ls1x0ls1x0cs100a.dll

LS-1x0 & CS-100A Support **D**ynamic **L**ink **L**ibrary

Version 1.0.0000
February 2003

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Introduction

This DLL is made to simplify communication with the Minolta Luminance Meter LS-100, LS-110 and Minolta Chroma Meter CS-100A. In addition it provides multiple colorimetric calculation functions.
All commands available by LS-1x0 and CS-100A are supported. By using program language like Visual Basic (for application) or others, full control of LS-1x0 and CS-100A is possible.
An Example by using Microsoft EXCEL is included as well as this full documentation of the DLL and the EXCEL example.

System requirements

IBM compatible PC
Operation system: Windows 95, Windows 98, Windows ME, Windows NT 4.0, Windows 2000, Windows XP

Programming:
Windows 32 Bit compatible programming language like Visual Basic 4.0 or higher, Visual C++ or others.

For Excel sample file:
Microsoft EXCEL 97 or never
Recommended screen resolution: 1024 * 768 or higher (true color)

Installation

As this is just a DLL and not a complete application, it doesn't come with a setup program. You only need to copy the "ls1x0ls1x0cs100a.dll" file to the proper location.

Depending on the way of usage there are two different locations:

If you are using the DLL from EXCEL or other Office application, please copy the file to the "Windows\System" folder.

If you are writing own software, best is to copy the DLL to the same folder like the EXE file of your application. This is the first place where Windows is searching for DLL files. Of course the "Windows\System" folder also would be OK.

Note!
The remaining files like the EXCEL example and this manual don't require a specific location!

RS-232C communication port

This section will explain about the usage of RC-232C port for connection to LS-1x0 and CS-100a.

Connection of LS-1x0 & CS-100a and PC

Minolta supplies different connection cables for the LS-1x0 and theCS-100a:

- LS-A12 RS connection cable CS-100A or LS-1x0 to PC (9 pin)
- LS-A15 RS connecting cable CS-100A or LS-1x0 to PC (9 pin) including AC-adapter for power supply. AC-adapter id connected to 9 pin connector at PC side, thus only one cable is going from PC to LS-1x0 or CS-100A

For details about connection please refer to LS-1x0 or CS-100A communication manual!

Setting LS-1x0 or CS-100A into two-directional communication mode

Check that LS-1x0 or CS-100A power is switched off
Switch power of LS-1x0 or CS-100A on while pressing the F key
The letter "C" will be displayed in the right bottom of LS-1x0 or CS-100A external display

Notes!

- **In two-directional communication mode no other keys or switches than the power switch are accepted by either LS-1x0 or CS-100A!**
- **In two-directional communication mode the power consumption of LS-1x0 or CS-100A is higher than in normal mode. It's recommended to use LS-A15 connection cable with external power supply.**

DLL functions related to communication

The ls1x0ls1x0cs100a.dll supports the communication ports 1 to 8! Thus you also should not face any problem by using USB to RS232C converter. The ls1x0ls1x0cs100a.dll has two functions for opening and closing a communication port.

Note!
This program has not been tested with all the different USB converters. We cannot assure that this program is working properly with each single converter because this might be depending on the driver of the converter.

Function name:

OpenComm

Library:
ls1x0cs100a.dll

Function:
Open RS232C communication port

Declaration: Visual Basic for Application – Ex: EXCEL (no Enum)
Public Declare Function OpenComm Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal PortNumber As Integer) As Long

Declaration: Visual Basic (with Enum)
Public Declare Function OpenComm Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal PortNumber As cs100aComPort) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByVal	PortNumber	Integer	1 – 8

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number to be used for communication to this port. File number is typically requested by the FreeFile function
PortNumber	Specify a port number within a range of 1 to 8. This value is depending on the communication port to which your instrument is connected.
	Predefined values in cs100a_VBdeclares.bas: (cs100aComPort Enumeration)
	CsCOM1 = 1 **CsCOM2 = 2** **CsCOM3 = 3** **CsCOM4 = 4** **CsCOM5 = 5** **CsCOM6 = 6** **CsCOM7 = 7** **CsCOM8 = 8**

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-100	Invalid number for communication port. Must be integer in the range of 1 - 8
-101	Port could not be opened. Please make sure that the specified port exists and is not used by any other device.

Notes:

Function name:

CloseComm

Library:
ls1x0cs100a.dll

Function:
Close RS232C communication port

Declaration:
Public Declare Function CloseComm Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-102	Port could not be closed. Please make sure that the specified file number is correct.

Notes:

CS-100a support functions

Please see the following list of commands available by CS-100A

Command	Function	Page
CLE	Clears the memory of CS-100A	
MDS	Mode setting like absolute or difference measurement, fast of slow measurement mode and user calibration	
MES	Taking measurement according to the settings defined by MDS command	
RCR	Re-calculate the data in memory according the settings made by MDS command	
TDR	Read target data, which is stored in CS-100A for difference measurements.	
TDS	Set the measured value into target memory of CS-100A	
TDW	Write target values into CS-100A memory	
UCR	Read the standard value for measuring user calibration standard which is memorized in CS-100A	
UCW	Write the standard value for measuring user calibration standard into CS-100A memory	

Function name:

cs100aCLE

Library:
1x0cs100a.dll

Function:
Clears the memory of connected CS-100A

Declaration:
Public Declare Function cs100aCLE Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aMDS

Library: ls1x0cs100a.dll

Function:
Mode setting

Declaration: Visual Basic for Application – Ex: EXCEL (no Enum)
Public Declare Function cs100aMDS Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal Mode As Integer) As Long

Declaration: Visual Basic (with Enum)
Public Declare Function cs100aMDS Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal Mode As cs100aMode) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByVal	Mode	Integer	0,1,4-7

Parameter usage:

Parameter:	Usage:	
fNum	Specify a file number, which was used to open this communication port.	
Mode	Specify the mode to which you would like to set CS-100A. If you would like to change multiple settings, you have to use this function multiple times/	
	Predefined values in cs100a_VBdeclares.bas: (cs100aMode Enumeration)	
	csPreset = 0	**Set CS-100A to Minolta calibration mode**
	csVari = 1	**Set CS-100A to user calibration mode**
	csAbs = 4	**Set CS-100A to absolute measurement mode**
	csDiff = 5	**Set CS-100A to difference measurement mode**
	csFast = 6	**Set CS-100A to fast measurement mode Response time = 100 msec**
	csSlow = 7	**Set CS-100A to slow measurement mode Response time = 400 msec**

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A
-106	Parameter error: Wrong mode parameter was sent.

Notes:

Function name:

cs100aMES

Library:
ls1x0cs100a.dll

Function:
Take a **mea**surement with connected CS-100A

Declaration:
Public Declare Function cs100aMES Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, LY As Double, sx As Double, sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	
ByRef	sx	Double	
ByRef	sy	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
LY	Variable used to return the Y data of CS-100A
sx	Variable used to return the x data of CS-100A
sy	Variable used to return the y data of CS-100A

Return type and value:

Data	Explanation
Long	Use for Error-Checking
13	OK13: Luminance display range under!
12	OK12: Luminance display range over!
11	OK11: Chromaticity measuring range over!
0	No error
-10	ER10: Luminance and chromaticity range over!
-11	ER11: Memory value Error!
-12	ER12: Luminance and chromaticity simultaneous range over!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aRCR

Library:
ls1x0cs100a.dll

Function:
Re **C**alculate **R**eading of CS-100A according to mode setting

You may use this command after sending mode change command. The CS-100A will return the re-calculated values of last measurement according to the new mode setting.

Declaration:
Public Declare Function cs100aRCR Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, LY As Double, sx As Double, sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	
ByRef	sx	Double	
ByRef	sy	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
LY	Variable used to return the Y data of CS-100A
sx	Variable used to return the x data of CS-100A
sy	Variable used to return the y data of CS-100A

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aTDR

Library:
ls1x0cs100a.dll

Function:
Target **D**ata **R**ead from CS-100A

Declaration:
Public Declare Function cs100aTDR Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, LY As Double, sx As Double, sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	
ByRef	sx	Double	
ByRef	sy	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
LY	Variable used to return the Y target data of CS-100A
sx	Variable used to return the x target data of CS-100A
sy	Variable used to return the y target data of CS-100A

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aTDS

Library:
ls1x0cs100a.dll

Function:
Target **D**ata **S**et to CS-100A

This function is used to store the actual measuring data of CS-100A into the target memory.
Function is same like switching CS-100A from ABS to DIFF while pressing the F key.

Declaration:
Public Declare Function cs100aTDS Lib "ls1x0cs100a.dll" (ByVal fNum As Integer) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aTDW

Library:
ls1x0cs100a.dll

Function:
Target **D**ata **W**rite to CS-100A

By using this function you can send your own target data (Yxy) to CS-100A

Declaration:
Public Declare Function cs100aTDW Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal LY As Double, ByVal sx As Double, ByVal sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByVal	LY	Double	
ByVal	sx	Double	
ByVal	sy	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
LY	Y target data
Sx	x target data
Sy	y target data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aUCR

Library:
ls1x0cs100a.dll

Function:
User **C**alibration **R**ead from CS-100A

This function returns the user calibration data memorized in CS-100A

Declaration:
Public Declare Function cs100aUCR Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, LY As Double, sx As Double, sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	
ByRef	sx	Double	
ByRef	sy	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
LY	Y User calibration data
Sx	x User calibration data
Sy	y User calibration data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

cs100aUCW

Library:
ls1x0cs100a.dll

Function:
User **C**alibration **W**rite to CS-100A

This function writes your user calibration data into CS-100A memory.

Declaration:
Public Declare Function cs100aUCW Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal LY As Double, ByVal sx As Double, ByVal sy As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	
ByRef	sx	Double	
ByRef	sy	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
LY	Y User calibration data
Sx	x User calibration data
Sy	y User calibration data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Timeout: CS-100A didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:
Please keep in mind that this user calibration data is in relation to the actual measurement data in CS-100A. When performing user calibration, you first have to measure the light source in Minolta calibration mode and then you may send your corrected values!!

LS-1x0 support functions

Please see the following list of commands available by LS-1x0

Command	Function	Page
CLE	Clears the memory of LS-1x0	
MDS	Mode setting like absolute or difference measurement, fast of slow measurement mode and user calibration	
MES	Taking measurement according to the settings defined by MDS command	
DSR	Read the displayed data in memory according the settings made by MDS command	
CMR	Read target data, which is stored in LS-1x0 for difference measurements.	
CMS	Set the measured value into target memory of LS-1x0	
CMW	Write target values into LS-1x0 memory	
LMR	Read the standard value for measuring user calibration standard which is memorized in LS-1x0	
LMW	Write the standard value for measuring user calibration standard into LS-1x0 memory	
CCR	Read the Color Correction Factor which is memorized in LS-1x0	
CCW	Write the Color Correction Factor into LS-1x0 memory	

Function name: **Ls100CLE**	**Library:** 1x0cs100a.dll

Function:
Clears the memory of connected LS-1x0

Declaration:
Public Declare Function ls100CLE Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	FNum	Integer	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to CS-100A

Notes:

Function name:

Ls100MDS

Library: 1x0cs100a.dll

Function:
Mode setting

Declaration: Visual Basic for Application – Ex: EXCEL (no Enum)
Public Declare Function ls100MDS Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal Mode As Integer) As Long

Declaration: Visual Basic (with Enum)
Public Declare Function ls100aMDS Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal Mode As ls1x0Mode) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	FNum	Integer	
ByVal	Mode	Integer	0,1,4-7

Parameter usage:

Parameter:	Usage:	
FNum	Specify a file number, which was used to open this communication port.	
Mode	Specify the mode to which you would like to set LS-1x0. If you would like to change multiple settings, you have to use this function multiple times/	
	Predefined values in ls100_VBdeclares.bas: (ls100Mode Enumeration)	
	LsPreset = 0	**Set LS-1x0 to Minolta calibration mode**
	LsVariCCF = 1	**Set LS-1x0 to CCF mode**
	LsVariLUMI = 2	**Set LS-1x0 to user calibration mode**
	LsVariCCFLUMI = 3	**Set LS-1x0 to user calibration & CCF mode**
	LsAbs = 4	**Set LS-1x0 to absolute measurement mode**
	LsDiff = 5	**Set LS-1x0 to difference measurement mode**
	LsFast = 6	**Set LS-1x0 to fast measurement mode Response time = 200 msec**
	LsSlow = 7	**Set LS-1x0 to slow measurement mode Response time = 400 msec**
	LsPEAK = 8	**Set LS-1x0 to PEAK measurement mode. (Only possible to reset by switching off LS1x0**
	LsCONT = 9	**Set LS-1x0 to CONTINUOUS measurement mode.**

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0
-106	Parameter error: Wrong mode parameter was sent.

Notes:

Function name:

ls100MES

Library:
1x0cs100a.dll

Function:
Take a **mea**surement with connected LS-1x0

Declaration:
Public Declare Function ls100MES Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, PeakMode as integer, Unit as integer, VARI as integer, LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	Fnum	Integer	
ByRef	PeakMode	Integer	
ByRef	Unit	Integer	
ByRef	Vari	Integer	
ByRef	LY	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
PeakMode	Flag showing Peak mode (0 = Continuous 1 = Peak)
Unit	Measurement unit (0 = cd/m² 1 = fL)
Vari	User calibration flag: 0 = Preset 1 = Vari CCF 2 = Vari LUMI 3 = Vari CCF & LUMI 4 = Difference mode
LY	Variable used to return the Y data of LS-1x0

Return type and value:

Data	Explanation
Long	Use for Error-Checking
13	OK13: Luminance display range under!
12	OK12: Luminance display range over!
11	OK11: Chromaticity measuring range over!
0	No error
-10	ER10: Luminance and chromaticity range over!
-11	ER11: Memory value Error!
-12	ER12: Luminance and chromaticity simultaneous range over!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:	**Library:**
ls100DSR	1x0cs100a.dll

Function:
Display **S**etting **R**ead of LS-1x0 according to mode setting
You may use this command after sending mode change command. The LS-1x0 will return the re-calculated values of last measurement according to the new mode setting.

Declaration:
Public Declare Function ls100DSR Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, PeakMode as integer, Unit as integer, VARI as integer, LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	Fnum	Integer	
ByRef	PeakMode	Integer	
ByRef	Unit	Integer	
ByRef	Vari	Integer	
ByRef	LY	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
PeakMode	Flag showing Peak mode (0 = Continuous 1 = Peak)
Unit	Measurement unit (0 = cd/m² 1 = fL)
Vari	User calibration flag: 0 = Preset 1 = Vari CCF 2 = Vari LUMI 3 = Vari CCF & LUMI 4 = Difference mode
LY	Variable used to return the Y data of LS-1x0

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100CMR

Library:
1x0cs100a.dll

Function:
Custom **M**ean **R**ead from LS-1x0

Declaration:
Public Declare Function ls100CMR Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, Unit as integer, LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	Unit	Integer	
ByRef	LY	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
Unit	Measurement unit (0 = cd/m² 1 = fL)
LY	• Variable used to return the Y target data of LS-1x0

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100CMS

Library:
ls1x0cs100a.dll

Function:
Custom **M**ean **S**et to LS-1x0

This function is used to store the actual measuring data of LS-1x0 into the target memory. Function is same like switching LS-1x0 from ABS to DIFF while pressing the F key.

Declaration:
Public Declare Function ls100CMS Lib "ls1x0cs100a.dll" (ByVal fNum As Integer) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100CMW

Library:
ls1x0cs100a.dll

Function:
Custom **M**ean **W**rite to LS-1x0

By using this function you can send your own target data (Y) to LS-1x0

Declaration:
Public Declare Function ls100CMW Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByVal	LY	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
LY	Y target data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100LMR

Library:
ls1x0cs100a.dll

Function:
Light **M**ean **R**ead from LS-1x0

This function returns the user calibration data memorized in LS-1x0

Declaration:
Public Declare Function ls100LMR Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, Unit as integer, LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	Unit	Integer	
ByRef	LY	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
Unit	Measurement unit (0 = cd/m² 1 = fL)
LY	Y User calibration data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100LMW

Library:
ls1x0cs100a.dll

Function:
Light **M**aean **W**rite to LS-1x0

This function writes your user calibration data into LS-1x0 memory.

Declaration:
Public Declare Function ls100LMW Lib "ls1x0cs100a.dll" (ByVal fNum As Integer, ByVal LY As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	LY	Double	

Parameter usage:

Parameter:	Usage:
Fnum	Specify a file number, which was used to open this communication port.
LY	Y User calibration data

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:
Please keep in mind that this user calibration data is in relation to the actual measurement data in LS-1x0. When performing user calibration, you first have to measure the light source in Minolta calibration mode and then you may send your corrected values!!

Function name:

ls100CCR

Library:
1x0cs100a.dll

Function:
Color **C**orrection **R**ead from LS-1x0

Declaration:
Public Declare Function ls100CCR Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, CCF As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	CCF	Double	0.002 to 9.998

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
CCF	Variable used to return the CCF data of LS-1x0

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Function name:

ls100CCW

Library:
1x0cs100a.dll

Function:
Color **C**orrection **W**rite to LS-1x0

Declaration:
Public Declare Function ls100CCW Lib "ls1x0ls1x0cs100a.dll" (ByVal fNum As Integer, CCF As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	fNum	Integer	
ByRef	CCF	Double	

Parameter usage:

Parameter:	Usage:
fNum	Specify a file number, which was used to open this communication port.
CCF	Variable used to send the CCF data to LS-1x0

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-11	ER11: Memory value Error!
-20	ER20: EEPROM Error!
-30	ER30: Low battery!
-103	Time out: LS-1x0 didn't answer in proper time!
-104	Communication error: Please check for correct file number
-105	Command error: Wrong command or parameter was sent to LS-1x0

Notes:

Colorimetric support functions

The following is a collection of some colorimetric calculation functions. Of course for LS-100 or LS-110 these are not required!

Function name:

YxyToXYZ

Library:
ls1x0cs100a.dll

Function:
Calculates Yxy to XYZ values

Declaration:
Public Declare Function YxyToXYZ Lib "ls1x0cs100a.dll" (ByVal LY As Double, ByVal sx As Double, ByVal sy As Double, X As Double, Y As Double, Z As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	LY	Double	
ByVal	sx	Double	
ByVal	sy	Double	
ByRef	X	Double	
ByRef	Y	Double	
ByRef	Z	Double	

Parameter usage:

Parameter:	Usage:
LY	Y value sent to function
Sx	x value sent to function
Sy	y value sent to function
X	X value returned from function
Y	Y value returned from function
Z	Z value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

xyToDomWL

Library: ls1x0cs100a.dll

Function:
Calculates dominant wavelength and excitation purity based on xy values

Declaration:
Public Declare Function xyToDomWL Lib "ls1x0cs100a.dll" (ByVal x As Double, ByVal y As Double, WLd As Double, Pe As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	x	Double	
ByVal	y	Double	
ByRef	WLd	Double	
ByRef	Pe	Double	

Parameter usage:

Parameter:	Usage:
x	x value sent to function
y	y value sent to function
u	Dominant wavelength value returned from function
v	Excitation purity value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

xyTouv

Library: ls1x0cs100a.dll

Function:
Calculates xy to uv values

Declaration:
Public Declare Function xyTouv Lib "ls1x0cs100a.dll" (ByVal x As Double, ByVal y As Double, u As Double, v As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	x	Double	
ByVal	y	Double	
ByRef	u	Double	
ByRef	v	Double	

Parameter usage:

Parameter:	Usage:
x	x value sent to function
y	y value sent to function
u	u value returned from function
v	v value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

xyToudvd

Library: ls1x0cs100a.dll

Function:
Calculates xy to u'v' values

Declaration:
Public Declare Function xyToudvd Lib "ls1x0cs100a.dll" (ByVal x As Double, ByVal y As Double, ud As Double, vd As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	x	Double	
ByVal	y	Double	
ByRef	ud	Double	
ByRef	vd	Double	

Parameter usage:

Parameter:	Usage:
x	x value sent to function
y	y value sent to function
ud	u' value returned from function
vd	v' value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

xyToRGBLong

Library:
ls1x0cs100a.dll

Function:
Calculates xy to a long RGB value

RGB value is compatible to VB color property

Declaration:
Public Declare Function xyToRGBLong Lib "ls1x0cs100a.dll" (ByVal x As Double, ByVal y As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	x	Double	
ByVal	y	Double	

Parameter usage:

Parameter:	Usage:
x	x value sent to function
y	y value sent to function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0 - FFFFFF	RGB long color value
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

XYZTouv

Library: ls1x0cs100a.dll

Function:
Calculates XYZ to uv values

Declaration:
Public Declare Function XYZTouv Lib "ls1x0cs100a.dll" (ByVal X As Double, ByVal Y As Double, ByVal Z As Double, u As Double, v As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	X	Double	
ByVal	Y	Double	
ByVal	Z	Double	
ByRef	u	Double	
ByRef	v	Double	

Parameter usage:

Parameter:	Usage:
X	X value sent to function
Y	Y value sent to function
Z	Z value sent to function
u	u value returned from function
v	v value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

XYZToudvd

Library: ls1x0cs100a.dll

Function:
Calculates XYZ to u'v' values

Declaration:
Public Declare Function XYZToudvd Lib "ls1x0cs100a.dll" (ByVal X As Double, ByVal Y As Double, ByVal Z As Double, ud As Double, vd As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	X	Double	
ByVal	Y	Double	
ByVal	Z	Double	
ByRef	ud	Double	
ByRef	vd	Double	

Parameter usage:

Parameter:	Usage:
X	X value sent to function
Y	Y value sent to function
Z	Z value sent to function
ud	u' value returned from function
vd	v' value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

XYZToRGBLong

Library:
ls1x0cs100a.dll

Function:
Calculates XYZ to a long RGB value

RGB value is compatible to VB color property

Declaration:
Public Declare Function XYZToRGBLong Lib "ls1x0cs100a.dll" (ByVal X As Double, ByVal Y As Double, ByVal Z As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	X	Double	
ByVal	Y	Double	
ByVal	Z	Double	

Parameter usage:

Parameter:	Usage:
X	X value sent to function
Y	Y value sent to function
Z	Z value sent to function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0 - FFFFFF	RGB long color value
-90	Calculation Error: Values passed to the function could not be calculated!

Notes:

Function name:

uvToTduv

Library: ls1x0cs100a.dll

Function:
Calculates uv to Tduv (Correlated Color Temperature and delta uv) values

Declaration:
Public Declare Function uvToTduv Lib "ls1x0cs100a.dll" (ByVal u As Double, ByVal v As Double, T As Double, duv As Double) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	u	Double	
ByVal	v	Double	
ByRef	T	Double	
ByRef	duv	Double	

Parameter usage:

Parameter:	Usage:
u	x value sent to function
v	y value sent to function
T	T value returned from function
duv	duv value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!
-92	Out of range, color temperature could not be calculated!

Notes:

Function name:

RGBLongToRGB

Library: ls1x0cs100a.dll

Function:
Calculates RGB long variable to separate R,G and B values

Declaration:
Public Declare Function RGBLongToRGB Lib "ls1x0cs100a.dll" (ByVal RGBLong As Long, R As Long, G As Long, B As Long) As Long

Parameter:

Pass by:	Name:	Data type:	Data range:
ByVal	RGBLong	Long	
ByRef	R	Long	
ByRef	G	Long	
ByRef	B	Long	

Parameter usage:

Parameter:	Usage:
RGBLong	RGB long value sent to function
R	R value returned from function
G	G value returned from function
B	B value returned from function

Return type and value:

Data	Explanation
Long	Use for Error-Checking
0	No error
-90	Calculation Error: Values passed to the function could not be calculated!
-91	RGB Long values can't be negative!

Notes:

Include modules for VBA & VB

These “modules” are made to provide all function declare statements. In addition, they provide a routine for converting error numbers to text. For customizing the error messages to any local language, simply edit the text in the “ErrNoToText” function.

VBA Visual Basic for Applications

The package includes the “CS100aDLL_VBAIncdude.bas” & “LS1x0DLL_VBAIncdude.bas” file. These files simply can be imported to any software, which is supporting Visual Basic for Applications.

In EXCEL for example, simply start the source code editor and select “Import File” from File menu.

Note!
In the examples for EXCEL this is of course already done and thus not necessary. If using the example file as a starting point for own files, also all functions are already implemented.

VB Visual Basic

The package includes the “CS100aDLL_VBIncdude.bas” & “LS1x0DLL_VBIncdude.bas” file. These files simply can be imported to any project of Visual Basic and will provide all function declare statements as well as some error checking code.

Note!
All Visual Basic versions are supported, however as the DLL is using the Windows API, only 32 bit versions of Windows are supported!

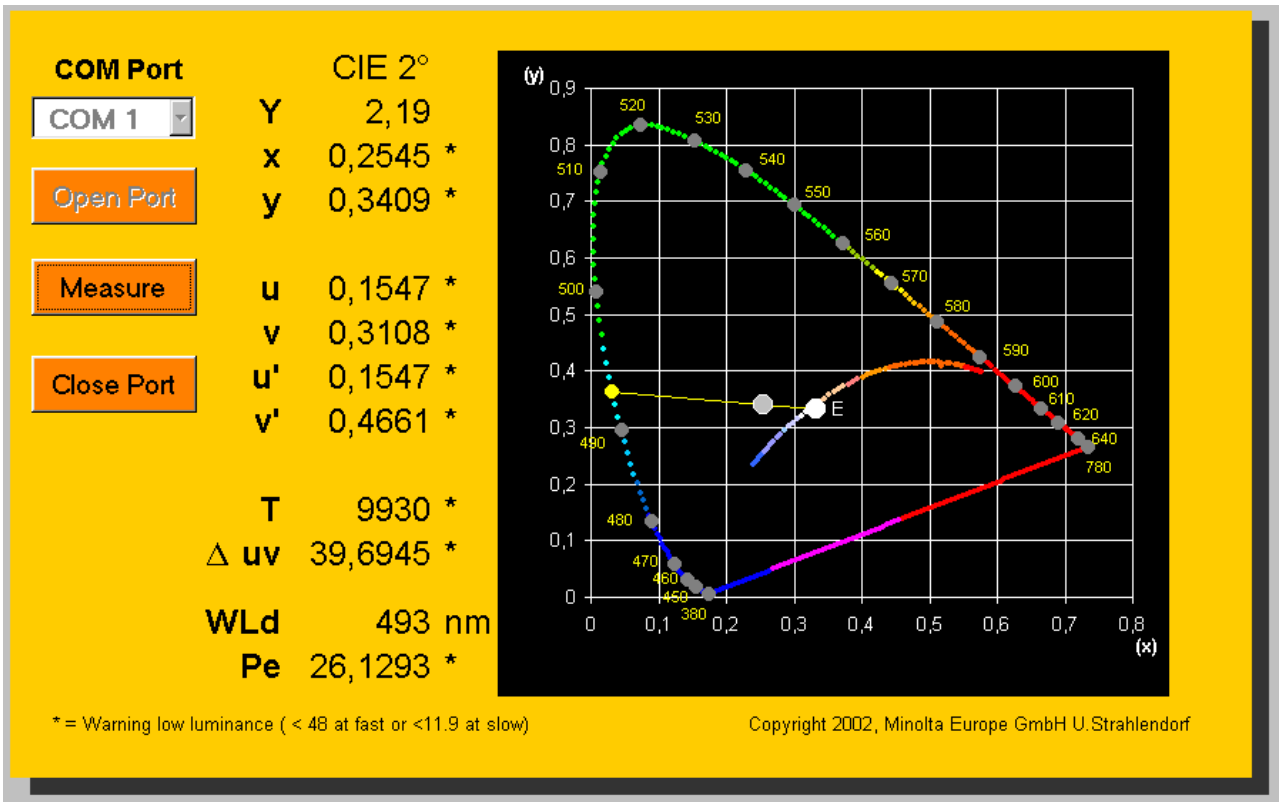
CS-100A Examples by using Microsoft EXCEL

The ls1x0cs100a.dll comes together with two example files by using Microsoft EXCEL. One shows the usage for CS-100A and is explained here. The other one is for LS100 and LS110 and is explained later in this document.

CS-100a_Demo.XLS contains seven sheets with different samples. In addition there is a hidden sheet, which supplies the basic data for the CIE color diagrams.

Yxy measurement and graphical display

This example shows how Yxy data can be read from CS-100A and displayed in a colored xy diagram. In addition, it shows calculation of XYZ, uv, u'v' and correlated color temperature.



How to use:

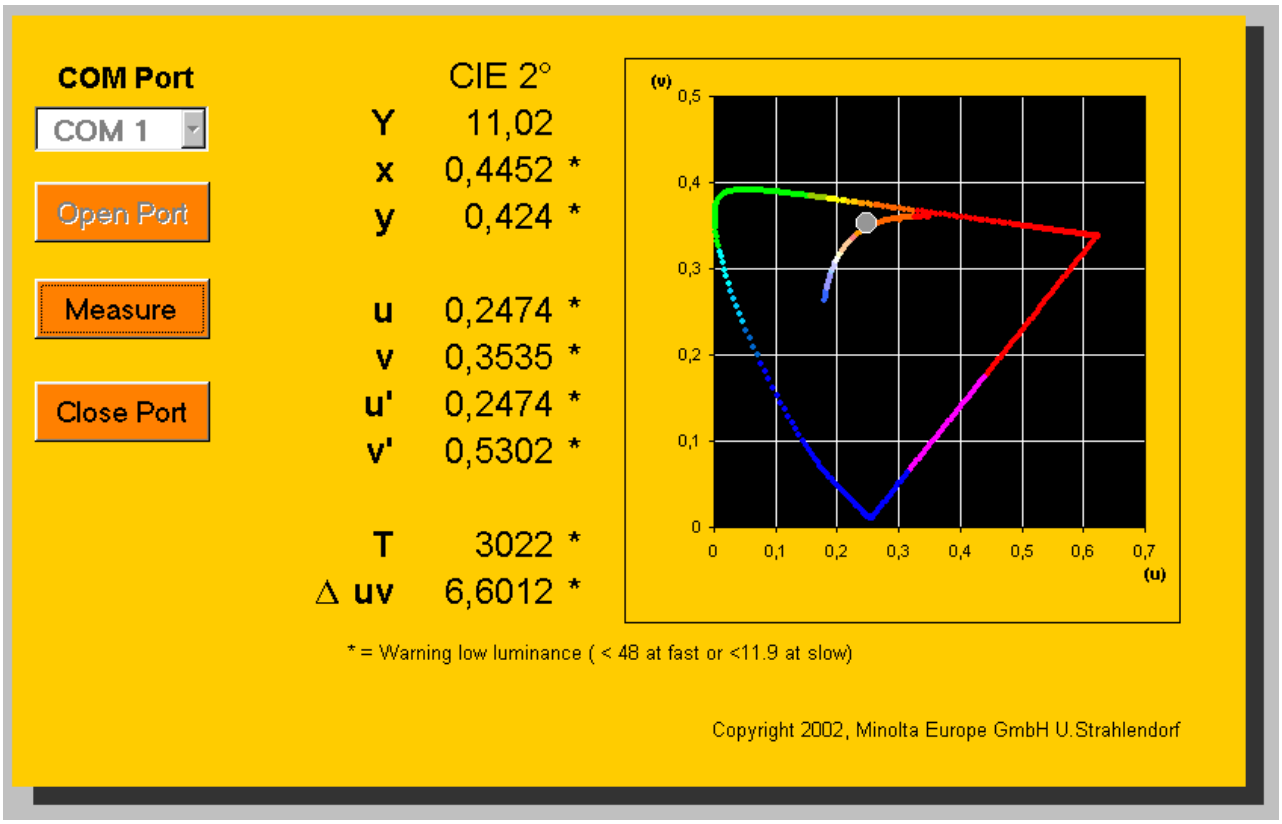
1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to absolute measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. Now you simply can push <Measure> to get the measurement data of CS-100A
4. Finally push <Close>

Note!

- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

Yxy measurement and uv (u'v') graphical display

This example shows how Yxy data can be read from CS-100A and uv (u'v') values can be displayed in a colored uv (u'v') diagram. In addition, it shows calculation of XYZ, uv, u'v' and correlated color temperature. Basic functionality is same like the Yxy sheet, only difference is the uv diagramm



How to use:

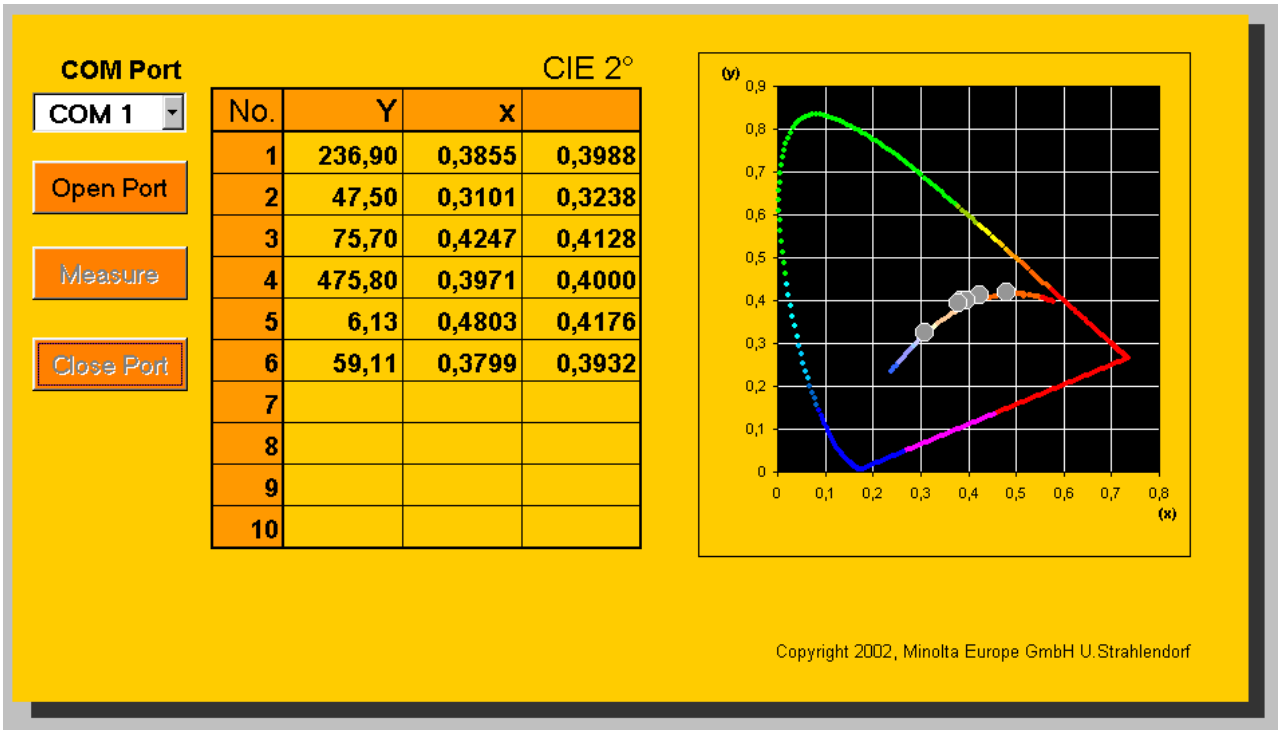
1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to absolute measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. Now you simply can push <Measure> to get the measurement data of CS-100A
4. Finally push <Close>

Note!

- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

Yxy multi measurement and graphical display

This example shows how Yxy data can be read from CS-100A and multiple data can be displayed in a colored xy diagram. In addition, it shows calculation of XYZ, uv, u'v' and correlated color temperature.



How to use:

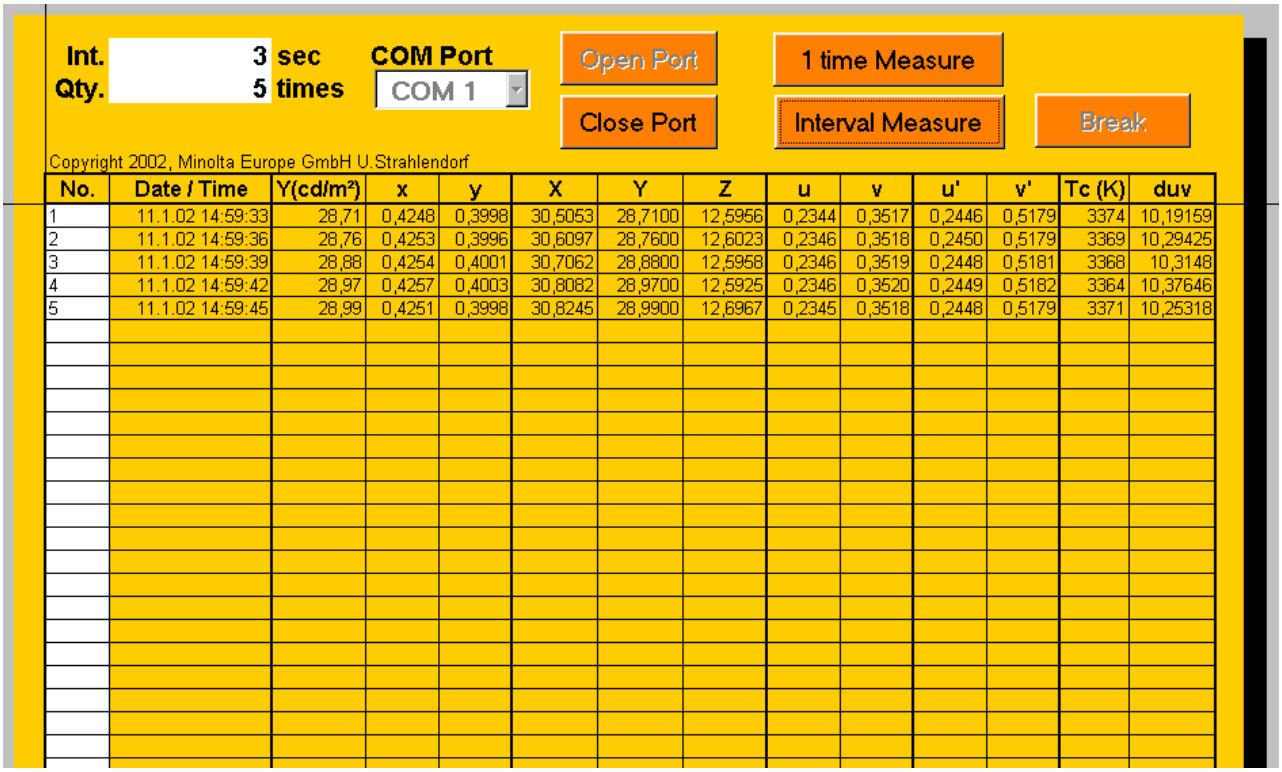
1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to absolute measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. Now you simply can push <Measure> to get the measurement data of CS-100A
4. The list can contain up to 10 sets of measurement data and will then start from the beginning
5. Finally push <Close>

Note!

- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

Sequence measurement

This example shows how Yxy measurement sequence can be read from CS-100A and displayed in a list. In addition, it shows calculation of XYZ, uv, u'v' and correlated color temperature.



No.	Date / Time	Y(cd/m²)	x	y	X	Y	Z	u	v	u'	v'	Tc (K)	duv
1	11.1.02 14:59:33	28,71	0,4248	0,3998	30,5053	28,7100	12,5956	0,2344	0,3517	0,2446	0,5179	3374	10,19159
2	11.1.02 14:59:36	28,76	0,4253	0,3996	30,6097	28,7600	12,6023	0,2346	0,3518	0,2450	0,5179	3369	10,29425
3	11.1.02 14:59:39	28,88	0,4254	0,4001	30,7062	28,8800	12,5958	0,2346	0,3519	0,2448	0,5181	3368	10,3148
4	11.1.02 14:59:42	28,97	0,4257	0,4003	30,8082	28,9700	12,5925	0,2346	0,3520	0,2449	0,5182	3364	10,37646
5	11.1.02 14:59:45	28,99	0,4251	0,3998	30,8245	28,9900	12,6967	0,2345	0,3518	0,2448	0,5179	3371	10,25318

How to use:

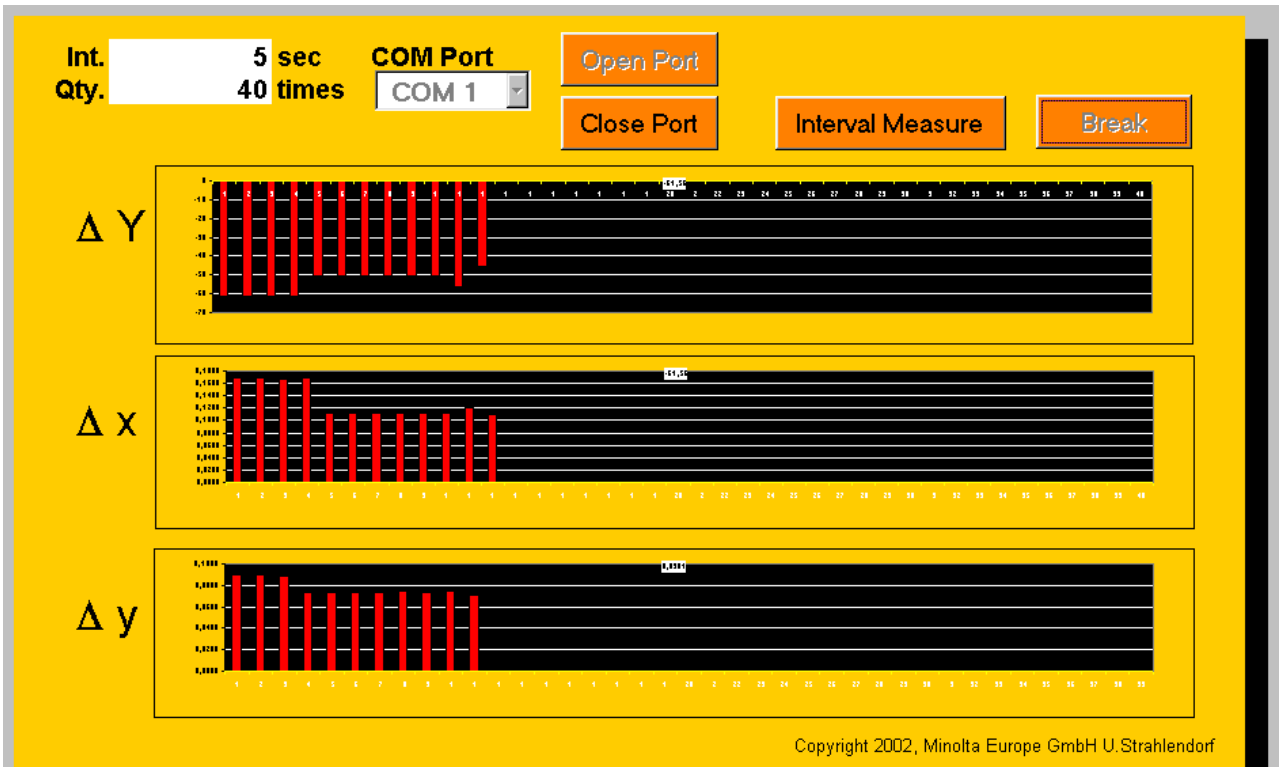
1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to absolute measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. For single measurement proceed as follows:
   Select the cell "C" within the row where you would like the measurement data to go.
   Push <1 time Measure> to get the measurement data of CS-100A
4. In addition you could start a sequence measurement.
   Specify interval time and number of measurements
   Select the cell "C" within the row where you would like the first measurement data to go.
   Push <Interval Measure> to start your sequence
5. Finally push <Close>

Note!

- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

Sequence of difference measurements

This example shows how Yxy measurement sequence can be read from CS-100A and displayed in three trend diagrams. In addition, it shows calculation of XYZ, uv, u'v' and correlated color temperature.
Difference to previous one is that CS-100A is working in difference mode.



How to use:

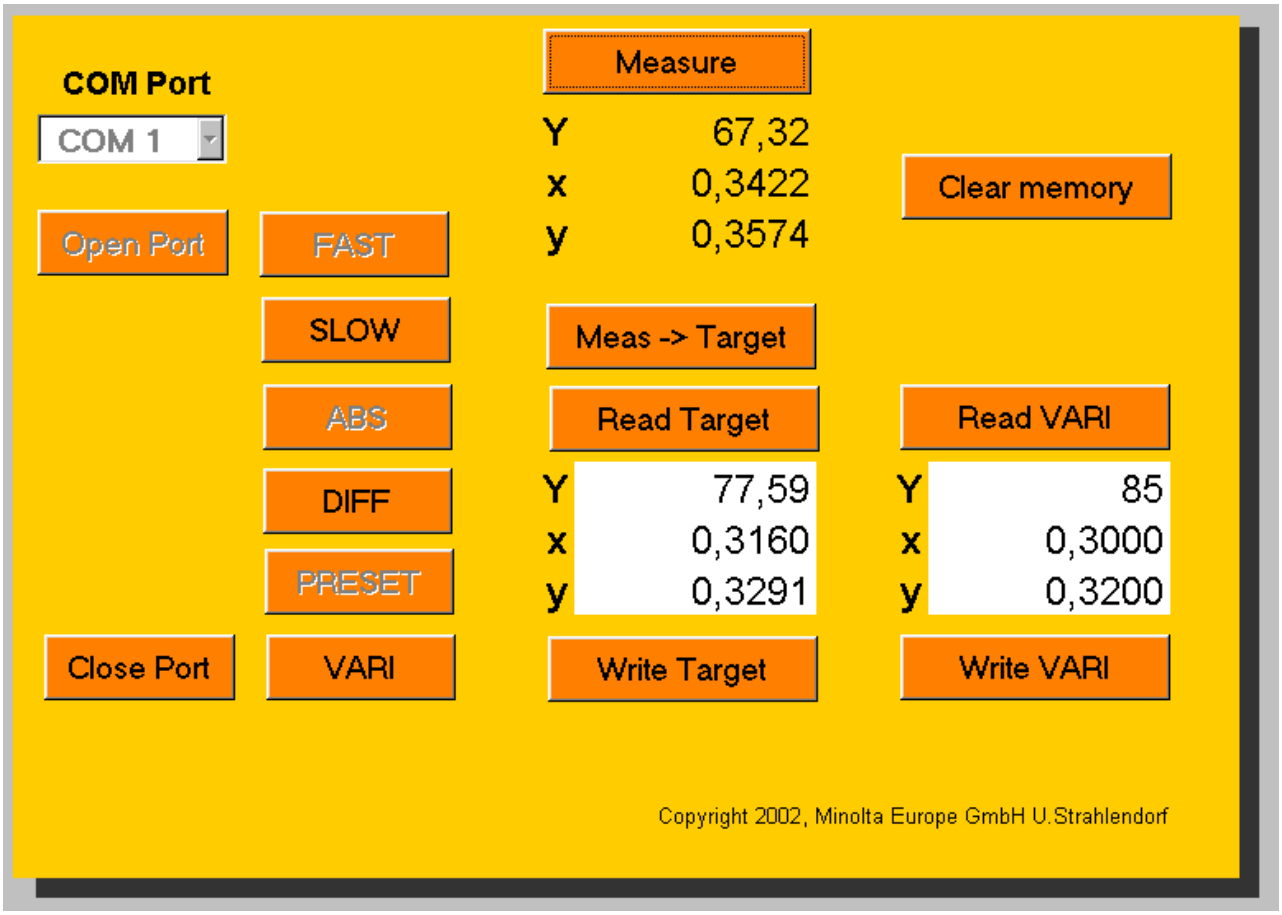
1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to difference measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. Specify interval time and number of measurements
4. Push <Interval Measure> to start your sequence
5. Finally push <Close>

Note!

- To set up your target for this difference measurement please refer to "Tools" sheet
- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

Tools

This example is made to show how settings can be changed, how target functions can be used and how user calibration can be used!



How to use:

1. Select the COM port, to which you connected the CS-100A, by the drop down list
2. Push <Open Port>
   CS-100A will be automatically switched to absolute measurement mode
   CS-100A will automatically be switched to Fast mode
   CS-100A will automatically be switched to Minolta calibration mode
3. The different modes simply can be change by pushing to the relevant button.
4. You can read or write target data to CS-100A
   Push <Read Target> to get the data from CS-100A
   Change your target data
   Push <Write Target to CS-100A
5. If you want to set the actual measurement data as target, your first have to measure
   Push <Measure> (Data with warning for out of range will not be accepted)
   <Meas. -> Target> button will be enabled
   Push <Meas. -> Target> button to store measurement data into CS-100A target channel.

6. You can read user calibration standard data
   Push <Read VARI> to get the data from CS-100A
7. To memorize new user calibration data, you first have to measure.
   Measure your standard light source
   Enter your own standard data into the user calibration fields
   Push <Write VARI> to send the data to CS-100A
   Note!
   User calibration is performed by calculating a factor against original measurement data, thus you cannot perform user calibration without first measuring the standard.

8. By pushing the <Clear> button you can delete the memory is CS-100A
9. Finally push <Close>

Note!

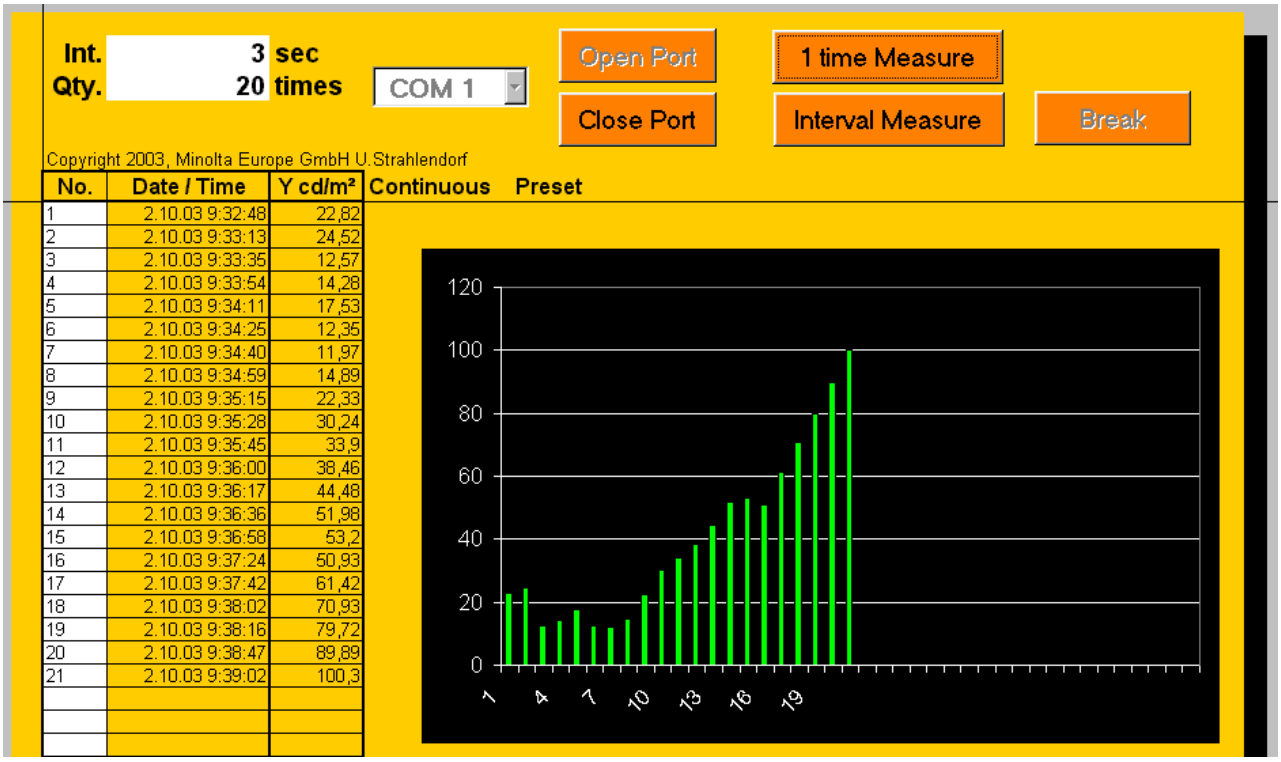
- When opening COM port, the previous measurement data will be deleted
- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

LS-1x0 Examples by using Microsoft EXCEL

This section is explaining about the usage of the second example with Microsoft EXCEL, which is used for LS-100 and LS-110!
LS-1x0_Demo.XLS contains four sheets with different samples.

Sequence measurement and graphical display

This example shows how measurement sequence can be read from LS-100/-110 and displayed in a list. In addition, it shows graphical display of the sequence.



No.	Date / Time	Y cd/m²
1	2.10.03 9:32:48	22,82
2	2.10.03 9:33:13	24,52
3	2.10.03 9:33:35	12,57
4	2.10.03 9:33:54	14,28
5	2.10.03 9:34:11	17,53
6	2.10.03 9:34:25	12,35
7	2.10.03 9:34:40	11,97
8	2.10.03 9:34:59	14,89
9	2.10.03 9:35:15	22,33
10	2.10.03 9:35:28	30,24
11	2.10.03 9:35:45	33,9
12	2.10.03 9:36:00	38,46
13	2.10.03 9:36:17	44,48
14	2.10.03 9:36:36	51,98
15	2.10.03 9:36:58	53,2
16	2.10.03 9:37:24	50,93
17	2.10.03 9:37:42	61,42
18	2.10.03 9:38:02	70,93
19	2.10.03 9:38:16	79,72
20	2.10.03 9:38:47	89,89
21	2.10.03 9:39:02	100,3

How to use:

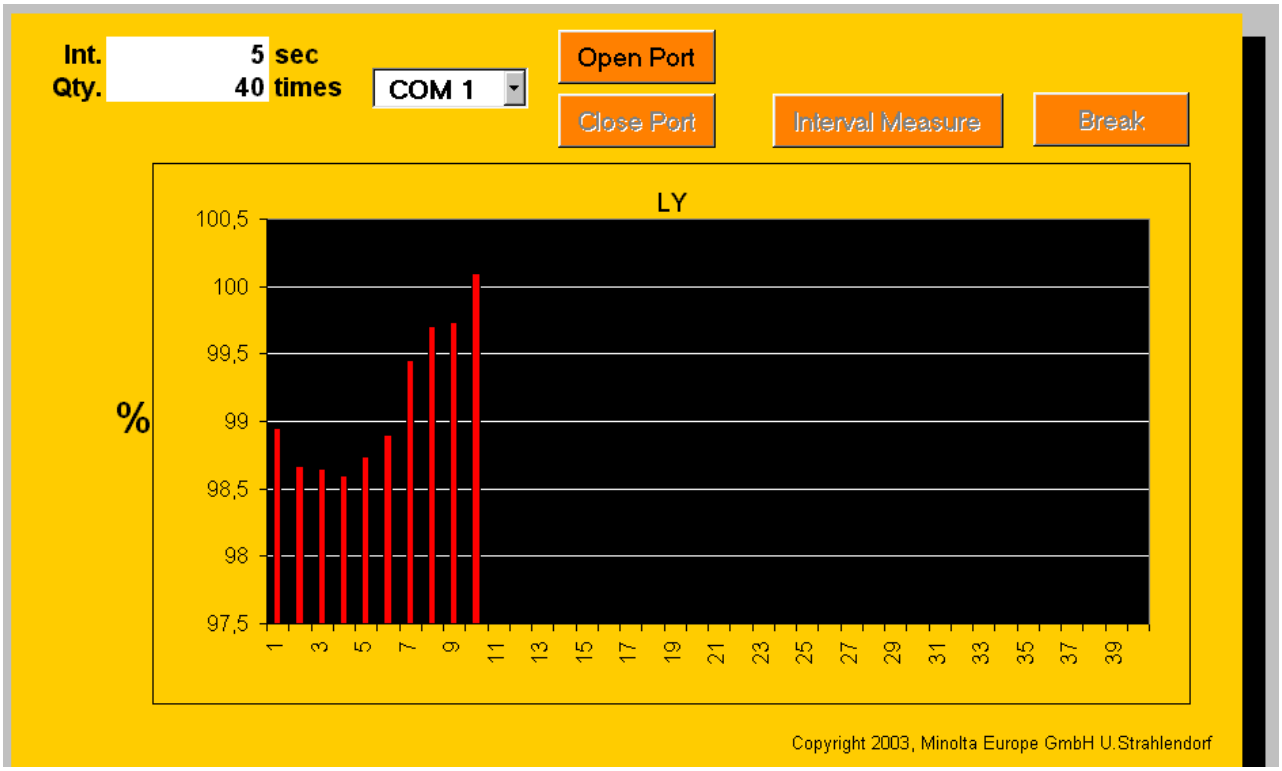
1. Select the COM port, to which you connected the LS-100/-110, by the drop down list
2. Push <Open Port>
   LS-1x0 will be automatically switched to absolute measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. For single measurement proceed as follows:
   Select the cell “C” within the row where you would like the measurement data to go.
   Push <1 time Measure> to get the measurement data of LS-1x0
4. In addition you could start a sequence measurement.
   Specify interval time and number of measurements
   Select the cell “C” within the row where you would like the first measurement data to go.
   Push <Interval Measure> to start your sequence
5. Finally push <Close>

Note!

- When opening COM port, the previous measurement data will be deleted
- If you don’t close the COM port before changing to another sheet, the COM port will be closed automatically.

Sequence of difference measurements

This example shows how measurement sequence can be read from LS-100/-110 and displayed in a trend diagrams.
Difference to previous one is that LS-1x0 is working in difference mode.



How to use:

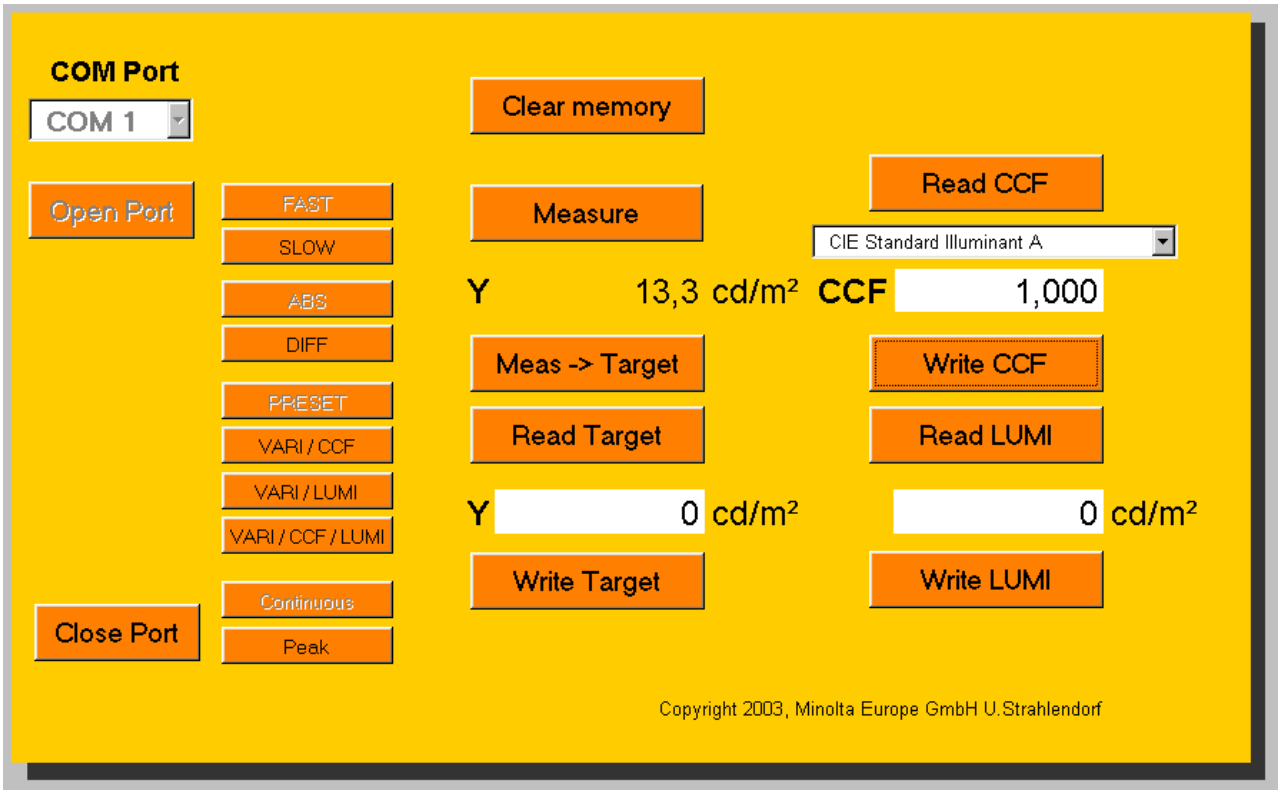
1. Select the COM port, to which you connected the LS-100/-110, by the drop down list
2. Push <Open Port>
   LS-1x0 will be automatically switched to difference measurement mode
   User or Minolta calibration mode setting will not be changed
   Fast or slow mode setting will not be changed
3. Specify interval time and number of measurements
4. Push <Interval Measure> to start your sequence
5. Finally push <Close>

Note!

- To set up your target for this difference measurement please refer to “Tools” sheet
- When opening COM port, the previous measurement data will be deleted
- If you don’t close the COM port before changing to another sheet, the COM port will be closed automatically.

Tools

This example is made to show how settings can be changed, how target functions can be used and how user calibration can be used!



How to use:

1. Select the COM port, to which you connected the LS-100/-110, by the drop down list
2. Push <Open Port>
   LS-1x0 will be automatically switched to Fast mode
   Absolute, difference, calibration and Peak mode settings will be detected automatically
3. The different modes simply can be change by pushing to the relevant button.
4. You can read or write target data to LS-1x0
   Push <Read Target> to get the data from LS-1x0
   Change your target data
   Push <Write Target to LS-1x0
5. If you want to set the actual measurement data as target, your first have to measure
   Push <Measure> (Data with warning for out of range will not be accepted)
   Push <Meas. -> Target> button to store measurement data into LS-1x0 target channel.

6. You can read user calibration (Luminance) standard data
   Push <Read LUMI> to get the data from LS-1x0
7. To memorize new user calibration data, you first have to measure.
   Measure your standard light source
   Enter your own standard data into the user calibration field
   Push <Write LUMI> to send the data to LS-1x0
   Note!
   User calibration is performed by calculating a factor against original measurement data, thus you cannot perform user calibration without first measuring the standard.

8. You can read CCF (Color Correction Factors)
   Push <Read CCF> to get the data from LS-1x0
9. To memorize new CCF data, follow this procedure
   Enter your own CCF (0.002 to 9.998) data into the CCF field
   Push <Write CCF> to send the data to LS-1x0
10. By the drop down list, you can select pre defined CCF factors. Please refer to the next page for details about how to define CCF factors. If reading CCF factor from instrument and this factor is defined, the defined name will be shown in the list. If value is multiple times in the definition, the first appearance will be selected!
11. By pushing the <Clear> button you can delete the memory is LS-1x0
11. Finally push <Close>

Note!

- If you don't close the COM port before changing to another sheet, the COM port will be closed automatically.

CCF definition

On this sheet you can define own CCF factors:

	A	B	C	D	E
1		**Name**	**Value**	**Number of CCF factors**	19
2	0	CIE Standard Illuminant A	1,000		
3	1	CIE Standard Illuminant B	1,007		
4	2	CIE Standard Illuminant C	1,010		
5	3	CIE Standard Illuminant D65	1,011		
6	4	Daylight flourescent lamp (F5)	1,013		
7	5	White floutescemt lamp (F6)	1,008		
8	6	Three-band flourescent lamp	1,005		
9	7	High pressure mecury lamp	1,007		
10	8	High pressure sodium lamp	1,009		
11	9	Metal halide lamp (3-additive)	1,014		
12	10	Metal halide lamp (rare-earth)	1,009		
13	11	Flourescent display (Material: ZnO:Zn)	1,022		
14	12	Color CRT -red	0,995		
15	13	Color CRT -green	1,018		
16	14	Color CRT -blue	1,123		
17	15	Color CRT -white	1,023		
18	16	CIE Standard Illuminant A + Y-44	1,000		
19	17	CIE Standard Illuminant A + O-54	0,987		
20	18	CIE Standard Illuminant A + R-64	0,856		
21	19				
22	20				
23	21				
24	22				
25	23				
26	24				

You can specify up to 50 CCF factors! (0 – 49)

Only columns C & D can be edited! Column C is a name for the factor whilst column D is the value!

Number of CCF factors is calculated automatically!

Please don’t enter names longer than the field as you might not be able to properly read such long name in the drop down list of “Tools” sheet!

Appendix

Colorimetric calculations:

1931 CIE Chromaticity System (Yxy)

$$Y = Y \qquad x = \frac{X}{X+Y+Z} \qquad y = \frac{Y}{X+Y+Z}$$

1960 CIE Uniform Color Space System (uv)

$$u = \frac{4X}{(X+15Y+3Z)} \qquad v = \frac{6Y}{(X+15Y+3Z)}$$

$$u = \frac{4x}{(-2x+12y+3)} \qquad v = \frac{6y}{(-2x+12y+3)}$$

$$x = \frac{1.5u}{(u-4v+2)} \qquad y = \frac{v}{(u-4v+2)}$$

1976 CIE Uniform Color Space System (u'v')

$$u' = \frac{4X}{(X+15Y+3Z)} \qquad v' = \frac{9Y}{(X+15Y+3Z)}$$

$$u' = \frac{4x}{(-2x+12y+3)} \qquad v' = \frac{9y}{(-2x+12y+3)}$$

$$x = \frac{6.75u'}{(4.5u'-12v'+9)} \qquad y = \frac{3v'}{(4.5u-12v'+9)}$$