ScienceMode

MANUAL FOR TEST SOFTWARE

Version 1.1

DOCUMENT INFORMATION

Acronym *Kürzel*	**Name** *Name*	**Property**[1] *Eigenschaft*	**Date/Signature** *Datum/Unterschrift*
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VERSION HISTORY

Version *Version*	**Date** *Datum*	**Author** *Autor*	**State**[2] *Status*	**Change description** *Änderungsbeschreibung*
1.0	2022-04-13	DHN	D	Initial Document
1.1	2023-10-05	DHN	C	Update of SMPT Version and I24

[1] Creator, Reviewer, Approval
[2] D – Draft, C – Reviewed, A – Approved, R – Reworked

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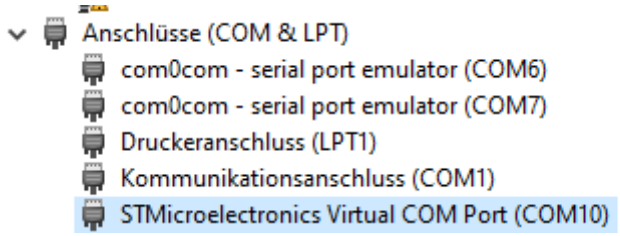
1 ScienceMode Test-Software

1.1 Connecting the P24/I24 Device

After connecting the device to the PC through the USB3 cable, a new COM port should be listed in the device manager. The device manager can be opened by pressing Windows+X and clicking on Device Manager.

The Com & LPT section should have a new entry STMicroelectronics Virtual COM Port

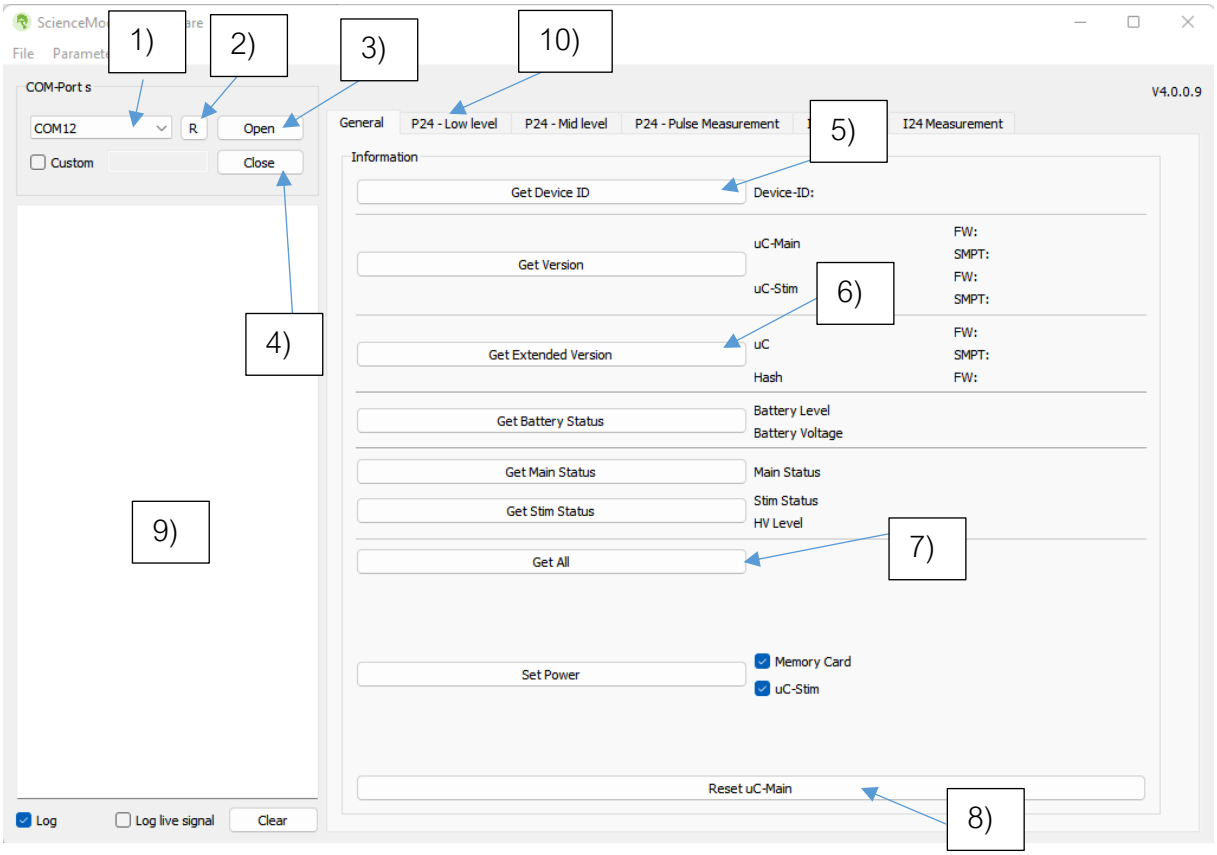


1.2 Starting the Test-Software

Double click on smpt_pc_software.exe

1.3 GENERAL OPERATION

The general tab on the ScienceMode Test-Software can be used to receive information about the device_id, the firmware version and the device status.

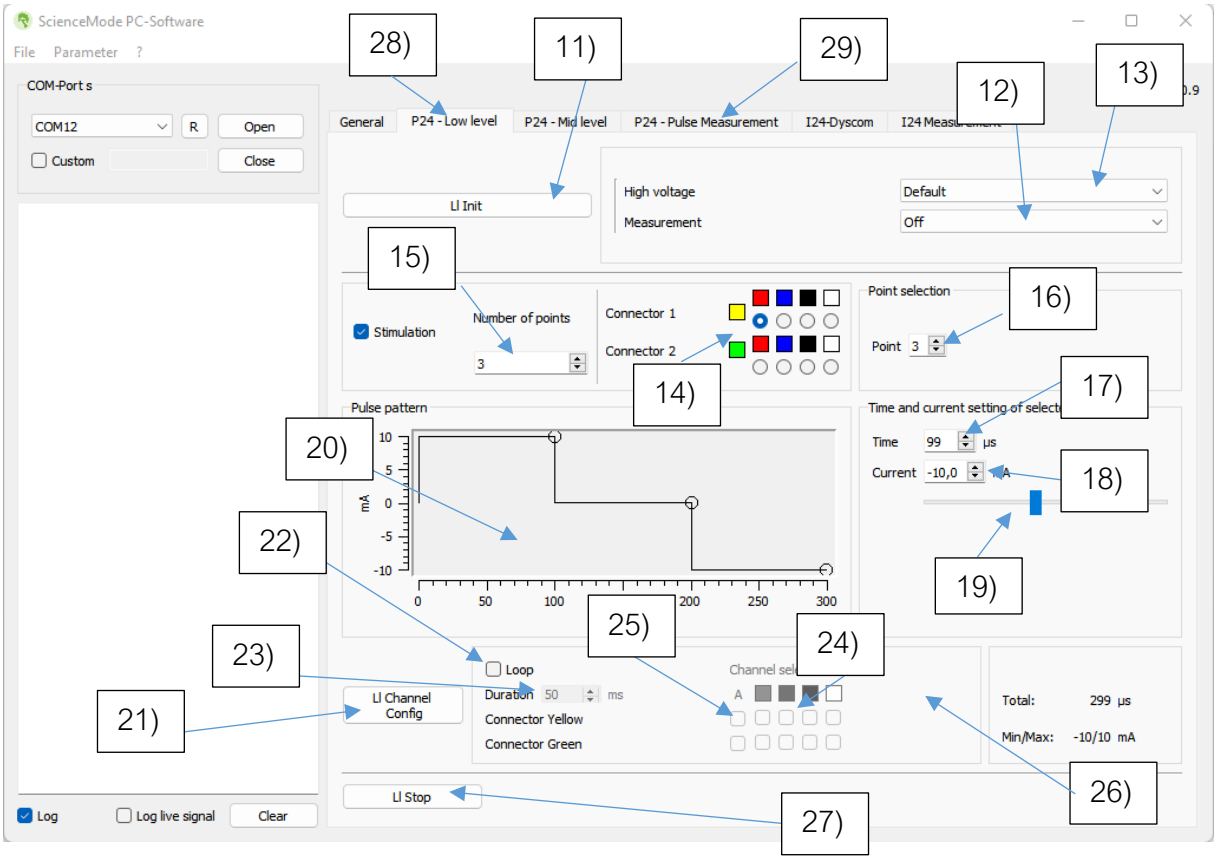


1) Click to select the correct com port, the number which is shown in the device manager has to be entered here
2) Click to refresh the listed com ports, should be done after connecting the P24 device
3) Click to open the comport of the P24 device
4) Click to close the comport of the P24 device
5) Click to read the set Device-ID from the P24
6) Click to read the firmware version and hash
7) Click to read the current P24 state, can be
    a. Uninitialized (High voltage is switched off
    b. LI_Initialized / 150 V – High voltage is switched on and the device is in Low level Mode
    c. MI_Initialized / 150 V - High voltage is switched on and the device is in Mid level Mode
8) Click to reset the P24
9) Log messages during operation are printed here
10) Click to switch the current screen

11)

1.4 Low-Level Operation (P24-Device)

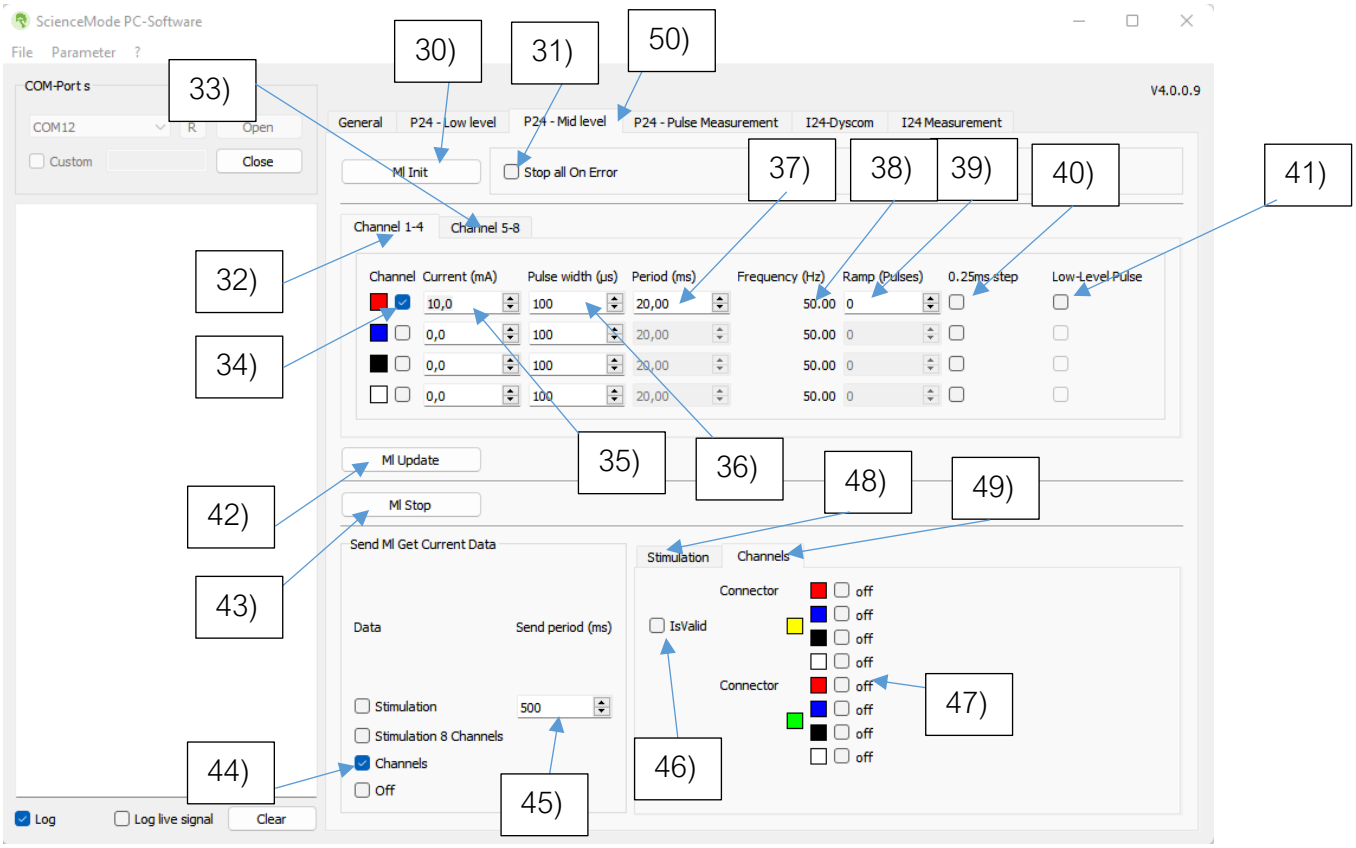
The low-level screen can for used for defining a custom shaped pulse. Each stimulation pulse needs to triggered from the PC.



12) Click to initialize the P24 for Low level operation (This switches on the high voltage source)
13) Click to enable pulse measurement (current, voltage or high voltage source), result is shown in 29)
14) Click to set high voltage source to off or 150 V (Normally not needed)
15) Click to set output channel (when stimulation is activated by 21))
16) Click and enter amount of pulse points (default 1)
17) Click and enter current point to edit
18) Click and set duration in microseconds
19) Click an the arrow to increase/decrease the current by 0.5mA (mouse wheel works also)
20) Click to increase/decrease the current by 1 mA (hold and drag works also)
21) This plot window shows the current pulse
22) Click to stimulate the channel selected at 15) by the pulse shown in 20)
23) Click to enable/disable, when enabled the selected channels in 24) are stimulated every 23) milliseconds
24) Click and enter stimulation period in milliseconds
25) Click to enable all channels that should be stimulating
26) Click to enable all channels at once
27) Click and enter time multiplier, e.g. 1.5 multiplies all times by 1.5 (Normally not visible, can be enabled by STRG+ALT+L)
28) Disables the high voltage source and set state to uninitialized
29) Click to switch to the low level configuration screen
30) Click to switch to pulse measurement

1.5 Mid-Level Operation (P24-Device)

The mid-level screen can be used for defining a stimulation pattern, which is executed at the P24 device



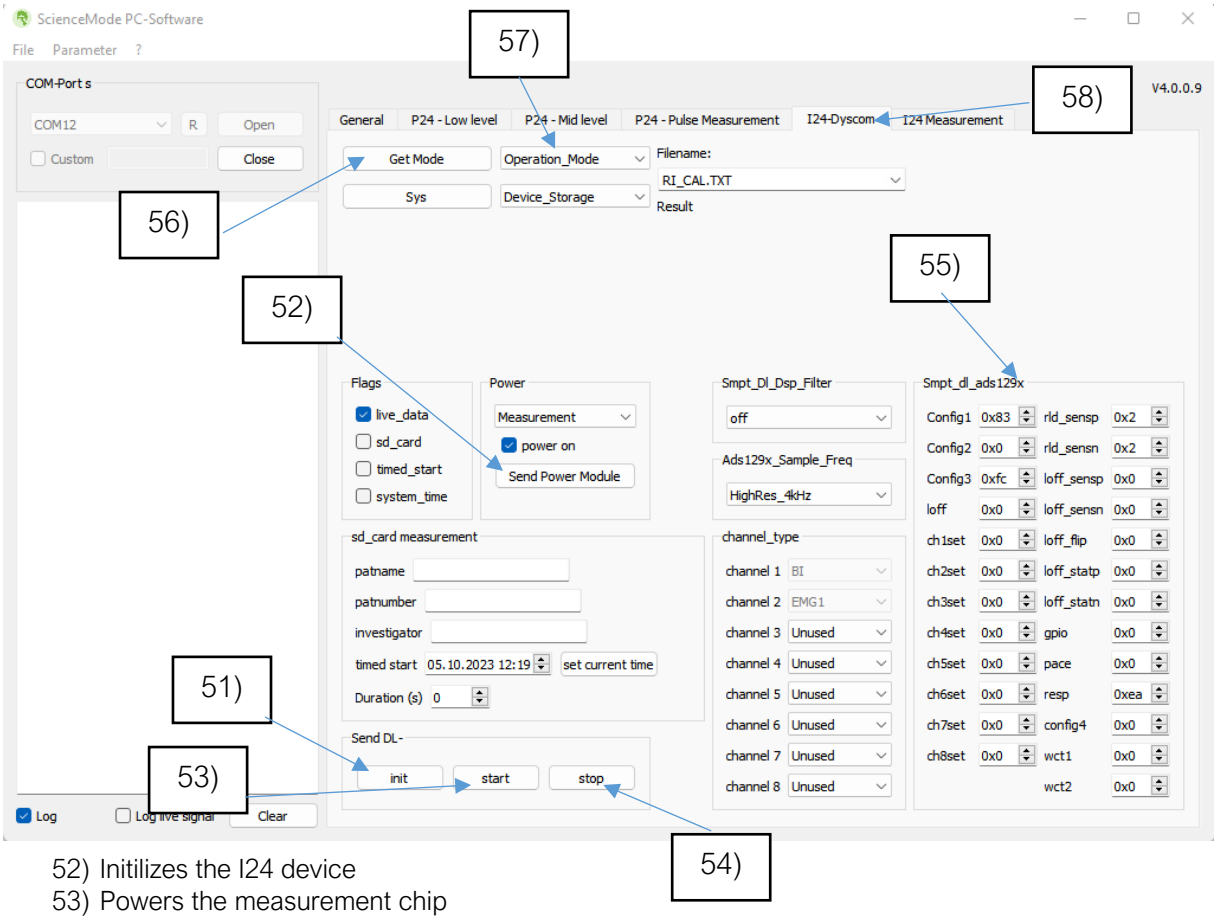
31) Click to initialize the P24 for Mid level operation (This switches on the high voltage source)
32) Click to enable/disable Stop on all errors (when active, the stimulation is stopped for all channels when an error in any channel occurs)
33) Click to select Channels 1-4 (Yellow connector) for editing (Points 35) to 41) are valid for each channel 1-4)
34) Click to select Channels 5-8 (Green connector) for editing (Points 35) to 41) are valid for each channel 5-8)
35) Click to enable/disable a channel for stimulation
36) Click the arrow to increase/decrease the stimulation current by 0.5 mA (mouse wheel can also be used)
37) Click and enter pulse width in microseconds
38) Click and enter stimulation period in milliseconds (Step size 0,5 milliseconds, when 40) is enabled, the step size is 0,25 milliseconds)
39) Shows the Stimulation frequency
40) Click and enter the number of pulses, which should be used to ramp up the current, a number between 0-15 is valid
41) Click to enable/disable period step size of 0,25 milliseconds
42) Click to enable/disable the usage of the low-level pulse which is set in 15) to 19), when enabled 35) and 36) is not used
43) Click to activate/update the mid-level pulse configuration. Stimulation is started when not active before, otherwise the parameters are updated.
44) Click to stop the stimulation and to disables the high voltage source and set state to uninitialized
45) Click to set the type of the returned MI Get current Data
    a. Stimulation: only information about the first 4 channels is shown in 48)
    b. Stimulation 8 Channels: information about all 8 channels is shown in 48)
    c. Channels: More information about all 8 channels is shown in 49)

d. Off: MI Get current Data is not send out, which means that the stimulation is stopped due to the missing keeping live signal

46) Set the send period of the MI Get current Data package
47) Is set to enabled with the correct view is selected (see also 44))
48) Shows which channel is active and when an error has occurred on the channel. Ok means no error at all
49) Information widget for Stimulation and Stimulation 8 Channels (see 44))
50) Information widget for Channels (see 44))
51) Click to switch to the mid level configuration screen

1.6 DYSCOM OPERATION (I24-DEVICE)

The dyscom screens (I24-Dyscom and I24 Measurement tabs) cannot be used together with the P24 device.



52) Initilizes the I24 device
53) Powers the measurement chip
54) Starts a measurement.
55) Stops the currently running measurement.
56) See the ADS1294R chip manual for a detailed description of registry values. The registry values are transmitted to the chip when pressing init (51))
57) Retungs the opation mode, when 57) is set to Operation_Mode
58) Defines what Button 56) will return. Default is Operation Mode
59) I24 Tab

1.7 MEASUREMENT OPERATION (I24-DEVICE)

60) Starts a measurement by doing an initialization (51), powering up the measurement chip (52) and starting a measurement (53)
61) Stops the currently running measurement.
62) I24 Measurement tab
63) I24 FFt Measurement tab (Shows the Offset and the amplitude / frequency of the highest peak)

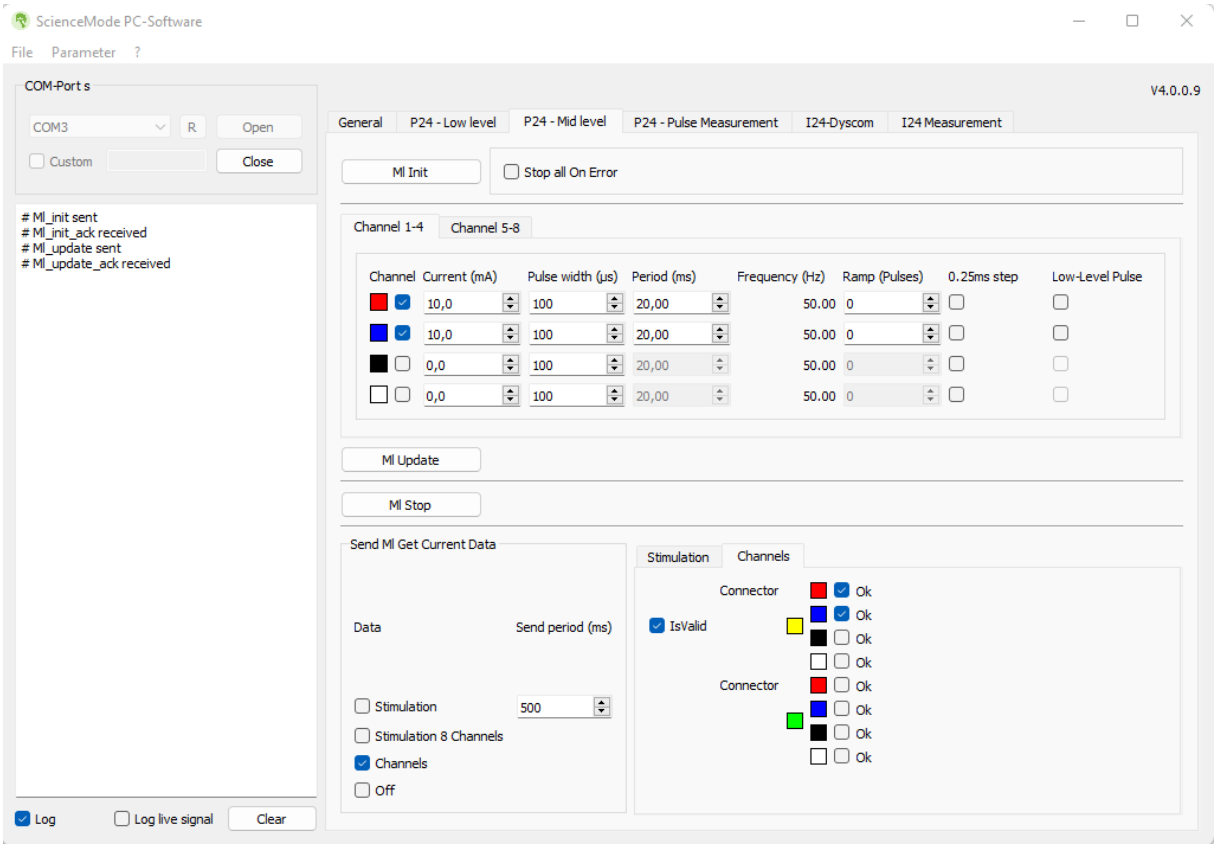
2 P24 Use Cases

2.1 Stimulating channel 1 and 2 with a bi-phasic pulse (10 mA and 100 microseconds)

- The P24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the mid-level tab 50)
- Initialize the mid-level by clicking 30)
- Enable channel 1 and 2 by clicking on the red and blue checkbox 34)
- Increase the current to 10 mA by pressing the up-arrow 35) or by turning the mouse wheel
- Set the pulse width in 36) for both channels
- Press MI-Update 42)

The setting can also be seen in the screenshot below.

Stimulation can be stopped by pressing MI stop 43)

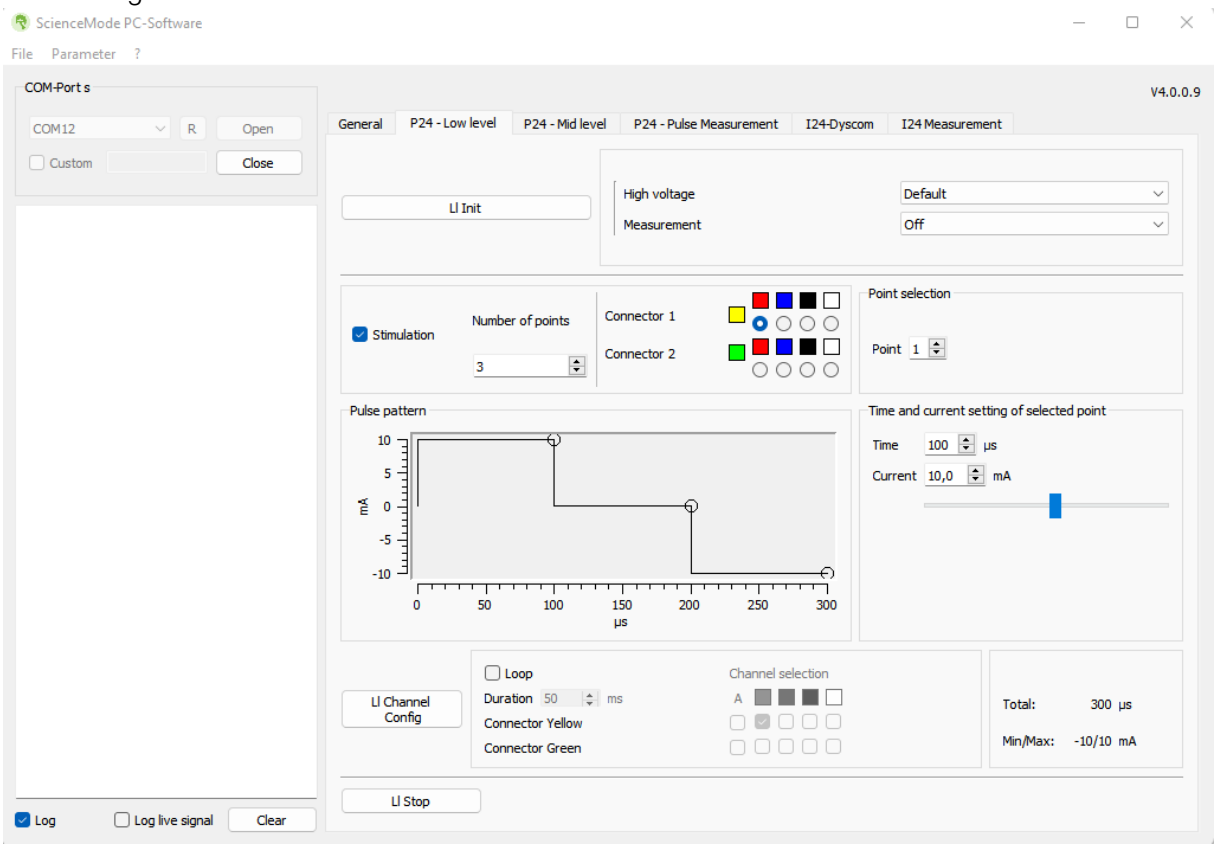


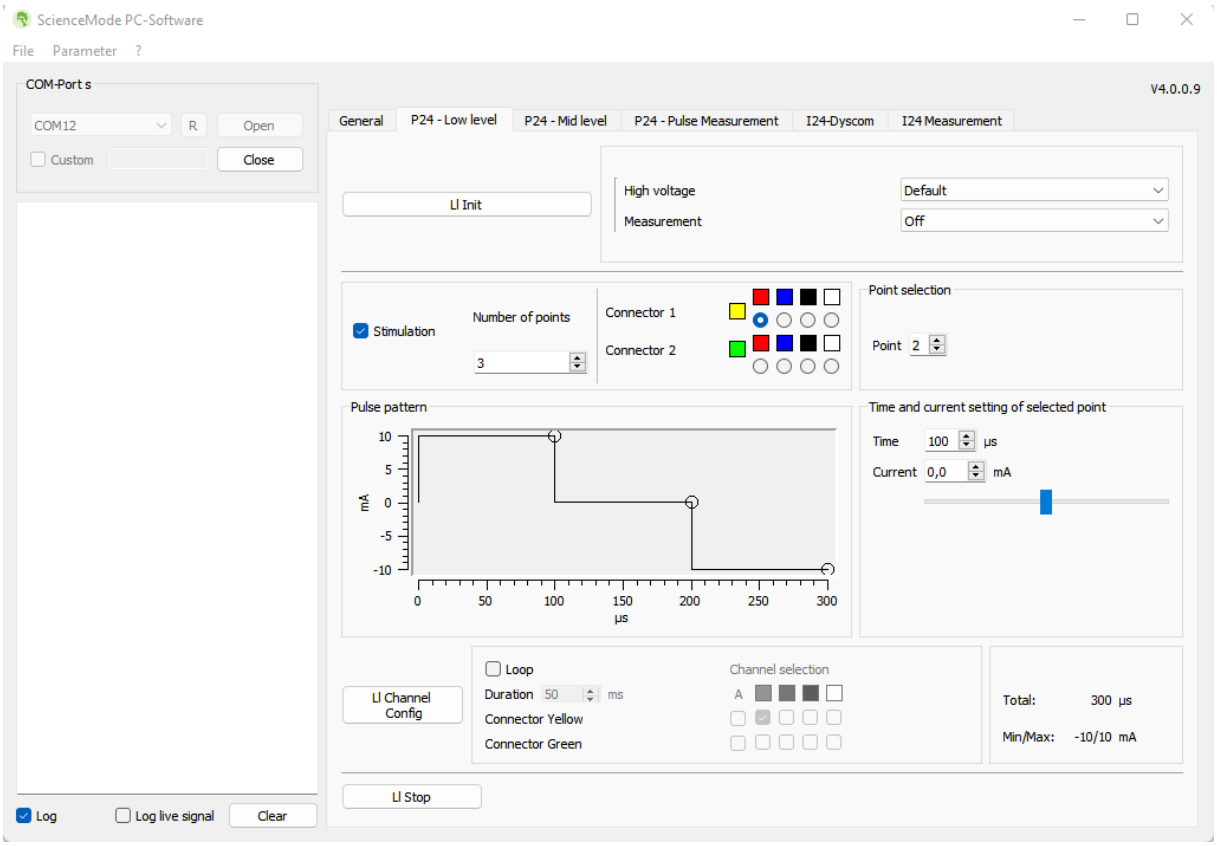
2.2 Stimulating Channel 1 and 2 with a low-level Pulse in Mid-Level

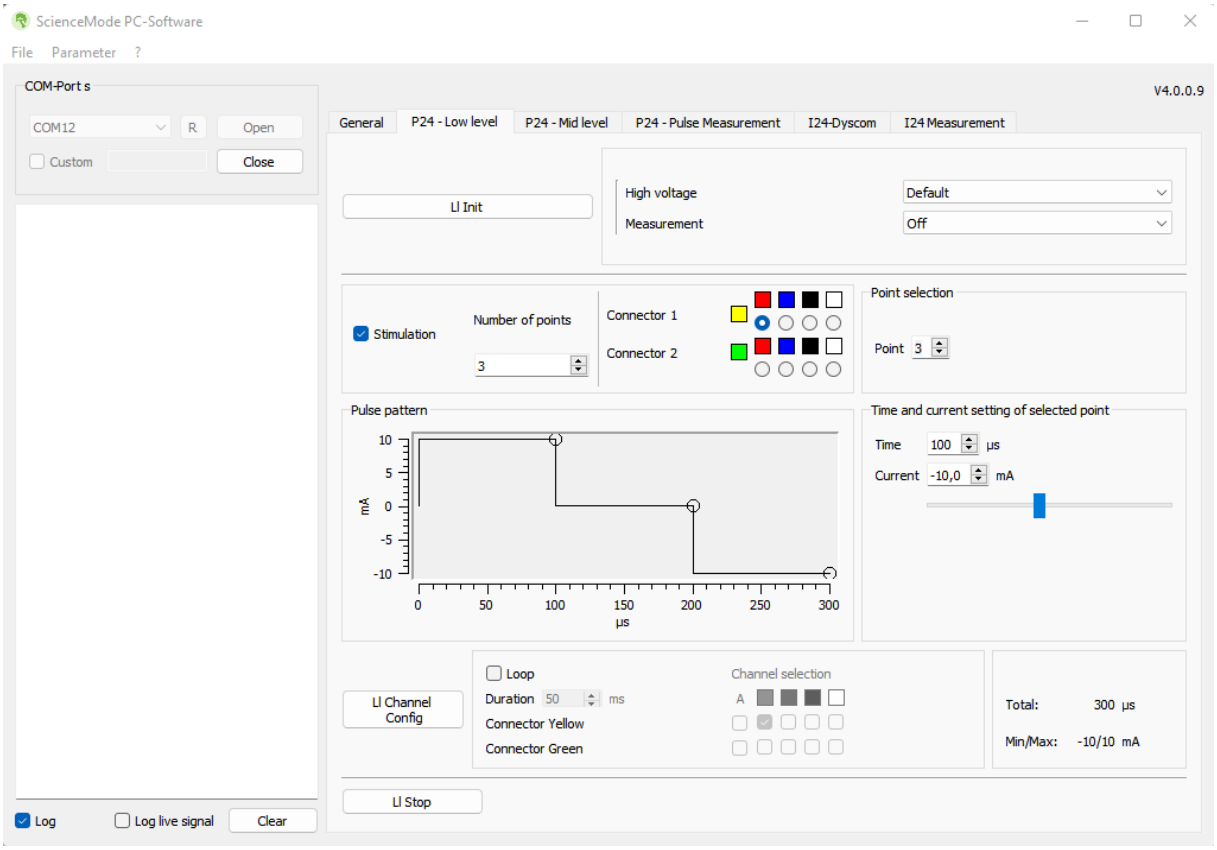
- The P24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the low-level tab 28)

- Initialize the low-level by clicking 11)
- Set 15) to 3 points
- Set the 1 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to 10 mA 18) / 19)
- Set the 2 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to 0 mA 18) / 19)
- Set the 3 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to -10 mA 18) / 19)
- Activate loop setting 22)
- Select the first channel at 24)
- Activate stimulation by pressing LI Channel Config 21)

The settings can be seen in the three screenshots below:





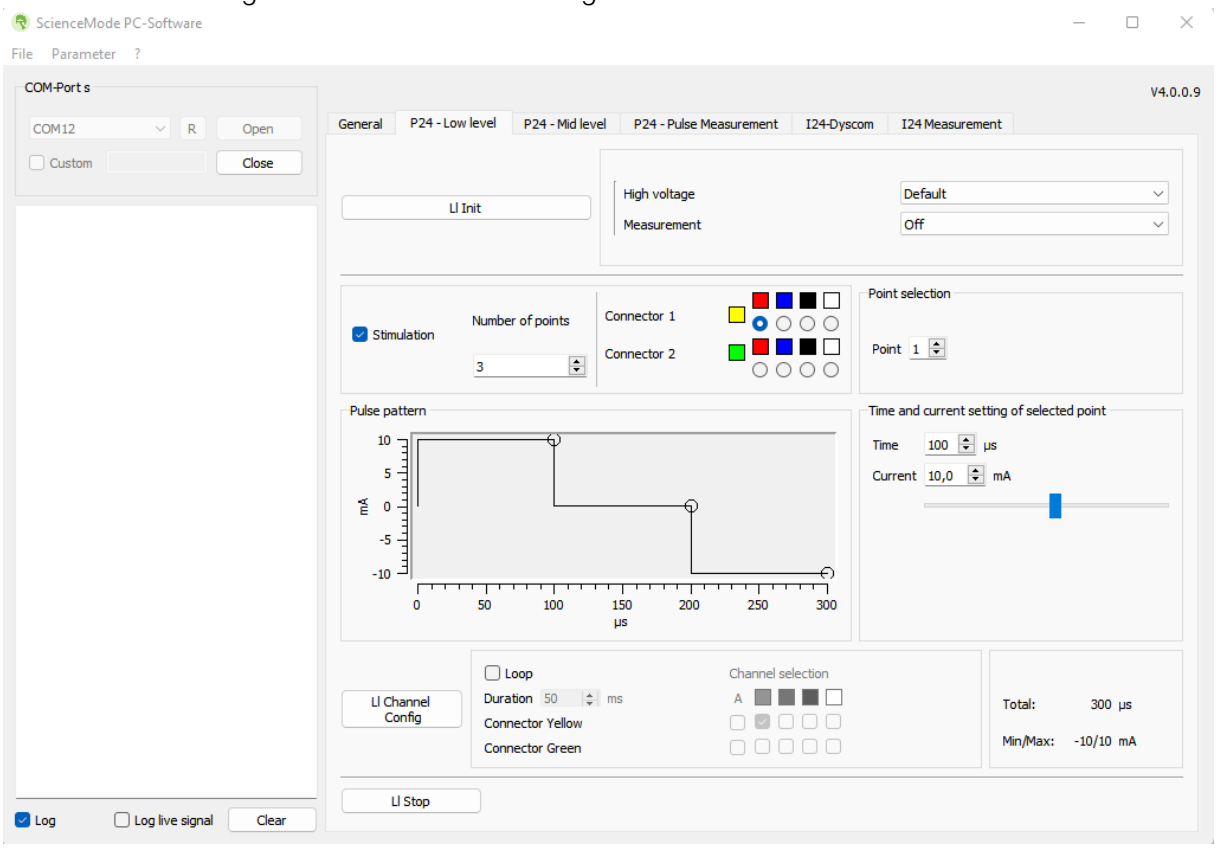


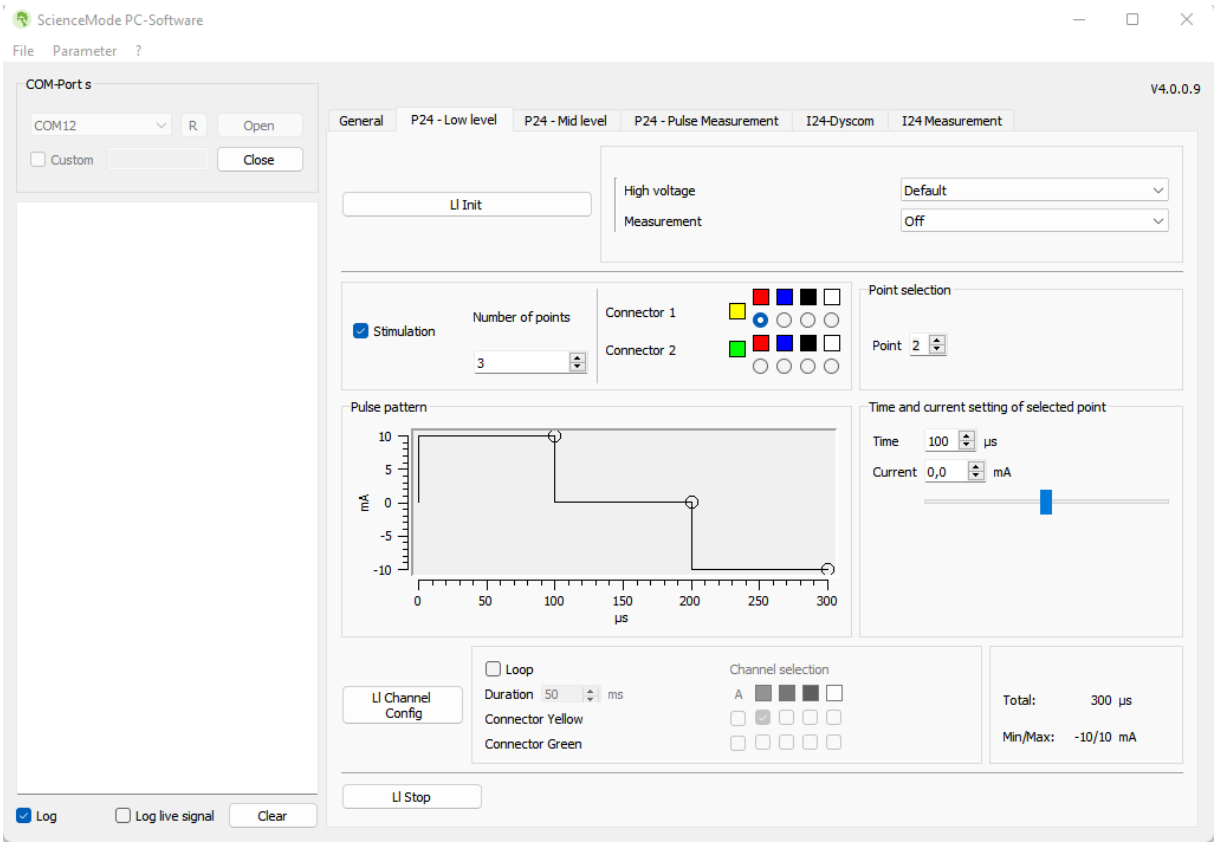
Stimulation can be stopped by pressing LI stop 27)

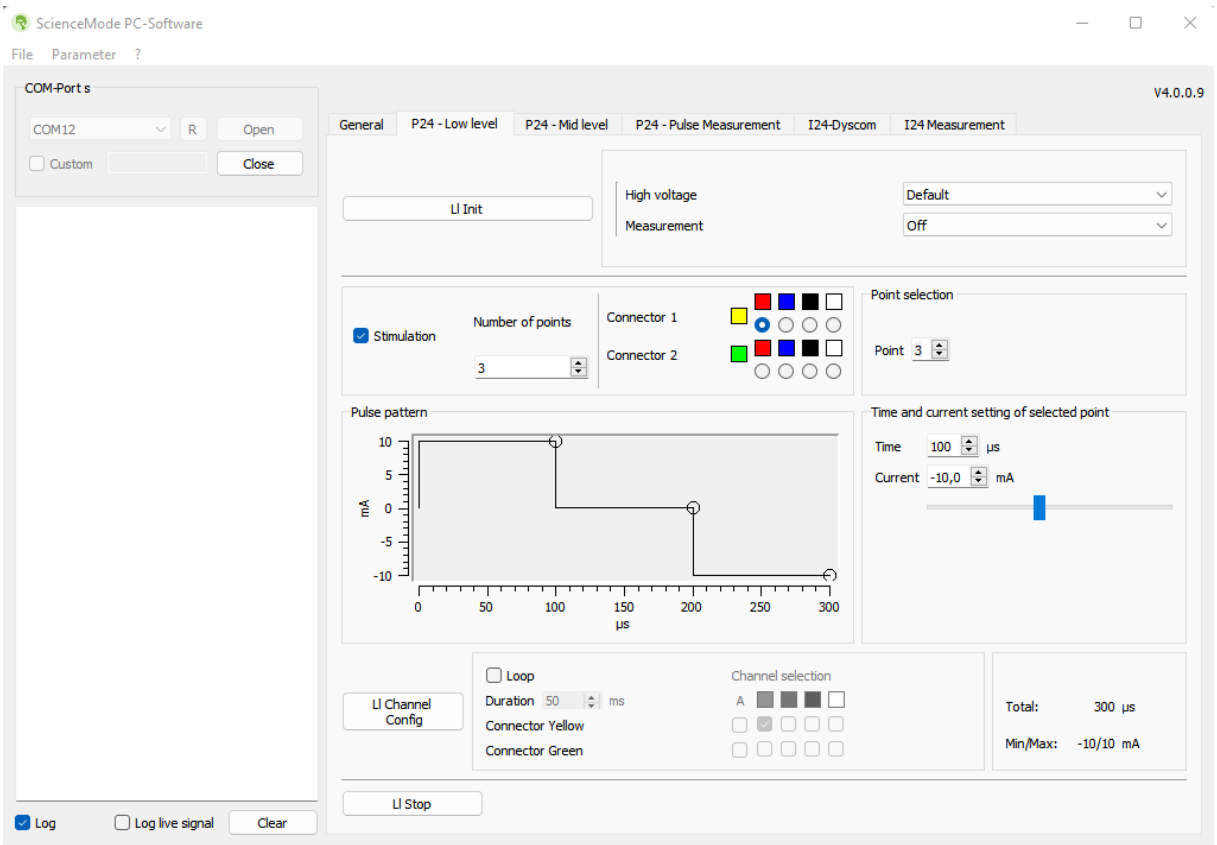
2.3 Stimulating Channel 1 and 2 with a low-level Pulse in Mid-Level

- The P24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the mid-level tab 50)
- Initialize the mid-level by clicking 30)
- Enable channel 1 and 2 by clicking on the red and blue checkbox 34)
- Enable low-level for both channels 41)
- Go to the low-level tab 28)
- Set 15) to 3 points
- Set the 1 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to 10 mA 18) / 19)
- Set the 2 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to 0 mA 18) / 19)
- Set the 3 point for editing 16)
- Set time to 100 microseconds 17)
- Set current to -10 mA 18) / 19)
- Go to the mid-level tab 50)
- Press MI-Update 42)

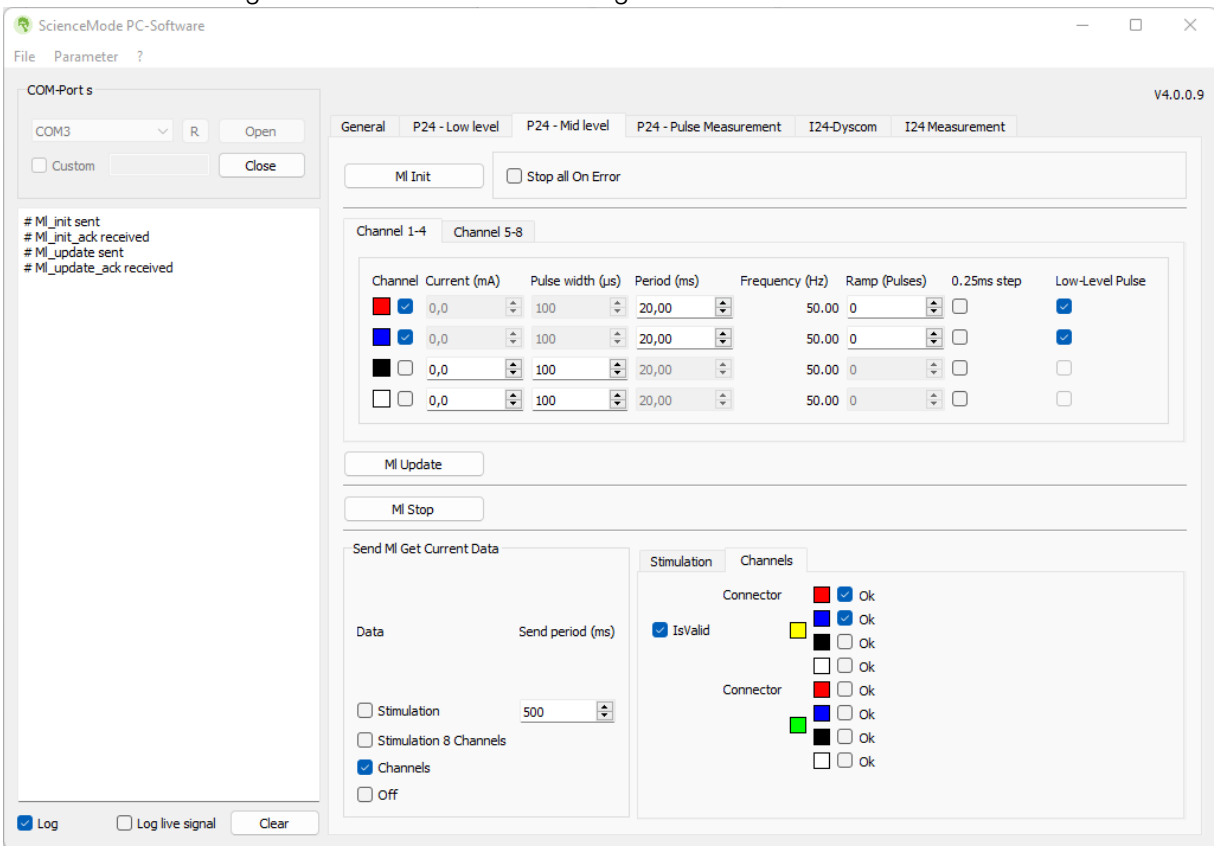
The low level settings can be seen the following three screen shots:




ScienceMode PC-Software
File
Parameter
?
COM-Port s
COM12
R
Open
Custom
Close
V4.0.0.9
General
P24 - Low level
P24 - Mid level
P24 - Pulse Measurement
I24-Dyscom
I24 Measurement
LI Init
High voltage
Default
Measurement
Off
Stimulation
Number of points
3
Connector 1
Connector 2
Point selection
Point 2
Pulse pattern
mA
µs
Time and current setting of selected point
Time 100 µs
Current 0,0 mA
LI Channel Config
Loop
Duration 50 ms
Connector Yellow
Connector Green
Channel selection
A
Total: 300 µs
Min/Max: -10/10 mA
LI Stop
Log
Log live signal
Clear


ScienceMode PC-Software
File
Parameter
?
COM-Port s
COM12
R
Open
Custom
Close
V4.0.0.9
General
P24 - Low level
P24 - Mid level
P24 - Pulse Measurement
I24-Dyscom
I24 Measurement
LI Init
High voltage
Default
Measurement
Off
Stimulation
Number of points
3
Connector 1
Connector 2
Point selection
Point 3
Pulse pattern
mA
µs
Time and current setting of selected point
Time 100 µs
Current -10,0 mA
LI Channel Config
Loop
Duration 50 ms
Connector Yellow
Connector Green
Channel selection
A
Total: 300 µs
Min/Max: -10/10 mA
LI Stop
Log
Log live signal
Clear

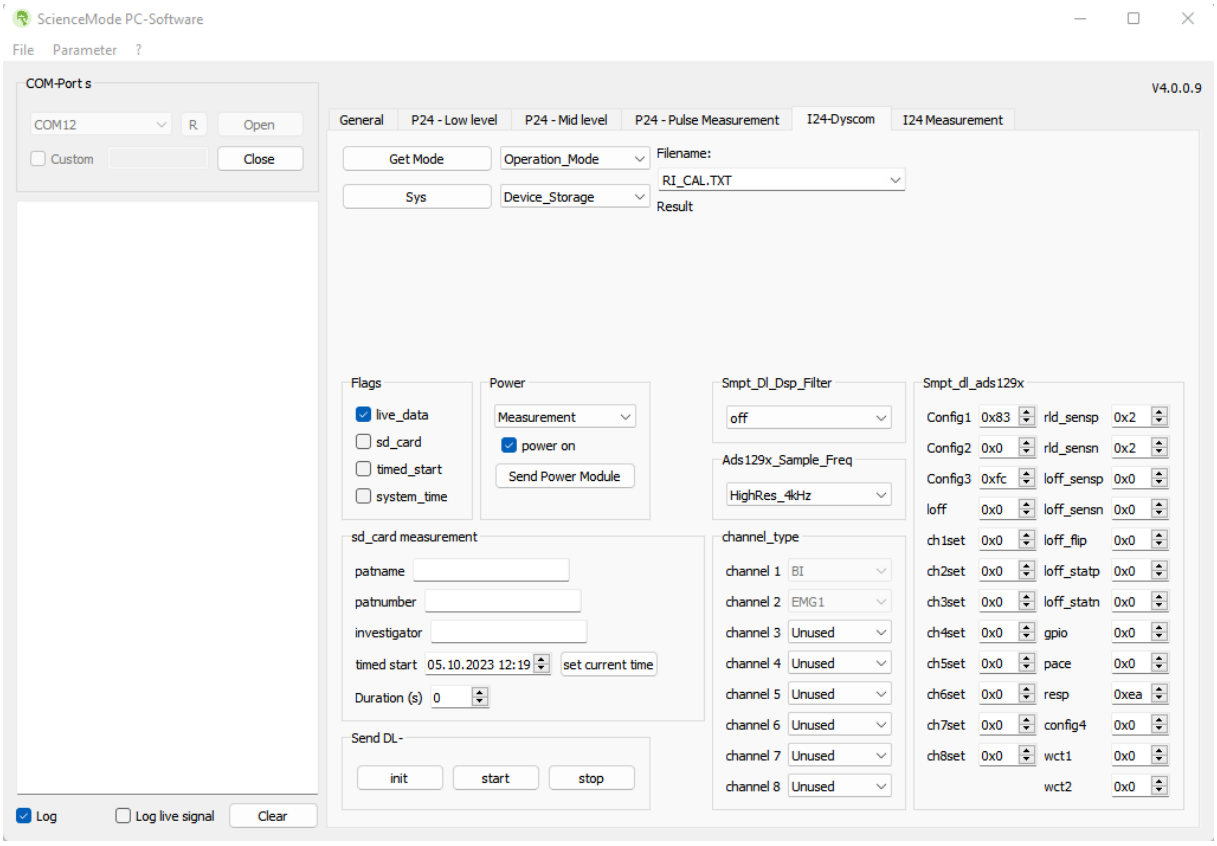
The mid level settings can be seen in the following screenshot:



Stimulation can be stopped by pressing MI stop 43)

3 I24 USE CASES

3.1 STARTING A EMG/BI MEASUREMENT ON THE I24 DEVICE



- The I24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the I24 tab 58)
- Initialize the measurement by clicking 51)
- Enable Power by clicking 52)
- Start the measurement by clicking 53)
- The measurement can be viewed in the measurement tab 61)

3.2 MEASUREMENT OPERATION (I24-DEVICE)

- The I24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the I24 Measurement tab (61)
- Start the measurement by clicking Start Measurement (59)

3.3 MEASUREMENT OPERATION FFT (I24-DEVICE)

- The I24 needs to be connected to the PC
- The com port needs to be checked in the device manager
- The ScienceMode PC-Software needs to be opened
- Enter the correct com port in 1), when not there refresh with 2)
- Open the com port by clicking 3)
- Go the I24 Measurement tab (61)
- Start the measurement by clicking Start Measurement (59)
- Go the I24 FFT tab (62)