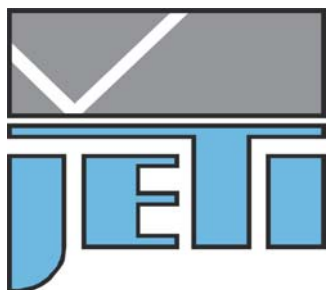


**Operating Instructions**

**Firmware Commands**

**VERSA PIC**

**Firmwareversion  $\geq$  2.12**



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## 1. General Remarks

Direct communication with *VersaPic* can be done with special commands via the USB interface. This interface is designed as a virtual COM port, so it can be handled similarly to a serial port with the settings 8n1/ no protocol. The allowed transfer rates are 38 400, 115 200 and 921 600 Bd. The default rate is 921 600 Bd.

The following list shows the available commands. They match the SCPI standard regulations, begin with \* (except ESC) and have the following key words:

*PARAMeter	Get and set general parameters
*CONFIGure	Get and set configuration data
*INITiate	Start a configured measurement
*FETCH	Get data from previous measurement
*READ	Start a configured measurement and get the data (combination of *INIT and *FETCH)
*MEASure	Configure, start the measurement and get the data (combination of *CONF, *INIT and *FETCH)
*CONTRol	Control peripheral components
*CALCulate	Calculate data from the previous measurement
*STATus	Information about error and configuration status
*HELP	Output of help information
*WRPARA	Write parameter field (1024 Byte)
*RDPARA	Read parameter field (1024 Byte)
*RDUSR2	Read 1k of 16k user data
*WRUSR2	Write 1k of 16k user data

These key words can be followed by one or two additional words, separated by colons, and by arguments.

It is only necessary to use the indicated capital letters, all other letters are optional.

Several commands can be extended by arguments. The meanings of the arguments are as follows:

tint	Integration time in ms, range from 1 ... 60 000 ms
av	Averaging of measurements (1 ... 10 000)

format	Output format
	0 no output
	1 L/H binary output without length and checksum
	2 ASCII output, space separated
	3 L/H binary output with length and checksum
	4 ASCII output, separated by <CR>
	5 H/L binary output without length and checksum
	6 H/L binary output with length and checksum
	7 Raw data with wavelength
function	Selection of output function
	0 None
	1 exposed spectrum (with shutter opened/lamp on)
	2 dark spectrum
	3 reference spectrum (difference of exposed spectrum and dark spectrum)
	4 transmission spectrum, unit: %
wbeg	Start of wavelength range, in nm (380 ... 779 nm)
wend	End of wavelength range, in nm (381 ... 780 nm)
wstp	Wavelength step (1 - 20 nm)
arg	Other arguments, described in text

If commands with get and set options are used with ?, the appropriate information is given. If an argument is used, this argument will be set.

**A space sign between command and argument is necessary (not in case of ?).**

If a command which accepts arguments is used without arguments, then the configured arguments will be used (exception: tint – see \*CONFigure:EXPOsure).

**If a command was successfully proceeded it will be answered by an Acknowledge sign (ACK, 06 hex), otherwise “Not acknowledged” (NAK, 15 hex) will be returned.**

**Several commands can be written successively in one line, they have to be separated by semicolons.**

An application note with a scene giving a general overview about the SCPI firmware commands can be downloaded from the JETI web site [www.jeti.com](http://www.jeti.com) (download section).

### Overview about instrument answers to the firmware commands

Command category	Answer
*PARA *CONF *CONTR	with setting of value and *PARA:SAVE: ACK (06 hex), if value is accepted NACK (15 hex), if value is not accepted with ? (data request): data sequence <CR>
*INIT	ACK (06 hex) immediately after command input BELL (07 hex) after finishing the measurement
*READ *MEAS	ACK (06 hex) immediately after command input <b>BELL (07 hex) after finishing the measurement</b> data sequence <CR> <CR> in case of spectral data output <CR> in case of single value output
ESC	BELL (07 hex)
*FETCH *CALC	data sequence <CR> <CR> in case of spectral data output <CR> in case of single value output
*STAT	Status information <CR>
*HELP	List with commands and description <CR>



## 2. General Commands

*RST<CR>	Software reset
*IDN? <CR>	Get device ID <u>Example of answer:</u> <i>JETI_PIC_VERSA</i>
*VERS? <CR>	Get firmware version <u>Example of answer:</u> <i>PIC_Versa256 VERSION 2.06 010309</i>
*RDPARA<CR>	Read parameter field (1024 Byte) The last 2 Bytes checksum over first 1022 Bytes
*WRPARA<CR>	Write parameter field (1024 Byte) The last 2 Bytes must be the checksum over the first 1022 Bytes
*RDUSR2 beg end <CR>	Read user data beg to end (1+(end-beg))*1024 Bytes + 2 Bytes checksum <b>conditions:</b> beg < 16 , beg <= end, end < 16
*WRUSR2 blk<CR>	Write user data block blk 1024 Bytes + 2 Bytes checksum <b>conditions:</b> blk < 16

### 3. Parameter Commands

These commands include the basic settings of an instrument. They are set in factory and normally the user has no reason to change them (except the settings for peak calculations).

**Keep in mind that changed parameters can cause errors in measurement.**

#### 3.1. General Settings

\*PARAMeter? <CR>

Get a help list of the parameter commands

Example of answer:

```
*RST<CR>      : softwarereset
*IDN?         : get device ID
*vers?        : get firmware version
*PARAMeter:CHANnel? : get channel
count
*PARAMeter:PIXel : get/set pixel
count
*PARAMeter:SENSor : get/set sensor
type
*PARAMeter:SDElay : get/set scan
delay
*PARAMeter:CONFig : get/set config
word (32 bit,set with password)
*PARAMeter:ADCType : get/set adc
parameters
*PARAMeter:ADCResolution : get/set
bit size of ADC
etc.
```

\*PARAMeter:SPNUMber? <CR>

Get spectrometer number

Example of answer:

```
spectrometer number: 2005184
```

\*PARAMeter:SERNumber? <CR>

Get serial number (internal number)

Example of answer:

```
serial number:      1012
```

\*PARAMeter:PIXel? <CR>

Get pixel quantity

Example of answer:

```
pixel:      256
```

\*PARAMeter:SENSor? <CR> Get sensor type

Example of answer:

Sensor: 59

\*PARAMeter:ADCResolution arg <CR>

Get/ Set ADC resolution

14 bit: 14

15 bit: 15

16 bit: 16 (not allowed for radiometric measurements)

Example of answer:

ADCResolution: 14

\*PARAMeter:ADCVoltage arg <CR>

Get/ Set input voltage range of ADC

(1 = 2V, 0 = 4V)

Example of answer:

ADC input range: 1

\*PARAMeter:ADPWdown? <CR>

Get power down active (on = 1, off = 0),  
will be deactivated automatically with  
the next command

Example of answer:

power down ADC: 1

\*PARAMeter:BAUD arg <CR> Get/ Set baudrate

38 400 Bd: 384

115 200 Bd: 115

921 000 Bd: 921 (default value)

Example of answer:

Baud: 384

### 3.2. Time Settings

\*PARAMeter:TINT tint <CR> Get/ Set default integration time  
(from 1 ... 65 000 ms),  
preset value: 100 ms

Example of answer:

Tint: 100

\*PARAMeter:SDElay arg <CR> Get/ Set scan delay (time difference  
between initiating a measurement and  
its real start, in ms)

Example of answer:

ScanDelay: 400

\*PARAMeter:BORDER arg arg <CR>

Get/ Set low and high border for the  
adaption of integration time  
(percent of fullscale)

Example of answer:

*border: 70 98*

\*PARAMeter:FASTscan arg <CR>

Get/ Set time to next fast cycle (in ms)

Example of answer:

*Fastscan: 50*

\*PARAMeter:FLASHlight arg arg <CR>

Get/ Set parameters (flash interval in ms  
and length in  $\mu$ s) for control of an  
external flash lamp  
(pinout of connector see next chapter)  
number of flashes = tint/ flash interval

Example of answer:

*FlashPara: 20 20*

### 3.3. Settings for Peripheral Units

\*PARAMeter:LAMPEnable arg <CR>

Get/ Set external lamp or shutter active  
(enable = 1, disable = 0), only if lamp or  
shutter are enabled, they can be used

Example for answer:

*Lamp enable: 1*

\*PARAMeter:LAMPPolarity arg <CR>

Get/ set external lamp or shutter polarity  
(low = 0, high = 1)

Example of answer:

*Lamp low: 1*

\*PARAMeter:TRIGger arg <CR>

Get/ Set trigger mode (enable = 1, disable = 0), start of a configured measurement with hardware trigger (shortcut with switch or TTL signal), similar to the command \*INITiate, last output: 07 (measurement finished, data are ready)

Example of answer:

*Trigger: 0*

\*PARAMeter:TRSLope arg <CR>

Get/ Set trigger slope (triggering with switch closing/ falling TTL signal = 1, with switch opening/ rising TTL signal = 0)

Example of answer:

*Trigger slope: 0*

\*PARAMeter:SHUTter? <CR>

Get shutter availability (available = 1 (dark measurement with shutter possible), not available = 0 (only dark compensation possible))

Example of answer:

*Shutter: 1*

### 3.4. Settings for Measurement

\*PARAMeter:OFFSet arg <CR> Get/ Set offset value (-250 ... 250 mV)

Example of answer:

Offset Channel 1: 50

\*PARAMeter:GAIN arg <CR> Get/ Set gain value (1.0 ... 5.0)

Example of answer:

Gain Channel 1: 1.0

\*PARAMeter:FITn arg <CR> Get/ Set wavelength fit parameters

$\lambda(p) = \text{fit0} + \text{fit1} \cdot p + \text{fit2} \cdot p^2 + \text{fit3} \cdot p^3 + \text{fit4} \cdot p^4$

p = pixel number

n= 0 ... 4

Example of answer for fit0:

Fit0 Channel 1: 2.729578e+02

\*PARAMeter:BASIC? <CR> Get configured basic parameters

Example of answer:

COMMAND: A(ask)

PIC\_Versa256 VERSION 2.06 010309

S/N 1010

CHANNELS : 1

PIXEL PER LINE : 256

LAMP PREHEAT TIME[ms] : 400

INTEGRATION TIME[ms] : 100

CHANNEL 0 FITx^0 : 3.200000E+02

CHANNEL 0 FITx^1 : 3.800000E+00

CHANNEL 0 FITx^2 : 0.000000E+00

CHANNEL 0 FITx^3 : 0.000000E+00

CHANNEL 0 FITx^4 : 0.000000E+00

\*PARAMeter:EXTENDED? <CR>

Get configured extended parameters

Example of answer:

fastscan time: 50 ms

Image sensor:TSL1401

gain value : 5.00

offset value : 50 mV

low gain HAMS8378

lamp enable

lamp low activ

flash intervall : 20 ms

flash length : 20 us

\*PARAMeter:ALLPARAMeter? <CR>

Get a list of all parameters

Example of answer:

Firmware: PIC\_Versa256 VERSION 2.04 260209

Spectrometer number: 000012

Serial number: 1010

Channel count: 1

Pixel count: 256

Image sensor nr.: 4

PDA gain (1-low, 0-high): 1

Frame mode ELIS (1-on, 0-off): 0

ADC type (0-AD9826, 1-HT82V26, 2-HT82V36):

0

ADC resolution: 16

ADC range (1-2V, 0-4V): 1

ADC Power down (1-on, 0-off): 0

Baudrate : 115

...

...

Wave min [nm]: 300 (calc. from  
fit polynom)Wave max [nm]: 843 (calc. from  
fit polynom)

Fault pixel: 116

**\*PARAMeter:BOXCAr <CR>**Get/ Set boxcar mode (running average  
of pixels, odd number (1 ... 25), 1 – no  
boxcar integration)Example of answer:

Boxcar count : 7

**\*PARAMeter:EXPOSure <CR>** Get/set predefined exposure mode  
(handling of integration time tint)

0 – uses previous tint (default value)

1 – always adaption of tint

2 – uses configured tint (see \*CONF:TINT)

Example of answer:

Predefined exposure mode: 0

**\*PARAMeter:ADAPtion <CR>** Get/ set predefined adaption mode  
(adaption of tint in case of over/ under  
exposure or no adaption)

0 – no adaption if under or overexposure

1 – new adaption only if overexposure

2 – new adaption if under or overexposure

Example of answer:

Predefined adaption mode: 1

\*PARAMeter:FORMat <CR> Get/ set predefined output format (see the list of arguments in chapt. 1)

Example of answer:

*Predefined format: 4*

\*PARAMeter:FUNCTion <CR> Get/ set predefined measurement function (see the list of arguments in chapt. 1)

Example of answer:

*Predefined function: 1*

### 3.5. Settings for Faultpixel

These commands can be used for settings of faulty pixel in a sensor array.

\*PARAMeter:FAULTPIxel arg1 arg2 .... arg 8 <CR>  
Set faulty pixel

\*PARAMeter:FAULTPIxel?<CR>

Get the defined fault pixel

Example of answer:

*Fault pixel: 153 179*

### 3.6. Permanent Storage of Parameters

After any change of parameters this change has to be saved to make it permanent.

\*PARAMeter:SAVE <CR> Write parameters on flash ROM

Example of answer:

*ACK (06 hex)*



## 4. Control Commands

These commands are used to control the peripheral elements lamp/shutter, laser and hall sensors.

\*CONTRol? Get a help list of the control commands

\*CONTRol:AUX1 arg <CR> Get/ Set auxiliary output 1

Example of answer:

Aux1: 0

\*CONTRol:AUX2 arg <CR> Get/ Set auxiliary output 2

Example of answer:

Aux2: 0

\*CONTRol:LAMP arg <CR> Get/ Set lamp/ shutter status (1 – lamp on, shutter opened, 0 – lamp off, shutter closed)

Example of answer:

lamp: 1

## 5. Configuration Commands

The configuration commands can be used to change the default status of several arguments temporarily. These arguments and their default values are as follows:

tint	set with *PARAMeter:TINT
function	1 (measurement of exposed spectrum)
format	4 (ASCII output, separated by <CR>)
av	1 (no averaging)
exposure mode	0 (uses previous tint, see *CONFigure:EXPOsure)
wbeg	380 nm
wend	780 nm
wstp	5 nm

*CONFigure?	Get a help list of the configuration commands
*CONFigure:TINT tint <CR>	Get/ Set integration time (from 1 ... 60 000 ms) <u>Example of answer:</u> <i>Tint: 100</i>
*CONFigure:MINTINT?<CR>	Get the shortest possible integration time in ms <u>Example of answer:</u> <i>Shortest integration time: 1</i>
*CONFigure:EXPOsure arg <CR>	Get/ Set handling of integration time 0 – uses previous tint (default value) 1 – always adaption of tint 2 – uses configured tint (*CONF:TINT) <u>Example of answer:</u> <i>Exposure: 0</i>
*CONFigure:ADAPtion arg <CR>	Get/ set adaption mode (adaption of tint in case of over/ under exposure or no adaption) 0 – no adaption if under or overexposure 1 – new adaption only if overexposure 2 – new adaption if under or overexposure <u>Example of answer:</u>

*Adaption mode: 1*

\*CONFigure:AVERage av <CR> Get/ Set the number of measurement scans for average calculation (1 ... 10 000)

Example of answer:

*Average: 5*

\*CONFigure:FUNCTion function <CR>

Get/ Set measurement function

Example of answer:

*Previous function: 1*

*Configured function: 7*

\*CONFigure:FORMat format <CR>

Get/ Set output format

Example of answer:

*Previous format: 2*

*Configured format: 4*

\*CONFigure:WRANge wbeg wend wstp <CR>

Get/ Set wavelength range

Example of answer:

*Wave begin: 380*

*Wave end: 780*

*Wave step: 1.0*

\*CONFigure:WSTP wstp <CR> Get/ Set wavelength step width (1 –20 nm)

Example of answer:

*Wave step: 5.0*

\*CONFigure:ALL tint av format function <CR>

Get/ Set all measurement parameters (except wavelength range and step)

Example of answer:

*Configured tint: 100*

*Configured average: 1*

*Configured format: 4*

*Configured function: 1*

\*CONFigure:DEFault <CR> Set all measurement parameters to the saved default values (see factory setting list chapter 14)

## 6. Initiate and Abort Commands

*INITIate <CR>	Run a pre configured measurement (without data output)
ESC	Abort a running measurement

## 7. Read Command

\*READ format <CR>

Run a configured measurement and output of data

## 8. Fetch Commands

A \*FETCH command can only be used if the appropriate measurement was proceeded before.

- |                                 |   |
|---------------------------------|---|
| *FETCH?                         | Get a help list of the fetch commands                         |
| *FETCH format <CR>              | Output of previous measurement                                |
| *FETCH:LIGHT format <CR>        | Output of exposed spectrum values                             |
| *FETCH:DARK format <CR>         | Output of dark spectrum values                                |
| *FETCH:REFERENCE format <CR>    | Output of reference values<br><u>(under preparation !)</u>    |
| *FETCH:TRANSMISSION format <CR> | Output of transmission values<br><u>(under preparation !)</u> |

## 9. Measure Commands

The measure commands contain a measurement scan and the successive output of data.

**\*MEASure?**

Get a help list of the measure commands

**\*MEASure tint av format <CR>**

Run measurement with parameters and output of data according to defined format

Example of answer if defined function 1...3 with format 2:

ACK (06 hex)

BEL (07 hex)

```
4174 4744 4669 4787 4652 4826 4744 4780 4745 4846 4724
4829 4739 4835 4708 4704 4546 4817 4652 4819 4748
4757 4711 4749 4696 4730 4708 4782 4740 4818 4655
4791 4687 4737 ....
<CR> (0D Hex)
```

**\*MEASure:DARKspectra tint av format <CR>**

Run dark measurement, tint ≠ 0 output of data according to defined format

Example of answer for "\*meas:dark 100 1 4<CR>":

ACK (06 hex)

BEL (07 hex)

552

551

544

549

545

547

...

...

<CR> (0D Hex)

<CR> (0D Hex)

Example of answer for

"\*meas:dark 100 1 2<CR>":

ACK (06 hex)

BEL (07 hex)

```
551 553 544 552 540 549 544 544 547 552 549
549 545 552 545 550 544 553 546 555 546 554
550 553 550 556 550 553 547 555 552 552 549
551 547 555 548 553 549 555 551 ....
```

**Remark:**     **The user has to ensure that the optical input of the instrument is darkened during the \*meas:compdark and \*meas:dark measurements (closed external shutter or switched off lamp).**

\*MEASure:LIGHTspectra tint av format <CR>

Run light measurement (exposed spectrum – with opened shutter or lamp switched on)  
output of data according to defined format

\*MEASure:REFERENCE tint av format <CR> (under preparation !)

Run reference measurement (Difference between light measurement and previously obtained dark measurement), same integration time as during dark scan is obligatory  
output of data according to defined format

\*MEASure:TRANSMission tint av format <CR> (under preparation !)

Run light measurement and calculate the ratio to the actual reference spectrum (both dark signal subtracted)  
output of data according to defined format



## 10. Calculation Commands

The calculation commands use the previously obtained measuring data.

\*CALCulate?                      Get a help list of the calculation commands

\*CALCulate:LINT:DARK wbeg wend wstp <CR>  
Linear interpolation of dark values  
(wstp  $\geq 1$  nm)

Example of answer:

400.0	4775.31
402.0	4764.11
404.0	4752.92
406.0	4786.45
408.0	4829.23

... .

\*CALCulate:LINT:LIGHT wbeg wend wstp <CR>  
Linear interpolation of light values  
(wstp  $\geq 1$  nm)

\*CALCulate:LINT:REFER wbeg wend wstp <CR> (under preparation !)  
Linear interpolation of reference values  
(wstp  $\geq 1$  nm)

\*CALCulate:LINT:TRANS wbeg wend wstp <CR> (under preparation !)  
Linear interpolation of transmission values  
(wstp  $\geq 1$  nm)

## 11. Status Commands

The status commands are used for get a information of error and config state.

\*STATus:ERRor?<CR>

Get an description of the error (list of error codes see chapter 12.1)

Example of answer:

*Error Code: 251*

\*STATus:EXPOSition?<CR>

Get the exposition state (after reference and radiometric measurements)

1 – under exposure

2 – over exposure

0 – correct exposure

Example of answer:

*Exposition state:*

*0*

## 12. Help Commands

The help commands gives all information to the SCPI-commands.

**\*HELP:PARA<CR>**

Get a summary of all parameter commands

Example of answer:

```
*RST<CR> : softwarereset
*IDN      : get device ID
*vers?    : get firmware version
*PARAMeter:CHANnel? : get channel count
*PARAMeter:PIXel : get/set pixel count
*PARAMeter:SENSor : get/set sensor type
*PARAMeter:SDElay : get/set scan delay
...
```

**\*HELP:PARA:<cmd2><CR>**

Get the description of the selected parameter command (cmd2)

Example of answer to "help:para:tint<CR>"

```
predefined integration time/ms,
valid values 1 ... 60 000
```

**\*HELP:CONF<CR>**

Get a summary of all configuration commands

Example of answer:

```
*CONFigure:TINT?<CR> : get last integration time
*CONFigure:TINT arg<CR> : set preset integration time
*CONFigure:AVERage?<CR> : get last average counts
...
```

**\*HELP:CONF:<cmd2><CR>**

Get the description of the selected configuration command (cmd2)

Example of answer to "help:conf:expos<CR>"

```
exposition mode
0-exposition with last integration time
1-exposition with new adaption integration time
```

*2-exposition with configured  
integration time*

**\*HELP:CONTR<CR>**

**Get a summary of all control commands**

Example of answer:

*\*CONTRol:LAMP?<CR> : get  
lamp/shutter state  
\*CONTRol:LAMP arg<CR> : set  
lamp/shutter on/off*

**\*HELP:READ<CR>**

**Get a description of the read commands**

Example of answer:

*\*READ format<CR> : initiate and  
output a pre configured  
measurement*

**\*HELP:FETCH<CR>**

**Get a summary of all fetch commands**

Example of answer:

*\*FETCH format<CR> : output last  
measurement  
\*FETCH:LIGHT format<CR> : output  
light values  
\*FETCH:DARK format<CR> : output  
dark values  
\*FETCH:REFErence format<CR> :  
output reference values  
...*

**\*HELP:MEAS<CR>**

**Get a summary of all measurement  
commands**

Example of answer:

*\*MEASure tint av format<CR> :  
run measurement with parameters  
\*MEASure:DARKspectra tint av  
format<CR> :  
run dark measurement  
\*MEASure:LIGHTspectra tint av  
format<CR> :  
run light measurement  
\*MEASure:REFErence tint av  
format<CR> :  
run reference measurement  
...*

**\*HELP:FETCH<CR>**

**Get a summary of all fetch commands**

Example of answer:

*\*FETCH format<CR> : output last measurement*  
*\*FETCH:LIGHT format<CR> : output light values*  
*\*FETCH:DARK format<CR> : output dark values*  
*\*FETCH:REFERENCE format<CR> : output reference values*  
*...*

**\*HELP:STAT:ERR<CR>**

**Get a summary of error codes**

Example of answer:

*Error codes:*

*0 : no error*  
*4 : command error*  
*7 : error password*  
*8 : digit error*  
*10 : error argument 1*  
*11 : error argument 2*  
*12 : error argument 3*  
*...*

For the full list of error messages – see below

## 12.1. Meaning of Error Codes

Error codes:

0	: no error
4	: command error
7	: error password
8	: digit error
10	: error argument 1
11	: error argument 2
12	: error argument 3
13	: error argument 4
20	: error parameter argument
21	: error config argument
22	: error control argument
23	: error read argument
24	: error fetch argument
25	: error measuring argument
26	: error calculation argument
27	: error calibration argument
101	: error parameter checksum
102	: error userfile checksum
103	: error userfile2 checksum
104	: error userfile2 argument
120	: error overexposure
121	: error underexposure
123	: error adaption integration time
130	: error shutter not exist
131	: error no dark measurement
132	: error no reference measurement
133	: error no transmission measurement
134	: error no radiometric calculation
137	: error no dark compensation
140	: error calibration data
141	: error exceed calibration wavelength
147	: error scan break
170	: error write parameter to flash
171	: error read parameter from flash
172	: error erase flash
180	: error no calib file
181	: error calib file header
182	: error write calib file
183	: error calib file values

184 : error calib file number  
186 : error clear calib file  
187 : error clear calib file argument  
190 : error no lamp file  
191 : error lamp file header  
192 : error write lamp file  
193 : error lamp file values  
194 : error lamp file number  
196 : error clear lamp file  
197 : error clear lamp file argument  
200 : error ram check  
220 : error data output  
230 : error first memory allocation  
231 : error second memory allocation  
232 : error third memory allocation  
251 : error wavelength range for radiometric calculation

## 13. Examples of Measurement Procedures

### 13.1. Raw Data Measurement

#### Simple Raw Data Remission Measurement

Task:

- Uses default values (see table below)
- The appropriate integration time *tint* has to be determined before.
- The necessary dark measurement will be automatically included. This is not the case if a dark scan with the same *tint* was already proceeded.
- Output of wavelengths and counts
- Program sequence:

\*CONF:FORM 7<CR> / Output format: ASCII values with wavelengths

\*MEAS:REFER *tint*<CR> / start of measurement and data output

Output:

383.2	0
385.7	0
388.2	0
390.7	0
393.2	0
395.6	0
398.1	0
400.6	0
403.1	7
405.6	0
408.0	0
410.5	0
412.9	0
415.4	0
417.9	0
420.3	0
422.8	3

Variations:

- Wavelength output can be suppressed changing \*CONF:FORM 7 by format 4
- ASCII format can be changed into binary L/H (format 1) or binary H/L (format 5)



## 14. Factory Settings for VersaPic

(settings which should not be modified by the user are marked in gray)

Parameter	Meaning	Default settings	Unit	Command	Remark
tint	Integration time (exposure time of detector)	100	ms	*para:tint, *conf:tint	minimum: *conf:mintint? (depending from detector) maximum: 60 000 ms
split time	splitting time, due to high dark signal at long integration times	5000	ms	*para:splitt	used for ELIS detectors, split of integration into several parts, allows to measure with long tint
av	Number of scans for averaging	1		*conf:aver	up to 32 average scans
format	data output format	7		*para:form, *conf:form	
function	kind of measurement	1		*para:func, *conf:func	
exposition	defines, which integration time will be used	0		*para:expo, *conf:expo	use previous integration time
adaption	defines the behaviour in case of over or under exposure	1		*para:adapt, *conf:adapt	new adaption of integration time only in case of over exposure
fit n	Wavelength fit coefficients	individual		*para:fitn	individually calibrated for each unit (has to be changed if pixel binning is changed, see sens)
wavbeg	predefined begin of wavelength range	200	nm	*para:wavbeg	valid after program start
wavend	predefined end of wavelength range	1000	nm	*para:wavend	valid after program start
wavstep	Predefined wavelength step	5	nm	*para:wavstep	valid after program start

pix	number of pixel	256		*para:pix	will be changed, if pixel binning is used, wavelength fit has to be changed too
sens	type of sensor	27 (ELIS, 256 pixel binning)		*para:sens	ELIS with 256 pixel binning
ADCR	resolution of ADC	15	bit	*para:adcr	Can be set to 14, 15 or 16 bit (16 bit is not allowed for radiometric and transmission/ reflexion calculations)
ADCV	Input voltage of ADC	2	V	*para :adcv	2 or 4 V
ADPW	Power down modus of ADC	0		*para:adpw	on
Baud	interface Baud rate	921 600	bd	*para:baud	
Scan delay	Delay between initialization of measurement and real start	400	ms	*para:sdcl	
gain	Amplification factor of ADC	2		*para:gain	
offset	ADC offset	-		*para:offs	individually adjusted
Fast scan	Continuous scan without data output	50	ms	*para:fast	
Lamp enable	Set lamp control on/ off	1		*para:lampe	Lamp signal enabled
Lamp polarity		1		*para:lampp	Lamp low active
Flash mode	Flash mode	0		*para:flmod	Flash mode disabled
Flash intervall	Flashlight intervall	20	ms	*para:flash	
Flash length	Flashlight length	20	ms	*para:flash	
Border min	Low and high limit for integration time determination	70	%	*para:bord	
Border max		98	%	*para:bord	
boxcar	Boxcar integration	1		*para:boxca	
shutter	Availability of mechanical shutter	1		*para:shut	Shutter exist

trigger	Trigger output signal	1		*para:trig	Trigger enabled
Trigger slope	Trigger edge	0		*para:trsl	Trigger at rising edge

15. Structure of Data Stream

All data transmitted via USB virtual COM Port (921 600 baud, no parity, 1 stop-bit, no Handshake)

format = 1

(L/H binary output without length and checksum)

All data transmitted as 16 bit word, low-byte first

Byte	Value	Definition
0	xx yy	first Pixel
2	xx yy	second Pixel
		:
		:
		:
n*2	xx yy	last Pixel
n: count of pixel per line		

format = 2

(ASCII output, space separated)

819 858 807 841 793 781 831 844 826 825 845  
862 795 856 810 845 799 837 849 861 787 881  
862 836 869 859 848 863 829 902 858 891 924  
917 881 910 903 919 912 964 915 969 989 1037  
1018 1078 1023 1132 1099 1155 1159 1197 1236 1309 1339  
1384 1551 1609 1727 1971 .....

format = 3

(L/H binary output with length and checksum)

All data transmitted as 16 bit word, low-byte first

Byte	Value	Definition
0	xx yy	length
2	xx yy	first Pixel
4	xx yy	second Pixel
		:
		:
		:
2+n*2	xx yy	last Pixel
4+n*2	xx yy	checksum
n: count of pixel per line		

**Format = 4**

(ASCII output, separated by <CR>)

819  
858  
807  
841  
793  
.....

**Format = 5**

(H/L binary output without length and checksum)

All data transmitted as 16 bit word, high-byte first

Byte	Value	Definition
0	xx yy	first Pixel
2	xx yy	second Pixel
		:
		:
		:
n*2	xx yy	last Pixel
n: count of pixel per line		

**Format = 6**

(H/L binary output with length and checksum)

All data transmitted as 16 bit word, high-byte first

Byte	Value	Definition
0	xx yy	length
2	xx yy	first Pixel
4	xx yy	second Pixel
		:
		:
		:
2+n*2	xx yy	last Pixel
4+n*2	xx yy	checksum
n: count of pixel per line		

**Format = 7**

(ASCII output with wavelength, separated by <CR>)

450.1	4153
450.5	4118
450.9	4126
451.4	3690
451.8	2425
452.2	1765
452.6	1452

453.0	1317
453.4	1277
453.8	1345
454.2	1525
454.6	1680
455.0	1728
.....	.....

<CR> (OD Hex)  
<CR> (OD Hex)

**Format by command “\*calc:lint:dark”**

(Line interpolated ASCII output with wavelength, separated by <CR>)

400.0	2316.75
405.0	2405.70
410.0	2505.48
415.0	2592.03
420.0	2614.35
425.0	2630.52
430.0	2584.60
435.0	2737.96
440.0	2814.95
...	....

<CR> (OD Hex)  
<CR> (OD Hex)

## 16. Service

Please contact in case of any question or technical problem:

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