



University of Oxford

Grating Test Instructions

Transmission Efficiency Measurements for HARMONI

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Introduction

A set of instructions to perform transmission efficiency tests on the HARMONI VPHGs using the 'Grating Test' automation software GUI.

Name	Band	R	λ min (nm)	λ central (nm)	λ max (nm)
VIS	V+R	3300	458		820
LR1	I+z+J	3355	811	1090	1369
LR2	H+K	3355	1450	1950	2450
MR1	I+z	7104	830	940	1050
MR2	J	7104	1046	1185	1324
MR3	H	7104	1435	1625	1815
MR4	K	7104	1951	2210	2469
HR1	z-high	17385	828	865	902
HR2	H-high	17385	1538	1608	1678
HR3	K-short	17385	2017	2109	2201
HR4	K-long	17385	2199	2300	2400

Component checklist

Safety instructions

ALL USERS MUST BE LASER SAFETY TRAINED

TAKE ALL NECESSARY PRECAUTIONS

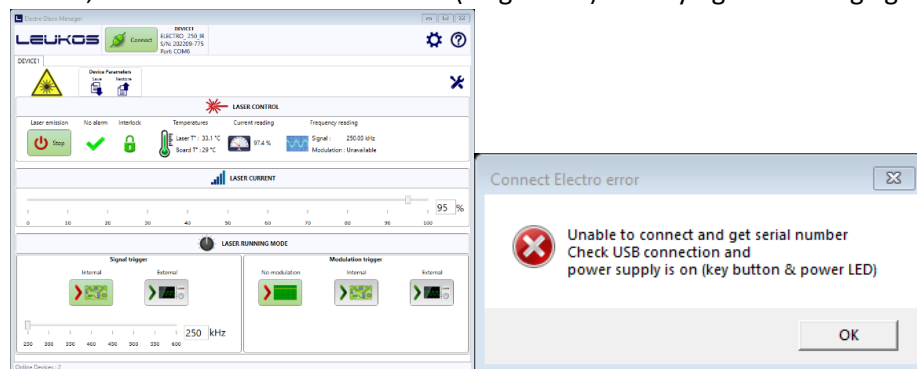
NEVER LOOK DIRECTLY INTO THE BEAM

More detail on the specifics for this test bench will be added.

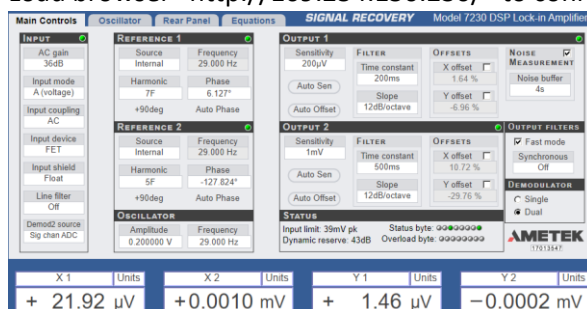
Setup instructions

Instructions from fresh restart

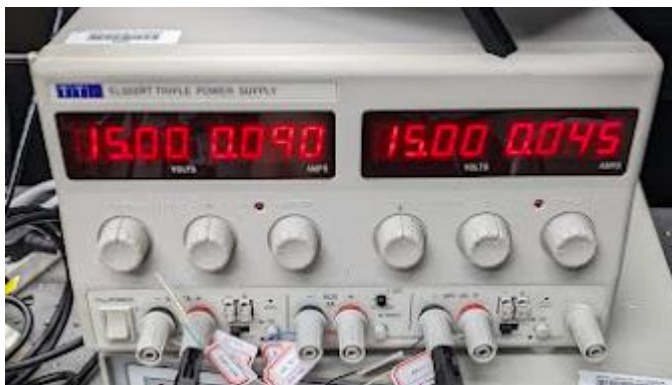
1. Open Anaconda Navigator
2. Select grating environment
3. Launch DataSpell
4. Turn on Monochromator at switch
5. Turn on lock-in amplifier
6. Turn on chopper, and start it with external reference from lock-in at 203Hz
7. Turn on laser with key
 - a. Check laser safety standards are applied, see Section 3
8. Launch "Electro Disco Manager"
9. Click Connect
 - a. If connection error, make sure 'Online Devices' on bottom left of GUI is 1. If more than 1, disconnect extra USB devices (stages etc.) and trying connecting again.



10. Load browser "<http://169.254.150.230/>" to connect to lock-in amplifier.



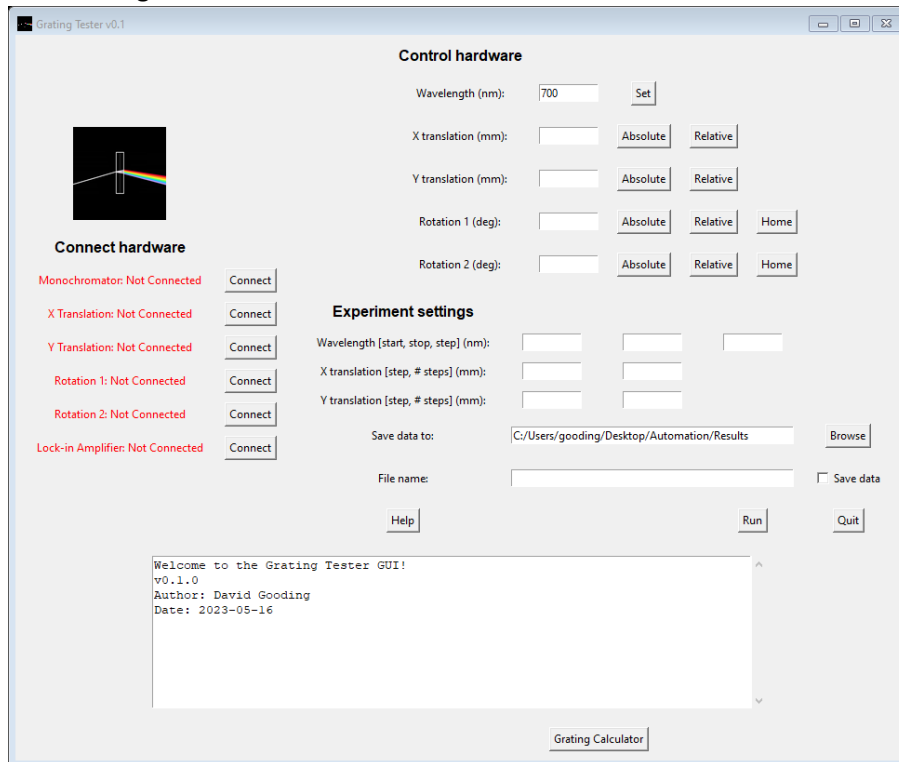
11. Switch on InGaAs detector



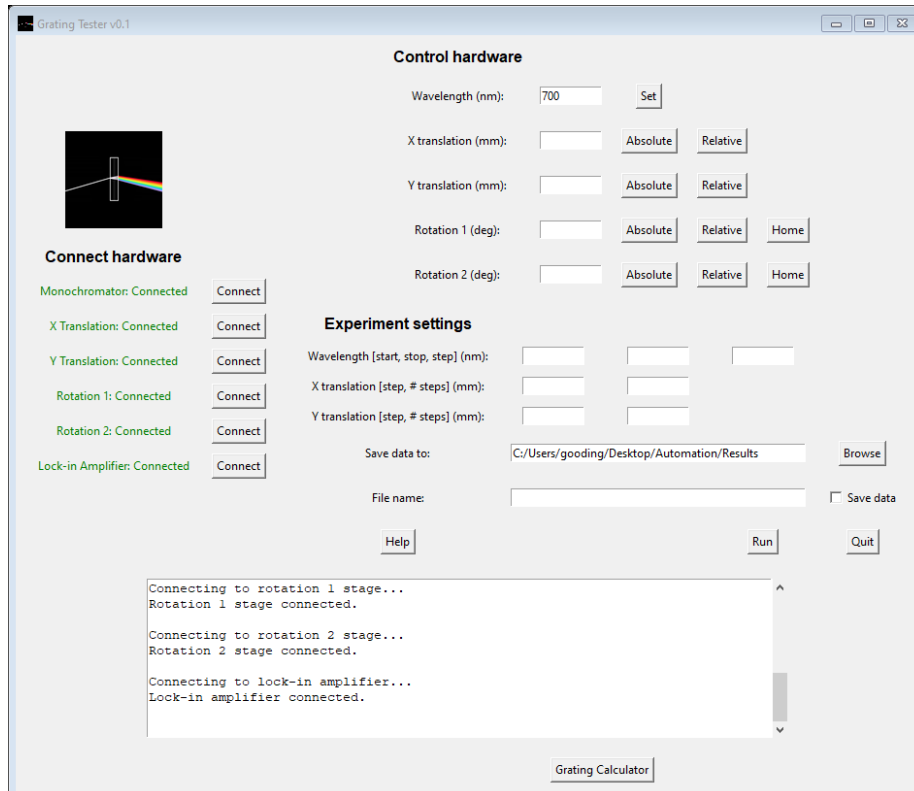
12. Auto-phase LIA Reference 1
- 13.

Test procedure

1. Run Grating Tester GUI

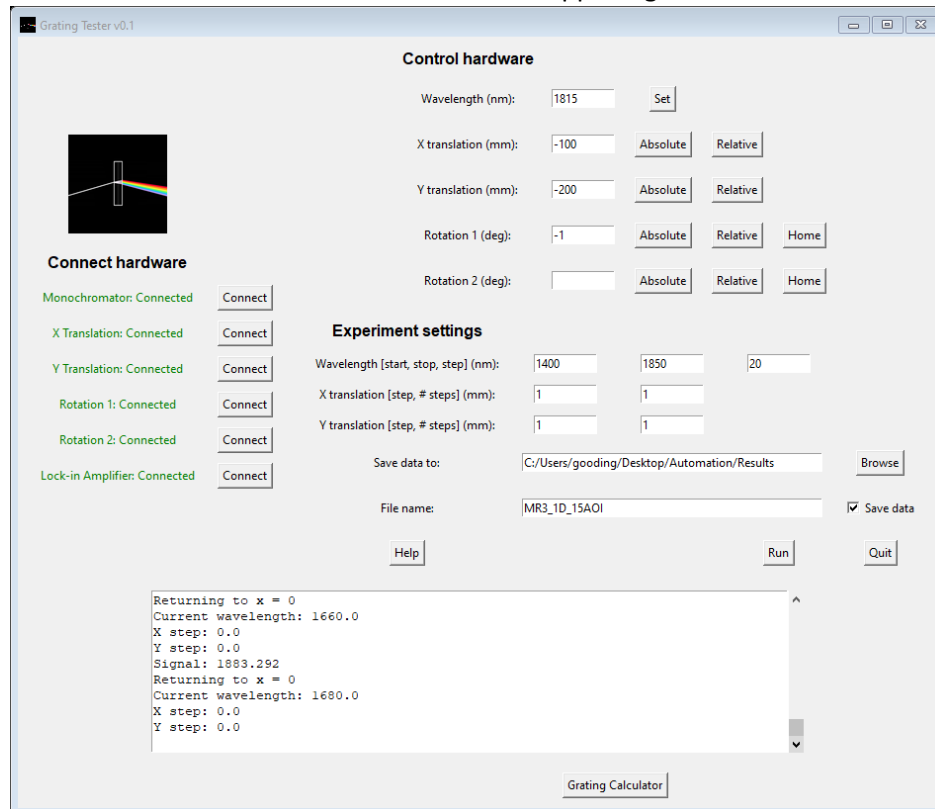


- 2.
3. Click 'Connect' next to all the hardware options, if successful the red text will turn green. If it won't connect try again, check all physical connections, and use 'Debugging' section below.



4. The GUI is divided into three sections. 'Connect hardware', 'Control hardware', and 'Experiment Settings'. There is also a dialogue box at the bottom which will print out outputs

from the software to show the user what is happening.



1D test procedure

A 1D test is measured across a wavelength range for a single physical location.

1. Type chosen wavelength parameters in nm. The wavelength stop value is the end of the range, **not inclusive of this value**. The step value is the step size between each measurement. For example entering (Start= 1500, stop= 2000, step= 100) will measure at 1500, 1600, 1700, 1800, and 1900nm. If you want to measure at 2000nm inclusive, then increase the stop value between 2001 to 2100nm. This is due to the Python logic employed:

```
wavelengths = np.arange(float(self.wavelength_start_entry.get()),
                        float(self.wavelength_stop_entry.get()),
                        float(self.wavelength_step_entry.get()))
```

2. X and Y translation is not required, and so values should be set to 1.
3. Choose a folder location to save data if desired, and a filename. A date and time stamp will be added to the front of the filename by default.

2D test procedure

1. Type chosen wavelength in nm as the 'start' wavelength. The wavelength stop value is the end of the range, **not inclusive of this value**. The step value is the step size between each measurement. For example entering (Start= 1500, stop= 2000, step= 100) will measure at 1500, 1600, 1700, 1800, and 1900nm. If you want to measure at 2000nm inclusive, then increase the stop value between 2001 to 2100nm. This is due to the Python logic employed:

```
wavelengths = np.arange(float(self.wavelength_start_entry.get()),
```

```
float(self.wavelength_stop_entry.get()),  
float(self.wavelength_step_entry.get()))
```

2. X and Y translation settings follows a different logic, whereby a step size in mm is entered first and then the number of steps to be taken. These values are relative to the current position, and therefore the start location needs to be set first

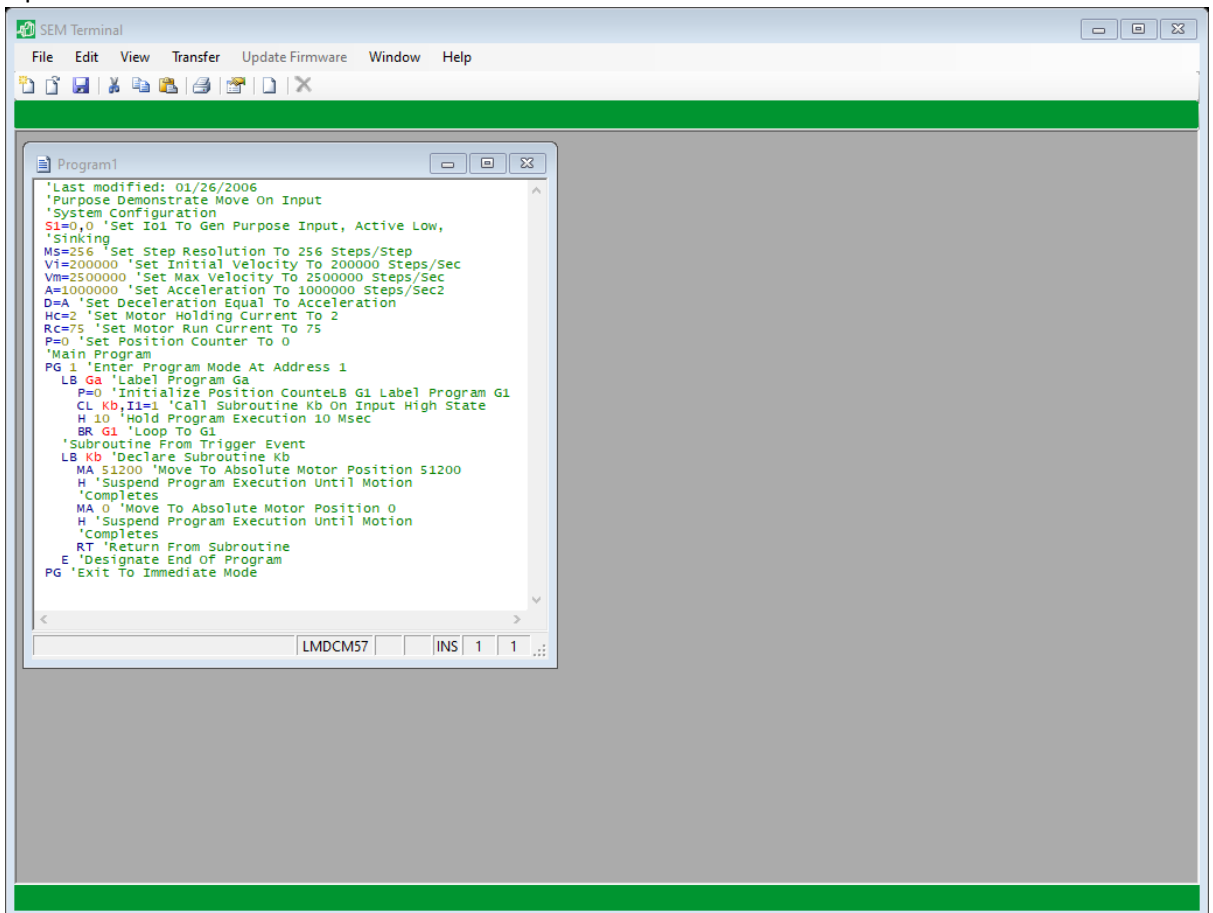
Results interpretation

Debugging

Newmark linear translation stages not moving

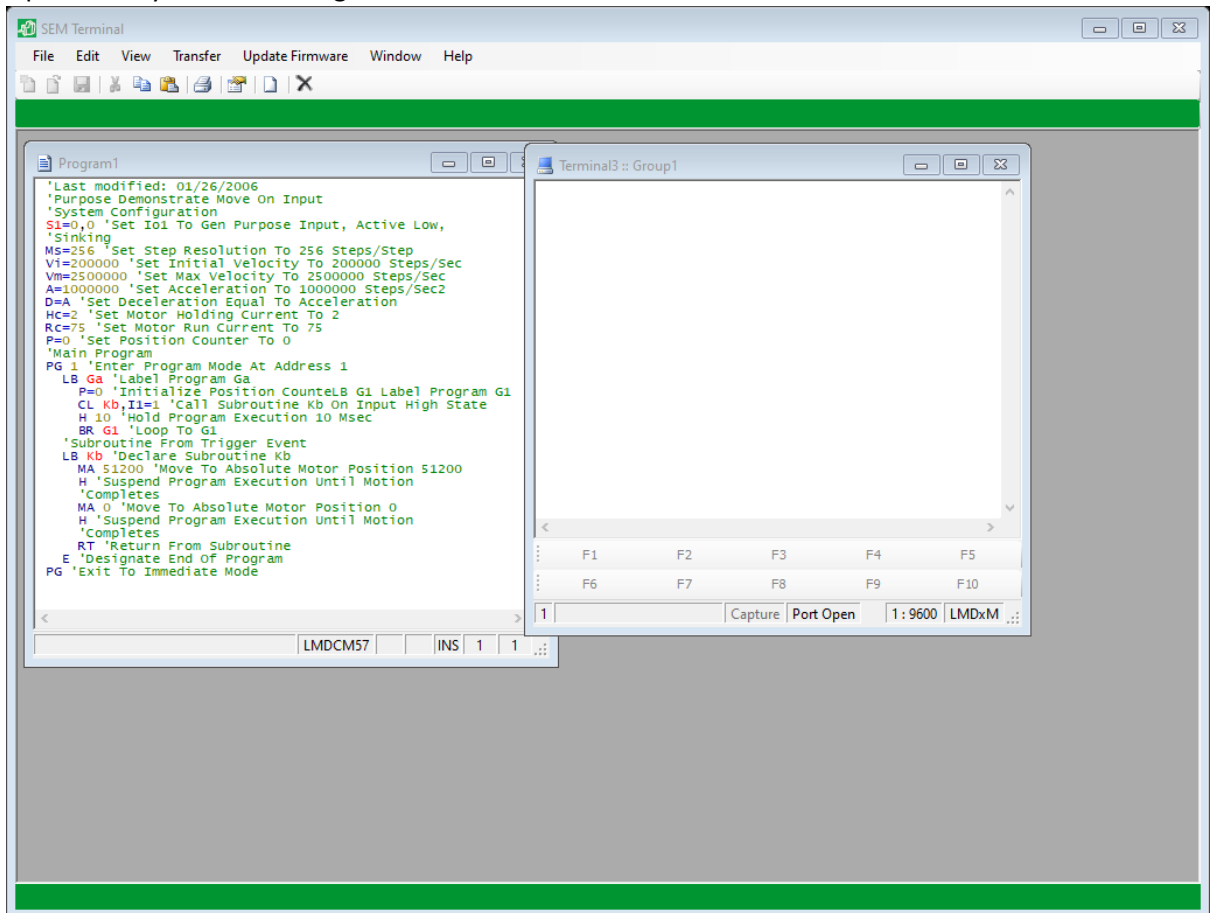
If no motion from the stages, but no obvious errors, the stages might be in 'party mode'.

1. Open 'SEM Terminal'



2. View > New Terminal
3. Select the relevant COM port (COM4 for X-axis, and COM5 for Y-axis at time of writing)

4. Open Port by double clicking on 'Port Closed' on bottom bar of Terminal.



5. Hit enter and try to type a command. If nothing appears in the Terminal then party mode is active and must be disabled.
6. Send command 'CTRL + J', then '*PY=0', followed by 'CTRL + J'. This will turn off party mode, now when you hit enter you should see the command prompt. Send 'S' to save.

Rotation stages not connecting

1. Close the program
2. Unplug rotation stage controller USB, and reconnect
3. Check correct lights on the front of the control box are on
4. Reload the program and try again

Laser not turning on or connecting

1. Turn off and on again!
2. Disconnect and reconnect USB