

# **Microflash 45**

## **Operators Manual**

Part No. 4230-0324

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# 1. Security instructions

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## **Please note:**

- The instrument should only be used by trained persons following the instructions of the user's manual.
- Do not use the instrument in rooms having a temperature over 40°C or next to explosive sectors.
- Make sure that no liquid or vapors can get into the instrument.
- Use only the charger delivered with the instrument and make sure that the voltage indicated on the charger corresponds to the main voltage.
- Use only original accessories (data cable, charger, etc.)
- Use only original packing for transport.
- Use only the white calibration standard delivered with the instrument for white calibration. The number on the white standard must be the same as the number indicated on the instrument.
- Do not open the instrument yourself. A non-authorized opening of the instrument could cause damage and cancels the warranty.

## 2. Generalities

---

Extremely easy handling is the characteristic of the Microflash 45 spectrophotometer. The new design principle of its measuring unit allows an exact positioning on the measuring patch. During measurement the positioning is visible and can be checked. This is particularly helpful for measurements on testforms.

The measuring unit of the MF45 is a high precision monolithic grating-diode-array. The holographic grating and the diode array form a fixed and long lasting adjusted unit.

The MF45 has no moving parts. Therefore, the instrument is not only wear resistant, but also sturdy and ideal for use in extreme conditions.

Four function keys and the self-explanatory menu make using the instrument very easy.

The Microflash 45 spectrophotometer calculates all important characteristics for colorimetry, such as **X Y Z** tristimulus values, the chromaticity coordinates **x y Y**, the characteristic values of the color spaces **L\*a\*b\*** and **L\*u\*v\*** as well as the **L\*C\*h\*-values** and the corresponding difference values with the **ΔE-value**. Other functions such as the measurement of **metamerism, whiteness** and **yellowness** are also available. The remission values are measured in a wave length of **380 nm to 780 nm** in steps of **10 nm** and are indicated in display in numerical or graphical form.

The MF45 allows memorization of colorimetric and spectral data for **500 references** and can exchange the data stock of the computer through the bi-directional interface. This allows working with complete color data files.

The Microflash 45 has been designed specifically to work with the complete range of Datacolor International Quality Control and Color Matching software

### 3. Starting up/Charging the instrument

---

- Check whether the power supply has the same voltage as indicated on the identification plate of the charger unit.
- Connect the charger and charge the MF45 for at least half an hour.

The instrument is then ready for use.

The Microflash 45 is equipped with the non-polluting rechargeable NiMH batteries. There is no danger of overcharging. The charging current begins high, gradually becomes lower and eventually compensates only the self-discharge of the batteries. Therefore, the MF45 can be permanently placed on the charger and always be ready for use.

The fully charged battery allows more than 10,000 measurements. When the battery is nearly discharged, LOW BATTERY is indicated in the display, which means that the instrument must be recharged. The instrument can be used again after about a 10 minute recharging.

The full charge is reached after 4 hours. **C = 100 %** on the instrument display indicates that the full capacity is reached.

## 4. Measuring

---

- Position the MF45 on the measuring patch after switching it on. Start measurement with the black round button (**Start Key**) on the side of the instrument.

The remission values are indicated with 4 decimals. That is why a high precision is required from the instruments. The measuring samples and the measurements themselves need to be prepared carefully in order to get reliable measuring results.

The sample should be placed flat on a hard surface. Avoid stapling several printing sheets together. Choose a regular white or grey surface to allow transparent samples to be measured reliably.

If the sample is smaller than the base of the instrument, equalize the base of the instrument with a base as high as the sample. Do not press excessively on the instrument in order to avoid pressing the sample too much. The best way to measure is not to touch the instrument during measurement.

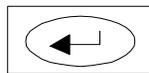
## 5. Keys and display

---

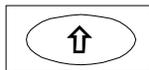
### 5.1 On/Off

|                      |                               |
|----------------------|-------------------------------|
| <b>SWITCHING ON.</b> | Press the black start key     |
| <b>SWITCHING OFF</b> | Automatically after 3 minutes |

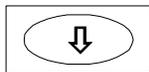
### 5.2 Key measuring-



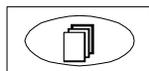
**SEND**



**REF**



**NEXT**



**functions in mode**

|                     |   |
|---------------------|---|
| <b>KEY START</b>    | Measure   |
| <b>↵ KEY (SEND)</b> | Transmission (send data to host computer)   |
| <b>↑ KEY (REF)</b>  | Open reference menu for comparison measurements<br>Position the cursor in the represented remission area<br>Go through the represented remission curves |
| <b>↓ KEY (NEXT)</b> | Change display  |
| <b>☐ KEY</b>        | Open and closes the main menu<br>Close the reference menu   |

### 5.3 Key functions in the main menu

|                     |  |
|---------------------|--|
| <b>KEY START</b>    | No Function  |
| <b>↵ KEY (SEND)</b> | Confirm the selection or open next menu                |
| <b>↑ KEY (REF)</b>  | Change the selection or increase the selected value    |
| <b>↓ KEY (NEXT)</b> | Change the selection or decrease the selected value    |
| <b>⏪ KEY</b>        | Quit the menu or go back to the last level in the menu |

### 5.4 Functions of the keys in the reference menu

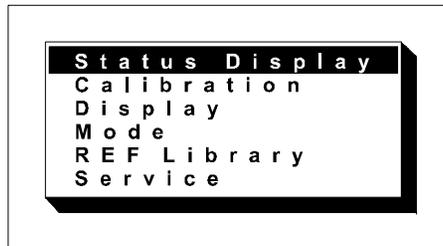
|                     |  |
|---------------------|--|
| <b>KEY START</b>    | No function  |
| <b>↵ KEY (SEND)</b> | Confirm the selection or open next menu<br>Switch off reference mode |
| <b>↑ KEY (REF)</b>  | Change the selection or increase the selected value                  |
| <b>↓ KEY (NEXT)</b> | Change the selection or decrease the selected value                  |
| <b>⏪ KEY</b>        | Quit the menu  |

## 5.5 Display

Select the display with the  $\Downarrow$  key (NEXT).

|                  |  |
|------------------|--|
| <b>XYZ</b>       | X Y Z values.  |
| <b>xyY</b>       | x y Y values.  |
| <b>L*a*b*</b>    | L* a* b* values, with a selected reference additionally dE*ab.   |
| <b>L*C*h* ab</b> | L* C* h* (ab) values, with a selected reference additionally dE*ab.  |
| <b>L*u*v*</b>    | L* u* v* Werte, with a selected reference additionally dE*uv.  |
| <b>L*C*h* uv</b> | L* C* h* (uv) values with a selected reference additionally dE*uv.   |
| <b>dE</b>        | dE*(ab) dE*(uv) dE94 dECMC.  |
| <b>Graph</b>     | Graphic representation of the remission values from 380nm to 780nm.  |
|                  | The measuring value marked by the cursor is indicated in display.  |
|                  | Change position of cursor with $\hat{u}$ KEY (REF).  |
|                  | Short press $\Rightarrow$ Cursor moves to the right.   |
|                  | Long press $\Rightarrow$ Cursor moves to the left.   |
| <b>Remission</b> | Numerical representation of remission values from 380nm to 780nm.  |
|                  | Change the display position with $\hat{u}$ KEY (REF).  |
| <b>WB/WCIE</b>   | Whiteness according to Berger, whiteness according to CIE,   |
| <b>G1925</b>     | Yellowness/ G1925.   |
| <b>Metamerie</b> | Metamerie index for the illuminants D65 $\Leftrightarrow$ A, D50 $\Leftrightarrow$ A, C $\Leftrightarrow$ A. |

## 5.6 Functions in the main menu



|                       |  |
|-----------------------|--|
| <b>Status Display</b> | Display of the selected options and software version   |
| <b>Calibration</b>    | White calibration on the white standard  |
| <b>Display</b>        | Switching on and off display options selected with the ↓ KEY (NEXT). Switching on and off with ↵ KEY (SEND).   |
| <b>Mode</b>           | <p>Illuminants (A, C, D50, D65), Observers (2°, 10°).</p> <p>Setting interface options, manual with ↵ KEY (SEND) or automatic after each measurement.</p> <p>Selection of the data format: Binary for special reception programs, and DATAC for communication with all Datacolor International programs.</p> <p>Selection of language.</p> |
| <b>REF LIBRARY</b>    | <p>Measuring LIBRARY-values.</p> <p>Transmission of all LIBRARY-values to a windows PC (with special utility software).</p> <p>Entering LIBRARY-values from a windows PC (with special utility software).</p>  |
| <b>Service</b>        | <p>RESET (measuring values, LIBRARY values, REF values and function mode are deleted).</p> <p>Display of ACCU power and temperature: Setting remission values of the white standard (only after replacing white std)</p> <p>Showing parameters of the spectrometer module</p>  |

## 6. Measuring absolute values (L\*a\*b\*,L\*u\*v\*,...)

---

Absolute values are measured when the display shows no inverse display. (e.g. SAMPLE, REF or LIB). If such a display is indicated, the instrument is programmed for comparison measurements.

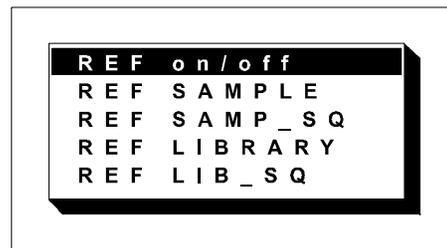
### 6.1 Settings before measurements

You can make the following settings, If necessary:

↑ KEY (REF)

↓ KEY (SEND)

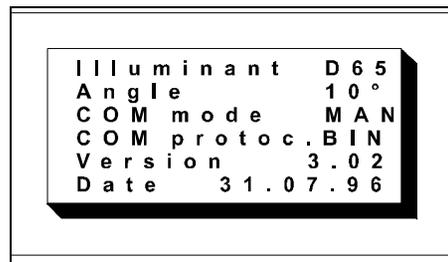
- Quit **Reference-mode** for comparison measurements



☐ KEY

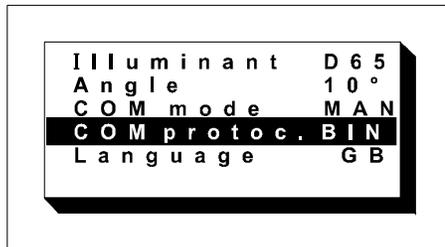
↓ KEY (SEND)

Check the selected options in **Status display**.



- You can change the selected options in **Mode** in the main menu, if necessary.

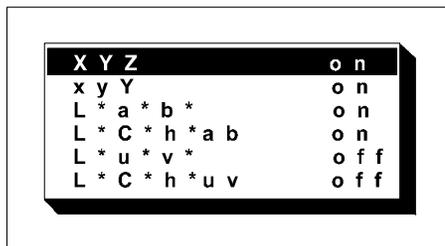
□ KEY  
 ↓ KEY (NEXT, 3 TIMES)  
 ↵ KEY (SEND)  
 ↑ KEY (REF)



- You can change display layout in **Display** in the main menu, if necessary.

□ KEY  
 ↓ KEY (NEXT, 2 TIMES)  
 ↵ KEY (SEND)  
 ↑ KEY & ↓ KEY (REF) to scroll  
 through display

Press the ↵ key (SEND) to toggle ON/OFF.



## 6.2 Calibration

Calibrate only if the prior calibration was uncertain. Use the white standard delivered with the instrument.

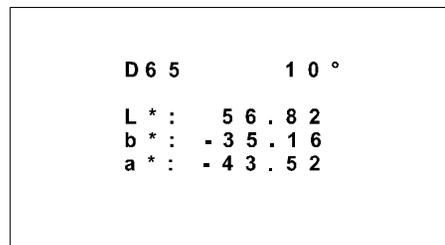
- ⇨ KEY
- ⇩ KEY (NEXT)
- ⇩ KEY (SEND)



## 6.3 Measuring

Position the instrument on the sample and start measurement.  
Select the appropriate display.

- START KEY
- ⇩ KEY (NEXT)

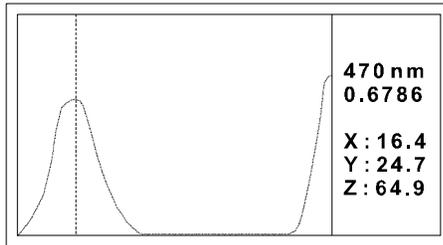


After measurements you can use other functions.

- Data transmission ↵ KEY (SEND)
- Change cursor position in the remission curves

↑ KEY (REF) short press ⇒ Moving to the right

↑ KEY (REF) long press ⇒ Moving to the left



- Changing display of numerical remission values

↑ KEY (REF)

```
R ( 3 8 0 ) = 0 . 0 5 6 9  
R ( 3 9 0 ) = 0 . 1 0 6 0  
R ( 4 0 0 ) = 0 . 1 9 0 2  
R ( 4 1 0 ) = 0 . 3 2 7 5  
R ( 4 2 0 ) = 0 . 4 2 8 8  
R ( 4 3 0 ) = 0 . 5 0 6 6
```

## 6.4 Measuring metamerism

The metamerie-index of a sample (SAMPLE) relates to a reference (REF) measured for the illuminants D65, D50, C in comparison with illuminant A.

- Select **Metamerie** in display.  
⇓ KEY (NEXT)
- Select **REF** and measure the reference.  
⇑ KEY (REF)  
START KEY

```
      M E T A M E R I E
M ( D 6 5 , A ) : 0 . 0 0
M ( D 5 0 , A ) : 0 . 0 0
M ( C      , A ) : 0 . 0 0
REF
```

- Select **SAMPLE** and measure the sample.

⇑ KEY (REF)  
START KEY

```
      M E T A M E R I E
M ( D 6 5 , A ) : 1 . 7 6
M ( D 5 0 , A ) : 1 . 3 7
M ( C      , A ) : 1 . 8 4
SAMPLE
```

## 7. Comparison measurements ( $\Delta L^*$ , $\Delta a^*$ , $\Delta b^*$ , $\Delta E^*_{ab}$ , .....

---

The instrument is set for comparison measurements if inverse measuring mode is indicated in the first line of the display.



```
REF
NEXT: SAMP
```

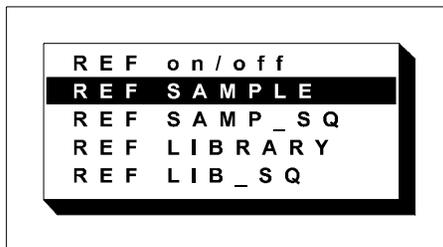
### 7.1 Settings before measuring and calibration

You can make the presettings described under **Measurements of absolute values; 6.2, 6.3 and 6.4.**

### 7.2 Measuring with several references (REF SAMPLE)

- Select **REF SAMPLE** in the reference menu. You return automatically to the measuring mode.

↑ KEY (REF)  
↓ KEY (NEXT)  
↵ KEY (SEND)



```
REF on/off
REF SAMPLE
REF SAMP_SQ
REF LIBRARY
REF LIB_SQ
```

- First measure the reference (REF) and then the sample (SAMPLE).

START KEY

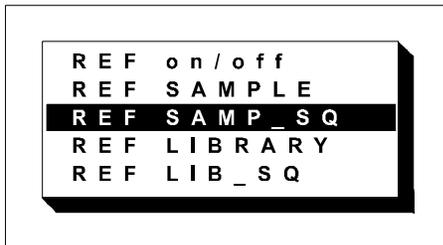
The SAMPLE values and REF values are indicated in the display, together with the SAMPLE values and the  $\Delta$ -values. Alternative measurements of the reference and sample can be repeated as often as needed.

### 7.3 Measurements with fixed references (REF SAMP\_SQ)

You can enter 1 to 10 references before you measure the samples. The automatically memorized references can be used as **Sequence (SQ)** as often as needed.

- Select the **REF SAMP\_SQ** mode in the reference menu. Measure the references in the sub-menu then go back to the measuring mode.

↑ KEY (REF)  
↓ KEY (NEXT, 2 TIMES)  
↵ KEY (SEND)  
☐ KEY



- Measure the samples in the order of sequence.

#### START KEY

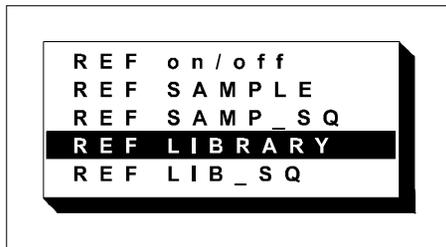
The SAMPLE values and the  $\Delta$ -values are indicated, as well as the sequence number of the sample measured last. The references memorized as a sequence can be overwritten by a new measurement.

## 7.4 Measuring a reference from the LIBRARY (REF LIBRARY)

You can use a reference from the LIBRARY for comparison measurements.

- Select the **REF LIBRARY** mode in the reference menu.

↑ KEY (REF)  
↓ KEY (NEXT, 3 TIMES)  
↵ KEY (SEND)



Select the desired **REF Nr.** in the sub-menu, then return to the measuring mode.

- Measure the sample.

START KEY

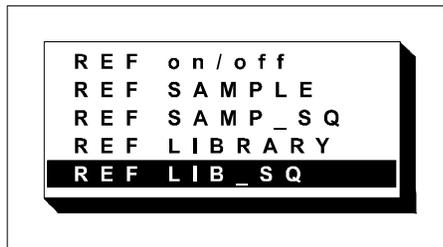
The display indicates the SAMPLE values and the  $\Delta$ -value as well the LIBRARY number of the reference.

## 7.5 Measuring with several references from the LIBRARY (REF LIB\_SQ)

It is possible to use 1 to 10 references for one **Sequence (SQ)** from the **LIBRARY**. You can use the selected sequence as often as desired.

Select the **REF LIB\_SQ** mode in the reference menu and select the sequence in the submenu. It is possible to attribute a definite reference from the **LIBRARY** to any sequence number. Return to the measuring mode.

↑ KEY (REF)  
↓ KEY (NEXT)  
↵ KEY (SEND)  
☐ KEY



- Measure the samples in the order of the sequence.

START KEY

The display indicates the **SAMPLE** values and the  $\Delta$ -values. The sequence number of the last measured reference, the sequence number of the next reference as well as the **LIBRARY** number of the reference are indicated. The sequence can be used as often as needed.

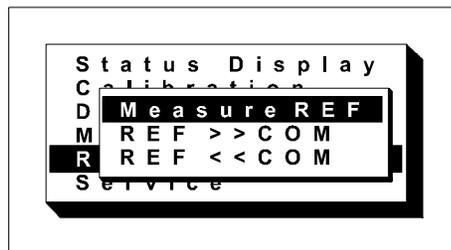
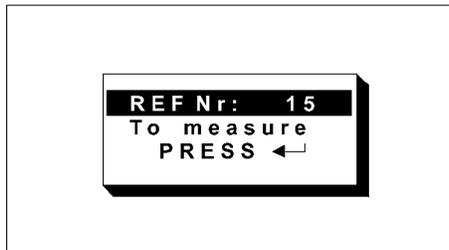
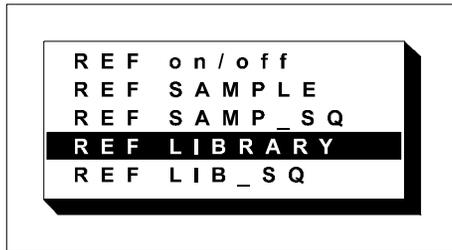
## 8. Working with the REF LIBRARY

---

### 8.1 Entering references

You can enter up to 500 references in the **REF LIBRARY** mode of the main menu.

- ⇨ KEY
- ⇩ KEY (NEXT)
- ⇩ KEY (SEND)



The measured references are numbered chronologically. The  $\uparrow$  KEY (REF) and  $\downarrow$  KEY (NEXT) allow you to select precise reference numbers. This enables you to enter the references in an organized manner.

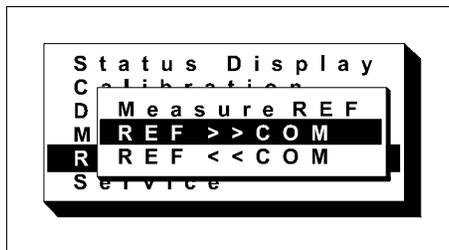
## 8.2 Transmission of data reference to DCI Datacolor Tools software

The reference data memorized in the MF45 **cannot** be transmitted to Datacolor Tools. The unit must be tethered to Datacolor Tools, to save the measurements into the Datacolor Tools database.

Before transmitting, it is necessary to adopt the data format corresponding to the software in the main menu (**binary format, DCI or XYZ**).

Adjustments and transmission are made with the following keys. Data transfer is made in the **REF >> COM** mode.

- $\boxtimes$  KEY
- $\downarrow$  KEY (NEXT)
- $\lrcorner$  KEY (SEND)
- $\uparrow$  KEY (REF)



## 9. Reset switch

---

Functional failure of the micro-processor due to outer electromagnetic fields will seldom occur. Should this happen, however, unreadable signs will appear in the display.

You can immediately correct the failure with the reset switch. This switch is located in a hole on the bottom plate and must be pushed with a pointed tool or pencil.

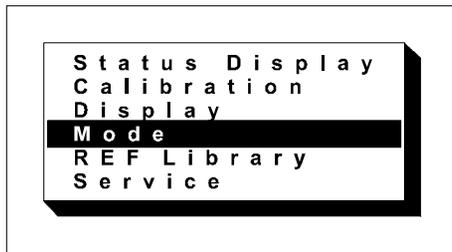
Stored values are not deleted by this reset procedure.

## 10. Data formats

---

The Microflash 45 has three different data formats; **BINARY, DCI and XYZ**. The data format is selected in the **main menu** under **Mode**.

- ⇐ KEY
- ↓ KEY (NEXT)
- ↵ KEY (SEND)
- ↑ KEY (REF)



## 10. Data formats

---

This is the COM protocol setting to connect to  
Datacolor Tools software.

|                    |            |
|--------------------|------------|
| ILLUMINANT         | D65        |
| ANGLE              | 10°        |
| COM MODE           | MAN        |
| <b>COM PROTOC.</b> | <b>DCI</b> |
| LANGUAGE           | ENG        |

|                   |            |
|-------------------|------------|
| ILLUMINANT        | D65        |
| ANGLE             | 10°        |
| COM MODE          | MAN        |
| <b>COM PROTOC</b> | <b>BIN</b> |
|                   | DCI        |
|                   | XYZ        |
| LANGUAGE          | ENG        |

The selected data format is indicated in the main menu under Status display.

The data formats have the following structure.

### **BINARY (BIN)**

All data is transferred in binary format (4800 BAUD, 8 data bits, no parity, 1 stop bit). The length of one data set is 12 bytes + number of measured values x 2 bytes (depends on the selected display mode).

**In case of transmission of an INTEGER, the first byte transmitted is the MSB. The following byte is the LSB.**

**One data set consists of:**

| <b>Byte No.</b> | <b>Contents</b>                 | <b>Value</b> (range of values) |
|-----------------|---------------------------------|--------------------------------|
| 1               | Start byte                      | 0xAA                           |
| 2               | # of transmitted bytes (nbYTES) | 0x0C bis 0xFF                  |
| 3+4             | ID of the device                | 0x2009 bis 0x2011              |
| 5+6             | software version                | 0x0000 bis 0xFFFF              |
| 7               | illuminant/observer             | 0x00 bis 0xFF                  |
| 8               | # of measured values            | 0x01 bis 0xFF                  |
| 9               | measurement mode                | 0x00 bis 0xFF                  |
| 10              | no function                     | 0x00 bis 0xFF                  |
| 11+12           | measured value 1                | 0x0000 bis 0xFFFF              |
| 13+14           | measured value 2                | 0x0000 bis 0xFFFF              |
| (n-1)+ n        | Checksum of all bytes           | 0x0000 bis 0xFFFF              |

**START BYTE:**

0xAA

**NUMBER OF TRANSMITTED BYTES:**

Defines how many bytes including the start byte and CHECKSUM are transmitted (between 16 and 94 bytes).

**ID OF THE DEVICE:**

Contains the serial number and the version:

8201: SP 820 Standard

**SOFTWARE VERSION:**

Contains the software version e.g. 100 for version no. 1.00.

**ILLUMINANT / OBSERVER:**

Displays the selected illuminant/observer combination

|           |      |
|-----------|------|
| D65 2° :  | 0X00 |
| D65 10° : | 0X01 |
| D50 2° :  | 0X02 |
| D50 10° : | 0X03 |
| C 2° :    | 0X04 |
| C 10° :   | 0X05 |
| A 2° :    | 0X06 |
| A 10° :   | 0X07 |

**NUMBER OF MEASURED VALUES:**

Contains the number of transmitted values:

|            |   |
|------------|---|
| XYZ:       | 3 values (X, Y, Z) / 6 values (X, Y, Z, ΔX, ΔY, ΔZ)                     |
| Yxy:       | 3 values (Y, x, y) / 6 values (X, x, y, ΔY, Δx, Δy)                     |
| L*a*b*:    | 3 values (L*, a*, b*) / 7 values (L*, a*, b*, ΔL*, Δa*, Δb*, ΔE*ab)     |
| L*C*h* ab: | 3 values (L*, C*ab, h*ab) / 7 values (L*, C*, h*, ΔL*, ΔC*, Δh*, ΔE*ab) |
| L*u*v*:    | 3 values (L*, u*, v*) / 7 values (L*, u*, v*, ΔL*, Δu*, Δv*, ΔE*uv)     |

L\*C\*h\*uv: 3 values (L\*, C\*uv, h\*uv) / 7 values (L\*, C\*, h\*, ΔL\*, ΔC\*, Δh\*, ΔE\*uv)

Graph: 41 values ( R[380nm] ..... R[780nm] )

Remission: 41 values ( R[380nm] .. R[780nm] ) / 92 values (ΔR[380nm]...ΔR[780nm])

WB/GB: 3 values (WB, WCIE, GB) / 6 values (WB, WCIE, GB, ΔWB, ΔWCIE, ΔGB)

METAMERIE3 values ( M(D65,A), M(D50,A), M(C,A) )

## MEASUREMENT MODE:

Contains the information on the selected measurement mode.

|            |      |
|------------|------|
| XYZ:       | 0x01 |
| Yxy:       | 0x02 |
| L*a*b*:    | 0x03 |
| L*C*h* ab: | 0x04 |
| L*u*v*:    | 0x05 |
| L*C*h* uv: | 0x06 |
| Graph:     | 0x07 |
| Remission: | 0x08 |
| WB/GB:     | 0x09 |
| METAMERIE  | 0x0A |

## NO FUNCTION:

Empty space for future versions.

## MEASURED VALUES:

The measured values are transmitted as a SIGNED INTEGER of 2 bytes (the 15<sup>th</sup> byte is the sign bit).

Floating point numbers are transmitted by multiplication of the origin number by 100.

100, 1000 bzw. 10000.

XYZ: \* 100

xyY: Y \* 100, x \* 1000, y \* 1000,  $\Delta Y$  \* 100,  $\Delta x$  \* 1000,  $\Delta y$  \* 1000

L\*a\*b\*: \* 100

L\*C\*h\* ab: \* 100

L\*u\*v\*: \* 100

L\*C\*h\* uv: \* 100

Graph: \* 10000

Remission: \* 10000

WB/GB: \* 100

METAMERIE: \* 100

E.g. a X value of 89.53 is transmitted as an INTEGER number 8953.

Or a remission value of 0.7492 is transmitted as an INTEGER number 7492.

## CHECKSUM:

The checksum is the addition of all transmitted bytes (excluding the checksum bytes).

$$\text{BYTE1} + \text{BYTE2} + \text{BYTE3} \dots \dots \text{BYTEn-1} + \text{BYTEn} \\ = \text{CHECKSUM}$$

## XYZ Data format

All data is transferred in binary format (4800 BAUD, 8 bits, no parity, 1 stop bit). The length of one data set is 18 bytes.

In case of transmission of an INTEGER, the first byte transmitted is the MBS. The following byte is the LSB.

### One data set consists of:

| Byte No: | Contents                        | Value (range of value) |
|----------|---------------------------------|------------------------|
| 1        | Start byte                      | 0xAA                   |
| 2        | # of transmitted bytes (nBYTES) | 0x0C bis 0xFF          |
| 3+4      | ID of the device                | 0x2009 bis 0x2011      |
| 5+6      | Software version                | 0x0000 bis 0xFFFF      |
| 7        | Illuminant/observer             | 0x00 bis 0xFF          |
| 8        | # of measured values            | 0x01 bis 0xFF          |
| 9+10     | No function                     | 0x00 bis 0xFF          |
| 11+12    | X-value                         | 0x0000 bis 0xFFFF      |
| 13+14    | Y-value                         | 0x0000 bis 0xFFFF      |
| 15+16    | Z-value                         | 0x0000 bis 0xFFFF      |
| 17+18    | Checksum of all bytes           | 0x0000 bis 0xFFFF      |

**START BYTE:**

0xAA

**NUMBER OF TRANSMITTED BYTES:**

Defines how many bytes including the Start byte and CHECKSUM are transmitted (always 18 bytes).

**ID OF DEVICE:**

Contains the serial number and the version:

8201: SP 820 standard

**SOFTWARE VERSION:**

Contains the version number of the software e.g. 100 for version no. 1.00.

**ILLUMINANT/OBSERVER**

Contains the information of the selected measuring mode.

D65 2° : 0X00

D65 10° : 0X01

D50 2° : 0X02

D50 10° : 0X03

C 2° : 0X04

C 10° : 0X05

A 2° : 0X06

A 10° : 0X07

**NUMBER OF MEASURED VALUES:**

Contains the number of transmitted values (always 3).

**NO FUNCTION:**

Empty space for future versions.

**MEASURED VALUES:**

The measured values are transmitted as a SIGNED INTEGER of 2 bytes (the 15<sup>th</sup> bit is the sign bit).

Floating point numbers are transmitted by multiplication of the origin by 100.

XYZ \* 100

E.g. a X-value of 89.53 is transmitted as an INTEGER number 8953.

**CHECKSUM:**

The checksum is the addition of all transmitted bytes (excluding the checksum bytes).

BYTE1 + BYTE2 + BYTE3 .....BYTE<sub>n-1</sub> + BYTE<sub>n</sub>  
= CHECKSUM

**Data transmission (for automatic measurements, triggered by the PC)**

The MF45 can receive commands from a computer through the bi-directional interface, allowing automizing of the measuring procedure.

Data is transmitted in binary form (4800 BAUD, 8 Data bit, no parity bit, 1 Stop bit).

**The following data is expected:**

| Byte No.: | Content | Value for e.g. |
|-----------|---------|----------------|
|-----------|---------|----------------|

|   |              |               |
|---|--------------|---------------|
| 1 | Start byte 1 | 0xAA          |
| 2 | Start byte 2 | 0x55          |
| 3 | Command      | 0x00 bis 0xFF |
| 4 | Stop byte    | 0xAA          |

### **COMMAND:**

The command is transmitted as an UNSIGNED CHAR with a length of 1 byte:

|       |                |
|-------|----------------|
| 0x01: | Measurement    |
| 0x10: | Illuminant A   |
| 0x11: | Illuminant C   |
| 0x12: | Illuminant D50 |
| 0x13: | Illuminant D65 |
| 0x14  | Observer 2°    |
| 0x15  | Observer 10°   |

The maximum allowable time between byte 1 and byte 4 is 80 ms (Timeout!)

## 11. Software

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### 11.1 Datacolor Tools and the Microflash 45

Refer to your software manual for information.

### 11.2 Datacolor Match and the Microflash 45

Refer to your software manual for information.

## 12. Care and maintenance

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The Microflash 45 is robust and sturdily built with no moving part, ideal for use in extreme conditions. Nevertheless, the instrument should receive the best possible care. Avoid unnecessary bumps, large differences in temperature, dust and dampness. Avoid letting the battery completely run down.

The measuring head of the MF45 is dustproof. However, take care that no dust or powder remains in the measuring tube. For cleaning use only an aerosol.

If necessary, clean the housing and the display glass with a glass cleanser.

Chemical reactions can cause a thin corrosive film on the surface of the contacts of the instrument and its charger. These contacts should be treated from time to time with a contact cleanser.

If necessary, clean the white standard with a very soft cloth and glass cleanser.

We recommended that you send in the MF45 every 18 months for a check.