

These release notes are describing changes in LIMES 2000 since version 16.0303.787 and cover a small number of topics which were left out in the preceding update.

Due to the importance the general notes regarding the installation procedure are repeated again in this document.

Installation procedure

- With introduction of CQS in LIMES 2000 Revision 787, a new class of evaluation tools is implemented which requires installation of the LMT Automation Objects (LMTAO) library.
- Version 1.2 with build number 20 or higher is required and can be downloaded from the LMT homepage. If the LMTAO library is not installed or shows a wrong version, Limes and LimesControl will not start but will display an error message that LMTAO is not installed or LMTAO has a wrong build number.

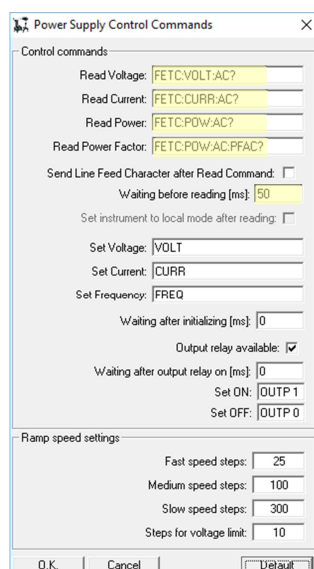
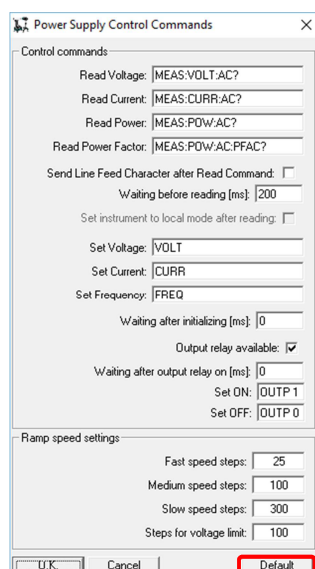
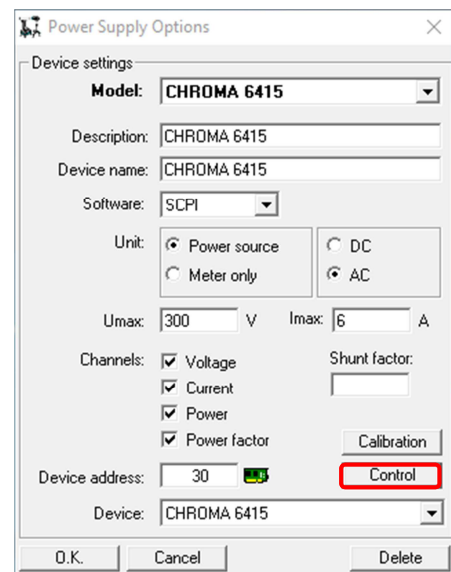
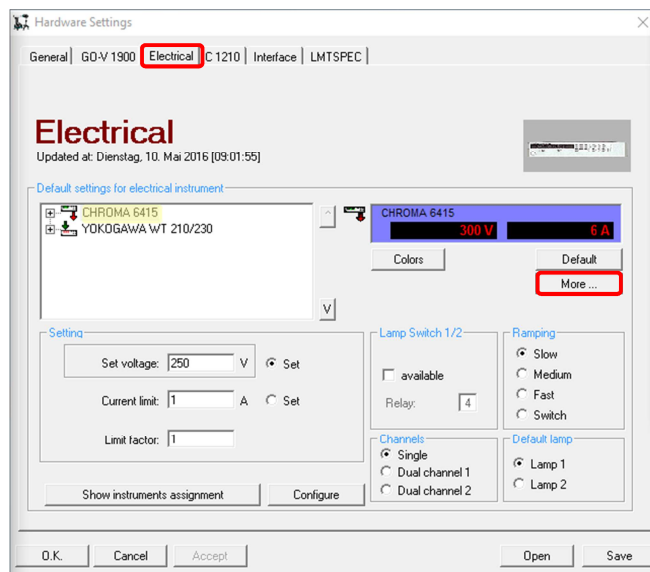
Light source stabilization

- Displaying of time scales with numerical values of $3 \leq t \leq 6$ did not work correctly. The bug was fixed.
- Adjustment of the time scale was changed slightly to correct for extreme values.
- Stabilization has been disabled for conflicting parameters. Now light source stabilization can be started only if the stabilization time has been chosen longer than the tolerance time.

Power supplies and related topics

- A new AC power source (SE-AS 1000) with the option to control both voltage and current was added to the list of available AC power supplies within Limes 2000. The device is mainly intended for driving AC current specified light sources often used in air-field lighting (6.6A AC) but of course the power supply can be used for any other AC based application.
- In the past ramp-up speed of light sources was depending on the individual power supply in use and had to be adjusted individually for each light source/power supply combination.
In the meantime the algorithm was changed to generate always the same ramp-up times for slow, medium or fast behavior independent of light source or power supply model.
- Several minor bugs were fixed in the user interface for power supply controls.

- The mapping of power measurement and power supplies in sphere applications with mixed AC/DC configurations was sometimes not set correctly. The bug was fixed.
- An alternative method for addressing the widely used Chroma 6415 AC power source was introduced. Now current, voltage, power and power factor can be read in one single command preventing from very long ramp-up times. However, in order to take advantage of the new command set, the corresponding default values have to be actively loaded by the user. The screen shots below illustrate the procedure.



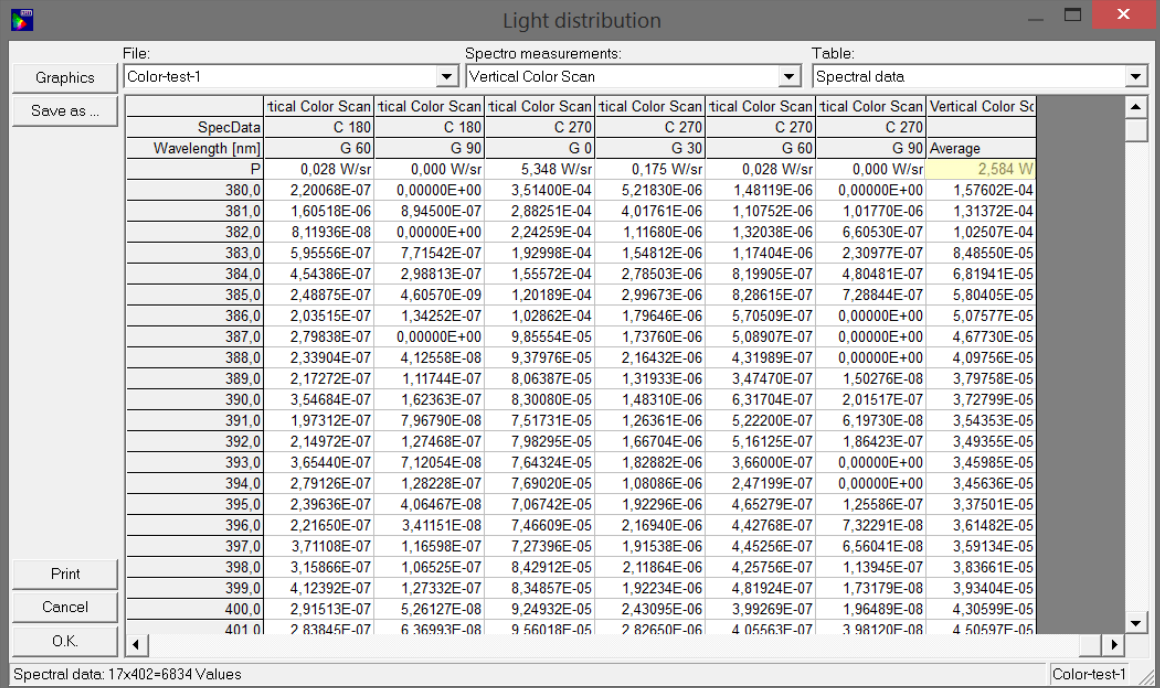
- Open the hardware settings menu and choose the tab for *Electrical* instruments (upper left).
- Mark the Chroma 6415 (if available) and select *More ...*
- Select *Control* (upper right).
- Click on *Default* in the new window (left) and the improved command set is loaded into the corresponding entries.
- Close both the Control Commands and Options window and save the *Electrical* hardware settings.

- The frequency could not be set for Agilent respectively Hewlett Packard AC power supplies HP6812A/B and HP6813A/B. The corresponding command for these devices was missing in the Limes 2000 description. It can now be activated by loading the default

values (as described above for the Chroma 6415) via *Hardware Settings – Electrical – HP381xA/B – More ... – Control – Default*.

Spectroradiometric evaluation

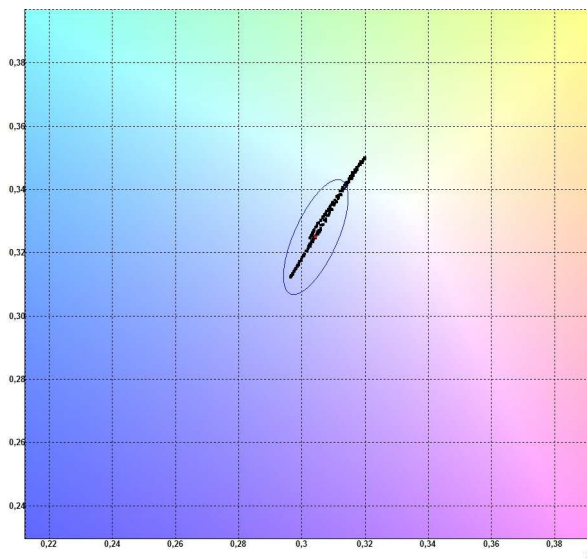
- According to the LM-79 standard only spectra with at least 10% of maximum intensity are considered in the corresponding evaluation for calculating the integral (or average) spectrum. However, in order to have all data available from now on, the table view displaying the spectral data shows all spectra which have been recorded during a full color scan.
- An additional line was introduced on top of the spectral data table showing the integral power or of each individual spectrum. It is as well part of the data export.
- In case the spectrometer has been calibrated with regard to intensity (see release notes 16.0303.787) the top entry for single spectra of a color scan carry the unit W/sr while the average (integral) spectrum shows the unit W, e.g. this spectral data set represents the total radiant flux of the measured solid angle.



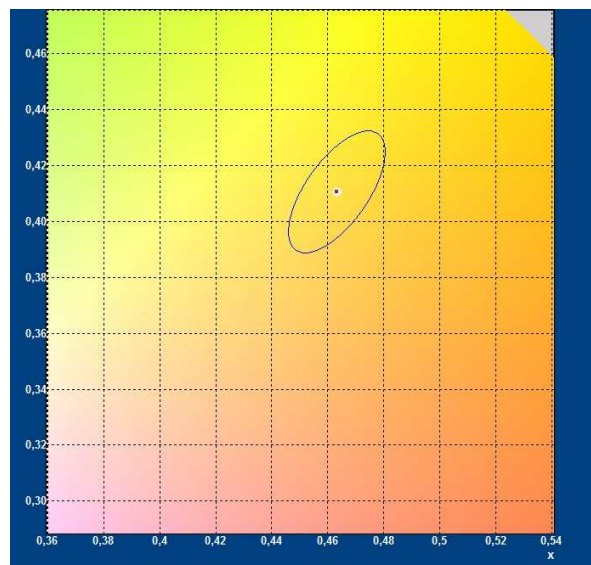
SpecData	tical Color Scan	tical Color Scan	tical Color Scan	tical Color Scan	tical Color Scan	tical Color Scan	Vertical Color Sc
Wavelength [nm]	C 180	C 180	C 270	C 270	C 270	C 270	Average
	G 60	G 90	G 0	G 30	G 60	G 90	
P	0,028 W/sr	0,000 W/sr	5,348 W/sr	0,175 W/sr	0,028 W/sr	0,000 W/sr	2,584 W
380.0	2,20068E-07	0,00000E+00	3,51400E-04	5,21830E-06	1,48119E-06	0,00000E+00	1,57602E-04
381.0	1,60518E-06	8,94500E-07	2,88251E-04	4,01761E-06	1,10752E-06	1,01770E-06	1,31372E-04
382.0	8,11936E-08	0,00000E+00	2,24259E-04	1,11680E-06	1,32038E-06	6,60530E-07	1,02507E-04
383.0	5,95566E-07	7,71542E-07	1,92998E-04	1,54812E-06	1,17404E-06	2,30977E-07	8,48550E-05
384.0	4,54386E-07	2,98813E-07	1,55572E-04	2,78503E-06	8,19905E-07	4,80481E-07	6,81941E-05
385.0	2,48875E-07	4,60570E-09	1,20189E-04	2,99673E-06	8,28615E-07	7,28844E-07	5,80405E-05
386.0	2,03515E-07	1,34252E-07	1,02862E-04	1,79646E-06	5,70509E-07	0,00000E+00	5,07577E-05
387.0	2,79838E-07	0,00000E+00	9,85554E-05	1,73760E-06	5,08907E-07	0,00000E+00	4,67730E-05
388.0	2,33904E-07	4,12558E-08	9,37976E-05	2,16432E-06	4,31989E-07	0,00000E+00	4,09756E-05
389.0	2,17272E-07	1,11744E-07	8,06387E-05	1,31933E-06	3,47470E-07	1,50276E-08	3,79758E-05
390.0	3,54684E-07	1,62363E-07	8,30080E-05	1,48310E-06	6,31704E-07	2,01517E-07	3,72799E-05
391.0	1,97312E-07	7,96790E-08	7,51731E-05	1,26361E-06	5,22200E-07	6,19730E-08	3,54353E-05
392.0	2,14972E-07	1,27468E-07	7,98295E-05	1,66704E-06	5,16125E-07	1,86423E-07	3,49355E-05
393.0	3,65440E-07	7,12054E-08	7,64324E-05	1,82882E-06	3,66000E-07	0,00000E+00	3,45985E-05
394.0	2,79126E-07	1,28228E-07	7,69020E-05	1,08086E-06	2,47199E-07	0,00000E+00	3,45636E-05
395.0	2,39636E-07	4,06467E-08	7,06742E-05	1,92296E-06	4,65279E-07	1,25586E-07	3,37501E-05
396.0	2,21650E-07	3,41151E-08	7,46609E-05	2,16940E-06	4,42768E-07	7,32291E-08	3,61482E-05
397.0	3,71108E-07	1,16598E-07	7,27396E-05	1,91538E-06	4,45256E-07	6,56041E-08	3,59134E-05
398.0	3,15866E-07	1,06525E-07	8,42912E-05	2,11864E-06	4,25756E-07	1,13945E-07	3,83661E-05
399.0	4,12392E-07	1,27332E-07	8,34857E-05	1,92234E-06	4,81924E-07	1,73179E-08	3,93404E-05
400.0	2,91513E-07	5,26127E-08	9,24932E-05	2,43095E-06	3,99269E-07	1,96489E-08	4,30599E-05
401.0	2,83845E-07	6,36993E-08	9,56018E-05	2,82650E-06	4,05563E-07	3,98120E-08	4,50597E-05

- In case the table is printed, the value of radiant power can be found in the last entry of the spectral data set.
- Naturally, in sphere measurements with a valid absolute calibration the radiant flux is displayed, too (in addition to the luminous flux).

- The default extension for exporting the CRI, CQS and spectra tables in the "Save as ...-dialogue" was changed to csv (instead of txt).
- In earlier versions the routine for drawing MacAdam ellipses in the CIE1931 color chart was only available when plotting average coordinates based on complete (angularly resolved) colorimetric scans (see below on the left hand side). This routine is now as well available in sphere measurements for displaying an ellipse with a defined number of MacAdam steps centered on a single chromaticity coordinate (right screenshot).



MacAdam ellipse centered on average chromaticity coordinate of a light distribution



MacAdam ellipse for single chromaticity coordinate measurement.