EMGREAD
EM Gain Readjustment Tool

Instruction Manual

⚠CAUTION	• The manual describes the correct handling method of the system and provides cautions in order to avoid accidents. Read this manual carefully beforehand use the system correctly. • After reading the manual, store it in a location where you can refer to it at any time.

Ver.15.6.4732E
June 2015

HAMAMATSU PHOTONICS K.K.

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Contents

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1. INTRODUCTION

These documents provide information of how to operate EMGREAD. Read this manual carefully before operating the EMGREAD for proper operation.

1-1 SYSTEM REQUIREMENTS

The system requirements for this software are as follows.

Product Name	ImagEM	ImagEM X2
Type of computer	PC-AT compatibles	
OS	Windows Vista, Windows 7 Windows 8, Windows 8.1	
Available HDD space	100 MB or more	
Interface	Camera Link	IEEE 1394b
Interface card	DALSA PC-CamLINK ActiveSilicon Phoenix	IOI FWB-PCIE1X21A
DCAM-API	DCAM-API 15.6 or latest	
Incident light check	No light to camera	Average 10,000 counts to camera – see section 5-7

Note
- This software may not work satisfactorily on some computers. This software may fail to operate due to inappropriate operating system or system requirements.

1-2 APPROPRIATE CAMERA

This software is appropriate to be used with the following cameras.

Product Name	Model type	Firmware
ImagEM	C9100-13	Version 2.0 or later
	C9100-14	Not specified
ImagEM X2	C9100-23B/-24B	Not specified

Note
- If the C9100-13 firmware version is earlier than 2.0, it can be upgraded (upgrading fee applies). Contact Hamamatsu subsidiary or distributor for details.

1-3 TRADEMARKS

Windows Vista, Windows 7, Windows 8 and Windows 8.1 are the registered trademarks of Microsoft Corporation in the United States and other countries. ImagEM and ImagEM X2 are trademarks of Hamamatsu Photonics K.K. Other brand names are the trademarks or registered trademarks of their respective companies.

2. STARTING METHOD

Start up this software from setup window of DCAM-API or specify path name directly.

2-1 START FROM SETUP WINDOW

Insert DCAM-API CD-ROM in PC and the DCAM-API setup window appears as shown below. If the window does not come up even though the CD-ROM is properly set, execute setup.exe directly from the CD-ROM.
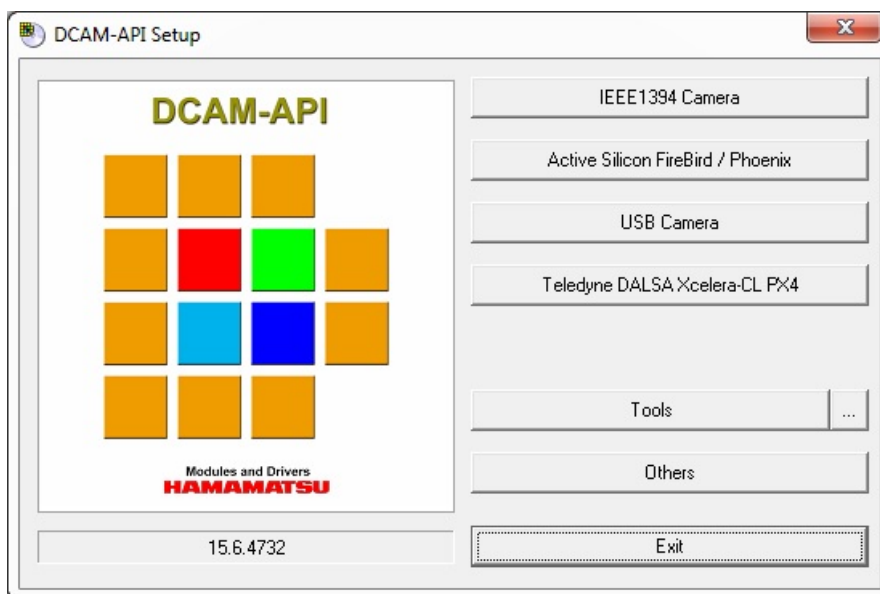

Fig.1 DCAM-API CD-ROM setup window

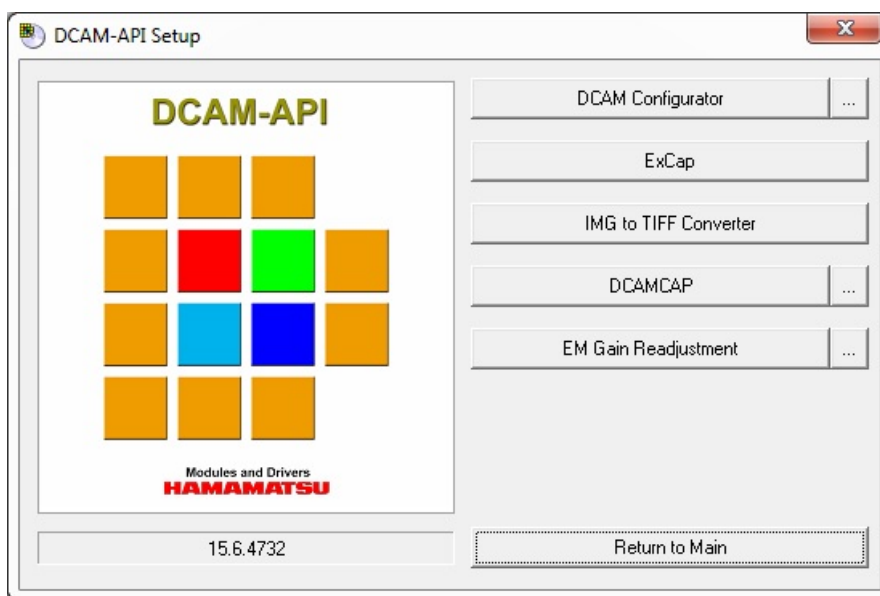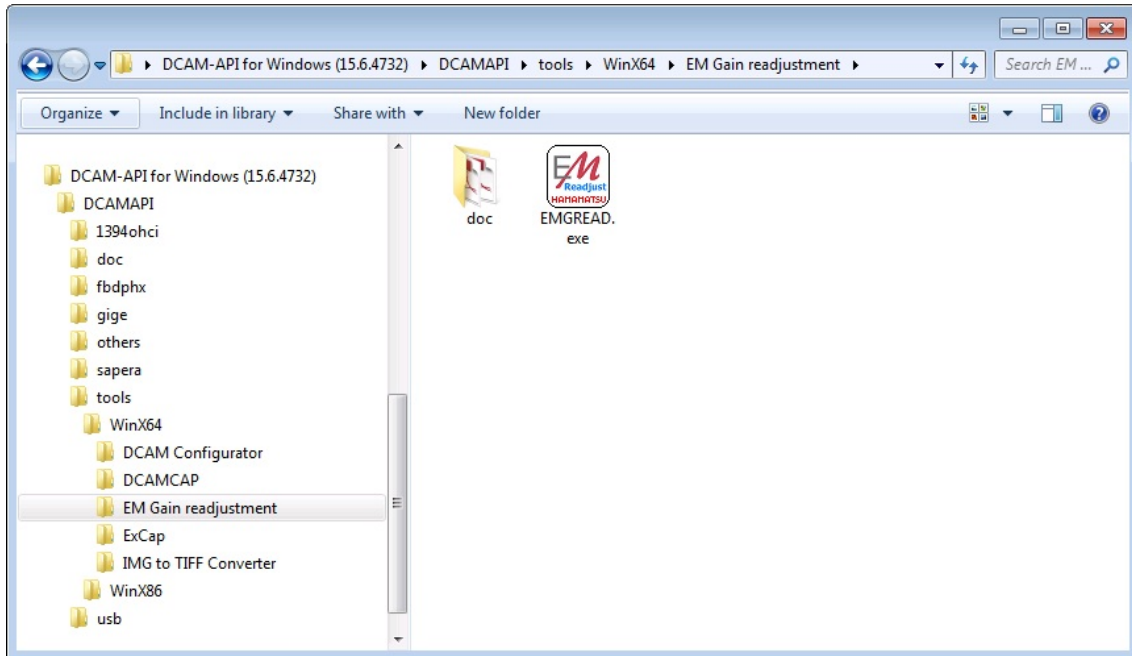Press "Tools" button, then the window become as shown below.

Fig.2 Setup window after "Tools" button is pressed

Press "EM Gain Readjustment" button to start EMGREAD.

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2-2 START BY SPECIFYING PATH

Locate EMGREAD.exe under the DCAMAPI folder inside install image includes DCAM-API.

The 64-bit version is available in the WinX64 directory. The 32-bit version is available in the WinX86 directory.

2-3   STARTUP WINDOW

A dialog is displayed in the maximized window as shown below when this program is installed. Progress of the program is indicated in the dialog box shown in the center. Position of this dialog box can be moved. It is minimized in accordance with the window.
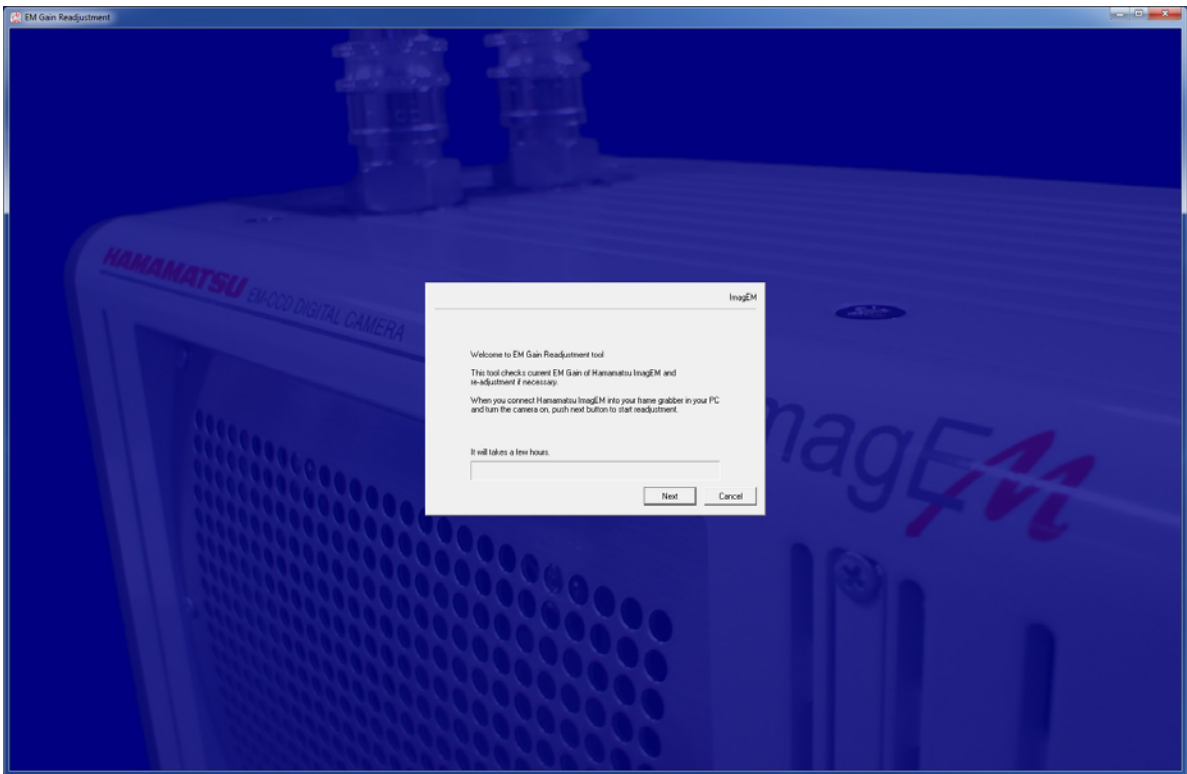

Fig.3 Whole image of startup window

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3. OVERVIEW

EMGREAD is a tool to readjust EM gain of Hamamatsu EM-CCD camera.
EM gain readjustment has different steps for the ImagEM and ImagEM X2.

3-1 IMAGEM ADJUSTMENT PROCEDURE

To perform EM gain readjustment, the camera should be set with no incident light, and also its cooling temperature needs to be sufficiently stable. To avoid inappropriate procedure, this tool confirms cooling status before performing EM gain readjustment.
In addition, when this tool has confirmed that readjustment is not necessary through the confirmation procedure, as gain is not aged, this tool does not perform EM gain readjustment.

Procedure of ImagEM is shown below.

Process of EMGREAD	Move to next step
Right after startup	Push Next button
Communication check	Wait several tens of seconds
Cooling status check	Push Next button In the case of cooling type is water, cooling is not started
Incident light check	Push Next button until covering is enough (No light to camera)
Standby for cooling temperature stabilization	Wait approximately 1 to 2 hours
EM gain check	Wait several minutes Procedure ends if readjustment is not necessary
EM gain readjustment	Wait approximately 1 to 4 hours

Note   • EM gain readjustment takes considerable time to complete once the readjustment procedure has started. Be aware of this fact before executing this software.

3-2 IMAGEM X2 ADJUSTMENT PROCEDURE

To perform EM gain readjustment, the camera should be set with certain uniform incident light, and also its cooling temperature needs to be sufficiently stable. To avoid inappropriate procedure, this tool confirms cooling status before performing EM gain readjustment.

In addition, when this tool has confirmed that readjustment is not necessary through the confirmation procedure, as gain is not aged, this tool does not perform EM gain readjustment.

Procedure of ImagEM X2 is shown below.

Process of EMGREAD	Move to next step
Right after startup	Push Next button
Communication check	Wait several tens of seconds
Readout speed selection	Push Next button after selecting the readout speed to readjust
Cooling status check	Push Next button In the case of cooling type is water, cooling is not started
Stable for cooling temperature stabilization	Wait approximately 30 minutes to 1 hour
Stable for starting incident light adjust	Push Next button
Incident light adjust	Push Next button after adjusting the incident light to display conditions (See section 5-7 for appropriate light conditions)
Incident light check	Wait several seconds Procedure ends if incident light is outside of conditions
EM gain check	Wait several minutes Procedure ends if readjustment is not necessary
EM gain readjustment	Wait several minutes In some cases its required to adjust incident light again Procedure ends if EM gain readjustment feature has reached the limit of readjustment

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4. DETAIL OF PROCEDURE FOR IMAGEM

4-1 RIGHT AFTER STARTUP

A dialog box displayed right after startup in the maximized window as shown below.
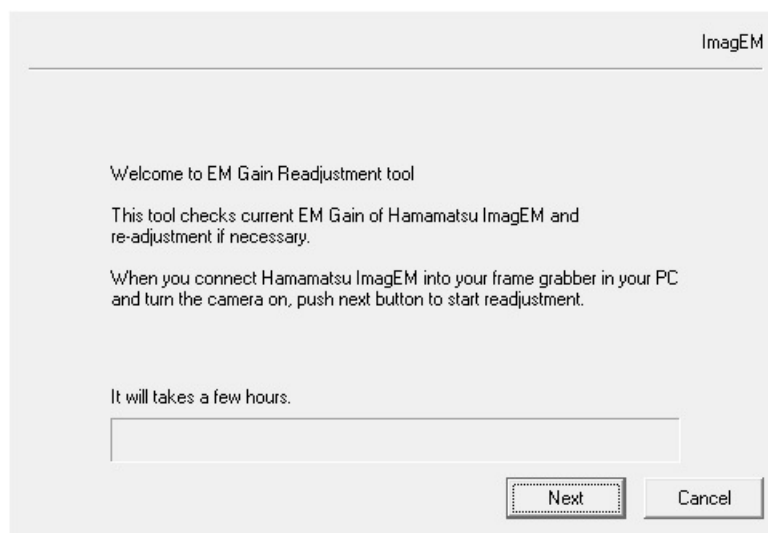

Fig.4 Dialog right after startup

Press "Next" button to proceed.

4-2   COMMUNICATION CHECK

This software checks for connected camera first. Prior to the camera check, this software searches for an available communication port and starts communication.

```
                                                              ImagEM


        Camera: C9100-13 VER 2.2B

        Now checking port PHX1.






        Elapse 0:00:10
        [                                              ]

                                        [ Next ]      [ Abort ]
```
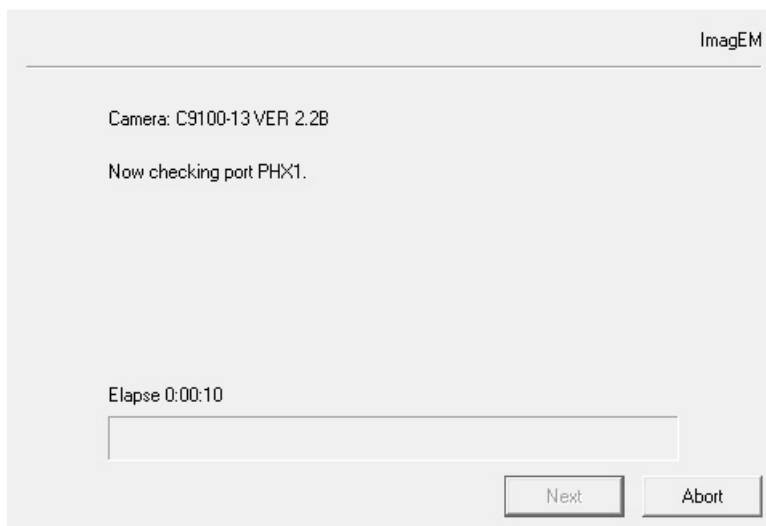
Fig.5 Checking communication

If an appropriate communication port is not detected, for example the frame grabber board is not installed, a window is indicated as shown below. In this case, press "Close" button to exit the software and then check connections such as connection with the camera.
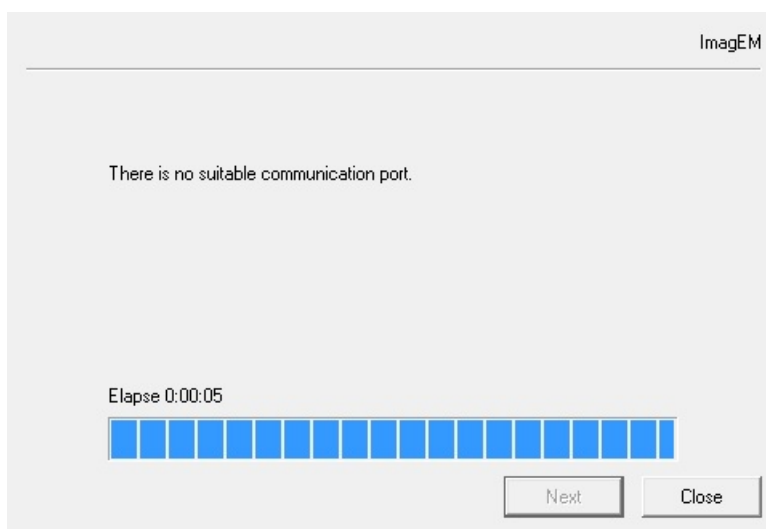
```
                                                              ImagEM



        There is no suitable communication port.




        Elapse 0:00:05
        [■■■■■■■■■■■■■■■■■■■■■■■■        ]
                                        [ Next ]      [ Close ]
```

Fig.6 Dialog when communication check has failed

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If the connected camera is not an appropriate one, a window is indicated as shown below, even if the frame grabber board is installed and the camera is properly connected. In this case, press "Close" button to exit this software.
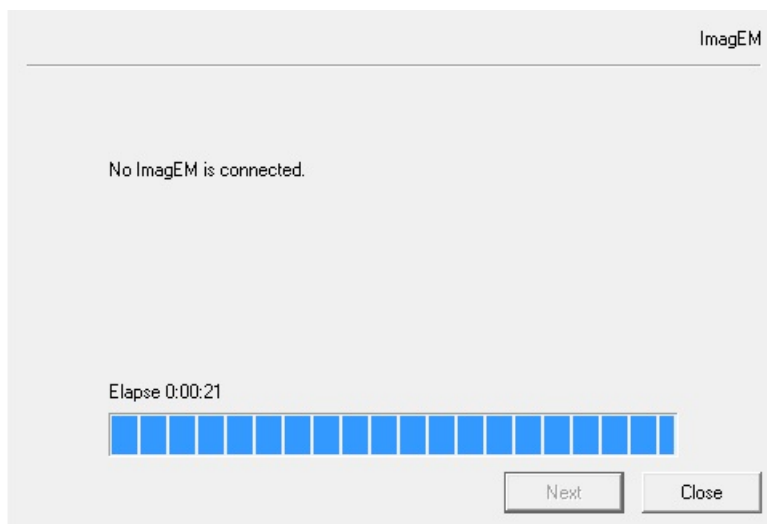

Fig.7 Dialog when an appropriate camera is not connected

4-3   COOLING STATUS CHECK (WATER COOLING)

Check water circulation status when the connected camera is operated in water cooling mode but cooling setting is not done on the camera.
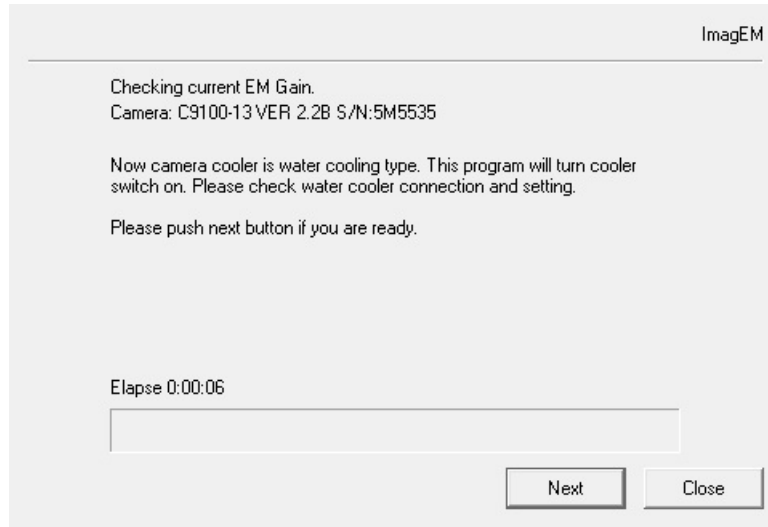

Fig.8 Check for cooling water

Press "Next" button when cooling water is ready. Start cooling the camera and go on to next step.

	•	Follow the operation manual for the cooling water circulator when handling or operating cooling water and cooling water circulator.

Note	•	When camera is operated in air cooling mode, this procedure is not necessary since cooling starts at the same time of power on.

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4-4　INCIDENT LIGHT CHECK

If the connected camera is appropriate for EM gain readjustment, the model name is indicated and the process continues to check the conditions for EM gain readjustment.
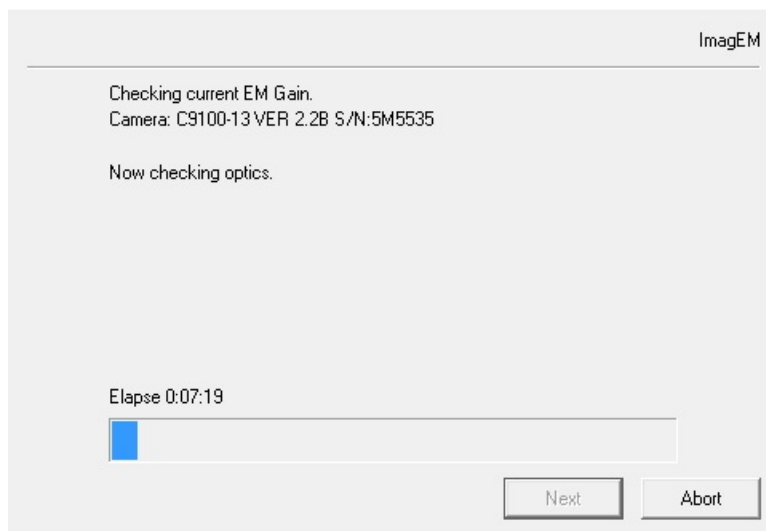

Fig.9 Check conditions for readjustment

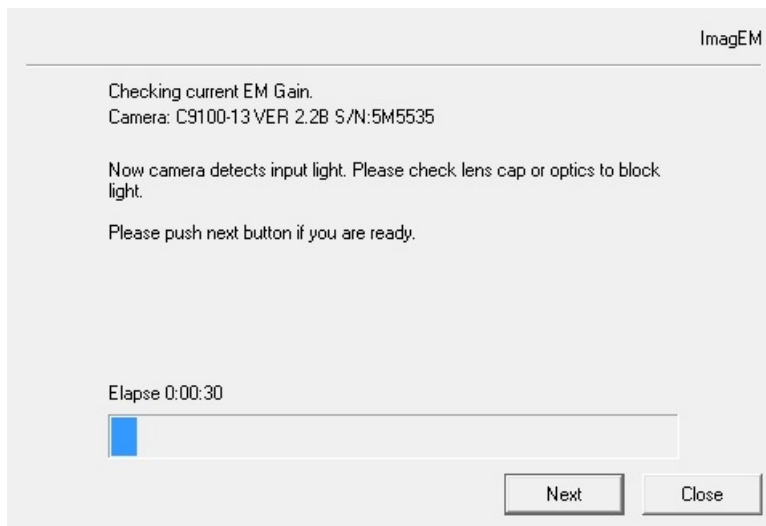If any condition is inappropriate for readjustment, a dialog is indicated as shown below.

Fig.10 Dialog when condition is inappropriate

Set camera with no incident light. For example by checking the lens cap. Then press "Next" button. All the conditions need to be appropriate before proceeding to the next step.
If all the conditions are appropriate, go on to the next step.

4-5   STANDBY FOR COOLING TEMPERATURE STABILIZATION

Wait until cooling temperature becomes sufficiently stable for proper EM gain readjustment.
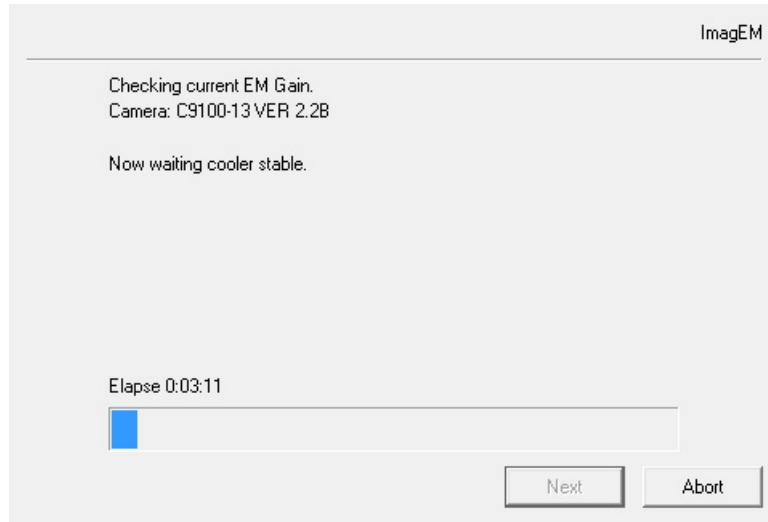

Fig.11 Standby for cooling temperature stabilization

The time for the cooling temperature to be stabilized varies depending on the cooling status of the camera up to this point and also the temperature of the ambient environment.

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4-6   EM GAIN CHECK

After cooling temperature has become stable, start measuring current EM gain condition.
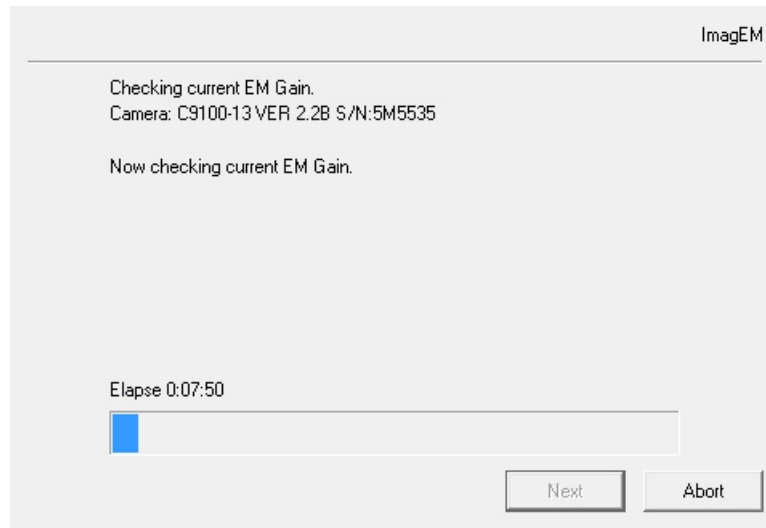

Fig.12 Measuring EM gain

If EM gain readjustment is not necessary, a dialog is indicated as shown below.
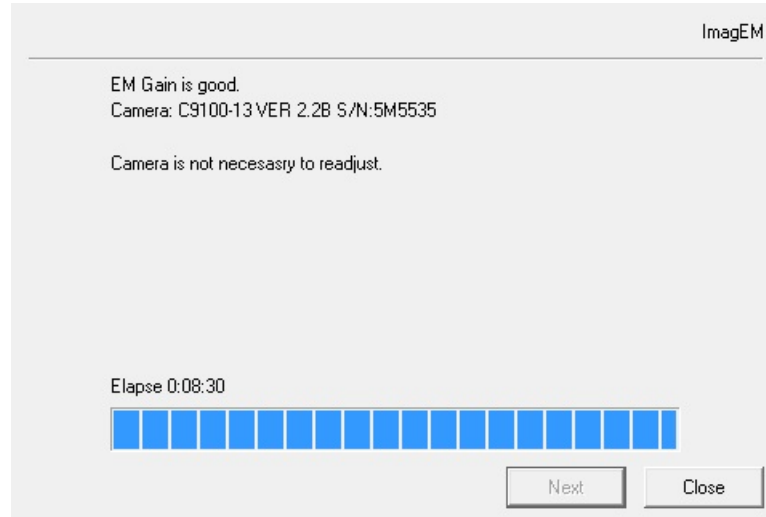Press "Close" button to exit this software.

Fig.13 Dialog when EM gain is favorable

4-7 EM GAIN READJUSTMENT

When EM gain readjustment is necessary as a result of "4-6 EM gain check", the readjustment process continues.
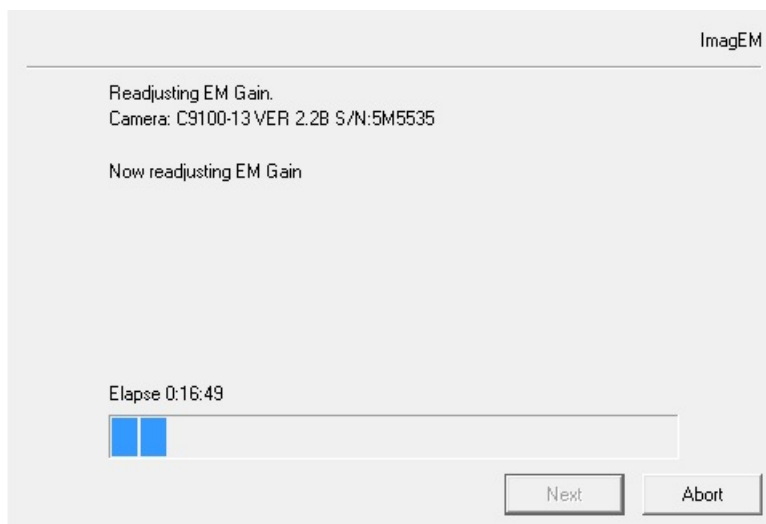

Fig.14 During process of EM gain readjustment

The time for completion of readjustment varies depending on the camera conditions. It takes approximately 1 to 4 hours.

4-8 FINISH

When the readjustment is complete, the following dialog is indicated, as well as intermittent blips from the camera to indicate the completion of readjustment. Press "Close" button to exit the software and stop sound from the camera.
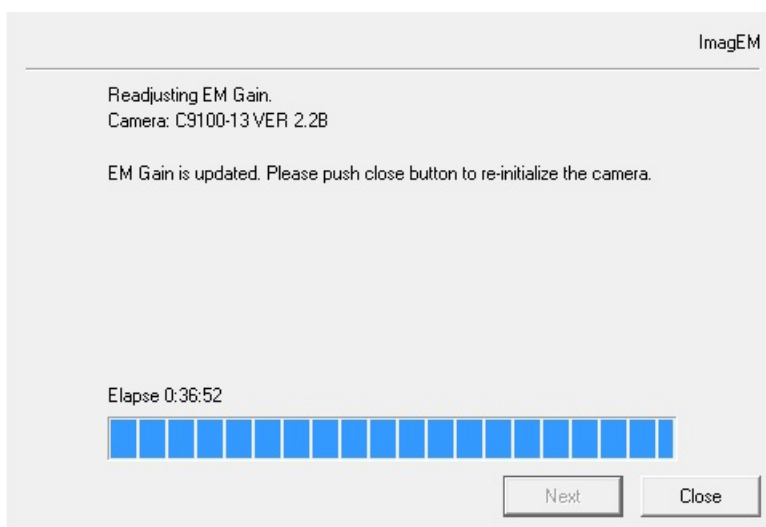

Fig.15 Completion of EM gain readjustment

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4-9   ABORT PROCESS

Press "Abort" button during each process to stop the EM gain readjustment. The following message is indicated to confirm when the "Abort" button is pressed.
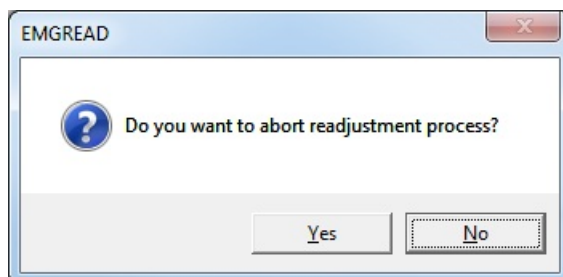

Fig.16 Message box to confirm abort process

Press "Yes" to stop current process. Next dialog is indicated.
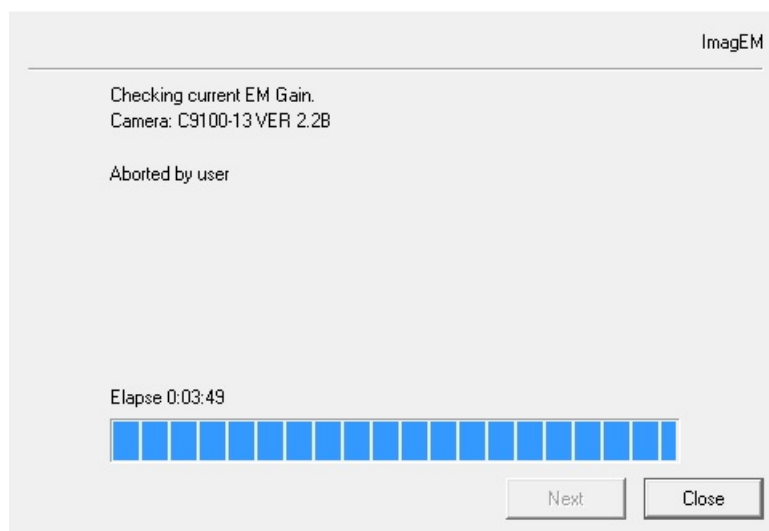

Fig.17 Abort process

When this dialog is indicated, the condition of EM gain was not revised from the condition before this software is started.
Press "Close" button to exit the software.

5. DETAIL OF PROCEDURE FOR IMAGEM X2

5-1 RIGHT AFTER STARTUP

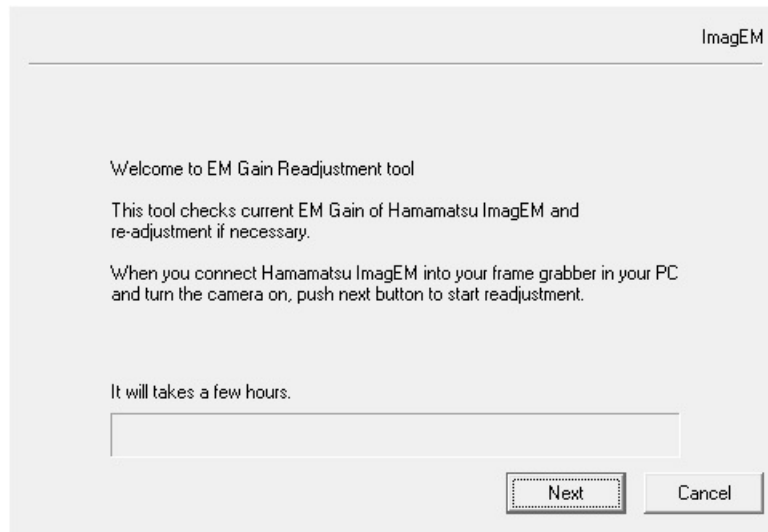A dialog box displayed right after startup in the maximized window as shown below.

Fig.18 Dialog right after startup

Press "Next" button to proceed.

HAMAMATSU

5-2 COMMUNICATION CHECK

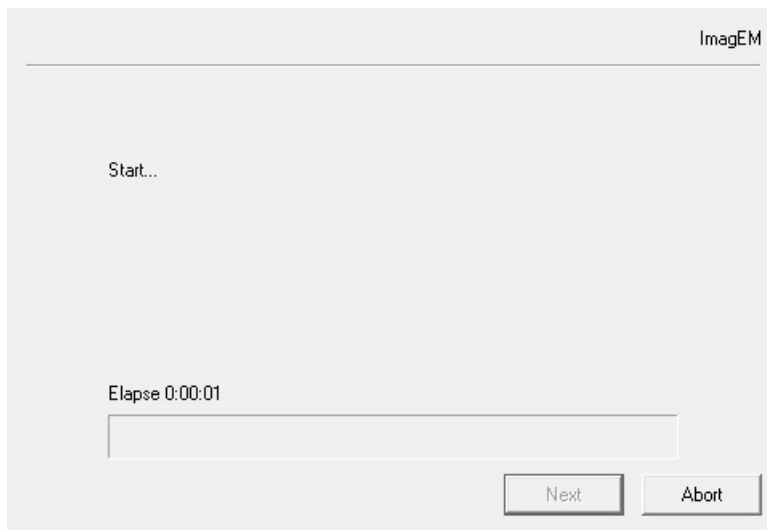This software checks for the connected camera first.

Fig.19 Checking communication

In this case, press "Close" button to exit the software and then check connections such as a connection with the camera.
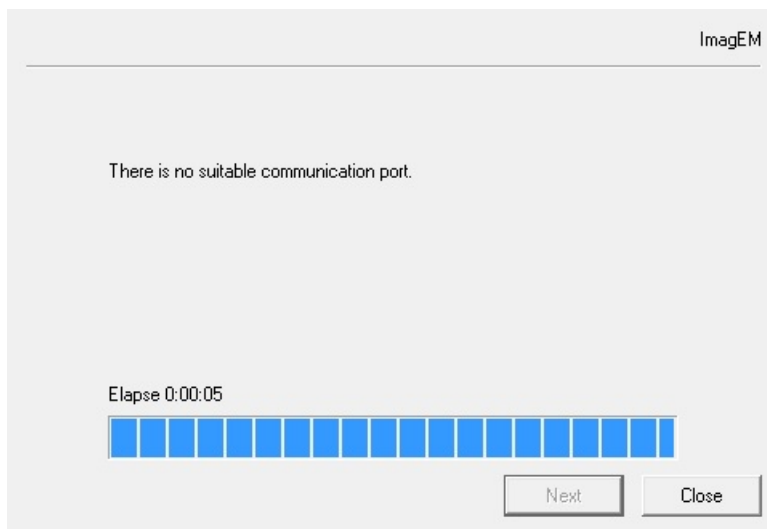

Fig.20 Dialog when communication check has failed

If the connected camera is not an appropriate one, a window is indicated as shown below, even if the camera is properly connected. In this case, press "Close" button to exit the software.
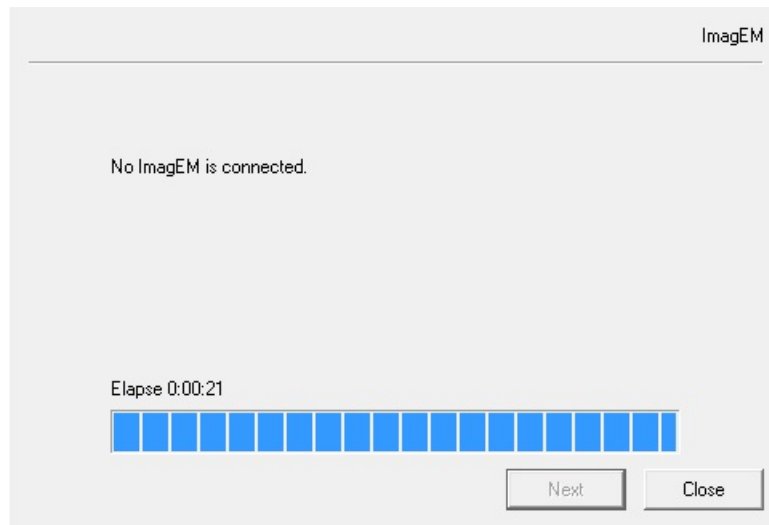

Fig.21 Dialog when an appropriate camera is not connected

5-3   READOUT SPEED SELECTION

EM gain readjustment for the ImagEM X2 is only done for the selected readout speed.
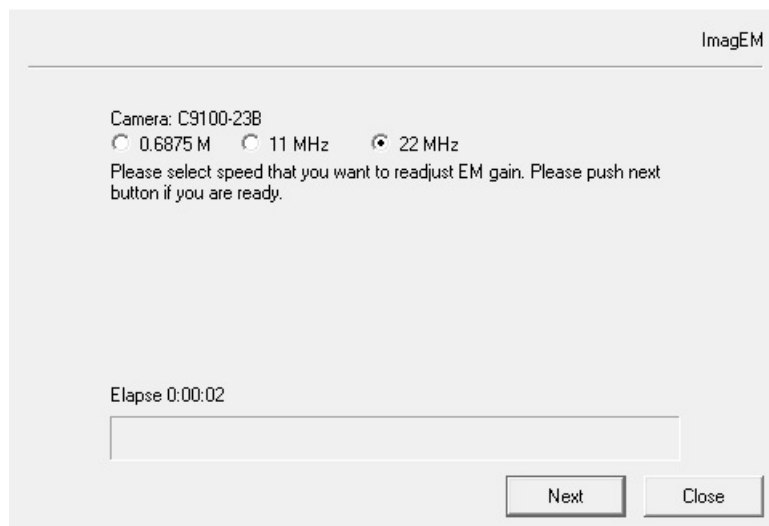Select the readout speed to readjust EM gain, please press "Next" button.

Fig.22 Select readout speed

Note
- Please execute EM gain readjustment tool again after the readjustment is complete if you want to readjust EM gain for all of the readout speeds.

5-4   COOLING STATUS CHECK (WATER COOLING)

Check water circulation status when the connected camera is operated in water cooling mode but cooling setting is not done on the camera.
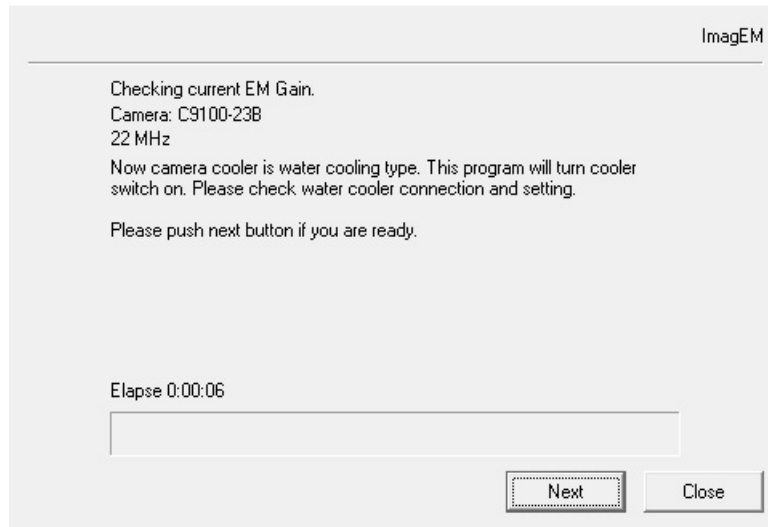
Fig.23 Check for cooling water

Press "Next" button when cooling water is ready. Start cooling the camera and go on to next step.

	• Follow the operation manual for the cooling water circulator when handling or operating cooling water and cooling water circulator.

Note	• When camera is operated in air cooling mode, this procedure is not necessary since cooling starts at the same time of power on.

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5-5   STANDBY FOR COOLING TEMPERATURE STABILIZATION

Wait until the cooling temperature becomes sufficiently stable for proper EM gain readjustment.
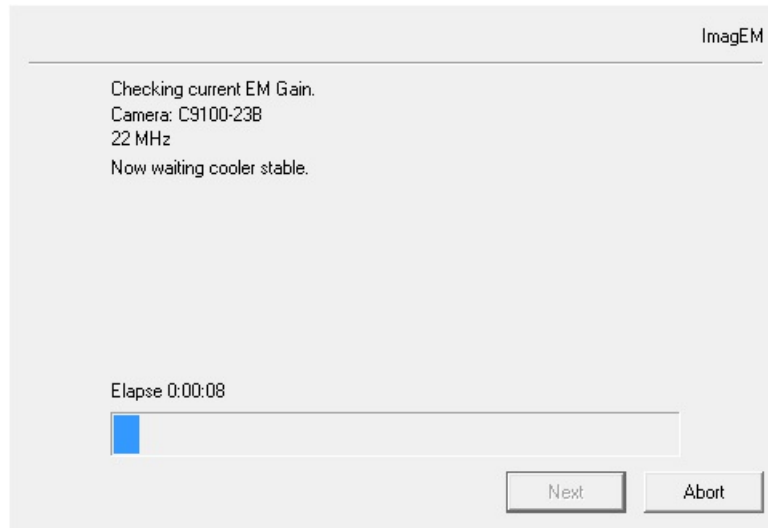

Fig.24 Standby for cooling temperature stabilization

The time for the cooling temperature to be stabilized varies depending on the cooling status of the camera up to this point and also the temperature of the ambient environment.

5-6   STANDBY FOR STARTING INCIDENT LIGHT ADJUSTMENT

After cooling temperature has become stable, a window is indicated as shown below.
Press "Next" button to start capturing image for adjusting the incident light.
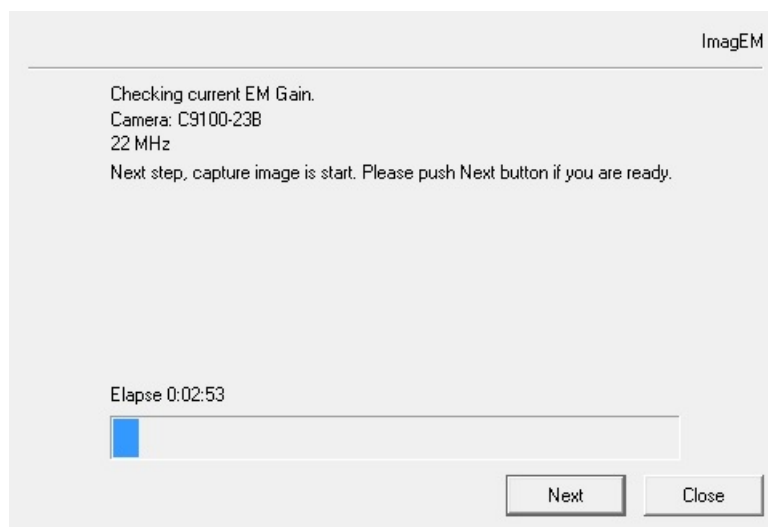

Fig.25 Standby for starting incident light adjustment

5-7   INCIDENT LIGHT ADJUSTMENT

While adjusting the incident light, a window is indicated as shown below.
Adjust the incident light under the standard conditions.
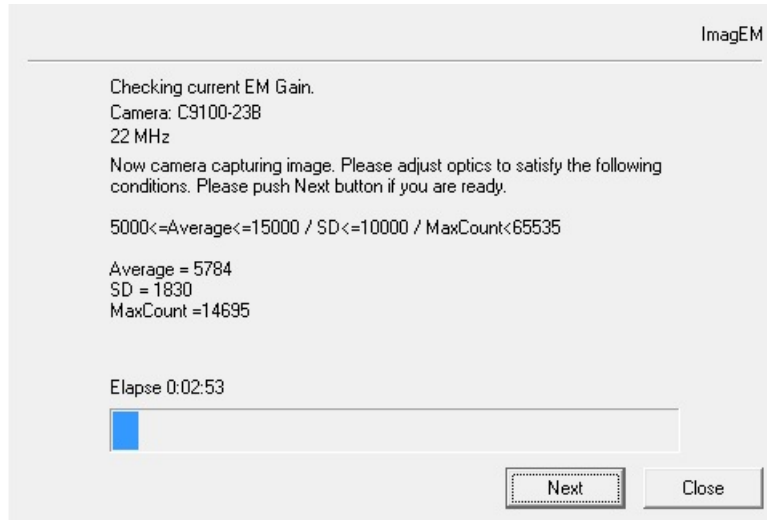
Fig.26 Incident light adjustment

Press "Next" button to check the incident light.

5-8 INCIDENT LIGHT CHECK

While checking the incident light, a window is indicated as shown below.
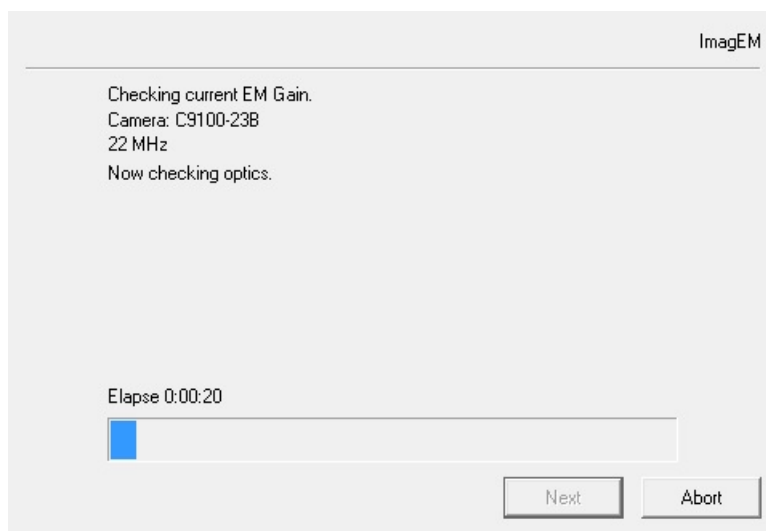
Fig.27 Incident light check

If any condition is inappropriate for readjustment, a dialog is indicated as shown below.
Press "Close" button to exit the software.
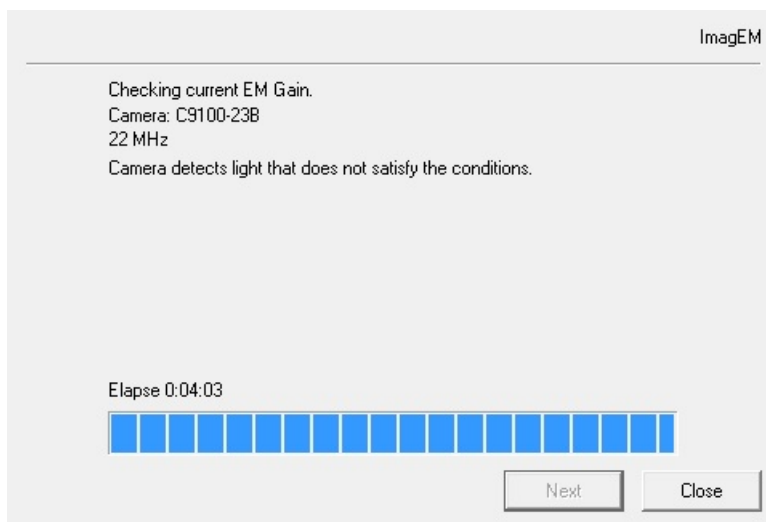
Fig.28 Dialog when the condition is inappropriate

If all of the conditions are appropriate, go on to the next step.

5-9 EM GAIN CHECK

After the incident light is correct, the software will start measuring the current EM gain condition.
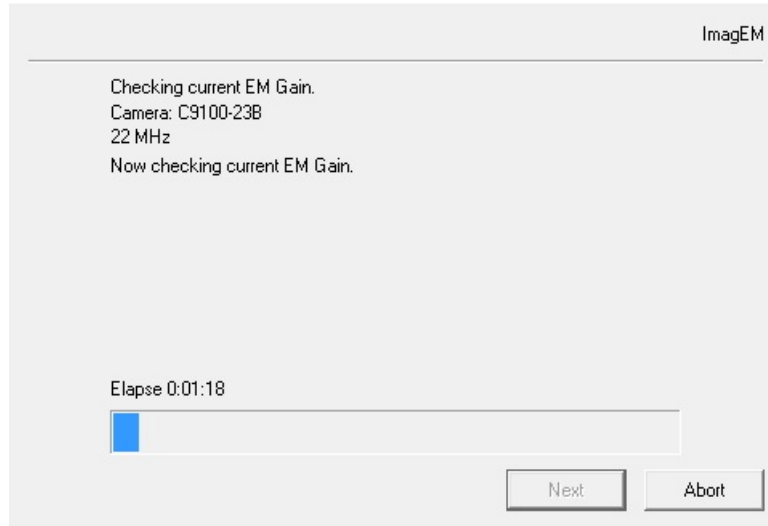
Fig.29 Measuring EM gain

If EM gain readjustment is not necessary, a dialog is indicated as shown below. Press "Close" button to exit the software.
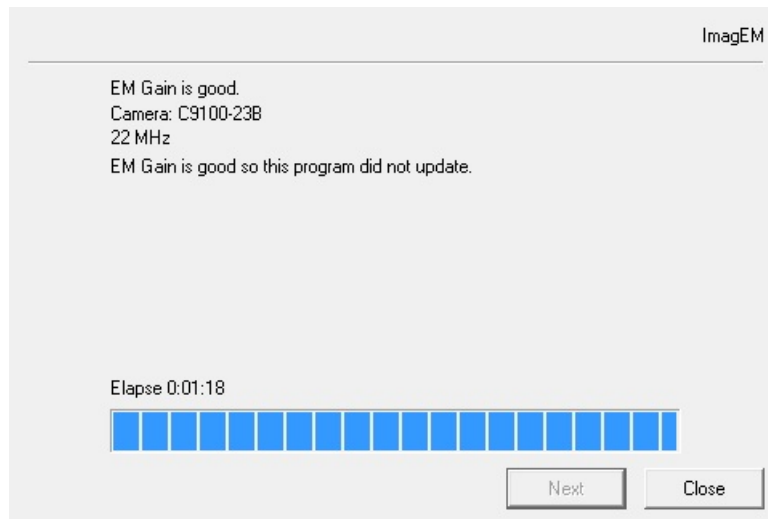
Fig.30 Dialog when EM gain is favorable

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5-10 EM GAIN READJUSTMENT

When EM gain readjustment is necessary as a result of "5-9 EM gain check", the readjustment process continues.
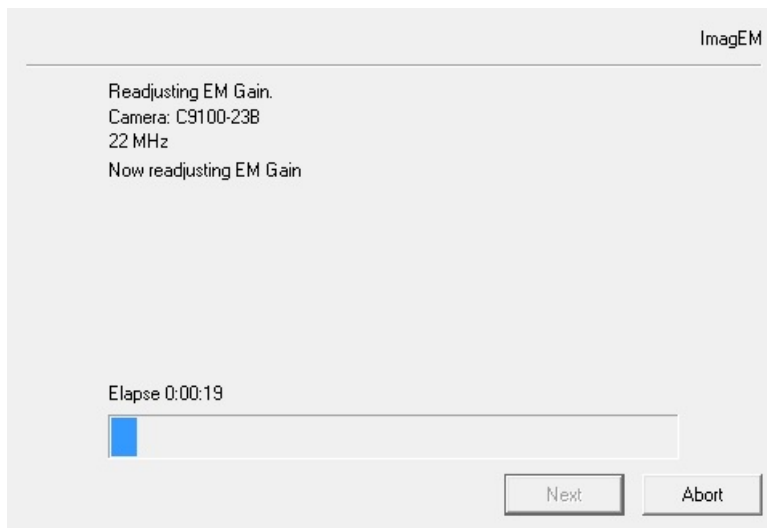
Fig.31 During process of EM gain readjustment

The time for completion of the readjustment varies depending on the camera conditions. It will take a few minutes.

In addition, if readjustment of the incident light is necessary, a dialog is indicated as shown below. Press "Next" button to readjust the incident light as described in "5-7 Incident Light Adjustment".
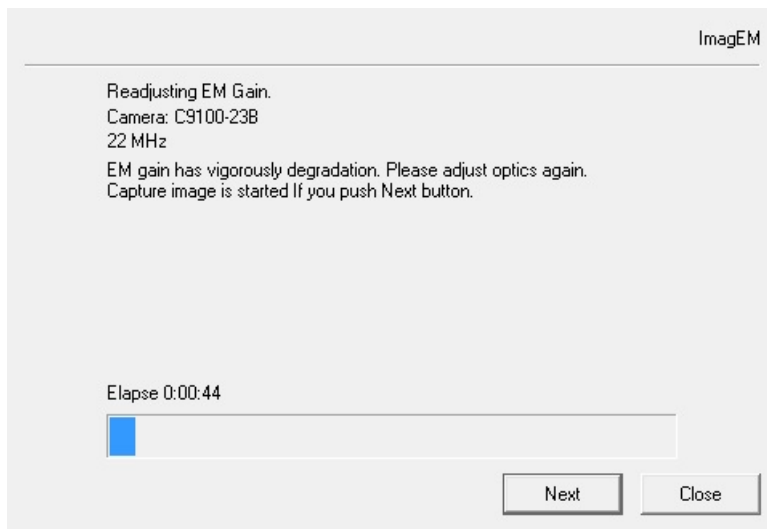
Fig.32 Incident light readjustment

5-11 FINISH

When the EM gain readjustment is complete, a dialog is indicated as shown below.
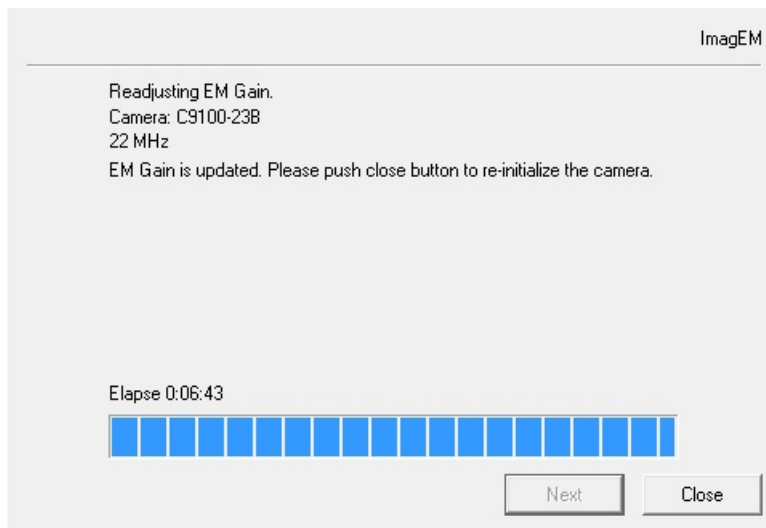
Fig.33 Completion of EM gain readjustment

Re-initialize the camera according to the instruction in the dialog.
Press "Close" button to exit the software.

When the EM gain readjustment feature has reached its limit of readjustment, a dialog is indicated as shown below.
Press "Close" button to exit the software.
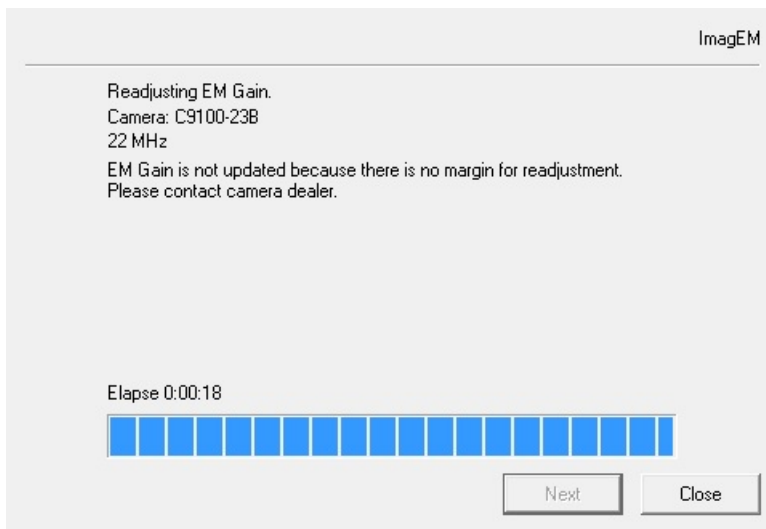
Fig.34 Limit of readjustment

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5-12 ABORT PROCESS

Press "Abort" button during each process to stop the EM gain readjustment. The following message is indicated to confirm when the "Abort" button is pressed.

Fig.35 Message box to confirm abort process

Press "Yes" to stop current process. Next dialog is indicated.

Fig.36 Abort process

When this dialog is indicated, the condition of EM gain was not revised from the condition before this software is started.
Press "Close" button to exit the software.

6. TROUBLESHOOTING

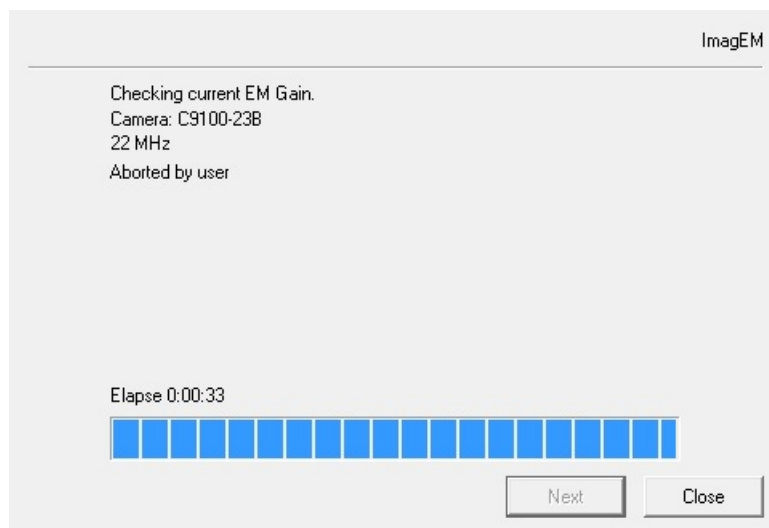| Issue	Cause
EMGREAD.exe is missing	There is the possibility that the DCAM-API is not the latest version. Use the latest version of DCAM-API.
"EM Gain Readjustment" button is missing on setup window of DCAM	
Camera is not found during the communication check	DCAM-API might not be installed. Install the latest version of DCAM-API. Camera firmware version is inappropriate.
Procedure does not proceed beyond standby for cooling temperature stabilization	Waiting time is not sufficient for the cooling temperature to become stable. Wait for 1 to 2 hours. Otherwise, ambient temperature of the camera or cooling water temperature is not appropriate for required operation conditions.
Procedure does not proceed beyond incident light check	ImagEM Use the dedicated lens cap.
	ImagEM X2 Presence of incident uniform light to the camera.
Long beep sounds from the camera (ImagEM)	EM gain readjustment feature was reached its limit of readjustment. The beep sound indicates that no more EM gain readjustment can be done on this camera.
Short intermittent blip sounds from the camera (ImagEM)	Check the status of readjustment completion. Press "Close" button to exit the software.

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7. WARRANTY

7-1 WARRANTY

(1) If you have any trouble or questions about the EM gain readjustment procedure, please feel free to contact a Hamamatsu subsidiary or local distributor.

8.   SOFTWARE USER AGREEMENT

In order to use the software that comes with this product (indicates the entire product if software is a single product item; hereafter called "this software"), the user must agree to the following terms and conditions. Always be sure to read these terms before use.

8-1   COPYRIGHTS

All ownership rights, intellectual property rights and all other rights relating to this software and instruction manual are the property of Hamamatsu Photonics K.K. (hereafter called "Hamamatsu"). Except for those items expressly permitted in this user agreement, Hamamatsu does not assign or grant any rights to the user, and Hamamatsu retains all rights relating to this software and instruction manual.

8-2   SCOPE OF USAGE RIGHTS

Hamamatsu grants the user non-exclusive rights to use of this software subject to the following conditions.

(1)   User may copy this software only for the purpose of making a backup.
(2)   User may not analyze, change or modify this software.
(3)   User may not transfer this software to a third party.

8-3   SCOPE OF WARRANTY LIMITED WARRANTY

(1)   If the storage media containing this software is found to be defective during the warranty period and this software does not properly function, then this software will be replaced free of charge or a substitute product given to the user.

(2)   Hamamatsu accepts absolutely no liability in any case whatsoever, for damages or losses arising directly or indirectly relating to or incidental to use of this software.

(3)   If an error (bug) is discovered in this software and is corrected, then the corrected software or software for making the correction (hereafter written as "correction software") or information relating to making the correction will be provided. However, the necessity, the time, and the period for providing the correction software or information relating to the correction will be decided at the discretion of Hamamatsu.

8-4   SCOPE OF SUPPORT

Support services will be provided only for users with appropriate the hardware.

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8-5   DISCLAIMER OF LIABILITY FOR DAMAGES

The legal liability of Hamamatsu including warranty against defects relating to this software and its usage is limited to the contents of this software user agreement. Hamamatsu shall not be liable to provide compensation for any damage or loss resulting from using this software, including direct, indirect or incidental damages or losses to the user. This holds true even if Hamamatsu or its suppliers have been advised of the possibility of such damages or losses.

8-6   GOVERNING LAW

This software user agreement shall be governed by the laws of Japan.

8-7   OTHERS

If a conflict or doubt should arise regarding this user license agreement or items not established within this user license agreement, then that matter shall be resolved by mutual consultation carried out in good faith by both parties. In the event a lawsuit should arise, it shall be resolved by a court of law having jurisdiction in the area where the head office of Hamamatsu Photonics is then located.

9.   CONTACT INFORMATION

Manufacturer

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

Local contact information worldwide could be found under:
www.hamamatsu.com

- *The contents of this manual are subject to change without notice.*
- *The unauthorized reproduction or distribution of parts or all of this manual is prohibited.*
- *If one of the following problems occurs, please contact Hamamatsu Photonics.*
  (See the CONTACT INFORMATION.) We will deal with the problem immediately.
  - *Some contents of the manual are dubious, incorrect or missing.*
  - *Some pages of the manual are missing or in the wrong order.*
  - *The manual is missing or dirty.*

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