LightingBulbManager

User Guide



Marcello Brocato and Tension Software - We Make Software

Brotens.com

LightingBulbManager© 2014-2015 - Marcello Brocato and Tension Software all rights reserved

Every effort has been made to ensure that the information in this manual is accurate.

Tension Software is not responsible for printing or clerical errors.

Other company and product names mentioned herein are trademarks of their respective companies.

Summary

1.	Wh	at's.	
	1.1.	Gen	eralities
	1.2.	The	Method
	1.3.	Vide	eo output
	1.4.	Nun	nerical output
	1.5.	Wha	at's the use
	1.6.	Who	o needs it
2.	Get	ting	started4
3.	Wo	rkspa	ace5
4.	Gui	de	
	4.1.	Men	u Lighting Bulb Manager11
	4.	1.1.	Command PREFERENCES11
	4.	1.2.	Command QUIT11
	4.2.	Men	ıu File12
	4	2.1.	Command: SERVICE FOLDER
	4.	2.2.	Command: OPEN SOURCE A12
	4.	2.3.	Command: OPEN SOURCE B12
	4.	2.4.	Command: SAVE SPECTRA
	4.	2.5.	Command: EXPORT REPORT12
	4	2.6.	Command: EXPORT COMPARISON12
	4.3.	Men	u Edit13
	4	3.1.	Command: CUT
	4	3.2.	Command: COPY13
	4	3.3.	Command: PASTE
5.	Tut	orial	s14
	5.1.	Man	age spectra data14
	5.	1.1.	Open the data14

1. What's

1.1. Generalities

LightingBulbManager is a Cocoa Mac OSX application specialized to view spectral bulb data saved in XML format (according to IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data) or CSV format and to compare the color of two sources calculating their 'distance'.

LightingBulbManager runs on Apple computers running OSX, fully respecting the specific technology.

The simplicity of use and the interface modeler should not be fooled; with LightingBulbManager we can examine XML or CSV spectra data files, calculate the real lighting source color and color temperature, copy the graphics in PDF format and save it in a Brotens library text-file.

1.2. The Method

The method to calculate the real lighting source color is through the opened emission spectra spd(i) weighted by the human visibility curve V(i) to reach the (X, Y, Z) color coordinates, then calculate the (x, y), (u, v) and (u', v') to describe the color point in the CIE 1931, CIE 1960 and CIE 1976 diagrams and finally it is possible to calculate the color temperature cct as function of the (x, y) color coordinates (see 3 Workspace)

1.3. Video output

Spectra are presented in a graphic [wavelength (nm) / value (%)] and the color point is plotted in the CIE diagram (1931, 1960 and 1976): it is possible to copy or to export them in PDF format.

1.4. Numerical output

LightingBulbManager permits:

- to view a spectra file as function of the wavelength, to calculate the color point in the CIE (1936, 1960 and 1976) diagrams and to save the report as a pdf file;
- to compare two spectra, calculate their color 'distance' and save the report as a pdf file;
- to add the spectra to the 'Lamps.txt' file, saving the fields necessary to be used in the luminaire creation in all Brotens applications.

1.5. What's the use

It is clear that, after this introduction, the use of LightingBulbManager is wide but targeted on well-defined problems. LightingBulbManager is a flexible, fast and simple tool to address and solve problems related to various professional activities as well as to different purposes of practical application.

It is also a powerful and intuitive verification tool to assess the compliance of systems to specific laws.

LightingBulbManager is, therefore, the ideal tool for:

- choose the right lighting source color: ;
- calculate real color from a spectra data;
- calculate color temperature from a spectra data;
- compare the color of two sources and their 'distance'.

1.6. Who needs it

LightingBulbManager is a Macintosh Application dedicated to professionals working in the industry, architects, engineers, designers, builders, and their professional needs. To large industries that design lighting, institutions that determine the sites of application, the engineers charged in audits of facilities and verification of compliance of plant.

2. Getting started

At the beginning LightingBulbManager asks for selecting or creating some folders in which the application will save all the libraries and support files for exported reports:

Library folder is a user custor provide support to calculatio Please select an empty folder Path:	m folder containing all the l n and various elements for r to autofill it with standard	ibraries used by the application to data input. initial content.
Reset Library Folder		Open Library Folder Select

If an empty folder was selected/created as library folder LightingBulbManager asks if the user wants to fill it with the default content:

Library folder is provide suppor Please select ar	You selected an empty library folder ation to Do you want to fill it with default start content?
Path: /Users/m	You can at any time add also your own libraries content
	Fill With Standard Content

Then the installation procedure for the libraries folder will end:

Library folder is	The folder you selected as Library Folder ation to
provide support	was automatically filled with standard
Please select an	start content
Path: /Users/m	This folder will be used by the Application to provide various content.
Reset Library	Now you can add and modify it over time.

Auxiliary folder may be selected/created in the same way, but not auto-filled.

Finally LightingBulbManager presents the window that permits to control open areas (see Workspace).

3. Workspace

At the beginning, the Bulb Manager dialog will be presented: the first box 'Spectra' permits to open, examine and save spectra data.

The following image present already opened spectra in XML format...

9.0		Bulb Librar	/ Manager	
	Spectr	CIE diagrams	, comparisor	Library
locument Header		Wavele	Value	
Manifacturer	Unknown	400	,034	27.
Catalon Number	11/4	405,5	,069	87%
Catalog Number	N/A	407,5	,037	205
Description	Rare earth fluorescent lamp	420,6	,042	
		431	,049	6%
The Country	Later the second second	433,7	,06	57%
rile Creator	byHeart Consultants	437	,357	
Laboratory	N/A	438,9	,06	
	[]	460	,068	
Unique Identifier	C3567553-	4//	,075	
	C738-4334-901E-35CEB9FEB42C	488.2	204	275
Report Number	N/A	492.6	.166	
D	[501,7	,095	
Report Date	N/A	507,6	,078	
File Creation Date	2014-06-23	\$17,6	,071	
e		529,9	,076	Calculated colour
Comments	Ambient temperature 25 degrees C.	\$35,4	,099	Colour temperature: 4236
		\$39,9	,423	
		Information fo	r saving	
		Туре	Halogen	: Watt 100 Lumen 1000
pectral distribution		Company	-	Chur NPS
Spectral Quantity	relative	Company	-	C1835 1105 -
opectian Quantity	relative	Identifier	C3567553	-C75B-4354-9 Socket -
Bandwidth FWHM	2.0	Spectra A		
Bandwidth Corr.	true	Open	1 (Copy plot Report Save

...and another spectra in CSV format:

00				Bulb Librar	y Manager						
			Spectra	CIE diagrams	, comparison	Library					
				Wavele	Value				\cap		
Product	LUXEON Rebel 8	is .		340	,00087607	90%					-
Part Number	LXW9-PW30	CRI-Ra	95,2	381	,00353284	80%			/		
Color Bin	7C	CRI-R9	86,1	383	,0043828	70%			/		
CDD #	141	CPI-P10	87.3	384	,00340103						
sru #	141	CRI-RIU	07,2	365	00038623	0.		/			
×	0,4418	CRI-R11	96,9	387	,00211734	50%					
y	0,4125	CRI-R12	82,4	388	,00238449	475	/				
	0.3501	CDI 013	05.0	389	,00407622	1				/	
u	0,2501	CRI-R15	32'3	390	,00168888	271					
¥	0,5254	CRI-R14	94,5	391	,00257034	20%	\vee				
Δuv	0,0027	CRI-R15	95,4	393	,00257294	17%					1
сст	2987	Øv [lm]	1	394	,0015784						
		a	0.004	395	,00137024	8 2 3	6 8	8 8	8 8 8	000	8 8
SP ratio	1,387	10e [W]	0,004	396	,00374687	Calculated colo	ur				
Ge (A <s00nm)< td=""><td>10.5</td><td>Øe (A<ssonm)< td=""><td>25.3</td><td>398</td><td>.00441446</td><td></td><td></td><td></td><td></td><td>_</td><td>_</td></ssonm)<></td></s00nm)<>	10.5	Øe (A <ssonm)< td=""><td>25.3</td><td>398</td><td>.00441446</td><td></td><td></td><td></td><td></td><td>_</td><td>_</td></ssonm)<>	25.3	398	.00441446					_	_
Øe total	1013	Øe total		399	,00428114			Colour te	mperature:	2992	
				Information fo	or saving						
				Туре	Halogen	:	Watt	100	Lumen	1000	
				Company	-		Class NB	s -			
				Identifier	LUXEON Re	bel ES	Socket	-			
				Spectra A							
				Open	1 0	Copy plot		Report		5	ave
										-	

Once opened the application calculate the color and the color temperature of the source and display them at the bottom of the graphic. The method to calculate the real lighting source color is through the opened emission spectra spd(i) weighted by the human visibility curve V(i) to reach the (X, Y, Z) color coordinates, then LightingBulbManager calculate the (x, y), (u, v) and (u', v') to describe the color point in the CIE 1931, CIE 1960 and CIE 1976 diagrams and finally it is possible to calculate the color temperature cct as function of the (x, y) color coordinates:

$$n = \frac{x - 0.332}{0.1858 - y}; \quad \text{cct} = 449 \cdot n^3 + 3528 \cdot n^2 + 6823.3 \cdot n + 5520.33$$

There are four commands available:

- Open...: permits to open an XML file formatted following the IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or a CSV file: once opened, the application calculate the spectra color and will round up the color temperature in K;
- Copy plot: permits to copy the graphic in PDF format;
- Report: permits to export the calculated data and the graphics in PDF format, as the in following image:

SOUR	ICE REPORT
Manifacturer: Unknot Catalog number: Image: Catalog number: Description: Rare earth fluorescent la File creator byHeart Consulta Laboratory: Image: Catalog number: Identifier: C3567553-C75B-4354-961E-35CEB9FEB4 Report number: Image: Catalog number: Report date: Image: Catalog number: File creation date: 2014-06 Comments: Ambient temperature 25 degrees Spectral quantity: rela Bandwidth FWHM: Image: Catalog number: Bandwidth Corrected: Image: Catalog number:	ACE REPORT
Color temperature [K]: 4 x: 0,38552 y: 0,44017 u: 0,20531 v: 0,35162 u': 0,20531 v': 0,20531 v': 0,20531 v': 0,20531 v': 0,52743 Distance from Black Body curve ∆uv: 0,02559	236 805 573 239 240 239 240 239 361 057 53 200 x 100
	К.0 v С.35 С.3

00 00 00 00

710 740

g

• Save: permits to save the current spectra in the 'Lamps.txt' library inside the service folder of Brotens applications before saving the user has to fill the Information in the relative box for saving fields.

The second box 'CIE diagrams / comparison' of the dialogue permits to examine the CIE 1931, CIE 1960 and CIE 1976 diagrams where the color point of the opened sources is plotted, and to compare two spectra (the following image present the two previous sources already opened as A and B):



There are six commands available:

- CIE 1931 copy: permits to copy the relative graphic in PDF format;
- CIE 1960 copy: permits to copy the relative graphic in PDF format;
- CIE 1976 copy: permits to copy the relative graphic in PDF format;
- Open source A: permits to open an XML file formatted following the IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or a CSV file;
- Open source B: permits to open an XML file formatted following the IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or a CSV file;
- On the fly comparison: Permits to insert manually two color-temperatures (pop menu 'CCT') or two CIE1931-colours (pop menu 'x, y') or two CIE1960-colours (pop menu 'u, v') and compare them as explained later.

Source 1		Sour	x, y u, v	
CCT	4.000	CCT	3.000	Г
x	0,380439	x	0,436931	
у	0,376747	у	0,404074	
u	0,225109	u	0,250569	
v	0,225109	v	0,250569	
u'	0,225109	u	0,250569	
v	0,225109	v	0,250569	
∆uv 1-2	0,0286791482	SDCM	>8x ACCT	

Comparison report: permits to save the calculated data and the graphics in PDF format, as in the following image:

SOURCES COMPARISON

		or y
SOURCE A (white)		
Identifier:	T5 linear fluorescent	0.5 3800 K 2990 K
Color temperature [K]:	4.236	
X:	0,38552805	0.4 5000 0
y:	0,44017573	1000 K 1
u:	0,20531239	
v:	0,35162240	2000 K
u':	0,20531239	
v':	0,52743361	
Distance from Black Body curve ∆uv:	0,02559057	
SOURCE B (black) Identifier:	LUXEON Rebel ES	×
Color temperature [K]:	2.992	2000 K
x:	0,44178637	1.37 3080 K
y:	0,41250549	10 000 m
u:	0,25007390	sace w
v:	0,35024911	
u':	0,25007390	,XII,
v':	0,52537367	ICA NORTH
Distance from Black Body curve ∆uv:	0,00266920	2.5 2000 4
RESULT		
Distance A-B ∆uv:	0,04478257	
		CEO V
		2000 K
		E36 2001K
		154
		1.52
		5000k
		1.00 000K
		EM CALL

The comparison is presented (following the ANSI_NEMA_ANSLG C78.377-2008 - Specifications for the Chromaticity of Solid State Lighting Products - American National Standard):

- in the 'Δuv A-B' field as the distance of the colors in the CIE 1960 diagram;
- in the 'SDCM' field that present the minimal McAdam ellipse that include this distance;
- in the 'ΔCCT' field that present the color temperature tolerance for the selected McAdam ellipse.

Parameters follow the next table:

Δυν Α-Β	SDCM	ΔCCT
< .0007	1x	±30K
< .0010	2x	±60K
< .0015	Зx	±80K
< .0020	4x	±100K
< .0060	7÷8x	±175K
> .0060	>8x	

The third box of the dialogue present the bulbs database in the Brotens service folder:

			Spec	tra CIE dia	agrams, comparis	on Library				_
Class NRS	Watt	Lumen	Colour K	Socket	Company	Identifier	×	v	Aux	
TS-R	22	1800	4200	2GX13	PHILIPS	TL5 C 22W	0	0	0	
TS-R	40	3200	4200	2CX13	PHILIPS	TL5 C 40W	0	0	0	
TS-R	55	4000	4200	2CX13	PHILIPS	TL5 C 55W	0	0	0	
TS-R	60	5000	4200	2GX13	PHILIPS	TL5 C 60W	0	0	0	
TC-S	5	210	4200	G23	PHILIPS	PL-S 5W/840/2P	0	0	0	
TC-S	7	408	4200	G23	PHILIPS	PL-S 7W/840/2P	0	0	0	
TC-S	9	600	4200	C23	PHILIPS	PL-S 9W/840/2P	0	0	0	
TC-S	11	900	4200	G23	PHILIPS	PL-S 11W/840/2P	0	0	0	
TC-D	10	600	4200	C24d-1	PHILIPS	PL-C 10W/840/2P	0	0	0	
TC-D	13	900	4200	G24d-1	PHILIPS	PL-C 13W/840/2P	0	0	0	
TC-D	18	1200	4200	G24d-2	PHILIPS	PL-C 18W/840/2P	0	0	0	
TC-D	26	1800	4200	G24d-3	PHILIPS	PL-C 26W/840/2P	0	0	0	
TC-DEL	10	600	4200	G24q-1	PHILIPS	PL-C 10W/840/4P	0	0	0	
TC-DEL	13	900	4200	G24q-1	PHILIPS	PL-C 13W/840/4P	0	0	0	
TC-DEL	18	1200	4200	G24q-2	PHILIPS	PL-C 18W/840/4P	0	0	0	
TC-DEL	26	1800	4200	G24q-3	PHILIPS	PL-C 26W/840/4P	0	0	0	
TC-SEL	5	210	4200	2G7	PHILIPS	PL-S 5W/840/4P	0	0	0	
TC-SEL	7	400	4200	2G7	PHILIPS	PL-S 7W/840/4P	0	0	0	
TC-SEL	9	600	4200	2G7	PHILIPS	PL-S 9W/840/4P	0	0	0	
TC-SEL	11	900	4200	2G7	PHILIPS	PL-S 11W/840/4P	0	0	0	
TC-L	18	1200	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0	
TC-L	18	750	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0	
TC-L	24	1800	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0	
TC-L	24	1200	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0	
TC-L	36	2900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0	
TC-L	36	1900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0	
TC-L	40	3500	4200	2G11	PHILIPS	PLL 40W/840/4P	0	0	0	
TC-L	55	4800	4200	2G11	PHILIPS	PLL 55W/840/4P	0	0	0	
TC-L	55	3000	4200	2G11	PHILIPS	PLL 55W/840/4P	0	0	0	
*** *		200	12.00		070111	D 1 T 13400040	~	^	^	

The bulb database is contained in the "Lamps.txt" file is a simple text file that can be edited with whatever software but saved as text file.

The file has the following structure:

class NBS	W	Lm	К	Holder	Company	Identifier	х	У	Δυν	Туре
Т5	35	3650	4000	G5	-	T5 tube	. 3855	. 44017	. 02559	FLIN

The first line is the header; follow the real lamp records, one each row.

Each field in a record is separated by a 'tab' code.

The user has to introduce a new lamp at the correct row, following the last field 'Type' in which:

Identifier	description
FCOM	compact fluorescent
FLIN	linear fluorescent
HALO	halogen
HGVA	mercury vapor
JMET	metal halide
NAHP	sodium high pressure
NABP	sodium low pressure
INCA	incandescent
LED_	led
XENO	xenon

The operation is to insert a new record as a row inside the correct lamp group, then each field of the record has to be filled:

class NBS	standard lamp name
W	nominal power consumption
Lumen	nominal lumen output
К	Kelvin color temperature of the source
Holder	lampholder
Company	Company
Identifier	Commercial name
x	x-coordinate (CIE 1931)
У	y-coordinate (CIE 1931)
Δυν	distance from the Black Body curve in the CIE 1960 diagram
ТҮРЕ	internal identifier for the lamp type (one of the name in the previous table)

4. Guide

- 4.1. Menu Lighting Bulb Manager
 - 4.1.1. Command PREFERENCES...

00	General
General Update	
Mesure Unit:	
💽 Metric Unit	
0	
Imperial Unit	

With this dialogue it is possible to work with the preferred units: metric (cm, m) or imperial (ft, in).

4.1.2. Command QUIT

From this menu it is possible to exit the Application.

4.2. Menu File

4.2.1. Command: SERVICE FOLDER...

This command permits to manage the Application service folders. The first time the Application the user is prompted for locating these folders:



...or navigating inside it through the button 'Open Library/Auxiliary Folder'.

4.2.2. Command: OPEN SOURCE A

This command permits to open an XML file formatted following the IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or a CSV format file and fill the A-source.

4.2.3. Command: OPEN SOURCE B

This command permits to open an XML file formatted following the IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or a CSV format file and fill the B-source.

4.2.4. Command: SAVE SPECTRA

This command permits to save the current spectra A in the 'Lamps.txt' library inside the service folder of Brotens applications.

4.2.5. Command: EXPORT REPORT

This command permits to export the calculated data and the graphics of the source A in PDF format.

4.2.6. Command: EXPORT COMPARISON

This command permits to export the calculated comparison data and the graphics of source A and B in PDF format.

4.3. Menu Edit

4.3.1. Command: CUT

Works only in the selected edit field, in the standard Macintosh mode.

4.3.2. Command: COPY

Works only in the selected edit field, in the standard Macintosh mode..

4.3.3. Command: PASTE

Works only in the selected edit field, in the standard Macintosh mode.

5. Tutorials

5.1. Manage spectra data

This tutorial permits to open, examine and save in the 'Lamps.txt' file an XML file formatted following IES TM-27-14 IES Standard Format for the Electronic Transfer of Spectral Data or CSV format.

5.1.1. Open the data.

1. The first step consist in selecting (from the menu "File" or from the button) the "Open" command:



2. navigate in the Brotens library folder to find and open the file "demo spectra.spdx"; the window will present the data:

	specie	Cie diagrams,	, companison	ciorary					
Document Header		Wavele	Value				1		
Manifacturer	Unknown	400	,034	90%L					+
mainnaccurer	Unknown	403,1	,037	875					
Catalog Number	N/A	405,5	,069						
Description	Page earth fluorescent lamo	470.6	.042	70%					÷
Description	kare earch hoorescent lamp	431	.049	60%					
		433,7	,06						
File Creator	byHeart Consultants	437	,357	50%L					t
Laboratory	1174	438,9	,06	47%					
caboratory	N/A	460	,068						
Unique Identifier	C3567553-	477	,075	30%		11			T
	C75B-4354-961E-35CEB9FEB42C	481	,085	20%		1 1			
Paport Number	NUA	488,2	,204		Λ	11/1	llu		
Report Number	N/A	492,6	,166	10%	\wedge	, .	V m		Ŧ
Report Date	N/A	501,7	,095	1			1 yr	-un	
File Creation Date	2014 05 22	507,6	071	8 2 3	6 8 8	88	8 8	00 LL 00	Ê
rile creation bate	2014-06-23	529.9	.076	Calculated colo	ur				
Comments	Ambient temperature 25 degrees C.	\$35,4	.099		-	olour term	naratura	1225	
		\$39,9	,423			olour tem	perature.	4236	
		Information fo	r saving						
		Type	Halogen	:	Watt	100	Lumen	1000	
pectral distribution									
	[states	Company	-		Class NBS	-			
Spectral Quantity	relative	Identifier	C3567553-	C758-4354-9	Socket	-			
Bandwidth FWHM	2.0								
Bandwidth Corr	true	Spectra A							
Contractine Contra	ane.	Open		Copy plot		Report		Save	

3. go to the 'CIE diagrams / comparison' tab and examine the color position in the CIE diagrams:



4. In the "Library" tab is still present the "Lamps.txt" file with the list of the lamps;

			Sper	tra CIE dia	arams comparis	an Library				
Concerned in the second s										
Class NBS	Watt	Lumen	Colour K	Socket	Company	Identifier	×	y	Δuv	
TS-R	22	1800	4200	2GX13	PHILIPS	TL5 C 22W	0	0	0	
TS-R	40	3200	4200	2GX13	PHILIPS	TL5 C 40W	0	0	0	
TS-R	55	4000	4200	2CX13	PHILIPS	TLS C SSW	0	0	0	
TS-R	60	5000	4200	2GX13	PHILIPS	TL5 C 60W	0	0	0	
TC-S	S	210	4200	G23	PHILIPS	PL-S 5W/840/2P	0	0	0	
TC-S	7	408	4200	C23	PHILIPS	PL-S 7W/840/2P	0	0	0	
TC-S	9	600	4200	G23	PHILIPS	PL-S 9W/840/2P	0	0	0	
TC-S	11	900	4200	G23	PHILIPS	PL-S 11W/840/2P	0	0	0	
TC-D	10	600	4200	G24d-1	PHILIPS	PL-C 10W/840/2P	0	0	0	
TC-D	13	900	4200	G24d-1	PHILIPS	PL-C 13W/840/2P	0	0	0	
TC-D	18	1200	4200	G24d-2	PHILIPS	PL-C 18W/840/2P	0	0	0	
TC-D	26	1800	4200	G24d-3	PHILIPS	PL-C 26W/840/2P	0	0	0	
TC-DEL	10	600	4200	G24q-1	PHILIPS	PL-C 10W/840/4P	0	0	0	
TC-DEL	13	900	4200	G24q-1	PHILIPS	PL-C 13W/840/4P	0	0	0	
TC-DEL	18	1200	4200	G24q-2	PHILIPS	PL-C 18W/840/4P	0	0	0	
TC-DEL	26	1800	4200	G24q-3	PHILIPS	PL-C 26W/840/4P	0	0	0	
TC-SEL	5	210	4200	2G7	PHILIPS	PL-S 5W/840/4P	0	0	0	
TC-SEL	7	400	4200	2G7	PHILIPS	PL-S 7W/840/4P	0	0	0	
TC-SEL	9	600	4200	2G7	PHILIPS	PL-S 9W/840/4P	0	0	0	
TC-SEL	11	900	4200	2G7	PHILIPS	PL-S 11W/840/4P	0	0	0	
TC-L	18	1200	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0	
TC-L	18	750	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0	
TC-L	24	1800	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0	
TC-L	24	1200	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0	
TC-L	36	2900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0	
TC-L	36	1900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0	
TC-L	40	3500	4200	2G11	PHILIPS	PLL 40W/840/4P	0	0	0	
TC-L	55	4800	4200	2G11	PHILIPS	PLL 55W/840/4P	0	0	0	
TC-L	55	3000	4200	2611	PHILIPS	PLL 55W/840/4P	0	0	0	
+/ +	12	200	1200		000111	D 1 T 1344040				

5. Now we want to save the spectra data as a bulb in the "Lamps.txt" Library: come back to the "Spectra" tab and fill the "Information for saving" fields as follow:

Information fo	r saving				
Туре	Linear fluorescent 🗘	Watt	35	Lumen	3400
Company	ACME	Class NBS	T5		
ldentifier	T5 fluorescent tube	Socket	G5		

6. Select (from the menu "File" or from the button) the "Save spectra" and the spectra data will be saved as a bulb in the "Lamps.txt" Library: come back to the "Library" tab to see the result:

00						Bulb Library Manager			
				(Spectra	CIE diagrams, comparison	Library		
Class NBS	Watt	Lumen	Colour K	Socket	Company	Identifier	×	iy.	Δυν
TC-DEL	26	1800	4200	G24q-3	PHILIPS	PL-C 26W/840/4P	0	0	0
TC-SEL	5	210	4200	2G7	PHILIPS	PL-S 5W/840/4P	0	0	0
TC-SEL	7	400	4200	2G7	PHILIPS	PL-S 7W/840/4P	0	0	0
TC-SEL	9	600	4200	2G7	PHILIPS	PL-S 9W/840/4P	0	0	0
TC-SEL	11	900	4200	2G7	PHILIPS	PL-S 11W/840/4P	0	0	0
TC-L	18	1200	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0
TC-L	18	750	4200	2G11	PHILIPS	PLL 18W/840/4P	0	0	0
TC-L	24	1800	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0
TC-L	24	1200	4200	2G11	PHILIPS	PLL 24W/840/4P	0	0	0
TC-L	36	2900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0
TC-L	36	1900	4200	2G11	PHILIPS	PLL 36W/840/4P	0	0	0
TC-L	40	3500	4200	2G11	PHILIPS	PLL 40W/840/4P	0	0	0
TC-L	55	4800	4200	2G11	PHILIPS	PLL 55W/840/4P	0	0	0
TC-L	55	3000	4200	2G11	PHILIPS	PLL 55W/840/4P	0	0	0
TC-T	13	500	4200	GX24d-1	OSRAM	Dulux T 13W/840	0	0	0
TC-T	18	1200	4200	CX24d-2	PHILIPS	PLT 18W/840/2P	0	0	0
TC-T	26	1800	4200	GX24d-3	PHILIPS	PLT 26W/840/2P	0	0	0
TC-TEL	13	900	4200	CX24q-1	OSRAM	Dulux T/E 13W/840	0	0	0
TC-TEL	18	1200	4200	GX24g-2	PHILIPS	PLT 18W/840/4P	0	0	0
TC-TEL	26	1800	4200	GX24q-3	PHILIPS	PLT 26W/840/4P	0	0	0
TC-TEL	32	2400	4200	GX24q-3	PHILIPS	PLT 32W/840/4P	0	0	0
TC-TEL	42	3200	4200	GX24q-4	PHILIPS	PLT 42W/840/4P	0	0	0
T5	35	3400	4236	GS	ACME	TS fluorescent tube	0,38552805	0,44017573	0,02559057
T5	13	1350	3000	GS	AURA	ECO SAVER	0	0	0
TS	19	2100	3000	GS	AURA	ECO SAVER	0	0	0
TS	50	5000	4000	GS	AURA	ECO SAVER	0	0	0
T5	22	2000	3000	G5	AURA	ECO SAVER	0	0	0
TS	25	2900	3000	GS	AURA	ECO SAVER	0	0	0
T5	32	3650	3000	G5	AURA	ECO SAVER	0	0	0

That's all!