



VACUtec

VacuDAP



Dose-/Dose Area Product Measuring System

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The Measuring System

The modular VacuDAP dose-/dose area product measuring system offers various ionization chambers and configurations for almost all medical diagnostic X-ray equipment in radiography, radioscopy, dental application or whole body scanners.

All complete systems have a serial interface RS 232 on the display unit for connecting a printer or transmitting data to a workstation or RIS.

The VacuDAP Systems are used for simultaneous DAP (dose area product) and DAP rate measurements according to IEC 60580.

The VacuDAP *duo* systems additionally determine reference air kerma and reference air kerma rate in accordance to the standards IEC 60 601-2-54, IEC 60 601-2-43 and 21 CFR 1020.32.

Measuring chambers

All measuring chambers provide a serial interface RS 485 to transfer measuring data and to receive control commands by means of an ASCII protocol.

Optionally the system is available with *Bluetooth*® wireless technology.

The measuring chambers can be completed with several display units to many different stand alone systems to match all X-ray systems and official requirements.

Chamber resolution of $0.01 \mu\text{Gy}\cdot\text{m}^2$ for DAP enables them for use in pediatrics.

All rectangular chambers are available with an active area of 123 mm x 123 mm or 147 mm x 147 mm. They are adaptable to all common X-ray collimators by means of different rails.

The circular chambers are designed and the calibration is set to meet the specifications of the C-arm X-ray machines.

One-field measuring systems for measurement of DAP, DAP rate and irradiation time:



VacuDAP *standard/fluoro/twin* and VacuDAP *Bluetooth*® with display unit

- Three types of display units can be added to the rectangular OEM measuring chambers to form systems VacuDAP *standard*, *fluoro* and *twin*:
 - single-line version (*standard*)
 - two-line version for simultaneous display of DAP and DAP rate (*fluoro*)
 - two-line version for the parallel connection of two measuring chambers (*twin*)
- The measuring chamber VacuDAP *Bluetooth*® in connection with a *Bluetooth* compatible display unit saves the expense of cable installation between the measuring chamber and the operating desk and assures the same function as VacuDAP *fluoro*.



VacuDAP - C and VacuDAP - C *Bluetooth*® with display unit

- The configuration with circular ionization chamber was developed for full integration into C-arm X-ray equipment.
- The systems are designed and the calibration is set to meet the specifications of the equipment.
- The electronics supplies the measuring results as ASCII protocol via a serial interface to the display unit *fluoro*.
- For fast and easy installation the circular measuring chamber VacuDAP - C in connection with an additional *Bluetooth* adapter can be used with a *Bluetooth* compatible display unit.

VacuDAP System

Two-field measuring systems „*duo*“ for simultaneous measurement of DAP, DAP rate, air kerma, air kerma rate and irradiation time:



VacuDAP duo and VacuDAP Bluetooth® duo with display unit

- VacuDAP - OEM duo and VacuDAP Bluetooth® duo measuring chambers
- Display unit „Dose/DAP“
 - upper display line: cumulated dose
 - lower display line: dose rate during irradiation, cumulated DAP after irradiation
- The display unit „Dose/DAP“ is available as a Bluetooth version as well.
- The measuring chamber VacuDAP Bluetooth® duo in the picture is presented with universal adjustable mounting rails.



VacuDAP - C duo and VacuDAP - C Bluetooth® duo with display unit

- The circular two field measuring system VacuDAP - C duo determines reference air kerma, reference air kerma rate and DAP, DAP rate and irradiation time.
- The data and control commands are transmitted via serial interface between the measuring chamber and the display unit „Dose/DAP“.
- VacuDAP - C duo in combination with a plugged Bluetooth adapter are used with a Bluetooth compatible display unit to avoid cable installation between the measuring chamber and the operating desk.

Further DAP-Meter

VacuDAP compact

This is a compact unit designed for uncomplicated retrofitting and is equipped with an integrated display and control keys directly attached to the measuring chamber. A model with reduced dimensions is available as a special type for mobile X-ray units having smaller collimators.

A secondary display unit that provides RS 232 interface can be connected to VacuDAP compact and acts as remote control.



VacuDAP 2004 OEM

The measuring chamber can be plugged easily into an existing pulse counting interface that is provided by several generators on the market. Two chamber sizes are available equivalent to the other versions of VacuDAP.



VacuDAP

Accessories:



Accu Pack

The VacuDAP *compact* in combination with the battery is the first complete stand alone DAP system and ideally suited for mobile X-ray units. The battery pack is also best suited for use with VacuDAP *Bluetooth*®.

Adapter

The rugged mechanical adapter allows the use of filters in combination with the measuring chamber.



Converter AC/DC

The converter provides the supply voltage from a primary SELV of 20 ... 50 VDC or 14 ... 35 VAC.

Converter RS 485/232

Interface cable with integrated RS 232 converter are available with different lengths in increments of 5 m.



Printer

The label printer Zebra LP2824 and the low cost thermal printer Seiko DPU414 can be used at the serial interface to print a protocol.

Fixing-Rails

Rails for fixing the rectangular measuring chambers to a collimator are available from 140 mm to 190 mm width.

Technical details:

General:

Quality equivalent filtration (70 kV)	0.2 mm Al
Light Transparency (rectangular chambers)	> 70%
Radiation quality	(40 ... 150) kV
Atmospheric pressure	(80 ... 106) kPa
Temperature	(+10 ... +40) °C
Air humidity	(10 ... 80)% rel. humid. (max. 20 g/m ³)

Dimensions:

Rectangular transparent measuring chambers:

Active area	123 mm x 123 mm, 147 mm x 147 mm
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Circular measuring chambers:

Active area/outer dimension (diam.)	44 mm/60 mm, 72 mm/100 mm (non transparent), 68 mm/90 mm (transparent)
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Electronics for circular chambers: 80 mm x 50 mm x 17 mm

Display unit: 160 mm x 94 mm x 37 mm

DAP:

Digital resolution	0.01 µGy·m ²
Measuring range	0.1 ... 99 999 999 µGy·m ²

DAP Rate:

Digital resolution	0.6 µGy·m ² /min
Measuring range	6 ... 1 800 000 µGy·m ² /min
Useable active area	1 ... 200 cm ²

Dose*:

Digital resolution	0.003 mGy
Measuring range	(0.03 ... 99 999 999) mGy

Dose Rate*:

Digital resolution	0.18 mGy/min
Measuring range	(1.8 ... 17 000) mGy/min
Useable active area	(2 ... 200) cm ²
Minimal field width	1.4 cm

* Distance focus-chamber: 28 cm; Distance focus-reference point: 100 cm