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Multichannel detector head controller

C7557-01

For control of multichannel detector head and data acquisition

The C7557-01 is specifically designed for basic control in multichannel photometry. When connected to Hamamatsu multichannel detector head and a PC, the C7557-01 allows easy control of the detector head and data acquisition by using dedicated software that comes with the unit.
The C7557-01 supports all models of Hamamatsu multichannel detector heads designed to use CCD/NMOS/InGaAs image sensors. The C7557-01 provides various useful functions (see P.2) that efficiently collect sample data during basic operation.
The C7557-01 controller includes a driver/amplifier circuit for operating a multichannel detector head, a power supply circuit, a temperature stabilizer circuit, an A/D conversion circuit that converts analog signals from the detector head into digital signals, and a data interface.
The software supplied with the C7557-01 allows easy control of the multichannel detector head and data acquisition through the USB interface. This software runs on Microsoft® Windows®*1, by simple operation from the menu neatly displayed on the screen. This software is available with different kinds of DLL*2 to help you develop your own software programs.

Features

- **Easy to control multichannel detector head and data acquisition**
- **Supports all models of Hamamatsu multichannel detector heads (CCD, NMOS, InGaAs)**
- **Software with different kind of DLL is supplied with the C7557-01**
- **Compact configuration**

Applications

- **Control of multichannel detector head and data acquisition**

Connections to multichannel detector head and PC

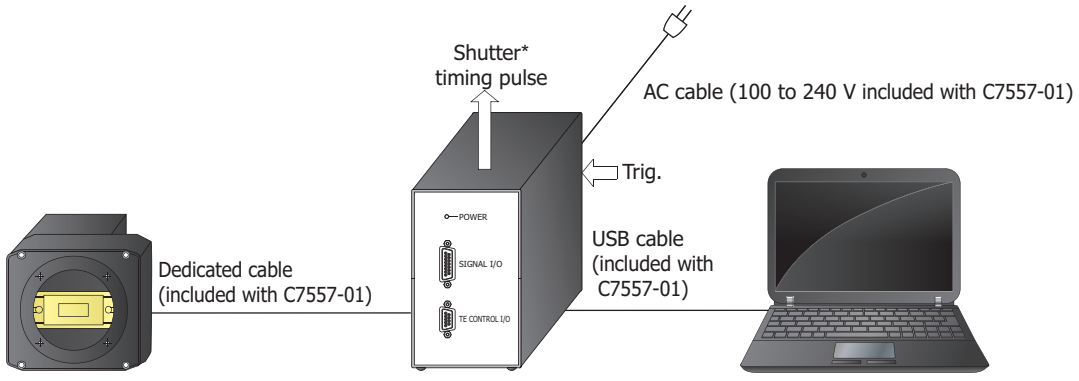

Image sensor + Multichannel detector head

C7557-01

PC (USB 2.0/3.0)
[Windows 7 (32-bit, 64-bit)/
Windows 8 (32-bit, 64-bit)/
Windows 8.1 (32-bit, 64-bit)/
Windows 10 (32-bit, 64-bit)]

* Shutter, etc. are not available.

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*1: Microsoft, Windows and Visual C++ are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
*2: DLL is one of useful functions the Windows. It is a library that can freely start up from application software or execute function procedure. Software development can be made easier with DLL. To use DLL, see the operation manual that comes with the unit. The development environment should be Microsoft® Visual C++®*1 2015 or later, or LabVIEW™*3 2015 (32-bit) or later.
*3: LabVIEW is a trademark of National Instruments, Inc.

Precaution for use

When operating the NMOS multichannel detector head, always be sure to attach the MOS adapter (supplied with the C7557-01) to the C7557-01 main unit. If the the NMOS multichannel detector head is connected and the power is turned on without attaching the adapter, the power supply in the C7557-01 main unit may be damaged.

Functions

Parameter	Specification
Data transfer	Transfers data stored in memory to computer.
Exposure time setting	1 ms to 65535 ms (1 ms steps) Minimum exposure time depends on sensor detection level.
External sync signal input	BNC connector input
Trigger mode	Internal sync, external sync
Trigger polarity	Trigger polarity selectable for external sync
Shutter timing pulse output	Outputs timing signal for operating external shutter or external light source via BNC connector. Pulse width, delay and polarity settings are possible.
Video signal output	Outputs video signal sent from head, via BNC connector
Video sync signal output	Outputs sync signal used to observe video signal output with external device such as oscilloscope, via BNC connector
Amplifier gain	1/2, 1, 2, 5, 10, 20, 50, 100*3
Image sensor and detector head combination	Compatible with each multichannel detector head Refer to "Selection guide for image sensor and detector head combination"
Detector cooling control	Cooling start and stop
Detector cooling temperature readout	Converts analog temperature data from detector into digital signal, and transfers it to computer. (10-bit A/D conversion)

*3: Depending on the drive conditions, normal output may not be obtained if the amplifier gain is set too high. In this case, lower the amplifier gain.

Specifications

A/D converter

Parameter	CCD area image sensor	NMOS linear image sensor	InGaAs linear image sensor	
A/D converter	16 bits	16 bits	12 bits	16 bits
Conversion speed	4 µs/ch	24 µs/ch	2 µs/ch	8 µs/ch
Input range	0 to 10 V	0 to 10 V	-10 to +10 V	
Input method	Differential input			
Nonlinear linearity	0.1%FS			
A/D conversion signal	External input			

Controller

Parameter	Specification
Clock	20 MHz
Memory	4 MB (1024 ch × 2048 lines)
Interface	USB 2.0/3.0

Equipment

Parameter	Specification
Interface	USB 2.0/3.0 Type B connector
Power supply	AC100 to 240 V ± 10%, 50 to 60 Hz
Power consumption	50 V · A typ.
Dimension (W × H × D)	92 × 150 × 226 mm
Operating temperature	0 to 40 °C
Storage temperature	-10 to 50 °C
Weight	Approx. 2.5 kg

Software

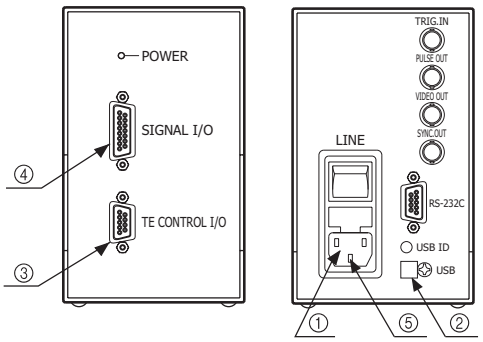
Parameter	Specification
Compatible OS	Windows 7 (32-bit, 64-bit)/ Windows 8 (32-bit, 64-bit)/ Windows 8.1 (32-bit, 64-bit)/ Windows 10 (32-bit, 64-bit)

Prepare a BNC cable in the following cases:

- Measurements by external sync
- Controlling an external shutter or external light source
- Measuring the video signal

Operation method

1. Make connections as indicated in ① to ⑤.
   - ① LINE — Connect to the power cable.
   - ② USB — Connect to a computer through the USB cable.
   - ③ TE CONTROL I/O — Connect to the "TE CONTROL I/O" terminal on the detector head.
   - ④ SIGNAL I/O — Connect to the "I/O SIGNAL" terminal on the detector head.
   - ⑤ GND — When a 2-pin AC plug is used with the power cable, use this GND connector to ground the unit.
2. When all the connections are complete, turn on the power to the C7557-01.
3. Install the MCD USB driver and softeware. (For details on the MCD USB driver and software, refer to the operation manual supplied in the package.)



Front view Rear view

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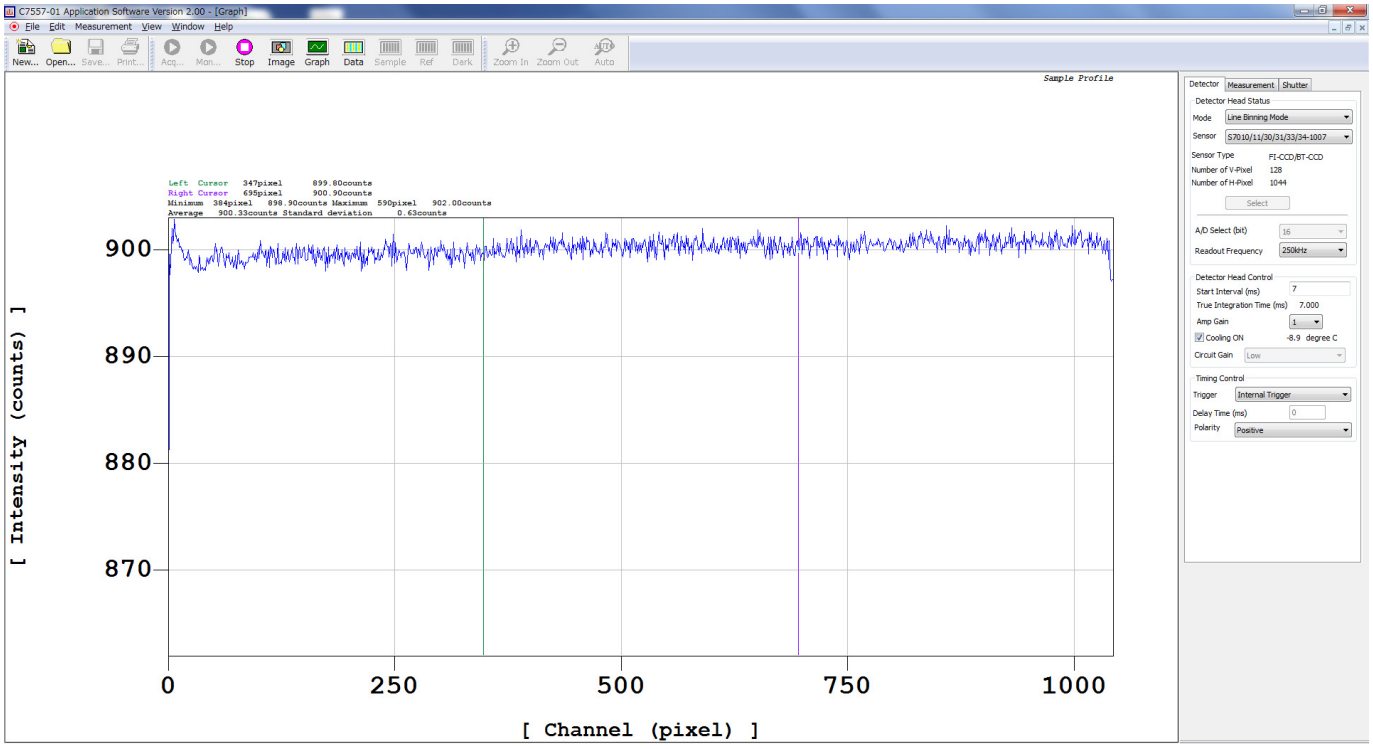
Software functions

The figure below shows the main screen (CCD image sensor: line binning) while running on Windows 7 (64-bit).
From the main screen menu, you can easily set operating conditions for the multichannel detector head and data acquisition parameters. The measurement screen displayed with this software shows the image sensor channel along the horizontal axis and the output count along the vertical axis. The main screen menu also allows to select the desired operation mode: line binning or area scanning (for CCD image sensors, NMOS linear image sensors), line binning (for NMOS linear image sensors) or line scanning (for InGaAs linear image sensors).

The parameters that can be set on the main screen are as follows:

- Exposure time
- Amplifier gain
- Cooling control
- Number of integrations
- Dark correction
- Type of measurement data
- Start or end of measurement
- Detector head status
- Trigger mode
- Trigger polarity
- Shutter timing pulse width
- Shutter timing pulse delay
- Shutter timing pulse polarity



Selection guide for image sensor and detector head combination (1)

Suitable multichannel detector head	Image sensor			
Type no.	Type no.	Number of effective pixel	Image size [mm (H) × mm (V)]	Types of sensor
C7020	S9970-0906	512 × 60	12.288 × 1.440	Front-illuminated CCD area image sensor
	S9970-1006	1024 × 60	24.576 × 1.440	
	S9970-1007	1024 × 124	24.576 × 2.976	
	S9970-1008	1024 × 252	24.576 × 6.048	
C7020-02	S9972-1007	1024 × 124	24.576 × 2.976	
	S9972-1008	1024 × 252	24.576 × 6.048	
C7021	S9971-0906	512 × 60	12.288 × 1.440	
	S9971-1006	1024 × 60	24.576 × 1.440	
	S9971-1007	1024 × 124	24.576 × 2.976	
C7021-02	S9973-1007	1024 × 124	24.576 × 2.976	
C7025	S9971-1008	1024 × 252	24.576 × 6.048	
C7025-02	S9973-1008	1024 × 252	24.576 × 6.048	
C7040	S7030-0906	512 × 58	12.288 × 1.392	Back-thinned[*4] CCD area image sensor
	S7030-0907	512 × 122	12.288 × 2.928	
	S7030-1006	1024 × 58	24.576 × 1.392	
	S7030-1007	1024 × 122	24.576 × 2.928	
	S11500-1007	1024 × 122	24.576 × 2.928	
C7041	S7031-0906S	512 × 58	12.288 × 1.392	
	S7031-0907S	512 × 122	12.288 × 2.928	
	S7031-1006S	1024 × 58	24.576 × 1.392	
	S7031-1007S	1024 × 122	24.576 × 2.928	
	S11501-1007S	1024 × 122	24.576 × 2.928	
C7043	S7033-0907	512 × 122	12.288 × 2.928	
	S7033-1007	1024 × 122	24.576 × 2.928	
C7044	S7034-0907S	512 × 122	12.288 × 2.928	
	S7034-1007S	1024 × 122	24.576 × 2.928	
C7180	S7170-0909	512 × 512	12.288 × 12.288	
C7181	S7171-0909-01	512 × 512	12.288 × 12.288	
C10150	S10140-1007	1024 × 122	12.288 × 1.464	
	S10140-1008	1024 × 250	12.288 × 3.000	
	S10140-1009	1024 × 506	12.288 × 6.072	
	S10140-1107	2048 × 122	24.576 × 1.464	
	S10140-1108	2048 × 250	24.576 × 3.000	
	S10140-1109	2048 × 506	24.576 × 6.072	
C10151	S10141-1007S	1024 × 122	12.288 × 1.464	
	S10141-1008S	1024 × 250	12.288 × 3.000	
	S10141-1009S	1024 × 506	12.288 × 6.072	
	S10141-1107S	2048 × 122	24.576 × 1.464	
	S10141-1108S	2048 × 250	24.576 × 3.000	
	S10141-1109S	2048 × 506	24.576 × 6.072	
C8061-01	G9201-256SB	256	12.8 × 0.25	InGaAs linear image sensor
	G9202-512SB	512	12.8 × 0.25	
	G9203-256SA	256	12.8 × 0.50	
	G9204-512SA	512	12.8 × 0.50	
	G9211-256SB	256	12.8 × 0.25	
	G9212-512SB	512	12.8 × 0.25	
	G9213-256SA	256	12.8 × 0.50	
	G9214-512SA	512	12.8 × 0.50	
C8062-01	G9205-256WB	256	12.8 × 0.25	
	G9205-512WB	512	12.8 × 0.25	
	G9206-02B	256	12.8 × 0.25	
	G9206-256WB	256	12.8 × 0.25	
	G9206-512WB	512	12.8 × 0.25	
	G9207-256WB	256	12.8 × 0.25	
	G9208-256WB	256	12.8 × 0.25	
	G9208-512WB	512	12.8 × 0.25	

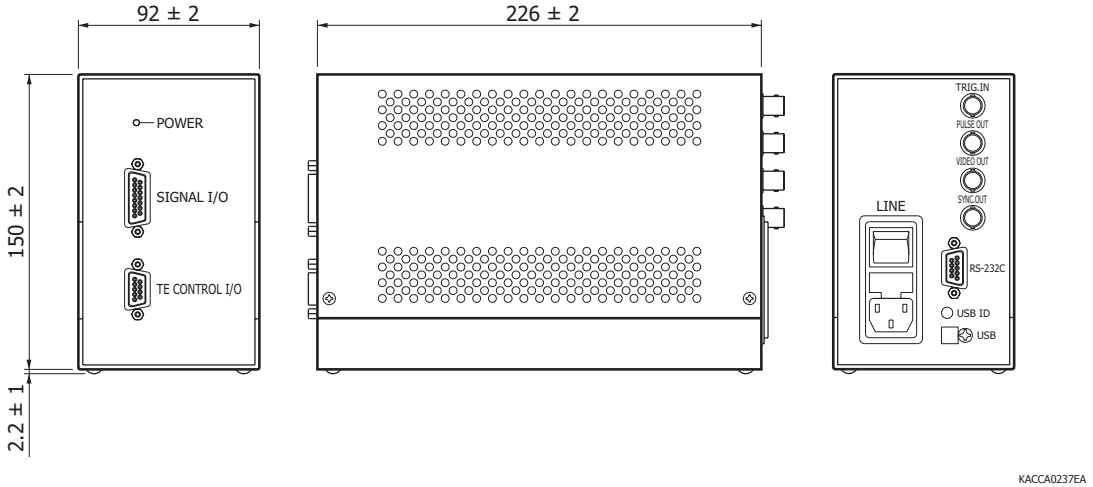
*4: The C7557-01 can be used with following back-thinned CCD area image sensors and multichannel detector heads.
Two-stage TE-cooled CCD S7032-1006/-1007 multichannel detector head C7042

Selection guide for image sensor and detector head combination (2)

Suitable multichannel detector head	Image sensor			
Type no.	Type no.	Number of effective pixels	Image size [mm (H) × mm (V)]	Type of sensor
C5964-0800	S5930-256S	256	12.8 × 2.5	NMOS linear image sensor
C5964-0900	S5930-512S	512	25.6 × 2.5	
C5964-0910	S5931-512S	512	12.8 × 2.5	
C5964-1010	S5931-1024S	1024	25.6 × 2.5	
C5964-0901	S8382-512S	512	25.6 × 2.5	
C5964-1011	S8383-1024S	1024	25.6 × 2.5	
C8892	S3901-128Q	128	6.4 × 2.5	
	S3901-256Q	256	12.8 × 2.5	
	S3901-512Q	512	25.6 × 2.5	
	S3902-128Q	128	6.4 × 0.5	
	S3902-256Q	256	12.8 × 0.5	
	S3902-512Q	512	25.6 × 0.5	
	S3903-256Q	256	6.4 × 0.5	
	S3903-512Q	512	12.8 × 0.5	
	S3903-1024Q	1024	25.6 × 0.5	
	S3904-256Q	256	6.4 × 2.5	
	S3904-512Q	512	12.8 × 2.5	
	S3904-1024Q	1024	25.6 × 2.5	
	S8380-128Q	128	6.4 × 2.5	
	S8380-256Q	256	12.8 × 2.5	
	S8380-512Q	512	25.6 × 2.5	
	S8381-256Q	256	6.4 × 2.5	
	S8381-512Q	512	12.8 × 2.5	
	S8381-1024Q	1024	25.6 × 2.5	

Note: If you want to connect the C7884 series driver circuits for NMOS linear image sensor or the C10808 series driver circuits for CMOS linear image sensor, contact your local Hamamatsu office.

Dimensional outline (unit: mm)

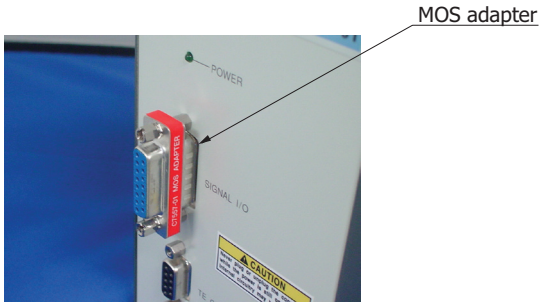


Accessories

· Spare fuse (2.5 A)*5	1
· AC cable	1
· 2 to 3 conversion adapter	1
· USB cable	1
· Detector head connection cables (for "SIGNAL I/O" and "TE CONTROL I/O" terminal of multichannel detector head)	2
· CD-R (MCD USB driver, Software, Operation manual)	1
· MOS adapter*6	1

*5: Contained in the holder just above the AC cable connector on the C7557-01 rear panel.

*6: When operating the NMOS multichannel detector head, always be sure to attach the MOS adapter (supplied) to the C7557-01 main unit. If the the NMOS multichannel detector head is connected and the power is turned on without attaching the adapter, the power supply in the C7557-01 main unit may be damaged.



MOS adapter mounting example

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions

· Disclaimar

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