

NEW

X-RAY I.I. CAMERA UNIT C7876, C7876-10

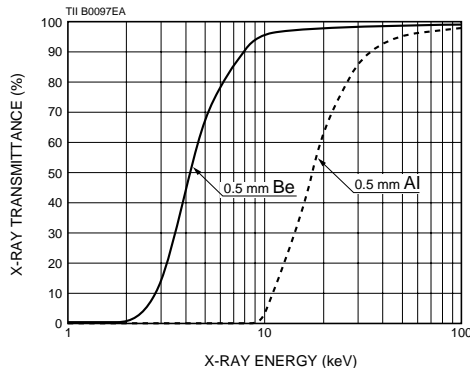
4" X-ray Image Intensifier with Beryllium Window Efficiently Coupled to CCD Camera

Captures low-energy X-ray images in real time!

The C7876 series X-ray image intensifier (X-ray I. I.) camera units are ideal for non-destructive inspection of light-element materials and radiation imaging at low-energy X-ray levels. The C7876 remarkably improves X-ray transmittance at low-energy X-ray levels because a beryllium (Be) window is used instead of the aluminum (Al) window currently used in most X-ray image intensifiers.

The result is a clear, distinct image taken in real time even at low-energy X-ray levels down to several keV. For example, the internal structure of thin resin or aluminum objects, which have been difficult to visualize, now can be clearly observed with high contrast.

● X-ray transmittance of window materials



▲ Flower (X-ray tube voltage: 10kV)

OVERVIEW

The C7876 series is an X-ray image intensifier camera unit using a 4" X-ray image intensifier with a beryllium window, efficiently coupled to a built-in high-sensitivity CCD camera.

FEATURES

- Ideal for X-ray imaging at low-energy levels (for thin resin, aluminum objects, etc.)
- High resolution, high contrast
- Low distortion



HAMAMATSU

BERYLLIUM WINDOW EFFECTS

The C7876 series uses an X-ray image intensifier having a beryllium (Be) window instead of the aluminum (Al) window commonly used in most X-ray image intensifiers. This has brought a significant improvement in X-ray transmittance at low-energy X-ray levels, making it possible to capture a clear, high contrast X-ray image of objects which up until now have been difficult to capture with good contrast.

Aluminum Window 0.5mm^t

With an aluminum window, no contrast can be obtained in the X-ray image of an object like plastics, but with a beryllium window ...

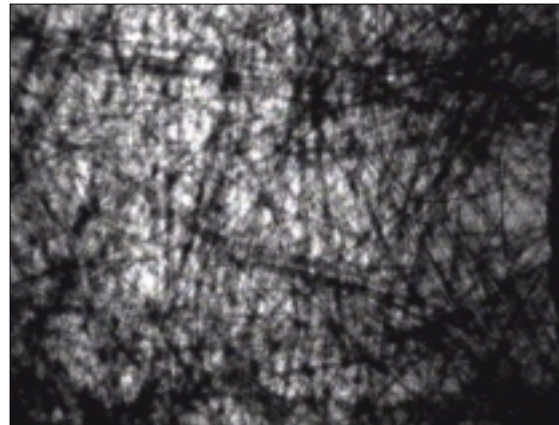


▲ Glass fiber reinforced plastics
(X-ray tube voltage: 16kV, tube current: 100μA)



Beryllium Window 0.5mm^t

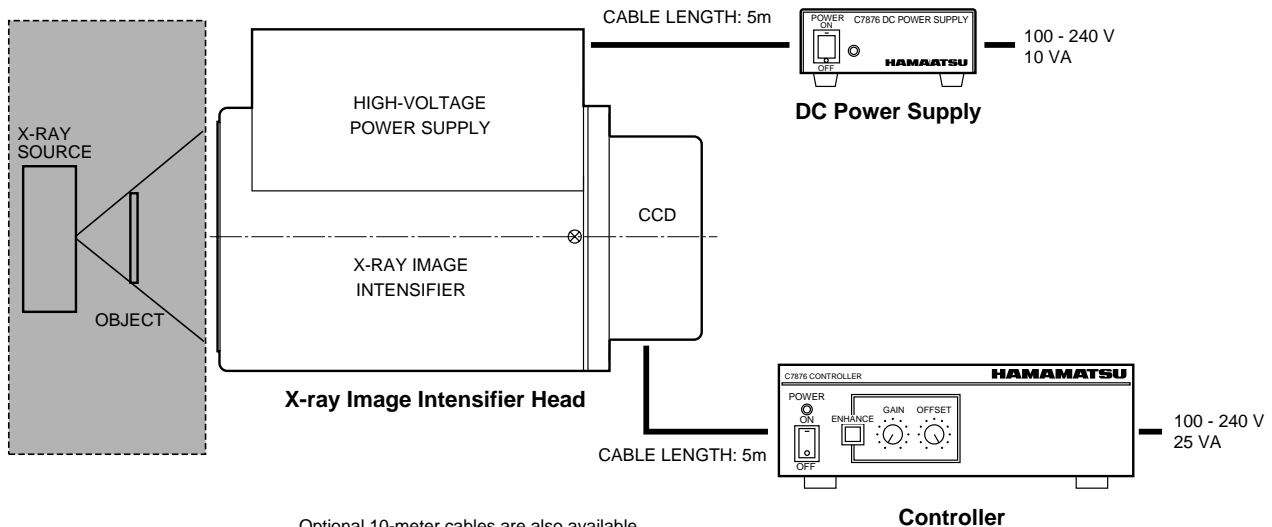
With a beryllium window, the fiber structure can be clearly viewed with high contrast.



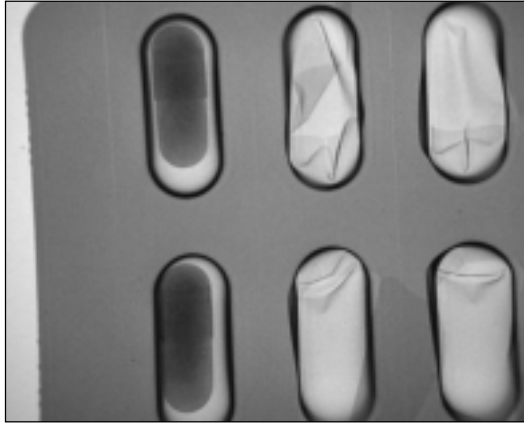
▲ Glass fiber reinforced plastics
(X-ray tube voltage: 16kV, tube current: 100μA)

CONFIGURATION

Unit Configuration: X-Ray I. I. Head CCD Controller DC Power Supply for X-Ray I. I.



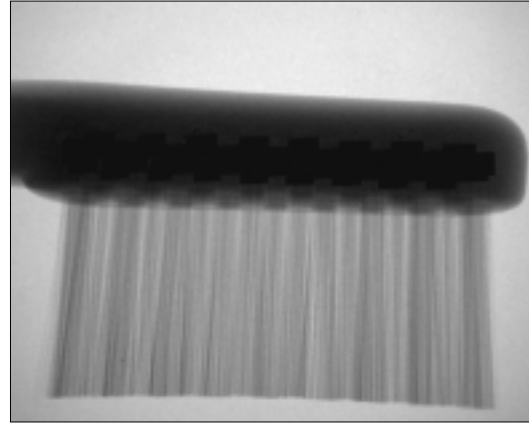
IMAGING EXAMPLES



▲ Drug capsules

(X-ray tube voltage: 16kV)

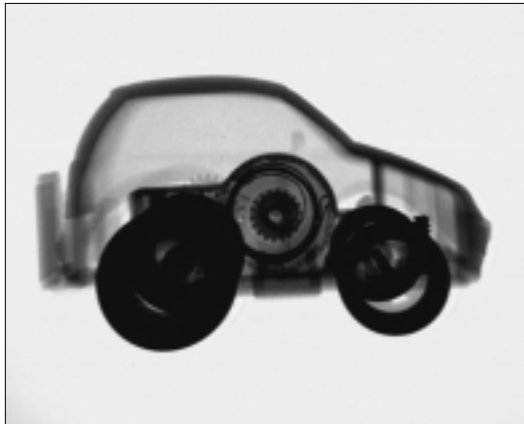
Drug capsules can be checked for proper filling or cracks in the aluminum film.



▲ Toothbrush

(X-ray tube voltage: 18kV)

The internal body structure and individual nylon bristles can be observed clearly.



▲ Toy car

(X-ray tube voltage: 20kV)

The outline of a plastic car body and the internal spring winding can be distinctly observed simultaneously.



▲ Aluminum bonding wires

(X-ray tube voltage: 30kV)

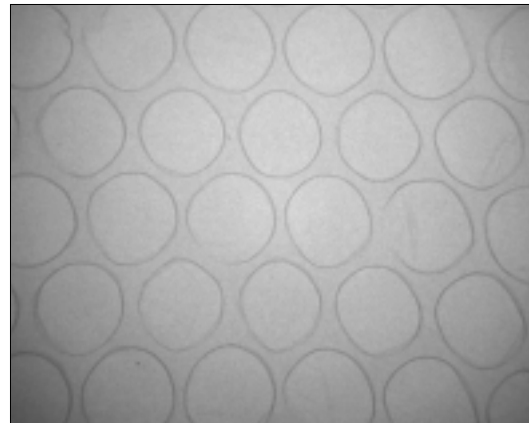
Aluminum bonding wires difficult to visualize with a conventional X-ray I. I. (aluminum window) can be viewed with high contrast.



▲ Dollar bill

(X-ray tube voltage: 9kV)

Ink printed on the front and back surfaces can be viewed clearly.



▲ Air cushioning material

(X-ray tube voltage: 10kV)

Slight differences in thin film thickness can be viewed with high contrast.

SPECIFICATIONS

| Parameter | | C7876 | C7876-10 | Unit |
|---|------------------------------|--|-------------------------|-------|
| Input Window Material | | Beryllium (0.5mmt) | | — |
| Input Phosphor | | CsI | | — |
| Output Phosphor | | P-20 or equivalent | | — |
| Imaging Area (on input surface) | | 72 (H) X 54 (V) average | | mm |
| Resolution ^{A)} (on input surface) | | 4.6 average | | lp/mm |
| Scanning Method | | NTSC/BW | CCIR | — |
| CCD | CCD Chip | 2/3" FIT 410,000 pixels | 2/3" FIT 480,000 pixels | — |
| | Aspect Ratio | 4 : 3 | | — |
| | S/N ratio | 61 | | dB |
| | Output Signal | Sync composite video signal 1.0Vp-p/75Ω | | — |
| Signal Processing Functions | Enhancement Function | Gain control range: 1 to 30 times | | — |
| | | Offset control range: 0 to -100% | | — |
| | Shading Correction | Horizontal and vertical parabolic correction: ±30% | | — |
| | | Horizontal and vertical slant correction: ±30% | | — |
| | AP Correction | 0 to 9 | | dB |
| Gamma Correction | 1 / 0.45 | | — | |
| Input Voltage | | 100 to 240 (50/60Hz) | | Vac |
| Power Consumption | | 35 | | VA |
| Weight | Head | Approx. 8 | | kg |
| | Controller & DC Power Supply | Approx. 3 | | kg |

A) Measured with an optimum tube voltage, using an X-ray resolution chart directly fitted to the X-ray image intensifier.

NTSC B/W : National Television System Committee

CCIR : Comité Consultatif Internationale des Radio Communications

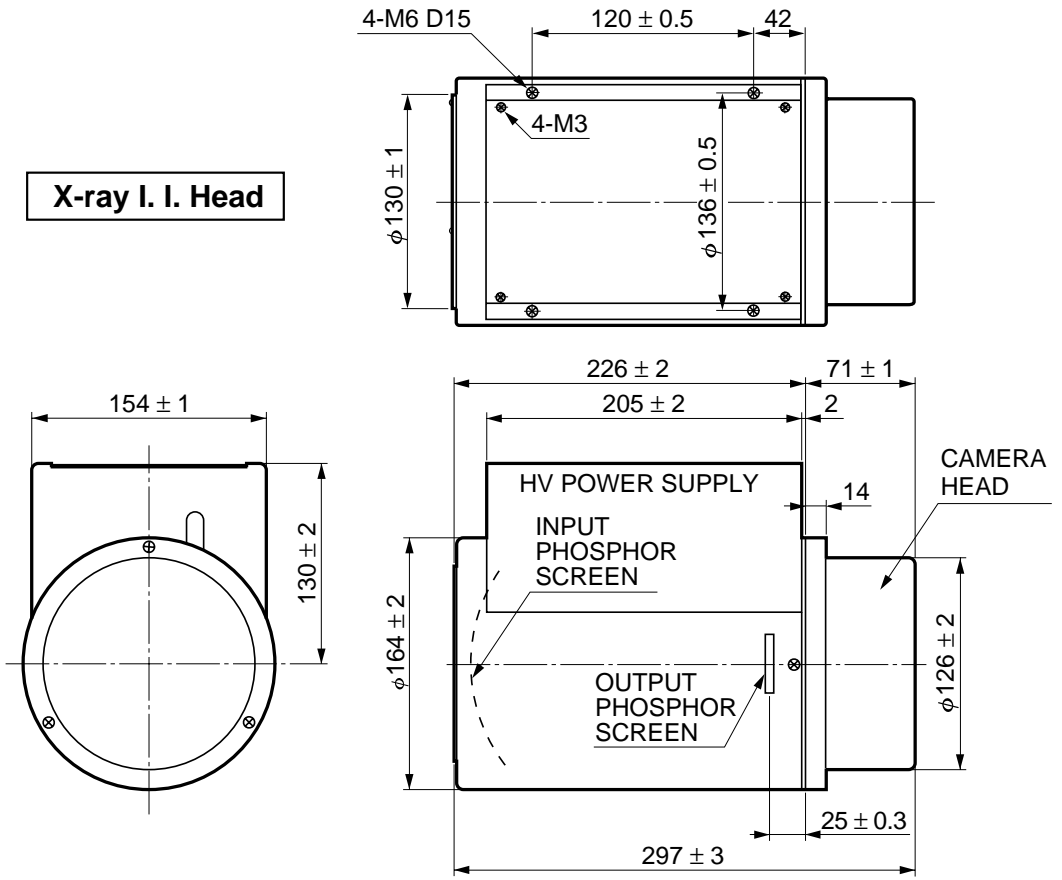
BERYLLIUM WINDOW SAFETY PRECAUTIONS

Beryllium (Be) is used for the window of this product. Beryllium is solid under normal conditions and not harmful as long as it stays unchanged in quality. However, if beryllium is mechanically or chemically processed and inhaled as fumes or in powder form, it may be extremely harmful. To prevent beryllium from entering your body through a cut, breathing, eating or drinking, NEVER TOUCH THE BERYLLIUM WINDOW WITH BARE HANDS. Should you touch the beryllium window or debris when broken, immediately wash your hands or other parts of the body that came in contact with the beryllium.

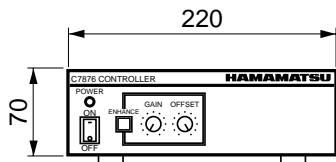
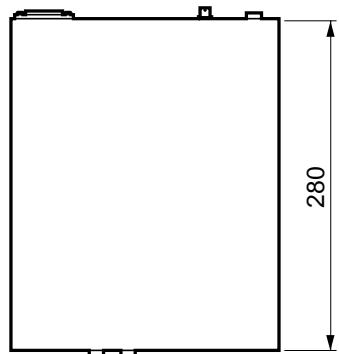
Beryllium is designated as a chemical substance that must be handled in accordance with authorized disposal methods. If this product is broken or has reached the end of its service life, please contact our sales office to ship it back to us and we will take the proper means to dispose of it.

DIMENSIONS (Unit: mm)

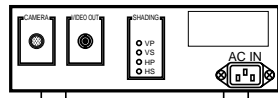
X-ray I. I. Head



Controller

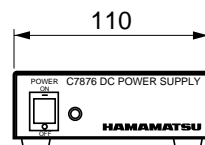
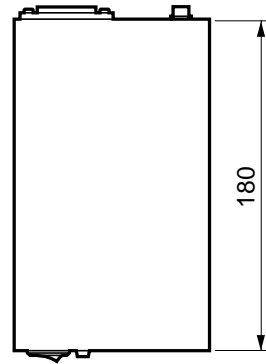


Front View

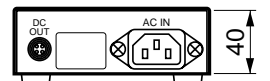


Rear View

DC Power Supply



Front View



Rear View

TII A0044EA

130kV Microfocus X-Ray Source

The Hamamatsu microfocus X-ray source uses an X-ray tube with an extremely small focal spot of 10 microns in diameter. This gives a sharp, clear image even at magnified image. When used with the C7876 series X-ray I. I. camera unit, high-quality X-ray images can be taken in fine detail even under high magnification. Besides the 130kV model, Hamamatsu offers various models of microfocus X-ray sources, including 80kV, 100kV and 150kV models.



X-ray Image Intensifier Camera Unit (3"/1.8" Dual Mode) C7716, C7716-10

The C7716 series X-ray image intensifier (I. I.) camera unit now offers greatly improved X-ray detection efficiency even at low energy levels. This improvement stems primarily from a built-in X-ray image intensifier having an extremely thin aluminum input window. Its thickness is only 0.3mm or less, virtually at the limit of present technology providing excellent X-ray transmittance and low scattering. The results are sharp, clear, high-quality images taken at low energy X-ray levels down to several keV which penetrate plastic (PET) materials.



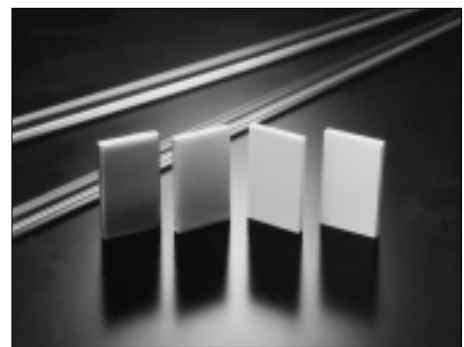
X-ray Image Intensifier Gate Unit C7077

The C7077 X-ray image intensifier gate unit consists of a gateable 4-inch X-ray image intensifier (X-ray I. I.) with a relay lens and a gate power supply. Since the X-ray I. I. itself has a gating function, still X-ray images of a high-speed moving object can be taken by inputting an external trigger signal while using a normal X-ray source. This means there is no need for a pulsed X-ray source. Gating can be performed by a TTL level trigger pulse, allowing easy gate control.



FOS (Fiber optic plate coated with X-ray scintillator)

The FOS is an optical device for X-ray imaging, fabricated by coating an X-ray scintillator material over a fiber optic plate consisting of tens of million glass fibers of several micrometers each in diameter. The FOS provides higher sensitivity and resolution than currently used sensitized paper films and also allows real-time digital radiography when directly coupled to a CCD. The fiber optic plate used in the FOS has excellent X-ray absorption characteristics, so that X-rays which penetrate the X-ray scintillator and directly enter the CCD are minimized to less than 1%. This protects the CCD from "deterioration" and "noise increase" caused by X-ray irradiation, assuring a long service life and maintaining high image quality.



CE marking status underway

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HAMAMATSU PHOTONICS K.K., Electron Tube Center

314-5, Shimokanzo, Toyooka-village, Iwata-gun, Shizuoka-ken, 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P. O. Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658

France: Hamamatsu Photonics France S.A.R.L.: 8, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 00

United Kingdom: Hamamatsu Photonics UK Limited: Lough Point, 2 Gladbeck Way, Windmill Hill, Enfield, Middlesex EN2 7JA, United Kingdom, Telephone: 44(20)8-367-3560, Fax: 44(20)8-367-6384

North Europe: Hamamatsu Photonics Norden AB: Smidesvägen 12, SE-171-41 SOLNA, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01

Italy: Hamamatsu Photonics Italia: S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741

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