

USB2.0 MULTI-HEAD SYNCHRONOUS CMOS CAMERA

ARTCAM-024TFF Series

INSTRUCTION BOOKLET

2 Heads ARTCAM-024TFF-2CAM Series

3 Heads ARTCAM-024TFF-3CAM Series

4 Heads ARTCAM-024TFF-4CAM Series

ARTRAY

ARTRAY CO., LTD.

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1. Attention

■About this manual

1. Before using the camera, please read this manual thoroughly.
2. Please keep this manual reachable and always refer to the contents when needed.
3. Please contact us if the manual is lost or damaged. We will provide an replacement.
4. We cannot guarantee the safety of improper uses of the camera.
5. For your safety, please follow the directions of this manual.
6. All contents are subject to change.
7. Images in this manual may have been simplified to be easier comprehended.
8. Please contact us if you find any unclear points or mistakes in this manual.
9. Quoting, copying or altering some or all parts of the manual without our permission is prohibited.
10. We are not responsible for any lost or damages on your profits due to the use of our products.
11. Please understand that our oversea branches do not provide maintenance or repair services.

■About the Icons

To keep the safety of the user, other people and their properties, please pay attention to the following icons.



Warning

If the user fails to follow the instruction, physical injury on human or damages on hardware may occur.



Caution

If the user fails to follow the instruction, serious injury or death may occur.

■For Safe Use



Warning

●In following circumstances, please stop using the product and turn off the power immediately to prevent the risks of fires and electric shocks. If the product is defective, please contact us for repair or exchange. For your safety, please do not disassemble, modify or repair the camera on your own.

Please stop using the product and turn off the power immediately when:

- The product becomes smoky or gets extremely hot on the surface, or makes unusual smells or sounds.
- Foreign material or water gets into the product.
- The product falls and becomes damaged.

●Do not place the product on unstable surfaces. The product may be fallen and people may get hurt.



Caution

●Do not expose the product to steam or fumes to avoid electric shocks and fires.

●Do not leave the product in high temperature places such as inside of vehicles or under direct sunlight. High temperature may cause damages to the camera, or even cause fires.

●Do not cover the product with cloth or other materials. The product may get extremely hot and the heat may cause deformations on the parts or even cause fires.

●Please avoid dropping or shocking the product as the product may be damaged.

●Do not touch the cable with a wet hand. Such action may cause electric shocks.

●Please avoid continuously contacting the surface of the camera to your skin when the camera is being used. The surface temperature of the camera may cause burns.

■Other Notices

●Please do not use the camera under strong lights such as sun light for a long period. Also please do not expose the camera under strong lights even when the product is not being used because the sensor might be damaged.

Maintenance

●Wipe the dirt on surface with soft cloth or tissue paper. Do not use alcohol, thinner or benzene to avoid damaging the surface paints.

Electro Magnetic Interference

●The camera may interference with electronic devices such as TV and radio. Please do not place the camera next to such equipment.

■Export Control

The Government of Japan controls military sensitive goods and technologies including relevant dual-use goods and technologies.

This product is a Catch-all Control item subject to the Foreign Exchange and Foreign Trade Act and its relevant legislations. Except for exporting to the 27 white countries designated in the Cabinet Order, export licenses are required if the products are going to be used for military use or if the end user of the product is related to all kinds of military activities. If your circumstances cause the need to apply export licenses, please notify us before you place orders. Also, please notify us in advance if the end users or purposes of use change after the purchase and thus cause the need to apply export licenses.

*The 27 white countries not under the UNSC Arms Embargo:

Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Republic of Korea, Luxemburg, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States

About the Japanese Security Export Controls, please refer to the webpage for Security Export Control Policy, The Ministry of Economy, Trade and Industry:

<http://www.meti.go.jp/policy/anpo/englishpage.html>

■Guarantee

To save the environment, we do not issue warranty in printed format. Instead, all records of the warranty periods, delivery dates and the customer information are well kept in our system.

For more details, please refer to the sites below:

Hardware Warranty: http://www.artray.us/download/artray_warranty.pdf

2. Introduction

ARTCAM-024TFF Series is CMOS cameras for industrial use.

This series adopt USB2.0 interface, so the data can be delivered to PC directly without a capture board.

It is possible to have 2~4 cameras capture images simultaneously, and its various usages covering from 3-dimension measurement to multi-view image input.

3. Main Features

- High Resolution, High Frame Rate

Featuring a CMOS sensor and with the exposure method of global shutter, 024TFF captures sharp and clear images even if objects are moving.

- USB2.0 Interface

Our cameras adopt USB2.0 interface, so the data can be delivered to PC directly and no capture board is needed.

- Small and Light

Our cameras are small and light, thus can be easily installed according to your desires.
The lens mount is C mount.

- Various Operating Mode

ARTCAM-024TFF-2CAM is able to capture images from 2 cameras with 30fps/each.

For ARTCAM-024TFF-3CAM/4CAM, each camera has 60fps and the image capturing of each camera is controlled by the software.

Also, it is optional to choose setting of 1/2frame or 1/4frame delay for each camera.

- Mirror function

As part of sensor functions, horizontally / up-down reversals are possible.

Mirror could be processed either on the sensors or on the viewer software (ART-Viewer).

- External Trigger

With input circuit of insulated external trigger by photo coupler, outputting image data is possible depending on timing of input signal from external circuit.

- Software Development Kit (Optional)

For customer who prefers to create their own image processing software or use our camera with other applications, we provide SDK upon requests.

4. The Product

ARTCAM-024TFF-2CAM Series

1) Camera Head	x2
2) Camera Cable 2m	x2
3) Camera Control Unit	x1
4) USB Cable (TYPE A-B Connector) 3m approx.	x1
5) AC Adapter (DC5V)	x1
6) Instruction Booklet	x1
7) Viewer software/Device Driver CD	x1

ARTCAM-024TFF-3CAM Series

1) Camera Head	x3
2) Camera Cable 2m	x3
3) Camera Control Unit	x1
4) USB Cable (TYPE A-B Connector) 3m approx.	x1
5) AC Adapter (DC5V)	x1
6) Instruction Booklet	x1
7) Viewer software/Device Driver CD	x1

ARTCAM-024TFF-4CAM Series

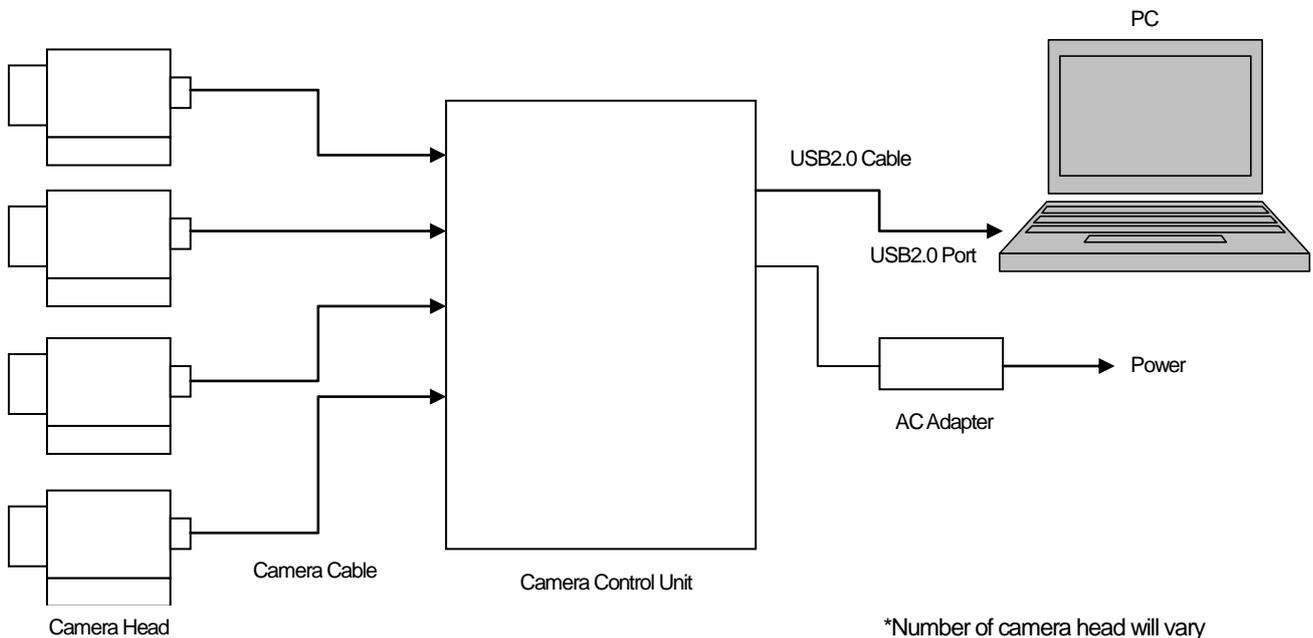
1) Camera Head	x4
2) Camera Cable 2m	x4
3) Camera Control Unit	x1
4) USB Cable (TYPE A-B Connector) 3m approx.	x1
5) AC Adapter (DC5V)	x1
6) Instruction Booklet	x1
7) Viewer software/Device Driver CD	x1

<Option>

- 1) C Mount lens
- 2) 5m extension cable with USB2.0 repeater

5. Connect the Camera

5-1 How to connect a camera



*Number of camera head will vary depending on products.

5-2 Shutter Speed

Shutter speed can be changed on the standard viewer software ART-Viewer.

The shutter speed is set directly on the sensor register, so please refer to the following formulas for the real exposure time.

Model	Method
ARTCAM-024TFF-2CAM	Range : 1~32767(Exposure Time : 1/16042~2 sec) $\text{Exposure Time} = (\text{Shutter Value} \times (640 + 88)) \times 0.0833 \text{ [\mu sec]}$ *640x480 at 12MHz
ARTCAM-024TFF-3CAM ARTCAM-024TFF-4CAM	Range : 1~32767(Exposure Time : 1/32086~1 sec) $\text{Exposure Time} = (\text{Shutter Value} \times (640 + 88)) \times 0.0417 \text{ [\mu sec]}$ *640x480 at 24MHz

6. Specifications

6-1 Color Model(1)

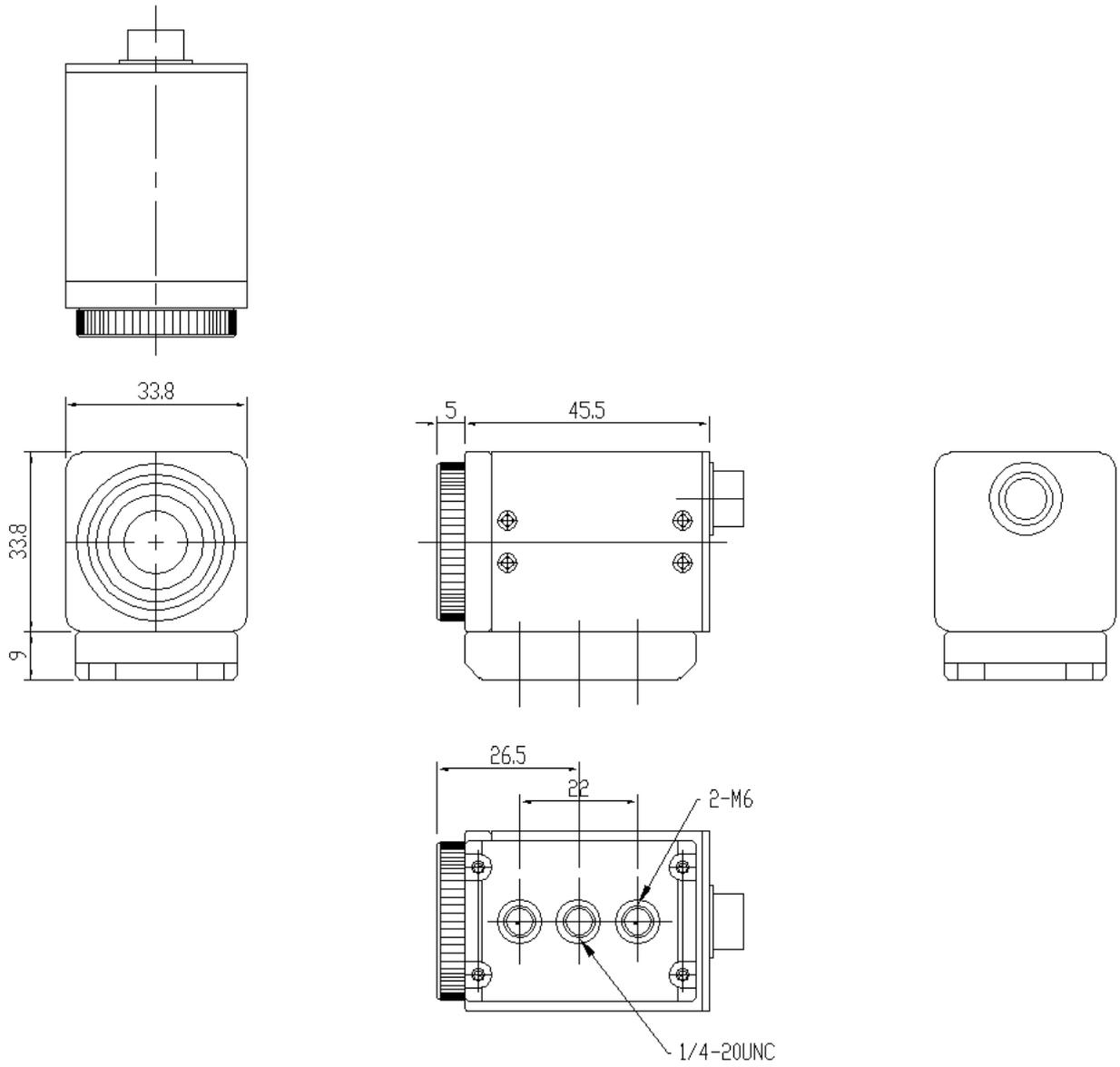
	ARTCAM-024TFF-2CAM	ARTCAM-024TFF-3CAM	ARTCAM-024TFF-4CAM
Sensor Type	CMOS Color Image Sensor		
Resolution	752(H)×480(V)		
Active Imager Size	4.51(H)×2.88(V)mm 1/3"		
Scan Mode	Progressive Scan		
Pixel Size	6.0(H)×6.0(V)μm		
Shutter Type	Global Shutter		
Color Filter Array	RGB Bayer Pattern		
Frame Rate	30fps *640×480 at 12MHz	60fps *Output of one camera is 640×480 at 24MHz	
Shutter Speed	1/16042~2s *at 12MHz	1/32086~1s *at 24MHz	
Interface	USB2.0 Bulk transfer		
Synchronization System	Internal Synchronization		
Lens Mount	C Mount		
Power	DC5V		
Power Consumption	Under Approx. 15W		
Ambient Conditions	Operating Temperature/Humidity : 0~35°C/10~80%(Non condensing) Storage Temperature/Humidity : 0~60°C /10~95%(Non condensing)		
External Dimensions	Camera Head : 33.8(W)×33.8(H)×50.5(D)mm *Tripod, protruding part not included Camera Control Unit : 200(W)×50(H)×140(D)mm *Rubber feet, protruding part not included		
Weight	Camera Head : Approx 70g Camera Control Unit : Approx 800g		

6-2 Monochrome Model

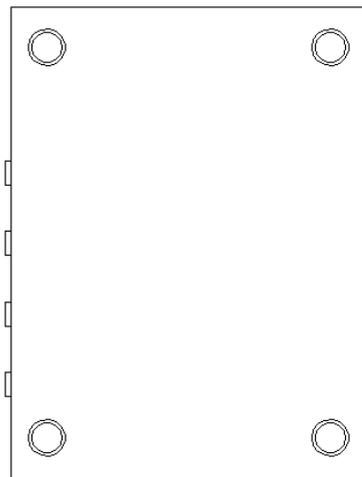
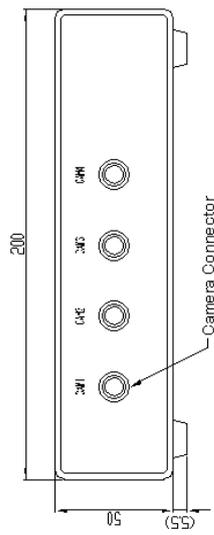
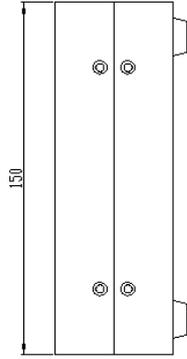
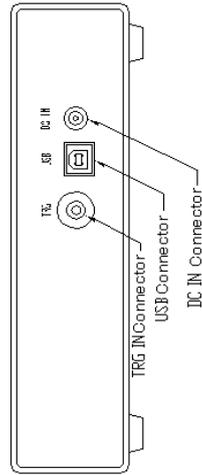
	ARTCAM-024TFF-BW-2CAM	ARTCAM-024TFF-BW-3CAM	ARTCAM-024TFF-BW-4CAM
Sensor Type	CMOS Monochrome Image Sensor		
Resolution	752(H)×480(V)		
Active Imager Size	4.51(H)×2.88(V)mm 1/3"		
Scan Mode	Progressive Scan		
Pixel Size	6.0(H)×6.0(V)μm		
Shutter Type	Global Shutter		
Frame Rate	30fps *640×480 at 12MHz	60fps *Output of one camera is 640×480 at 24MHz	
Shutter Speed	1/16042~2s *at 12MHz	1/32086~1s *24MHz	
Interface	USB2.0 Bulk transfer		
Synchronization System	Internal Synchronization		
Lens Mount	C Mount		
Power	DC5V		
Power Consumption	Under Approx. 15W		
Ambient Conditions	Operating Temperature/Humidity : 0~35°C /10~80%(Non condensing) Storage Temperature/Humidity : 0~60°C /10~95%(Non condensing)		
External Dimensions	Camera Head : 33.8(W)×33.8(H)×50.5(D)mm *Tripod, protruding parts not included Camera Control Unit : 200(W)×50(H)×140(D)mm *Rubber feet, protruding part not included		
Weight	Camera Head : Approx 70g Camera Control Unit : Approx 800g		

7. External Dimensions

7-1 Camera Head



7-2 Camera Control Unit



8. Recommended PC

8-1 Recommended System Requirements

- Intel chip set, Southbridge above ICH6
- CPU: Intel Core2duo 2.4GHz or higher
- Memory: Above 512MB
- OS: Windows XP or above

8-2 Minimum System Requirements

- USB2.0 Enhanced Host Controller
- CPU: Intel Pentium4 1.7GHz or higher
- Memory: Above 256MB
- OS: Windows 2000(SP4) or above



■ Please refer the restrictions below when you use ARTCAM.

(1) Recommended System Requirements

If the system specifications do not meet the requirements recommended above, it may be difficult to run at the maximum frame rate, especially at 48MHz high-speed mode.

(2) Connection of Multiple USB Devices

Please be aware that depending on the specifications of the user's PC, it may be difficult to supply the power to the USB devices when multiple USB devices are connected.

(3) USB2.0 cable Extension

We cannot guarantee the functionality of the USB2 camera if the user adopts USB3.0 extension cables or repeaters which are not confirmed by us. With the extension cables or repeaters, the bandwidth of transfer may differ, and thus caused malfunctions such as a low frame rate or recognition failure on the camera.

What may cause the problem is that the regulation of the power lines becomes not enough, and so causes impedance mismatch on data signals.

*For the recommended extension cable, please contact our sales department. (TEL: +81-3-3389-5488)



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