Technical Note 25

Reducing the Measuring Time of specbos 1211-2 / spectraval 15x1

The measuring time of the specbos radiometers is not only determined by the integration time. Additionally, it consists of the time for the adaption of the integration time, the opening/ closing time of the mechanical shutter, the time for the dark measurement (equals the integration time), the time for the calculation of the radiometric/ photometric/ colorimetric data and the data transfer time.
E.g., if the integration time is around 50 ms, the full measuring time will be around 1 s. The maximum measuring time is around 130 s.

Sometimes, especially in online applications or if many measurements on low light are necessary, e.g., during monitor calibration, such measuring times cannot be accepted. There exist several methods to reduce them. They are described here.

Please use the actual firmware and DLL versions.

1.1 Reduction of maximum integration time (specbos 1211-2)

It is possible to limit the integration time to a certain value. The default maximum integration time is 60 s. It can be reduced by the DLL function

JETI_SetMaxTintConf (…, maxtint[ms])/ jeti_core DLL

to e.g. 4 s, a recommended value for monitor measurements. This measure will significantly reduce the measuring time in case of low lights. It is necessary to check if the reduced repeatability/ precision can be accepted for the particular application.
(The range of maxtint is between 1000 and 60 000 ms)

1.2 Reduction of maximum integration time and maximum average (spectraval)

Due to a modified adaptation algorithm compared to the specbos series, the maximum integration time for spectraval units is 1 s. Instead of using longer integration times, several averages are automatically performed here.
By default, the maximum number of averages is 60, so that a maximum of 60 s can also be measured.
The number can be reduced by the following DLL function

JETI_SetMaxAverConf (..., maxaver)/ jeti_core DLL

to e.g. 10. This measure will significantly reduce the measuring time in case of low lights. It is necessary to check if the reduced repeatability/ precision can be accepted for the particular application.
(The range of maxaver is between 1 and 100)

2 Supress the individual dark scan for every measurement (only specbos 1211-2)

The default situation is that a dark scan will be executed during every measurement. So, the measuring time will be longer than two times the actual integration time.
It is possible to proceed a dark measurement in the beginning and to apply the data to the following measurements:

Use the following DLL commands from jeti_core DLL:

JETI_SetDarkmodeConf (…, 0)	/ no dark scan after each Measurement
JETI_MeasCompDark	/ Dark measurement
JETI_MeasureStatusCore	/ Check if the dark measurement is finished
JETI_GetSDelay	/ store the actual shutter delay time
JETI_SetSDelay (…, 1)	/ set the shutter delay time to 1 ms (a neglectible value)
JETI_SetShutterStat (…, 1)	/ open the shutter

go on with any radiometric measuring command sequence

Remark:
It must be ensured that the time period between two successive dark measurements is short enough to avoid drift effects of the dark signal. Therefore, it is recommended to repeat the dark measurement in suited breaks of the measurement cycle, e.g. when the DUT is changed.

To do that use the following sequence:

JETI_SetSDelay (…, stored value)	/ set the shutter delay time to the original value
JETI_MeasCompDark	/ Dark measurement
JETI_MeasureStatusCore	/ Check if the dark measurement is finished
JETI_SetSDelay (…, 1)	/ set the shutter delay time to 1 ms (a neglectible value)
JETI_SetShutterStat (…, 1)	/ open the shutter

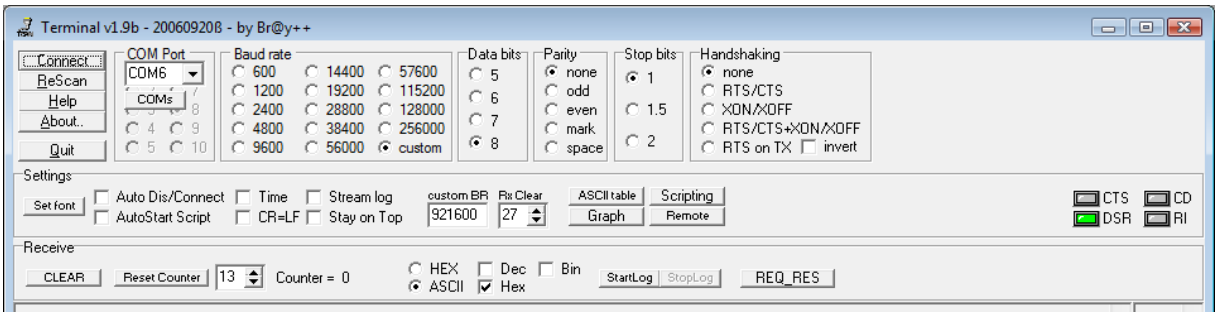
go on with your radiometric measuring command sequence

The longer the integration time the more this measure of suppressing the individual dark scan will reduce the total measuring time.

3. Reduction of adaption level for the integration time (only specbos 1211-2)

The specbos instruments use an adaption of the integration time regarding the intensity of light to be measured. The criterion for this adaption is the degree of exposure of the spectral maximum. This value must reach a range which is predefined. The default settings are typically 70 and 98% of full exposure (beginning of over exposure). The reduction of these values limits the integration time. But it is always necessary to maintain at least 25 % between minimum and maximum, otherwise the adaption procedure can be endless.
There exists no DLL function to control these parameters, therefore it is necessary to set them using firmware commands:

Use a terminal program (e.g. Hyperterminal or Terminal), select the right settings (COM-port- see device manager, Baud rate 921600 Bd (specbos 1211 RS, BT – 115 200 Bd), 8 data bits, no parity, 1 stop bit, no handshaking) and connect the instrument.



The simple command **a** can be used to check if the connection works, it returns some device parameters.

Use the following commands to reduce the lower and upper limit for the adaption of integration time:

*para:bord 35 50<CR> / sets the lower and upper limit of adaption to 35 and 50% of full scale
*para:save<CR> / saves all settings

Again it is necessary to check if the reduction of the adaption range gives acceptable results. If not, use higher values.

This method will shorten the measuring time especially for longer integration times
(> 2 s), because the time spans for adaption of integration time, calculation of data, opening and closing the mechanical shutter and data transfer dominate in case of short integration times (up to 200 ms).
Nevertheless, the integration time itself will always be reduced.

4. Application of a fixed integration time

If the application is to measure many objects with similar brightness, then it is possible to reduce the measuring time further by using a fixed integration time. The time span for the adaption of the integration time will be saved. This is especially effective for short integration times up to 200 ms.
At first it is necessary to determine the integration time of a normal measurement:

```
JETI_StartAdaption          / jeti_core DLL
JETI_CheckAdaptionStat      / actual integration time will be returned
```

Afterwards all following measurements can be done with this time + a safety span, depending of the application (e.g. 10 %).

It is only necessary to check the error of overexposure. This will be indicated by the error code 0x20.

Additionally, it is possible to observe the degree of exposure for each scan. This can be done with the DLL Function

```
JETI_GetLevel          / jeti_core DLL
```

The returned result can be used to check underexposure too.

5. Combination of methods

It is possible to combine the methods depending on the application. The limitation of integration time can be used with reducing the dark measurements, e.g. for measurements on low lights.

The examination of the results is always necessary, because every method will decrease the precision and the reproducibility of the readings.

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