

Solid State Measuring Chamber

Type SSMC 617
P/N 14207

Technical Documentation no. 14300

Location for ID label

CE₀₁₂₃

Documentation no. 14300
Revision no. 1
Date of release 03.2010

Measuring Chamber
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The contents of this documentation must be transmitted to the service technician of the automatic exposure control.

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This measuring chamber fulfills the Essential Requirements of the Directive 93/42/EEC according to the standards

| | |
|--------------|-----------------|
| EN 60601-1 | (IEC 60601-1) |
| EN 60601-1-2 | (IEC 60601-1-2) |
| EN 60601-2-7 | (IEC 60601-2-7) |

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Measuring Chamber
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Modification notes

Revision: 1
Date: 03.2010
REMARKS:
First release

Intended use

The Claymount measuring chamber is intended for measuring the dose of x-rays in real time in the medical radiology.

The chamber is placed between patient and imaging device (film, detector) and detects the actual dose value for the automatic exposure control.

Specifications

1. Technical data

Number of measuring fields
3

kV range
40 ... 150 kV

Exposure time range
< 1 ms ... 5 s

Sensitivity typ. at 80 kV, 25 mm Al
 1.3×10^{-9} A/ μ Gy/s

Sensitivity tolerance from measuring chamber to measuring chamber
 $\leq \pm 25\%$

Sensitivity tolerance between measuring fields
 $\leq 10\%$

Attenuation factor
as per DIN 6811, part 1
 ≤ 1.05

Operating temperature
+ 10 ... + 40°C

Storage temperature
- 20 ... + 60°C

Humidity
35 – 85% (non condensing)

Atmospheric pressure
860 – 1060 hPa

Mounting orientation
Any

Degree of protection
Ordinary equipment

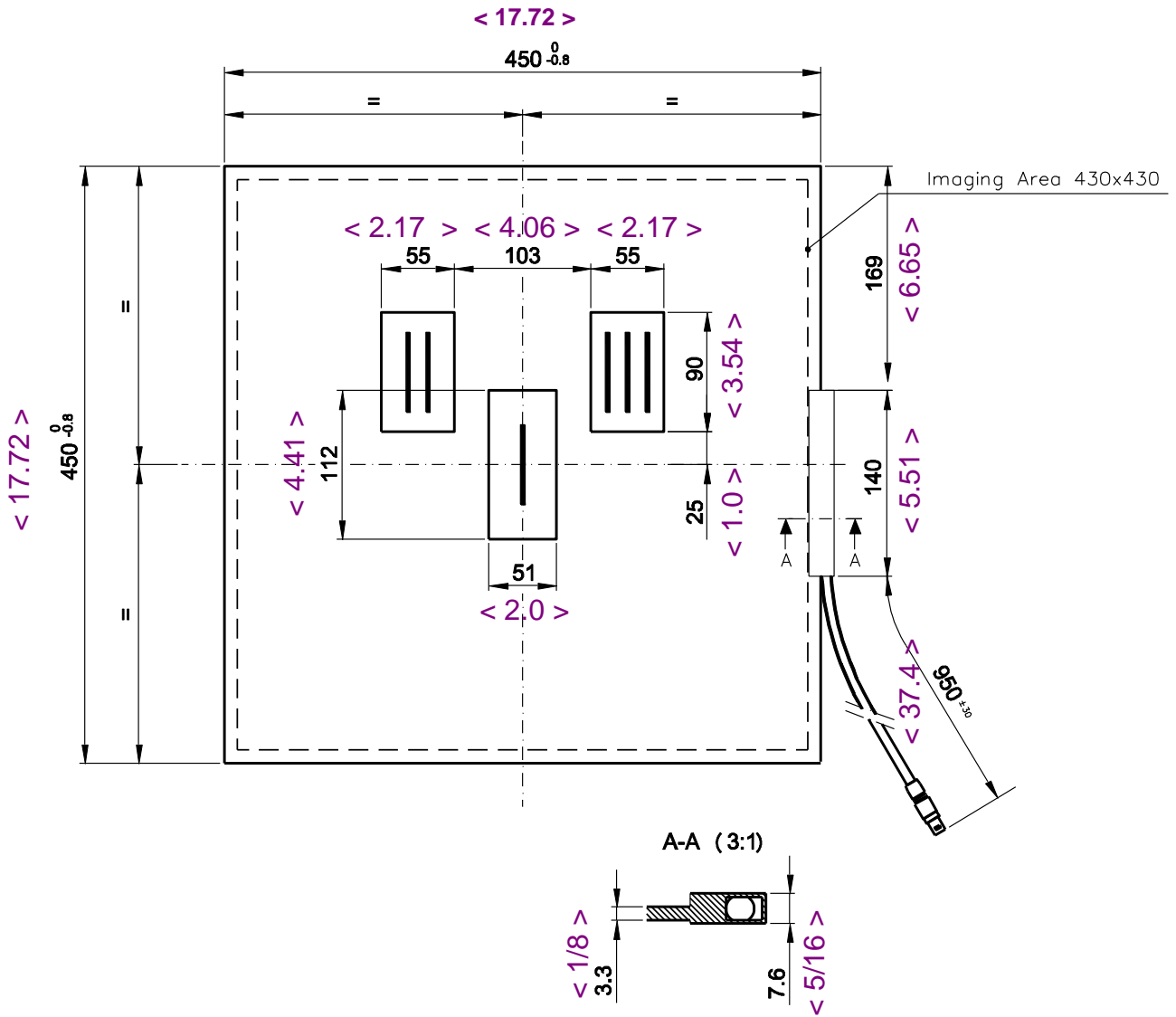
Weight
960 g

Housing material
Phenolic

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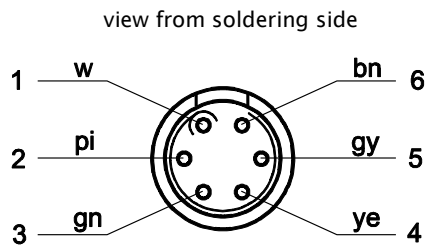
2. Dimensions (in mm) < inch >



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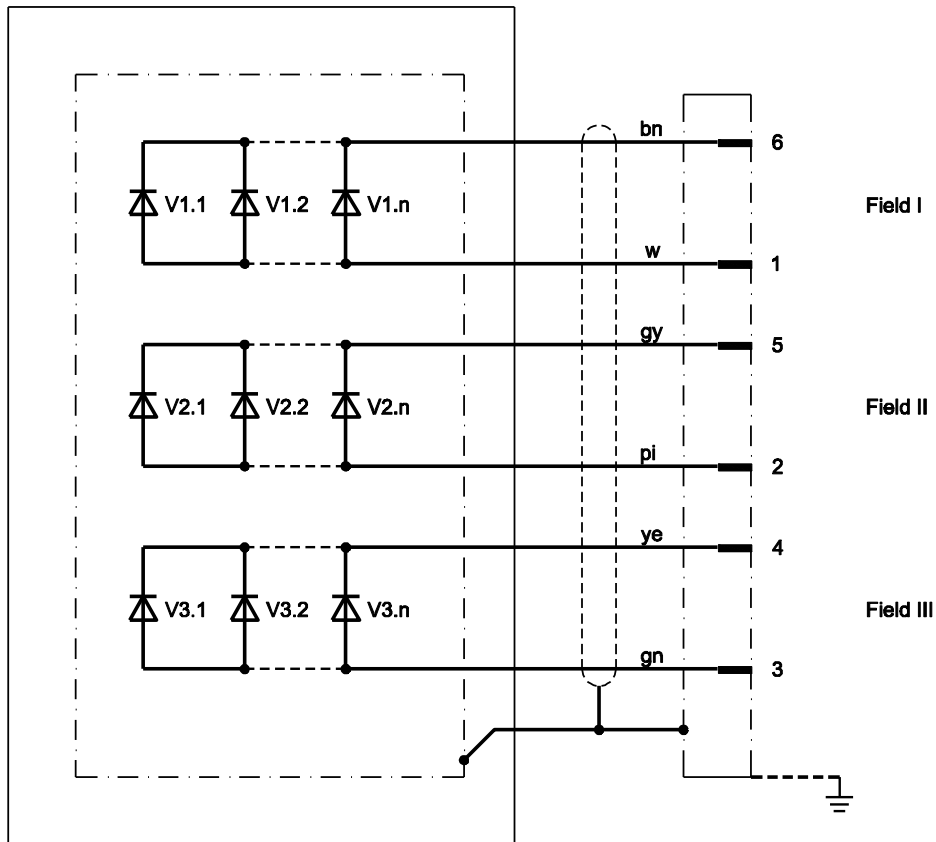
3. Plug pin layout



Colour code :

w : white
 pi : pink
 gn : green
 bn : brown
 gy : grey
 ye : yellow

4. Schematic diagram



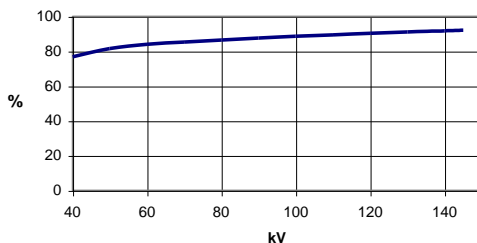
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Charts

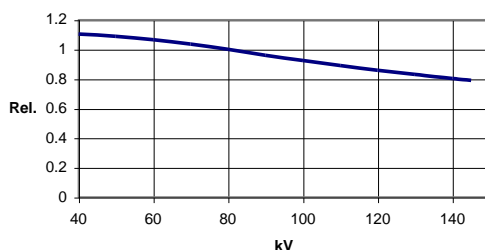
1. Transmission

MEASURED AT:
 Generator multipulse
Focal distance
 150 cm
Total filtration
 3.5 mm Al



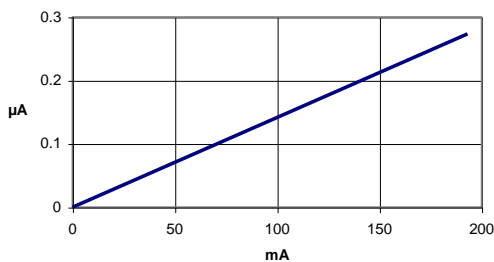
2. Energy dependence

MEASURED AT:
 Generator multipulse
Focal distance
 150 cm
Total filtration
 3.5 mm Al
Constant dose rate
 1.5 mGy



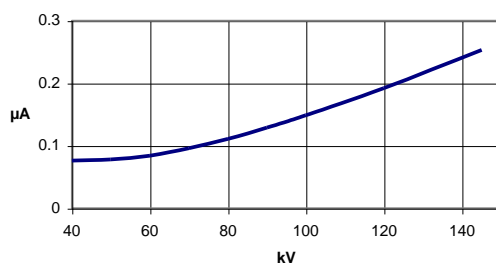
3. mA sensitivity

MEASURED AT:
 Generator multipulse
Focal distance
 150 cm
Total filtration
 3.5 mm Al
Phantom
 25 mm Al
Constant kV
 80 kV



4. kV sensitivity

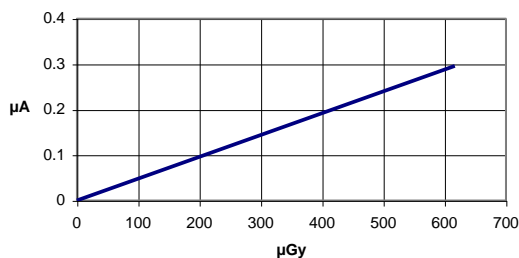
MEASURED AT:
 Generator multipulse
Focal distance
 150 cm
Total filtration
 3.5 mm Al
Constant mA
 100 mA
Phantom
 EN / IEC 60601-2-7



| kV | Phantom Al |
|-----|------------|
| 40 | 4 |
| 50 | 10 |
| 60 | 16 |
| 70 | 21 |
| 80 | 26 |
| 90 | 30 |
| 100 | 34 |
| 120 | 40 |
| 145 | 45 |

5. Sensitivity

MEASURED AT:
 Generator multipulse
Focal distance
 150 cm
Total filtration
 3.5 mm Al
Water phantom
 20 cm
Constant kV
 80 kV



General description

The purpose of the automatic exposure control of an X-ray unit is to obtain the correct image contrast by measuring the radiation quantity striking the film or detector. As soon as the sufficient amount of X-rays has struck the film or the correct film exposure is reached, the exposure control switches off the X-ray generator automatically.

The measuring chamber serves as measuring device for the X-ray radiation. In a subsequently operated electronics the electric signals are amplified and conditioned.

In the CLAYMOUNT measuring chamber, semiconductor components are used as sensors. The ionizing reaction of the X-rays produces an electrical current in the semiconductor sensors. This current is in proportion to the dose and represents therefore a value for the film blackening.

This measure takes place separately for each measuring field.

Handling

The CLAYMOUNT measuring chambers are delicate measuring instruments and need to be handled with care.

No pressure should be applied to the measuring chambers. Avoid deformations.

For transport and return shipments use the original packaging.

Cleaning

Wipe with damp cloth.

Installation and Operation

Important!



Installation and initial operation may only be carried out by an expert who has been trained in the field of medical diagnostic x-ray equipment

In the X-ray path, the position of the measuring chamber is always between patient and film cassette.

An anti-scatter grid has to be mounted in front of the measuring chamber. Choose the mechanical position of the measuring chamber in such a way that the film cassette is located in the range of the imaging area according to chapter "Specifications", paragraph 2 of this document. Adjust the field fading-in of the collimator on the measuring fields of the measuring chamber.

The measuring chamber is electrically connected to the control electronics by means of a cable (see chapter "Accessories"). Connection diagram and plug pin layout are found in chapter "Specifications, paragraph 3 and 4". Correct functioning of the measuring chamber is guaranteed only if the cable as well as the chamber shielding is properly connected. See also chapter "Safety".

After installation a function control according to this manual should be performed.

After this, connect the measuring chamber to the control electronics and put the automatic exposure control into operation.



Before enabling the automatic exposure control for the use on patients, check the functionality and the settings on a phantom.

Disposal

This product contains no dangerous parts and can be disposed of as standard electronic waste.



Safety

Important!

The control electronics to which the measuring chamber will be connected must fulfill the standards of EN 60601-1 (IEC 60601-1) and EN 60601-2-7 (IEC 60601-2-7).

To grant electrical safety carry out the installation as follows:

In the control electronics, measuring chamber shielding and cable plug are connected to the functional earth (screen).



Measuring chamber and cable plug must be protected against accidental contacts and should be mounted insulated.

After installation and before operation, the safety aspects must be checked as described in EN 60601-1 (IEC 60601-1). Disregarding this condition will result in danger of electrical shock.

Moreover, insufficient insulation of the measuring chamber or the cable plug may cause noise on the measuring signal and therefore lead to wrong exposures (generally underexposures).

Test procedure

1. Check-up on open contacts or short circuits

Check-up of measuring chamber and measuring cable on open contacts or short circuits is done with a universal instrument suitable for diode measuring.

The measuring chamber can be regarded as a silicon diode.

The terminal arrangement is found in the schematic diagram, page 4 and plug pin layout, page 4.

Perform check of silicon diodes as usual for general-purpose instruments. Locate possible trouble on measuring chamber or measuring cable by checking on measuring chamber directly or on the electronic side of the cable.

PROCEDURE AT DEFECTS:

- exchange measuring chamber
- repair or exchange measuring cable.

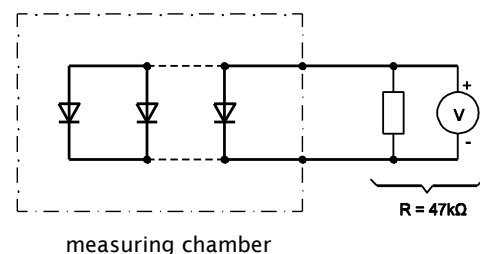
2. Auxiliary measurement under radiation

Carry out a separate measurement for each field of the measuring chamber. The terminal arrangement is found in the schematic diagram, page 4 and plug pin layout, page 4.

The measurement is carried out as a voltage measurement. Connect voltmeter (anode on +, cathode on -) and load-resistance.

Important!

The total resistance, i.e. parallel connection of load resistance and internal resistance of the voltmeter must amount to 47 k Ω .



Select radiation values for normal operation of the measuring chamber and measure voltage at radiation.

Perform this measurement after installation. Record these results as reference values for future function controls.

If - under the same conditions - measured voltages of future function controls differ more than 30% from the

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(auxiliary measurement, continued)

recorded reference values, replace the measuring chamber.

Typical value.
The measured voltage depends on several factors. The following indication serves as typical value:

| | |
|--|-----------|
| Tube voltage | 40 kV |
| Tube current | 100 mA |
| Distance focal spot - measuring chamber | 150 cm |
| Total filtration | 3.5 mm Al |

Under these conditions the typical auxiliary voltage on the measuring chamber is approx. 30 mV.

Accessories

Measuring cables confectioned with 6-pin plug and socket

5 m measuring cable
P/N 12865

10 m measuring cable
P/N 12866

15 m measuring cable
P/N 12867

20 m measuring cable
P/N 12868

Other cable lengths available upon request

Sockets

**6 pin socket
for cable mounting**
P/N 13013

**Angular socket 90°, 6-pin,
for printed circuit board**
P/N 13014

