QUART
Quality Assurance in Radiological Technologies

Product Catalog

Diagnostic X-Ray QA/QC

www.quart.de

Expertise and Innovation

1980 QUART Integrator I

For diagnostic x-ray measurements, the Integrator I was the major step forward in the meter industry. The **world-wide first** application of solid state technology for detectors, instead of utilising ionisation chambers, changed the characteristics of test equipment dramatically.

1983 QUART dido

The Integrator II, which 1 year later (1984) became known as the base of our *QUART dido* Series, was the **first PTB* approved diagnostic meter** of its kind.

1988 QUART dido/time | QUART RöVi

Some time after its launch, the RöVi/time was further developed to become the first **sandwich/double dosimeter** to measure dose before and after patient equivalent filtration – all in one exposure!

1992 Dental Test Phantom

The development of dental test phantoms was launched after the industry started inquiring for respective solutions. The design of QUARTs phantoms was soon to be adapted by the standardisation working groups of **DIN & IEC** in this area of application.

1992 The DAVID System

The DAVID system for the first time featured a compact Laptop Computer as a **waveform analysis tool** to replace oscilloscopes previously used. Designed as a sophisticated measurement system for service experts and state radiation inspectors, it also contained a data collection and evaluation module soon gaining a reputation for causing a “toolbox revolution” in x-ray quality control in Germany.
The DAVID system can be considered as being „way ahead of its time“. The system name transcribes as „**D**igital **A**nalyser for High-**V**oltage, **I**nherent Filtration and **D**ose Rate“. It featured even more functions than these.

1996 Digital Subtraction Angiography Phantom

The introduction of QUART‘s DSA phantom featuring longitudinal sliding technology has enabled a **precise** way to assess the imaging quality of subtraction angiography equipment. The method is still up-to-date and widely used.

2004/2005 QUART dido2000K / dido2100K

The *dido2000K/2100K* series dosimeters are **all-in-one devices** that incorporate kV and pulse next to time, dose and dose rate measurement. With their optional feature to output data via an USB interface, they enable waveform analysis and protocol print-outs.

2008 QUART ConeBeam CT Phantom and Software

The combination of both phantom and evaluation software introduced a **whole new concept** into x-ray QA/QC. The software automatically evaluates phantom images and thus objectively assesses the imaging performance of the x-ray system.

2012 QUART didoNEO Series

The new didoNEO continues to advance the role that genuine technology plays in **superior measurement applications** by expanding user capabilities, maximising efficiency, increasing flexibility, improving quality control and service while reducing process time and work-flow limitations.

*** Physikalisch-Technische Bundesanstalt (German Meter Admission Authority)**

Genuine X-Ray QA/QC concepts – from Professionals for Professionals

Company Overview

Since its foundation in 1984, QUART has achieved a very high level of specialisation and expertise in manufacture and distribution of products for x-ray Quality Assurance (QA) and Quality Control (QC). Serving our industry for more than three decades, QUART has earned a reputation for excellent products and often **best-in-class solutions**.

Our manufacturing, service and warehouse facilities provide a wide range of inventory. Our stock enables us to fast delivery for large as well as small quantities. Additionally, our manufacturing plant is tooled to fabricate **special orders** in various quantities needed to our customer‘s specifications.

Design and Performance

Flawless performance is one of our core values in product application. Therefore, **genuine features** and technical design optimise product performance and contribute to a maximum in user benefit.

Quality

QUART prides itself in our internal quality management which has been set up early in the company history. Our committment to quality is primarily aimed at achieving **customer satisfaction** by preventing nonconformity at all stages and continuously improving the performance of our products. Our QM system has also gained ISO 9001:2008 certification.

Customisation

With almost three decades of development and manufacturing expertise, designing versatile QA/QC equipment is QUART‘s core competence. We even develop and produce items in various quantities to our **customer‘s specifications** to localise their requirements.

Service

Our service philosophy begins with a belief that our customers need their orders fulfilled accurately and delivered in the most timely fashion. At QUART, experienced, knowledgeable and trained personnel are driven to provide the **ideal service** to our customers.

Made in Germany

All our products are „**Made in Germany**“. This not only raises the excellent reputation of our products. QUART is also committed to a high level of quality, unique functionality and long-term reliability. Our products have a **2-year-warranty**.

Meters and Instruments

QA/QC Test Phantoms

All technical data in this catalog is subject to change.
QUART reserves the right to alter specifications without prior notice.

Diagnostic Dosemeters for Mammography / R&F / Dental

QUART dido2100K — Art. No. 11102
QUART dido2000K — Art. No. 11101

The QUART dido2K series of diagnostic dosemeters covers almost any field of x-ray application. No matter if conventional or digital modality, the meters can be used for measurements in: Radiography, (Pulsed) Fluoroscopy, DSA, Dental, 3D (CBCT), and Mammography.

• *dido2000K* w/o mammography functionality, rest of technical specifications identical w/*dido2100K* • multi-functional quality control platforms • optimised size and design • compact multi-functional state-of-the-art solid state detector • downsize-detector design • enables measurements in spots with limited space • straight-forward and easy detector positioning • measurements behind scatter radiation grids without limitations • no influence on the automated exposure control (AEC) • direct dose-width product (DWP) measurement at dental OPGs*

* REFERENCE: S A Mitchell and C J Martin, *Comparison of ionisation chamber and semiconductor detector devices for measurement of the dose–width product for panoramic dental units*, **J. Radiol. Prot. 33 321 (2013)**.

Technical Specifications

DOSE*	Range	5 nGy – 999 Gy	(*dido2100K*)
		10 nGy - 999 Gy	(*dido2000K*)
	Resolution	0.01 nGy	
	Uncertainty	< 5 %	
DOSE RATE**	Range	0.1 µGy/s – 0.1 Gy/s	
	Resolution	0.1 nGy/s	
	Uncertainty	< 5 %	
	Dose Rate Modes (3)	Real-Time / Period / Maximum Dose Rate	
kV	Range	21 – 36 kV / 40 – 160 kV	(*dido2100K*)
		40 – 160 kV	(*dido2000K*)
	Resolution	0.1 kV	
	Uncertainty	< 2 % (for calibrated exposure condition)	
	kV Modes (2)	kVp / effective kV (PPV)	
PULSES	Range	1 – 65.000	
	Resolution	Single Pulse	
	Uncertainty	+/- 1 Pulse	
TIME	Range	0.5 ms – 40 s (or 20 /25 / 30 s optional)	
	Resolution	0.1 ms	
	Uncertainty	< 0.5 % (+/- 0.5 ms)	
	Time Modes (2)	Exposure Time / ImagingTime (IEC 60601-2-54)	

QUART dido2100 — Art. No. 11105
QUART dido2000 — Art. No. 11104

Although the kV feature is part of the “standard” configuration of the dido2K series, the dosemeters can also be ordered without it. All other featuress will be identical, thus providing an excellent price/performance ratio compared to other equipment.

Technical Specifications

same as	*QUART dido2100K/dido2000K*
EXCEPTION	no kV functionality

*** Minimum Exposure Condition**
dido2100(K): 0.3 mA / 22 kV / no filtration / SID 80 cm
dido2000(K): 0.5 mA / 40 kV / 25mm Al / SID 100 cm

**** Trigger Level**
dido2100(K): 100 nGy/s
dido2000(K): 250 nGy/s

Precision Survey Meter

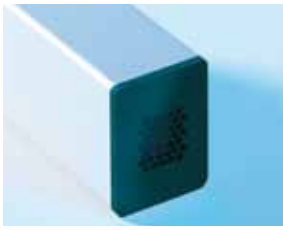
QUART didoSVM

Art. No. 11140

The ***QUART didoSVM survey dose*** meter is designed to detect beta, gamma and x-ray sources of very low intensity. Its modern design as well as premium technology underline the meter's strong performance within its scope of work.

The QUART survey meter features an unrivalled energy response to measure radiation rate and dose from x-ray, beta and gamma sources. The meter detects leakage and scatter radiation around diagnostic x-ray equipment as well as in radiation therapy environments.

• compact and light-weight radiation detector • light weight base unit • solid-state technology • fast response time to radiation • reproducible measurement results • accurate detection of signals against background noise • detects radiation from leakage, scatter beams and pinholes • detector and base unit connect magnetically for one-hand use • detector mountable on tripod or a telescopic extension for measurements in heights up to approx. 3.5 meters above ground • backlit display to assure readings in dark environments • dose rate refreshed continuously while measurement is running • powered by rechargeable battery • approximately 120 hours of continuous use • recharging duration 3–4 hours • low battery warning



PARAMETERS

Air Kerma	K
Air Kerma Rate	K°
Ambient Dose equivalent	H*(10)
Ambient Dose Rate equivalent	dH*(10)/dt
Directional Dose equivalent	H'(0.07)
Directional Dose Rate equivalent	dH'(0.07)/dt

Technical Specifications

OPERATING RANGE		15 keV – 20 MeV (Auto-Ranging) Above 15 keV for gamma and x-rays Above 1 MeV for beta radiation
DOSE	Range Resolution	3 nSv – 99 Sv 0.1 nSv
DOSE RATE	Range Resolution	1 µSv/h – 10 Sv/h 0.1 µSv/h
TIME	Range	0.5 s – 15 min
UNCERTAINTY		< 10 % (for the full dynamic range)
RESPONSE		< 1.0 s (for the full dynamic range) Measuring time of approx. 10s may be required for very low dose reates, i.e. in mammography x-ray
DISPLAY		Digital numeric value refreshed every second, Analog Bar Graph in three divisions according pre-defined danger levels*: 3.2 µSv/h – 10 µSv/h – 3 mSv/h

* Danger Levels in accordance with German Labour Protection regulations:
- Radiation Protection Act
- X-Ray Appliance Act

AUDIO OUTPUT	Signal frequency dependent on danger level

Precision Meters for Dose, Dose Rate and Time

QUART didoEASY R — Art. No. 11115
QUART didoEASY M — Art. No. 11116
QUART didoEASY MR — Art. No. 11117

The *QUART didoEASY* meters are designed for users who emphasise high precision in dosimetric applications but do not require the performance of a full-range dosemeter package.

QUART didoEASY meters can be used to measure parameters which are essential for service and quality assurance operations at x-ray equipment such as dose, dose rate and exposure time. Of course, as with all QUART meters – with maximum precision.

• simple but very precise dose measurements • NO pre-setting procedure required • quick measurement acquisition • simple setup procedure: Position - Expose - Read the TRUE DOSE value • automatic compensation for ALL beam qualities • NO further corrections or compensations required • measures dose, dose rate and exposure time • direct dose-width product (DWP) measurement at dental OPGs

REFERENCE: S A Mitchell and C J Martin, *Comparison of ionisation chamber and semiconductor detector devices for measurement of the dose–width product for panoramic dental units*, **J. Radiol. Prot. 33 321 (2013)**.

Technical Specifications

APPLICATION	Range	40 to 160 kV (*didoEASY R*) 25 to 40 kV (*didoEASY M*) 25 to 160 kV (*didoEASY MR*)
SPECIAL FEATURE		Automatic compensation for ALL radiation qualities and beam filtrations in: • Dental • RAD and Fluoro • Mammography (*didoEASY M* and *MR* only) No pre-setting procedure required No additional corrections required
CUSTOMISATION SERVICE		Customisable beam quality calibration available!
DOSE	Range Resolution Uncertainty	0.2 µGy - 999 Gy 0.01 µGy < 5 %
DWP	Range Resolution Uncertainty	0.2 µGy*cm - 999 Gy*cm between 50 - 150 kV 0.01 µGy*cm < 5 %
DOSE RATE	Range Resolution Uncertainty Dose Rate Mode (1)	0.25 µGy/s – 999 mGy/s 0.01 µGy/s < 5 % Average Dose Rate
TIME	Range Resolution Uncertainty Time Mode (1)	0.5 ms – 300 s 0.1 ms < 0.5 % (+/- 0.5 ms) Exposure Time

mAs / kVp / Exposure Time Meters

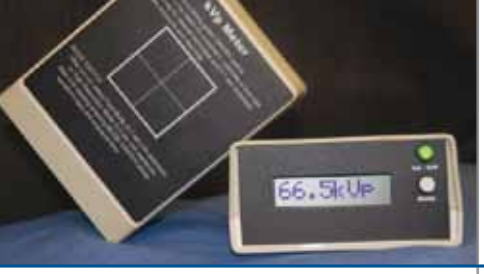
MAK1 Art. No. 11627
MAK1L Art. No. 11628

The MAK series of devices combines two instruments in one: a kVp meter as well as a mAs meter. It measures kVp, mA, mAs and exposure time. Handling the meter is very easy and straight-forward. The housing is quite robust due to use of ABS plastic.

• AC or DC x-rays • no need to set for AC/DC • mAs meter self-resetting • non-invasive kVp measurement • high accuracy • battery operated • solid-state digital design • kVp mode measures peak x-ray accelerating voltage tungsten xray generators • direct measurement of peak kV from the x-ray head • exposure time measurement • indicates x-ray waveform type (half-wave, full-wave or DC / 3-phase) • optimised for dental x-rays, also works on radiographic and fluoroscopic x-rays • large display (alphanumeric) readable from outside x-ray room • plug in mAs cable to measure mA and mAs, remove cable to measure kVp

Technical Specifications

APPLICATION	Range	45 to 125 kV *(MAK1)* 40 to 115 kV *(MAK1L)*
ACCURACY	kVp	2 % +/- 1 kV, at 25 to 100 mA (*MAK1*) or 10 to 50 mA (*MAK1L*) both 18 to 42 cm from head, for Tungsten target x-ray tube with 1.5 mm Aluminum equivalent filtration.
	Time	1 % +/- 2 ms (1/5 to 2 sec)
	mAs	Specifications same as *MAS1* (next page)
MIN. EXPO TIME		100 millisec -High Speed Mode 200 millisec -High Resolution Mode
MIN. CURRENT		7 mA (*MAK1*) or 5 mA (*MAK1L*) at 50 kV, 10 cm from x-ray
DISPLAY		10.2 mm (0.4“), Liquid Crystal, 8 Character Alphanumeric
CONTROLS		ON/OFF Switch Illuminated MODE Switch - momentary push-button No connections needed for kVp measurement
POWER		4 AA batteries accessible (BATTERY LIFE 48 hours continuous) Low batt. indicator (Typically 9 months of normal use)
OP CONDITIONS		+10 to 40 °C, (50 to 104 °F)
CALIBRATION		Annually (recommended)
WARRANTY		2 years from ship date
SIZE		150 x 120 x 58.5 mm, (5.9 x 4.7 x 2.3 inches)
WEIGHT		0.7 kg, (1.5 lb)



mAs / Time Meters & kVp / Time Meters

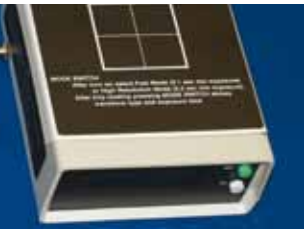
MAS1

Art. No. 11625

• small hand held size • measures current from any x-ray: single phase / full wave / multiphase / DC • self-resetting • battery operated • built in measurement of battery • use for medical or dental x-rays • use for digital x-ray • displays mA, mAs and exposure time for each reading • easy to use

Technical Specifications

APPLICATION	Range	200 mA Full Scale: 5 – 200 mA / 0.1 mA Resolution 2 A Full Scale: 1 mA Resolution
ACCURACY	mA/mAs	1 % +/- 2 mA on all ranges
CONNECTION		Tip Jacks, Test leads with two alligator clips 1 meter cable with two alligator clips
DISPLAY		5.5 mm, (0.22“) Liquid Cr ystal, 2 lines, 12 Character Alphanumeric
CONTROLS		ON / OFF / Range Switch
POWER		9 Volt battery accessible (BATTERY LIFE 100 hours continuous) Low battery indicator (After over one year of normal use)
OP CONDITIONS		+10 to 40 °C, (50 to 104 °F)
CALIBRATION		Annually (recommended)
WARRANTY		2 years from ship date
SIZE		80 X 147 X 40 mm, (3.15 X 5.8 X 1.6 inches)
WEIGHT		250 g, (0.55 lb)



K2

Art. No. 11629

K2L

Art. No. 11630

• measures kVp for tungsten generators • single phase / full wave / multiphase / DC • direct measurement of peak kV from the x-ray head • exposure time measurement • indicates x-ray waveform type (half-wave, full-wave or DC / 3-phase) • optimized for dental x-rays, also works on radiographic and fluoroscopic xrays • large display (alphanumeric) readable from outside x-ray room

Technical Specifications

APPLICATION	Range	*K2:* *K2L:*	45 to 125 kV 40 to 115 kV
ACCURACY	kVp		2 % +/- 1 kV, at 25 to 100 mA (*K2*) or 10 to 50 mA (*K2L*) both 18 to 42 cm from head, for Tungsten target x-ray tube with 1.5 mm Aluminum equivalent filtration.
	Time		1 % +/- 2 ms (1/5 to 2 sec)
MIN. EXPO TIME			100 ms - High Speed Mode 200 ms - High Resolution Mode
MIN. CURRENT			7 mA (*MAK1*) or 5 mA (*MAK1L*) at 50 kV, 10 cm from x-ray
DISPLAY			10.2 mm (0.4“), Liquid Crystal, 8 Character Alphanumeric
CONTROLS			ON/OFF Switch Illuminated MODE Switch - momentary push-button No connections needed for kVp measurement
POWER			4 AA batteries accessible (BATTERY LIFE 48 hours continuous) Low batt. indicator (Typically 9 months of normal use)
OP CONDITIONS			+10 to 40 °C, (50 to 104 °F)
CALIBRATION			Annually (recommended)
WARRANTY			2 years from ship date
SIZE			150 x 120 x 58.5 mm, (5.9 x 4.7 x 2.3 inches)
WEIGHT			0.7 kg, (1.5 lb)

X-Ray Field & Fan-Beam Measurement

QUART nonius

Art. No. 13209

The *QUART nonius* is an easy-to-use but very sophisticated measuring instrument to verify size and geometrical properties of x-ray fields. It can also be used to analyse characteristics of fanned x-ray beams. The *QUART nonius* is technically highly flexible: it can be used in digital as well as conventional X-Ray Technology. In any case, its precision is an absolute strong point – as it goes down into to the nonius range of 0.1mm!

Digitisation in x-ray technology makes traditional screen-films less available. Originally, they were used for checks on x-ray beam properties. Today, the *QUART nonius* performs the same task. Yet, it provides more substantial features.

The *QUART nonius* can be used to verify if the light visor matches the actual x-ray field. In addition, the nonius provides the option to assess the position and width as well as the dose profile of fanned x-ray beams. For that purpose, it features improved fields to line-up the light field or laser markings.

• measurement data and results transferred to PC in real time • display of test result and visualisation in unique nonius software programme • all results automatically saved and stored on PC hardware • can be loaded into the software at a later point of time for evaluation purposes • software provides protocol function including hardcopy print-out • *nonius* is equipped with USB cable and comes with associated software • compact carrying case included • can be hooked up to any Laptop or Tablet PC with Windows OS • easy and quick device positioning (also in vertical position) • optional *QUART bridge* holder available as accessory

MODE OF OPERATION

Operating the *QUART nonius* is easy and straight-forward:
1. Connect the device via USB to a Laptop or Tablet PC (Windows OS required).
2. Position the head unit at the respective position.
3. Use light field or a reference point for alignment.
4. Trigger the *QA/QC* exposure.
5. Immediately evaluate the results.

Technical Specifications

Accuracy / Resolution	+/- 0.1 mm
Exposure Threshold	Dose ≥ 200 µGy Dose Rate ≥ 20 µGy/s
Minimum Exposure	Variable; depends on application
Measurement Method	Open measurement – no added filtration
Connectivity	Standard USB (2.0) Plug and Play Component
Operation Temperature Range Storage Temperature Range	15 – 40 °C 0 - 50 °C
System Requirements Operating System	Pentium III, 128 Mb RAM, min. 1x USB Windows 7, Vista, XP
Sensor Area	40 mm Length (16 Active Sensor Elements) Radiopaque center marker (Visible in test exposure) Improved sections for light field and laser markings
Weight	190 g (without USB Cable)
Size of Head Unit	55 x 75 x 15 mm (W x L x H)

High-Precision Light and Luminance Meter

MaVo_spot

Art. No. 11705

The *MaVo_spot USB* is a precision instrument for specific requirements of medical light measurement applications. It features a measuring angle of 1° (strict Class B requirement) and provides luminance measurements for distances between 1m to ∞.

The *MaVo_spot* is equipped with a high quality SLR optical system having a viewingfield of 15° and clearly marked measuring angle of 1° in the center. An external focusing ring is also provided. Two close-up lenses (optional) allow for a measuring distances down to 34 cm.

Contact measurements of the luminance directly on the screen of the monitor can be performed with a photometric measuring probe (optional accessory for this purpose).

• light sensor spectral responsitivity matched to the photopic daylight vision of the human eye V(λ) • accuracy classification for luminance meters as defined in DIN 5032-7, Class B and EN 13032-1, Appendix B • *MaVo_spot USB* meets all requirements for Class B devices • data memory for storing up to 1000 single measuring values • can be subdivided into 10 groups • memory data can be visualised and processed directly via key pad and display • data handling for PC via USB Port enabled • standard software included

Technical Specifications

APPLICATION	Modes	Distance and proximity/contact measurement For back-lit or light emitting surfaces, viewboxes or digital monitors
APPLICATION	Range cd/m², fc	0.01 cd/m² to 999 990 cd/m² or 0.01 fL to 30 000 fL 4 dynamic ranges, auto-setting
	Range lx	0.1 lx to 99 990 lx 4 dynamic ranges, auto-setting
ACCURACY		+/- 3 %
MEMORY		Storage of up to 1.000 measurements
DISPLAY		Cleartext, Liquid crystal
CONTROLS		Self-explaining 4 Buttons, 1 switch Manual correction input Plus DIP switches in the battery compartment, if required
POWER		2 AA batteries accessible (BATTERY LIFE typically for 5.000 measurements)
CALIBRATION		2 years (recommended)
WARRANTY		2 years from ship date
WEIGHT		400 gr. (w/o battery)
DELIVERY		• Luminance head section • Close-up lenses • Lense cover • Standard software • Transport case
ACCESSORIES		• Reflexion standard (recommended) • Carrying strap (recommended)

Light and Luminance Meters (Medical and Non-Medical)

MaVo_lux 5032B Medical

Art. No. 11709

• device for medical application • luminance and illumination measurement • Class B device

Technical Specifications

APPLICATION	Modes	Distance and proximity/contact measurement
APPLICATION	Range cd/m², fc	0.1 cd/m² to 1 999 990 cd/m² or 0.01 fL to 199 900 fL 5 dynamic ranges, auto-setting
	Range lx	0.01 lx to 199 990 lx 5 dynamic ranges, auto-setting
ACCURACY		+/- 3 %
MEMORY		Storage of up to 1.000 measurements
DISPLAY		3½ digits, Liquid crystal
CONTROLS		Self-explaining 6 Buttons
POWER		1 AA battery accessible (BATTERY LIFE typically 45 hours)
CALIBRATION		2 years (recommended)
WARRANTY		2 years from ship date
WEIGHT		200 gr. (w/o battery)
DELIVERY		• Base unit / Lense head • Luminance lense • Lense cover and contact ring • Standard software • Transport case

MaVo_lux 5032C Non-Medical

Art. No. 11710

• device for non-medical application • luminance and illumination measurement • Class C only device

Technical Specifications

APPLICATION	Modes	Distance and proximity/contact measurement
APPLICATION	Range cd/m², fc	1 cd/m² to 1 999 990 cd/m² or 0.1 fL to 199 900 fL 4 dynamic ranges, auto-setting
	Range lx	0.1 lx to 199 990 lx 4 dynamic ranges, auto-setting
ACCURACY		+/- 7.5 %
DISPLAY		3½ digits, Liquid crystal
CONTROLS		Self-explaining 6 Buttons
POWER		1 AA battery accessible (BATTERY LIFE typically 45 hours)
CALIBRATION		2 years (recommended)
WARRANTY		2 years from ship date
WEIGHT		200 gr. (w/o battery)
DELIVERY		• Base unit / Lense head • Luminance lense • Lense cover and contact ring • Standard software • Transport case

Ambient Light Monitoring Device

QUART MONI_lux

Art. No. 11701

The *QUART MONI_lux* is designed for real-time monitoring of light and ambient light conditions. The device evaluates and signals if present light conditions are suitable for critical assessment of x-ray images and if ergonomic working conditions are present. The *MONI_lux* can be applied in digital or conventional x-ray imaging environments (e.g. on top of monitors or viewboxes).

The *QUART MONI_lux* automatically checks if the ambient light is not too bright to assure proper viewing conditions. For this purpose it has been factory calibrated to signal the appropriate (green) range between 20 – 50 lux.

The device also signals when the room light is too dark for critical image assessment (yellow). The reason for this is that in too dark environments, light areas in an x-ray image tend to glare when viewed on a viewbox or on a digital monitor. The prevention of this assures an ergonomic image viewing environment where the radiologist's concentration is kept up. Thus, the ability to recognise important details in the image is ensured.

Regarding various national QA/QC Standards, the use of the *QUART MONI_lux* may also reduce the scope of testing. Example Germany: When continuously used in image viewing environments, parameters such as Maximum Contrast and Veiling Luminance need only be checked twice per year at a monitor instead of four times.

The device is designed for continuous long-time use. Its power consumption is very low. The power supply can be established from an available USB port at any workstation.
The *QUART MONI_lux* complies with IEC 61223-2-5 and DIN 6856-1.

Technical Specifications

APPLICATION	Range	Yellow < 20 lux Green 20 – 50 lux Red > 50 lx (blinking) For light emitting devices, viewboxes or digital monitors
PLACEMENT		On top of viewing device (to be flush with monitor front)
SIZE		7.5 x 5.5 x 1.5 cm (W x L x H)
WEIGHT		50 g
POWER		USB direct
PROTECTION CLASS		Class II equipment VDE 0106, part I

Calibrated Reference Sensitometer and Scanning Densitometer

darkscan duo ref

Art. No. 11605

The *darkscan duo ref* is a high-precision combination of reference sensitometer and scanning densitometer in one unit. It is designed for acceptance testing as well as daily routine testing of x-ray film-screen equipment according IEC 61223-2-1, DIN V 6868-55 and DIN 6868-2 standards.

The device combination provides functional and technical advantages such as one power supply (batteries or rechargeable batteries), less maintenance cost and less room for operation or storage. The sensitometer section is suitable for blue and green x-ray films. The exposition for blue and green films is manually adjustable in 5 steps. The step wedge with 21 steps has an optical step wedge constant of 0.15. The exposition homogeneity of each step is almost constant. The maximum tolerance is ± 0.01 log (H).

• scanning densitometer allows measurement of single grey steps in „manual" mode • up to 21 grey steps in „automatic" mode • all optical densities of a 21 step grey scale measured automatically when pulling the film at constant speed beneath the measuring orifice • bedstops provide control over film movement • optical densities measured with an accuracy of D ± 0.0l • memory storage of grey values of 25 film strips, 21 grey steps each • standard parameters like Minimum Density (D_{min}), Light Speed (LS), Light Contrast (LC), Contrast Index (CI), and Speed Index (SI) automatically calculated • connection to PC via serial connection enabled • software DARKSCANFOR WINDOWS with features for standard compliant documentation • sensitometer provided with precise 21-step wedge • reference sensitometers calibrated to minimum tolerance at DKD laboratory*

Technical Specifications

SENSITOMETER SECTION

Exposure color	Selectable blue or green
Peak Wavelength	Blue (460 ± 10) nm Green (510 ± 10) nm
Exposure H[lx.s]	5 steps selectable for each exposure color
Exposure Homogeneity	± 0.01 log (H) for each step
Step Wedge	21 steps
Step Wedge Constant	0.15 ± 5 %
Reference Sensitometer	according to DINV6868-55
Calibration	2 years (recommended)

DENSITOMETER SECTION

Spectral Characteristics	ANSIPH 2.19-1979 (DIN 4512-3) for light source
Sensor Optics Size	3 mm diameter
Measuring Range	D = 0 – 4.5
Measuring Accuracy	± 2.0 % for D~ 3; ± (1.5 – 2) % for D>3
Accuracy	D = ±0.0l

DELIVERY

- *darkscan duo ref*
- Pins for screen-film positioning
- Calibration strip, D=2.8
- Power supply
- 4 AA batteries (1.5 V)
- *DARKSCAN QA Software*

ALSO AVAILABLE

darkscan duo	Sensitometer/Scanning Densitometer for routine tests only
darklight duo	Sensitometer/Densitometer w/o scanning modality

*** DKD - Deutscher Kalibrierdienst (German Calibration Service)**

Densitometer / Sensitometer

The *darklight* single purpose devices comply with IEC 61223-2-1 and DIN 6868-2. They are suitable for routine tests of all screen-film formats, and they are very easy to use.

A great deal of practical study had been put into the development of the sensitometer/densitometer range of devices. The wide screen supporting and positioning surface allows processing of x-ray films of various formats - from small to large.

Mode of Operation

The densitometers allow measurements of single grey steps up to a density value of 4.5. The grey step to be measured is placed beneath a measuring orifice. Pressing the „Lamp“ key initiates the measurement. The optical densities are measured with a reproducibility of D ±0.01.

The sensitometers are suitabe for blue and green films. The exposure for blue and green films is manually adjustable in 5 steps. The step wedge with 21 steps has an optical step wedge constant of 0.15. The exposition homogeneity of each step is almost constant. The maximum tolerance is ± 0.01 log (H).

GENERAL SPECIFICATIONS

Size	240 x 165 x 60 mm
Weight	800 gr. (without batteries)
Operating Temperature	15°C – 35 °C
Display	Integrated clear text instructions for manual operation
System Languages	German, French, English

darklight densi ec Densitometer Art. No. 11608

Technical Specifications

SPECTRAL CHARACTERISTICS	ANSIPH 2.19-1979 (DIN 4512-3) for light source
SENSOR OPTICS	Size 3mm diameter
MEASURING RANGE	D = 0 – 4.5
MEASURING ACCURACY	± 2.0 % for D~ 3; ± (1.5 – 2) % or D>3
ACCURACY	D = ±0.0l

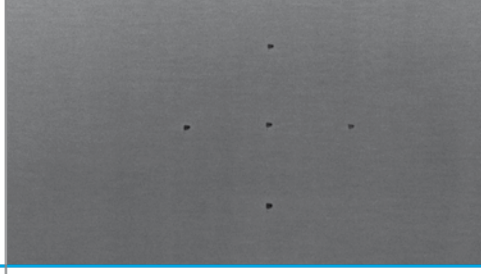
darklight sensi Sensitometer Art. No. 11606

Technical Specifications

EXPOSURE COLOUR	Selectable blue or green
PEAK WAVE LENGTH	Blue (460 ± 10) nm, Green (510 ± 10) nm
EXPOSURE H[lx.s]	5 steps selectable for each exposure color
EXPOSURE HOMOGENEITY	± 0.01 log (H) for each step
STEP WEDGE	21 steps
WEDGE CONSTANT	0.15 ± 5 %
REFERENCE	according to DINV6868-55
CALIBRATION	2 years (recommended)

ALSO AVAILABLE

darklight sensi ref	Reference Sensitometer for acceptance tests



Focal Spot Measurement Tools

The *QUART Pinhole Cameras* are test tools designed to be used in conventional as well as digital radiographic applications where focal spot assessment is required.

The tools are designed to precisely measure both length and width of the effective focal spot size of x-ray equipment projected down the central ray in the x-ray field. Contrary to a slit camera, both of these focal spot properties can be identified in only ONE exposure!

• tools enable analyses if ageing effects are present in the x-ray tube • hot spots within projected focal spot are imaged as well as areas with less intensity • density distribution analysis of the focal spot directly by using focal spot image • materials of pinhole masks provide ideal contrast and sharpness • automatic exposure control (AEC) can be used for the test • time saving procedure for focal spot property assessment • all versions comply with essential requirements of NEMA, DIN, IEC, AAPM, IPEM, and other standards and regulations

Test Procedure

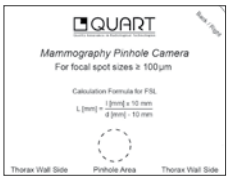
The application of the pinhole cameras is very simple and straight forward:
1. Position the test tools as close to the focal spot as possible.
2. Set the x-ray equipment for an exposure using the AEC function.
3. Expose.
4. Access the test image (or develop the film with the image).
5. Geomtrically evaluate the bead pattern in the image.
6. Finally, apply a formula to determine true focal spot sizes (printed on the tools).

QUART RAD Pinhole Camera Art. No. 13231

DIMENSION	176 x 169 mm, marked pinhole area Can also be used with light visor adapter (see art. 13240)
THICKNESS	3.1 mm
PINHOLE MASK	Metal foil w/ bead pattern Covered by 2 protective layers
DETAILS	Can be inserted into the light visor rails on the tube head Fits every major brand's equipment, 2 insert options

QUART MAMMO Pinhole Camera Art. No. 12301

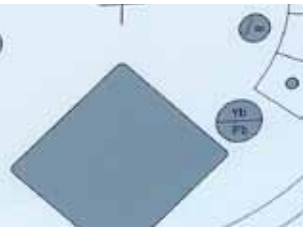
DIMENSION	108 x 80 mm, marked pinhole area
THICKNESS	2.0 mm
PINHOLE MASK	Metal foil w/ bead pattern Covered by 2 protective layers
DETAILS	Can easily be fixed on the tube head due to light weight and compact size



QUART DENTAL Intra-Oral Pinhole Camera Art. No. 12180

HEIGHT	210 mm, pinhole area visible
PINHOLE MASK	Metal foil w/ bead pattern
DETAILS	Accepts all tube beam applicators with standard size Flexible rods for universal handling possibilities Positioning close to the focal spot enabled Slot(s) prepared to accept variety of image receiving media

Radiography / Fluoroscopy Test Phantom



QUART SP_dl — Art. No. 12204

QUART SP_dl Extension — Art. No. 12205

kV Calibration for SP_dl Test Object — Art. No. 12204K

The QUART SP_dl phantom is designed to be used for QA/QC routine testing in Digital and Conventional x-ray applications ranging from DR, CR to Fluoroscopy equipment. Only one exposure is required to collect all necessary parameters to determine the imaging quality of the x-ray system. After the exposure, the test image is evaluated visually.

The QUART SP_dl phantom complies with IEC, DIN 6868-150 and DIN 6868-4 as well as IPEM, ÖNORM, PN-EN standards and AFSSAPS regulations.

Phantom and Test Procedure

QC tests are carried out at initial equipment installation to establish a visual reference. On a regular routine basis, they are meant to ensure the constancy of the system‘s imaging capabilities. Any deterioration in imaging performance is revealed by the visual evaluation of the test images. A single image of the QA/QC phantom contains a lot of information for that purpose.

The *QUART SP_dl* can also be used as a Pediatric Phantom (Child Phantom), if no additional filtration, i.e. Al or PMMA/Cu, is used in QA/QC test procedures.

Genuine Feature: kV Stability Test*

The phantom‘s special feature is the integrated kV test object. With it, the generator output stability can be monitored on a regular basis without performing invasive or non-invasive kV measurements. As the kV test object consists of 2 different materials, 2 transition points can be defined for a specific radiation quality. The accuracy of the method is +/-2 kV for a pure visual evaluation. When measured with a luminance meter (digital) or a sensitometer (film/screen), the accuracy of the method will increase to +/- 0.5 kV.

PARAMETERS

_ Spatial Resolution
_ Low-Contrast Resolution
_ Radiation Field Alignment
_ Image Homogeneity
_ Artefacts, Image Flaws, etc.
_ Generator Stability
_ Radiation Quality
_ Dose Indicator

Technical Specifications

INTERNAL FILTRATION	1.5 mm standard compliant copper filtration 17 mm PMMA for tissue simulation
DYNAMIC STEP WEDGE	17 Steps; thickness 0 – 3.5 mm
LOW-CONTRAST RESOLUTION	8 Test objects (Aluminium; 0.4 – 4 mm; Ø 15 mm) 17 Additional test objects; 1 object per step (Ø 4 mm)
HIGH-CONTRAST RESOLUTION	Line pair bar pattern (Type 38 / Pb 0.05 mm / 45 °)
kV STABILITY	Unique kV test object (Yb + Pb)
X-RAY FIELD ALIGNMENT	Field size markings
CENTERING	Radio-opaque center marker
SIGNAL NORMALISATION	Homogeneous area in phantom center
VERTICAL POSITIONING	Wire mount system available for tests of wall-mounted units
SIZE	200 x 200 x 18.5 mm (L x W x H)
LARGE FIELDS	**Extension** available to provide a homogeneous surface and field markings for formats **up to 33 cm x 33 cm**

* REFERENCE: Eder H, Schöfer H, Mota H. *Routine monitoring of tube voltage with edge filters for purposes of quality control.* (in Germany) **Röntgenpraxis; Zeitschrift Für Radiologische Technik, Vol. 36 (5), pp. 173-7, May 1983**; PMID: 6867864; ISSN: 0035-7820.

CR / DR / Screen-Film R+F Test Phantom

QUART SP digi

Art. No. 12203

The *QUART SP digi phantom* is designed be used for QA/QC in radiographic x-ray equipment featuring digital storage screen (CR) or CCD image detectors (DR). The phantom does not feature planar grid structures, thus clearly revealing disturbing artefacts.

It complies with DIN 6868-13, -58 and -150 as well as IEC 61223-3-1 and -2-11.

PARAMETERS

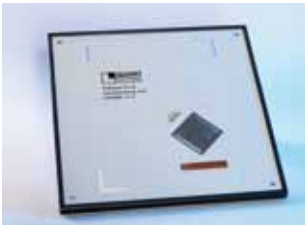
_ Spatial Resolution
_ Low-Contrast Resolution
_ Radiation Field Alignment
_ Image Homogeneity
_ Signal Normalisation
_ Artefacts, Image Flaws, etc.
_ Dose Indicator

Technical Specifications

INTERNAL FILTRATION	1.0 mm standard compliant copper filtration 11 mm PMMA for tissue simulation
DYNAMIC STEP WEDGE	7 Steps; thickness 0 – 2.3 mm
LOW-CONTRAST RESOLUTION	6 Test objects (Aluminium; 0.1–0.7 mm)
HIGH-CONTRAST RESOLUTION	Line Pair Bar Pattern (Type 38 / Pb 0.05 mm/45 °)
X-RAY FIELD ALIGNMENT	Field size markings for all major Fields-of-View
CENTERING	Center marker, also visible when *QUART ZTB* Beam Alignment tool is in use (see next page)
SIGNAL NORMALISATION	Homogeneous area in phantom center
DESIGN	Plain structure for optimal artefact visibility
VERTICAL POSITIONING	Wire mount system available for tests of wall-mounted units
SIZE	330 x 330 x 12 mm (L x W x H)

QUART SP vario

Art. No. 12202



The *QUART SP vario* phantom is designed for QA/QC in screen-film radiography and conventional fluoroscopy equipment. The phantom complies with DIN 6868-3 and -4.

The phantom does not feature planar grid structures, thus clearly revealing disturbing artefacts.

PARAMETERS

_ Spatial Resolution
_ Low-Contrast Resolution
_ Radiation Field Alignment and Field Symmetry
_ Image Homogeneity
_ Optical Density
_ Artefacts, Image Flaws, etc.

Technical Specifications

DYNAMIC STEP WEDGE	7 Steps; thickness 0 – 1.6 mm
OPTICAL DENSITY	Test object in central position
HIGH-CONTRAST RESOLUTION	Line Pair Bar Pattern (Type 38 / Pb 0.05 mm / 45 °) *QUART SP econo* phantom (Art. No. 12201) available w/o line pair test pattern
X-RAY FIELD ALIGNMENT	Field size markings for 24 x 18 cm standard FoV Flexible field size markings in 1.0 cm division
CENTERING	Center marker designed for use with *QUART ZTB* Beam Alignment tool (see next page)
DESIGN	Plain structure for optimal artefact visibility
VERTICAL POSITIONING	Wire mount system available for tests of wall-mounted units
SIZE	280 x 280 x 10 mm (L x W x H)

Beam Alignment / Contrast Detail / Screen-Film Contact Tools

QUART ZTB

Art. No. 13201

The *QUART ZTB* Beam Alignment Test Tool is very easy to use due to pre-defined positioning options: center marker of QUART IQ test phantoms / center marker of specifically prepared dental test phantoms / center of x-ray fields.

The tool has a concentric 2-ring structure for checks on alignment accuracy. Four ring contact options correlate with different quantities of alignment between 0 – 6 °.

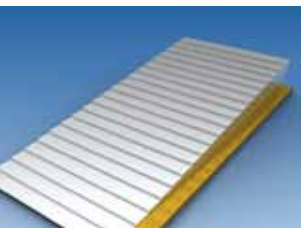
QUART NKK

Art. No. 13207

The QUART Low-Contrast Wedge is compact and small in size. It is designed to evaluate contrast detail for a wide range of x-ray equipment. The wedge contributes to a precise identification of visual perceptibility limits (limiting contrast detail similar to an IQF or Contrast Detail curve) by providing the specific infomation if the wedge structure is still visible against the noise in the image. In addition, it provides the possibility to relate perceptibility levels to specific image receiver doses or rates.*

The positioning is straightforward as the tool is directly placed on the phantom top side. The wedge features 3 low-contrast holes Ø 2.0 mm / wedge length: 4.0 cm / predefined wedge constant.

* REFERENCE: Schoefer H, *Quantification Potential of Low-Contrast Imaging at Image Intensifier Units for Acceptance Tests according DIN 6868-50*, **Z. Med. Phys. 4 (1994) 221-223** (in Germany).



RAD Step Wedge

Art. No. 12206

21-step aluminium wedge for tests of dose reproducibility and sensitometric properties of radiographic screen-film systems. Features numbers to mark each step.

SIZE	231 x 110 x 31.5 mm
STEPS	21, 1.5 mm graduation per step

QUART KAT 43 x 45

Art. No. 13604

The *QUART KAT 43 x 45* is used to check the screen contact at conventional radiography equipment with screen-film technology.

Poor screen contact would be revealed by variations in density on the developed film when evaluating the test image either visually or using a densitometer. The test tools features an open space to perform optical density (OD) measurements.

MESH DISTANCE	3.2 mm
WIRE	Ø 0.7 mm diameter

AEC Test Set / Standard Compliant Added Filtration

QUART AEC RAD Test Set

Art. No. 13230

The *AEC RAD test set* consists of 12 PMMA plates of varying thicknesses. The set is used to test the automatic exposure control features of radiography equipment according IEC 61223-3-1.

Additional sheets to add to the set are available on request.

SIZE	240 x 240 mm
THICKNESS	9x 20mm / 1x 10mm / 2x 5mm

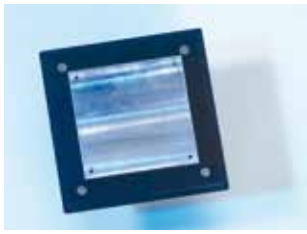
QUART al250

Art. No. 13202

The *QUART al250* is a standard compliant filter to perform QA tests in Radiography / Fluoroscopy applications. The filter features an adaptor to be used for many rails of conventional and digital R&F x-ray equipment.

A filter adaptor is available to use the filter for collimator rails with smaller distances (see art. 13240).

THICKNESS	25 mm Aluminium
PURITY	99.5 % (guaranteed)
RAIL DISTANCES	176 mm or 169 mm



Filter Adaptor

Art. No. 13240

Adaptor to use *QUART al250* for collimator rails with distances between 98 mm – 174 mm, e.g. as used for mobile C-arm x-ray equipment.

RAIL DISTANCES	98 mm to 174 mm

QUART FST

Art. No. 13206

The *QUART FST* filter stand is designed to provide appropriate support when a special test setup is required. The stand can be placed directly on a R&F phantom, or it can be used to position the filter beneath the patient table at C-arm units (under-couch positioning).

Extension Set

Art. No. 13208

4 additional poles – for increased height up to 80 cm

QUART cu10

Art. No. 13203

The *QUART cu10* is a standard compliant filter to perform QA testing in radiography. The filter is to be used for tests of conventional or digital R&F equipment with exposure conditions at/above 100 kV.

THICKNESS	1.0 mm Copper
PURITY	99.9 % (guaranteed)

Subtraction Angiography QA

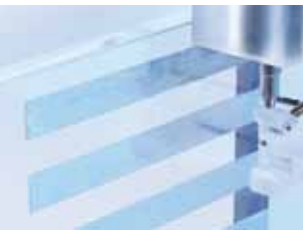
QUART DSA Phantom

Art. No. 12401

The *QUART DSA* phantom is designed for maximum precision in QA/QC of Digital Subtraction Angiography equipment. It is a Type B sliding design which maximises QC performance in subtraction angiography applications.

Unique in its kind, the phantom features longitudinal sliding technique to minimize structural movement artefacts in the test image. In comparision, other phantoms available may exceed artefact limits caused by transversely forced movements.

The phantom complies with DIN 6868-4, -150 and IEC 61223-3-3.



Mode of Operation

• after simulating the injection process, the *QUART DSA* reveals lateral borders of contrast step wedge • low-contrast steps clearly visible in the test image • provides optimal threshold identification in the test image • application note for *contrast-to-noise ratio evaluation* available

PARAMETERS

_ Dynamic Range
_ Contrast Sensitivity
_ Artefacts
_ Attenuation Compression (Logarithmic Compression)
_ Visual Spatial Resolution (in combination with Type 38 Line Pair Test Pattern)
Test Pattern properties: 45° / 0.05 mm Pb / 20 line pair groups / 0.6 – 5.0 Lp/mm
Position: Limiting line pair should be located centrally on Step No. 4.
Diagonal arrangement is recommended to prevent aliasing effects

Technical Specifications

PHANTOM MAIN BODY	PMMA
SLIDER	PMMA
VESSEL SIMULATION	4 aluminium strips Distance: 10 mm between strips Purity: 99.5 % (guaranteed) Thickness: 0.05 / 0.1 / 0.2 / 0.4 mm Strip width: 10 mm
TISSUE SIMULATION	Step wedge 7 copper steps Steps 0.2 – 1.4 mm
LOGARITHMIC COMPRESSION	1 additional copper step Height: 0.2 mm
REMOTE	Pneumatic Control Length: 7 m
SIZE	Phantom Main Body 150 x 150 x 57 mm (L x W x H) Slider 300 x 90 x 9.5 mm (L x W x H)

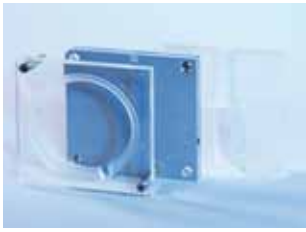
Dental Test Phantom

QUART dent/digitest

Art. No. 12107

The *QUART dent/digitest* line of phantoms is designed to be used for QA/QC acceptance and routine testing in digital dental x-ray applications ranging from intra-oral, panoramic and cephalometric equipment. The phantoms comly with IEC 61223-3-4 and IEC 61223-2-7, DIN 6868-151 and DIN 6868-5 as well as IPEM, ÖNORM, PN-EN standards and AFSSAPS regulations.

• features notch for optional customised *dent/digi H* OPG holder fit (see below) • universal Ceph holder also available (see below) • separable design for all dental modalities • slit to slide out intra-oral sensor without pulling the cable • enables secure sensor cable routing • 2-point fitting for cephalometric systems



PARAMETERS

_ Spatial Resolution
_ Low Contrast Resolution
_ Radiation Field Alignment
_ Image Homogeneity
_ Dose Equivalent
_ Artefacts, Image Flaws, etc.

Technical Specifications

INTERNAL FILTRATION	6.0 mm standard compliant aluminium filtration
LOW-CONTRAST RESOLUTION	4 objects (Ø 2.5/2/1.5/1 mm)
HIGH-CONTRAST RESOLUTION	Line pair bar pattern (2.5/2.8/3.1/5.0/5.8/6.3 Lp/mm; 0.05 Pb / 45°)
SLOTS	for digital storage screen, intra-oral sensor, dose detector
CENTERING	3 centring rings to fit variety of tube diameters
SIZE	80 x 80 x 3.6 mm (L x W x H)

QUART dent/digi H

Art. No.: Equipment/Type specific

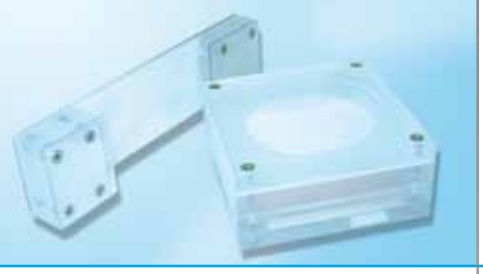
Customised manufacturer specific holders are available to provide quick and reproducible positioning of the phantom in the tomographic plane. Most contemporary brands and units are already represented. More on request.

AJAT / BLUEX / FONA	PantOs Series / ART Plus Series / XPAN Series
GENDEX	Orthoralix 8500/9200
J. MORITA	IC-5/Veraviewepocs
KODAK / CARESTREAM	K8000/K9000
NEWTOM / MYRAY	VG series/Giano / Hyperion X Series
OWANDY / VILLA SISTEMI MEDICALI	Imax Series / Rotograph Series
PLANMECA	Proline/(ProOne/ProMax)
RAY	RAYSCAN α Series
SIRONA	OP3/5/10/100/Orthophos Series
SOREDEX	OP30/OP100/OP200
VATECH / EWOO	Pax/Picasso Series

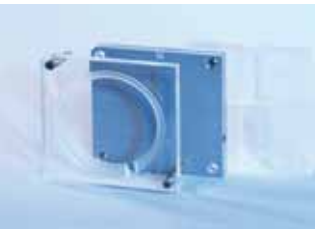
QUART Universal Ceph Holder

Art. No. 12161

Universal phantom holder for dent/digitest 3.x and 2.x. Positions phantom reproducibly for QA tests of the dental CEPH modality.



Enhanced Digital Dental Phantom / Coventional Dental Phantom



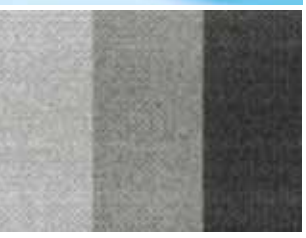
QUART dent/digitest M1 Art. No. 12108

QUART dent/digitest M2 Art. No. 12109

The *QUART dent/digitest M1 & M2* phantoms are extended versions of the *digitest* line of products. The phantoms incorporate additional test objects which allow a very detailed image examination and/or critical assessment of any dental x-ray system's performance.

Technical Specifications

INTERNAL FILTRATION	6.0 mm standard compliant aluminium filtration
LOW-CONTRAST RESOLUTION	6 objects (Ø 2.5/2/1.5/1/0.75/0.5 mm)
CONTRAST DETAIL	Low-Contrast Wedge to determine actual perceptability limit Wedge is integrated in the phantom body, located between line pair resolution bar pattern and low-contrast objects (fig.)
LIMITING CONTRAST DETAILS	Limiting contrast detail visibility in the integrated wedge is a simple test (similar to IQF or Contrast Detail curve)
HIGH-CONTRAST RESOLUTION	*M1*: 4/5/5.5/6/7/8/9 Lp/mm; 45° / 0.05 Pb) for Pano/Ceph *M2*: 10/12/14/16/18/20 Lp/mm; 45° / 0.05 Pb) for intra-oral
SLOTS	for digital storage screen, intra-oral sensor, dose detector
CENTERING	3 centring rings to fit variety of tube diameters
SIZE	80 x 80 x 3.6 mm (L x W x H)



QUART dent II Art. No. 12101

QUART dent II mpc Art. No. 13102

The *QUART dent II test* phantom and *QUART dent II mpc* holder are designed to be used for acceptance and routine testing in conventional dental x-ray applications ranging from intra-oral to panoramic and cephalometric equipment. Both are designed to test equipment featuring screen-film technology.

The *QUART dent II* phantom and holder comply with IEC 61223-3-4 and IEC 61223-2-7, DIN 6868-151 and DIN 6868-5 as well as IPEM, ÖNORM, PN-EN standards and AFSSAPS regulations. The *dent II mpc* holder is only to be used with the *QUART dent II* phantom.*

PARAMETERS

_ Optical Density
_ Homogeneity
_ Radiation Field Alignment
_ Artefacts, Image Flaws

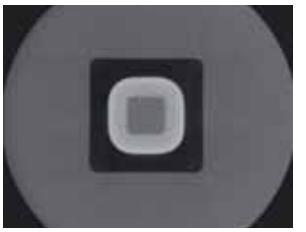
Technical Specifications

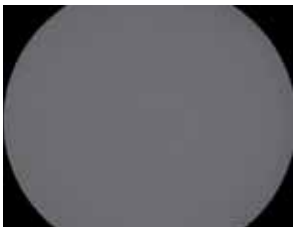
ATTENUATION OBJECTS	Step Wedge featuring: 0.3 mm Cu / 0.3 mm Cu + 8 mm PTFE / 0.3 mm Cu + 16 mm PTFE according anatomical attenuation properties
PANO/CEPH FILTRATION	*dent II mpc* holder features integrated 0.5 mm copper filtration
SLOTS	for screen-film, x-ray dose detector
CENTERING	3 centring rings to fit variety of tube diameters
ATTACHMENT	Magnetic attachment of *phantom* and *holder* at conventional Pano and Ceph units Fail-safe hook – if no metal surface is present
SIZE	*dent II*: 80 x 80 x 3.2 mm (L x W x H)

*No compatibility to other products.

ConeBeam CT / 3D Test Phantom

QUART DVT_AP and QUART DVT_tec Test Set Art. No. 12130





The *QUART DVT_AP* phantom is designed to be used as a universal tool for QA/QC within the full range of Cone Beam CT (CBCT), Dental Volume Tomography (DVT) and 3D imaging equipment. That includes applications in dental 3D imaging as well as angiography in C-arm x-ray applications. Based on latest research, the solution can also be utilised for standard CT IQ tests.

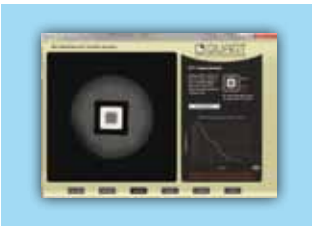
• only one exposure required to create 3D data set • contains all required parameters to evaluate IQ • automated evaluation through unique QUART QA/QC software • test results can be stored or printed out for documentation • QA/QC tool for a wide range of 3D imaging equipment • can be applied for field sizes from 4x4cm to large fields-of-view (FOV) • universal holder or customised phantom holders available for easy and reproducible positioning

PARAMETERS

_ Nyquist Frequency (NF)
_ Voxel Values
_ Contrast
_ Noise
_ Contrast-to-Noise Ratio (CNR)
_ Homogeneity / Image Uniformity
_ Modulation Transfer Function (MTF) at 10 % and 50 %
_ Artefacts, Image Flaws
_ Patient/Phantom Positioning Accuracy
_ Geometric Accuracy
_ Automatic System Indicator

Technical Specifications

SPATIAL RESOLUTION	Line spread function
STANDARD TEST OBJECTS	PMMA / Air / PVC
MATERIAL EQUIVALENTS	Free Air / Soft tissue / Bone
ENHANCED TEST MATERIALS	Water / Bone+Tooth equivalents (available on request)
POSTIONING TOOLS	Linear (top side) / Selective markers
SIZE	Ø 16 cm, height: 15 cm
SCATTER RADIATION MODULES	1x 6 cm / 1x 5 cm



QUART DVT_Tec

The associated QA software automatically evaluates all parameters which are essential for the assessment of imaging quality of CBCT equipment. The interface is specifically designed for technical acceptance or commissioning tests and complies with DIN 6868-161.

The software is easy to use. It provides a walkthrough function and assists users to carry out the QA test. The *QUART_Tec* stores the result of each single test in its internal data bank. In addition, a protocol print-out function is provided for matters of documentation (hardcopy) and later reference.

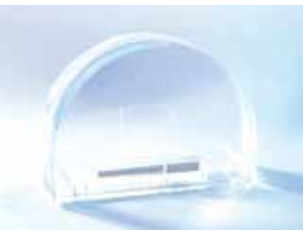
QUART DVT_150 Art. No. 12171

The *QUART DVT_150* phantom is designed for quality control of Digital Volume Tomography (DVT) 3D x-ray installations. It includes objects to test spatial resolution of DVT, DENT and C-arm x-ray equipment featuring 3D modality.
The phantom complies with DIN 6868-150.

Technical Specifications

SPATIAL RESOLUTION	7 cylindrical objects
OBJECT FEATURES	Ø 0.5/0.6/0.7/0.8/0.9/1/1.3 mm in a 10 mm PMMA sheet
SIZE	120 x 120 x 60 mm

Technical & Clinical Mammography IQ Phantom



QUART mam/digi EPQC

Art. No. 12305

The *QUART mam/digi EPQC* phantom is designed to be used as a universal tool for QA/QC routine testing in Digital and Analog Mammography. Due to its concept, the phantom creates a link between technical and clinical image quality. It can also be used as QA tool for Digital Tomosynthesis.

Only one exposure is required to collect all necessary parameters to determine the imaging quality of the x-ray system. After the exposure, the image can be visually checked or automatically evaluated through the unique *QUART MammoPro* software module.

The *QUART mam/digi* phantom incorporates Landolt ring objects. Similar to the gold structures of the CDMAM phantom, the Landolt C's are used to verify low-contrast and perceptibility limits. However, the Landolt rings are developed to compare better to the morphology of microcalcifications than any other available structure in current mammography QA/QC phantoms.*

The phantom additionally enables Contrast-to-Noise Ratio (CNR) measurements over the full dynamic range of an image – ranging from peripheral to highly dense parenchyma areas. The MTF and Nyquist frequency are evaluated automatically.

A total of 12 steps simulate different densities of tissue material thus providing the basis for QA procedures which correspond to actual anatomical conditions. Additional attenuation can be added to simulate further thickness and density of mamma tissue. Low-contrast is visually checked using special objects in the 12-step wedge.

All test objects are arranged and positioned near the thorax wall side of the mammography unit. This is intentional to avoid heel effect influence on the consistency of test results.

Technical Specifications

STEP WEDGE	12 steps 5 – 40 mm PMMA Additional 3 Aluminium step wedge	(2)
CONTRAST DETAIL	72 Landolt C's, Group of 6 on each step	(2)
LOW-CONTRAST	Row of low-contrast numbers on each step	(2)
NF / MTF	Line spread function test object	(3)
FIELD ALIGNMENT	2 rows of radiopaque balls to check field alignment at thorax wall side	(4)
DETECTOR SLOT	Dosemeter slot for reproducible dose measurements	(5)
INSERT AREA	For additional test inserts (e.g. ghosts/artefacts)	(6)
SIZE	240 x 180 x 46 mm (L x W x H)	

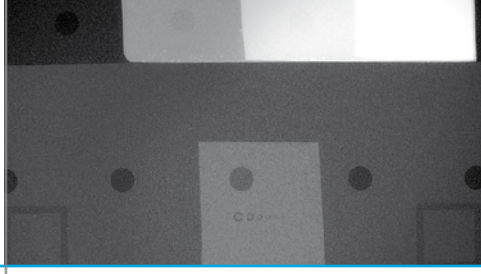
QA Test Procedure

Software-assisted Evaluation: After the phantom is positioned on the bucky table, the exposure is initiated. After the exposure, a DICOM image is loaded into the *QUART MammoPRO* software module. The software will guide the user step-by-step through the evaluation process, collect all data from the test image and create a test protocol.

The whole procedure from phantom positioning to the software assisted evaluation and creation of the test protocol takes only about 5 minutes. Essential test parameters are displayed for evaluation, others are collected in the software's backend, or are visually assessed.

Visual Evaluation: The visual evaluation of the QA/QC image is performed according EUREF and EPQC protocols.

* REFERENCE: H. de las Heras Gala et al., *A phantom using titanium and Landolt rings for image quality evaluation in mammography*, **Phys. Med. Biol. 58 (8) 2013.** Free to download at *http://iopscience.iop.org/0031-9155/58/8/L17/article*



Stereotactic Biopsy Phantom

QUART Biopsy Phantom

Art. No. 12311

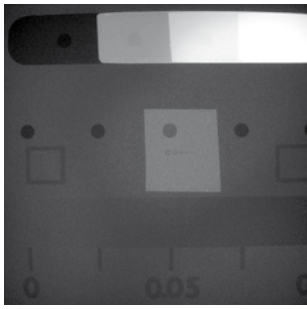
The *QUART Biopsy Phantom* is designed for QA/QC at stereotactic biopsy systems in digital and analog mammography. Its design is optimised for all common image formats and fields-of-view (FoV) from 4 x 4 cm. The phantom's integrated test objects enable comprehensive QA/QC testing.

The Biopsy Phantom, and also the *QUART Q-Vision* Phantom/Dosemeter combination (see below), allow checks on actual low-contrast properties. Low-contrast resolution can be verified to the perceptibility limit, thus providing a solid base for precise equipment calibration.

One exposure is sufficient to acquire all test parameters. The phantom is required to test equipment used in National mammography screening programmes.

PARAMETERS

_ Visual Spatial Resolution
_ Low-Contrast
_ Minimum Contrast (Perceptibility Limit)
_ Lateral Homogeneity
_ X-Ray Field Collimation
_ Artefacts / Image Flaws



Technical Specifications

INTERNAL FILTRATION	46 mm PMMA
SPATIAL RESOLUTION	6 Landolt objects in 1 group
DYNAMIC STEP	4 steps
CONTRAST DETAIL	4 object details in the step
VISIBILITY THRESHOLD	low-contrast wedge w/ pre-defined constant
HOMOGENEITY	2 fields for pixel value measurement
GEOMETRIC ACCURACY	Horizontal ruler; 10 mm division
SIZE	80 x 70 x 46 mm (L x W x T)

QUART Q-Vision

Art. No. 11203

A combination of phantom and DAP meter in the *Q-Vision* system provides an ideal solution for comprehensive but very time efficient QA/QC testing in stereotactic mammography. Image quality analyses can be directly correlated with dose reference values, thereby achieving a very high level of quality control and equipment safety.

Technical Specifications

OPERATING RANGE	25 – 40 kV
DOSE-AREA PRODUCT	10 mGy*cm^2 – 1.0 mGy*cm^2 Uncertainty: +/- 1%
DOSE-AREA PRODUCT RATE	10 mGy*cm^2/s – 1.0 mGy*cm^2/s Uncertainty: +/- 1%
EXPOSURE TIME	1,5 ms – 2 s Uncertainty: from 10ms < 1%
VISUAL TEST OBJECTS	Same as *QUART Biopsy Phantom*

Screen-Film Mammography Phantom

QUART mam FS

Art. No. 12303

The *QUART mam FS* phantom is designed to be used for QA/QC testing in conventional mammography applications according DIN/IEC requirements.

Only one exposure is required to collect all parameters to determine the imaging quality of the x-ray system. After the exposure, the test image is evaluated visually.

The *QUART mam FS* phantom complies with IEC 61223-3-2, DIN 6868-7 and DIN 6868-152, as well as the „European Guidelines for Quality Assurance in Mammography Screening" (EPQC).

Mode of Operation
QC tests are carried out at initial equipment installation to establish a visual reference. On a regular routine basis, they are meant to ensure the constancy of the system's imaging capabilities. Any deterioration in imaging performance is revealed by the visual evaluation of the test images. The evaluation of grey values, as traditionally required for conventional x-ray technology, is carried out using a densitometer.

PARAMETERS

_ Spatial Resolution
_ Low-Contrast
_ Radiation Field Alignment
_ Image Homogeneity
_ Optical Density
_ Artefacts, Image Flaws, etc.
_ Dose Indicator

Technical Specifications

INTERNAL FILTRATION	45 mm PMMA
SPATIAL RESOLUTION	Line pair test object (5.0 – 13.0 Lp/mm; 45°; 0.05 mm Pb or alternatively: 2x 8.0 – 16.0 Lp/mm horizontal/vertical arrangement, 0.05 mm Pb)
REFERENCE MARK	60 mm from thorax wall side
LOW-CONTRAST	7 objects
DENSITOMETRY	3 objects for densitometric evaluation
DOSIMETRY	Insert area for dosemeter detector
FIELD ALIGNMENT	2 rows of radiopaque balls to check field alignment at thorax wall side
GEOMETRIC ACCURACY	Various structures for field geometry evaluation
ADDED ATTENUATION OPTIONS	Additional 20 mm PMMA slab available on request
SIZE	240 x 180 x 45 mm (L x W x H)

QUART AEC MAMMO Test Set

Art. No. 13303

The *AEC MAMMO test set* consists of 5 PMMA plates of varying thicknesses. The set is used to test the automatic exposure control features of mammography equipment according IEC 61223-3-1.

Additional sheets to add to the set are available on request.

SIZE	240 x 180 mm
THICKNESS	3x 20mm / 1x 10mm / 2x 5mm

Compression Force Test Set / Screen-Film Contact

CompFor MTS ref Art. No. 12332
CompFor MTS Art. No. 12331

The set to measure compression force of mammography systems was compiled to meet all requirements of DIN 6868-152 and 6868-7 as well as IEC 61223-3-2 and 61223-2-10.

The compression force of mammography systems is regularly to be measured in both automatic and manual mode to assure accuracy and reliability. Appropriate compression of the breast is one of the essential parameters to achieve an ideal imaging quality in mammography.

The test set consists of a foam cube featuring pre-defined size and density, electronic scales to fit the bucky, and a tape measure. The recommended compression force per DIN standard can be checked as well as the maximum force which is not to be exceeded. The top plate of the scales is made of stainless steel and can be taken off for cleaning or sanitisation purposes.

Technical Specifications

SCALES	Size	330 x 300 x 65 mm
	Measuring Range	0 - 395 N (or 0 - 40 kg / 0 - 88 lb)
	Resolution	0.1 N (or 10 g / 0.02 lb)
	Units	kg / lb
FOAM BLOC	Size	80 x 80 x 40 mm
	Density	30 ± 5 kg/m^3
TAPE MEASURE	Units	mm / cm / m
	Length	2 m

QUART Focal Spot Test Art. No. 12302

This unique focal spot test tool (*QUART mammotest 2.0)* is designed to visualise the focal spot position together with the associated distribution within a digital or conventional mammography image.

The check verifies, if and to what extent does the position of the focal spot affect the equipment's imaging properties in the corresponding region of interest.

QUART KAT 18 x 24 and *KAT 24 x 30* Art. No. 13601 (KAT18x24)
Art. No. 13602 (KAT 24x30)

The *QUART KAT 18 x 24 and KAT 24 x 30* are both used to check the film contact at conventional mammography equipment with screen-film technology. Radiopaque mesh structure.

Poor screen contact is revealed by variations in density on the developed film when evaluating the test image. The test tools feature an open space to perform optical density measurements.

Technical Specifications

MESH DISTANCES	0.5 mm
WIRES	Ø 0.1 mm

HVL and AEC Sets

QUART HVL Set

Art. No. 13117

The *QUART HVL Set* can be used for standard compliant half-value layer measurement.

HVL is one characteristic to describe the radiation quality of an x-ray beam. In service work, HVL is a valid alternative to time consuming and complicated x-ray spectrometry.

MATERIAL	8 sheets of aluminium
SIZE	100 x 100 mm
THICKNESS	5.5 mm whole 1x 2.0 / 2x 1.0 / 2x 0.5 / 1x 0.3 / 2x 0.1 mm
PURITY	99.5 % (guaranteed)

The filter sheets are compatible with the filter insert of the *QUART HVL Stand* (see below).

High Purity HVL Set

Art. No. 13121

This *HVL Set* features filter sheets with a ultra-high purity. It is used for measurements where a very high accuracy is required.

MATERIAL	7 sheets of aluminium
SIZE	100 x 100 mm
THICKNESS	0.7 mm whole 7x 0.1 mm
PURITY	99.99 % (guaranteed)

The filter sheets are compatible with the filter insert of the *QUART HVL Stand* (see below).

QUART HVL Stand

Art. No. 13116

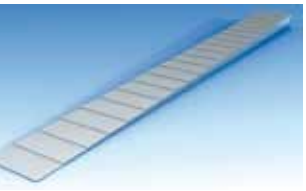
The *HVL Stand* is designed to make HVL measurements easy and straightforward.

The stand is easy to transport and fast to set up as it features a collapsible design. The stand allows a reproducible and safe positioning for both filter sheets as well as detectors of the QUART meter series.

HEIGHT	210 mm
FEATURES	Slot for dosemeter detector

QUART MAMMO Step Wedge

Art. No. 12315



21-step aluminium wedge for tests of dose reproducibility and sensitometric properties of mammography screen-film systems.

SIZE	105 x 10 x 6.3 mm
STEPS	21, 0.3 mm graduation per step

Anthropomorphic Phantoms

Body Part X-Ray Phantoms

Our body part x-pay phantoms allow repeated x-ray imaging of specific body regions. The phantoms include real human bones. They are ideal for schools and education, but also for medical applications or manufacturer equipment testing.

The bones are embedded in tissue equivalent material. The phantoms could be coated with opaque colour to hide the inner structures. All phantoms are hand made and unique. They may differ in size and shape. Due to production technology, there may be discolouring and cracks inside the phantom. This is related to production and represents no lack of quality.

Dental Anatomy Head Phantom

Art. No. 12701 (transparent)
Art. No. 12701-o (opaque)

The dental anatomy head is specifically prepared to be used for dental applications such as panoramic, cephalometric or dental Cone-Beam CT/3D.

SKULL FEATURES	Lower jaw and 5 cervical vertebrae Jaw slightly opened 1 tooth repair and 1 inlay (or as per customer requirement) M6 screw hole for optional tripod positioning
DELIVERY	Case for transport and storage

Anatomy Head Phantom I

Art. No. 12702 (transparent)
Art. No. 12702-o (opaque)

SKULL FEATURES	Lower jaw and 5 cervical vertebrae Connecting jaws
DELIVERY	Case for transport and storage

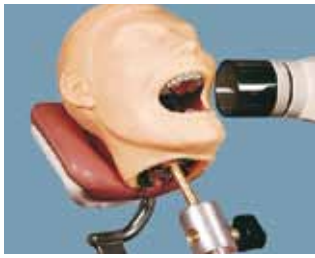
Anatomy Head Phantom II

Art. No. 12703 (transparent)
Art. No. 12703-o (opaque)

SKULL FEATURES	Lower jaw, no extra vertebrae Connecting jaws
DELIVERY	Case for transport and storage

Dental X-Ray Training Phantom

Art. No. 12704



The dental intra-oral X-ray training phantom includes a special DENTOFORM® model with radio-opaque metal teeth, flexible finger for holding film, bite-opening instruments, and latex tongue. Adult version.

FEATURES	Chair mount included
WEIGHT	3 kg
OPTIONAL	• Paediatric version • Holder for bench/table

Anthropomorphic Phantoms

Hand Phantom

Phantom features wrist joint (transparent / opaque)

Foot Phantom

Phantom features ankle joint (transparent / opaque)

Arm Phantom

Phantom features lower arm and elbow (transparent / opaque)

Knee Phantom

Phantom features thigh, lower leg and kneecap (transparent / opaque)

Spine Phantom

Phantom features 24 vertebrae and sacral bone (transparent / opaque)

Hip Phantom

Phantom features pelvis, 2 lumbar vertebrae and thigh part (transparent / opaque)

CT Torso Phantom

A one-piece anthropomorphic torso phantom with anatomical structures allows various CT approaches including helical scanning. Along with state-of-the-art synthetic bones, brain with cerebral ventricles, eye balls, lungs with 3-dimensional pulmonary vessels, trachea, liver with portal and hepatic veins, kidneys, gallbladder, pancreas, spleen, aorta, cava, ureter, urinary bladder, prostate, rectum, sigmoid colon are embedded. Each individual organ has a particular Hounsfield unit which corresponds to the human equivalent. The original phantom material with radiation absorption approximate to human tissue allows scanning in actual clinical settings.

Full Body X-Ray Phantom

This model is unique in the world and provides best opportunities for x-ray trainings. It is a must-have for all radiological schools. The phantom can be used for positioning practice as well as for general x-ray training. The model contains a real human skeleton and allows taking real x-ray images comparable to a real patient. In addition to the real skeleton, the phantom incorporates reproductions of heart, lungs, larynx and kidneys appearing in the x-ray images. Each model is hand-made and differs in size and design. Phantoms may include pathologies and may also differ in appearance. Life size.

Lung Cancer Screening Phantom

This phantom is an adapted CT phantom developed to optimise radiation dose and other scanning conditions for Lung Cancer Screening CT examination. Helical CT or MDCT can be tested. The phantom is designed to simulate conditions for the early detection of small lung cancers such as GGA. Quantitative evaluation on radiation dose and density curve of the image can be done simultaneously with a single scan. The model consists of a life size torso with arms-up position and has the following internal structures: bones; simulated tumors on sections of three lung areas (apical portion of the lungs/ bifurcation of the trachea/base of lungs); central dosemeter inserts; 8-steps linearity phantom (8 steps, 30mm diameter); embedded density samples.

Added Filtration

Pediatric Filtration

QUART cu006 al05

Art. No. 13108

The pediatric filter features a 0.06 mm copper plus 0.5 mm aluminium material combination. It is used to lower dose-effective parameters while high imaging quality is required. Such a feature is usually necessary in pediatric imaging.

IEC and DIN Compliant Filtration

QUART cu03

Art. No. 13103

SIZE	80 x 40 x 0.3 mm
APPLICATION	Dental

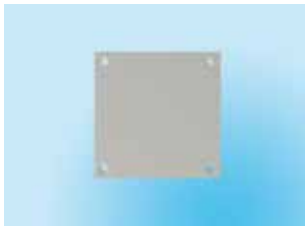
QUART cu05

Art. No. 13104

SIZE	80 x 40 x 0.5 mm
APPLICATION	Dental

QUART cu08

Art. No. 13105



SIZE	80 x 40 x 0.8 mm
APPLICATION	Dental

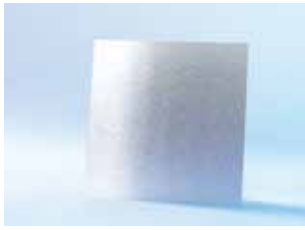
QUART cu10d

Art. No. 13118

SIZE	80 x 40 x 1.0 mm
APPLICATION	Dental

QUART al60

Art. No. 13107



SIZE	80 x 80 x 6.0 mm
APPLICATION	Dental

QUART Dental Analog

Art. No. 13119

SIZE	80 x 80 mm. 8.0 mm
ATTENUATION	PTFE + 0.3 mm Cu
APPLICATION	Dental; Dose measurement Conventional screen-film applications

QUART al20

Art. No. 12305

SIZE	100 x 100 x 2.0 mm
APPLICATION	Mammography

Dosimetry Accessories

QUART MK Measuring Cassettes

The *QUART MK Measuring Cassettes* are used for precise dose measurements. Their use is strongly recommended when a reproducible detector positioning is required for dose measurements in image receiver plane, i.e. film plane.

The detectors of both *QUART dido* and *EASY* meters fit the respective insert in the measuring cassettes. A variety of cassettes is available for different film sizes in different areas of application:

QUART MKmam 18 x 24	**Art. No. 13210**
QUART MKmam 24 x 30	**Art. No. 13211**
QUART MKdent 30 x 15	**Art. No. 13101**

QUART Helping Hand Holders Art. No. 13221

The *QUART Helping Hands* suction mounts can be used for a variety of tasks. They are able to hold small and light items in place, i.e. filters or dosemeter detectors.

OBJECT HEIGHTS	3 – 12 mm
FEATURES	One object height per side (4 heights per holder)

QUART Bridge Holder Art. No. 13220

The *QUART Bridge Holder* is designed to provide excellent vertical fix to light objects, mainly for the detectors of QUART meters such as the *dido* or the *nonius*.

The holder enables incredibly fast positioning. One second, and it is done. Yet, the support is very strong and keeps the items solidly in place. It is a true alternative to adhesive tape, which is standardly used for that purpose.

OBJECT HEIGHTS	1 – 20 mm
FEATURES	Six object heights possible

Added Filtration

Customised Filtration

Our long-term expertise in various fields of radiography enables us to translate technical customer requirements into physical features.

This expertise is being used by several customers already. Usually customised filters are inquired by x-ray manufacturers. The filters are integrated into the x-ray machine to shape radiation quality to specific exposure conditions.

QUART offers services for customisation in small as well as large quantities.

Ergonomic and Mobile X-Ray Shielding

QUART RST

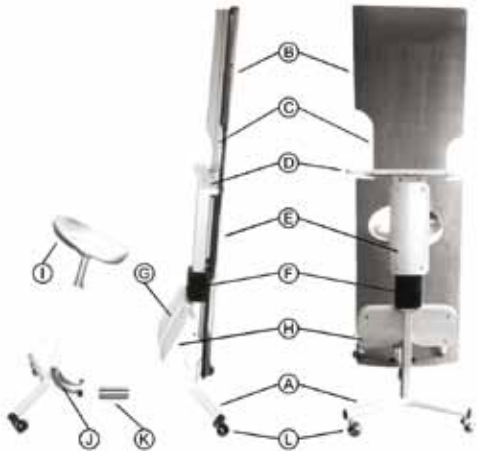
Art. No. 21201

The *QUART RST* combines a seat with armrests behind mobile protective shielding. The protective seat was designed in close cooperation with radiologists. Their input was appreciated to achieve the best anatomical design for a seated working position. Hence, the ideal areas of application for the *RST* are Interventional Radiology, Angiography, or Neuroradiology, where a seated position would be desirable while performing lengthy procedures.

The *QUART RST* can be used in any field of radiology where radiation protection and a comfortable and ergonomic seated position shall be achieved. All parts of the RST can be sanitised.

DESCRIPTION

A Steel Frame (white; sanitisable)
B Lead Shield (transparent; 0.5 mm Pb equivalent; 45° rotatable)
C Arm Recesses
D Arm/Elbow Rest
E Shock Protection for Shield
F Height Adjustment
G Shield Height Control
H Knee Rest
I Ergonomic Seat
J Pedal for Seat Height Adjustment
K Seat Length Adjustment
L 4 Casters



SHIELDING EFFECT

Height above Ground [cm]	Dose D_1 [mSv/h] Patient Side	Dose D_2 [mSv/h] behind Shield	D_2/D_1 in [%]
150 (Eyes)	600	1.0	0.002 (**0.2%**)
140 (Shoulders)	700	0.5	0.0007 (**0.07%**)
100 (Table)	500	0.5	0.001 (**0.1%**)
20 (Feet)	100	0.3	0.003 (**0.3%**)

Source: Bavarian Institute for Work Safety (LfAS), 2003.

Mammography / CT

QUART konkoma 1.0

Conventional Mammography including QA in Film Processing

PHANTOM	*QUART mam FS*	IQ phantom w/ line pair pattern Additional 20 mm PMMA sheet
METERS	*QUART dido/time M* *darkscan duo ref* Thermo 1	Dose/exposure time meter Sensi-/Densitometer Digital thermometer
ACCESSORIES	*KAT 18x24 or 24 x 30* Report forms Magnifying glass QA software optional	Film contact test tool
	Transport case included	

QUART konkoma 2.0

Digital Mammography including Imaging Chain Assessment

PHANTOM	*QUART mam/digi EPQC*	IQ phantom Assortment of PMMA sheets
METERS	*QUART dido/time M* MaVo_lux 5032 B USB	Dose/exposure time meter Luminance/light meter Class B
ACCESSORIES	Report forms QA software optional	
	Transport case included	

CT Set

Computerised Tomography

PHANTOM	CTDI Phantom	Nested Head/body/pediatric phantom
METER	Diados E Base CT chamber CT adaptor	Dosemeter (including HV source) 3.14 cm^3 100mm ionisation chamber Connector/100V provider
ACCESSORIES	6 m extension cable optional QA software optional	
	Transport case included	

Items in the sets are interchangeable.

Radiography / Fluoroscopy

QUART konkord 1.0

Conventional Radiography / Fluoroscopy including QA in Film Processing

PHANTOM	*QUART SP vario*	IQ phantom w/line pair pattern
METERS	*QUART dido/time RF*	Dose/exposure time meter w/ patient-equivalent filtration
	darkscan duo ref	Sensi-/Densitometer
	Thermo 1	Digital thermometer
ACCESSORIES	*QUART cu10*	Standard required added filtration
	Report forms	
	Transport case included	

QUART konkord 2.0

Digital Direct Radiography / Fluoroscopy including Acceptance Testing

PHANTOMS	*QUART SP_dl*	Fluoro phantom w/line pair pattern
	SP_dl Extension	Phantom frame for large image formats 20–33 cm
	QUART SP digi	DR phantom w/ line pair pattern
METERS	*QUART dido/time RF*	Dose/exposure time meter w/ patient-equivalent filtration
	QUART FST	Filter stand for meter detector
	MaVo_lux 5032 B USB	Luminance/light meter Class B
ACCESSORIES	*QUART cu10*	Standard required added filtration
	QA software optional	
	Report forms	
	Transport case included	

QUART DSA Set

Digital Subtraction Angiography including Imaging Chain Assessment

PHANTOMS	*QUART DSA*	Equipment performance test phantom
METERS	*QUART dido/time R*	Dose/exposure time meter
	MaVo_lux 5032 B USB	Luminance/light meter Class B
ACCESSORIES	Report forms	
	Transport case included	

Items in the sets are interchangeable.

QUART
Quality Assurance in Radiological Technologies

QUART didoSVM

Precision Survey Dose Meter

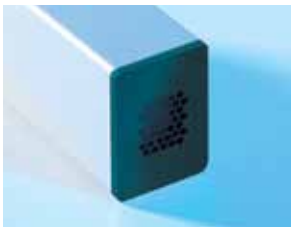
QUART didoSVM

Survey Meter for Beta-, Gamma- and X-Ray Source Detection

The *QUART didoSVM* survey dose meter is designed to detect beta, gamma and x-ray sources of very low intensity. Its modern design as well as premium technology epitomise the meter's strong performance within its scope of work.

The QUART survey meter features an unrivalled energy response to measure radiation rate and dose from x-ray, beta and gamma sources. It can therefore be utilised to detect leakage and scatter radiation around diagnostic x-ray equipment as well as in radiation therapy environments.

The detector of the *QUART didoSVM* is compact and light-weight, thus making handling the meter a breeze. As its technical concept is based on solid state technology, the meter provides all the advantages connected with this approach: fast response time to radiation, reproducible measurement results and accurate detection of signals against background noise. Radiation is detected from leakage, scatter beams and pinholes.



USABILITY

Although base unit and detector are separated, both may be combined magnetically to carry and use the meter with one hand.

The detector can be mounted on a tripod or a telescopic extension to allow measurements in heights up to approx. 3.5 meters above the ground.

The *didoSVM* is equipped with a backlit display to assure swift readings even in darkened environments. To provide the ability to track dose rate characteristics, the dose rate is refreshed continuously on the meter display while the measurement is running.

The meter is powered by a rechargeable battery. One charge is sufficient to last approximately 120 hours of continuous use. Recharging the meter until full takes only between 3 – 4 hours. A warning will appear on the display when the battery charge is running low.

GENERAL FEATURES

Dimension:	Base Unit - 17 x 7.5 x 2 cm (L x W x H)
	Detector - 10 x 3 x 4 cm (L x W x H)
Weight:	Base unit - 200 gr. (including battery)
	Detector - 220 gr. (including cable)
Special Feature:	Date and real-time display (user adjustable)
Warm-Up Time:	None required
Power Supply:	Rechargeable battery
Battery Time:	Approx. 120 working hrs.
Recharging Time:	3 – 4 hrs.
Recharging Link:	Micro-B USB (to power socket or USB A 2.0 PC)
Display:	LCD with backlight; colour: white
Operating Temperature:	10 °C – 35 °C
Storage Temperature:	-10 °C – 60 °C
System Language:	English
Calibration:	2 years (recomm.)

QUART
Quality Assurance in Radiological Technologies

Survey Dose Meter

QUART didoSVM

Survey Meter for Beta-, Gamma- and X-Ray Source Detection

PARAMETERS

Air Kerma	K
Air Kerma Rate	K°
Ambient Dose equivalent:	H*(10)
Ambient Dose Rate equivalent:	dH*(10)/dt
Directional Dose equivalent:	H'(0.07)
Directional Dose Rate equivalent:	dH'(0.07)/dt
Application Area	Single and mixed types of radiation fields (X-rays, gamma and beta radiation)

TECHNICAL SPECIFICATIONS

Operating Range:	15 keV – 20 MeV (Auto-Ranging) Above 15 keV for gamma and x-rays Above 1 MeV for beta radiation
DOSE:	3 nSv – 99 Sv
DOSE RATE:	1 µSv/h – 10 Sv/h
TIME:	0.5 s – 15 min.
Uncertainty:	+/- 10% (for the full dynamic range)
Response Time:	< 1.0 s (for the full dynamic range) Measuring time of approx. 10 sec. may be required for very low dose reates, i.e. in mammography
Special Feature:	Detector mountable on tripod or extender/ telescopic rod (Optional Accessory) Base and detector connectable (magnetically)
Display:	Digital numeric value refreshed every second Analog Bar Graph in three divisions according to defined danger levels*: 3.2 µSv/h -- 10 µSv/h -- 3 mSv/h
Audio Output:	Signal frequency according to danger level

* Danger Levels according to German Labour Protection regulations: Radiation Protection Act and X-Ray Appliance Act.

STANDARD SCOPE OF DELIVERY

- ✓ *QUART didoSVM* survey meter
- ✓ Recharging USB cable (optional power plug with connector available)
- ✓ Manual
- ✓ Transport Case

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Note :

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