Differences

between

STEP Survey Meter OD-01 and new OD-02

STEP

Dr. Werner Schüler
Managing Partner

Survey Meters OD-01 /OD-01Hx
OD-02 / OD-02H_x

OD-02 is the further development of the OD-1 with better properties for measurement in the area of the natural radiation background

-The OD-02 has a microcontroller which, in addition to the electronic filter of the OD-01, provides the dose rate measurement signal in the nominal operating range of 0.01 to 2 µSv / h denoises and smoothes.

-Result: More accurate statistical safety in the smallest range for dose rate

-Why it is so?

- Chamber factor of the air-open ionization chamber:

1 µSv / h of dose rate generate approx. 4.5 fA ionization current

- Dose rate values in the range of the zero effect of ≈ 0.1µSv / h require the measurement of chamber currents Imin in the range 0.1 femto Ampere < Imin <1 fA !

- state-certified radiation protection experts in the European Union have the requirement of measuring a dose rate ≤ 0.5 µSv / h outside of control ranges according to Radiation Protection Ordinance.

Why: limit for annual dose of the normal population is 1mSv.
divided by 2000 maximum working hours per year corresponds to 0.5 µSv/h dose rate outside of control areas

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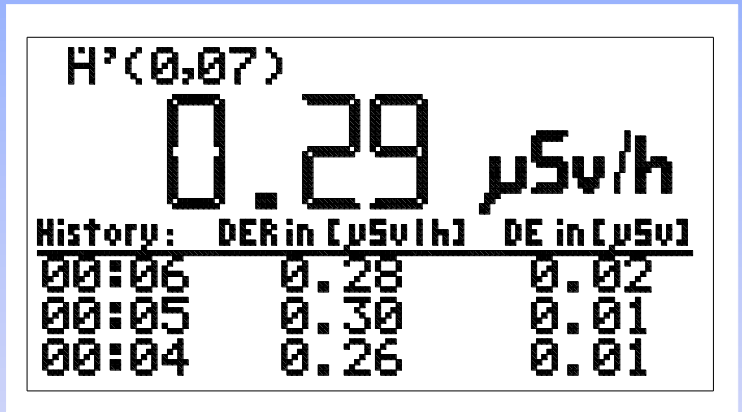
Survey Meters OD-01 /OD-01Hx
OD-02 / OD-02H_x

OD-02 is the further development of the OD-1
with better properties for measurement in the area
of the natural radiation background

- The OD-02 also has the possibility to display a "Measured History" table which allows the user to retrieve the last 15 average values of the dose rate averaged over 60 seconds measuring time.



The OD-02 is also capable in dose rate measurement mode

1. To display the dose calculated from the dose rate and the measurement time.
2. To "Hold" and display the maximum dose rate that occurred during the measurement.

   This is very helpful in measuring pulsed radiation in the dose rate mode!

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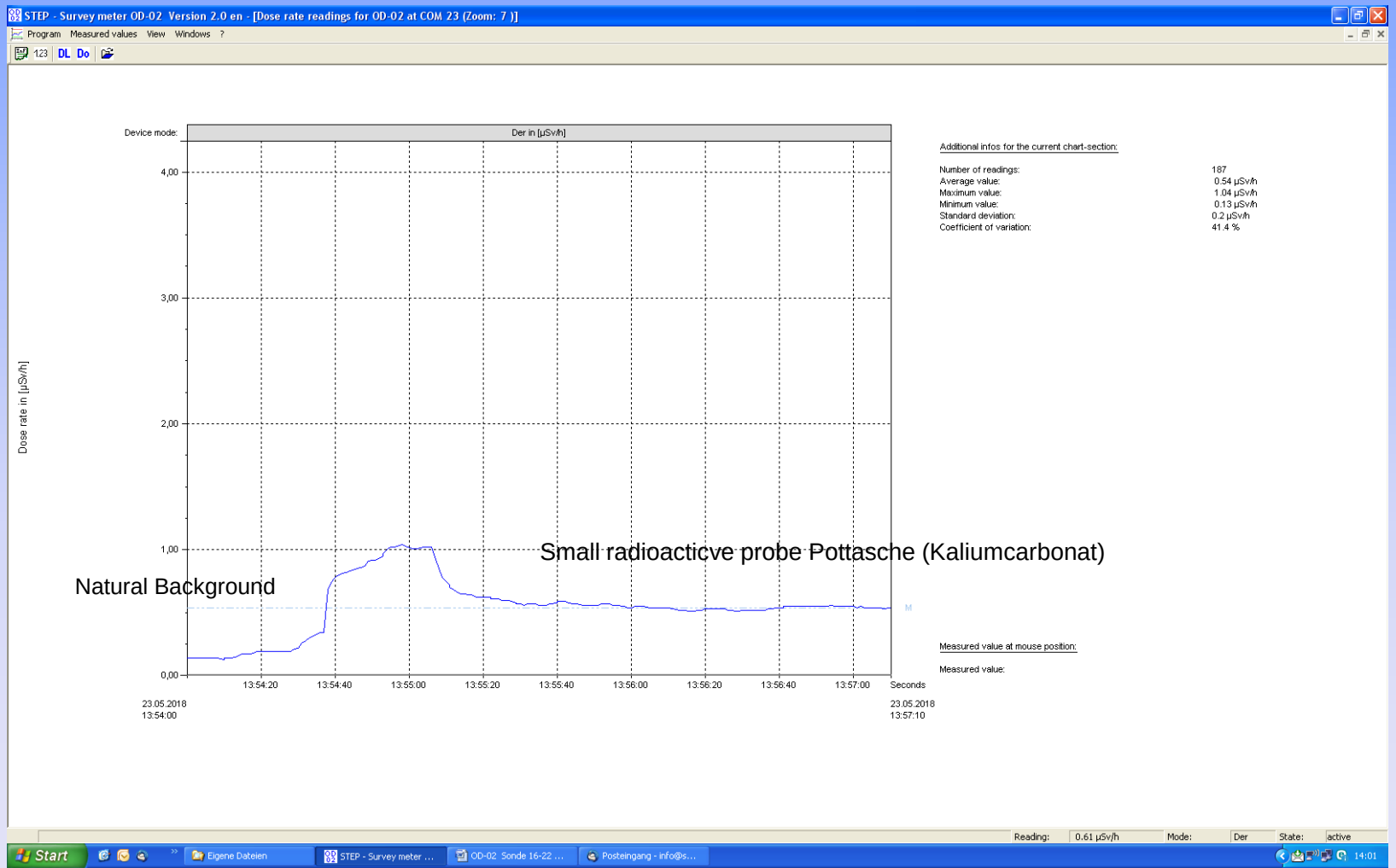
OD-02

The OD-02 thus has a better statistical reliability of the measured values in the smallest measuring range of the dose rate.

Requirement of the Physikalisch Technische Bundesanstalt (PTB) in Germany demands a statistical certainty **coefficient of variation < 16%**

Part 1 Examples of the Dose rate measurement in the range f the natural zero effect



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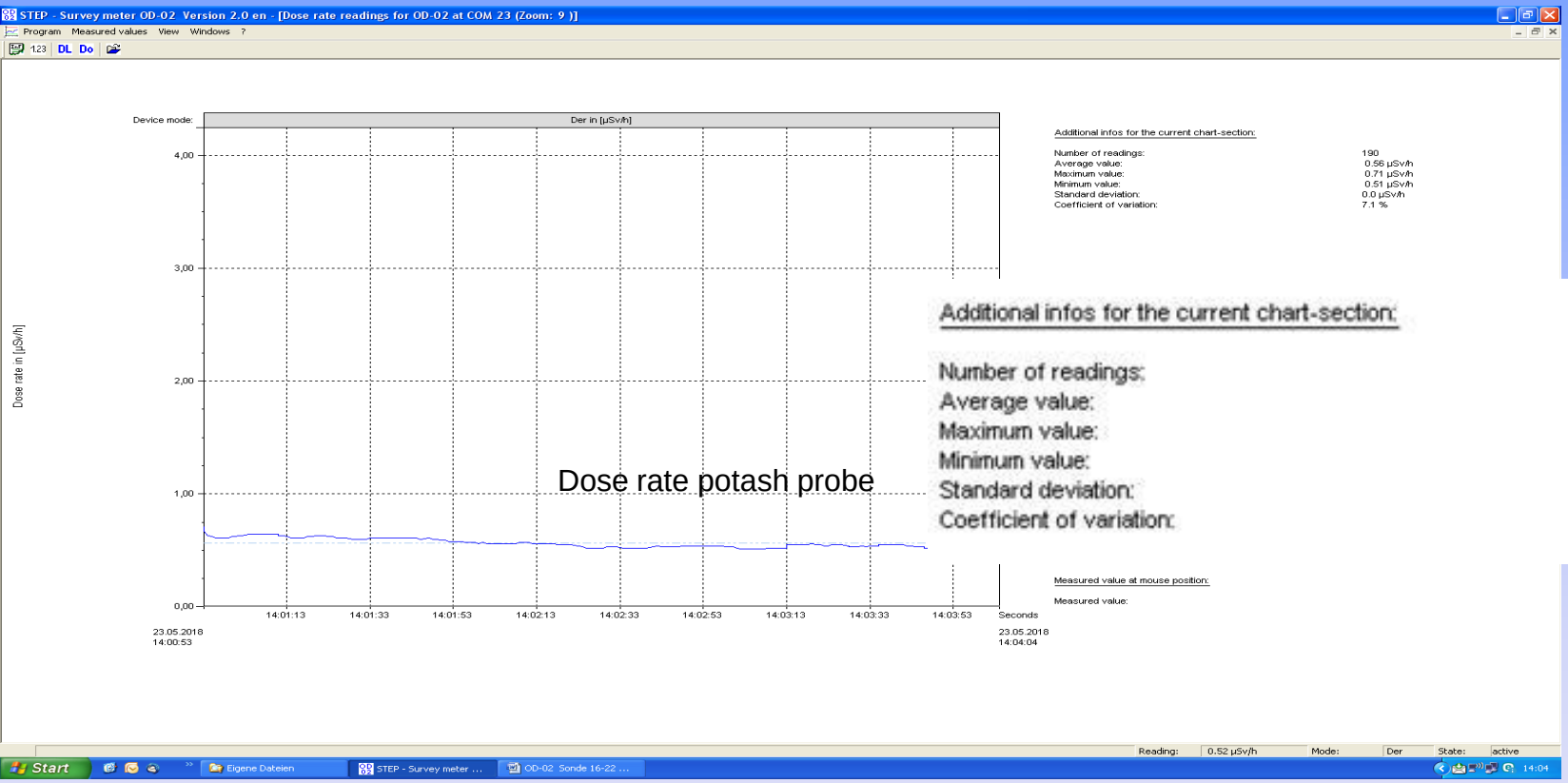
Part 2

Examples of the Dose rate measurement in the range of the natural zero effect



Additional infos for the current chart-section:

Number of readings: 190
Average value: 0.56 µSv/h
Maximum value: 0.71 µSv/h
Minimum value: 0.51 µSv/h
Standard deviation: 0.0 µSv/h
Coefficient of variation: 7.1 %

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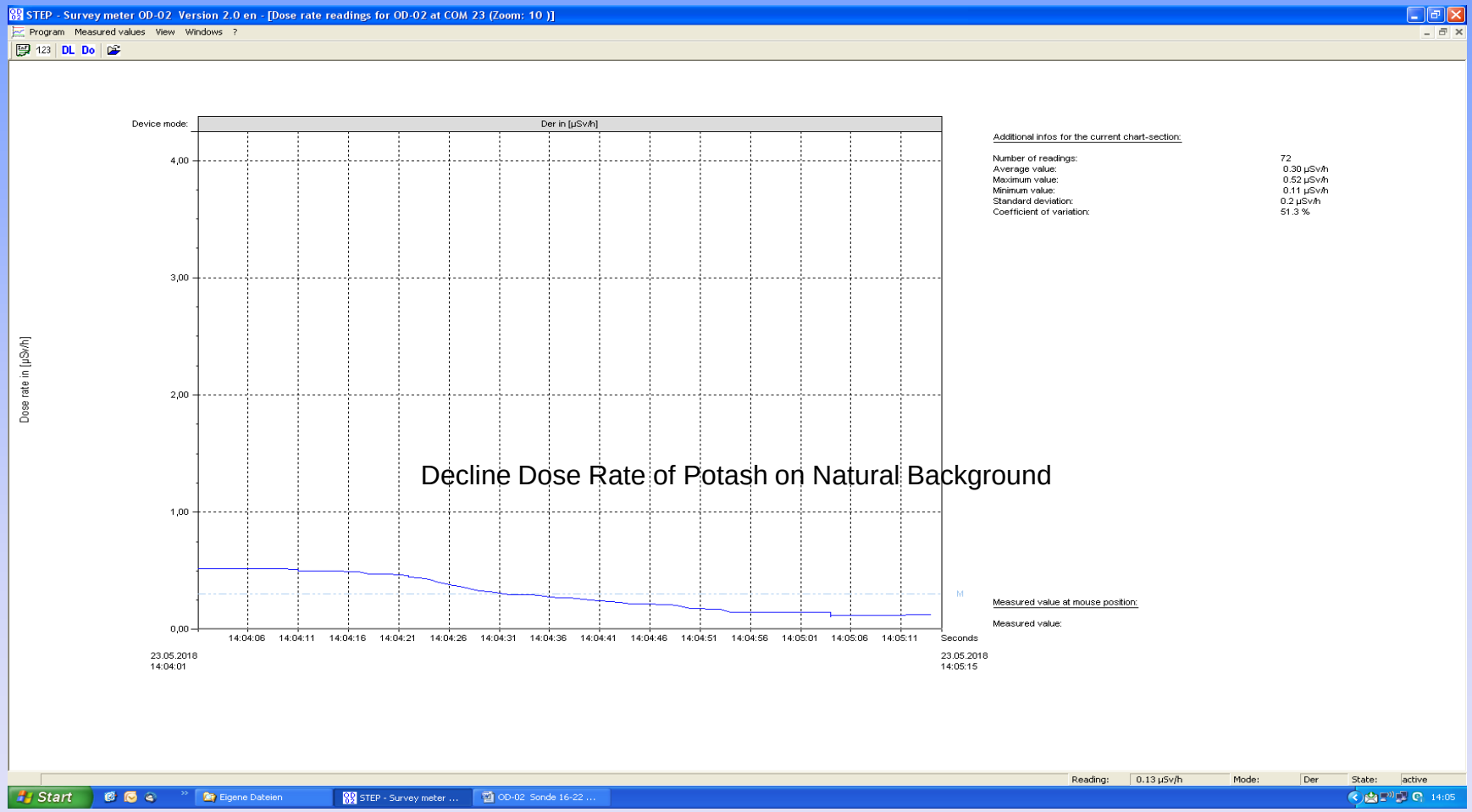
Part 3
Examples of the Dose rate measurement in the range of the natural zero effect

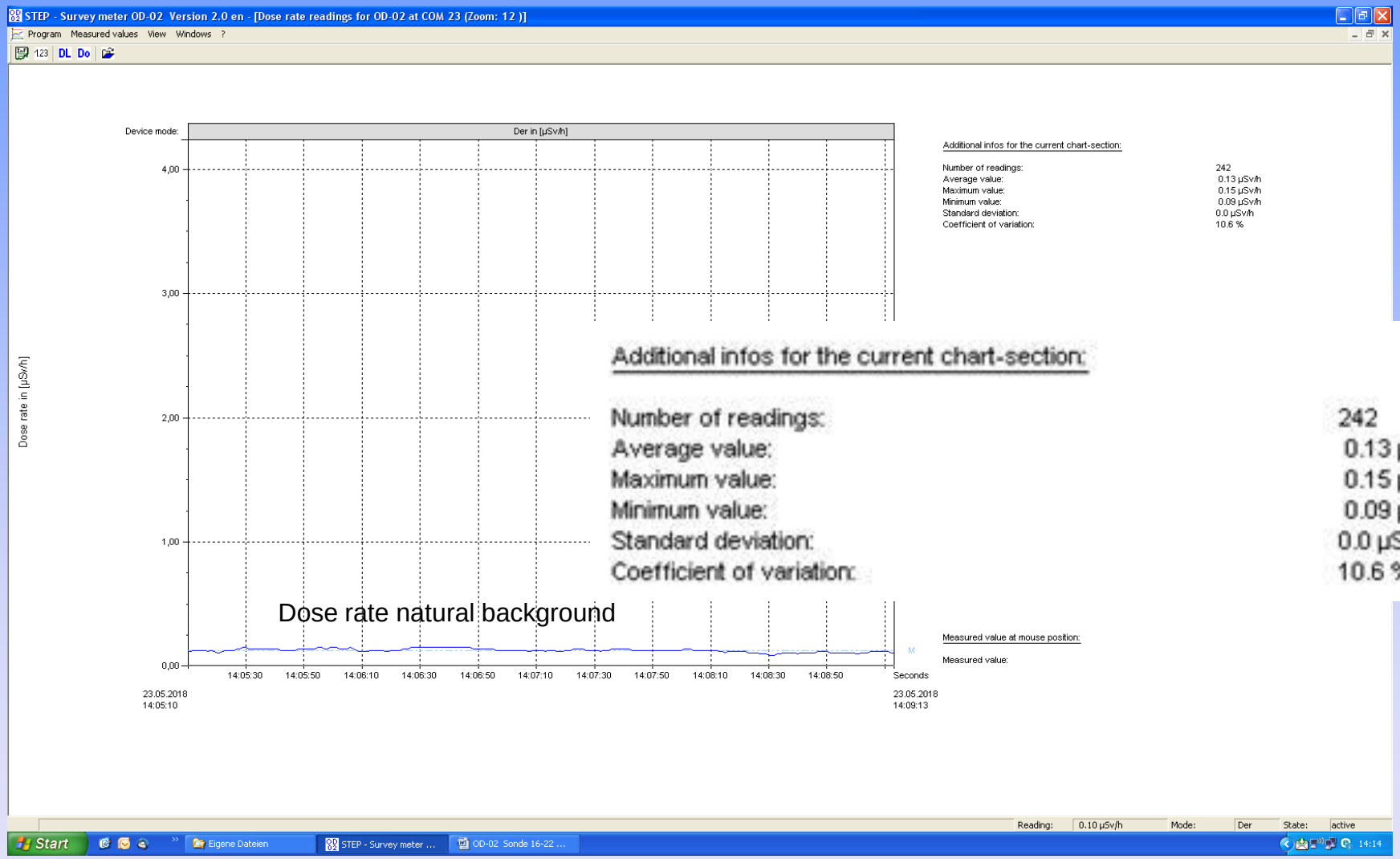


Decline Dose Rate of Potash on Natural Background

OD-02

Part 4

Examples of the Dose rate measurement in the range of the natural zero effect



Additional infos for the current chart-section:

Number of readings:	242
Average value:	0.13 µSv/h
Maximum value:	0.15 µSv/h
Minimum value:	0.09 µSv/h
Standard deviation:	0.0 µSv/h
Coefficient of variation:	10.6 %

OD-02 / OD-02H_x

- Radiation Detector -

OD-02 and OD-01

Type	Air open ionization chamber
Volume	600 cm^3
Area mass I-chamber	35 $mg \cdot cm^{-2}$
entrance windows on front	3.3 $mg \cdot cm^{-2}$ (one-side metallized PET folie)
Wall reinforcement cap	550 mg / cm^{-2}, removable
preferred direction	axial
reference point	marked on the detector
chamber voltage	+ 400 V (mSv / h, µSv mode) + 40V (µSv / h mode)

OD-02 Hx

Type	Air open ionization chamber
Volume	600 cm^3
Area mass I-chamber	35 $mg \cdot cm^{-2}$
entrance windows on front	non-existent
Wall reinforcement cap	550 mg / cm^{-2}, removable
preferred direction	axial
reference point	marked on the detector
chamber voltage	+ 400 V (mSv / h, µSv mode) + 40V (µSv / h mode)

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OD-02 / OD-02H_x

- Photons Energy Range -

Measurement without Wall reinforcement cap
using entrance windows on front of chamber by OD-02

- **start:** **1 keV** **OD-02**
  5 keV **OD-02Hx**
- **end:** **80 keV**

Measurement with Wall reinforcement cap

- **start:** **80 keV**
- **end:** **15 MeV**

For details, see the device description / operating instructions

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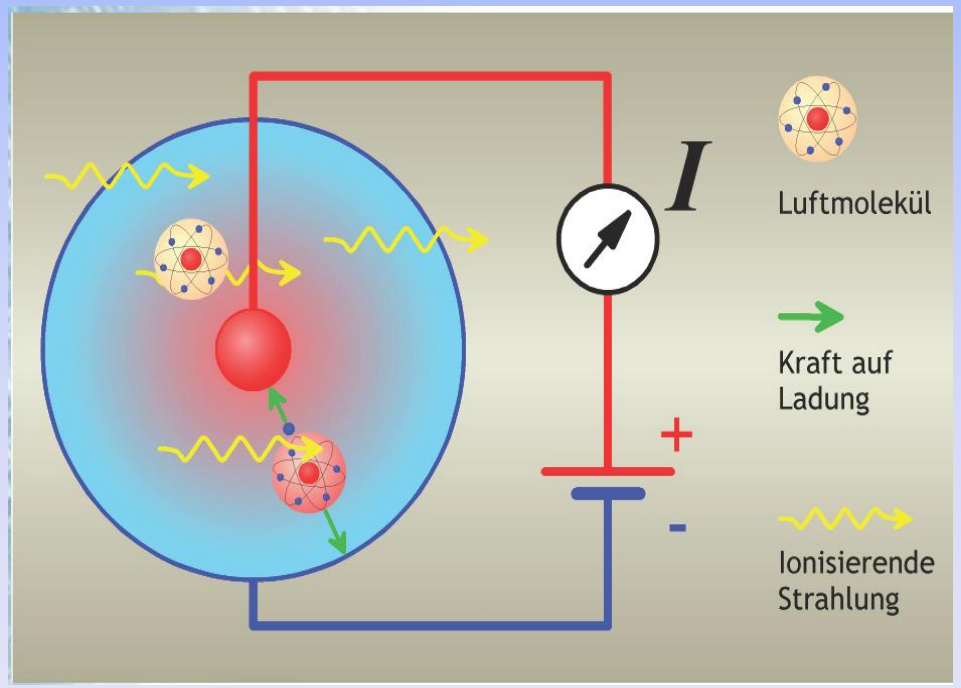
- Measurement of pulsed radiation -

Pulse dose measurement with ionization chamber

When operating the ionization chamber in the saturation region, there is a proportional relationship between the dose rate and the chamber current.

Physically seen by means of the chamber, a detection of directly ionizing particle radiation (beta and alpha radiation). The measurement of gamma and X-ray radiation occurs indirectly via secondary electrons, which are generated by an interaction with the chamber wall material and the air.

Advantageous are the energy resolution and the lack of dead time.



Picture: PTB Germany

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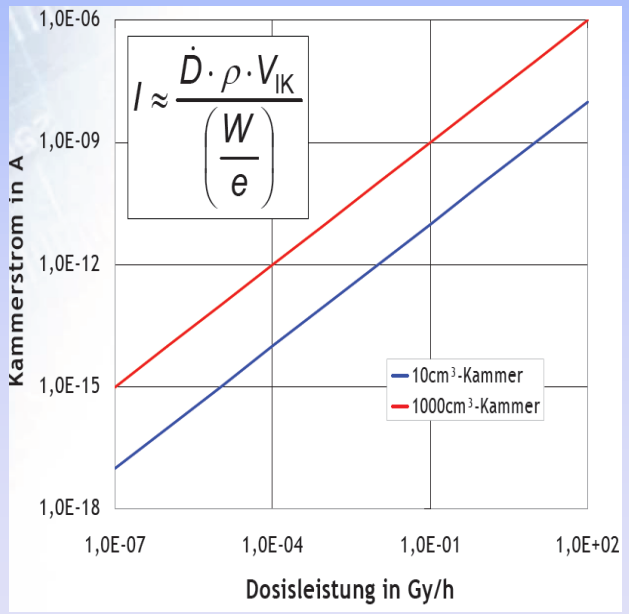
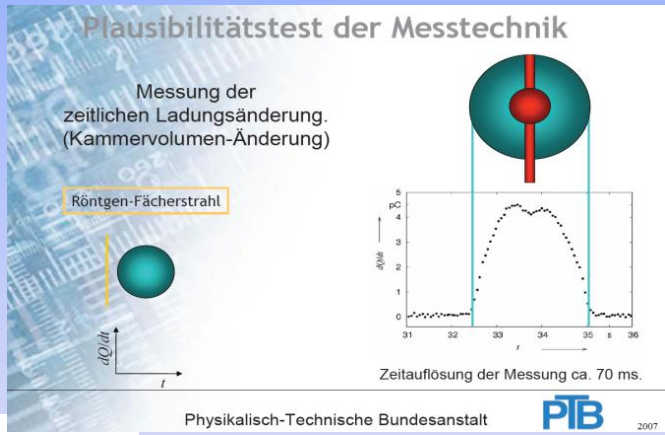
- Measurement of pulsed radiation, preferably in Dose Measurement Mode -

Due to the low sampling rate and the limited analogue bandwidth, the method for signal acquisition and processing in the OD-02, which is optimized with regard to quasi-static dose rate curves, is not suitable for the acquisition of short dose rate pulses.

However, if the integration of the chamber current by charging a capacitor, then the capacitor voltage after completion of the charging process corresponds to the appropriate dose of the dose rate pulse on condition of proportionality between dose rate and chamber current!





$$T = \frac{d^2}{U \cdot c}$$

$T_{10cm^3} = 0{,}56$ ms

$T_{1000cm^3} = 212$ ms

T: Ionensammelzeit
d: Elektrodenabstand
U: Kammerspannung
c: Ionenbeweglichkeit der langsamsten Ionen

$\left(c_{Luft} = 1{,}5 \ \frac{cm^2}{V \cdot s}\right)$

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