquery)
```

result is a list object containing the data of samples as BLOB, sample conversion factor and sample rate.

```
lstBLOB <- result[1]          # the BLOB representation of samples as a list
mVconversion <- result[2]     # the mV conversion factor as numeric
tconversion <- result[3]      # the samples to time conversion as numeric
```

Next step requires to convert the list object lstBLOB into an array

```
arrBinary <- unlist(lstBLOB)
```

and then converting the array of binary values into integer values

```
vecSamples <- readBin(arrBinary, "int", n = length(arrBinary), size = 2, signed = "TRUE", endian = .Platform$endian)
```

Finally converting into engineering units is done as follows

```
vecTR <- vecSamples * mVconversion
vecT <- (1:length(vecTR))/tconversion
plot(vecT,vecTR)                  # plots waveform
```

Python

Python is usually shipped with SQLite support. So there is no need to import or install a package. Additionally numpy and matplotlib are needed. Please download windows installers from SciPy.org website.

Note: Python 2.7 comes with an sqlite3.dll (version 3.6.x) that cannot read tradb files. SQLite version 3.7.1 or newer is required.

As a workaround replace the sqlite3.dll in c:\Pyhton27\DLLs with a newer one (e.g. from c:\Vallen\bin)

Usage

establishing a connection to the database:

```
import sqlite3
conn = sqlite3.connect("databasefilename")
```

sending a query to the database:

```
cur = conn.execute("SQL statement")
```

retrieving data

```
row = cur.fetchone()
```

row is a Python list object

Converting a BLOB

It is recommended to install - and this example uses - package NumPy. NumPy is needed for vector multiplication, i.e. multiplication of sample vector with conversion factor to deliver results in engineering units.

First retrieve data from the database:

```
result= conn.execute("Select Data, TR_mV, SampleRate FROM view_tr_data WHERE TRAI=1").fetchone()
```

result is a list object. Instead of using fetchone(), one could also use fetchall(), but in this case data is a nested list object.

Now, convert BLOB into a vector of values representing the samples of the waveform:

```
import array
import numpy
import matplotlib.pyplot as grafix

vecSamples = array.array('h',bytes(result[0]))
vecTR = numpy.multiply(samples,result[1])      # converts samples in mV
vecT = numpy.arange(len(vecTR ))               # create a vector for time axis
```

```
vecT = numpy.multiply(vecT,1/result[2])        # convert to timescale
```

Finally, to check that everything has been done correct, plot data:

```
grafix.plot(vecT,vecTR)                    # create plot
grafix.show()                          # display plot
```

LabVIEW

The National Instruments website provides a download of a library which enables access of SQLite3 data bases. The library is from Dr. James Powell. The download link is http://sine.ni.com/nips/cds/view/p/lang/de/nid/212894. Practical examples are given. Since LabVIEW VI's are built around graphical elements, code snippets cannot be presented here.

Scilab

Currently no support in Scilab for SQLite3 database

Octave

Currently no support for SQLite3 database

Title: ACQFiles-6: External Access
Link: AESuite/Acq32/AcquisitionFiles/ACQFiles-6__External_Access.htm

XTR

Purpose

Provides an ActiveX interface that can be used by other Windows applications to access TR data.

XTR

ActiveX (COM) Interface to read TRA-files and write feature files (.TRFDB): lets one write programs in any 32-bit Windows supported programming language (e.g. C, Delphi, VisualBasic, EXCEL...) that read TR-data, extract special features and write those to a feature file that can be read and processed by VisualAE (a fully documented Excel sample is included as macro for quick start). The extracted features can be used in listings, graphs, and filters.

Vxaebas.ocx

The programming interface based on ActiveX for reading and writing to TRADB files.

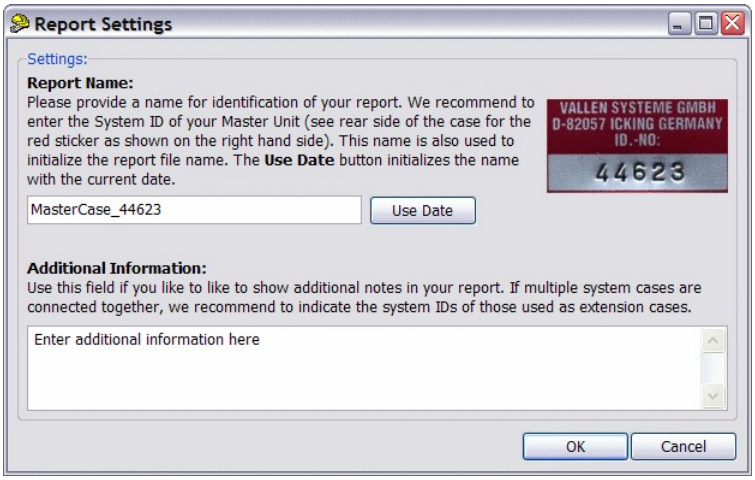
Hint: You can find a documentation (pdf-file) and the Vxaebas.ocx in c:\vallen\api.

Title: XTR-1: XTR-Utility
Link: AESuite/Acq32/AcquisitionFiles/TR-XTR.htm

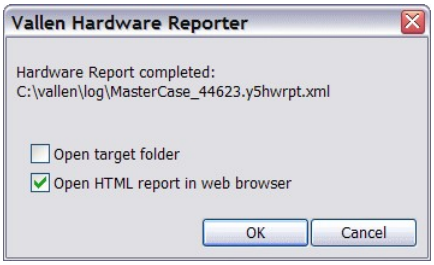
Hardware Reporter

This tool creates a detailed hardware report in HTML format for all channel boards (ASIP-2 / ASIPP) and is completely self explaining. See the screen shots below. On start up the program pops up as follows and asks you to run either in online or offline mode. To start operation click on one of the two blue hyperlink lines:

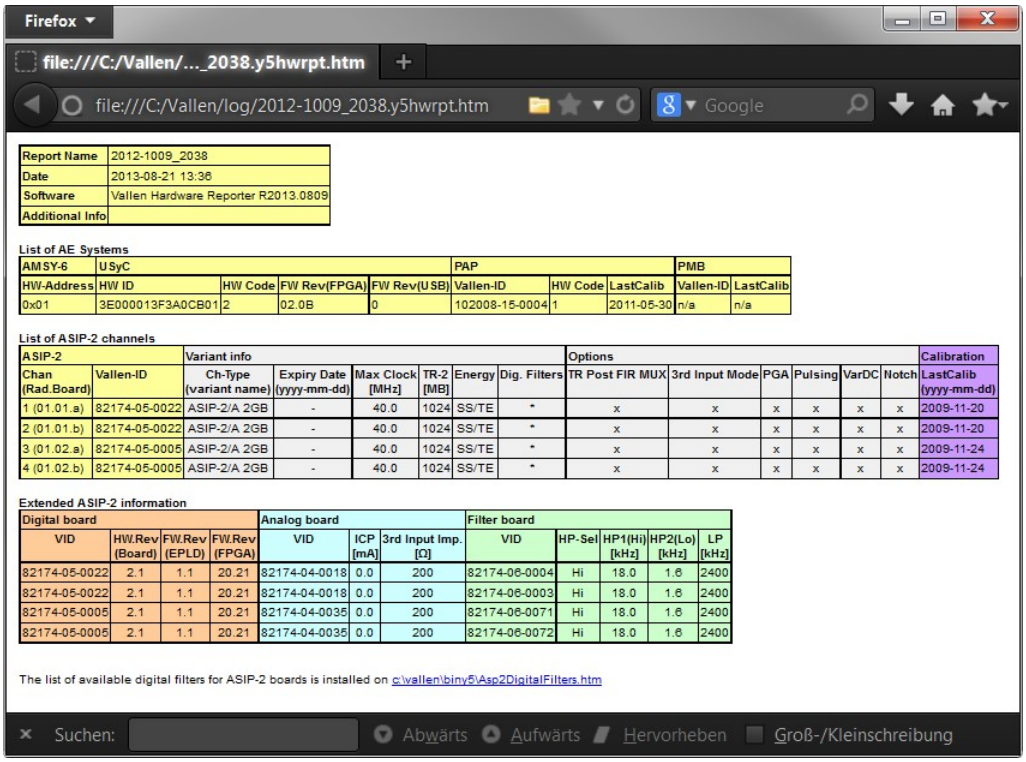
In online mode the program runs a hardware detection automatically. In offline mode a XML file containing information of a previous hardware report has to be provided. Enter requested information into the dialog below.



When the report has been completed, you are asked if you want to show the target folder in the Windows Explorer where the report has been created in. Additionally the report can be opened in the web browser, which is currently assigned to HTML files by the operating system.



Press OK and your default web browser is opened and should look as follows:



Use your web browser to examine the report. The Hardware reporter has been tested with Internet Explorer and Mozilla Firefox. Both browsers support to increase the font size for better reading. Both browsers also have a good printer support.

Note: By default the background colors are not printed. If you need support on how to get the colors printed, please read here for more information.

The Report

The report consists of three tables which are explained below:

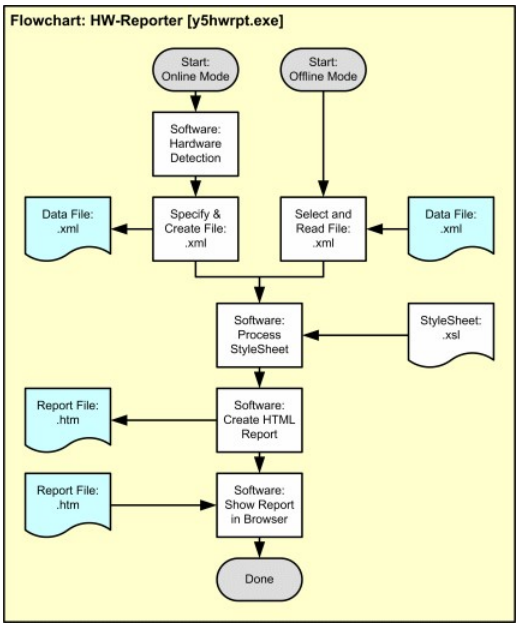
Info Table

Report Name	Text field to be edited by the user (limited to 100 characters), we recommend to write the system ID into this field. If multiple system cases are connected together, we recommend to indicate the one configured as master (by the orange switch on the rear).

	This field also gives the default output file names (HTML and XML).
Date	The date when the report was generated in online mode (format: yyyy-mm-dd hh:mm); it is not changed when the HTML output is recreated in offline mode.
Software	Software name and version used to create this report.
Additional Info	Text field to be edited by the user. If multiple system cases are connected together we recommend to indicate the system IDs of those used as extension cases.
ASIP-2 Table	
Chan (Rad.Board)	Channel identification, both logical number and hardware address. e.g. the ASIP-2 board No. 3 in the master unit: 5 (01.03.a) and 6 (01.03.b), where a. 5/6 are the logical channel numbers (decimal) b. 01 denotes the address of the master unit (defined by the orange switch on the rear ? hexadecimal) c. 03 denotes the board No. 3 (by dip switch on the board ? hexadecimal) d. a/b indicate the upper/lower channel respectively.
Vallen-ID	Unique ID number of the board (10 or 11 digits); as there are 2 channels per board the same number will appear for both channels of a board. See notes below.
Ch-Type (variant name)	Name indicating the board variant (e.g. 'ASIP-2/S w/o TR' or 'ASIP-2/A 512MB' or similar).
Expiry Date (yyyy-mm-dd)	If a date is given the board will stop working at this date. If no date is specified there is no time limit for this board.
Max Clock [MHz]	Maximum sample rate for this board (e.g. 10MHz for ASIP-2/S and 40MHz for ASIP-2/A).
TR-2 [MB]	Size of the TR-buffer per channel (in MB). With option TR-2/512MB, the buffer size per channel is 256MB.
Energy	SS: Signal Strength only SS/TE: User can select either Signal Strength or True Energy See details here.
Opt. 3rd Input Mode	'x' indicates that the 3rd Input Mode is available. The 3rd Input Mode is by default 200Ohm @ DC, other impedance on request.
Opt. PGA	'x' indicates that option PGA (= Programmable Gain Amplifier) is available. The user can select from three programmable input ranges: ▪ 10Vpp (gain x1) ▪ 5Vpp (gain x2) ▪ 2.5Vpp (gain x4) Note: 10Vpp is available also without option PGA.
Opt. AutoCal	'x' indicates that the pulser is available.
Opt. VarDC	'x' indicates that the user adjustable DC voltage supply is available (range: 8 - 28V).
Opt. Notch	'x' indicates that the notch filter (band rejection) is available.
Opt. ModalAE Filter	'x' indicates that the ModalAE Filter option is available. It allows for using a more narrow frequency range for threshold detection than for signal recording.
Dig.-Filters	List of enabled digital filters. Each number indicates a specific filter (see list below), an asterisk (*) indicates that all available filters are enabled.
LastCalib (yyyy-mm-dd)	The date when the last calibration of that board was performed.
HW.Rev(Board)	Hardware revision of the ASIP-2 board.
FW.Rev(EPLD)	Firmware revision of the EPLD (chip).
FW.Rev(FPGA)	Firmware revision of the FPGA (chip).
ICP [mA]	If > 0, then channel is equipped with modified hardware to drive ICP sensors with the constant DC current given.
3rd Input Imp. [O]	Shows the value of the input impedance of the 3rd input mode (default 200 Ohm). 0 if ICP installed.
HP-Sel	Indicates the (switch-) selected analog high-pass filter (Hi or Lo)
HP1(Hi) [kHz]	Gives the corner frequency of the analog high-pass Hi (normal: 18kHz).
HP2(Lo) [kHz]	Gives the corner frequency of the analog high-pass Lo (normal: 1.6kHz).
LP [kHz]	Gives the corner frequency of the analog low-pass.
ASIPP Table	
Chan	Channel number.
Rev(EPLD)	Firmware revision of the EPLD (chip)
Rev(FPGA)	Firmware revision of the FPGA (chip)
TR-4M	Indicates (Y/N) if the TR-4M module is installed.
Energy	SS or SS/TE, indicates if the squarer chip is installed for true energy calculation.

Detailed information

For a better understanding the online/offline and file handling operation, the following flow chart is included to provide some in-depth information:



VID format

There are two different VID formats existing!

The Vallen HW-Reporter can return one or both of the following two formats:

Format a): 10 digit VID, single line on small sticker on the ASIP-2 board. In this case the VID given by the HW-Reporter in column "Vallen-ID" is identical to the one written on the sticker:

Format b): 11 digit VID, in TWO lines on small sticker on the ASIP-2 board. In this case the VID given by the HW-Reporter is composed as in the following example:

HW-Reporter shows in column "Vallen-ID": 70720-01-0011 (three parts xxxxx-yy-zzzz, separated by hyphen '-')

Where:

xxxxx: these are the first five digits of the lower line
yy: the last digit of the lower line is converted into a two digit number by placing a '0' before the digit itself
zzzz: this part is the upper line WITHOUT the first digit (leaving only the last 4 digits)

Title: Tools-3: Hardware Reporter
Link: AESuite/Acq32/Tools/Acq32_y5hwrpt.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Vallen Sensor Tester (VST) > Overview

Vallen Sensor Tester Overview (VST)

The Vallen Sensor Tester (VST) is designed to test and record the sensor's frequency response from face-to-face calibration for the purpose of periodic comparison of AE sensors.

Note: The term PC is used to refer to the build-in PC for AMSY4 systems or to the standalone PC for AMSY-6/-5 systems.

Steps for Producing a Sensor Test Curve:

Step 1: Configure the instruments. For more information see Function Generator Cabling and Setup.

Step 2: For more information see the section VST Software setup.

Step 3: Run sensor test.

Step 4: For more information see the section VST Context menu

Step 5: Print and/or export Results.

Description of Main Menu Commands:

File/Open Setup

Opens a setup file for the VST. A setup file contains the correct axis settings (frequency - and sensitivity range) and Y-offset. A setup file is chosen from a list of predefined setups.

File/Save Setup

Saves the current setup by overwriting the old setup parameters

File/Save Setup as...

Saves the current setup into a new setup file.

File/Import data...

Imports data from a previous sensor test. Imported data will delete current data that is displayed

File/Export data...

Saves the data from a sensor test to file.

File/Import overlay curve...

Imports data from a sensor test as an overlay. Overlays are resident and not deleted if new data is imported or measured. Any number of curves can be overlaid.

File/Clear all overlay curves

Deletes all overlay curves

File/Print...

Prints current diagram

File/Show log file

Opens a dialog in which the log file is shown.

File/Exit

Exits the VST and closes the application.

Edit/Function Generator...

Searches for a function generator and tries to connect to it

Edit/Hardware detection...

Starts a hardware detection

Edit/Start Sensor Test or -/Stop Sensor Test

Starts or stops the VST

Edit/Setup

Calls the setup menu (see VST Setup for more information) which controls the calibration data.

Edit/Show diagram legend

Toggles the diagram legend on and off.

Edit/Diagram Comment...

Opens the dialog to edit the diagram comment.

Edit/Copy to clipboard

Exports the data in the diagram to the clipboard.

Edit/Auto sequence...

Enters a semi-automated mode for testing several sensors. See VST Auto Sequence mode for more information.

Edit/Batch Print...

Print out in a batch mode

Context Menu

By clicking on the right mouse button on the calibration field, a context menu appears. This menu can

1. Call the comment dialog,
2. Choose to show each data point as a circle and
3. Choose to remove the zoom on the diagram.

Title: VST-1: Vallen Sensor Tester (VST): Overview
Link: AESuite/Acq32/VST/VST_Overview.htm

Function Generator Cabling and Setup

Note: before sensor test, all components must be correctly configured!

Components Required

- AMYS4 or AMSY-6/-5
- ASIP-2 or ASIPP with broad band filters: TP4-2.00 and HP4-003 (HP-dummy -- Vallen-System part designation for no high pass filter effectively 3 kHz high pass)
- VSTHP: sensor tester function generator (Hewlett Packard HP33220A or Agilent 33220A function generator)
- Interface cable (usually USB) from PC to function generator VSTHP
- for sensors without integrated preamplifier: AEP4 preamplifier
- Signal emitter: usually a wideband ultrasonic transducer, e.g. V103, V101
- 50 Ohm BNC-terminator with T-piece

Cables

- function generator to signal emitter cable, usually BNC to Microdot
- sensor under test to preamplifier cable, usually BNC to Microdot
- preamplifier to AMYS4/AMSY-6/-5 cable (BNC to BNC)
- USB or network cable for interfacing function generator to PC

Sensor Holder

- Optional: sensor mounting stand for face-to-face calibration

Instrument and Measurement Chain Configuration

- Connect the PC with either USB or network cable to function generator.
- Connect function generator output (BNC at front panel), BNC-T-piece plus 50 Ohm terminator, and signal emitter.
- Set up signal emitter and sensor-under-test face-to-face. Make sure that they are in good acoustic contact and use coupling agent (e.g. thin layer light machine oil).
- Connect sensor-under-test via preamplifier (if it is a sensor without integrated preamplifier) to the AMYS4/AMSY-6/-5 as usual.

Note: If you connect the function generator over network to PC please get IP address first. See Connectivity Guide, a PDF document on the driver CD of your function generator, on how to setup network. See Remote Connection Setup also for more information.

Title: VST-2: Vallen Sensor Tester (VST): Cabling and Setup
Link: AESuite/Acq32/VST/VST_FuncGenSetup.htm

Remote Connection Setup

The following Agilent or HP function generators are supported by Vallen Sensor Tester:

- Agilent 33120A
- Agilent 33220A
- HP: HP33120A
- HP: HP33220A

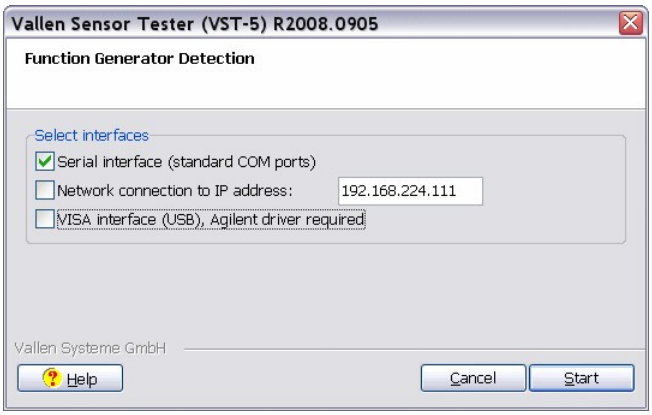
Currently there are 3 ways for VST to access hardware instruments (HP/Agilent function generators):

- Serial ports (No drivers required)
- LAN interface (No drivers, but TCP/IP connection and known IP address required)
- USB (Agilent VISA drivers required)

Note: Not all interfaces are available on all instruments.

The serial and LAN interface require no special driver. The USB interface is currently only available by using the VISA (VISA: Agilent Virtual Instrument Software Architecture) drivers from the CD included with your Agilent device (at the location <CDROM>:\IntuiLinkApp\IO_Libs\). The VISA drivers install a high level interface and support various different interfaces such as USB, serial and LAN. Properties of the interface have to be specified in the VISA drivers settings. You can use VISA drivers for LAN and serial interface but you do not have to.

All programs of the Vallen AE-Suite software that use Agilent/HP devices use a Device Detection Wizard when detecting and connecting to the device.



The correct steps when connecting to a hardware instrument are:

1. If you want to use the USB connection make sure you have the VISA drivers installed. The drivers only need to be installed once. If installed you should see a blue icon in the task bar showing "IO". If the VISA drivers are not installed, the VISA USB interface option is disabled.
2. Select the connections where to try to detect the device. The VISA Interface option is enabled only if you have the VISA drivers installed. For the network connection, you need to know the IP address of the instrument. How to retrieve the IP address is described below in detail. Make sure you have the right cables connected to the instrument and/or computer. It will not work if you select LAN connection but you only have the USB or serial cable connected.
3. Press "Start". The device should be properly detected.

Network connection: To find the IP address of the instrument

1. Press "Utility" button
2. Press "I/O"
3. Press "LAN"
4. Press "Current config"
5. Press (if necessary) the arrow button to scroll until you can see the IP address.

Troubleshooting

In case your device is not properly detected or identified please first check the cabling. If this doesn't help please refer to the Troubleshooting section of your function generator's user guide.

Title: VST-3: Vallen Sensor Tester (VST): Remote Connection Setup
Link: AESuite/Acq32/VST/VST_RemoteSetup.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Vallen Sensor Tester (VST) > VST Software Setup

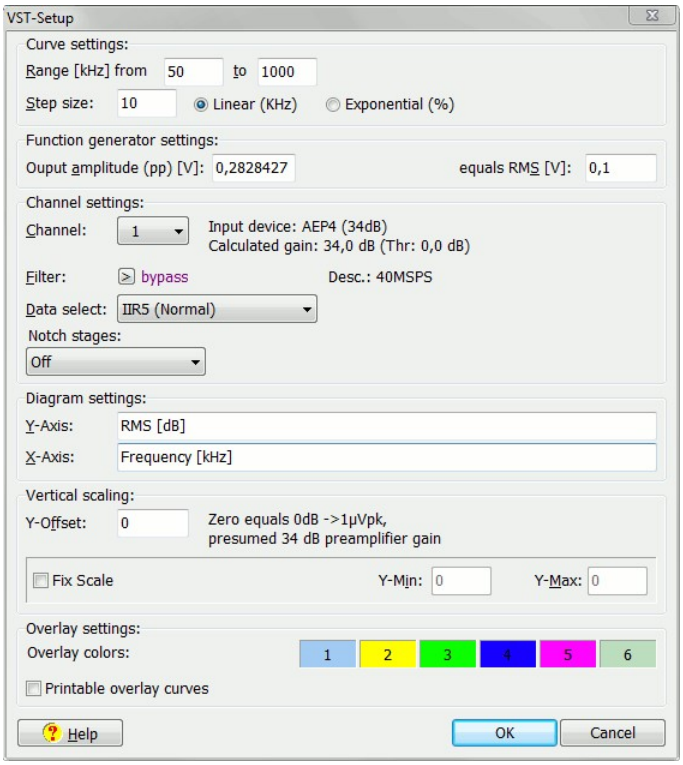
VST Software Setup

Loading original Vallen Systeme settings:

with the VST software the original Vallen Systeme VST settings are provided. You can load the original software setup Vallen Systeme uses for quality control to run your sensor tests.

Adjusting the VST settings:

You can use the VST Settings dialog (Edit/Settings..) to define your individual settings for sensor testing:



Curve settings

Range

The Range setting specifies the lower and upper frequency which is used for testing. The frequency range also specifies the bounds for the horizontal x-axis.

Step size

The step size in kHz defines the amount of increase in frequency when scanning through the frequency band specified by Range.

- linear mode: for each step the frequency is increased by the specified fixed amount.
- exponential mode: for each step the frequency is calculated as the previous frequency multiplied with the specified percentage. In this case the step size is expressed in percentage

The linear mode is better suited for testing a small frequency band, while the exponential mode is useful when testing a wide frequency band. In the example above, the pulser will send signals starting at 50 kHz and increasing by 10 kHz until 1000 kHz is reached.

Function generator settings

Output amplitude

The setting specifies the peak-to-peak amplitude of the signal which the function generator delivers. The RMS equivalent to the V_{pp} value is also given.

equals RMS

The corresponding RMS value of the peak-to-peak amplitude. Make sure that the AMYS4/AMSY-6/-5 input is not saturated by a signal.

Channel settings

These are settings for the AE-channel similar to the Acquisition settings. Make sure that the channel is selected to which the sensor-under-test is connected.

Channel

Channel number to be used for sensor testing. This must be the channel to which the sensor-under-test and its preamplifier is connected. If on restart the selected channel is no longer available (e.g. because it has been removed), the software selects the next channel with higher channel number.

The Input device and Calculated gain settings are taken from the Hardware Detection and Channel Configuration settings.

Hint: The software assumes a preamplifier gain of 34dB . In case of another preamplifier gain the results will show a corresponding deviation unless you correct it with a suited offset.

Example:with a 40dB gain preamplifier (instead of 34dB) you would have to subtract 6dB from the actual offset value.

Filter

Filters that are used during sensor test.

- ASIPP: use "Filter 1 (High)". If only one filter is mounted in the used ASIPP (single channel board), it is mounted by default to "Filter 1 (High)". Selecting the other filter would not give any result in this case.
- ASIP-2/S: use bypass

- ASIP-2/A: use bypass

The filter setting is not saved at closing the software.

Data select (ASIP-2/A only)

Data select is used, to select output of TR data at. Use IIR5.

Notch Filter (ASIP-2/A only)

Select "Off" if you do not want to use a notch filter.

Diagram settings

Y-Axis / X-Axis

Specifies the attributes for the according axis.

Vertical Scaling

Y-Offset

Value for obtaining relative sensitivity. At 0dB, the diagram refers to 1µV peak (0.7µVrms) at 34 dB preamplification. Saturation point is 100mV peak (100dBAE), or 70mV RMS (97dB RMS).

The Y-Offset is defined as follows:

- for sensors without integrated preamplifier: -(114 + *gain of preamplifier in dB*)dB.
- for sensors with integrated preamplifier of 34dB or 40dB gain: -114dB.
- for sensors with integrated preamplifier of 46dB gain: -108dB (because input signal is only half the magnitude compared to other test settings. At full magnitude measurement chain gets saturated).

Fix Scale

If checked, the manually specified y-axis limits are valid.

Y-Min / Y-Max

Manually specify limits of the y-axis.

Overlay settings

Overlay Colors

Colors used for imported overlay curves. Each color can be selected individually.

Printable overlay curves

If checked the overlay curves are also drawn when printing.

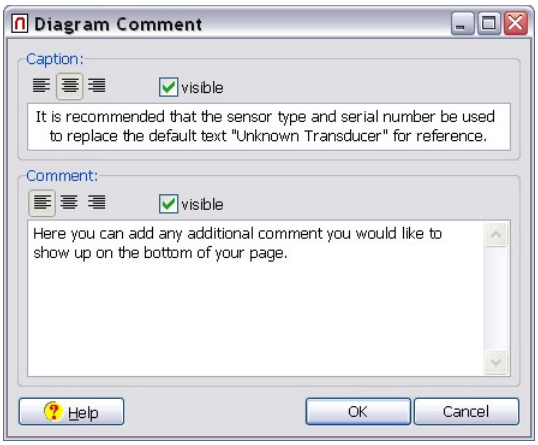
More Hints

- Start the sensor test via Edit/Start (shortcut <F9>)
- Print the diagram via File/Print (shortcut <F2>)
- The File menu offers options to store and load prepared settings on user-defined files (extension .VST)
- Place cursor into diagram and press right mouse button to see the context menu for further options.

Title: VST-4: Vallen Sensor Tester (VST): Software Setup
Link: AESuite/Acq32/VST/VST_Settings.htm

VST Diagram Comment

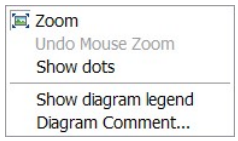
You can specify a caption and a comment to show up with your curve. You find this **Diagram Comment** dialog in the Menu Edit or in the context menu.



Note: It is recommended that the sensor type and serial number be used to replace the default text "Unknown Transducer" for reference.

Title: VST-6: Vallen Sensor Tester (VST): Diagram Comment
Link: AESuite/Acq32/VST/VST_Comment.htm

VST Context Menu



The context menu is accessed by clicking on the right mouse button on the frequency response test diagram:

Zoom

Displays the pulser and receiver function along with calibration. This option is helpful in understanding what signals are being analyzed during the calibration process.

Show dots

This command toggles representation of each data point with an open circle.

Show diagram legend

Displays the legend on the bottom of the diagram and shows the file name of imported overlay curves.

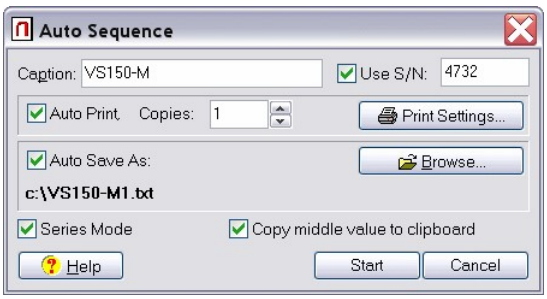
Diagram Comment...

The Diagram Comment (for more information see the section about VST Diagram Comment) dialog allows to edit the text above and below the calibration curve.

Title: VST-5: Vallen Sensor Tester (VST): Context Menu
Link: AESuite/Acq32/VST/VST_ContextMenu.htm

VST Auto Sequence Mode

This feature helps when testing a large number of sensors of the same type. After setting the parameters, there is only little interaction needed from the user.



Caption

Is the text to appear on top of the diagram.

Use SN

If checked, a number will be appended to the auto generated file name.

Auto Print

If checked, the diagram will be printed after the test; the user can also specify the number of copies.

Print Settings

Change page setting for printed diagram.

Auto Save As

If checked the test will be exported with the generated name.

Series Mode

If checked, the operation will be started again when completed. The serial number is incremented and the user only needs to confirm the next step.

Title: VST-7: Vallen Sensor Tester (VST): Auto Sequence
Link: AESuite/Acq32/VST/VST_AutoSequence.htm

Verify Sensor Certificate

The VST allows one to perform the original Vallen sensor testing quality control. However, since you are not using the identical hardware (e.g. emitter, cable length between sensor and preamplifier,...) as Vallen did, you may discover some deviations to the original test curve.

We recommend that sensor curves measured with same hardware and setup are used for comparison. By making measurements regularly the sensitivity of the sensors can be tracked.

For your convenience the VST-Setups used during initial sensor verification are included with the installation of the VST in folder c:\vallen\vst-setup.

Import those by "Open setup" out of File menu. The files in c:\vallen\vst-setup are write protected for security reasons.

The extension of VST-Setup files is vst. For each sensor model you will find a specific setup file which you can easily identify by its file name and your sensor model (e.g. VS150-RIC.vst).

After loading the .vst file we recommend to enter the serial number of the sensor to be tested in the caption (replacing the question marks). The comment below the diagram provides some information regarding setup details. You can modify both, caption and comment, with the **Diagram Comment** dialog in the Menu Edit or in the context menu.

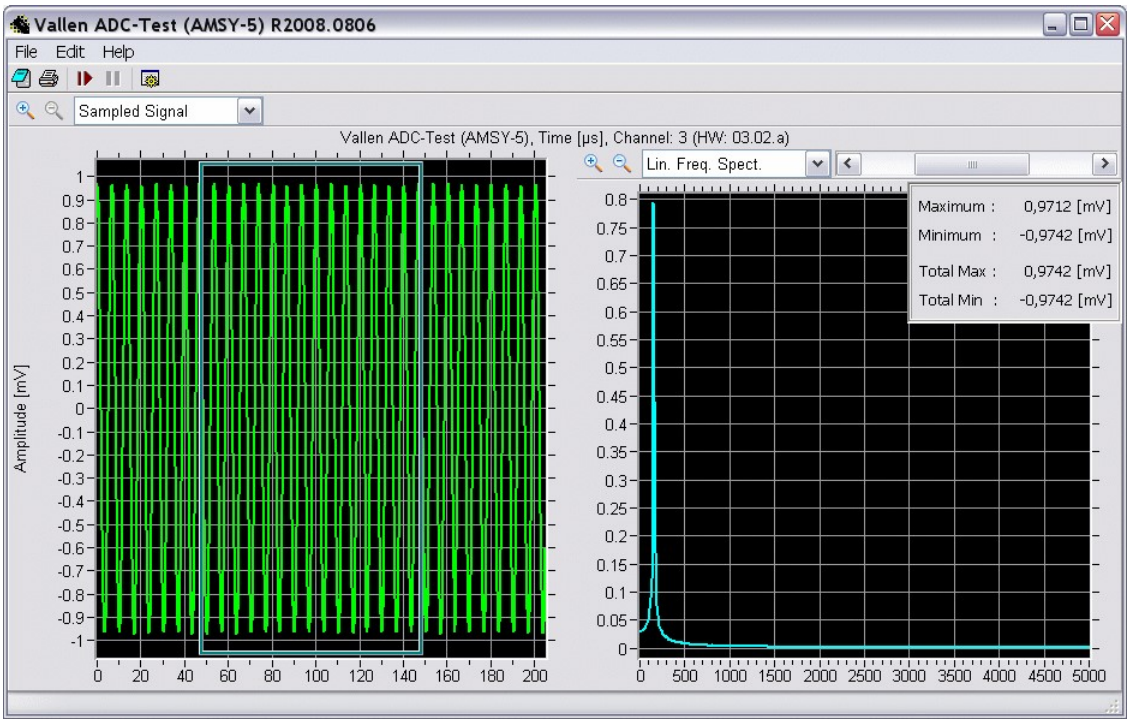
Note: It is recommended to safe the recorded frequency response (File/Export data) in a separate directory, specifying sensor model and serial number in the file name for easy identification.

Title: VST-8: Vallen Sensor Tester (VST): Verify Sensor Certificate
Link: AESuite/Acq32/VST/VST_ManufacturerTesting.htm

ADC-Test Overview

The ADC-Test application is designed to test basic functionality of AE channels, without TR option. Usually it is not needed during normal operation of the ASMY-5.

Main window:



The main window contains a TR diagram on the left hand side and a FFT diagram on the right hand side. Please note that only the last signal can be displayed. Features common to the VisualTR software module are not available.

Description of the Menu Bar Commands

File/Print

Shows the print dialog for producing a hardcopy of the main window.

File/Show Log file

Shows the log file

File/Exit

closes Vallen ADC Test

Edit/Hardware detection...

Switches to the Hardware Detection Results & Channel Configuration screen in View Mode.

Edit/Record enable, -/Record disable

Starts and stops signal recording

Edit/Auto Trigger

The recording continues until manually stopped.

Edit/Single Trigger

The recording stops after the last signal.

Edit/Show Min/Max

Show/Hide the upper right window with information about signal limits.

Edit/Setup

Show the AE channel settings dialog.

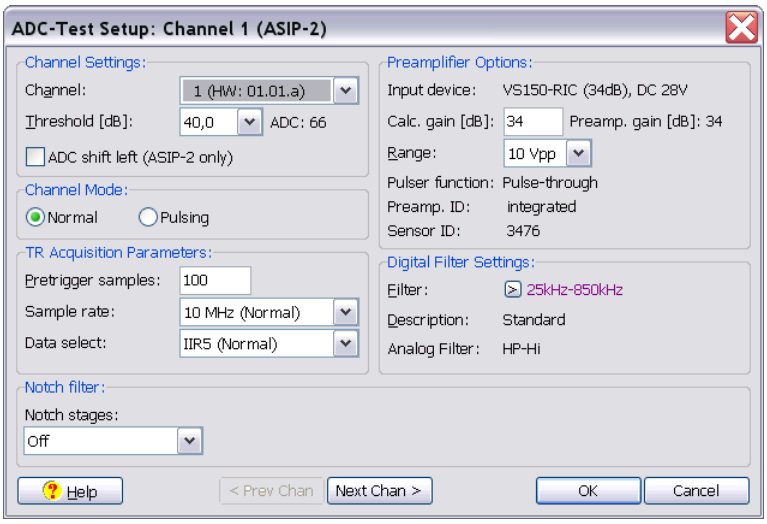
From the Toolbar available commands are

- Show Log file
- Print
- Record enable
- Record disable
- Setup

Title: ADCTest-1: ADCTest Overview
Link: AESuite/Acq32/ADCTest/ADCTest_Overview.htm

ADC-Test Settings for ASIP-2

This dialog controls the settings for the application:



Channel settings

Channel

With this drop-down list a channel is selected for which the waveform is output.

Threshold [dB]

Defines the trigger threshold of the channel selected in the Channel drop-down list. The threshold value depends on the selected "Calc. gain". Next to the drop-down list of the threshold the ADC value of the threshold setting is shown. The ADC resolution is 152µV at an input range of 10Vpp.

ADC shift left (ASIP-2 only)

This option lets one select “normal” (=unchecked) or “high resolution” (=checked).

unchecked: Normal display resolution: 152µV @10VPP range, 0dB calc. gain (Bit 0 truncated).

checked: High display resolution (for trouble shooting only): 76µV @10VPP range, 0dB calc. gain (Bit 15 truncated). Amplitudes above half range are not properly shown.

Channel mode

Defines whether the channel is in normal mode or pulsing. In normal mode the channel is configured to acquire data. In pulsing mode, the channel sends pulses to the sensor. Pulsing mode requires the definition of an input device capable of pulse-through. See also Hardware Detection Results and Channel Configuration.

TR Acquisition Parameters

Pretrigger samples

This setting specifies the number of samples in advance of the trigger. The number of pretrigger samples can be in the range between 0 and 2000. The TR-page length used by the ADC test is 2048 samples.

Sample rate

The selectable sample rate depends on ASIP-2 variant (/A or /S) and the selected dig.-filter (output sample rate). The ASIP-2/A supports 2.5 -, 3.3 -, 5 -, 10 -, 20 -, or 40MHz. The ASIP-2/S supports 2.5 -, 3.3 -, 5 -, or 10MHz.

Data select

Defines the data source for the ADC-Test program. Possible data sources are:

1. 1. IIR5: 10, 20 or 40MSPS, Normal use
2. 2. IIR4: 10, 20 or 40MSPS
3. 3. FIR: 40MSPS, no IIR filter support
4. 4. ADC: 40MSPS, no digital filter support

Preamplifier Options

Input device

Information about selected input device (e.g. AEP4-40dB) and DC voltage on BNC (e.g. 28V). See also Hardware Detection Results and Channel Configuration.

Calc. gain [dB]

This value is used to scale the results of peak amplitude, RMS, energy, and the parameter threshold, to the input of the preamplifier. The value is initiated by the preamplifier gain, when an input device is assigned to the channel. It can be modified by the user , e.g. to compensate different sensor sensitivities.

A change of this parameter also modifies the parameter threshold!

Allowed range: 0 - 100dB

The Preamp. gain [dB]is defined by selected input device. See also Hardware Detection Results and Channel Configuration.

Range

Selectable range of input signal (ASIP-2/A only). The input signal is amplified accordingly in order that the full range of the ADC is used. The input range setting can be

- 10Vpp (input signal x1): normal mode
- 5Vpp (input signal x2)
- 2.5Vpp (input signal x4)

Pulser function, Preamp. ID, Sensor ID

Information as defined in Hardware Detection Results and Channel Configuration.

Digital Filter Settings

Filter, Description, Analog Filter

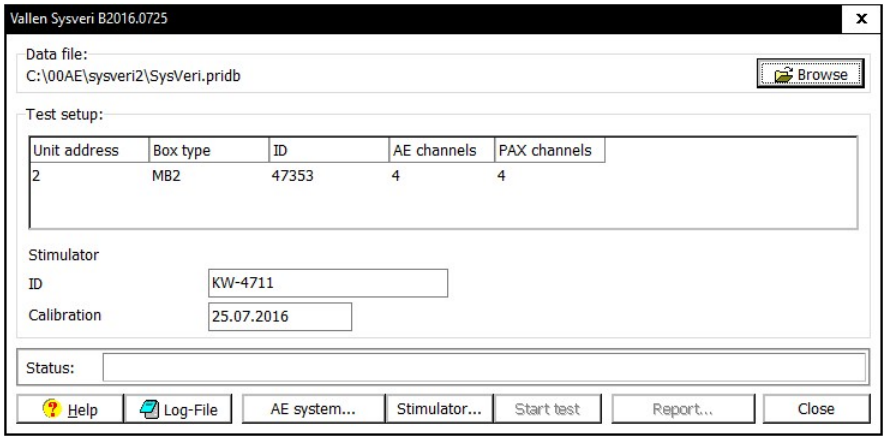
Information as defined in Hardware Detection Results and Channel Configuration.

Title: ADCTest-2: ADCTest ASIP-2
Link: AESuite/Acq32/ADCTest/ADCTest_Setup_ASIP-2.htm

Home > The Vallen AE-Suite Software > Data Acquisition > System Verification > System Verification

System Verification 2 (for ASIP-2 in AMSY-5 or AMSY-6, only)

System Verification 2 works only for ASIP-2 signal processor boards and AMSY-5 or AMSY-6 systems. Verifying older systems, such as AMSY4 is only possible with old System Verification software. For using previous System Verification software, a release pre R2016.0804 needs to be installed.



Operating System Verification Software

1. connect AMSY-6 system to PC

2. connect arbitrary function generator (Keysigth) either via USB to PC or via LAN

3. select a file to which measurement data shall be stored

4. detect the AE system (by clicking button "AE system...") and fill in missing information (e.g. ID of system or box type)

5. detect function generator (by clicking button "Stimulator...") and fill in missing information (e.g. calibration date)

6. perform test and follow instructions from pop-up dialogues (to start procedure click button "Start test")

7. when finished print out or store report (start generating report by clicking button: "Report...")

In cases when a report from existing data needs to be generated, select the data file (step 1) and generated the report (step 7).

Dialogue details

Data file:

Select a file to which data from a system verification is stored

Test setup:

Test setup data is partially filled out when "Detect AE system..." and "Function generator..." is executed

Unit address

Automatically detected and filled in when AE system is detected. The unit address corresponds to the rotary switch setting at the rear side of the MBx chassis

Box type

Automatically filled in and can be MB2, MB6 or MB19. This may not be the correct box type, because the type is concluded on basis of detected AE channels. If 4 or less AE channels are detected box type MB2 is proposed. MB6 is proposed if more than 4 - but less than including 12 AE channels are detected during Hardware Detection. In all other cases a MB19 chassis is proposed. Discrepancies can occur when e.g. 4 channels are mounted in an MB6 box. In this case the operator should correct the proposed value.

ID

Setting that the user/operator has to provide. Vallen System ID is marked on a white sticker on the top side of a chassis.

AE channels

Automatically detected and filled in during Hardware Detection.

PAX channels

Automatically detected and filled in during Hardware Detection.

Stimulator

Refers to the properties of the arbitrary function generator

ID

Automatically detected and filled in when function generator is detected (clicking button "Function generator..."). This field holds the ID of the function generator. It can be edited by the operator.

Calibration

Date of last calibration of function generator. This data has to be filled in by the operator

Status

Line that holds automatically generated status information, e.g. what test is currently performed.

Buttons

AE system...

Performs a hardware detection.

Stimulator...

Detects the function generator and reads out the ID of it.

Log-File

Opens the log-file viewer.

Start test

Starts the system verification. User is guided through system verification by pop up menus.

Report...

Creates a report about the test. Existing files can be reevaluated when the appropriate data source file has been selected. Options available are Preview/Print for direct printing, exporting to PDF or exporting to Open Document format.

Close

Closes and exits system verification

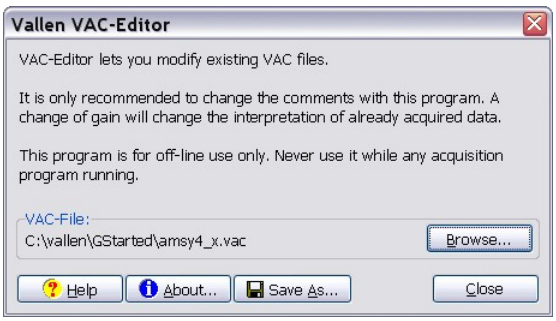
Home > The Vallen AE-Suite Software > Data Acquisition > VAC-Editor > VAC-Editor

VAC-Editor: Patching Acquisition Parameters

Warning: This tool overwrites the acquisition parameters of the measurement. Please always make a backup of your VAC-file before editing.

This tool can only be used in offline mode when the VAC-file is not used by the acquisition software.

Select the VAC-file to be edited by clicking on **Browse...**



Afterwards all acquisition parameters are accessible in a similar way as known from the Acquisition Parameter Setup. Save the edited file by clicking the **Save As...** button in the dialog window shown above.

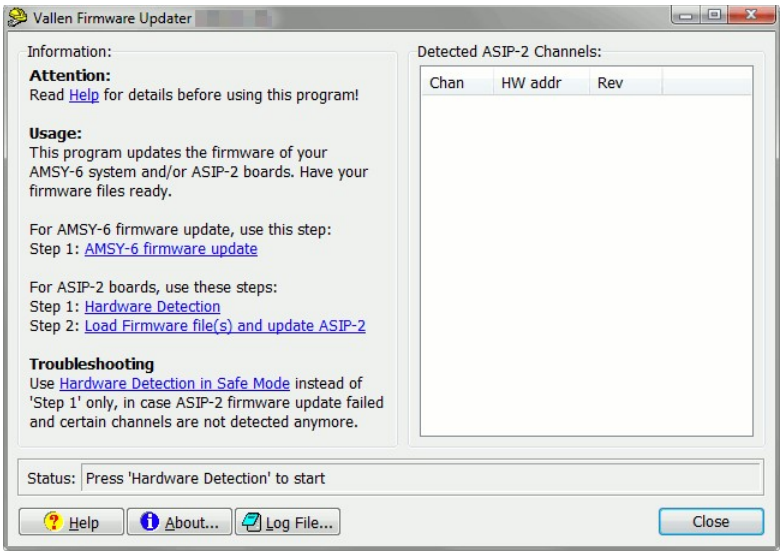
Warning: Any other change than modifying the Comments should be performed by an advanced user only.

Title: Tools-1: VAC-Editor
Link: AESuite/Acq32/Tools/Acq32_vacedit.htm

Home > The Vallen AE-Suite Software > Data Acquisition > Vallen Firmware updater > ASIP-2 Firmware updater

Vallen Firmware Updater

Warning: This tool writes data into the flash memory of the ASIP-2 channels or USYC; use this only when instructed after installation of new Vallen AE-Suite software or by Vallen Systeme GmbH, to avoid/remove potential problems or version conflicts.



The tool provides a simple interface to update the firmware for USYC (AMSY-6 firmware update) and ASIP-2 channels. Usually the firmware is linked to a certain release of the Vallen AE-Suite software. The files containing the correct firmware version is always part of the AE-Suite software release. Use this tool only if the firmware of USYC or ASIP-2 board has to be updated. New firmware is only provided by Vallen Systeme GmbH.

AMSY-6 firmware update (USYC firmware update)

Step 1

Update the USYC firmware by clicking on the text-link labelled Step 1. Please do not disconnect or shut down power of chassis during updating process. You will be prompted when the update process has been completed.

ASIP-2 firmware update

Step 1: Hardware detection

In the first step a hardware detection is conducted. The result with regards to the firmware version is listed for each channel on the right side of the dialog.

Step 2: Load firmware

Step 2 brings up a file open dialog to select a firmware file. Once the new firmware file is selected, the update process is started.

Note: Loading new firmware can take several minutes, depending on the number of ASIP-2 channels. You can calculate an approximate time by multiplying the number of channels by 10 seconds and adding 300 seconds (e.g. 20 channels: 300sec + 20x10sec = 500sec = 8.3 minutes).

Troubleshooting

Hardware detection in Safe Mode: if the normal hardware detection fails ("fail" means either errors or not detecting certain ASIP-2 channels; this could happen if a previous firmware update failed), then this procedure is using a backup firmware on the ASIP-2 channels. It requires to power off the chassis, first (not the control PC).

The backup firmware can show a different (older) revision in the listing.

Other hardware problems are not solved with the Safe Mode detection.

More details

There are two kinds of firmware updates that can be performed. The firmware file content dictates which update to perform.

1. Binary files

This is the FPGA program which drives the USYC or ASIP-2 channels. It is updated when problems are found and fixed, or when new functionality is added to the hardware.

The revision in the listing shows the version of the FPGA binaries (the current revision is provided with the software installation). For ASIP-2 channels, the first public release was "20.00".

An ASIP-2 firmware update is applied to all ASIP-2 channels connected to the PC while running the Firmware Updater. Eeach channel is verified (with automatic retries in case of verification errors) afterwards.

An update of the FPGA binary file may be necessary if a new version of the acquisition software is installed on the host PC. The acquisition program requires a certain FPGA binary version and may cause conflicts if the according binary file version is not found. The new binary file is installed by the Firmware Updater. When clicking 'AMSY-6 firmware update' or 'Load Firmware' it will select (by default) the correct binary file to be loaded.

2. Firmware options and configuration files

This contains the calibration and firmware options (like TR recording, digital filters, etc.) for each ASIP-2 channel. If for example an ASIP-2/S is upgraded to an ASIP-2/A a new configuration file is to be installed into the ASIP-2. Such a file may contain information for several channels. The updates are applied one by one using a unique identifier on each channel. The status line (and log file) shows detailed information on how many channels are updated.

The log file always shows detailed information about all operations. During updating the activity is also visible for each AE channel indicated by the LEDs:

- writing the threshold LED shows yellow (all channels)
- reading (verifying) the select LED (only channel A for each board) shows green

Note: This tool is for ASIP-2 (dual channel) boards only. ASIPP (single channel) board do not require a manual firmware update.

Title: Tools-2: ASIP-2 Firmware Updater
Link: AESuite/Acq32/Tools/Acq32_Asp2Upd.htm