

HighFinesse Tutorial Control lasers with the HighFinesse Multichannel Laser Controller (MCLC)

HighFinesse Tutorial · Multichannel Laser Controller (MCLC) · 4-2025 This document provides general information only and may be subject to change at any time without prior notice.

Overview

How to ...

... set up the HighFinesse Multichannel Laser Controller (MCLC)

This tutorial is intended to give you a brief overview of how to configure the HighFinesse Multichannel Laser Controller. The tutorial does not replace reading the manual. Make sure you have read and understood it (especially section 3.1 and 3.2) before you start the regulation. Setting voltage bounds incorrectly might cause damage to your laser.

Here we assume that the laser is already successfully connected with a fiber to the MCLC, the MCLC is connected to the wavemeter and laser control outputs are connected to the respective laser controllers. For more information check the quickstart guide. If you have any questions about that refer to the quickstart guide "HighFinesse Multichannel Laser Controller".

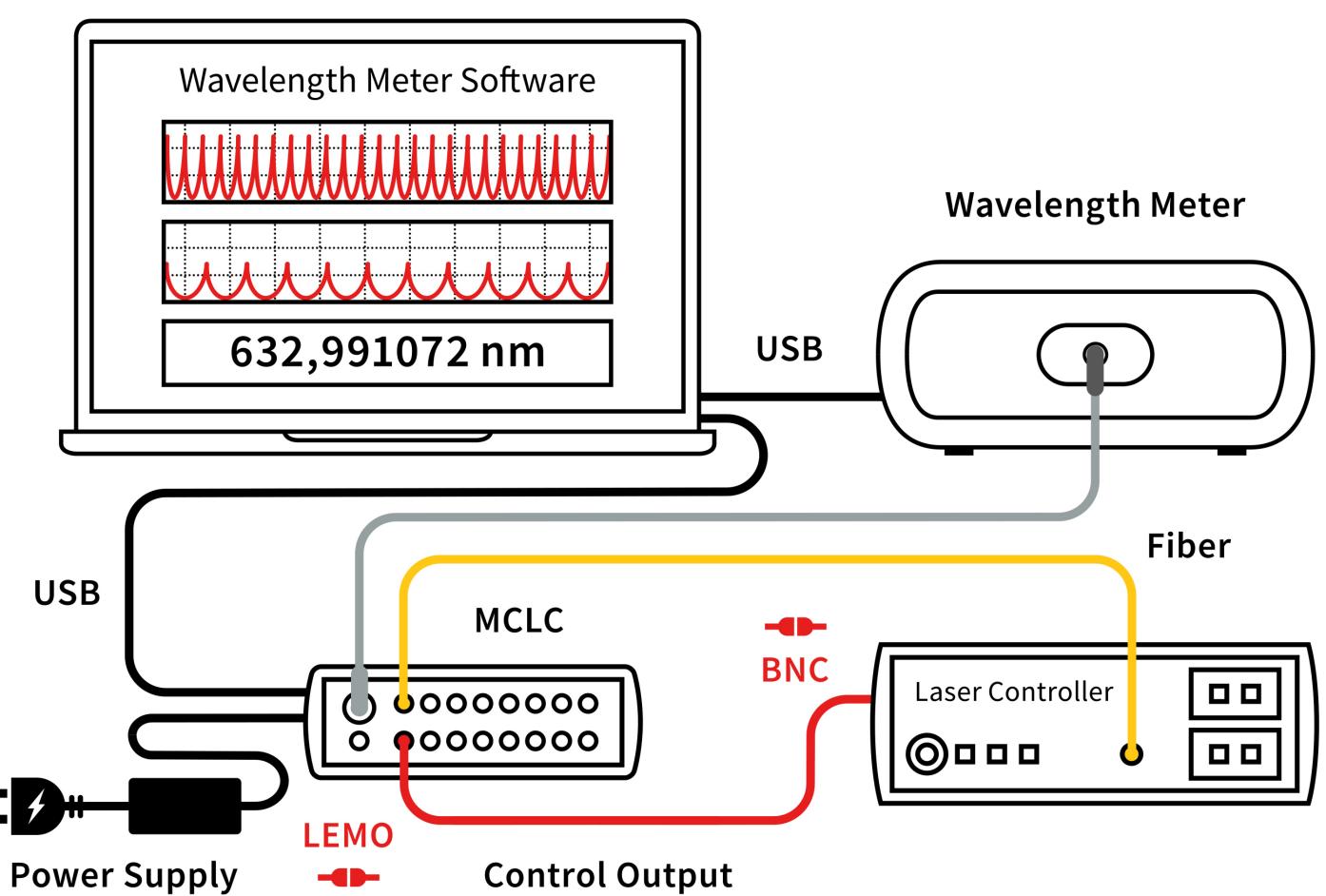
Further information

Quick Start Guide

HighFinesse Wavelength Meter

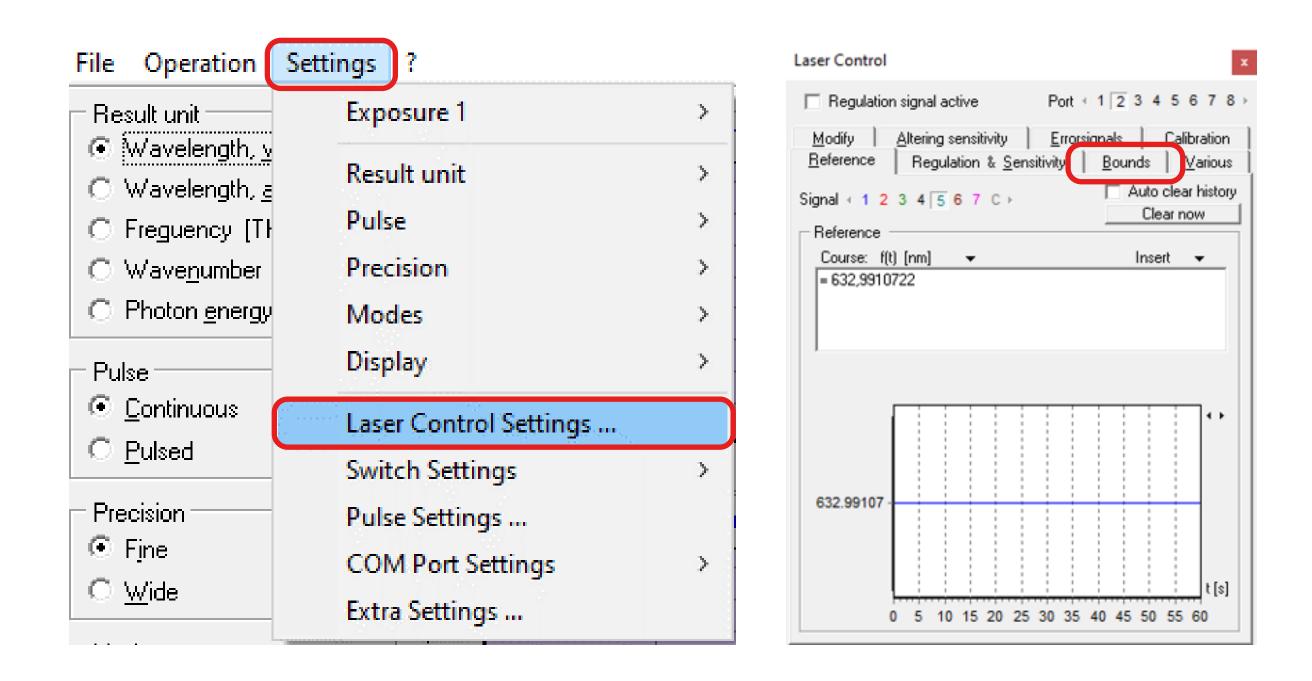
https://www.highfinesse.com /en /support /quick-start-guide.html





- **1a** Connect the laser to the MCLC input.
- **1b** Connect the MCLC output fiber to the wavelength meter.
- **1c** Connect the MCLC laser control output to the laser controlling unit. ——
- 1d Connect the wavelength meter and MCLC to the computer via the USB cable and Install the wavelength meter software. —

2

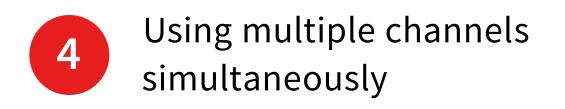


Start the software and set the voltage bounds in the Laser Control Menu in order to avoid damage to your laser and make sure the output range is suitable (e.g. as defined by a mode-hop-free scanning range).

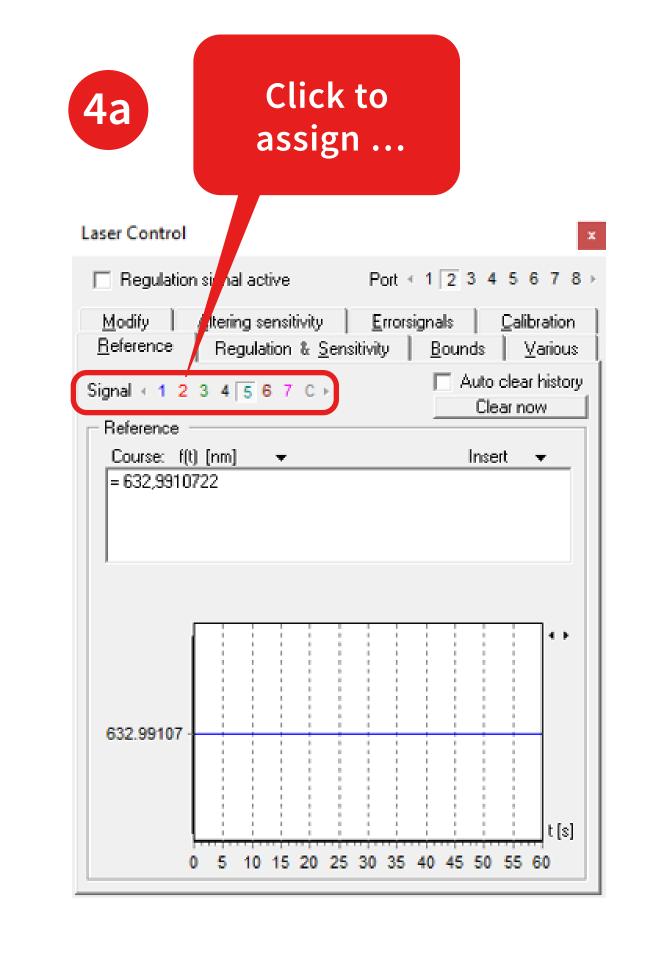
3		

Laser Control	x
Regulation signal active	Port ← 1 2 3 4 5 6 7 8 →
<u>M</u> odify <u>A</u> ltering sensitivity <u>E</u> r <u>R</u> eference Regulation & <u>S</u> ensitivity	rorsignals <u>C</u> alibration <u>B</u> ounds <u>V</u> arious
Signal bounds [mV] Minimur -10000 + Maximur 10000 Adjust reference midway (0.0 mV) Adjust reference at 0 + mV	
 Behaviour on exceeding bounds Only cut at signal bounds Output errorvalue [mV] at min2800 at max3200 Clear integral history 	л Т
Maximum shot-per-shot change [mV]	

Move to the frame Bounds to enter the minimum and maximum value (correctly).



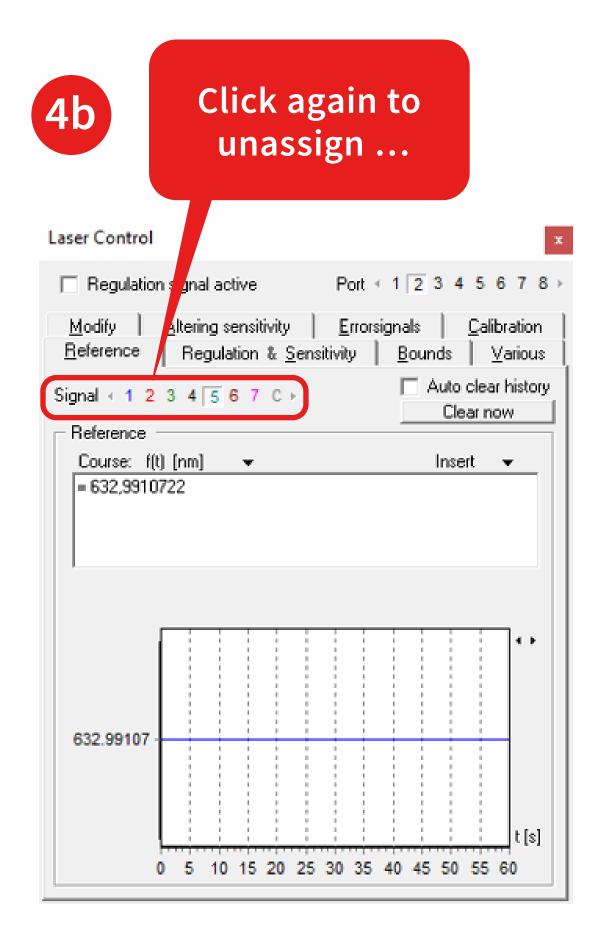
Laser Control												x
Regulation	n signa	il acti	ve		Р	ort 🔹	1	2	34	5	678	⊧
<u>M</u> odify <u>R</u> eference	<u>A</u> lterir Rej	_		rity & <u>S</u> er						h.,	bration ⊻arious	
Signal + 1 2 ⊢ Reference -	34	56	7	C ⊧				4		clea ar n	r history ow	1
Course: f(t			•						Inse	rt	•	
632.99107 -		10	15	20.2	30	35	40	45	50	55	t [s]	
) 5	10	15 :	20 25	30	35	40	45	50	55	60	



Choose the port where the voltage will be put out by clicking on the black numbers.

to the port.

Then click on one of the colored numbers to assign the switch signal



You can unassign it by clicking on the same number again. In the example the Switch signal 5 is assigned to port 2.

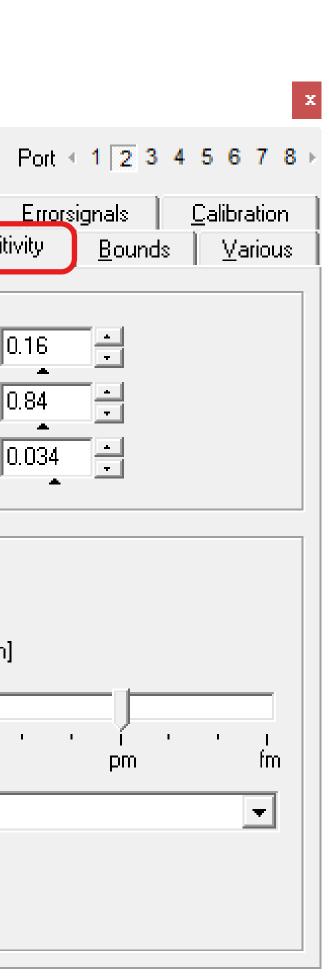
5

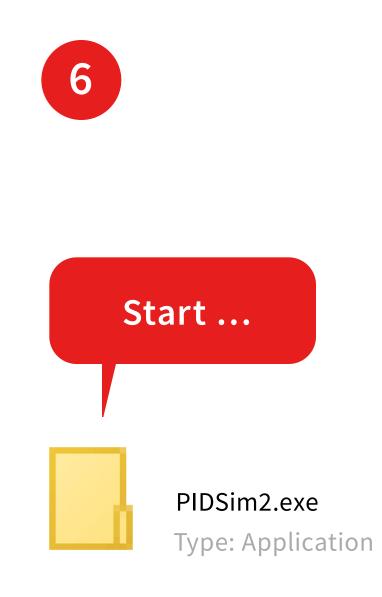
Use the **PIDSim2 Tool** to simulate good starting parameters.

Alternatively, you can set PID parameters manually in the laser control settings/frame: **"Regulation & Sensitivity".**

Laser Control

Regulation	n signal active	F
<u>M</u> odify	Alterina sensi	tivitu
<u>R</u> eference	Regulation	& <u>S</u> ensitiv
Regulation		
 ✓ Constant dt [s] ✓ Use t_a in t_a [s] 	.010	P 0. I 0. D 0.
Sensitivity -		
Actual sen	sitivity: 1 V/p	m
Min. reso	olution: 305 e	:-18 m
Deviation	range: [-10 p)m, 10 pm]
1.00 ÷ V	γ µm	'ı''
Polarity Po	ositive	





Start the PIDSim2 application located in the path ...

Installation Path of the Wavelength Meter Software \Tools \PIDSim2.exe

... and make sure you can measure.

7	7a PIDSim2 Settings
General Measurement count 200 Time / Measurement [s] 0.020 ± Laser 1 / Amplification 1 / Amplification	General Measurement count 200 Time / Measurement [s] 0.020 Response count 2 VOut minimum [V] 0.000 VOut maximum [V] 10.000 VOut resolution [mV] 0.500 VOut resolution [mV] 0.500 Synchronize f and r Laser 1 / Amplification 1 .00 V V velength 632.991075
Clicking on the small black triangle will enable more settings.	Now you can enter your settin for simulation.
איונ בוומטוב וווטוב זבננוווצז.	

ngs

Measurement count:

number of points in the simulation.

Time/Measurement [s]:

get this live from the wavelength meter by clicking on the red dot and confirm by clicking on the checkmark.

Response Count:

2 for single channel, 1 for multichannel measurements.

Set the minimum and maximum output

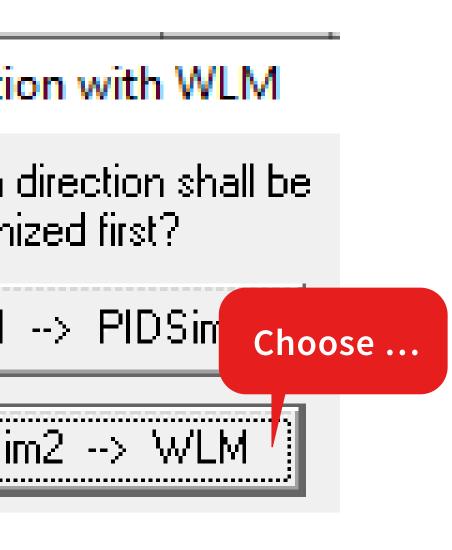
according to your system (voltage bounds set in 1.).

Set the **resolution** to obtain a realistic simulation of your system.

8 Show more settings	8a
Regulation f(t) [nm]	Connecti
= 632,9910722	In which synchron
✓ ta [s] P 0.25 → 0.040 → 1.00 →	WLM
Auto TPID D 0.060	PIDSi
Sensitivity + 1.00 + V / nm -	
Synchronize WLM	Choose to sy PIDSim2 in t
The tool can be used as a pure	Choose PIDS

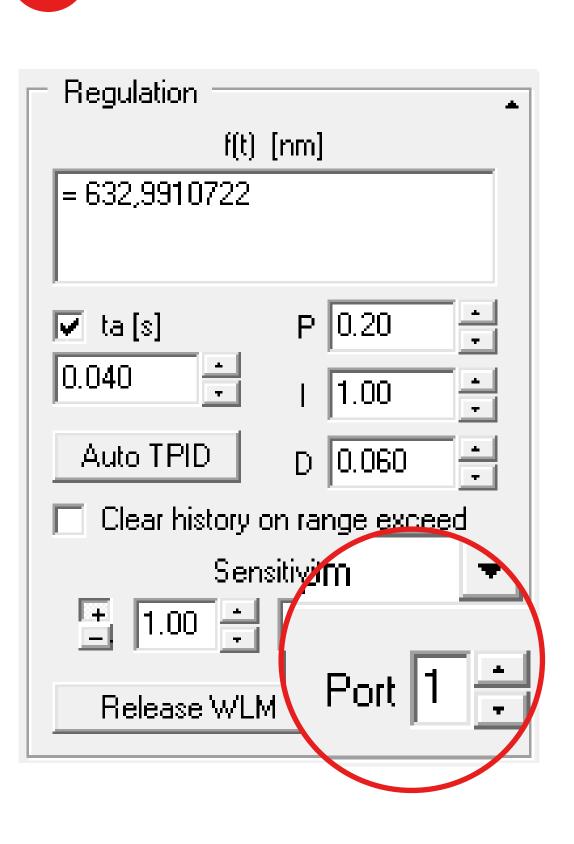
simulation tool or synchronized to the wavelength meter software running in parallel.

You can alternatively also transfer all settings you have made from the wavelength meter to the PIDsim2 tool.



ynchronize the the section regulation.

Sim --> WLM.



8b

After that set the port that you would like to adjust.

9

Amplification settings

Collection points per cycle 900

Upper voltage border [mV] 1250

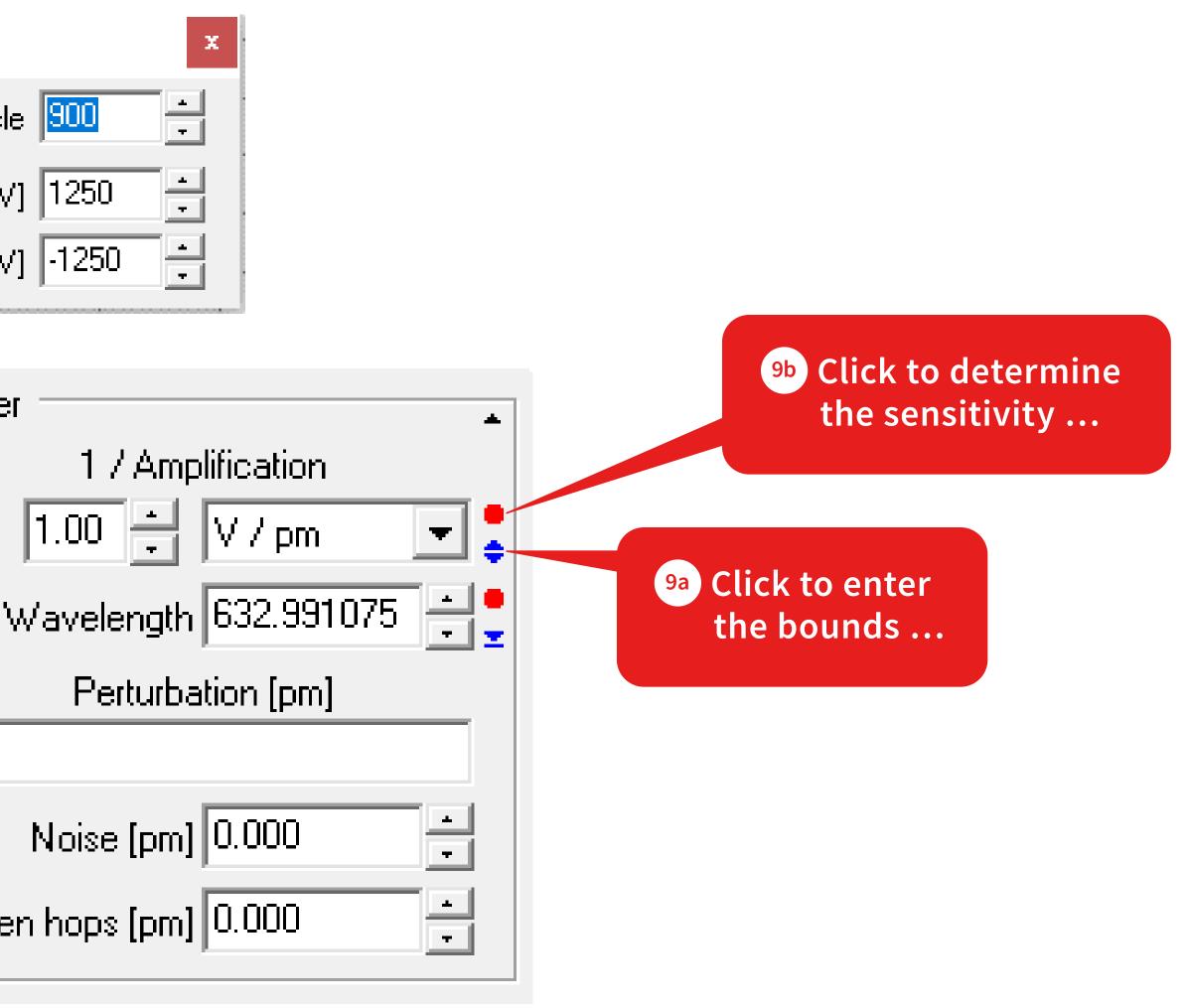
Lower voltage border [mV] -1250

Click on the blue triangles to enter the bounds (9a) (range should be smaller or equal to the bounds in 1.) and number of collection points used for calculation.

Then click on the red dot ⁽¹⁾ to automatically determine the sensitivity. Once this is determined transfer the result to the frame "Regulation" and enter it as the "Sensitivity" of the laser.

Caution: this will vary the output voltage, so a safe choice for the bounds is important.

– Lase
+
0٧٧
0
Sudde





Reference Voltage

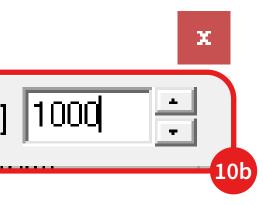
Reference Voltage [mV] 1000

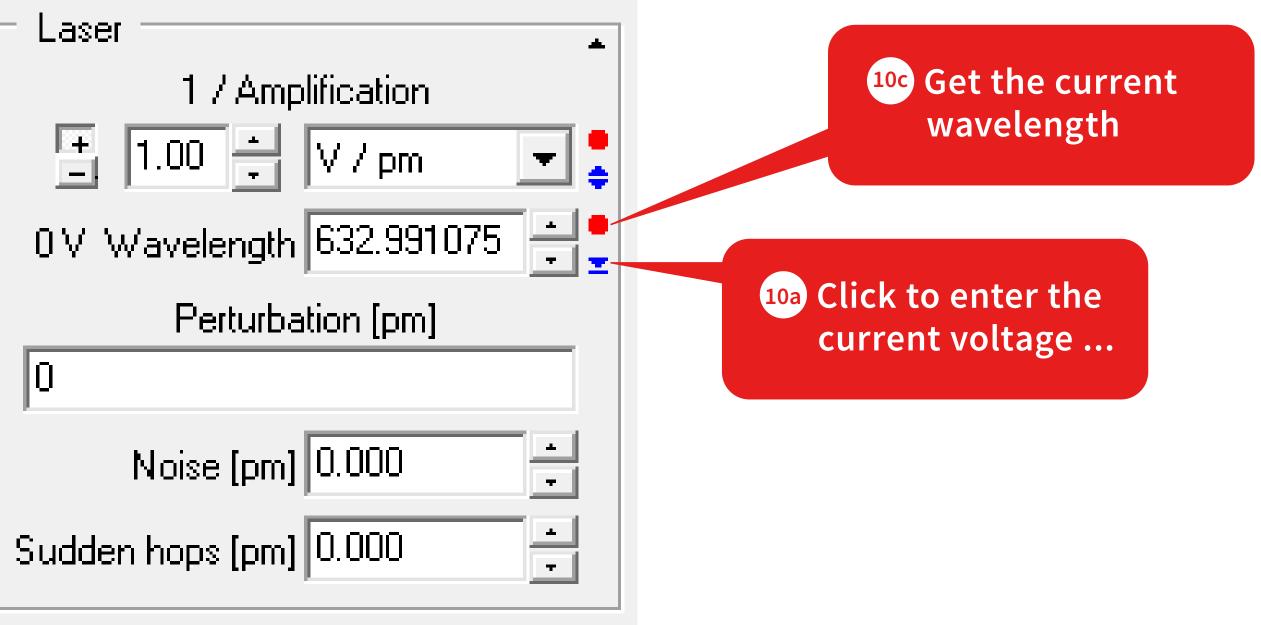
Laser 0

Click on the **blue triangle** 10a.

Enter the **current voltage** 10b.

Get the corresponding wavelenth by clicking on the red dot 100.







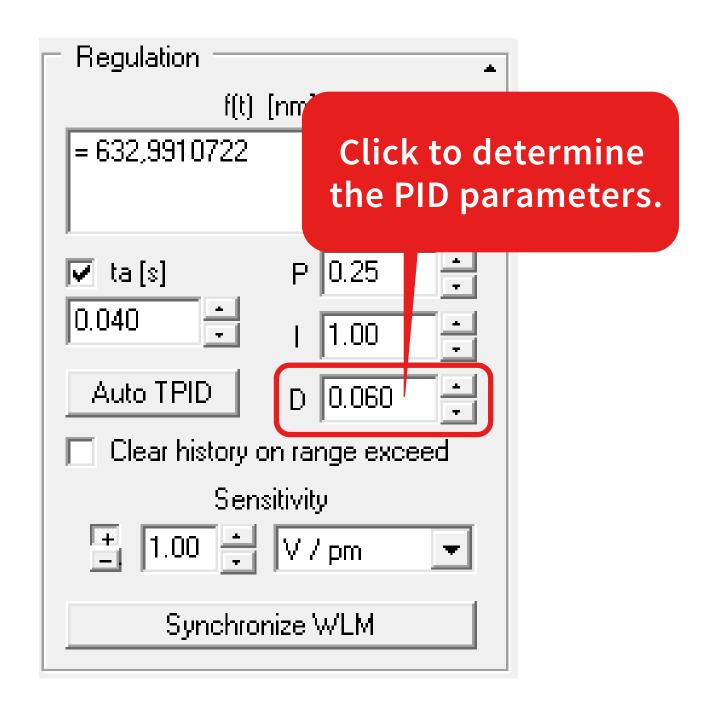
Regulation
fít) [nm]
= 632,9910722
✓ ta [s] P 0.25
0.040
Auto TPID D 0.060
Clear history on range exceed
Sensitivity
+ 1.00 ▲ V / pm ▼
Synchronize WLM

11a
Regulation
f(t) [nm]
= 632,9910722
🔽 ta [s] 🛛 P 0.25 🚔
0.040
Auto TPID D 0.060
Clear history on range exceed
Sensitivity
1.00 🕂 V / pm 💌
Synchronize WLM

Enter a target wavelength or a function.

In this example the laser should be **stabilized at 632.9910722 nm.**





Press "Auto TPID" to determine the
PID parameters. Finally, you can close
the PIDSim2. Now the system should
be ready for a test.



Laser Control x Port < 1 2 3 4 5 6 7 8 ≻ Regulation signal active Modify Altering sensitivity <u>E</u>rrorsignals Calibration <u>R</u>eference Regulation & Sensitivity <u>B</u>ounds <u>V</u>arious Auto clear history Signal ← 1 2 3 4 5 6 7 C + Clear now Reference Course: f(t) [nm] 🛛 👻 Insert 🚽 👻 = 632,9910722 6 F. 632.99107 t [s] 0 5 10 15 20 25 30 35 40 45 50 55 60

For this **start the Regulation**.

You can optimize the regulation further by using the LongTerm application and minimizing possible unwanted effects by altering the PID parameters.





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