Operation Manual

Thorlabs TXP Series

External Cavity Laser

ECL5000D

2004

THORLABS

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Contents **Page**

We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to come up to your expectations and develop our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.

Thorlabs GmbH

This part of the instruction manual contains every specific information on how to operate an ECL5000D Laser. A general description is followed by explanations on how to operate the unit by means of the graphical user interface.

☝Attention☝

This manual contains "WARNINGS" and "ATTENTION" label in this form, to indicate dangers for persons or possible damage of equipment.

Please read these advises carefully!

NOTE

This manual also contains "NOTES" and "HINTS" written in this form.

1 General description of the module

1.1 Safety

☝ Attention ☝

The modules 'ECL5000' are class 1M laser sources.
Emitted wavelengths and optical power: see label on the ECL5000

CAUTION – The use of optical instruments with these products will increase eye hazard!!

☝ Attention ☝

The laser modules supplied by Thorlabs GmbH are class 1M laser systems. However, if you collimate or focus the laser beam you will create a class 3R or class 3B laser system!
In that case additional safety measures have to be observed!

For the individual wavelength and output power see the certificate of calibration supplied with the module!

Never switch on the output with no fiber connected and switch off the output before disconnecting the fiber!

☝ Attention ☝

Mobile telephones, cellular phones or other radio transmitters are not to be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to EN 50 082-1.

NOTE

The products are classified and labeled according to
IEC 60825-1/Am2 (2001).
If you need an additional aperture label according to CFR § 1040.10.g (5) please use the adhesive labels delivered with the TXP ECL5000 and place them clearly visible for any possible user on your laser set-up!.

1.2 Warranty

Thorlabs GmbH warrants material and production of the ECL5000D for a period of 24 months starting with the date of shipment. During this warranty period *Thorlabs GmbH* will see to defaults by repair or by exchange if these ,are entitled to warranty.

For warranty repairs or service the unit must be sent back to *Thorlabs GmbH (Germany)* or to a place determined by *Thorlabs GmbH*. The customer will carry the shipping costs to *Thorlabs GmbH,* in case of warranty repairs *Thorlabs GmbH* will carry the shipping costs back to the customer.
If no warranty repair is applicable the customer also has to carry the costs for back shipment.
In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

Thorlabs GmbH warrants the hard- and software determined by *Thorlabs GmbH* for this unit to operate fault-free provided that they are handled according to our requirements. However, *Thorlabs GmbH* does not warrant a faulty free and uninterrupted operation of the unit, of the soft- or firmware for special applications nor this instruction manual to be error free. *Thorlabs GmbH* is not liable for consequential damages.

Restriction of warranty

The warranty mentioned before does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modification, misuse or operation outside the defined ambient conditions stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. *Thorlabs GmbH* does explicitly not warrant the usability or the economical use for certain cases of application.

Thorlabs GmbH reserves the right to change this instruction manual or the technical data of the described unit at any time.

1.3 Features

1.3.1 General functions

The external cavity laser ECL5000D is designed for leading manufacturers of test and measurement equipment, fiber optic components, spectroscopy and other basic research applications. It combines a very fast tuneability over the full range of the C, L and S band with high accuracy and repeatability. The superior price/performance of the ECL5000D enables cost-effective, swift, and precise testing of fiber optic components. It features a broader temperature range in a narrower cassette with internal vibration absorption, as well as microprocessor based control electronics.
The ECL5000D is fully compatible with the TXP5000 test system and fits perfectly into a TXP5004 mainframe. Alternatively it can be operated just with the TXP5001AD interface.

The unit can be operated either by a comfortable graphical user interface (GUI) or can be programmed by means of LabVIEW®- LabWindows/CVI®, MSVC or Borland-C commands.

1.4 Technical Data

Wavelength Range	1519 … 1630 nm
Mode Hops	0
Tuning Speed continuous	0 – 130 nm/s
Tuning Speed step	1nm: < 30ms Including rise and settling time
	10nm: < 100ms
	100nm: < 800ms
Wavelength Resolution	0.6 pm
Wavelength Repeatability	+/- 1 pm
Wavelength Accuracy	+/- 10 pm
Wavelength Stability	1h +/- 2 pm Const. temp. +/- 0.5°C
Wavelength internal analog modulation	1 .. 100 Hz Sine-wave
Optical Output Power	> 6 dBm over 50 nm at center wavelength
	> 3 dBm over tuning range
Power Resolution	0.1 mW
Power Stability	1h +/- 0.05 dB Const. temp. +/- 0.5°C
Power Repeatability	+/- 0.1 dB 1 hour
Power internal analog modulation	0.01 .. 100 kHz
Spectral line width FWHM	< 150 kHz
Coherence Control	150 MHz typically Sinusoidal 1.55 kHz
Side Mode Suppression SMSR	> 50 dB
Signal to Source-Spontaneous Emission Ratio SSE	> 70 dB/nm
Signal to Total Source-Spontaneous Emission Ratio STSSER	65 dB
Optical Isolation	60 dB @ 1560 nm
RIN	-140 dB/√Hz
Optical Power Modulation Bandwidth	> 100 kHz
Wavelength Modulation Bandwidth	100 Hz
Card Power Consumption	< 50 W
Operating temperature	+10 … +40 °C
Storage temperature	-20 … +60 °C
Width	4 units
Weight	< 2.5 kg
Dimensions (W x H x D)	101 x 128 x 271 mm^3

1.5 Operating Elements at the Front Panel

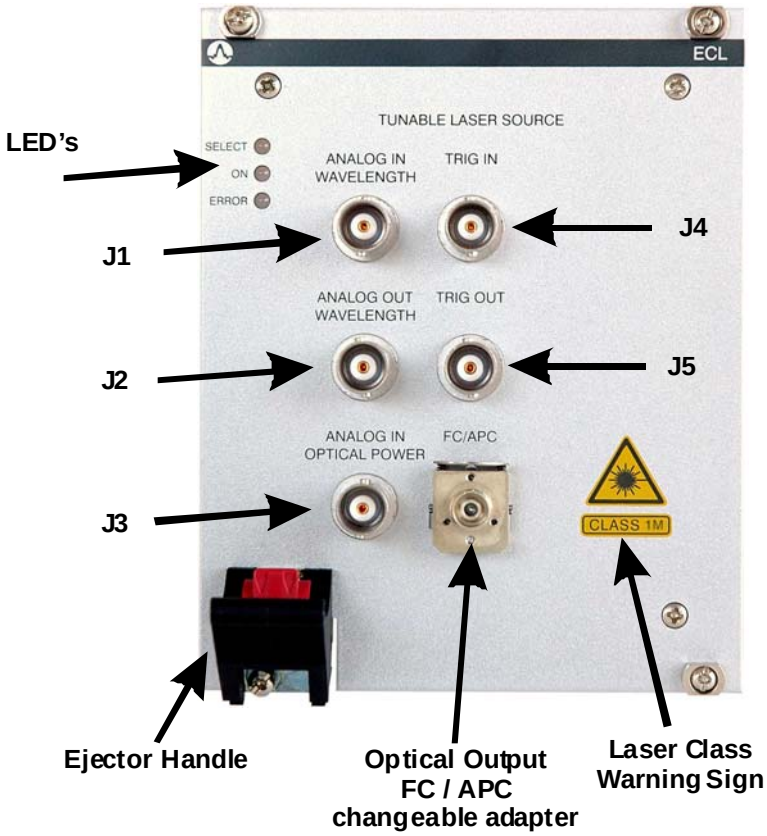


Figure 1 ECL5000D operating elements

LED's	LED's for 1) Card selected, 2) Laser on and 3) Error occurred
J1	Analog voltage input for wavelength tuning / modulation (-10 … +10V)
J2	Analog output voltage proportional to actual wavelength (-10 … +10V)
J3	Analog voltage input for output power setting / modulation (0 … +10V)
J4	Trigger signal input (TTL) for the sweep mode
J5	Trigger signal output (TTL) for the sweep mode
Optical Output	Universal Fiber connector with exchangeable adapter (FC/APC)

1.6 Installing and removing Cards

The Thorlabs TXP series mainframes and cards are 'Hot-Swappable', that means you do not have to switch off the mainframe while exchanging cards:

- Loosen the four mounting screws on top and below the ejector handle (see Figure 1)
- Push the red button of the ejector handle and flip down the black ejector handle. This pulls out the card from its internal plug.

You can now remove the card. If you do not insert another card, please close the empty slots with a blind module to maintain a proper cooling air flow inside of the unit. Re-tighten the screws.

NOTE

All Slots of the TXP must be occupied, either by a card or by a blind module to maintain proper air flow for internal cooling!

☝ Attention ☝

If you use a TXP5001AD it is possible to remove the card without using the ejector handle. This is dangerous for the TXP5001AD and for the ECL module!
Always remember to flip down the ejector handle before removing the card! This interrupts the power supply for the card.

1.7 Theory of Operation

The heart of the ECL5000D is the external cavity laser (ECL). The principal construction of such a laser is shown in Figure 2.

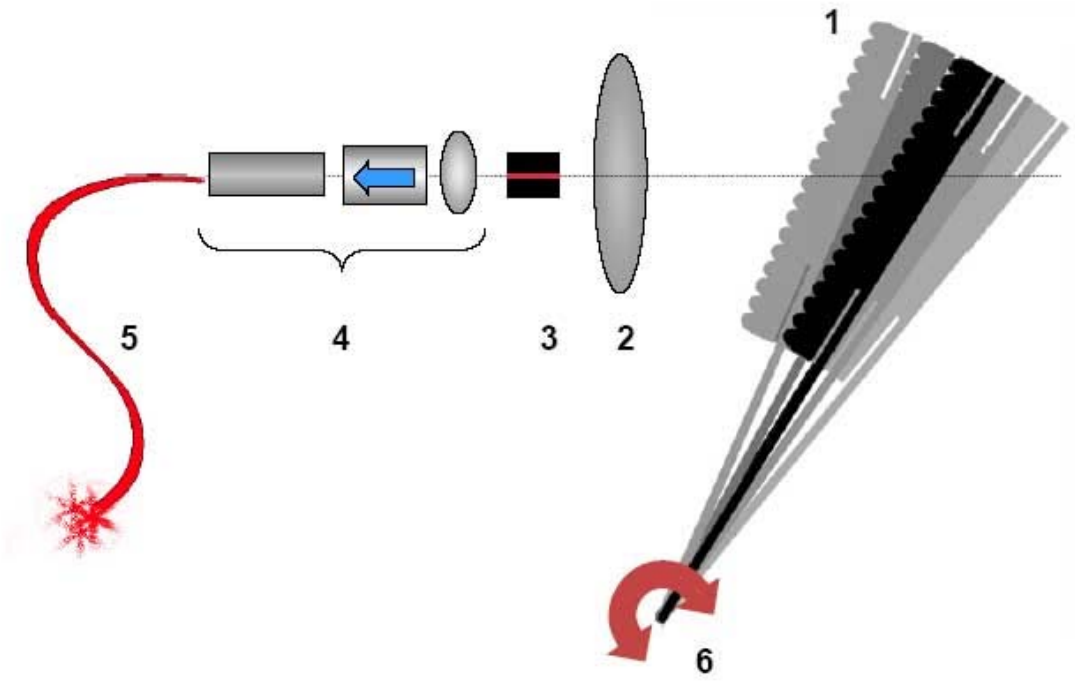


Figure 2 Principle set-up of the external cavity laser

The active laser crystal is designated here as (3). In contrary to conventional laser diodes, the laser cavity is not formed by coating both surfaces of the crystal with reflective material. In the ECL the cavity is formed by coating one output face of the crystal and by a diffraction grating in Littrow arrangement (1) on the other side. The Littrow grating is a wavelength dependent 'mirror' whose reflection wavelength depends on the angle between grating and laser crystal. Because the inter-cavity laser beam is very narrow, a special lens (2) collimates the beam to optimally use the surface of the Littrow-grating. Part (4) of the system is the output coupling optics together with an optical isolator. The laser beam is then coupled into the fiber (5). To tune the laser wavelength, the diffraction grating is tilted by a motor (6).

To obtain a mode-hop free operation of the system while tuning, special requirements concerning wavelength and output power are given.

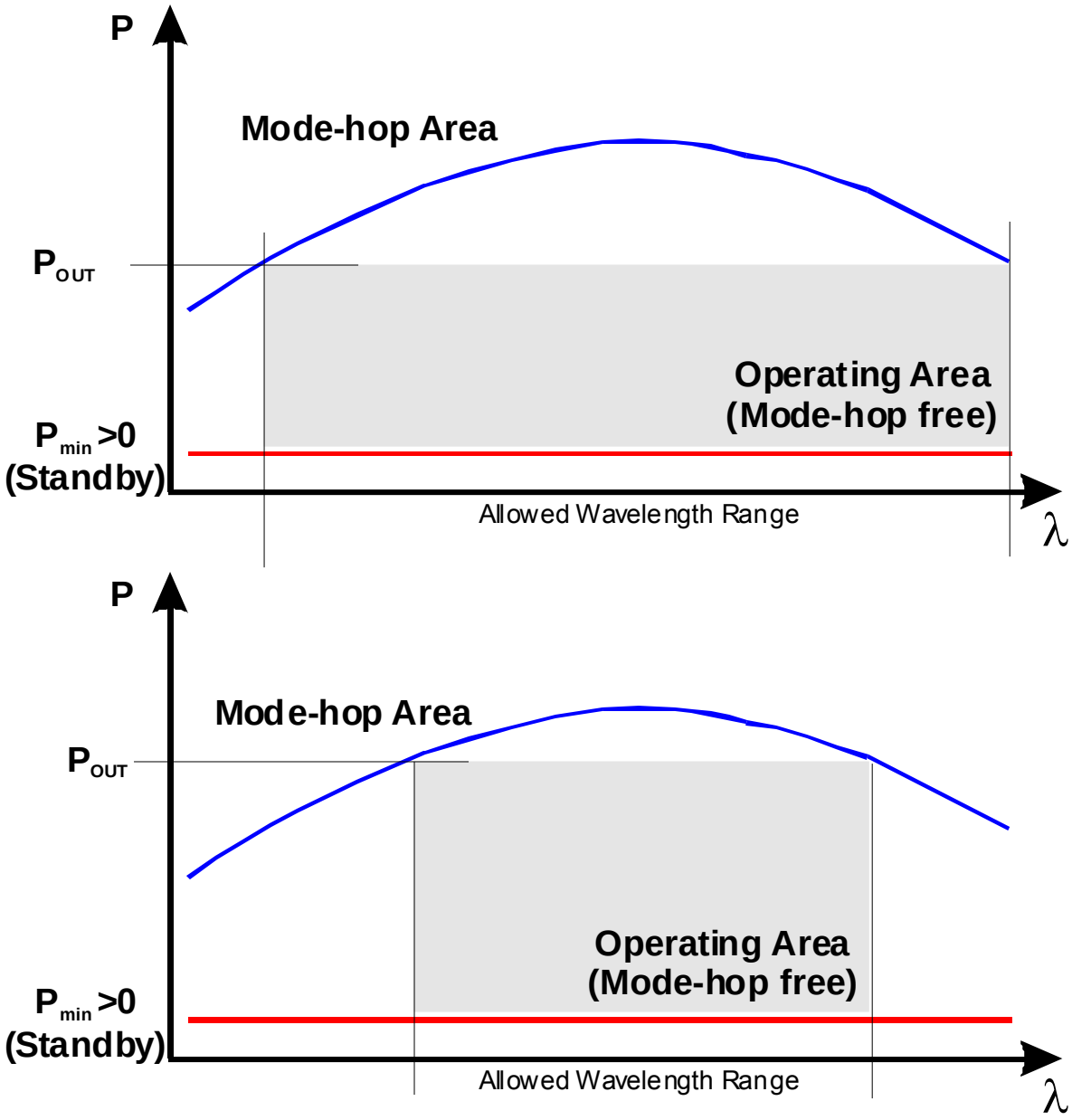


Figure 3 Mode-hop free operating areas of the ECL

The bended curve shows schematically the maximum allowed output power vs. wavelength for a mainly mode-hop free operation. Depending on the selected output power, only parts of the total tuning range may be useable.

NOTE

A complete mode-hop free operation over the full wavelength region is only guaranteed at output powers of 0 ± 0.2 dBm.

2 Getting Started

2.1 Preconditions

1) Precondition: you have installed and initialized the connection between the TXP and your PC according to the manual of the corresponding TXP mainframe.
2) You have installed the card specific software driver (is normally installed together with the TXP Administrator and TXP Explorer. If not, insert the CD-ROM delivered with the TXP / card into your CD-ROM drive. If the 'autorun' function is active on your PC, the installation program should start automatically. If not start the program 'TXP_System_Instrumentation.exe' on the CD. The installation wizard leads you through the installation process. When it comes to the type of installation, select 'custom'. Then mark the components for the ECL modules and proceed with the installation.
3) Insert the ECL5000D card in your TXP mainframe (see 1.6, "Installing and removing Cards")
4) Switch on the TXP if not yet done

The TXP system is now ready for operation and you can start the card specific graphics user interface (GUI).

2.2 The Graphical User Interface (GUI)

2.2.1 Start the GUI

To start the graphics user interface you have two possibilities:

1. Use the TXP Explorer or
2. Directly start the program: TXP_ECL.exe (ECL5000D)

1) Start the TXP-Explorer and connect to the desired mainframe  . You will get a system overview of the selected TXP mainframe (all TXP-Explorer details are explained in the mainframe manual). If you use a USB based TXP chassis, the IP number you must enter for the connection is '**localhost**'.

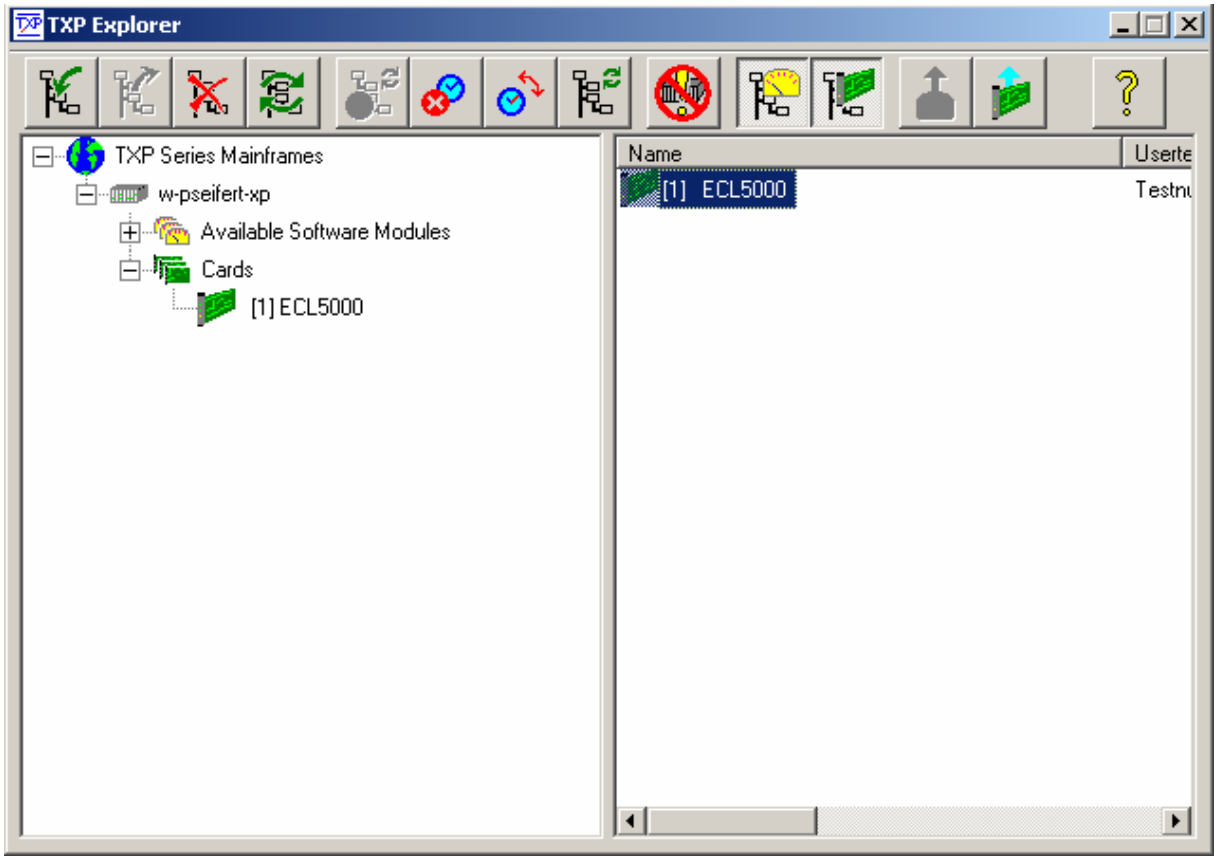


Figure 4 The TXP Explorer Window

Now select the module you want to control (if more than one card is inserted in your TXP) and launch the ECL specific operating program by double clicking on this card or by clicking the button 'Use card with standard module'.

Now the card specific operating software (GUI) starts.

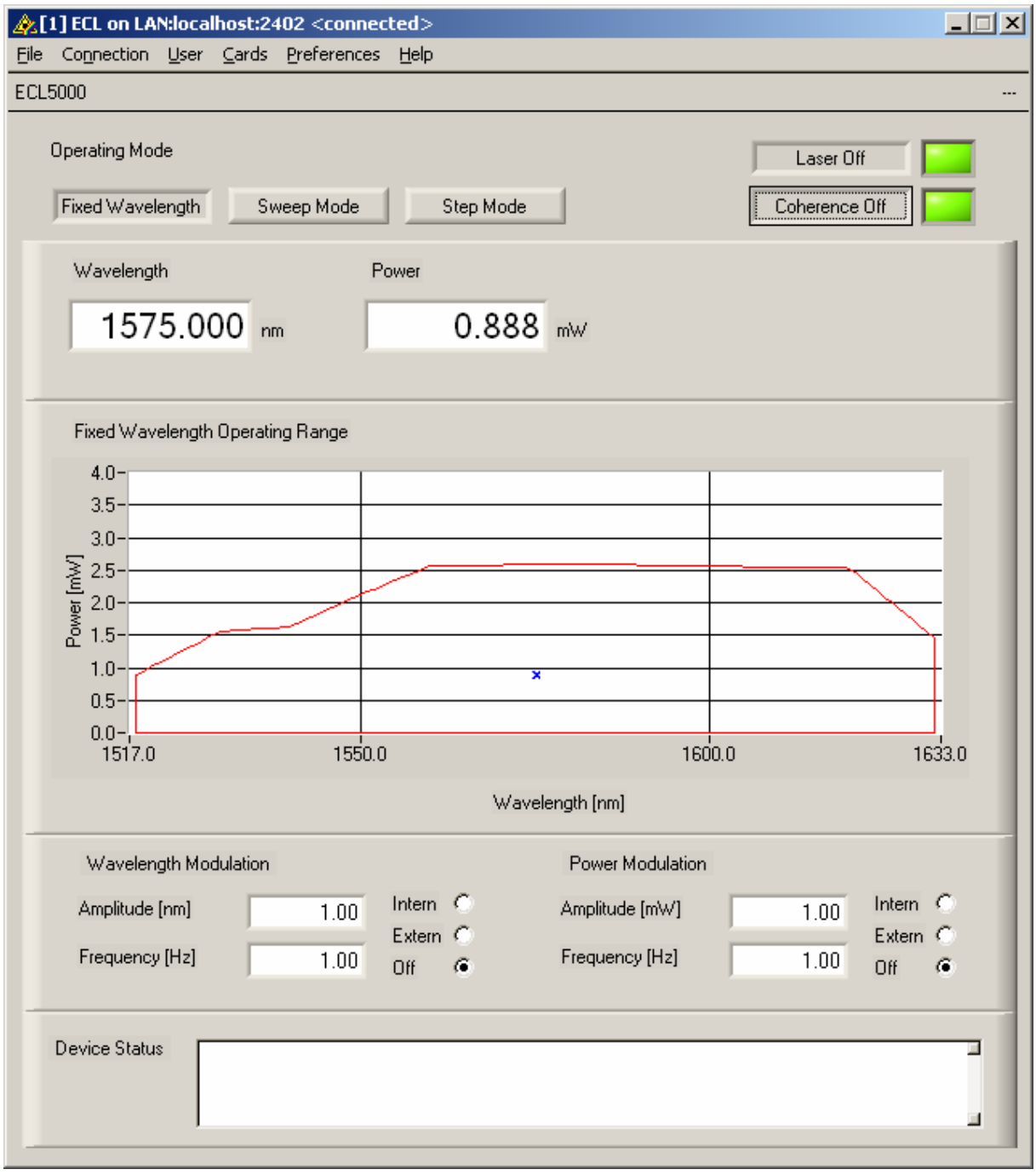


Figure 5 The ECL5000D GUI Surface

Alternatively:

2) Start TXP_ECL.exe directly.

In this case you must connect to the desired card in the corresponding mainframe through the 'Connection' menu. Clicking 'Connect' opens the selection window for the mainframe IP-address (see Figure 6). If you are using an USB based TXP, the IP address is **'localhost'**. If necessary (normally not, ask your system administrator) also enter the port-number and a timeout-value in the 'advanced' section (see Figure 7). If you have a slow network connection, increase the timeout. Normally you can leave both default-values as they are.
Click 'OK' and the program will yield a selection of all available ECL cards, which are accessible. Not shown are cards, which are in use by another program / operator.
(See Figure 8). Select the card you want to use and confirm with 'OK'. You are now connected to this specific card and can operate it in the main window.

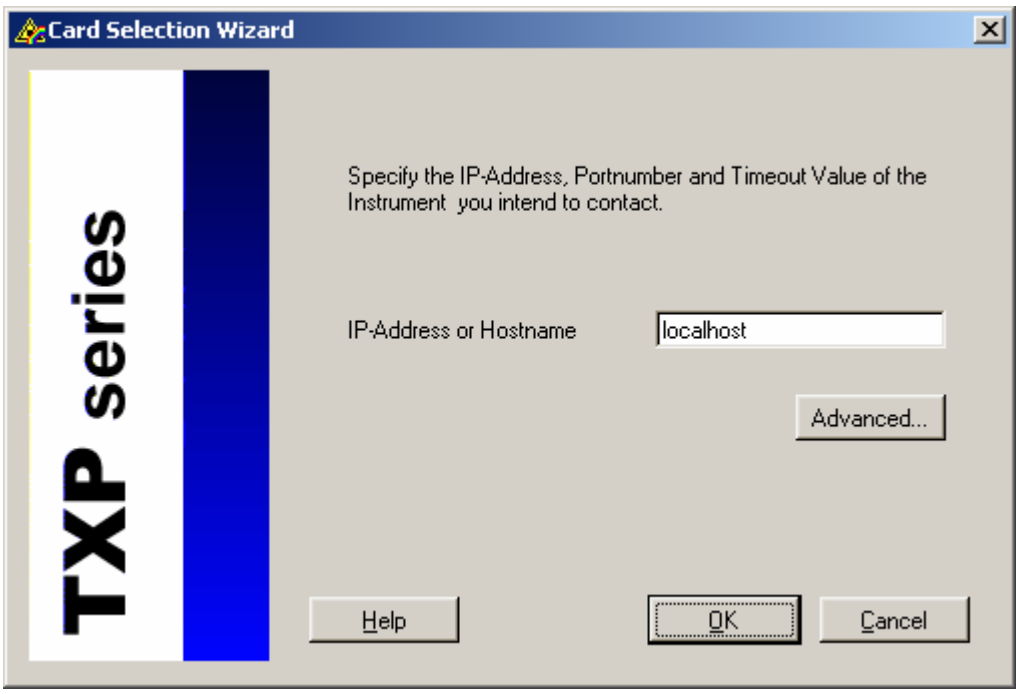


Figure 6 Enter the IP-Address

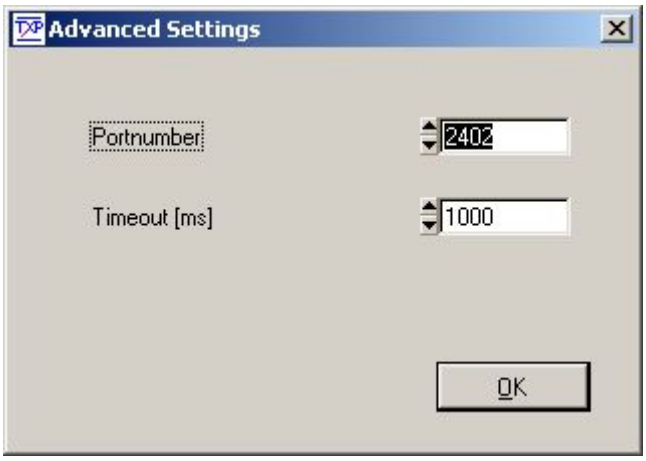


Figure 7 Select Portnumber and Timeout

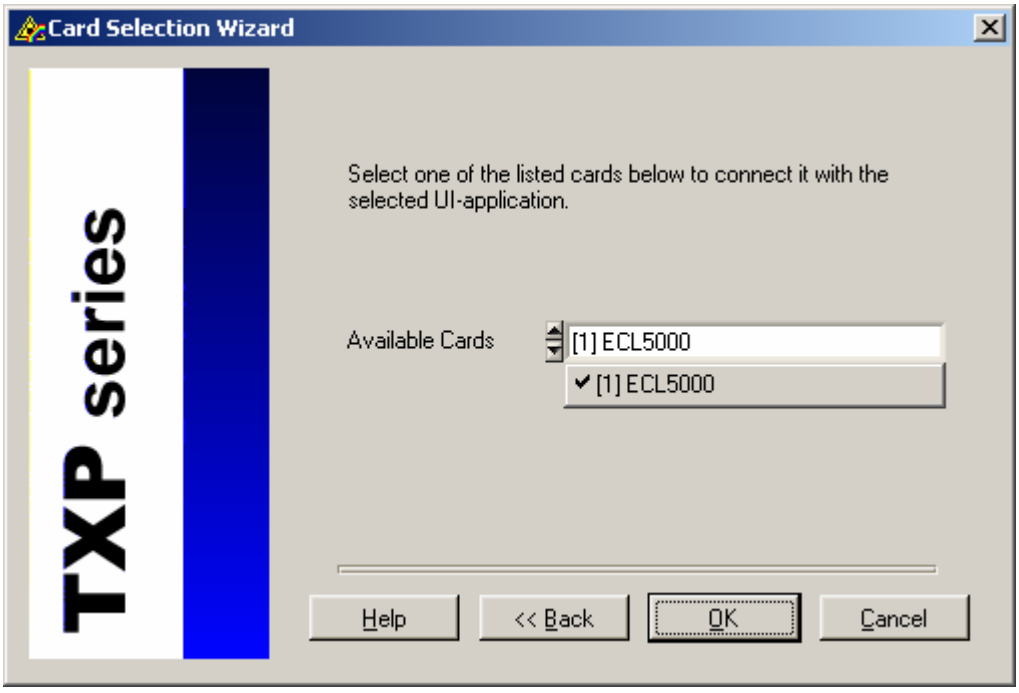
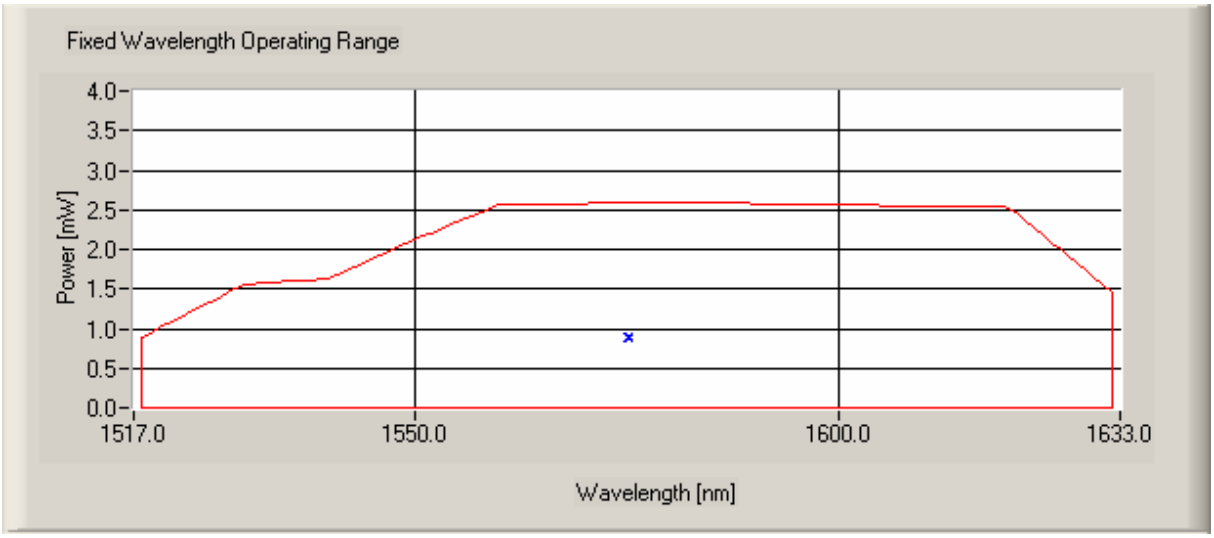


Figure 8 The card selection window

Hitting ‘OK’ starts the ECL Graphics User Interface
(see Figure 5The ECL5000D GUI Surface).

2.2.2 Operate the ECL the first time

If you start the GUI for the first time the unit runs a startup sequence and waits until thermal stability has been reached. Then you can see a red graphics being created in the operating range window:



The red region comprises the operation area that shows the maximum output power versus wavelength. You can select any wavelength and any power within this graph. The little blue hair-cross (here in the middle) shows you your actual settings.

Now enter a wavelength and a desired output power in the corresponding fields. Just mark the values (or only digits) with your cursor and type in new values.

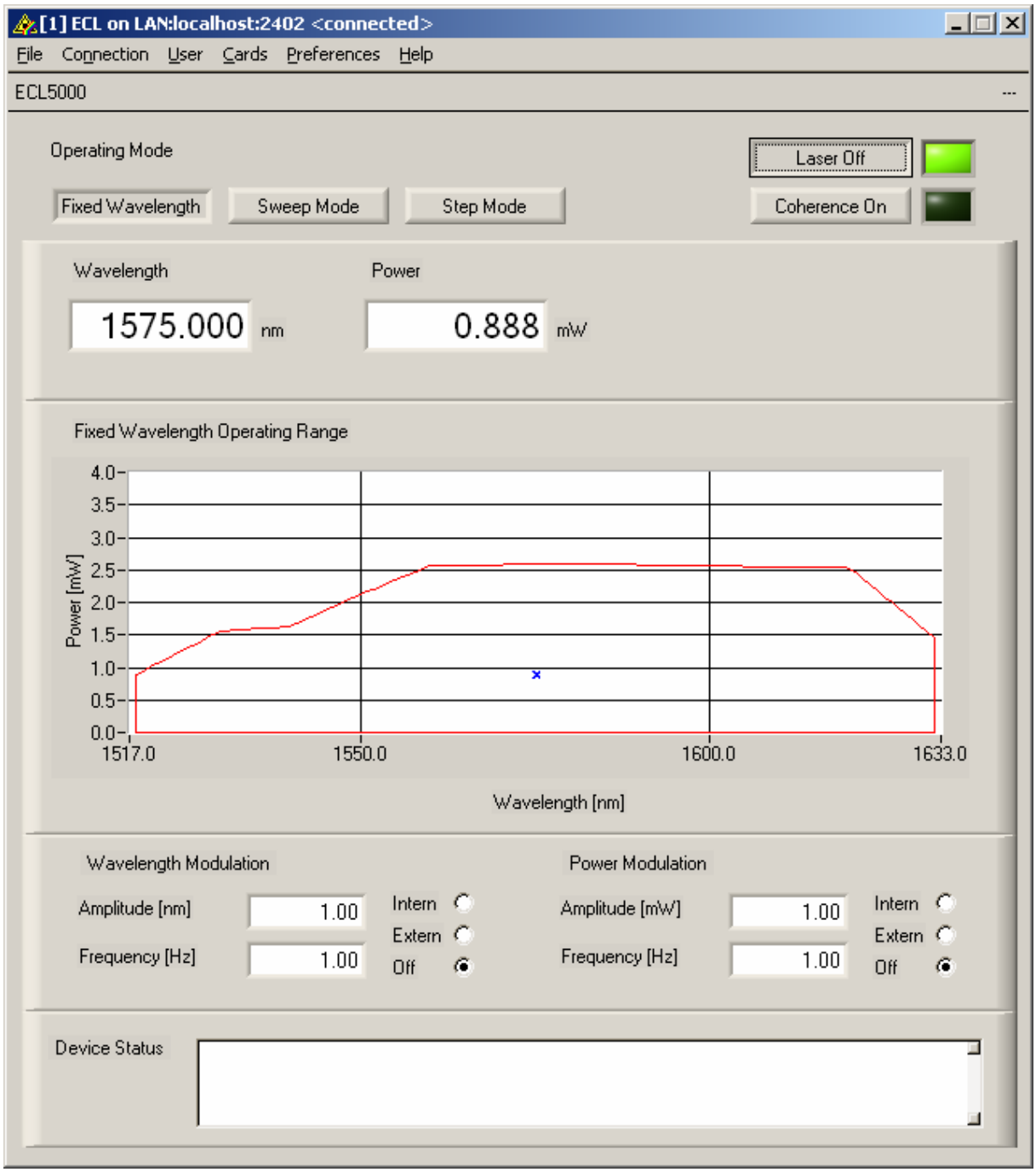


Figure 9 Operate the ECL the first time

The blue cursor jumps to the position corresponding to the new parameters. If you try to enter values which would bring the laser out of the stable operating area, the entered values are corrected automatically until the allowed limit is reached. If in the example in Figure 9 you had entered an output power of 3 mW, the program corrects this value to the maximum allowed output power of 2.55 mW for this wavelength.

NOTE

If you switch on the ECL5000D allow for some 2-3 minutes to warm up until the message “Startup Sequence Running” disappears!

Now click the button ‘**Laser On**’. The button text changes to ‘Laser Off’, the corresponding indicator field turns green and the laser switches on.

☝ Attention ☝

For safety reasons never operate the laser with no fiber connected!

3 ECL5500D Operation in Detail

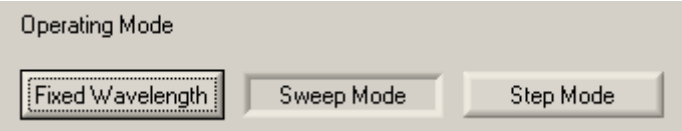
3.1 Principal Modes of Operation

The ECL5000D offers three principal modes of operation:

- Operation at a fixed, predetermined wavelength
- Operation in sweep mode. The output wavelength changes according to a predefined time schedule
- Operation in step mode. The output wavelength changes in predefined steps also according to a predefined time schedule.

The viewing of the ECL GUI mainscreen changes according to the selected operating mode.

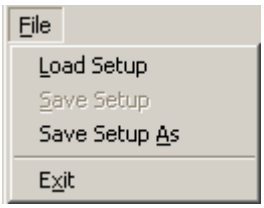
You can select the operating mode in the ‘Operating Mode’ panel on all three screens:



In the following part all operating elements of the different operating modi are described in detail.

3.2 The drop down Menus

3.2.1 The ‘File’ menu

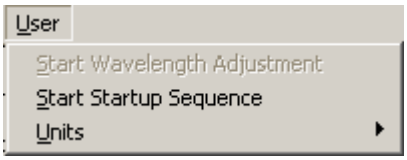


These menu items allow to store and recall the current settings for the ECL module in a file.
File extension is ‘.txs’.
‘**Exit’** quits the program.

3.2.2 The ‘Connection’ menu

Use these items to connect to a ECL card in a specified TXP chassis or to disconnect from this unit.

3.2.3 The ‘User’ menu

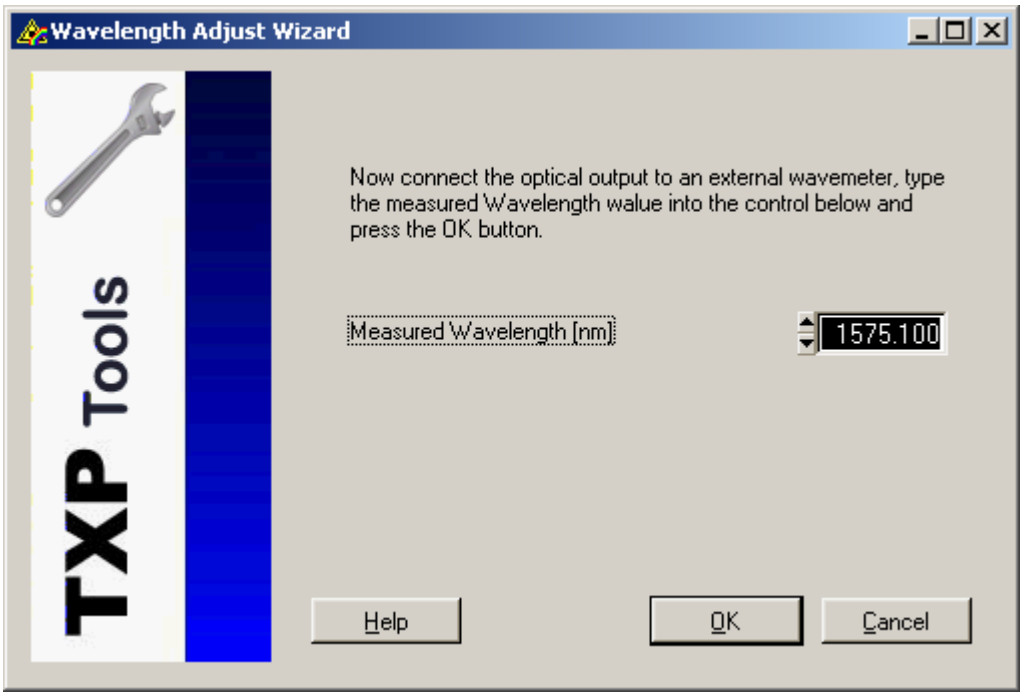


The user menu contains three items:

Start Wavelength Adjustment
This item allows the wavelength calibration of the ECL (due to mechanical drifts and aging of the laser, this calibration is necessary from time to time if highest precision of wavelength is vital for you.

1) Connect a sufficient precise wavemeter to the output of the ECL5000D. Set the laser wavelength in the middle of the wavelength region at about 1575 nm, the output power to 1 or 2 mW and switch the laser on.

2) Click the button ‘Start Wavelength Adjustment’

3) 

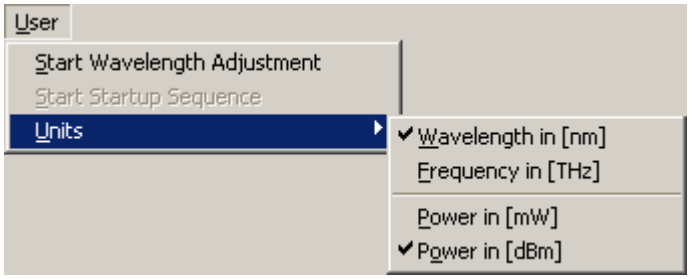
Now type in the measured wavelength and hit ‘OK’. This finishes the calibration procedure.

Start Startup Sequence

If the laser, e.g. due to mechanical vibrations, has made a mode hop, the frequency calibration of the system is no more precise. In this case it is recommended to run a startup sequence again. The laser runs a self-calibration sequence.

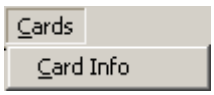
Units

The user can select the units in which he wants to enter wavelength and power.



You can select between wavelength in nanometer [nm] or frequency in tera-Hertz [THz] resp. power in milli-Watt [mW] or in decibles obove 1 mW [dBm].

3.2.4 The ‘Cards’ menu



Card Info shows you detailed information about the ECL card:

Card Name	ECL5000
Serial Number	E00510062
User Text	Made by Thorlabs GmbH
Card Type	60
Assembly Option	0
Hardware Option	0
Software Option	0
Protocol Version	1.1
Version Name	TXP ECL5000 - 08.208 - V0.9 - (Sep 06 2004)
Pow. Consumpt.	27.00 W
Assembly Date	Aug 10 2004 10:27
Last Repair Date	- not set -
Last Adjust Date	- not set -
Last Calib Date	Sep 10 2004 12:52
Next Calib Date	Sep 10 2006 12:52
card temperature	- not available -

Figure 10 The card information window

You can see the serial number of the card, all essential dates like the next calibration date and a user text. You can change this user text yourself by means of LabVIEW®-LabWindows/CVI®, MSVC or Borland-C commands.

3.2.5 The ‘Preferences’ menu

Set the refresh rate of your GUI according to the properties of your connecting network:

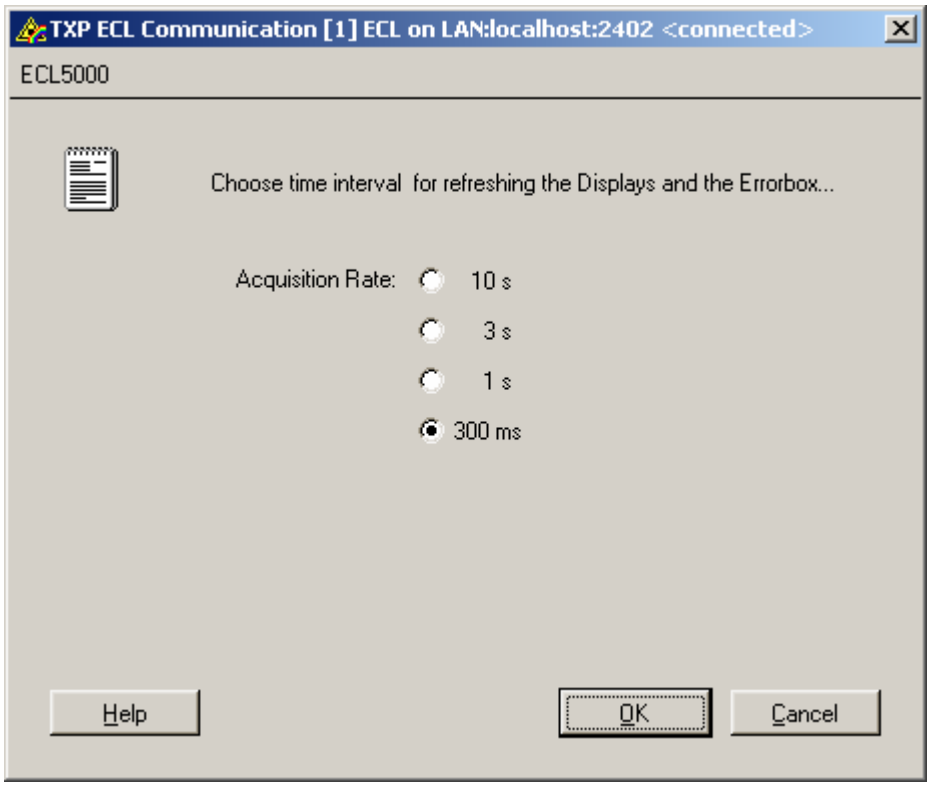
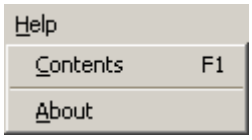


Figure 11 The communication settings

Depending on the bandwidth and reliability of your connection between TXP and PC, you can select update rates from 10 seconds down to 0.03 s.
This means, that all actual data you see on the GUI are updated with this time constant.

3.2.6 The 'Help' menu



With the item 'Contents' or the Function key 'F1' you can open the ECL help-file.

'About' shows general information about your ECL GUI software:

3.3 The Fixed Wavelength Operating Mode

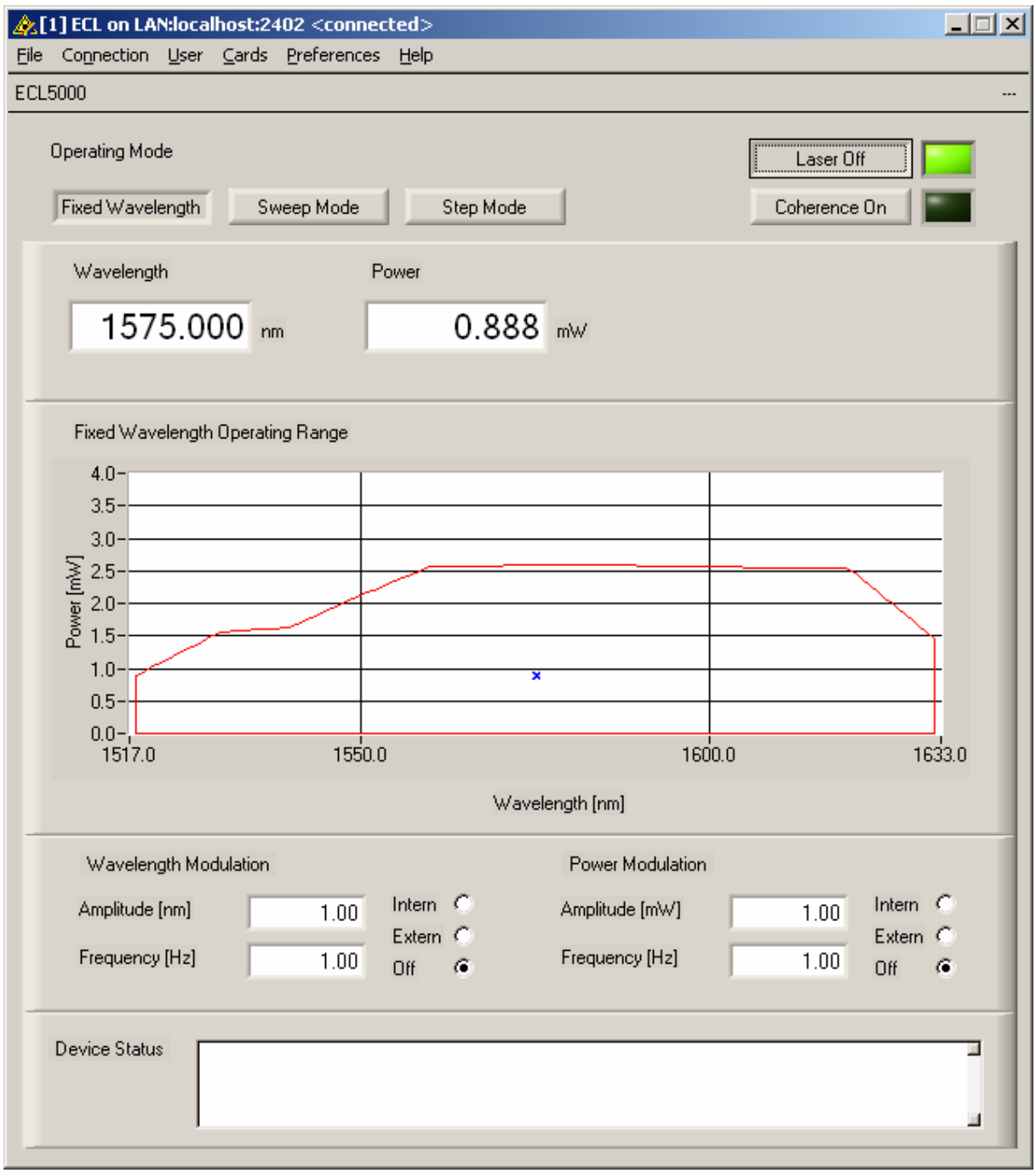
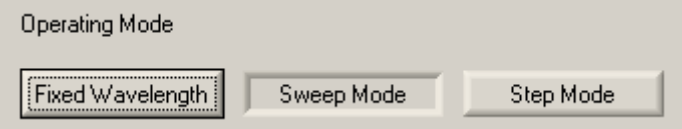


Figure 12 The Fixed Wavelength Mainscreen

3.3.1 Operating Mode Panel

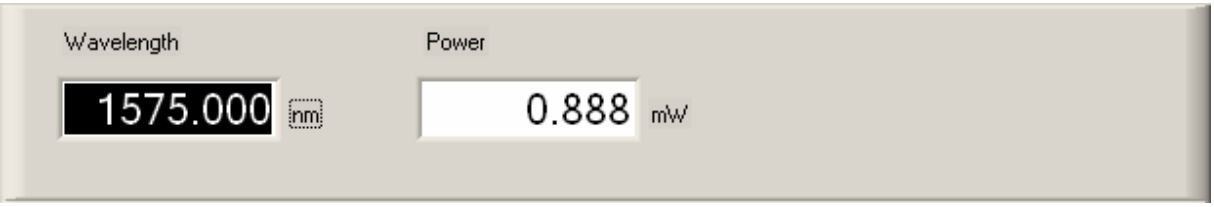
Here you can select the operating mode of the laser.



You have the choice between the fixed wavelength mode, the sweep mode and the step mode.
Fixed Wavelength Mode: You can enter wavelength and power manually, static operation (see 3.3)
Sweep Mode: You enter start- and stop wavelength and the laser scans once or continuously between both. (see 3.4)
Step mode: You enter start- and stop wavelength, step-width and stay-time for every step and the laser steps through the wavelength range (see 3.5)

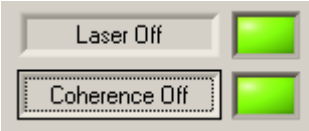
3.3.2 Power & Wavelength Control Panel

The Power and Wavelength Control panel consists of two input-fields for laser wavelength and laser power, the Laser On / Standby button and the graphical operation area field.



You can enter new numerical values by marking the whole display or single digits with your cursor, then type-in a new value und hit ‘Enter’.
If the values you entered would bring the laser out of the mode-hop free area (see graphical display), the entered numerical values are corrected automatically to keep the laser inside the operating area.
The values are entered in the physical dimension you selected in the ‘User’ menu (see 3.2.3).

3.3.3 Laser Control and Coherence Control



The button marked with ‘Laser On’ / ‘Laser Off’ switches the laser output power between the selected output power and a minimum value (< -20 dBm).

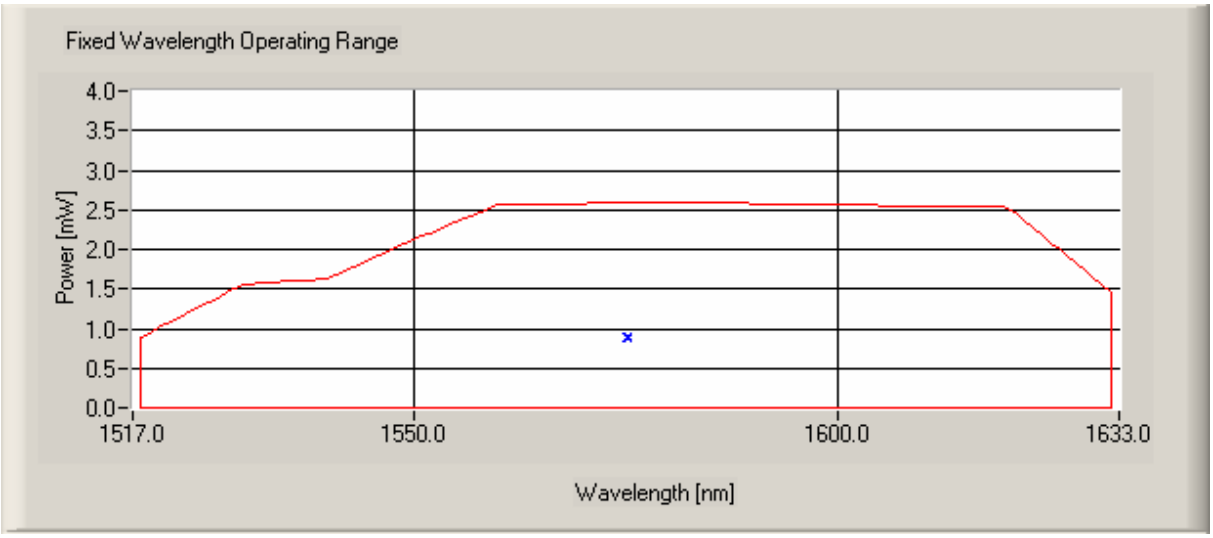
☝ Attention ☝

It is not possible to ‘switch off’ the laser! Due to the physical properties of the laser, the laser must still be running and delivering power (< -20 dBm) in the ‘Laser Off’ mode!

On this panel you can also switch the coherence control on or off.

The coherence control is sinusoidal at a modulation frequency of 1.55 kHz and produces a laser bandwidth of abt. 150 MHz.

3.3.4 The operating range panel



The red surrounded region comprises the operation area, in which no mode hops occur. You can select any wavelength and any power within this graph for mode-hop free operation.
The little blue hair-cross (here in the middle) shows you your actual settings.

If you work with the GUI all entries you make, which would bring the laser out of this mode-hop free region are corrected automatically to the maximal allowed values.

3.3.5 Wavelength and Power Modulation Panels

There are different ways to modulate the ECL laser: internal modulation of wavelength **or** power, external modulation of wavelength **and / or** power and no modulation at all. You can also mix internal and external modulation.

In internal mode you can modulate the wavelength with a deviation from 0 to 100 nm max. The modulation frequency can be selected between 1 and 50 Hz.
The output power can be modulated with an amplitude from -20 dBm to maximum output power at a modulation frequency between 1 and 50 Hz.

The external modulation is applied to the BNC jacks ‘Analog In Wavelength’ and ‘Analog In Optical Power’ (please see 1.5, “Operating Elements at the Front Panel”).
Because both inputs for wavelength and power modulation also serve for wavelength and power tuning, the inputs are DC coupled. This has some consequences for the use of these inputs:

Power:
The optical power tuning and modulation input has a calibrated sensitivity of 1 mW / V. The input is unipolar and ranges from 0 to +10 V. 0V in this case means an optical output power of -20 dBm = 0.01 mW. Negative input voltages are clipped, so it is not possible to extinguish the laser.

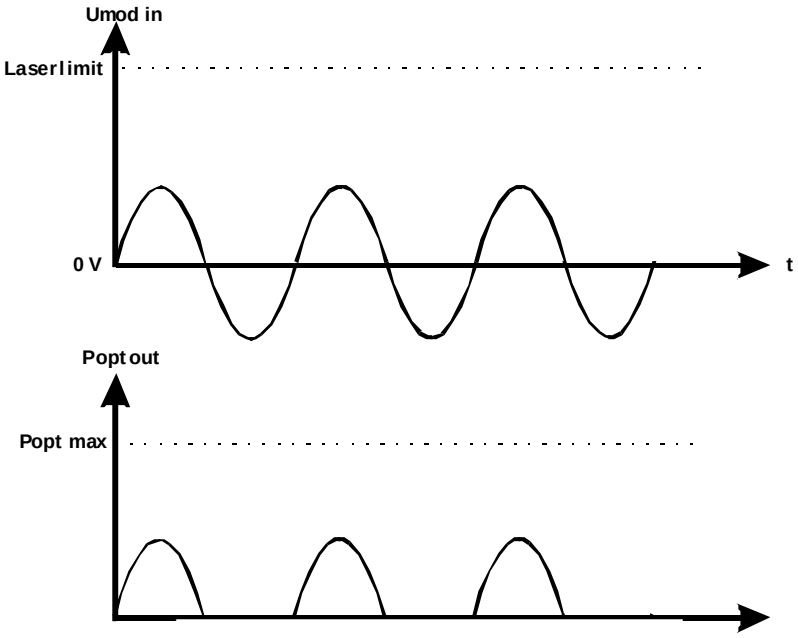


Figure 13 Power Modulation Clipping.

Input voltages which would lead to an output power above the mode-hop free region are clipped too. E.g. if the maximum output power of the laser is 3.2 mW, all input voltages above 3.2 V would yield the same output power.
For modulation purposes this means that you must apply a DC offset to your modulation voltage if you want to have an unclipped modulation.

Please keep in mind, that the wavelength tuning voltage set by the GUI is also added (see Figure 14 Power Modulation Clipping (offset too high)). So the best way to deal with power modulation is to set the output power in the GUI to its minimum and then control the mean output power by a variable DC offset voltage added to the modulation signal.

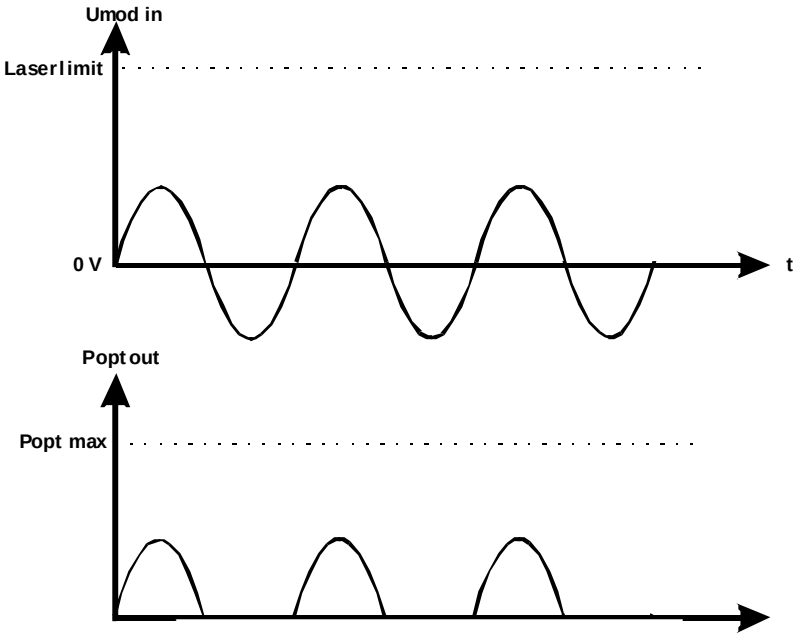


Figure 13 Power Modulation Clipping (no offset)

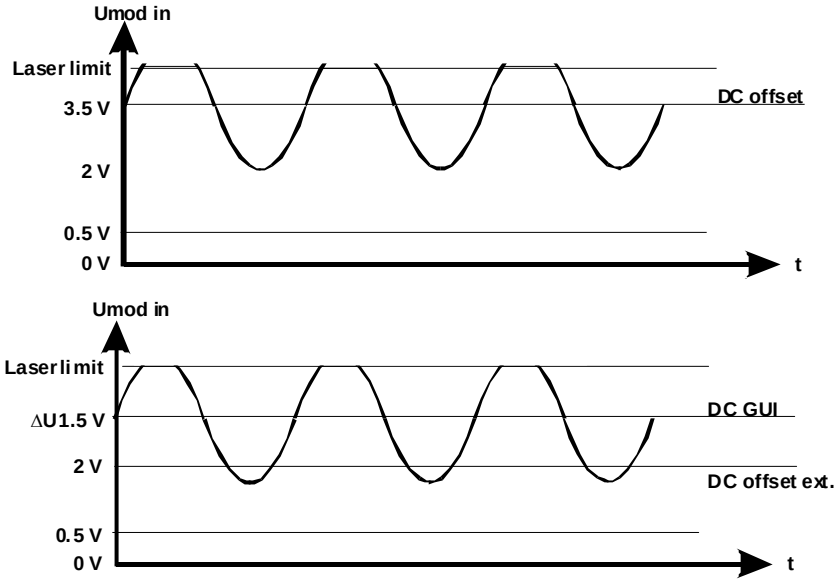


Figure 14 Power Modulation Clipping (offset too high)

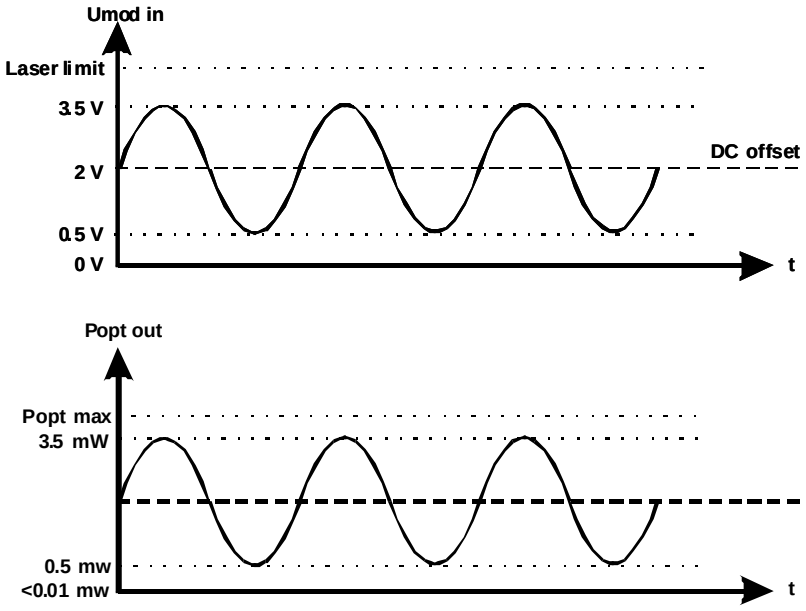


Figure 15 Power Modulation with correct DC offset

Wavelength:

For the wavelength you must take care yourself on the DC offset. If the offset value is wrong or the modulation amplitude too high, the laser may jump out of the mode-hop free operating area!

3.3.6 Device Status Panel

Any status message or warning or occurring error is displayed in the Device Status field. E.g. if the measurement executes the startup sequence after turning it on the first time, the status field shows ‘Startup Sequence running’.
(See 5.3 for a list of possible status messages)

NOTE

If it is a major error you will get a separate pop-up window which must be acknowledged, minor warnings or status messages disappear if the cause of their display has vanished.

3.3.7 Trigger In- / Output

In the fixed wavelength mode no trigger input or output signal has a function.

3.4 The Sweep Mode

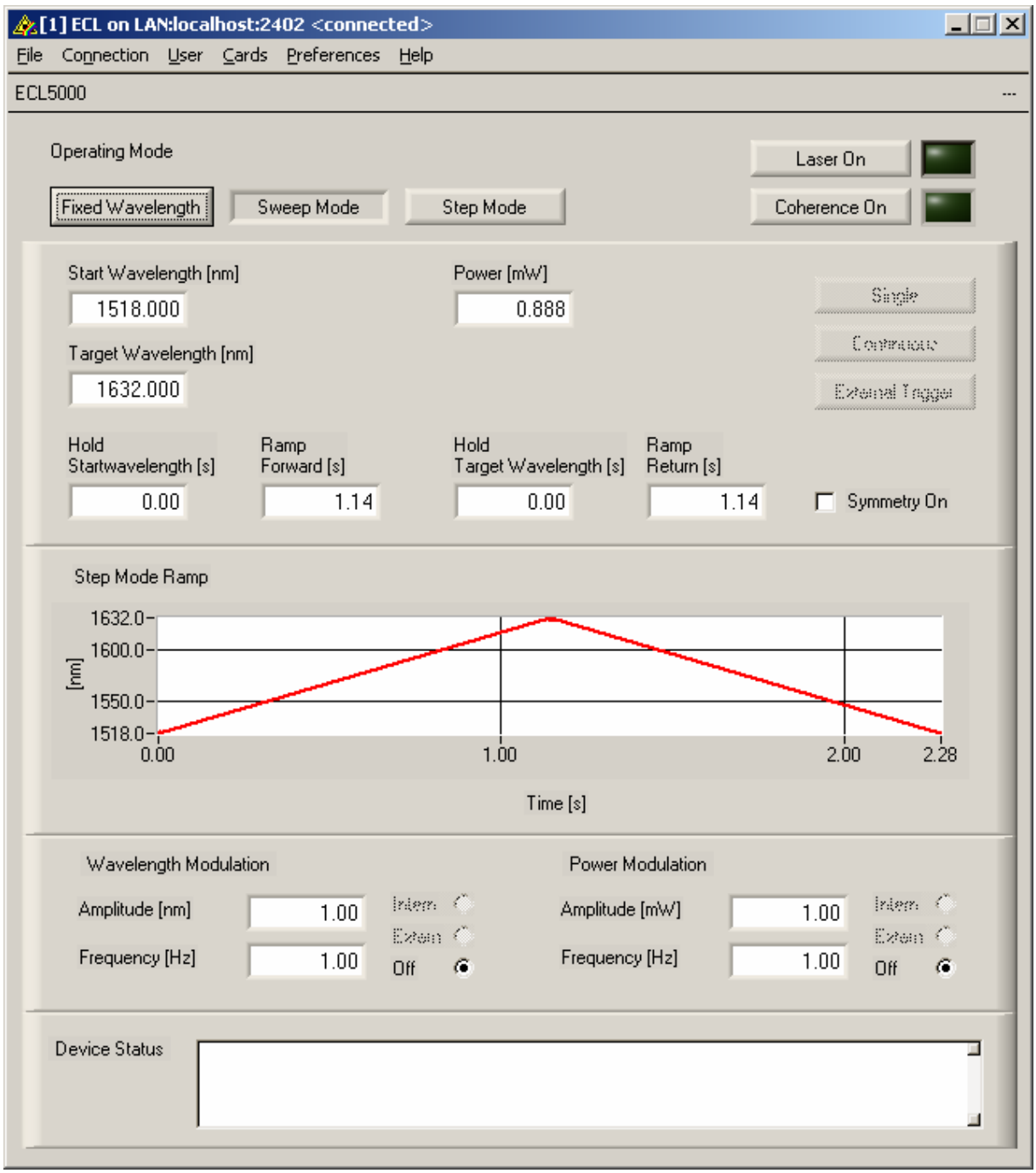
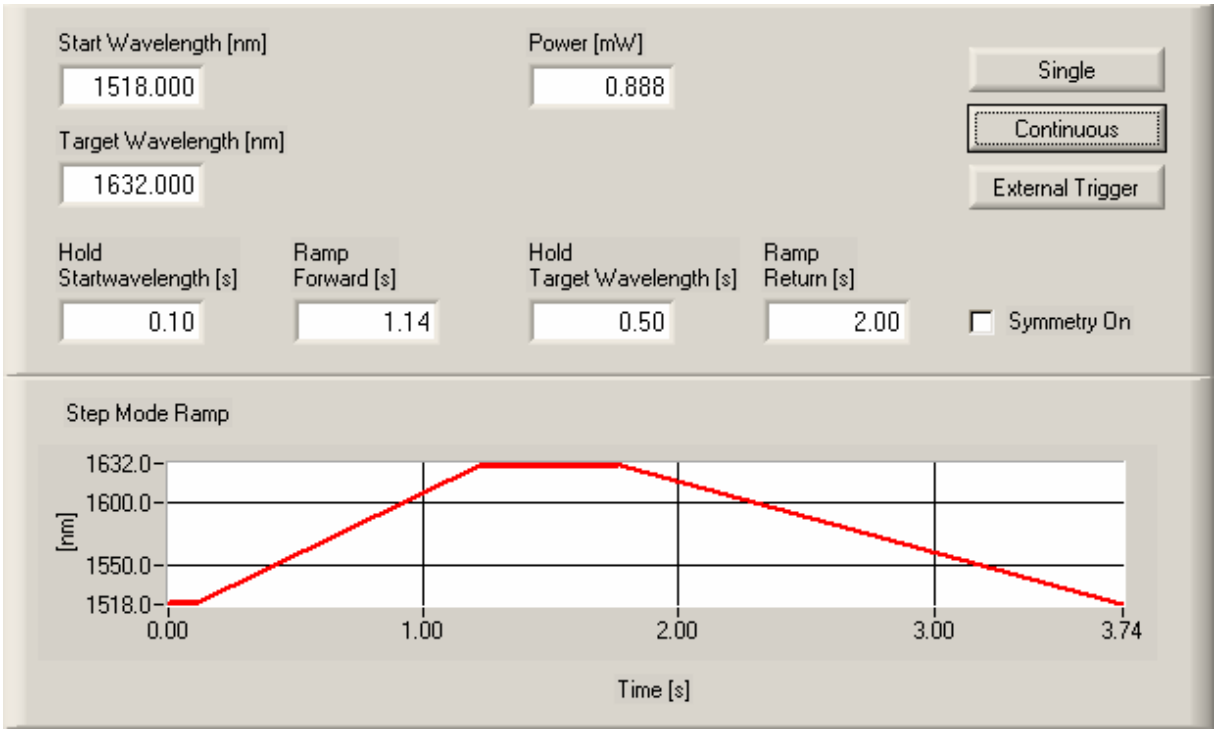


Figure 16 The Sweep Mode mainscreen

3.4.1 The 'Sweep Control' Panel

The graphical window shows you the time-behavior of your laser wavelength. You can set all parameters in the display fields above. You can run the sweep mode only once (triggered or un-triggered) or continuously.



The sweep control panel offers a graphical representation of the sweep, 7 numerical input fields, one checkbox and 3 operating buttons.
In the first two numerical fields you enter the start- and target wavelength of the sweep. If you want to sweep up first, the start wavelength is lower than the stop wavelength, if you want to sweep down vice versa.
In the third field enter the desired output power.

NOTE

Please keep in mind, that you can not scan the full wavelength range with the maximum output power. The last entry you make, wavelength or power will be corrected automatically if the laser would else leave the mode-hop free operating area!

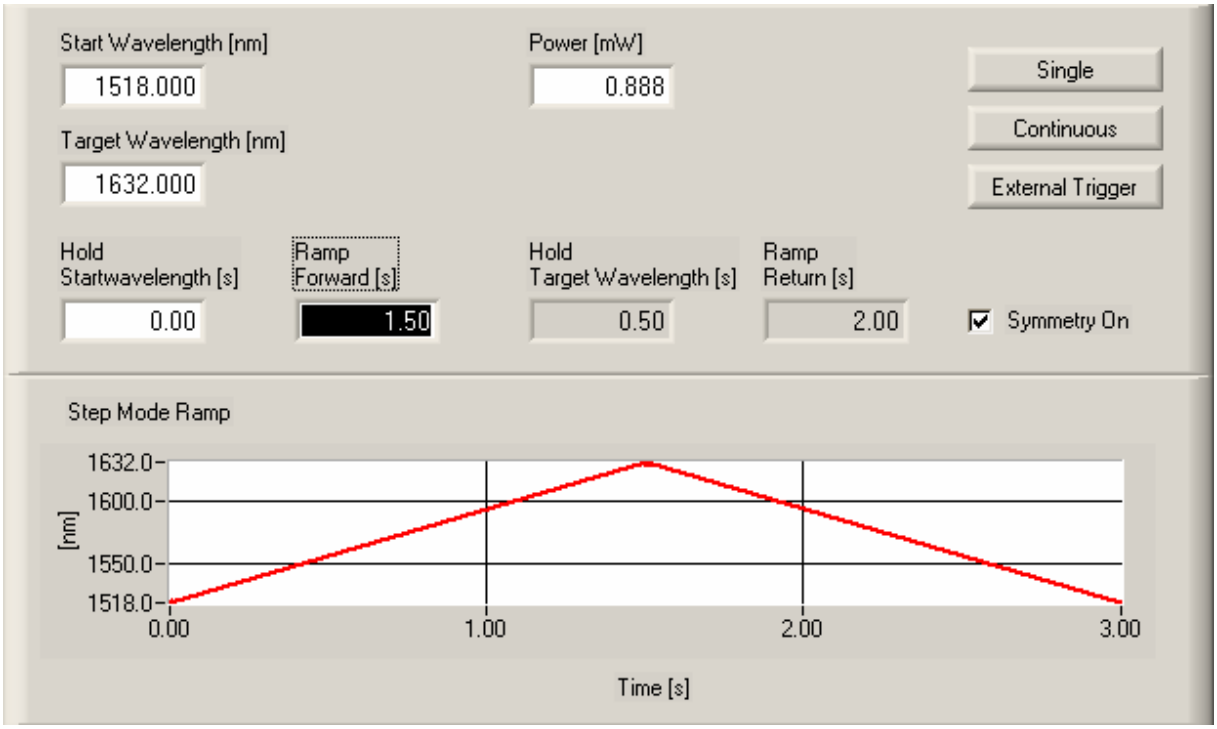
The lower four input fields determine the rise and fall time of the wavelength scan as well as the stay-time on the upper and lower wavelength.

- Hold Start Wavelength: The time the laser stays on the start wavelength
- Ramp Forward: Rise time for the wavelength to reach the target wavelength
- Hold Target Wavelength: The time the laser stays on the target wavelength
- Ramp Return: Fall time for the laser wavelength to reach the start wavelength again

The checkbox ‘Symmetry On’ allows for a symmetrical scan behavior, that means the times for ‘Hold Start Wavelength’ and ‘Ramp Forward’ are the same as for ‘Hold Target Wavelength’ and ‘Ramp Return’.

EXAMPLE:

To have the laser scan up and down continuously, click the button ‘Symmetry On’, set the ‘Hold Startwavelength’-time to 0 and select an appropriate ‘Ramp’-time.



Select ‘Continuous’ and the sweep starts.

The buttons:

- Continuous / Single: Select between a single wavelength scan and a continuous scan, i.e. if the laser has reached the stop-wavelength, it jumps automatically to the start-wavelength again and starts a new scan cycle.
- External Trigger: In addition this button allows to select whether you would like to start the wavelength sweep manually or by an external trigger.

No Trigger: start the sweep simply by pressing ‘Single or ‘Continuous’’
With Trigger: hit ‘Trigger, then the system waits for the next hardware trigger signal at the corresponding BNC input jack (see 1.5). The input trigger is a TTL signal. At the rising edge of the trigger signal the wavelength sweep starts. The width of the input trigger signal has no influence on the sweep.

3.4.2 Wavelength and Power Modulation Panels

Internal Wavelength and power modulation within a sweep is not possible. For external modulation see 3.3.5.

3.4.3 Device Status Panel

See 3.3.6

3.4.4 The Trigger output

If the direction of the wavelength sweep changes, you will get a signal at the trigger output (TTL level).

3.5 The Step Mode

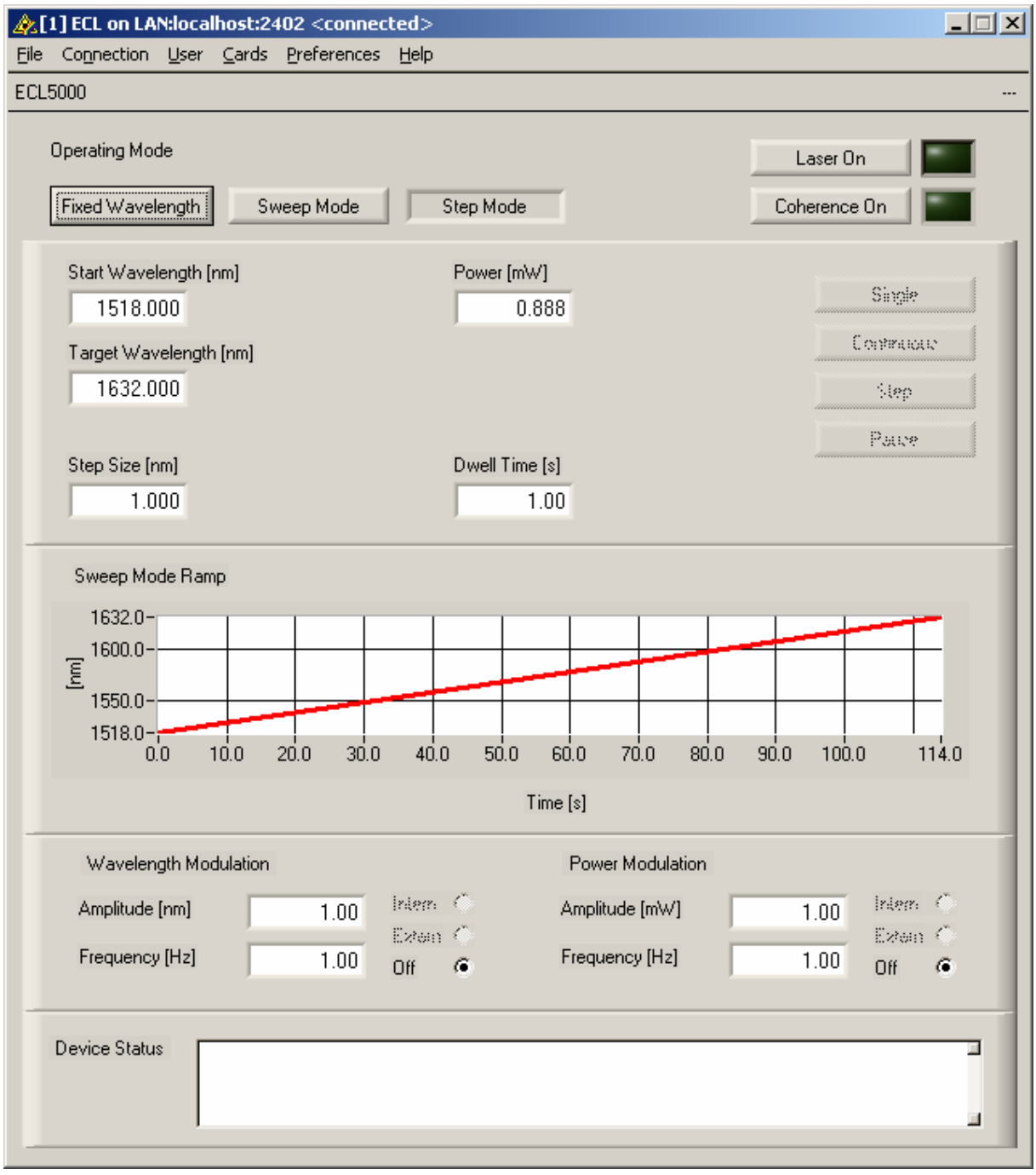


Figure 17 The Step Mode Mainscreen

3.5.1 The Step Control Panel

The step control panel offers a graphical representation of the step-scan, 5 numerical input fields and 4 operating buttons.

In the first two numerical fields you enter the start- and stop wavelength of the step-scan. If you want to step up, the start wavelength is lower than the stop wavelength, if you want to step down vice versa.
In the third field enter the desired output power.

NOTE

Please keep in mind, that you can not scan the full wavelength range with the maximum output power. The last entry you make, wavelength or power will be corrected automatically if the laser would else leave the mode-hop free operating area!

The fourth button allows to define the step-size in nm. The fifth button (Dwell time) represents the time for which the laser wavelength is kept constant for every step.

The buttons:

- Continuous / Single: Select between a single wavelength scan and a continuous scan, i.e. if the laser has reached the stop-wavelength, it jumps automatically to the start-wavelength again and starts a new scan cycle. If started, the corresponding button text changes to ‘Stop’ to halt the scan and reset the laser to the start wavelength.
- Pause: Interrupts a running scan.
- Continue: Continues a paused scan.
- Step: In a paused scan you can jump manually to the next step and hold on there.

3.5.2 Wavelength and Power Modulation Panels

See 3.3.5

3.5.3 Device Status Panel

See 3.3.6

3.5.4 The Trigger in- / output

In the step mode no trigger output signal is available. The Trigger input has no function.

4 Service and Maintenance

4.1 General remarks

In normal operation the ECL5000D card does not need any service. If highest precision of the measurements is vital for you, you should have recalibrated the ECL5000D every two years. You can see the due date of calibration in the card info-menu of the card driver (refer to 3.2.4)

4.2 Troubleshooting

◆ Card does not work at all :

- Look if the Card is inserted properly into the TXP mainframe and the ejector handle has snapped into its position.
- Look if the mainframe is powered up (does any LED light up)
- If the mainframe LEDs are lighting but the ECL card shows no reaction, check whether the slot fuse has opened. (Refer to the corresponding mainframe manual).

5 Listings

5.1 List of Acronyms / Abbreviations

ECL	External Cavity Laser
FWHM	Full Width Half Maximum
GUI	Graphical User Interface
LED	Light Emitting Diode
RIN	Relative Intensity Noise
SMSR	Side Mode Suppression Ratio
SSE	Signal to Source-Spontaneous Emission Ratio
STSSER	Signal to Total Source-Spontaneous Emission Ratio

5.2 List of Figures

5.3 List of possible Status Messages

“System Error”	Retry or Call Thorlabs Service Support
“Card Missing”	This status message shows if you have established a connection between the corresponding software module and a card and then remove the card from the TXP.
“Critical Card Temperature reached”	Internal temperature too high. Please switch off the ECL and let the card cool down.
“Supply Voltage Failed”	Internal error. Call Thorlabs Service Support
“Global Interlock Open”	You must close the global interlock line to operate the laser.
“Temperature Error”	Wait until the laser temperature has stabilized
“Cooling changed”	The ECL Card requires enhanced cooling
“Mode Hop Detected”	A mode hop occurred. That means your wavelength scale is not precise any more. Please run a startup sequence to re-synchronize the laser (see 3.2.3)
“System Error”	Internal laser error. Call Thorlabs Service Support
“Miscellaneous Error”	Internal laser error. Call Thorlabs Service Support
“Sweep Mode Running”	Info that the sweep mode macro is running
“Step Mode Running”	Info that the step mode macro is running
“Startup Sequence Running”	Info, initialization of laser parameters

5.4 Addresses

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