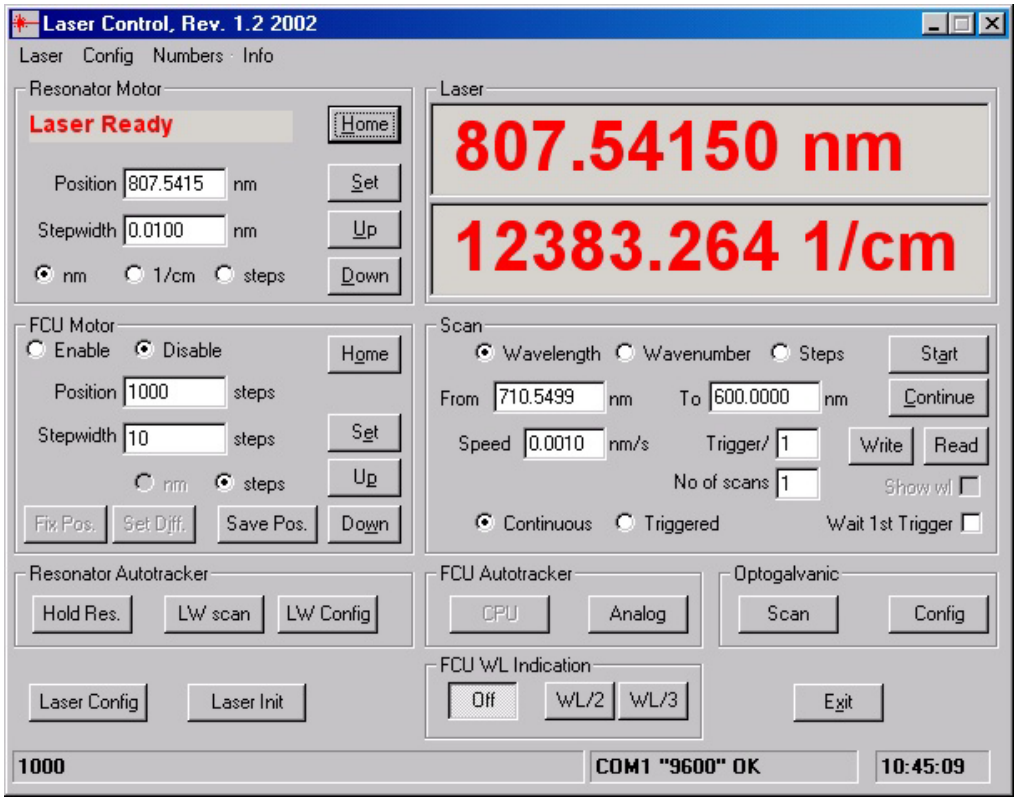
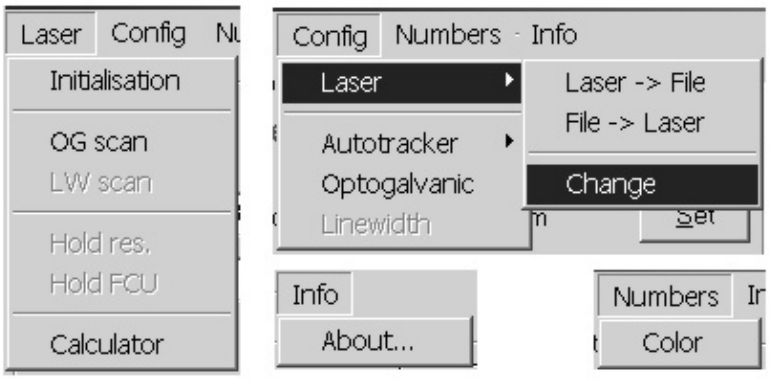
Main Window of the Control Program



Main window of the Narrowscan Control program

Picture above illustrates the ***Main*** window of the Narrowscan Control program. The screen is divided into several sub-windows for ease of use. What windows are available for laser, depends of the configuration of the laser. Sub-windows ***Resonator Motor***, ***Laser*** and ***Scan*** are usable for every Narrowscan laser, but windows ***FCU Motor***, ***Autotracker*** and ***Optogalvanic*** are only valid for lasers with FCU unit, Autotracker Unit and Optogalvanic Unit (or Resonator Frequency Stabilization Unit) installed. The top part of the ***Main*** window offers pull down menus respectively a ***Laser*** menu, a ***Config*** (configuration) menu, a ***Numbers*** menu and an ***Info*** menu. For item ***Config*** sub-item ***Laser*** is extended. In the right bottom of the ***Main*** window are buttons for some common operations – ***Laser Config, Laser init*** and ***Exit***. In the status bar, find in the bottom of the ***Main*** window, are presented status of the used serial (RS-232) port, last string received from a laser controller (left area of the status bar) and clock in the right end of the status bar.



Open view of all pull down menus of the program.

Status Bar

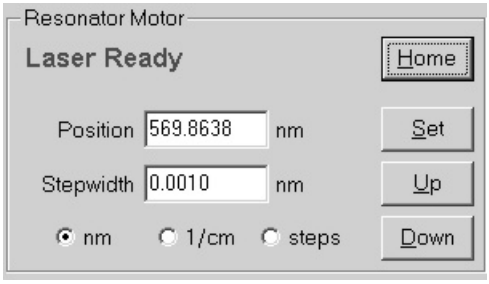
Laser Window

The ***Laser*** window shows in the top right of the ***Main*** window, the current signal wavelength position of the laser in nm and the current wavenumber position of the laser in cm^{-1} (in the ***Resonator*** window is chosen one of the radio buttons - ***nm*** or ***cm^{-1}***) or current stepper motor step position for resonator motor and for FCU motor if FCU is installed (in the ***Resonator*** window is chosen radio button ***steps***). ***Laser*** window shows these values all the time with big numbers visible at the distance of some meters from the computer screen. Numbers color can changed using pull down menu ***Numbers*** item ***Color***.

Laser Window

Resonator Motor Window

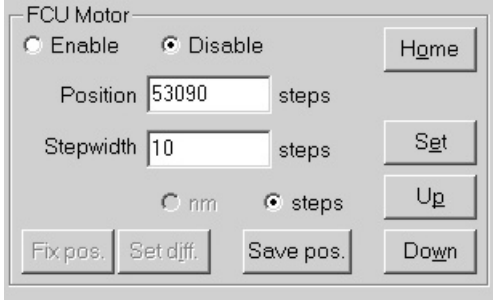
The ***Resonator Motor*** window is located in the left top of the ***Main*** window. In this window are located all controls for resonator motor. Edit box ***Position*** shows current position of the motor in ***nm***, ***cm^{-1}*** or ***steps*** depending of the choice of the according radio button in the bottom of the window. Edit box allows modifications to be made and after mouse click on the button ***Set*** laser tunes to the requested wavelength (or stepper motor position). Edit box ***Stepwidth*** allows to choose step value for step up and step down tasks. To change the laser current position one step up click on the button ***Up*** and to change the laser position one step down click on the button ***Down***. Mouse click on the button ***Home*** tunes the laser to the reference position, determined with the special high precision switch on the beginning of the linear drive. ***Process, called homing of the laser, takes long time if current laser position is far from the beginning of the linear drive***. Needed time could be approximately calculated using pull down menu ***Laser*** item ***Calculator***.



Resonator Motor Window

FCU Motor Window

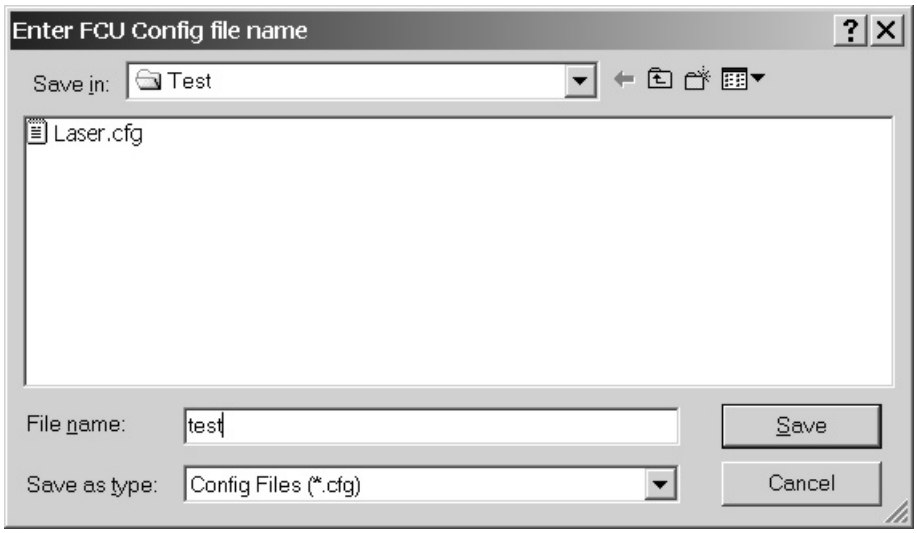
FCU Motor window in the left middle of the ***Main*** window, locates all controls for the FCU motor. Controls in this window are enabled only if FCU unit is installed to the laser and enabled from configuration file.



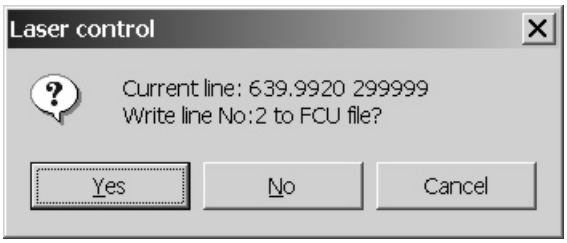
FCU Motor Window

FCU motor controls

- ***Enable*** … radio button enables FCU tuning using lookup table if laser wavelength is changed during scanning or if wavelength is changed with tasks of the ***Resonator Motor*** window (radio buttons ***nm*** or ***cm^{-1}*** must be chosen and tasks ***Position Set***, ***Up*** and ***Down*** have been used). ***Lookup table must be made and sent to controller before trying to enable FCU motor moving!***
- ***Disable*** … radio button disables FCU tuning if laser wavelength is changed.
- ***Position*** … edit box shows current position of the motor in steps, allows to enter new position for motor and after mouse click on the button ***Set*** FCU motor is tuned to requested position. ***Resonator motor position is not changed!***
- ***Stepwidth*** … edit box allows to choose step value in stepper motor steps for step up and step down tasks. To change FCU motor position one step up/down click on the button ***Up***/***Down***. ***Resonator motor position is not changed!***
- ***Home*** … mouse click on the button tunes FCU to the reference position, determined with high precision switch on the beginning of the FCU linear drive.
- ***Save pos.*** … button for half-automatic FCU lookup table generation. First click on the button opens standard MS Windows dialog box for entering the file name of the lookup table. Every following click on the button write one line, containing current resonator wavelength in nm and FCU motor stepper motor step value to the FCU lookup table file. Before actual write process conformation window is displayed. Click on the button ***Yes*** writes line to the file, click on the button ***No*** discards current line and click on the button ***Cancel*** closes file and finishes the lookup file generation process. ***Button Save pos. stays to the pressed state during all the process of the file generation. Before writing next line to the file choose new laser wavelength and adjust FCU to the correct position for chosen wavelength using accordingly Resonator Motor window tasks and FCU Motor window tasks. FCU Motor window radio button Disable must be activated during file generation process. Maximal 49 lines can be written to file, after writing line No 49 file will close automatically.***



FCU Config File Name Window



FCU File Write Conformation Window

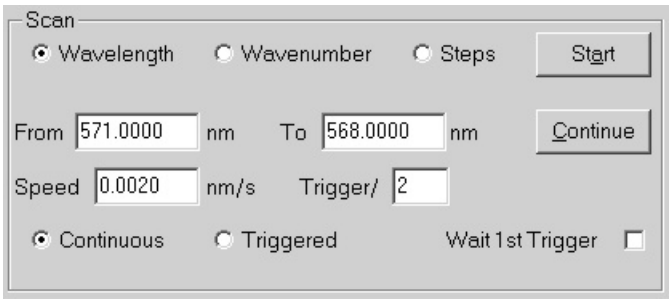
- ***Fix pos., Set diff*** … buttons for fine tuning of the FCU lookup table. Activating radio button ***Enable***, enables Button ***Fix pos.*** If with laser tuning to a requested wavelength, according FCU tuning is inexact on any reason (temperature change in laser room etc), click on the button ***Fix pos.*** Lookup table adjusting conformation window is displayed and after click on button ***OK,*** button ***Fix pos.*** stays to the pressed state causing the current position of the FCU motor to be saved as reference value. FCU correct position for current wavelength can be found using ***FCU Motor*** window buttons ***Up/Down***. If correct position is found, mouse click on the button ***Set diff.*** recalculates full lookup table accordingly to the difference found between the estimated FCU position and of the correct FCU position. ***Lookup table data is changed only in the laser controller battery buffered memory – lookup data file in the disk is not changed. Lookup table data (as well as laser configuration***

data) is stored in the laser controller battery buffered memory and remains between working sessions.

Lookup Table Adjusting Conformation Window

Scan Window

Scan window is located in the right middle of the ***Main*** window. In this window are located all controls of the scanning of the laser. It displays current scan mode and parameters. It also allows the user to change the values for a scan and between different scan modes.



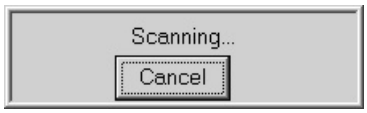
Scan Window

Scan controls

- ***Wavelength, Wavenumber, Steps*** … radio buttons to set requested scan mode together with radio buttons ***Continuous*** and ***Triggered***. Scan mode also determines units for upper and lower scan limits.
- ***From, To*** … edit boxes allow to set upper and lower limits of the scan process. Unit of the scan limits depend of type of a scan. For ***Wavelength*** scan and for ***Steps*** scan, edit box ***From*** value must have higher value to

compare with edit box ***To***, for ***Wavenumber*** scan ***To*** must have higher value. It is determined of the mechanical set-up of the laser.

- ***Speed/Step*** … edit box for scan speed (continuous scan) / step (triggered scan) value. For continuous (constant speed) ***Wavelength*** and ***Wavenumber*** scan speed value is always nm/s.
- ***Trigger*** … edit box to set the number of external trigger events, that controller waits during a triggered scan until it steps to the next spectral position.
- ***Wait 1st Trigger*** … check box to enable waiting of the trigger event between the beginning of the scan and tuning a laser to scan start (***From***) position. Useful to synchronize start of a continuous (constant speed) scan with other control devices used.
- ***Start*** … pushing the ***Start*** button in the scan window starts a scan process concurrently displaying information window in the left up area of the ***Main*** window. Click on button ***Cancel*** of this window aborts a scan process.



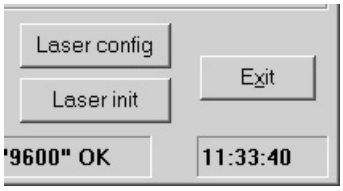
Scanning Window

- ***Continue*** … click on this button continues interrupted scan (button ***Cancel*** clicked if scan process in progress) or starts scan process from the current position of the laser using other parameters from ***Scan*** window controls.

Common Controls of the Main Window

In the right bottom of the ***Main*** window common control buttons are located.

- ***Exit*** … click on this button stops the execution of the laser control program.
- ***Laser config*** … click on button opens laser ***Configuration Dialog*** window ***Laser init*** … click on this button sends initialisation task to the laser controller. Use it if in some of the laser control windows are displayed unpredictable values or when communication between PC and laser controller stops on any reason. It is recommended to click on this button also after stopping laser normal working processes (like position setting etc) using button ***Cancel***.



Common Control Buttons

Autotracker Window

Autotracker window in the left bottom area of the ***Main*** window is available only when FCU autotracking unit is installed in the laser or when laser wavelength stabilization unit is installed in the laser.

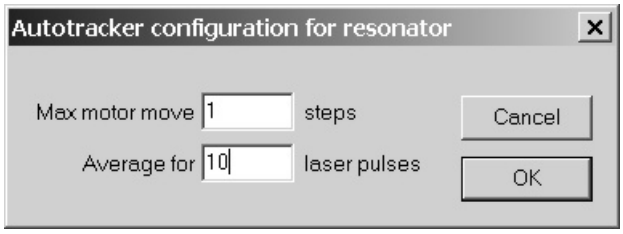
Autotracker Window, only FCU Autotracker is present in the laser

Autotracker controls

- ***Hold res.*** … click on this button starts automatic frequency stabilization of the resonator according to feedback signals from two area photodiode installed in the laser. In the upper left corner of the ***Main*** window informational window indicates working of the Autotracker. ***When tracking is in progress, laser controller cannot be used for executing other commands . Before using tracking, check the track parameter values from pull down menu item Config->Autotracker->Resonator. Recommended values for frequency stabilization are: Average for 10 or more laser pulses and Max motor move - 1 or 2 stepper motor steps.***
- ***Hold FCU*** … click on this button starts automatic adjusting of the position of the FCU according to feedback signals from two area photodiode installed in the FCU unit of the laser. In the upper left corner informational indicating working of the Autotracker is displayed. ***When tracking is in progress, laser controller cannot be used for executing other commands . Before using tracking, check the track parameter values from pull down menu item Config->Autotracker->FCU. Recommended values for FCU are: Average***

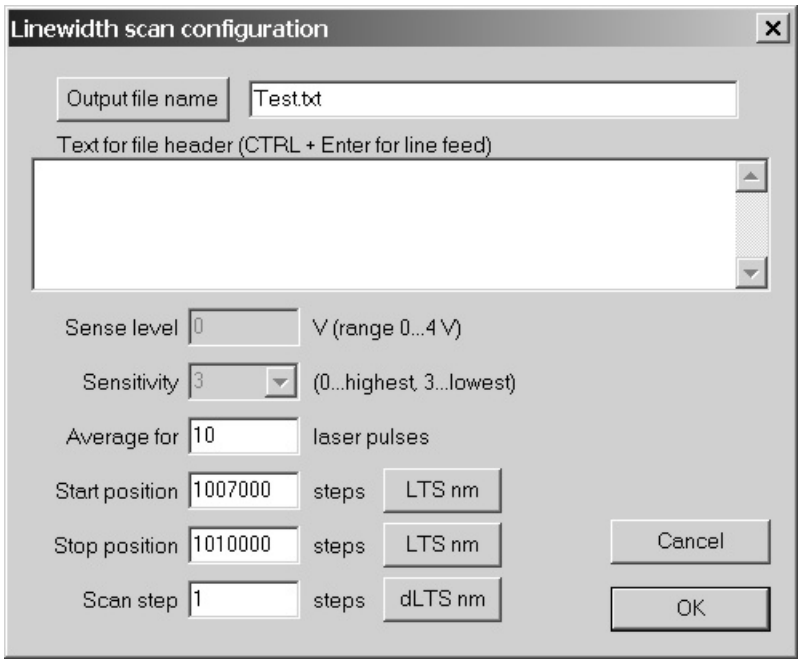
for 5 or more laser pulses and Max motor move – 5…10 stepper motor steps.

Autotracker Information Window



Autotracker Configuration Window

- ***LW scan*** … button starts ***Linewidth scan*** process used for half-automatic spectral line width measurement of the dye laser pulse. ***Linewidth scan*** is available only for lasers with special hardware set up (installed Autotracker unit with two area photodiode for resonator frequency stabilisation). Before using this task scan parameters and output data file name for ***Linewidth scan*** must set using pull down menu item ***Config->Linewidth*****.** Buttons ***LTS*** and ***dLTS*** help to calculate needed stepper motor step values. Recommended ***Scan step*** value is 1 or 2 and difference between ***Start position*** and ***Stop position*** is from 50 to some hundred steps. Button ***Output file name*** allows to choose file name and folder for data file consisting measured values. Written to the disk data file includes header, containing measurement configuration data and data lines containing resonator step motor position in steps, according laser wavelength in nm and pulse intensity from etalon in volts (measured from first diode integrator output). Linewidth can find using standard spectre treatment software like Origin from MicroCalc.



Linewidth Scan Configuration Window

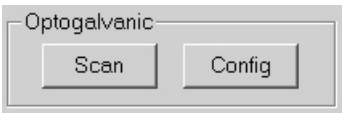
```
==== Linewidth scan ============================
==== User note =================================


==== Measurement configuration ================
Scan start position: 347550
Scan stop position:  347571
Scan step:           1
Sensitivity:         3
Pulses averaged:     10

==== Data values ===============================
== step, wavelength (nm), AT diode1 voltage (V)=

347551, 933.1935, 1.852
347552, 933.1933, 1.862
347553, 933.1928, 2.102
347554, 933.1923, 2.566
347555, 933.1922, 2.796
347556, 933.1918, 2.595
347557, 933.1914, 2.234
347558, 933.1911, 1.745
347559, 933.1906, 1.843
347560, 933.1903, 1.672
347561, 933.1899, 1.618
347562, 933.1896, 2.102
347563, 933.1892, 2.634
347564, 933.1889, 3.372
347565, 933.1884, 3.030
347566, 933.1881, 2.454
347567, 933.1877, 2.410
347568, 933.1873, 2.116
347569, 933.1869, 2.028
347570, 933.1865, 1.994
347571, 933.1861, 2.072
```

Linewidth Scan File Sample

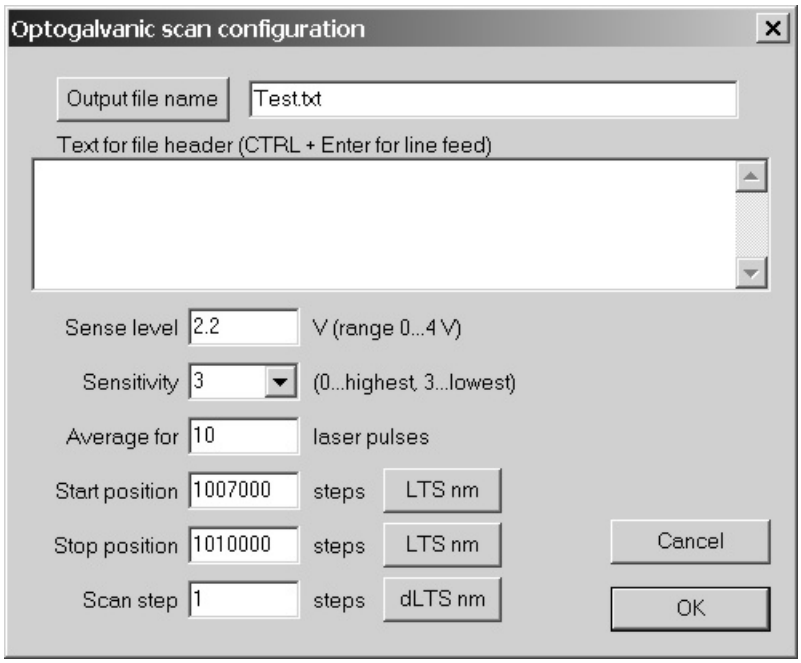
Optogalvanic Window

The ***Optogalvanic*** window is located in the middle bottom area of the ***Main*** window. In this window are located controls for optogalvanic (OG) device. It is enabled only when OG device is installed in the laser.

- ***Scan*** … click on this button starts ***Optogalvanic scan*** process used for half-automatic calibration of the laser (to find correspondence between resonator stepper motor step values and according wavelength values). Before using this button ***Optogalvanic scan*** parameters must set using pull down menu task ***Config->Optogalvanic*** or using button ***Config*** in the ***Optogalvanic*** window.
- ***Config*** … click on this button opens ***Optogalvanic scan configuration*** window. It displays current OG scan settings and allows the user to change the values for a scan. Edit boxes ***Start position, Stop position*** and ***Step*** allow to change scan limits and step value. Start value of the scan must be greater of the stop value to obtain highest possible precision of the scan values. Buttons ***LTS*** and ***dLTS*** help to insert step values using wavelength values in nm (according to the existing calibration of the laser). If laser calibration is far away from the right values, calculated step positions have probably invalid values. Button ***Output file name*** with right located edit box allow the user to choose file name for the optogalvanic data. Sample file is illustrated. Edit box ***Sense level*** value determines level in voltages. Measured values increasing it are written to output file. Edit box ***Average*** determines number of the measurements to average (recommended value 10).



Optogalvanic Window



Optogalvanic Scan Configuration Window

```
==== Optogalvanic scan ========================
==== User note ================================


==== Measurement configuration ================
Scan start position: 256807
Scan stop position:  608947
Scan step:           2
Sense level:         1.0 V
Sensitivity:         3
Pulses averaged:     2

==== Data values ==============================
==== step, wavelength (nm), OG voltage (V)======

256821, 664.9972, 1.070
256833, 664.9948, 2.727
```

Optogalvanic Scan Generated Sample File

Laser Configuration Window

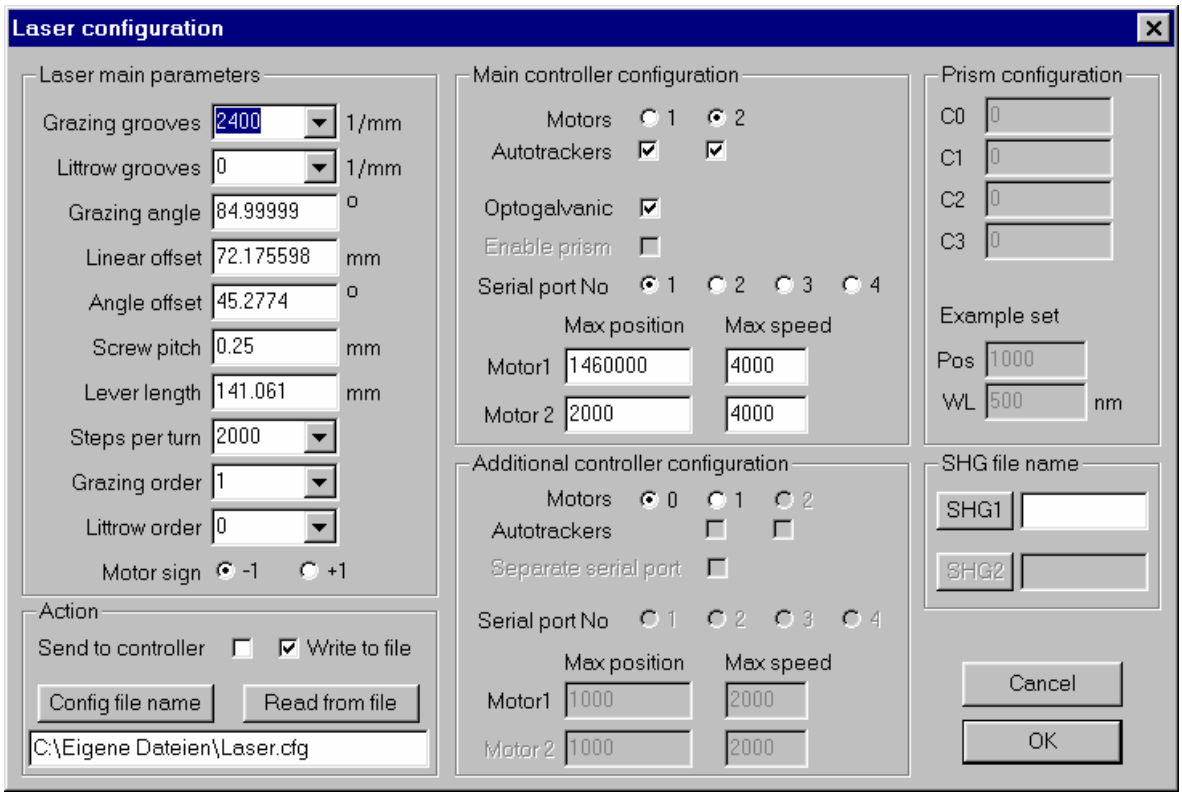
The ***Laser Configuration*** window opens when clicking on the button ***Laser config*** in the right bottom area of the ***Main*** window (also using pull down menu item ***Config->Laser->Change***).

Making changes to the parameters in the Laser Configuration window(file) without direct advice from the Continuum Service Department in not allowed!

Certainly make backup copy of the configuration file before changing any of the parameters!

Laser configuration window has the following sub-windows:

- ***Laser main parameters*** … in this window are displayed parameters specified by the mechanical and optical set up of the laser. After making new calibration, using data from ***Optogalvanic scan(s)*** fitted with program ***Laserfit.exe***, configuration parameters ***Linear offset***, ***Angle offset*** and ***Lever length*** can changed (must saved also to file and sent to controller using sub-window ***Action***).



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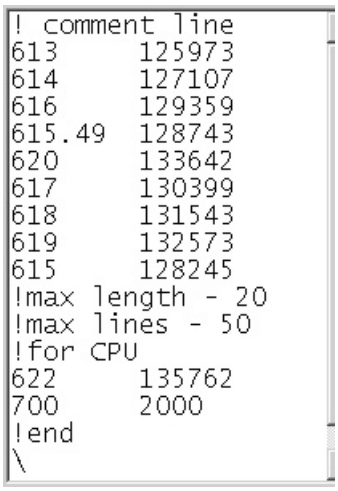
Laser Configuration Window

- ***Main controller configuration*** … in this window all parameters depend of the configuration of the laser except ***Serial port No***, and are factory adjusted to the correct values. ***Serial port No*** must set correct value in the configuration

file (normally laser.cfg) using simple text editor (like Notepad in MS Windows) before starting control program.

- ***Additional controller configuration*** … this sub-window is reserved for future development of the laser, functions are not realized now.
- ***Prism configuration*** … sub-window for special lasers with prism configuration.
- ***FCU file*** … this sub-window is used to send to the laser controller FCU lookup table. Last symbol in the file must be backslash (\) to inform controller of the end of the file. Sample FCU table file is presented in the. Button ***FCU1*** and right of it located edit box allow to choose (change) file name for the lookup table. Check box ***Send to controller*** must be selected to send the lookup table file to laser controller.



FCU Sample File