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Technical Overview



IMAGO Record - Recording and Online Analysis

IMAGO ProcessMaster - Offline Analysis

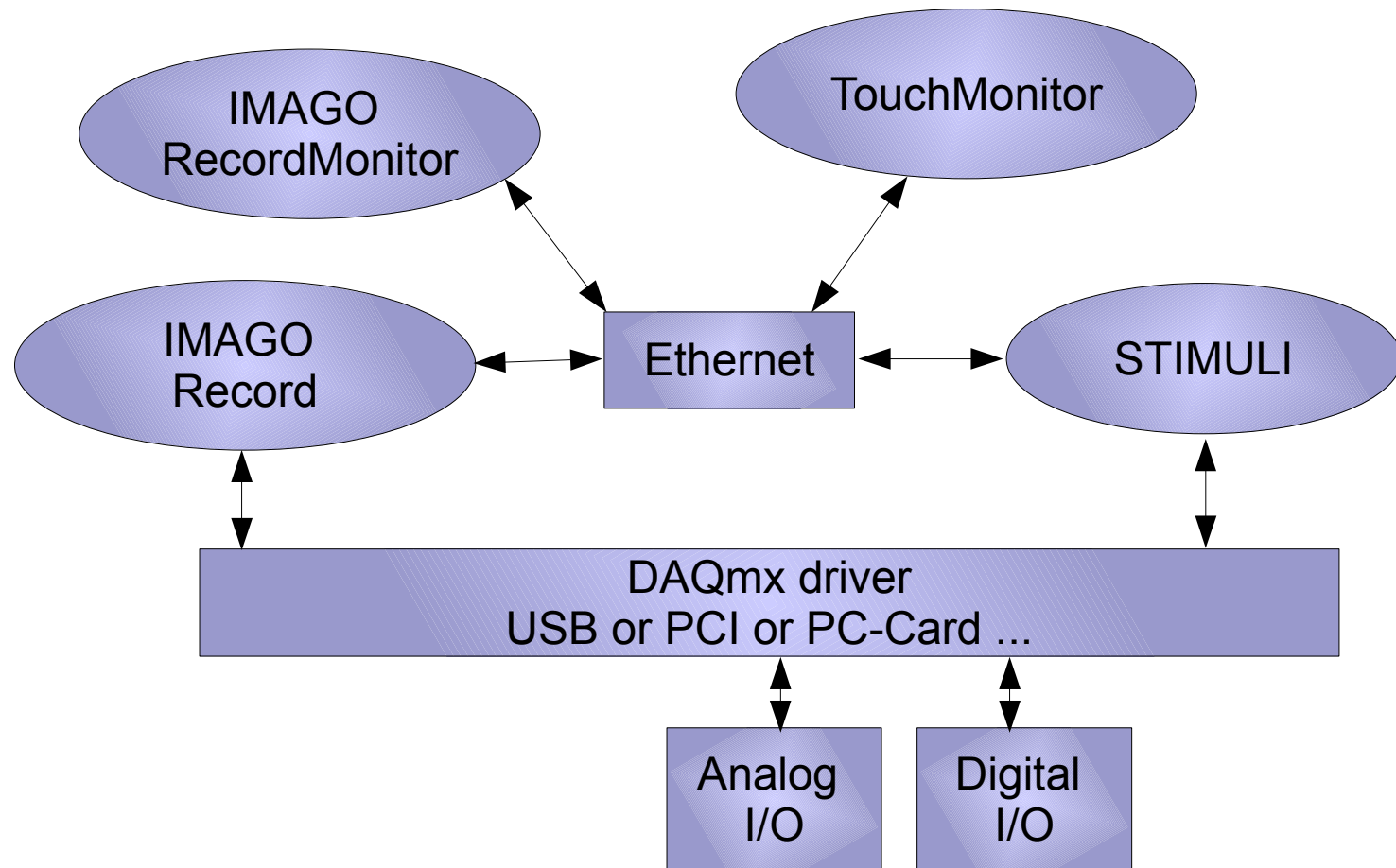
IMAGO RecordMonitor – Patient feedback system

STIMULI - Stimulus and digital trigger generation

TouchRecorder – Present pictures and sounds, record mouse movement

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Interaction of programs



Shared resources are possible between
IMAGO Record and STIMULI with DAQmx driver

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Hardware Requirements 1



Windows XP / Windows7
Min. resolution 1024 x 768
Min. 1 GB RAM
Enough disk space for recording

For Recording:

Support for DAQ-mx driver required

Recommended devices:

Low End: NI USB-6008, 8-channel
Mid Range: NI USB-6218, 32-channel
NI PCI-6224, 32-channel

For Stimulation:

Support for DAQ-mx driver required

Recommended devices:

Low End: Combined use with
Recording hardware
(only with internal trigger)
Mid Range: NI PCI-6224, 4 Outputs

Buffered outputs necessary
Reaction on external trigger requires PCI card

IMAGO Record Hardware Requirements 2



Additional Hardware Requirements:

For **H/M Curve Generation** is a current measurement device necessary

To use **Digital trigger**, EISA is necessary.

Exception: Only Digital Trigger On / Off is used. This is working with any analog signal connected to the digital trigger channel.

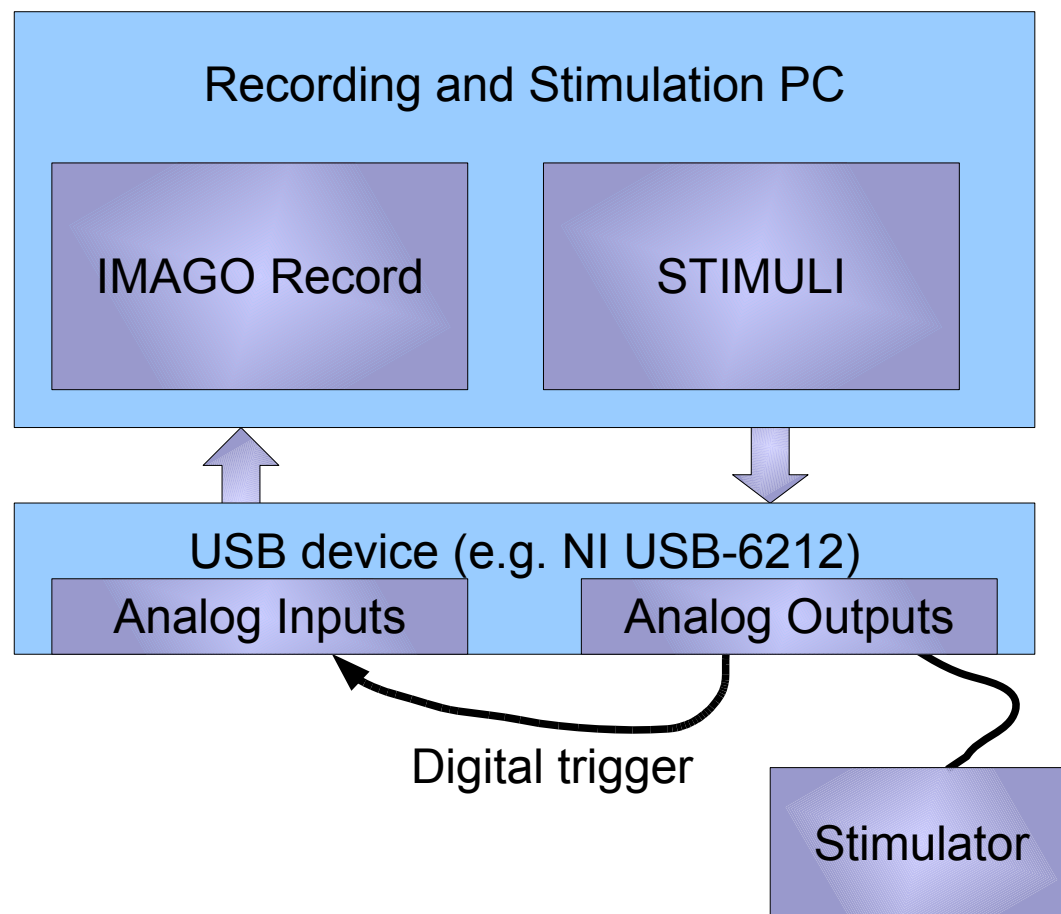
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Scalability 1

Low End Solution

1 PC / Laptop
1 USB device

No stimulation on external
trigger events possible
(USB too slow)



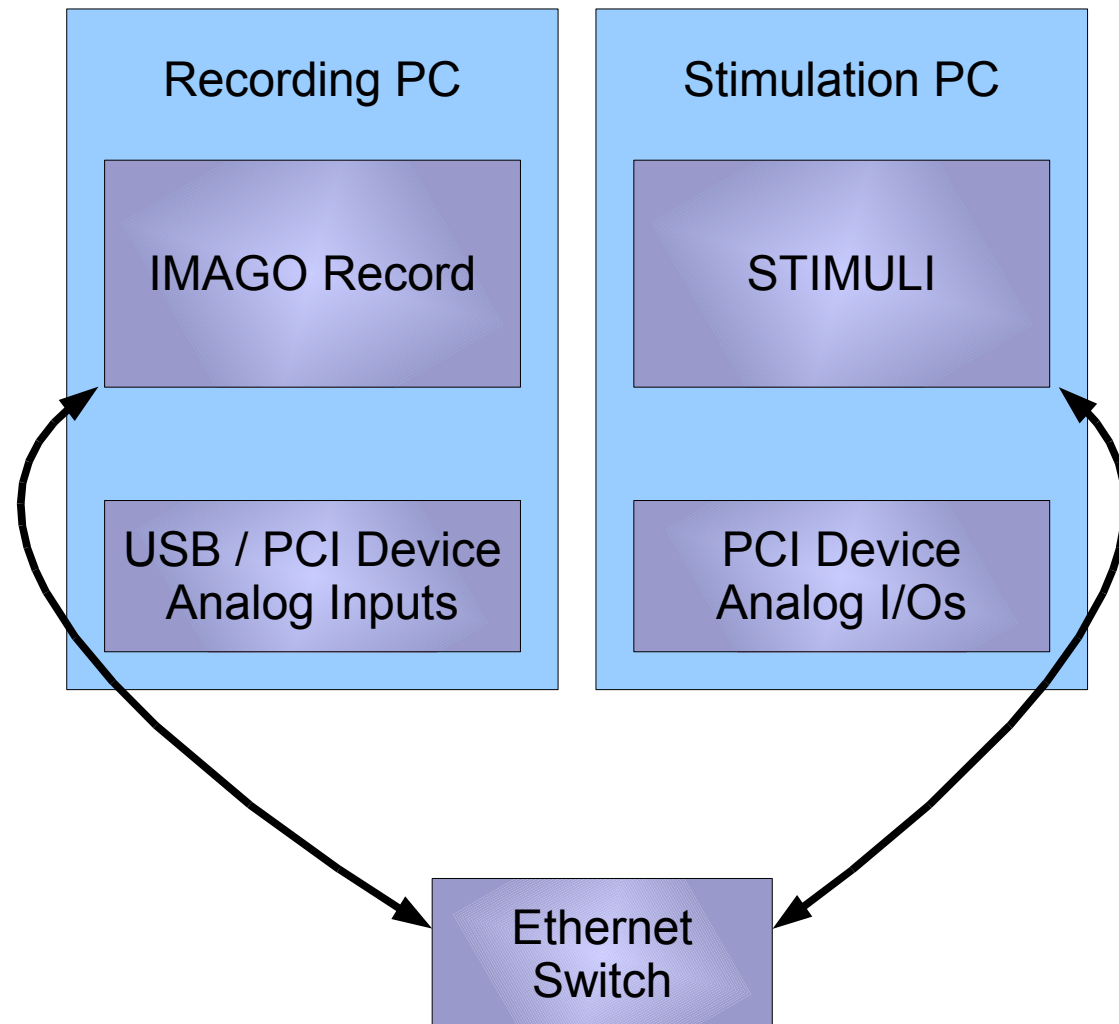
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Scalability 2



Full Feature Solution

1 PC / Laptop
1 USB / PCI Card
1 PCs with PCI slot
1 PCI Card
1 Ethernet Switch
(Stimulation Control loop only)



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Installation



Install DAQ-mx driver www.ni.com/dataacquisition/nidaqmx.htm

Install LabView Runtime Engine www.pfitec.de

Install IMAGO Record

Install IMAGO ProcessMaster

Install STIMULI

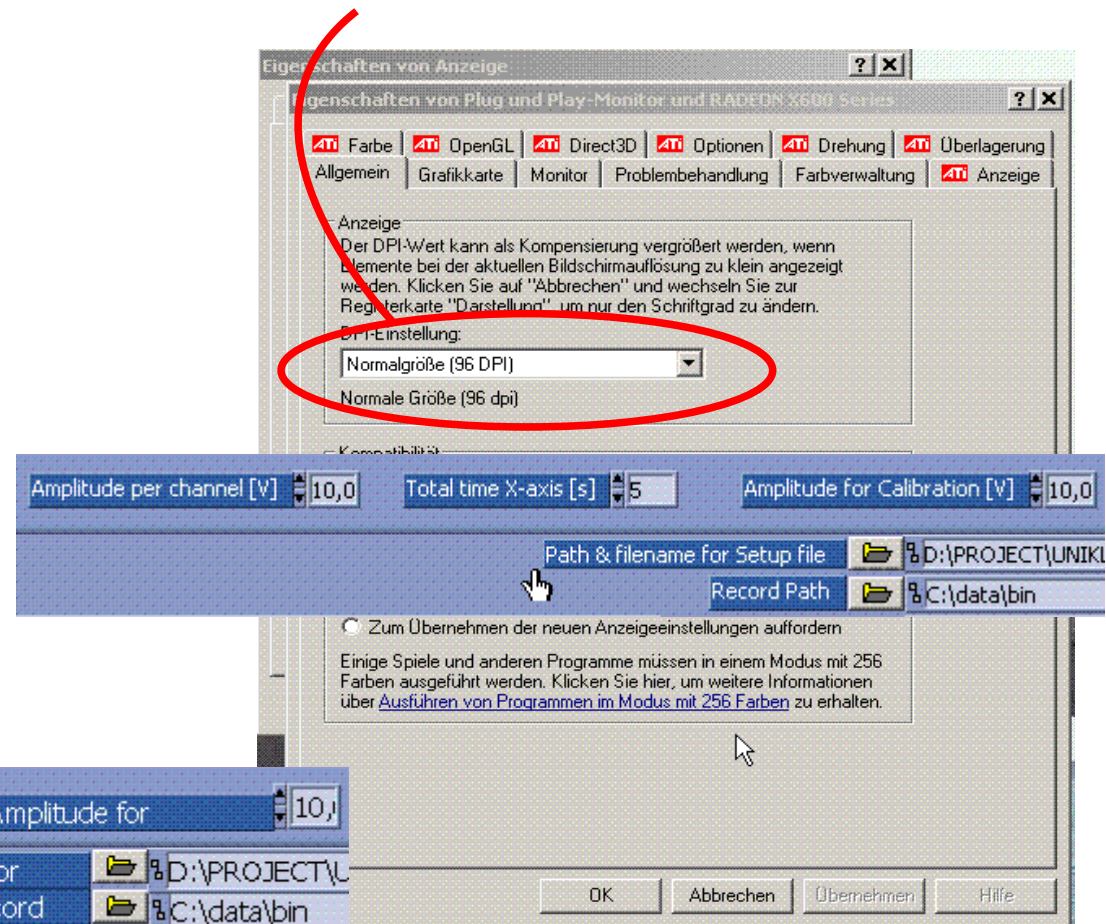
Install IMAGO Record before STIMULI

Only necessary for APV or BioAmp access:

Install AccessHW driver `Imago\Record\Utilities\setup.exe`

pfitec Graphics Options

Best graphical results are achieved with Normal Character Size



Example with Large font setting



IMAGO Record Instruments 1



Define channel names for recording

Define Calibration coefficients for each channel

Define offset for each channel
Offset also possible without amplifier

Only channels which have been defined with an instrument
are visible in IMAGO Record

IMAGO Record Instruments 2



PowerPack
EMG Amplifier

Connection: Wireless
Fully integrated in IMAGO Record

TMSI
EEG Amplifier

Connection: USB
Fully integrated in IMAGO Record (in work)

Channel Definition
Instrument

If no integrated amplifier is available, use Channel Definition Instrument to define recording channels. An offset correction is possible.

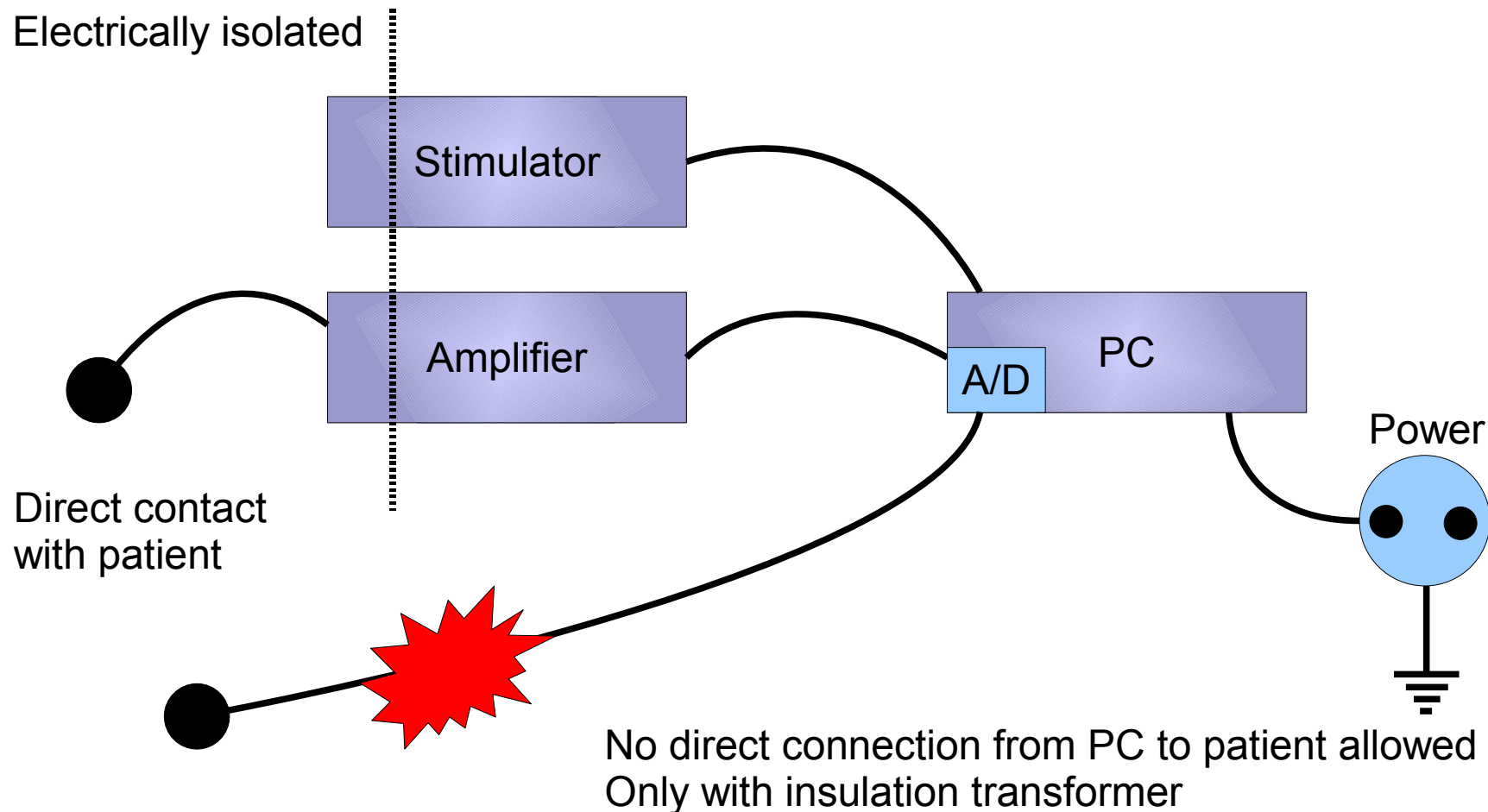
Cycle Plot

Special wireless amplifier to record pedal forces

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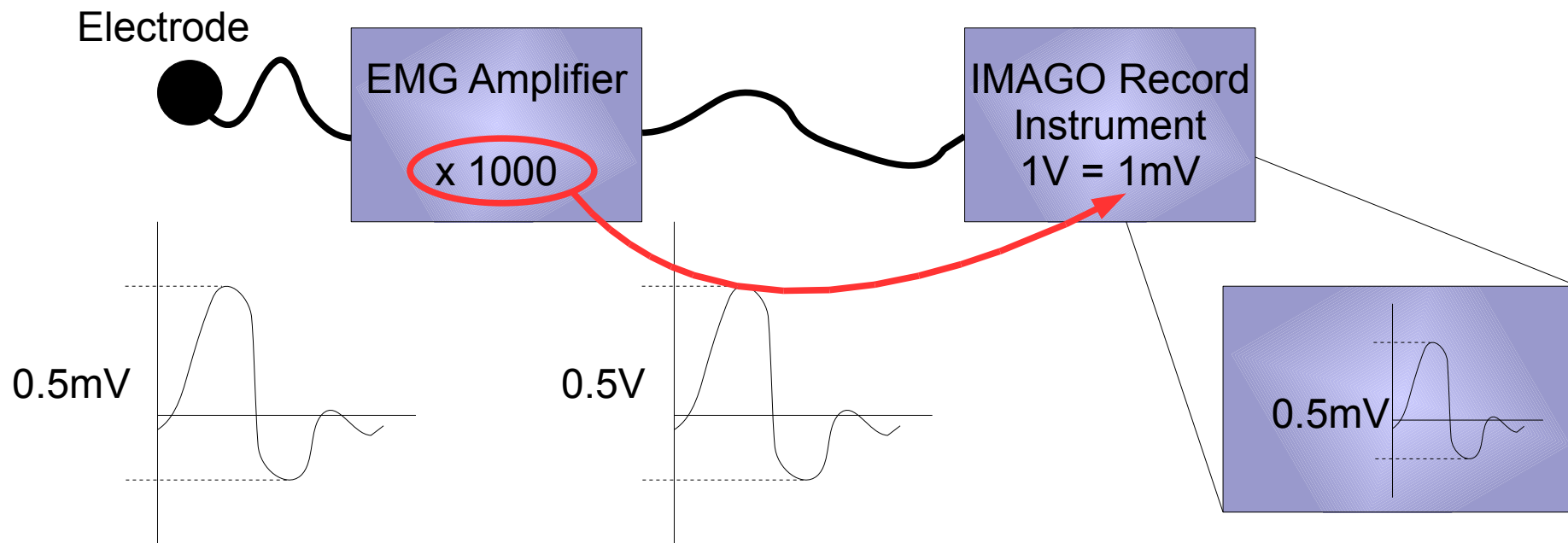


Electrically isolated



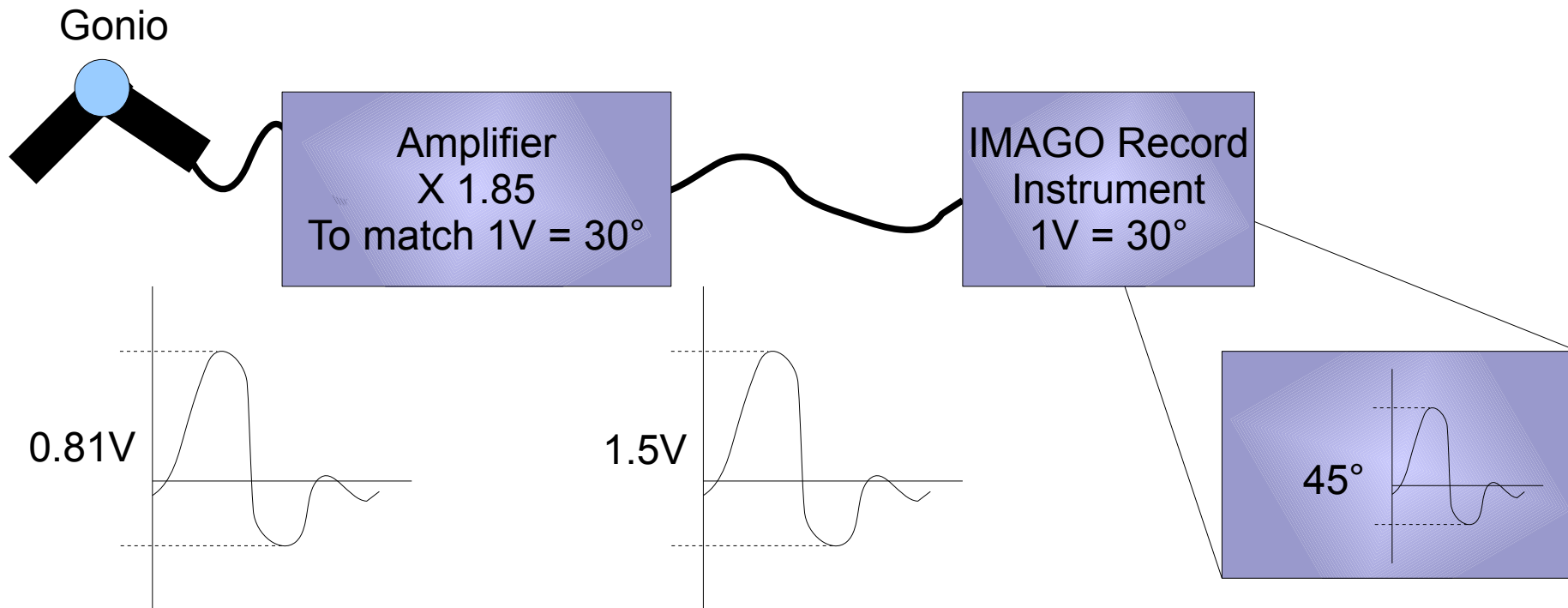
Instruments Calibration Coefficient 1

Example with amplifier: Measuring EMGs



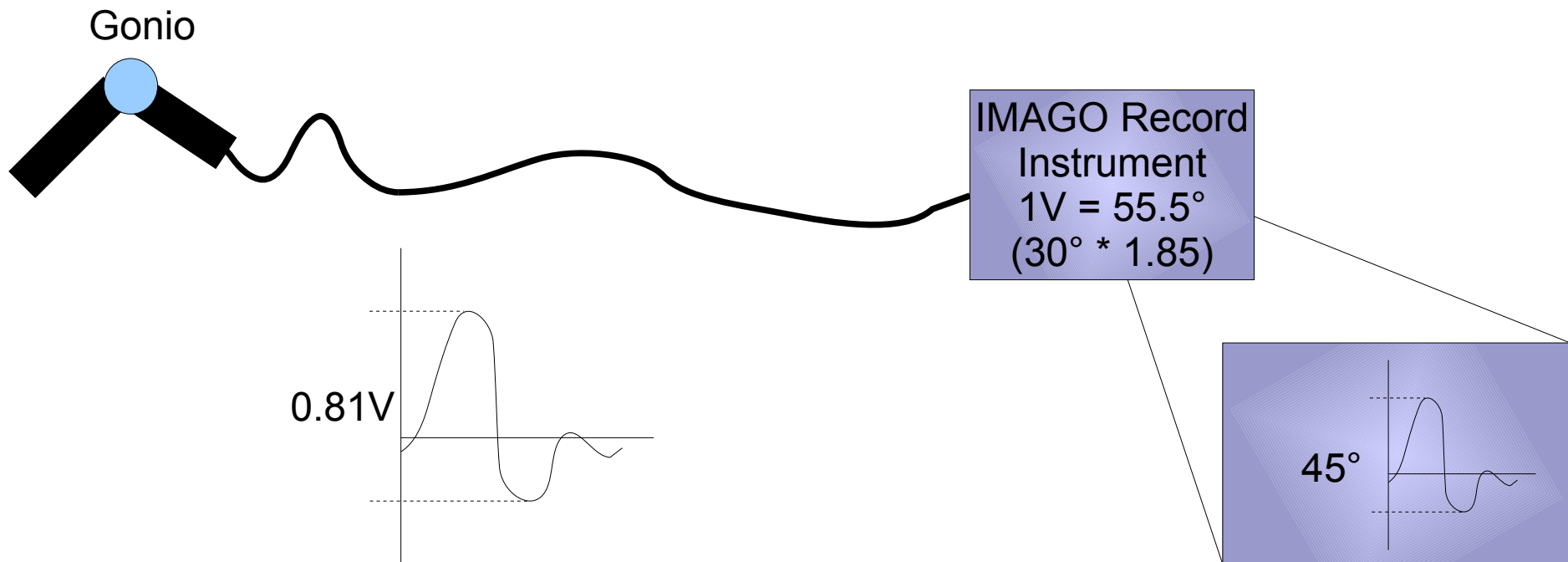
Instruments Calibration Coefficient 2

Example with amplifier: Measuring angles



Instruments Calibration Coefficient 3

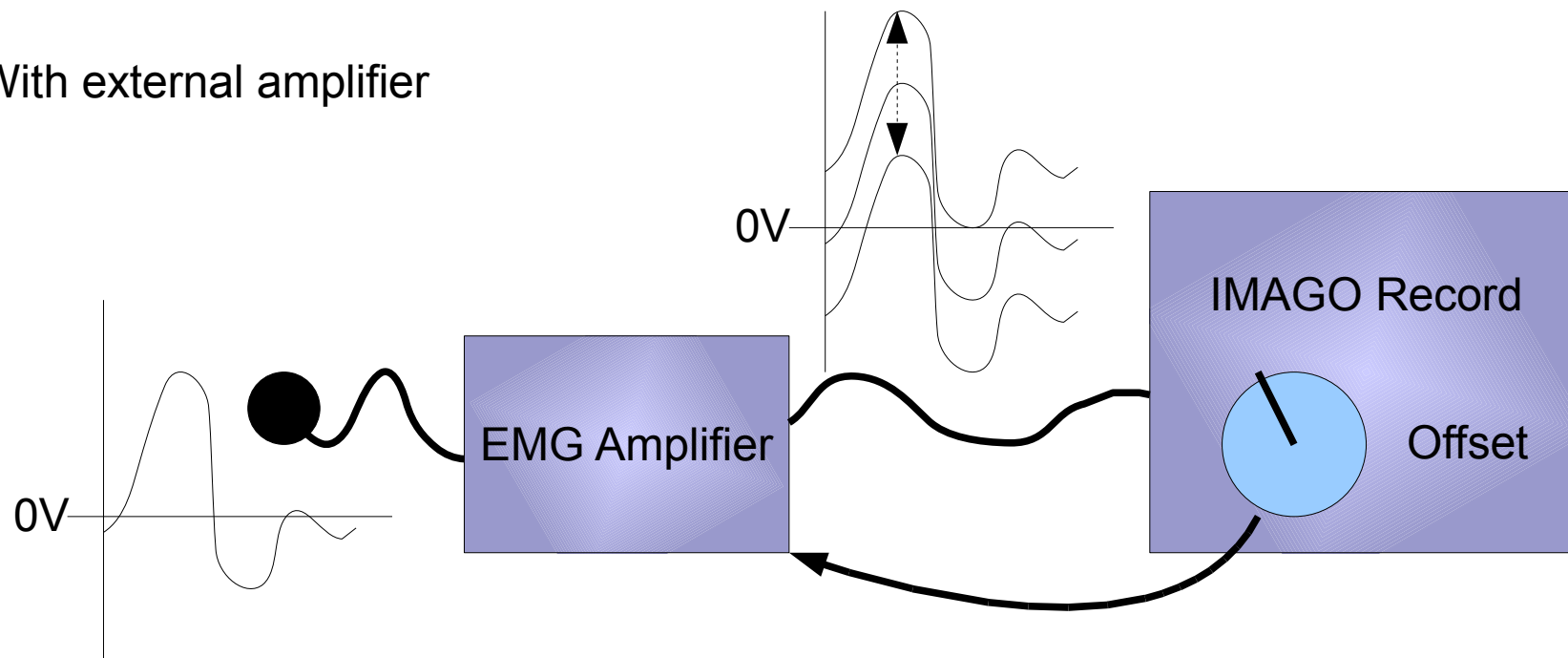
Example without amplifier



Instruments

Changing Offsets 1

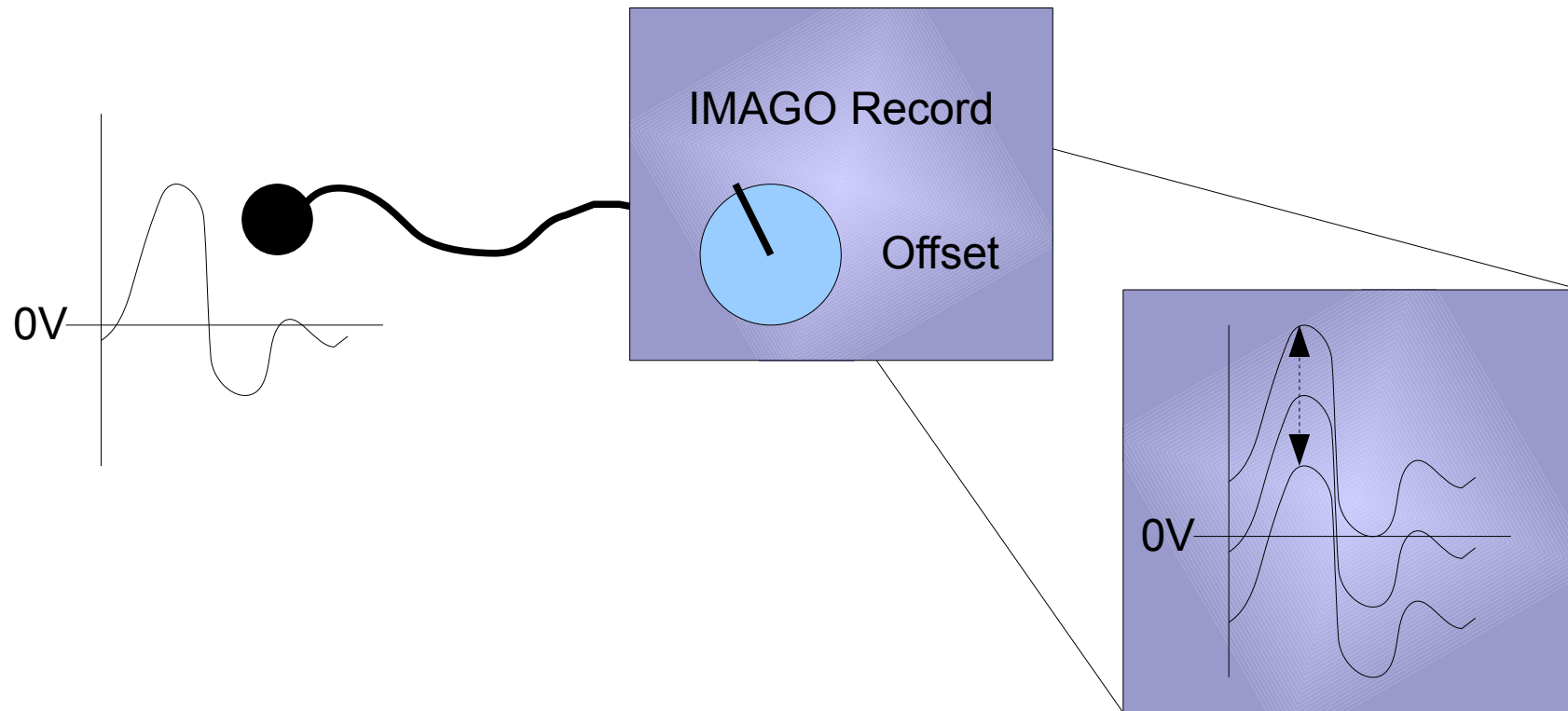
With external amplifier



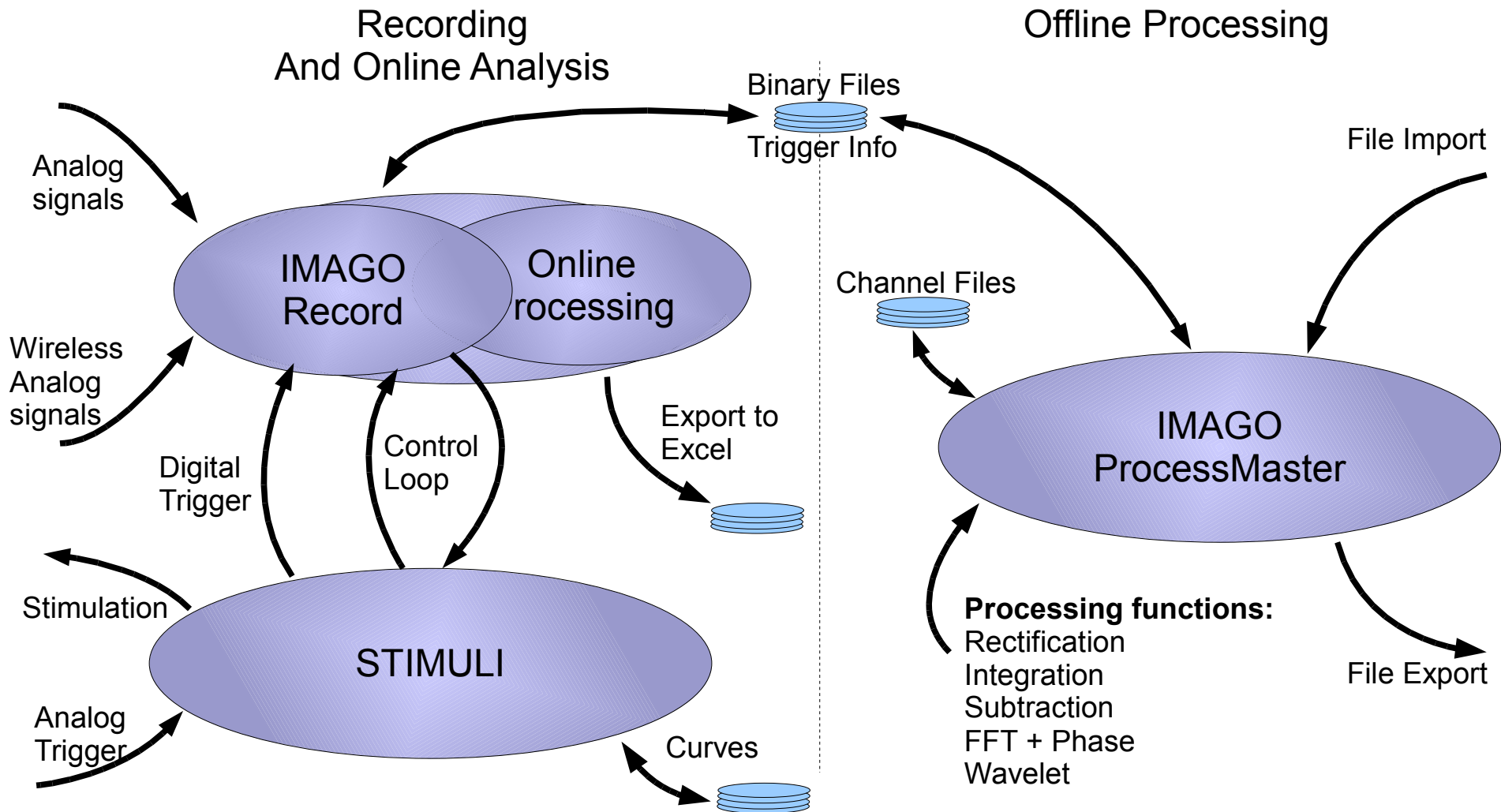
Instruments

Changing Offsets 2

With Channel Definition Instrument:
Offset is added to the Binary data



IMAGO / STIMULI Connections



IMAGO Record Extras – Options 1



Define the recording parameters, they will be stored in the Registry
→ Each measurement system stores its own values

Number of channels of first A/D converter

A/D converter resolution (only re-formatting)

Input Range

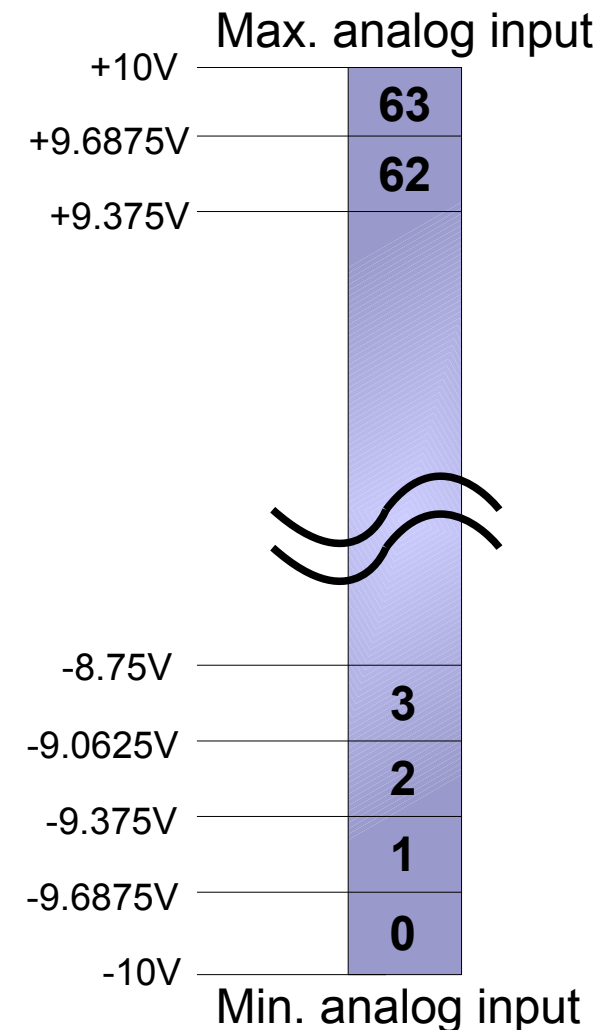
Digital trigger channel

Nr of bits D/A converter (digital trigger resolution = $2^{\text{\#bits}}$)

Instruments

The logo for pfi tec biomedical systems. It features the word "pfi" in a bold, blue, italicized sans-serif font, followed by "tec" in a bold, grey, italicized sans-serif font. Below "pfi" is the text "biomedical systems" in a smaller, italicized sans-serif font. The logo is accented with several blue lines: a horizontal line under "pfi", a vertical line separating "pfi" and "tec", and a horizontal line under "tec".

20V / 64 = 312.5mV per trigger value

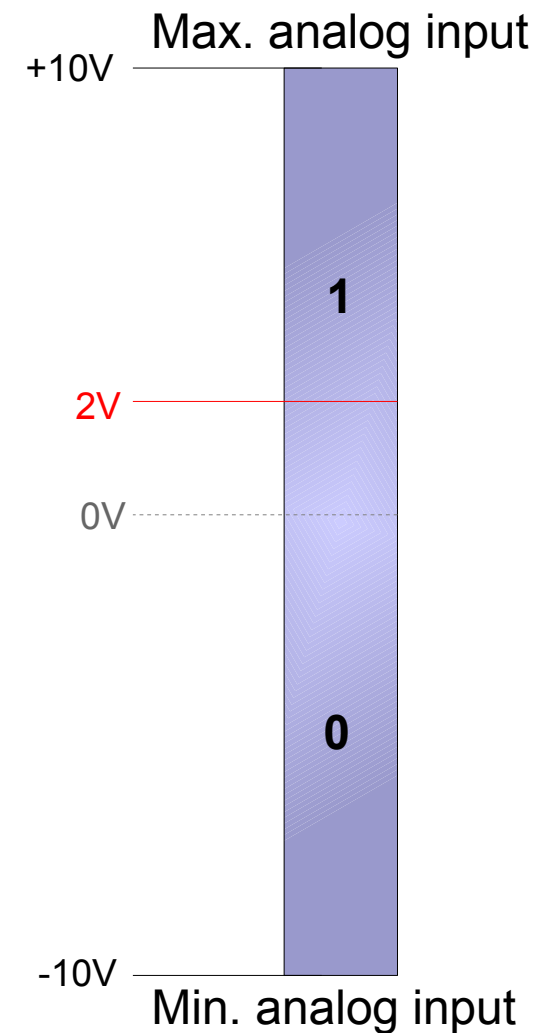
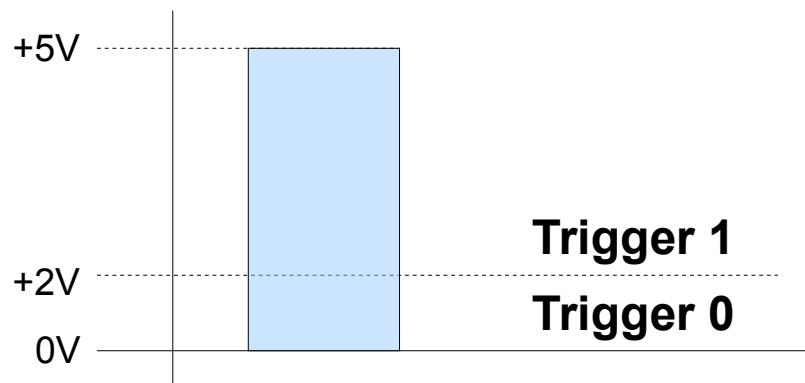


IMAGO Record Extras – Options 3

Special Handling for Digital Trigger 2¹

Normally change between 0 and 1
would be at 0V

Shifted to 2V to enable TTL input signals
as trigger signal



STIMULI

Generate digital trigger

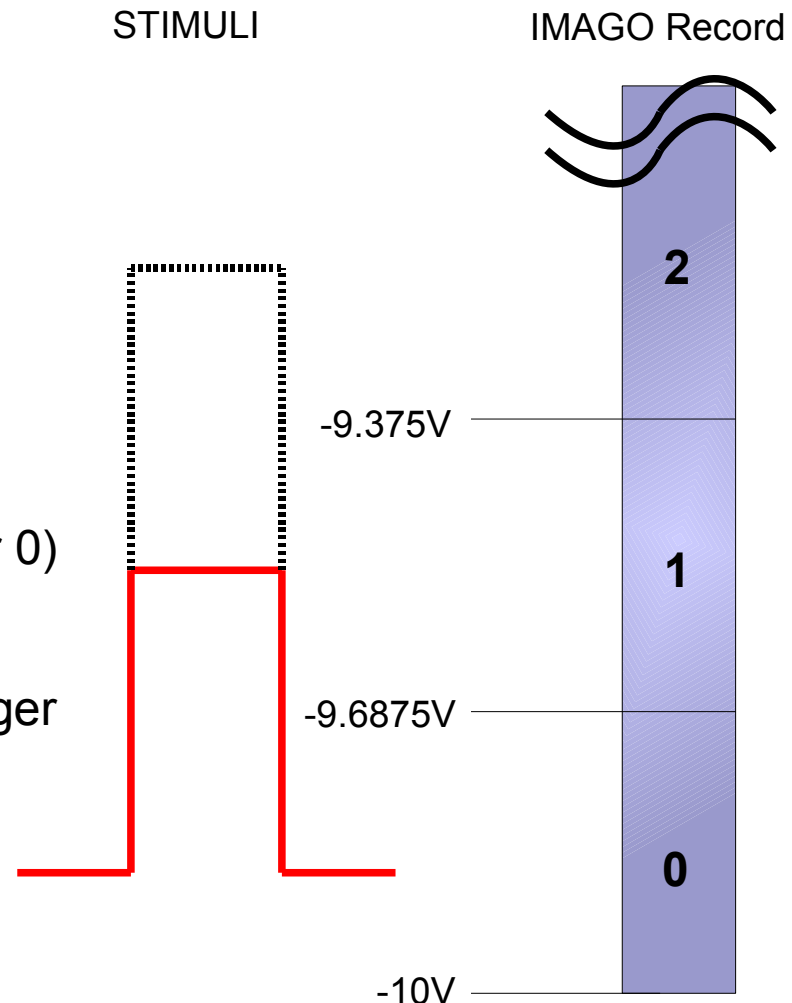
Using STIMULI analog output:

In our example: 312.5mV per trigger value
Generate curve with amplitude 312.5mV

Define length of trigger signal to match your
need for triggered recording

Set offset of signal to -9.8V (middle of trigger 0)

Generate all other digital trigger values with
amplitude modulation → readable digital trigger
information in STIMULI



IMAGO Record Setup 1

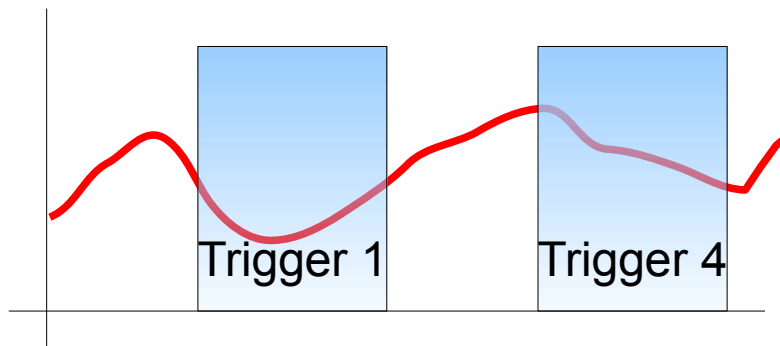
Sample frequency

Path for recorded data

Record mode

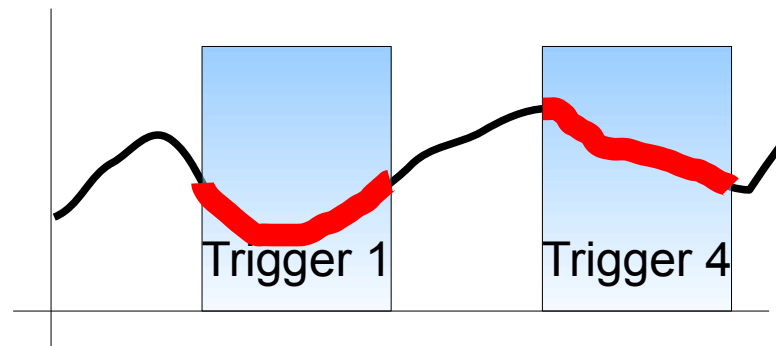
Continuous Recording

Everything is written to file



Triggered Recording

Times with trigger information are written



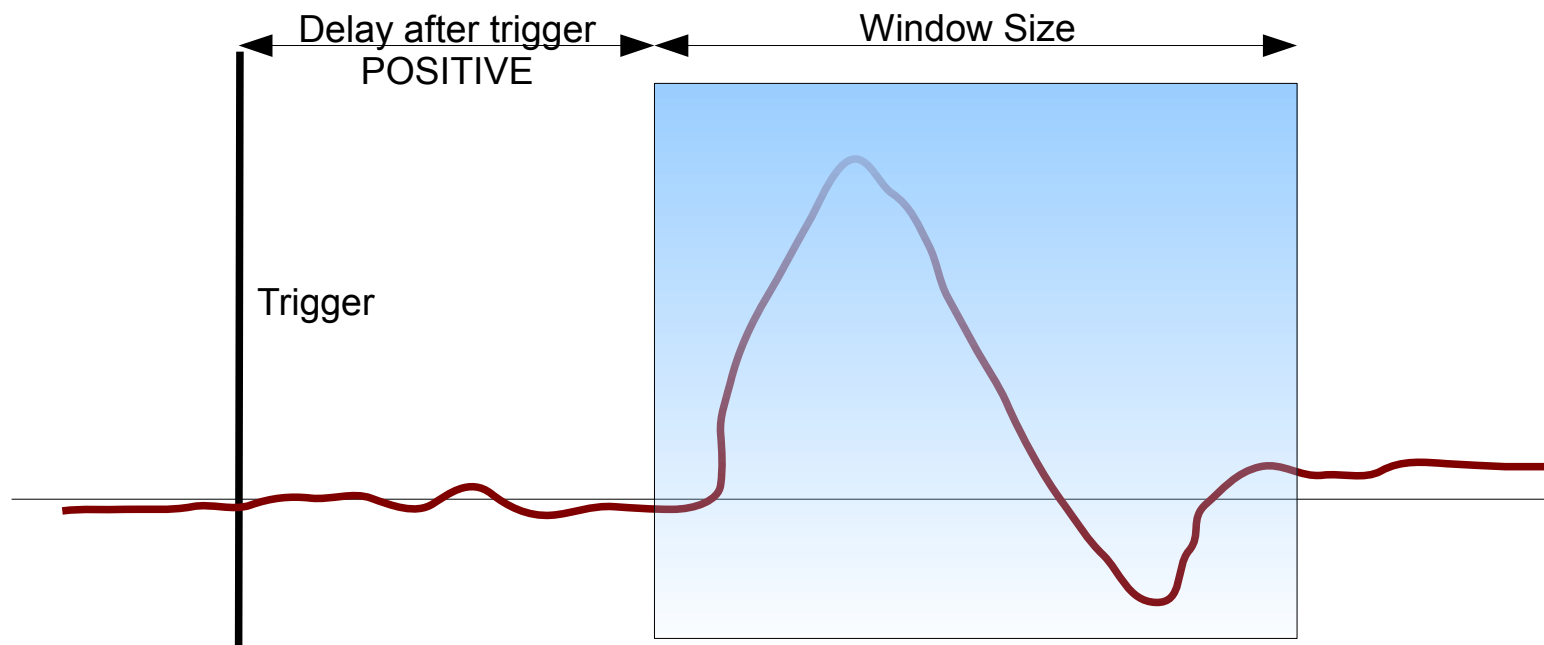
IMAGO Record Setup 2

Delay after trigger:

Start of the region of interest relative to the recorded trigger
Positive and negative values possible

Window Size

Time from Start to End of the region of interest

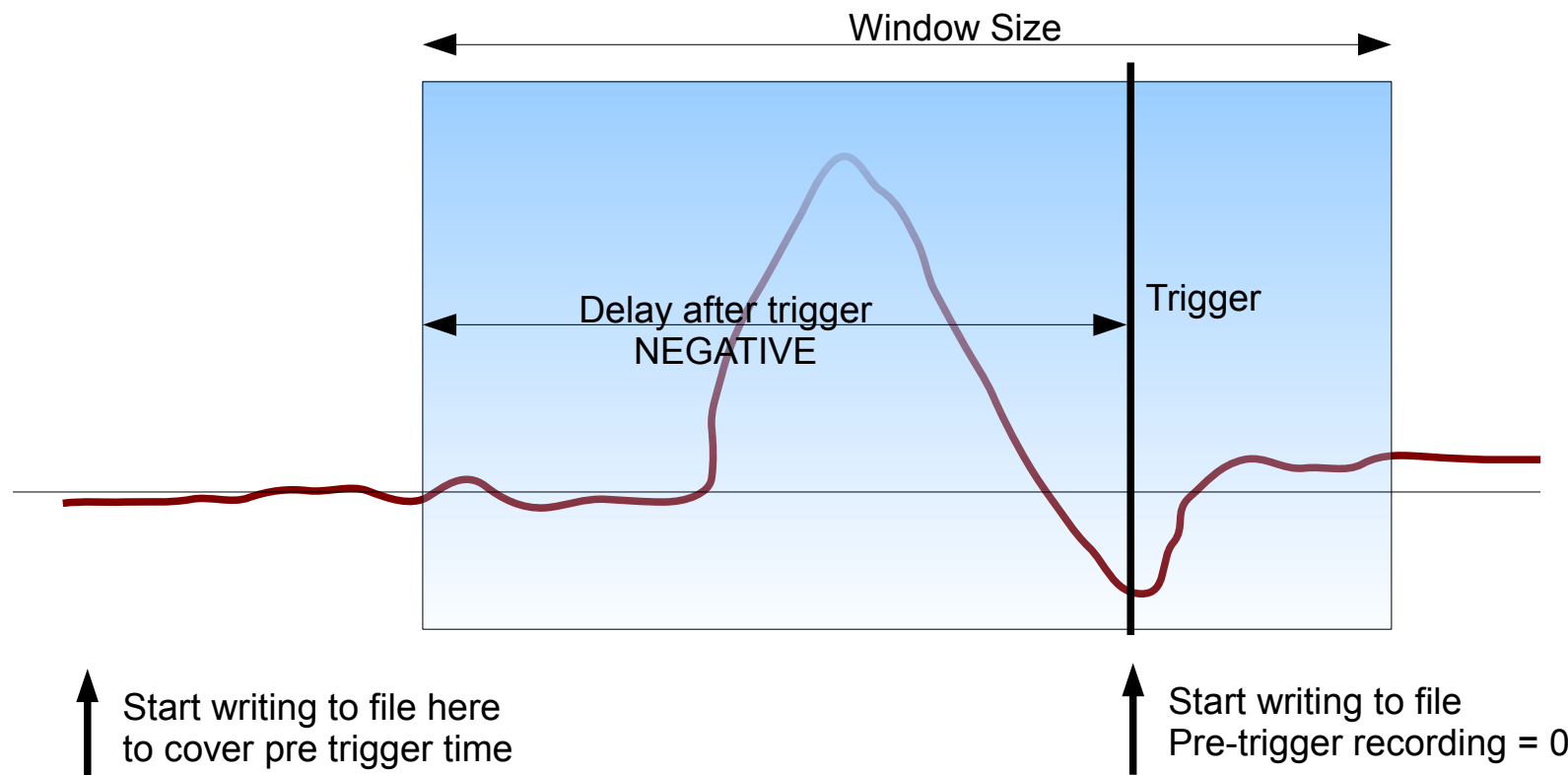


IMAGO Record Setup 3

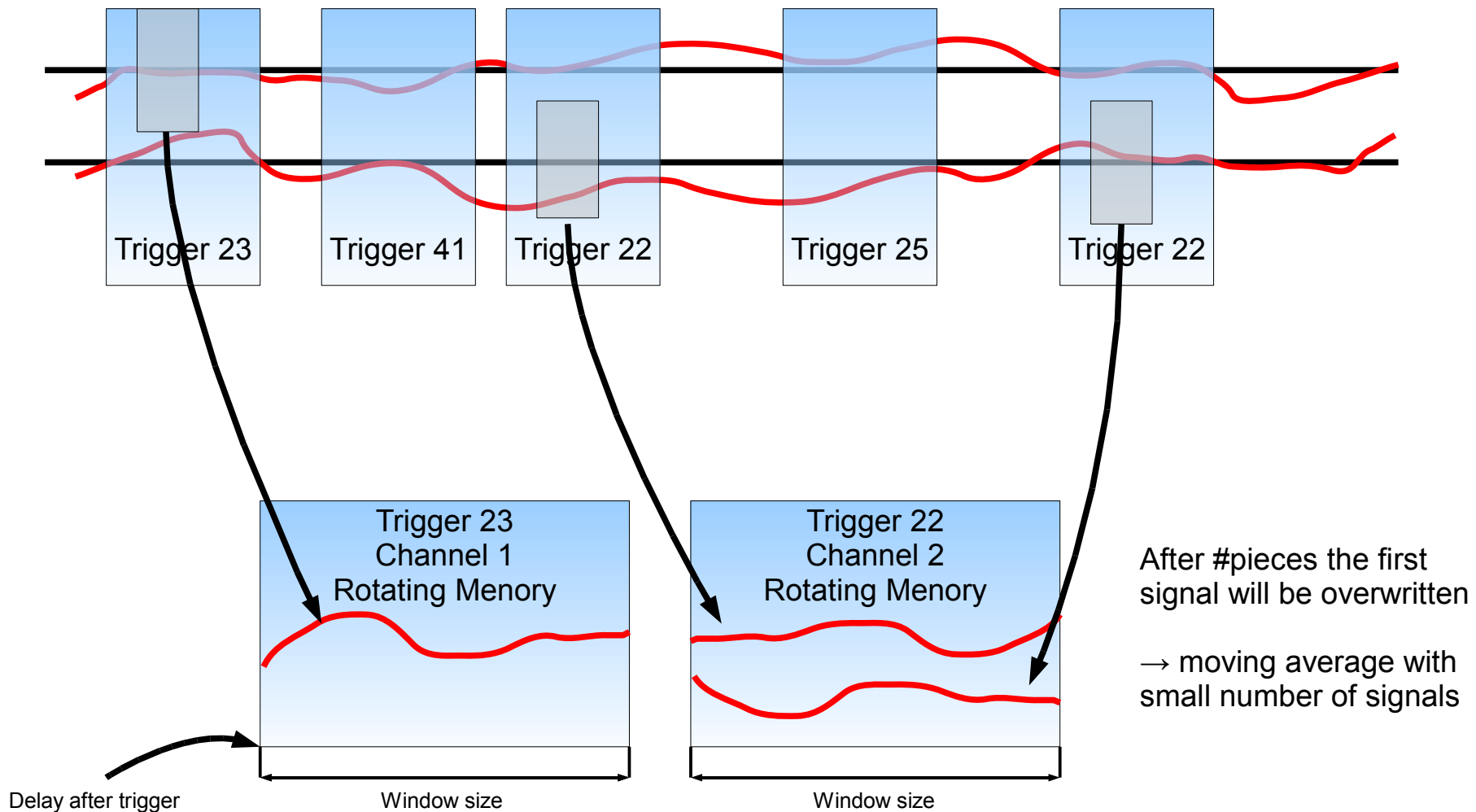
Pre Trigger Recording Time

Recording with negative Delay after trigger also possible with Triggered recording

→ use parameter Pre Trigger Recording



IMAGO Record Online Processing 1



IMAGO Record Online Processing 2



After stopping recording:

Do processing of
 all signals
 all channels
 all trigger conditions

Result
 Excel files with all results

IMAGO Record Online Processing 3



H-Reflex

H/M curve
Stimulus Current Measurement

PSTH Analysis

Post Stimulus Time Histogram

Online processing methods

Online Processing

Mean or Median
Reflex amplitude

Pedal Force Measurement

Trigger Cut
Time Normalization
Mean or RMS
Total Power

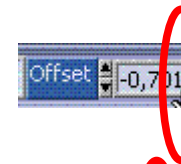
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Graphical Interaction 1

Changing values with buttons:
Default increment is defined for each object



Changing values with keyboard
Set the cursor to specific location
Use Up / Down keys on keyboard



Changing values with double click
Overwrite existing value
Overwrite useful ranges

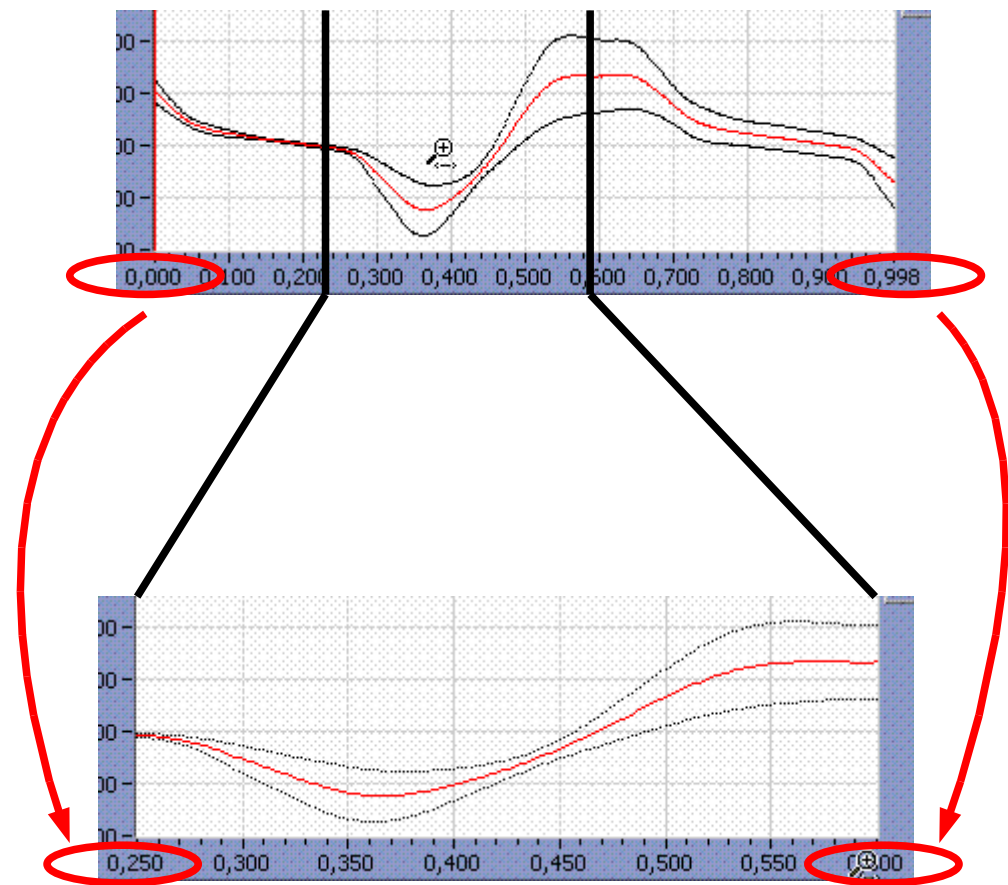


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Graphical Interaction 2

Change the scale of a graph:

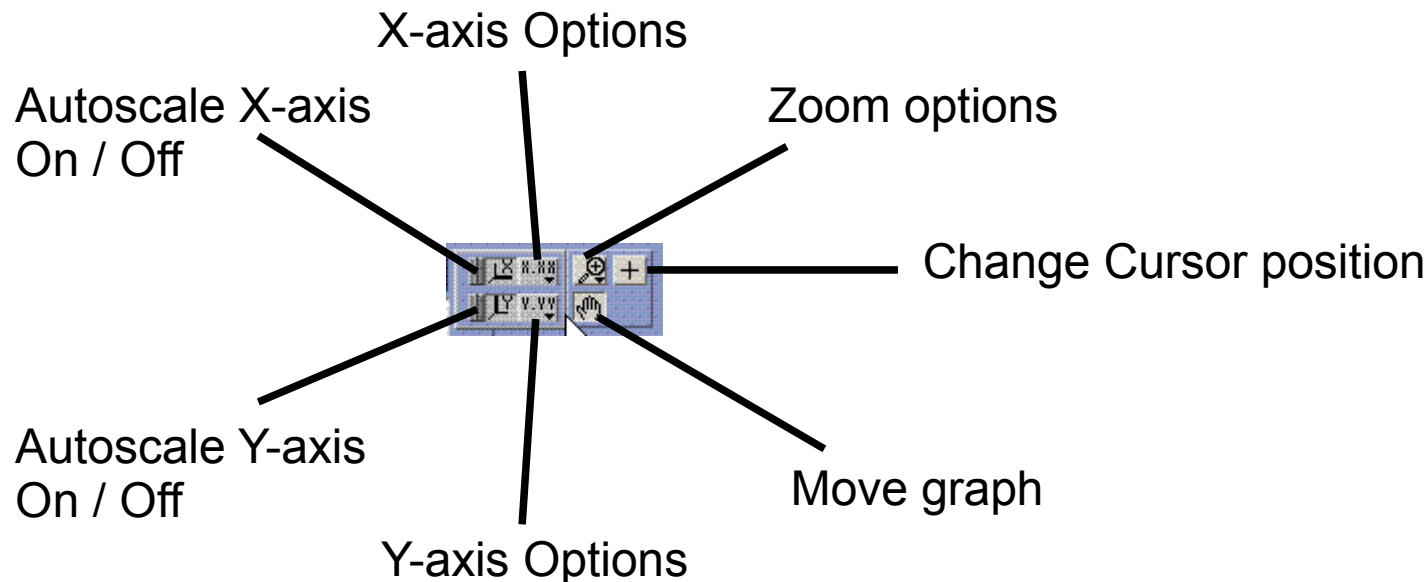
Change the outermost numbers



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Graphical Interaction 3

Each graph can be changed.
Right click on the graph to view the tool bars

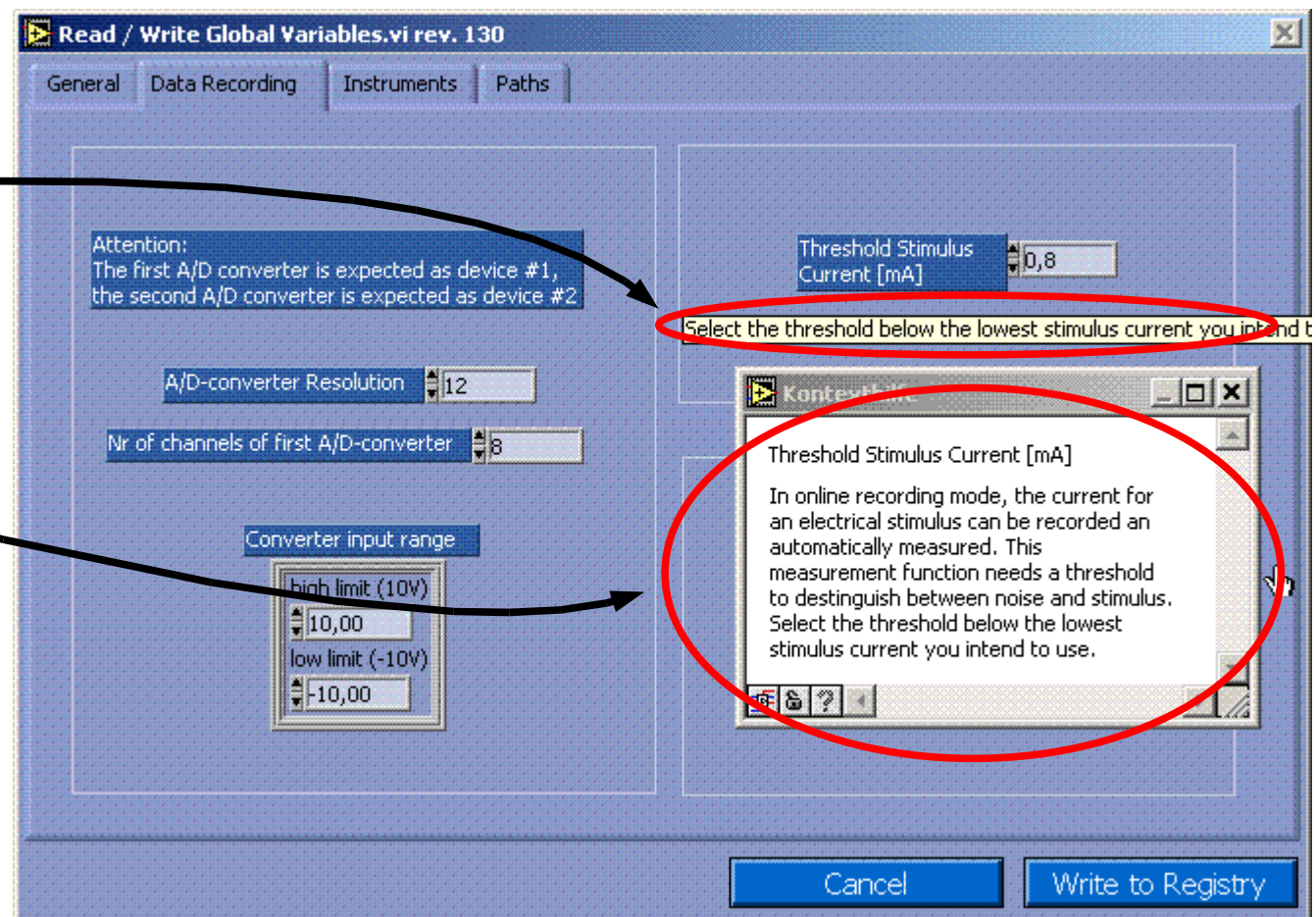


Please note: Some graphical features are predefined and will be overwritten with User Interface changes

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Move cursor
above an object
and view help text.

Press <ctrl>H
to view
additional help text.



pfitec Interactive Help

Integrated interactive help

