

AE-Amp

Acoustic Emission Amplifier MK II



Programming Manual

AE-Amp Boxed
AE-Amp Rack

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Safety Information

This instrument is intended for indoor use and should be operated in a clean, dry environment. Do not block any ventilation openings.

Make sure this product's operating environment is kept within the parameters as specified in the chapter Operating Condition!

The design of the instrument has been verified to conform to the EN 61010-1 safety standard per the following limits:

- Installation (Over voltage)
- Category II (Main Supply Connector) and Category I (Measuring Terminals)
- Pollution Degree 2
- Protection Class I

Warning (Rack Unit only)

Lethal voltages exist inside the instrument. Only qualified technicians of supplier staff are authorized to open the case of the Base Unit. Otherwise warranty will be lost!

Always ensure that power cord is removed before opening the case.

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1. Overview

The AE-Amp is design for amplifying signals generated from various types of different Acoustic Emission (AE) sensors. The amplifier inputs are AC coupled with a high pass frequency of 5 kHz. The Bandwidth depends on the selected gain from 1 to 3 MHz. The amplifier can be used with passive or active sensors due the integrated sensor power supply. The amplifier path can be passed-through for applying high voltage pulses when using the sensors also as ultra-sonic actuator.



This manual refers to product version MK2.

1.1 Key Capabilities

- Two independent channels per module
- Gain 0 dB, 20 dB, 40 dB, 60 dB
- Bandwidth up to 3 MHz (Gain 0 dB)
- High Voltage Pulse Through up to 500 V
- USB or RS485 interface for configuring all settings

1.2 Versions

There are two versions available:

Boxed Version

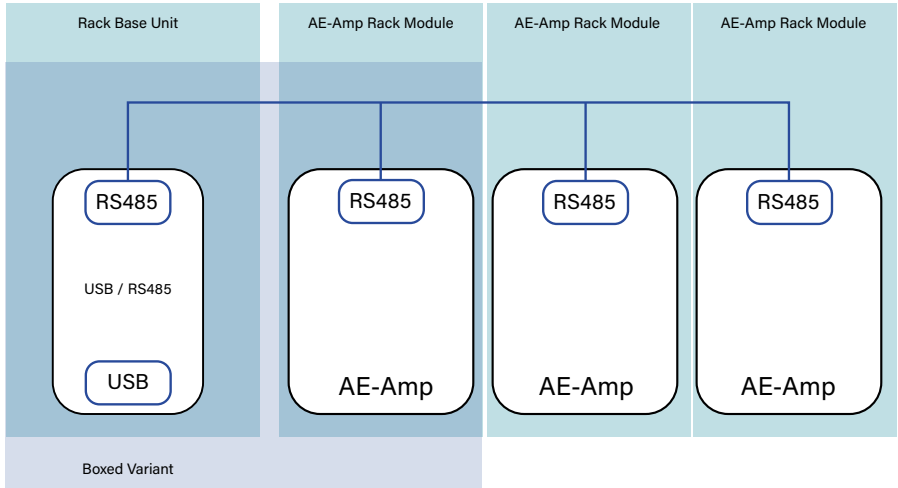
- 2-Channel Modules AE-Amp-Box
- USB interface (emulated COM port)
- External power supply

Rack Version

- 2-Channel Rack-Modules AE-Amp-P
- Two different Base Unit chassis available:
 - Amp-BU-24-AE
(for up to 12 modules / 24 channels)
 - Amp-BU-48-AE
(for up to 24 modules / 48 channels)
- USB interface (emulated COM port) for accessing all installed amplifiers (Internally over RS485)


2. Communication

All AE-Amp modules have a RS485 interface. For the boxed version, each box comes with an USB to RS485 converter module. RS485 interface is used as a unidirectional interface.



The Rack version uses a so called Base Unit with a built in USB to RS485 converter module. The USB module uses a standard FTDI chip and its FTDI drivers. After installation of the drivers the module will be listed in the windows device manager as a USB Serial Port.

The number of the Serial Port, in this example COM9 depends on the configuration and already used ports on the final system. There is no need to do change any settings in the device manager, this should be done with software or configuration tool itself.

 USB Serial Port (COM9)

2.1 Serial Port Settings

Use the following settings to communicate with the modules:

Settings	Value
Baud	57'600
Data Bits	8
Stop Bits	1
Parity	None

2.2 Driver Download

Download the drivers for the USB to RS485 converter chip directly from the FTDI web-site: www.ftdichip.com/Drivers/VCP.html

3. Recommended Tools

Main tool for using the AE-AMP mk2 modules is the Elsys AE-Amp 2 Application. It allows to configure the AE-Amp modules directly. It can be downloaded from the website www.elsys-instruments.com

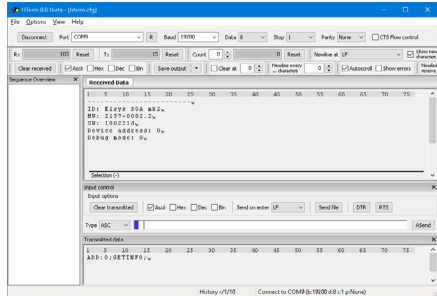


Attention: The AE-AMP MK2 requires software version 2 and is not compatible with version 1.

3.1 Serial Terminal

A very useful tool for testing is HTerm, this can be downloaded here:

<https://www.der-hammer.info/terminal/>



4. Serial Protocol

The used protocol is based on simple string commands and parameters, which makes it easy to understand and to use. The syntax is always: **COMMAND:VALUE;**

4.1 Addressing

The ADD:n; and CHN:n; parameters can be used to select a specific device or channel.

Some Parameters are broadcast messages, which can be used for either all available channel or one specific channel.

4.2 Info

Some functions and commands are meant to get information from the device.

- ADD:0;GETINFO; returns multiple lines with information about hard and software.
- ADD:0;DEBUG:1; enables the debug output which will give much more detailed feedback regarding settings etc..

It's not recommended to use DEBUG:1; in combination with the AE-Amp 2.0 tool.

5. Commands

5.1 AE-Amp

Parameter (String)	Value	Return	Example	Description
Addressing				
ADD	0 – 31	-		Address of the device
CHN	1, 2, n	-		Channel 1, 2 or both
Info				
GETINFO	-	one line	ADD:0;GETINFO;	Returns address, hardware and software version
GETINFO	-	multiple lines	GETINFO;	Returns ID, HW SW, ADD, DEBUG status 2 lines (Chn1 \r\n Chn2) delay of 40ms between each board
GETALL	-	one line	ADD:0;CHN:1;GETALL;	Returns channel settings from one Channel
GETALL	-	multiple lines	ADD:0;GETALL;	Returns channel settings from one Board (two Chns) 2 lines (Chn1 \r\n Chn2)
GETALL	-	multiple lines	GETALL;	Returns channel settings from all Boards 2 lines (Chn1 \r\n Chn2) delay of 40ms between each board"
DEBUG	0, 1			1 more detailed output, any other value than 1 will be equal to DEBUG:0;
System				
RESET	-	-	ADD:0;RESET;	Restart uP, Debug off, Gain 0dB, AMP 1
Write Settings				
AMP	0, 1	-	ADD:0;CHN:1;AMP:1;	Overrides AMP, CHARGE, IEPE and PVDC, only one can be set
CHARGE	0, 1	-	ADD:0;CHN:1;CHARGE:1;	
IEPE	0 - 50	-	ADD:0;CHN:1;IEPE:4;	
PVDC	0, 5 , 28	-	ADD:0;CHN:1;PVDC:5;	
GAIN	0, 20, 40, 60	-	ADD:0;CHN:1;GAIN:20;	
SPLIT	0, 1	-	ADD:0;CHN:1;SPLIT:1;	Use Chn1 as input source for Chn2
HV	0, 1	-	ADD:0;CHN:1;HV:1;	Enable HV Out and ATT, disable=0(default), enable=1
HV	0, 1	-	HV:0;	Disable HV Out and ATT on all channels

GETINFO Return example:

ADD:99;ID:Elsys Base-Unit;HW:2195-2000.3;SW:240125a;OSC:114;Debug:0;
 ADD:0;ID:Elsys AE-Amp MK2;HW:2192-2000.4;SW:240125a;OSC:85;Debug:0;
 ADD:1;ID:Elsys AE-Amp MK2;HW:2192-2000.4;SW:240125a;OSC:108;Debug:0;

GETALL Return Example:

ADD:0;CHN:1;AMP:0;CHARGE:0;IEPE:4;PVDC:0;GAIN:40;SPLIT:0;HV:0;

5.2 Base Unit

Parameter (String)	Value	Return	Example	Description
Addressing				
ADD	99	-		Address of the base unit
Info				
GETINFO	-	one line	ADD:99;GETINFO;	returns ID, HW SW, ADD, DEBUG status
GETALL	-	one line	ADD:99;CHN:1;GETALL;	Returns settings from Base Unit
GETCHNLST	-	one line	ADD:99;GETCHNLST	Get the set channel list for the HV pulse sequence
DEBUG	0, 1			1 more detailed output, any other value than 1 will be equal to DEBUG:0; 0 after restart of the device*
System				
RESET	-	-	ADD:0;RESET;	Restart uP, Debug off
Write Settings				
VOLTAGE	0.00 ... 5.00	-	ADD:99;VOLTAGE:1.50;	Control Out level in Volt
PULSES	0 ... 1000	-	ADD:99;PULSES:14;	Number of pulses
WIDTHMIN	0 ... 1000	-	ADD:99;WIDTHMIN:10;	Min. length of the HV pulses in us
WIDTHMAX	0 ... 1000	-	ADD:99;WIDTHMAX:100;	Max. length of the HV pulses in us
PULSEINTERVAL	0 ... 1000	-	ADD:99;PULSEINTERVAL:3;	Interval between pulses in ms
CHNDELAY	0 ... 10000	-	ADD:99;CHNDELAY:50;	Delay between channel list in ms
PULSESTART	666, 777	-		Start HV pulser: 666 actual channel 777 hands the channel list
PULSESTOP	-	-		Stops HV pulser sequence. In case of running PULSESTART, return value will be sent ones for both commands, In non running sequence return value will be 0, else 1
SECHNLST	011, 322			Defines a list with 32 values, first two digits are the module number, last digit the channel. In Combination with PULSESTART:777; HV pulses will be generated on the defined channel list.

GETINFO Return example:

ADD:99;ID:Elsys Base-Unit;HW:2195-2000.3;SW:240125a;OSC:113;Debug:0;

GETALL Return Example:

ADD:99;VOLTAGE:150;PULSES:14;PULSEINTERVAL:3;WIDTHMIN:10;WIDTHMAX:100;CHNDELAY:50;

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