SFAM

Spectral Fiber Attenuation Meter

Operating Manual - Version V 1.0, Date: 01.12.2008
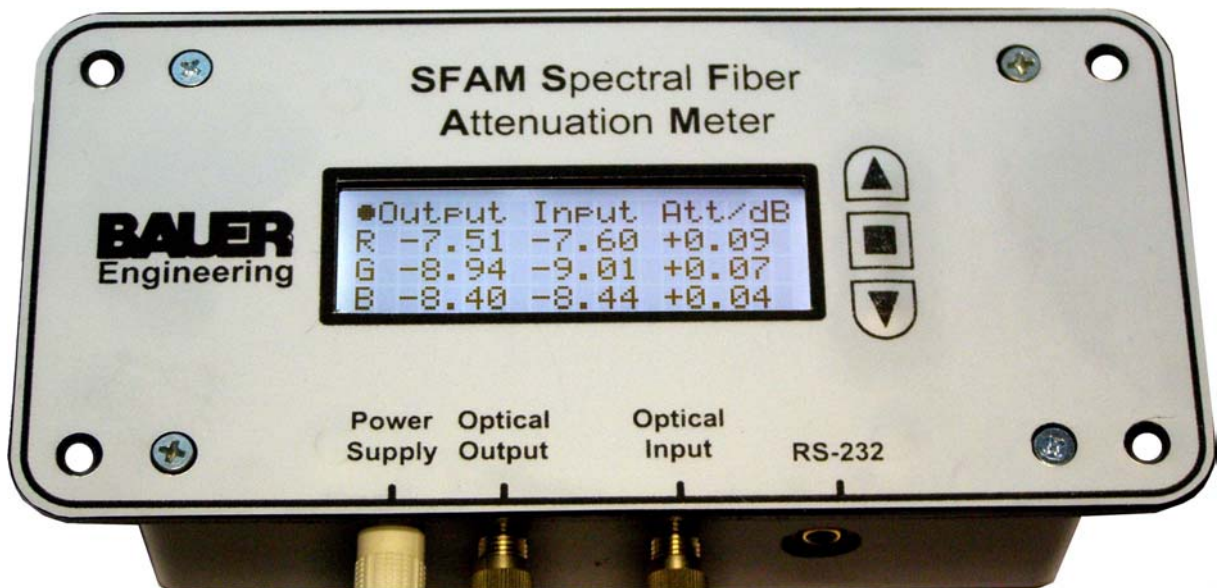
Figure 1: Spectral Fiber Attenuation Meter

Contents

0. Declaration of Conformity

The manufacturer,

BAUER Engineering GmbH

Clermont-Ferrand-Allee 36

**93049 Regensburg, Germany**

declares, that the device, as described in the operating manual, conforms with European standards as follows:

EMC: EN55022 (1991), Group 1, Class B

EN50082-1 (1992) / IEC 801-4

The product herewith complies with the requirements of EMC Directive 89/336/EEC and CE markings have been affixed on the devices accordingly.

Date: 11.12.2008   Autograph:

BAUER · ENGINEERING GMBH
Clermont-Ferrand-Allee 36, 93049 Regensburg
Tel. 09 41/2 96 38-0, Fax 09 41/2 96 38-90
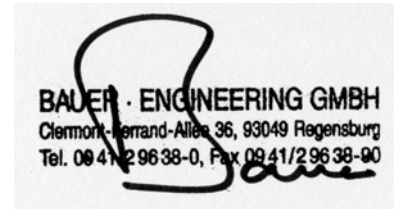
1. Safety

> **Attention!**
>
> All statements regarding safety of the operation and the technical data in this instruction manual will only apply when the unit is operated correctly.

2. Warranty

BAUER Engineering GmbH warrants material and production of the device for a period of 6 months starting with the date of shipment. During this warranty period **BAUER** Engineering will see to defaults by repair or by exchange if these are entitled to warranty.

The device must be sent back to **BAUER** Engineering for warranty repairs or service. The consumer will carry the shipping cost to **BAUER** Engineering, in case of warranty repairs **BAUER** Engineering will carry the shipping costs back to the customer.

If no warranty repair is applicable, the customer also has to carry the costs for back shipment.

In case of shipment from outside EU duties, taxes etc. which should arise have to be carried by the customer.

BAUER Engineering warrants the hard- and software determined by **BAUER** Engineering for this unit to operate fault-free provided that they are handled according to our requirements. However, **BAUER** Engineering does not warrant a faulty free and uninterrupted operation of the unit, to soft- or firmware for special applications nor this operation manual to be error free.

BAUER Engineering is not liable for consequential damages.

2.1 Restriction of warranty

The afore mentioned warranty does not cover errors and defects being the result of improper treatment, software or interface not supplied by us, modifications stated by us or unauthorised maintenance.

Further claims will not be consented to and will not be acknowledged. **BAUER** Engineering does explicitly not warrant the usability or the economical use for certain cases of application**.**

BAUER Engineering reserves the right to change this operating manual or the technical data of the described unit at any time.

3. Introduction

This manual is provided as a help in operating the Spectral Fiber Attenuation Meter device (SFAM). SFAM is a stand-alone instrument that makes it possible to measure the attenuation of a fiber by three light wavelengths.

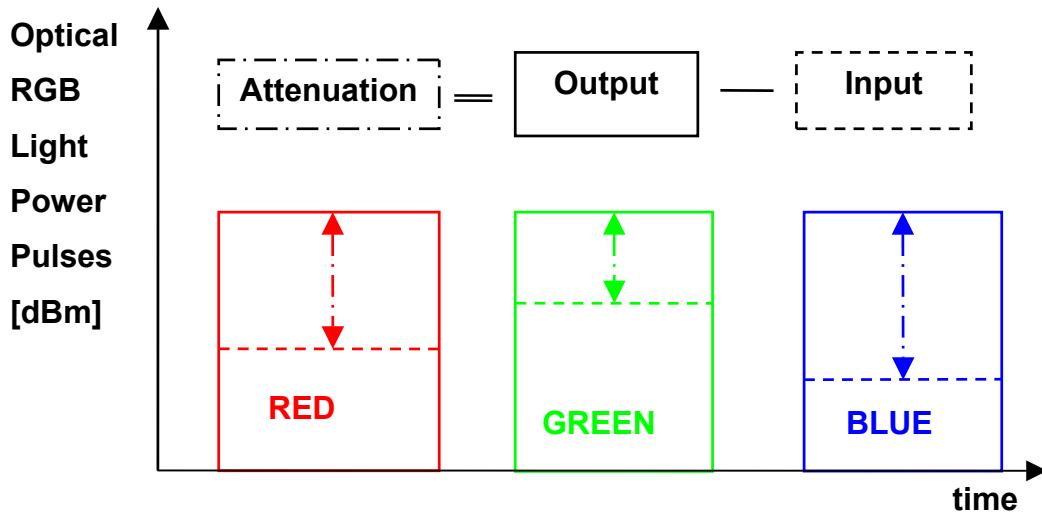The device could be controlled local with help of the keyboard or remote per RS232 interface.

Figure 2: Principle of the attenuation measure

4. Function diagram

The SFAM is composed of a RGB LED source, optical coupler, optical fiber power meter (FPM), optical power meter (PM), A/D converter and a microcontroller.
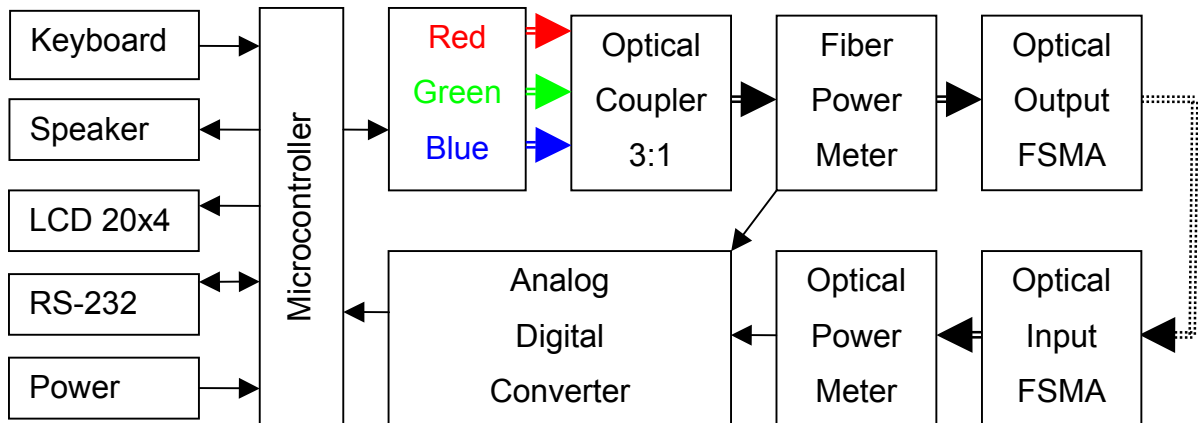
Figure 3: Functional diagram

LEDs are pulsed sequential. The optical coupler couple the light of all LEDs together in one fiber. The FPM monitor the output light power. The input light is connected to the optical PM. The input and output light power is digitalized with the Analog Digital Converter. The difference between output and input light is the attenuation.

Attenuation [dB] = output light power [dBm] – input light power [dBm]   (Eq. 1)

5. Attenuation referencing

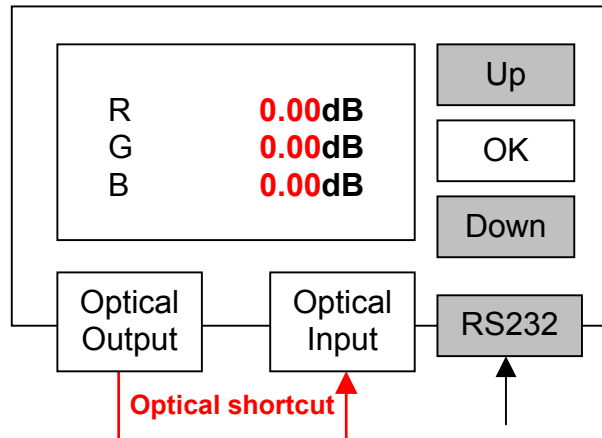The attenuation referencing is attenuation zeroing.

Figure 4: The referencing

Before the referencing must be the optical output connected to the optical input (= optical shortcut).

The referencing could be started:

- Local with pressing of <UP> and <DOWN> keys together,
- Local with entering the referencing item in main menu,
- Remote with referencing command.

6. Local control

After power on, the firmware information is displayed, comes the main window. On the LCD are displayed measured and calculated values.

```
. Output Input Att(dB)
R -10.00 -21.00 +11.00
G -10.00 -20.00 +10.00
B -10.00 LOW   OOR
```

Figure 5: Main window

If the measured input light power is lower as the minimum of the input:

- the input is replaced with the LOW string and
- the attenuation is replaced with out of range string OOR.

The configuration could be done remote per RS232 interface or local in the menu. Press OK key to enter to the menu.

```
►▲Menu window
  Firmware..
  Referencing
  RS-232..
```

Figure 6: Menu window

The local control is possible with three keys UP, OK and DOWN.

The functions of UP/DOWN are:

- move in the menu (item selection),
- value change, longer UP/DOWN press starts automatic in/decrement,
- UP and DOWN together starts the referencing.

The functions of OK key are:

- enter to the menu from the main window,
- selection confirmation.

The functions of the speaker are:

- key press confirmation, if it is configured,
- error advise.

6.1 Menu flow diagram

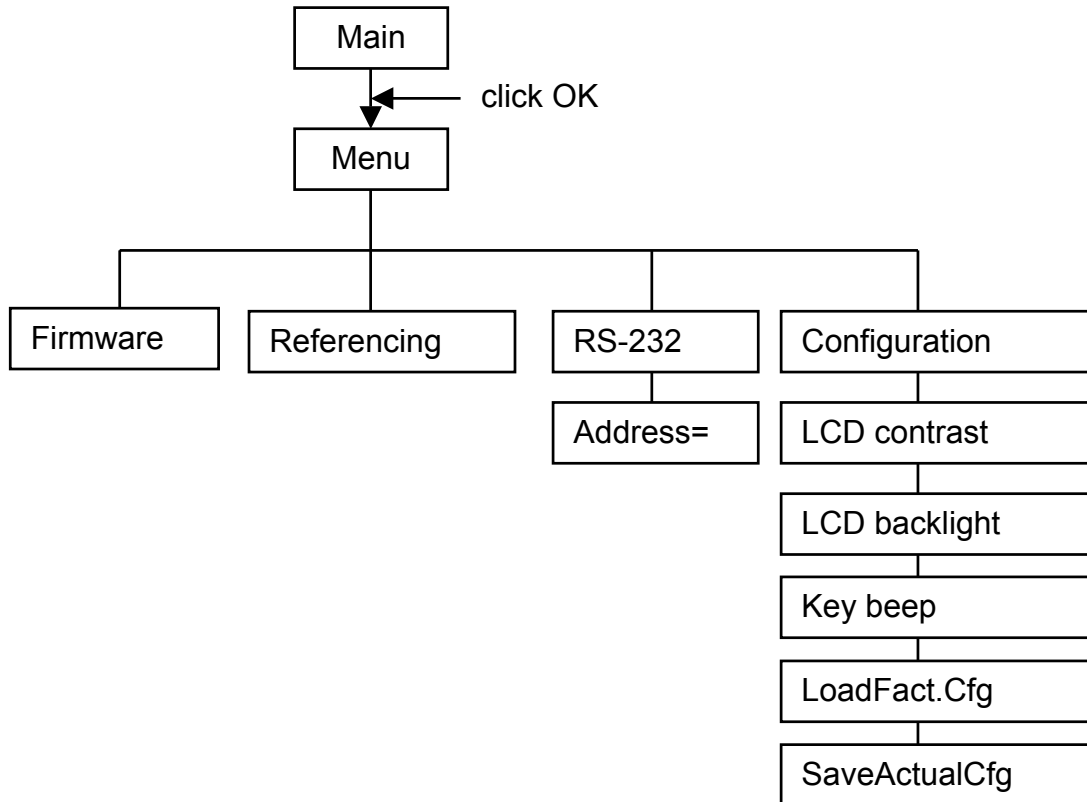For better menu orientation see flow diagram below.

Figure 7: Flow diagram of the menu

6.2 Errors

The microcontroller operating software checks the system and if something is out of order, the error code is displayed.
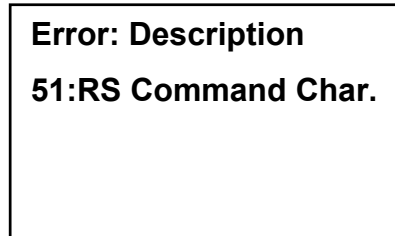
<div style="border:1px solid">

Error: Description

51:RS Command Char.

</div>

Figure 8: Error window

OK key clears one error from the error list. If there is no error the main window is returned.

Part symbols:

LCD =   Liquid Crystal Display

SYS =   Operation System

RS232 =   Recommended Standard 232

Error	Part	Error description
50	RS232	Port number out of range
51	RS232	Command character out of range
52	RS232	Operation character out of range
53	RS232	Command parameter 1 out of range
54	RS232	Command parameter 2 out of range
55	RS232	Data out of range
56	RS232	Buffer overflow
60	SYS	Data out of range
61	SYS	Operation mode out of range
62	SYS	Menu buffer overflow out
63	SYS	LCD Time Out

6.3 Service menu

Hardware adjustment is done in the service menu. This is only for service and adjustment purposes. **Change of this setting could lead to fault function of the device. Please do not change the setting!** This chapter inform about the possibilities of the device.

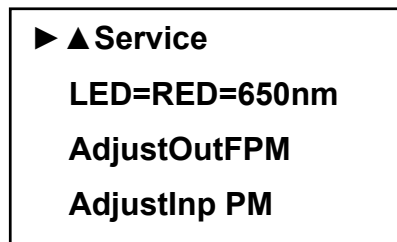The service menu is entered if the OK key is pressed longer as 5 seconds.

```
► ▲ Service
   LED=RED=650nm
   AdjustOutFPM
   AdjustInp PM
```

Figure 9: Service menu window

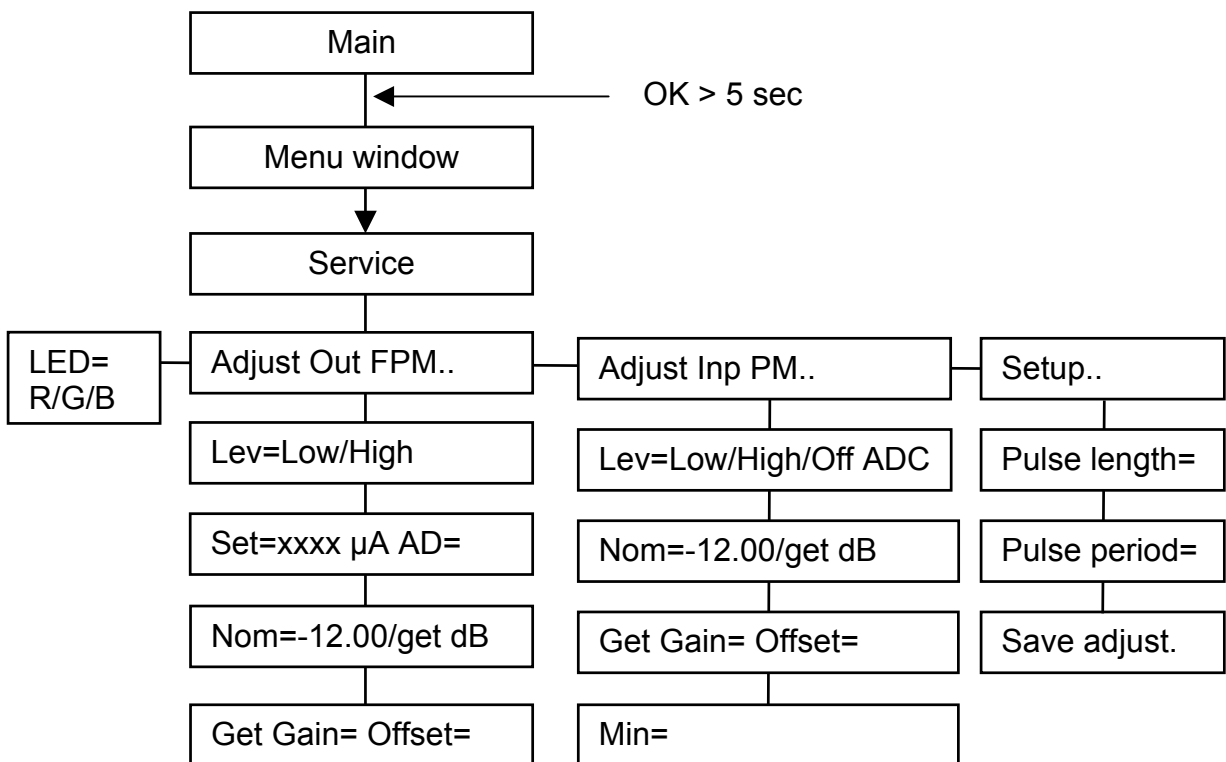For the better menu orientation see the diagram below.

Figure 10: Service menu diagram

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7. Remote control

7.1 Chain concept

The standard RS232 connection allows to connect only one device to the personal computer (PC) COM port. The next device need an additional COM port.

The chain concept makes it possible to connect more devices to a single COM port of the PC.
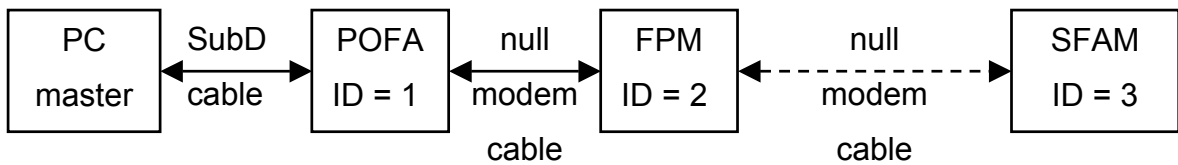
Figure 11: RS232 chain concept

Each device has its own identification address (ID) and mostly two separated COM ports. All messages have recipient and transmitter addresses. The SFAM ID Address is adjustable in the RS232 menu. The two COM ports function as a repeater if the message has a different recipient ID. Connection between the PC and the first device is realised with a SubD cable (Fig.6) and between devices with a null modem cable.
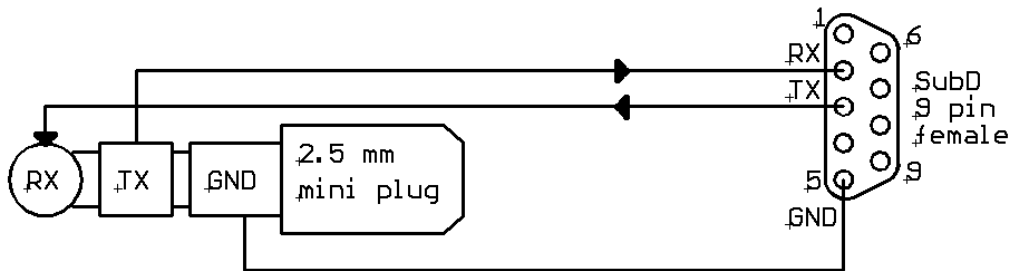
Figure 12: SubD Cable
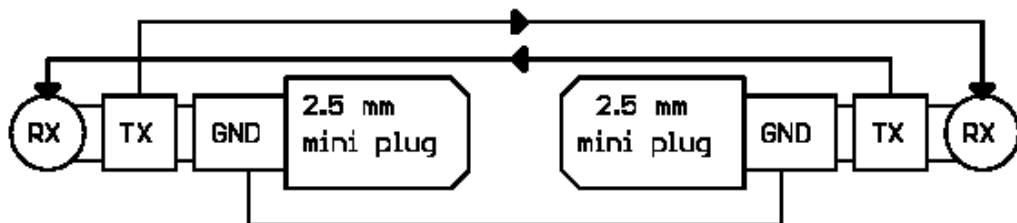
Figure 13: Null modem cable

7.2 RS232 settings

Baud rate: 9600

Stop bit: 1

Data bits: 8

Parity: no

Handshake: no

Cable: 1:1

For the communication the hyperterminal program could be used, which is integrated in the Windows operation system. See the correct port setting on figure 14 and the ASCII settings on figure 15.
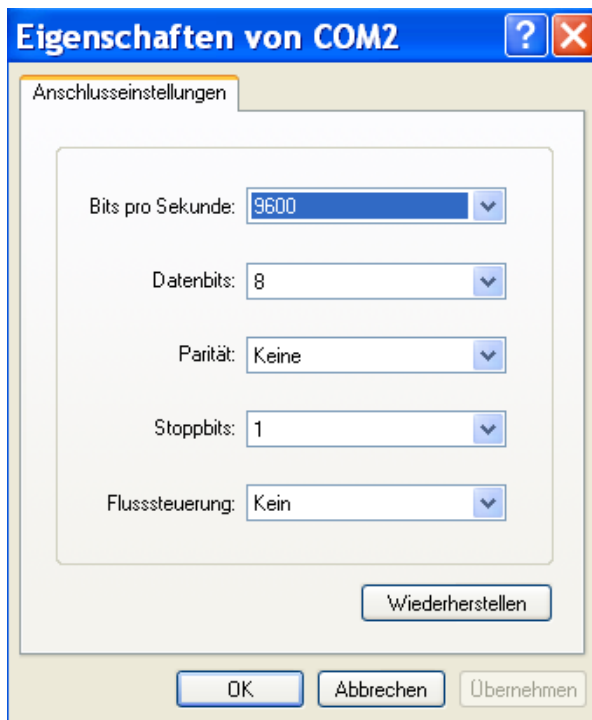

Figure 14: Port configuration
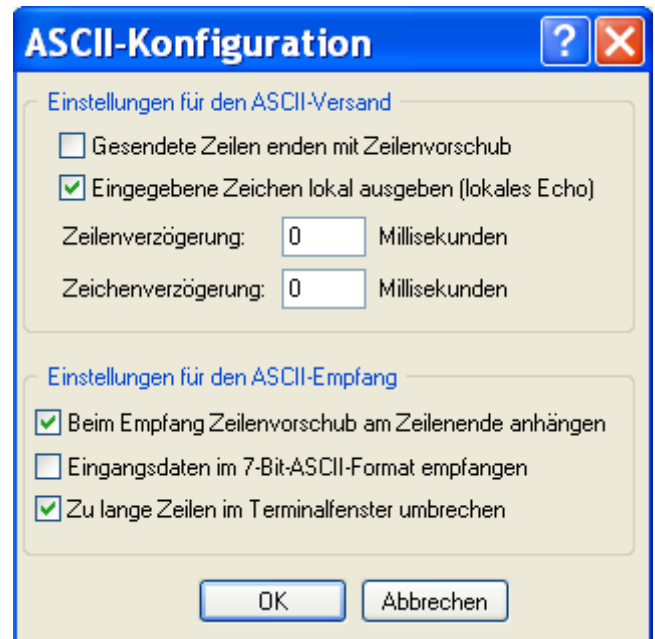
Figure 15: ASCII configuration

7.3 Command structure

Receiver char	Transmitter ID char	Command char	Parameter char	Operator char	Data string	Unit string	End Of Message
'3'	'p'	'r'	'a'	':', '?', '='	'10.5'	'dB'	CR

Receiver ID char = '3': this char indicates the message for SFAM

Transmitter ID char = 'P': This char indicates the addressee of the message.

(for example 'P' = Personal computer**)**

Command char: The command char identifies the command type.

Operator: The operator indicates whether the selected value

- has to be written (':', followed by data),

- has to be read ('?', without data) or

- is an answer to a read command ('=', with data).

Data: This field is filled with a data string formatted according to the command type.

End of message: EOM = CR Carriage Return (=13 dec = 0D hex).

7.4 Command summary

Command	Cmd Char	Parameter Char	Oper. Char	Data (Range)	Units string
Red Green Blue	'r' 'g' 'b'	'a' = attenuation 'i' = input power 'o' = output power	'?', '='	xx.xxdB or OOR xx.xxdBm or LOW xx.xxdBm	dB dBm
Configuration	'c'	'b' = LCD backlight 'c' = contrast 'p' = peep enable 'l'$_1$ = load factory config. 'r' = referencing 's' = save configuration	'?', '=', ':' none	<0;100> 0 = off, 1 = on	%
Serial Num.	'n'	none	'?', '='	<POF08200xx>	
Identify	'IDN'	none	'?','='	Firmware string	
HW Reset$_2$	'RST'	none	none	none	

Remarks

1. 'l' is small letter for 'L'.
2. The device is reset after approx. 1 second.

For further explanations see also the next chapter with examples.

7.5 Examples of commands

The device address is set to 3.

Attenuation

Get attenuation for the red light.

Get syntax	3Pra?<EOM>
Response	P3ra=3.12dB<EOM>

Get attenuation for the green light.

Get syntax	3Pga?<EOM>
Response	P3ga=OOR<EOM>

Get minimum light power for the green light.

Get syntax	3P1n?<EOM>
Response	P31n=-25.00dBm<EOM>

Configuration

Get the LCD background light configuration.

Set syntax	3Pcb?<EOM>
Response	P3cb=50%<EOM>

The LCD contrast get command is analogical.

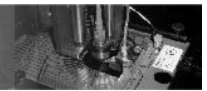Set the LCD background light to the 30%.

Set syntax	3Pcb:30%<EOM>
Response	No response

The LCD contrast set command is analogical.

Active the peep feature.

Set syntax	3Pcp:1<EOM>
Response	No response

Load factory configuration.

Set syntax	3Pcl<EOM>
Response	No response

Configuration save command is analogical.

Attenuation referencing.

Set syntax	3Pcr<EOM>
Response	No response

Serial Number

Get the serial number.

Set syntax	3Pn?<EOM>
Response	P3n=POF0x2xxxx<CR>

Identify

Device identify.

Set syntax	3PIDN?<EOM>
Response	P3IDN=SFAM..<EOM>

Reset

Hardware reset.

Set syntax	3PRST<EOM>
Response	No response

8. Trouble shooting

Trouble shooting	Problem	Solution
Device does not answer.	Configuration	Check the RS-232 configuration.
	Cable	1:1, female : male
Not described trouble shooting.		Please contact the manufacturer **BAUER Engineering.**

9. Specification

- Attenuation range: 0.00 ~ approx. 20.00 dB
- Resolution: 0.01 dB
- Accuracy: $\pm$0,2dB (=5% in Watt)
- Wavelength: Red = 650nm, G = 525 nm, B = 470nm
- Timing: period = 200ms, pulse = 190 ms

10. Technical data

- Connectors: Power supply: Low voltage 5,1 mm (core = +)

      Optical in/output: FSMA female

      RS232:   jack 2.5" stereo
- Power supply: 12 VDC / 200 mA
- ID address: '3' (default)
- RS232:   9600bps, 8 bit, 1 stop, no parity
- Operation temperature: 15 ~ 35 °C
- Dimension: Plastic, 153 x 74 x 38 mm
- Weight: 165 g

Specification are subject to change without notice.