

**Nondestructive X-ray inspection**

# **X-ray Line Scan Camera C9750**

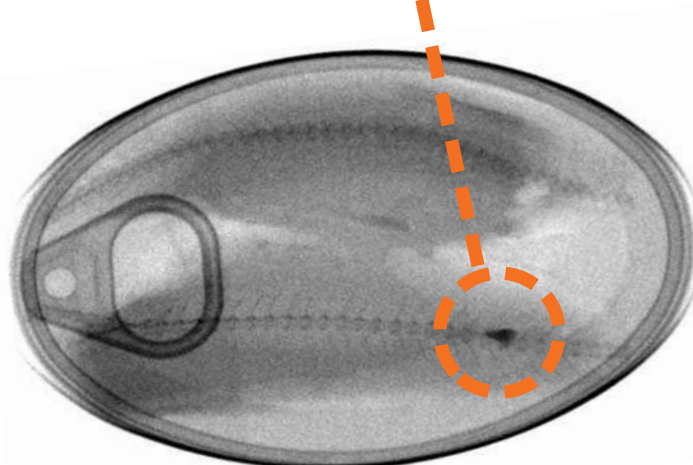


## **NEW FEATURES**

- **High speed**  
(Max. 800 m/min for 1.6 mm pitch sensor)
- **200  $\mu$ m pitch camera**
- **Low energy type** (10 kV to 40 kV) (option)
- **Camera Link interface** (option)



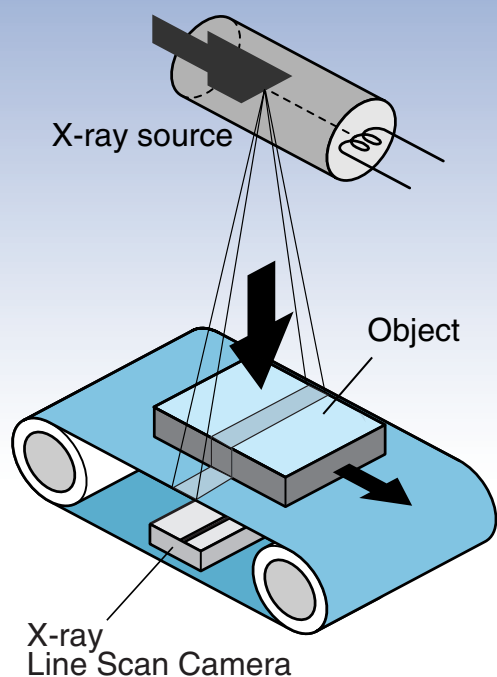
Foreign objects, such as pieces of metal, glass or stone, can be detected inside an object in an instant.



**HAMAMATSU**  
PHOTON IS OUR BUSINESS

# Detector for nondestructive X-ray inspection

In an instant, the line scan camera detects foreign bodies,



**The X-ray Line Scan Camera can take a high-sensitivity, high-resolution transparent X-ray image of an inspected object transported on a belt conveyor or similar apparatus.**

Since the content of an object, which is not visible with the naked eye, can be inspected without contact or destruction, this camera is suitable for broad interior X-ray observation, enabling the detection of a foreign body mixed in food, electronic components, etc.

By adopting a thin sensor head with a thickness of only 50 mm, installation inside a conveyor is also possible. Moreover, the wide inspection area enables internal observation of a large object, which was difficult until now.

With its 12 bit digital-signal output, data processing and analysis with a computer can be performed through a frame grabber board.



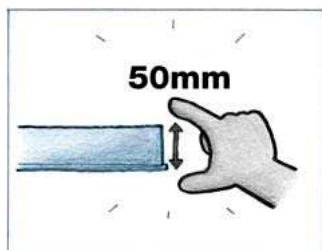
▲ C9750-10FCN / -20TCN



▲ C9750-05FCV (Customized product)

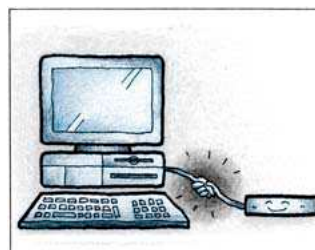
\* Please consult Hamamatsu for specification and dimensional outline.

## FEATURES



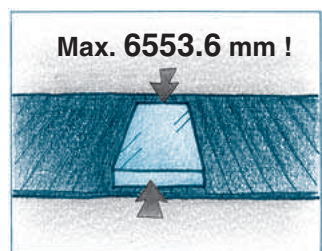
### ● Only 50 mm in thickness

By adopting a line sensor as a detector, the thickness of the sensor head is reduced to a maximum of 50 mm. Installation inside a belt conveyor is also possible. It is available for vertical shaped camera (V type) which can be installed at narrow space.



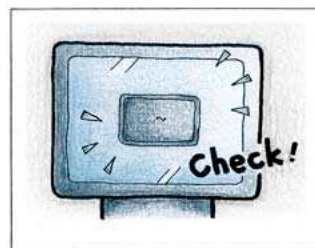
### ● Connection to a computer is possible.

Using the commercial frame grabber board, the 12 bit digital output enables easy connection to a computer or other external instrument. Acquired image processing, data processing and filing can be performed, allowing the configuration of any system.



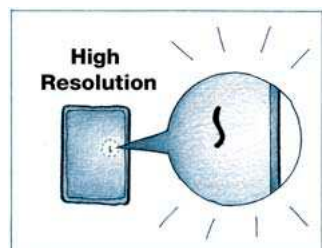
### ● Detection width

Detection width is selectable from 51.2 mm to 1433.6 mm. Maximum detection length is 6553.6 mm (1.6 mm pitch). (Option)



### ● Pausing the image

Using the optional processor board (installed into a computer), the scrolled image can be paused or scrolled, and the sensor head controlled arbitrarily.



### ● Spatial resolution

A high spatial resolution is realized in addition to a high sensitivity. Even low-contrast or small-sized foreign object inside an object can be clearly observed. (Max. 1/4096)

### ● High speed

Line speed: 800 m/min is realized (by using 1.6 mm pitch).

### ● Sensitivity setting is possible.

Sensitivity at low energy and the lifetime by X-ray irradiation are improved by implementing multigain module. (option)

\* The minimum detectability differs according to certain conditions, such as the dimension of the object being checked, the quality of the material, the X-ray intensity, and the transport speed.

# Inspection / in-line X-ray inspection

such as pieces of metal, glass, or stone, inside any object.

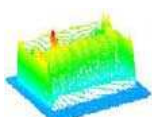
## MEASUREMENT EXAMPLES



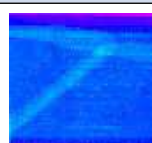
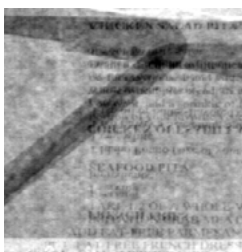
Image Galleries

[www.sales.hamamatsu.com/c9750](http://www.sales.hamamatsu.com/c9750)

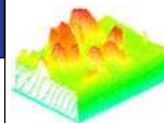
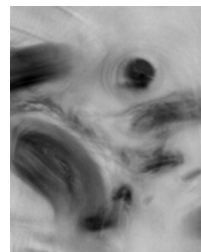
### Cookies



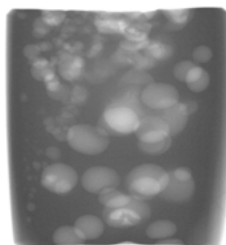
### Mail (Low energy version)



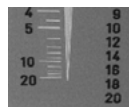
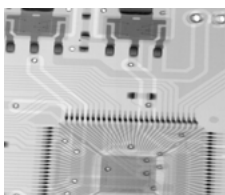
### Planks



### Swiss cheese



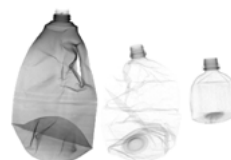
### IC board



Taken by MFX\*

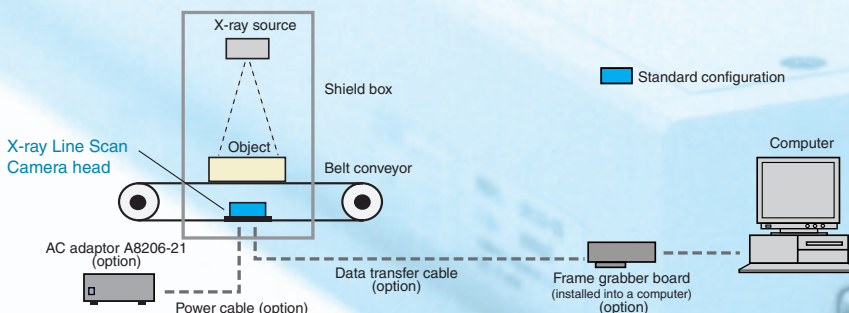


### A difference between PET and PP



\*MFX ... Microfocus X-ray source

## SYSTEM CONFIGURATION EXAMPLE



< Note >

- The X-ray Line Scan Camera consists of only a sensor head.  
The image display equipment and the X-ray source should be ordered separately.

# SPECIFICATIONS

| Type number                                     | C9750-05FCN   | C9750-10FCN         | C9750-10TCN         | C9750-20TCN         |
|---|---|---------------------|---------------------|---------------------|
| Detection method                                | Scintillator method   |                     |                     |                     |
| Effective X-ray tube voltage range <sup>①</sup> | Approx. 25 kV to 160 kV   |                     |                     |                     |
| Sensor element pitch <sup>②</sup>               | 0.4 mm  |                     | 0.2 mm              |                     |
| Detection width                                 | 256 mm: 640 pixels  | 512 mm: 1280 pixels | 256 mm: 1280 pixels | 512 mm: 2560 pixels |
| Resolution                                      | 1/ 640  | 1/ 1280             | 1/ 1280             | 1/ 2560             |
| Line speed <sup>③</sup>                         | 4 m/min to 100 m/min  |                     | 2 m/min to 50 m/min |                     |
| A/D converter                                   | 12 bit  |                     |                     |                     |
| Digital interface <sup>④</sup>                  | RS-422 (Standard)   |                     |                     |                     |
| External control                                | RS-232C   |                     |                     |                     |
| Correction functions                            | Analog processing : dark correction (offset)<br>Digital processing : dark correction (offset), sensitivity correction |                     |                     |                     |
| Multi analog gain control feature               | Option  |                     |                     |                     |
| Operating temperature                           | 0 °C to +40 °C  |                     |                     |                     |
| Storage temperature                             | -10 °C to +50 °C  |                     |                     |                     |
| Operating and storage humidity                  | 30 % to 80 % (no condensation)  |                     |                     |                     |
| Power supply                                    | DC +5V / DC +15V  |                     |                     |                     |

① Low kV (10 kV to 40 kV) is available as option (M10313-01). Please consult us if High kV (over 160 kV) is needed. ② 0.8 mm and 1.6 mm pitch are available as option.

③ Maximum line speed is changed by pixel number. Please consult Hamamatsu. ④ Camera Link I/F is available as option (M10389-01).

\* Please consult Hamamatsu for these options.

## The specifications are available below.

### Line speed

|          | 0.2 mm pitch camera | 0.4 mm pitch camera  | 0.8 mm pitch camera  | 1.6 mm pitch camera   |
|----------|---------------------|----------------------|----------------------|-----------------------|
| Standard | 2 m/min to 50 m/min | 4 m/min to 100 m/min | 8 m/min to 200 m/min | 16 m/min to 800 m/min |

\* Maximum line speed is changed by sensor length (more than 2432 pixels). Please consult Hamamatsu.

### Number of pixels / Detection width

| Element pitch | Number of pixels          | Detection width       |
|---------------|---------------------------|-----------------------|
| 0.2 mm        | 256 pixels to 4096 pixels | 51.2 mm to 819.2 mm   |
| 0.4 mm        | 128 pixels to 3584 pixels | 51.2 mm to 1433.6 mm  |
| 0.8 mm        | 128 pixels to 1792 pixels | 102.4 mm to 1433.6 mm |
| 1.6 mm        | 128 pixels to 896 pixels  | 204.8 mm to 1433.6 mm |

\* 0.4 mm pitch: 1638.4 mm, 0.8 mm pitch: 3276.8 mm, 1.6 mm pitch: 6553.6 mm

\* For more detailed information, please consult Hamamatsu.

### Description of model name

C9750-□□□ CN  
① ②

### Number of pixels

01 ... 128 pixels  
to to  
32 ... 4096 pixels

### Pixel pitch

T ... 0.2 mm  
F ... 0.4 mm  
E ... 0.8 mm  
S ... 1.6 mm

## OPTIONS

- Camera link I/F option: M10389-01
- Low energy option (10 kV to 40 kV): M10313-01
- AC adaptor: A8206-21
- Power cable: A9348-05
- Software API Support (Microsoft Windows) :  
- DCAM-API (<http://www.dcamapi.com>)

★ Product and software package names noted in this documentation are trademarks or registered trademarks of their respective manufacturers.

- Subject to local technical requirements and regulations, availability of products included in this promotional material may vary. Please consult your local sales representative.
- Information furnished by HAMAMATSU is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions.

Specifications and external appearance are subject to change without notice.

- Please note the X-Ray images on this brochure are taken for test purpose, the images do not reflect actual qualities of the products on the market.

©2012 HAMAMATSU PHOTONICS K.K.

## HAMAMATSU PHOTONICS K.K. [www.hamamatsu.com](http://www.hamamatsu.com)

### HAMAMATSU PHOTONICS K.K., Systems Division

812 Joko-cho, Higashi-ku, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-435-1574, E-mail: [export@sys.hpk.co.jp](mailto:export@sys.hpk.co.jp)

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 E-mail: [usa@hamamatsu.com](mailto:usa@hamamatsu.com)

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658 E-mail: [info@hamamatsu.de](mailto:info@hamamatsu.de)

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trappu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: [infos@hamamatsu.fr](mailto:infos@hamamatsu.fr)

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road Welwyn Garden City Hertfordshire AL7 1BW, United Kingdom, Telephone: 44-(0)1707-294888, Fax: 44(0)1707-325777 E-mail: [info@hamamatsu.co.uk](mailto:info@hamamatsu.co.uk)

North Europe: Hamamatsu Photonics Norden AB: Thorshamnsgatan 35 SE-164 40 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: [info@hamamatsu.se](mailto:info@hamamatsu.se)

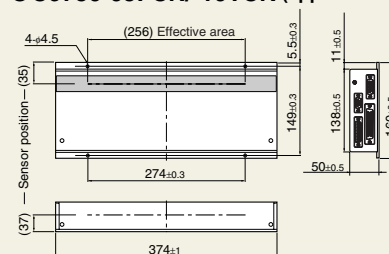
Italy: Hamamatsu Photonics Italia: S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741 E-mail: [info@hamamatsu.it](mailto:info@hamamatsu.it)

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaoming Center, 27 Dongsanhuan Road North, Chaoyang District, Beijing 100020, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: [hpc@hamamatsu.com.cn](mailto:hpc@hamamatsu.com.cn)

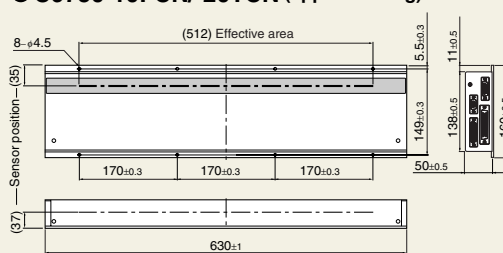
Cat. No. SFAS0017E08  
NOV/2012 HPK

## DIMENSIONAL OUTLINES (Unit: mm)

### ● C9750-05FCN/-10TCN (approx. 5.0 kg)



### ● C9750-10FCN/-20TCN (approx. 9.0 kg)



### ● A8206-21 (option) (approx. 2.0 kg)

