MAICO Resolution Simulator U17065-01 Instruction Manual



Ver.1.0 Apr. 2023

HAMAMATSU PHOTONICS K.K.

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1. SAFETY PRECAUTIONS

1-1 CLASSIFICATION OF WARNINGS

We have classified the warnings symbols that appear in this instruction manual and on the system as follows for your convenience. Make sure that you fully understand them and follow the instructions they contain.

WARNI	NG	Improper handling of the system without observing these warnings could lead to serious injury to the user and even death.
	ON	Improper handling of the system without observing these cautions could lead to personal injury to the user or damage to property.
Note	This from correc impai	symbol indicates a note to help you get the best performance the system. Read the contents of the note carefully to ensure ct and safe use. Failure to observe one of these notes might r the performance of the system.
\triangle	This s handl and s	symbol indicates a cautionary item that should be followed when ing the system. Read the contents carefully to ensure correct afe use.
\bigcirc	This s instru	symbol indicates an action that is forbidden. Read and follow the ctions carefully.
	This s follow	symbol indicates a compulsory action or instruction. Read and the instructions carefully.



2. INTRODUCTION

Please read this manual carefully before using the U17065-01.

Note

This software may not work satisfactorily on some computers. This software may fail to operate due to the operating system or system requirements. Read the "System requirements" carefully and use the software with adequate system requirements.

System requirements

The system requirements for this software are as follows.

Type of computer	PC-AT compatibles
OS	Windows 10,11
Memory	4 GB or more
Available HDD space	2 GB or more
Screen Resolution	800x600 or higher windows size

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Windows 10 and Windows 11 are the registered trademarks of Microsoft Corporation in the United States and other countries. Other brand names are the trademarks or registered trademarks of each company.



Contents

1.	SAFETY PRECAUTIONS	1
	1-1 CLASSIFICATION OF WARNINGS	1
2.	INTRODUCTION	2
3.	OVERVIEW	4
4.	INSTALLATION	5
	4-1 INSTALLATION OF MAICO RESOLUTION SIMULATOR	5
5.	START	10
	5-1 START	
6.	SIMULATION	
7.	PARAMETER LIMITATION	13
8.	SOFTWARE USER AGREEMENT	
	 8-1 COPYRIGHTS 8-2 SCOPE OF USAGE RIGHTS 8-3 SCOPE OF WARRANTY LIMITED WARRANTY 8-4 DISCLAIMER OF LIABILITY FOR DAMAGES 8-5 GOVERNING LAW 8-6 OTHERS 	15 15 15 15 15 15 16
•		47

3. OVERVIEW

This software is used to estimate the resolution that can be achieved with MAICO from the objective lenses used by customers.

The software simulates the optics inside MAICO and calculates the expected resolution.

The values given here are only simulation values.

The actual observed resolution is affected by a number of factors, such as manufacturing errors of the MAICO, objective lens and microscope, the sample, etc., and may not always correspond to simulation value.

Please be aware of that when using the software.



4. INSTALLATION

This software runs on Windows 10 and 11. Before installation, check the environment of the computer to be used. Moreover, when other application software is running, end all software. Keep in mind that the administrator authority may be required at the time of installation.

4-1 INSTALLATION OF MAICO RESOLUTION SIMULATOR

Double click "MAICO_ResolutionSimulator Installer101.exe." User account control window may pop up. Then, choose "Yes"

User Account Control	×
Do you want to allow t unknown publisher to device?	his app from an make changes to your
MAICO_ResolutionSimula	tor Installer.exe
Publisher: Unknown File origin: Hard drive on this cor	mputer
Show more details	
Yes	No





Next, the installer starts and a new window appears.

Note
• It may take a minute for this window to appear.

Choose "Next"



You can choose installation folder. It does not need to be changed unless there is a special reason.

And then, you can choose MATLAB Runtime installation folder. It does not need to be changed unless there is a special reason.

MAICO_ResolutionSimulator Installer		- D >	(
DESTINATION	MATLAB RUNTIME	CONFIRMATION	
Select destination fol	der		
C:\Program Files\MATL	AB\MATLAB Runtime	MATLAB [•]	
Restore Default	Brows		
		Next	

After that, license agreement dialog will open. Choose "Yes" radio button then click "Next" button.

Μ	MAICO_ResolutionSimulator Installer	_		×
	DESTINATION MATLAB RUNTIME CON	FIRMATION		
	• • • • • • • • • • • • • • • • • • • •	0		
	MATLAB RUNTIME LICENSE IMPORTANT NOTICE BY CLICKING THE "YES" BUTTON BELOW, YOU ACCEPT THE TERMS OF THIS LICENSE. IF NOT WILLING TO DO SO, SELECT THE "NO" BUTTON AND THE INSTALLATION WILL BE AI 1. LICENSE GRANT. Subject to the restrictions below, The MathWorks, Inc. ("MathWorks") hereby g whether you are an individual or an entity, a license to install and use the MATLAB Runtime ("Runtime" expressly for the purpose of running software created with the MATLAB Compiler (the "Application Soft no other purpose. This license is personal, noncellusive, and nontransferable. 2. LICENSE RESTRICTIONS. You shall not modify or adapt the Runtime for any reason. You shall not decompile, or reverse engineer the Runtime. You shall not alter or remove any proprietary or other legal	YOU ARE BORTED. rants to you, '), solely and tware'), and for t disassemble, notices on or in	•	
	Do you accept the terms of the license agreement? • Yes O No			
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Then, the installer will display installation path for confirmation. Choose "Begin Install" if there is no mistake.

MAICO_Res	olutionSimulator Installer		-	□ ×
	DESTINATION	MATLAB RUNTIME		
	Confirm selections			
	MAICO_RESOLUTIONSIMU C:\Program Files\MAICO_	LATOR DESTINATION ResolutionSimulator		
	MATLAB RUNTIME DESTINA C:\Program Files\MATLAB 1.96 GB required	NTION MATLAB Runtime\R2022b		
			Begin Install	

Now, installation process starts. This process takes several minutes to complete.





MAICO_ResolutionSimulator Installer	- 🗆 X
Installation Complete	
	Close

When the window below appears, the installation process is complete.

5. START

5-1 START

Choose "MAICO_ResolutionSimulator" from start menu.



Then, you will see a splash screen below.





Objectiv	e lens		
Magn	ification	20	
NA		0.75	
MAICO) Channel	405nm ▼	
Simulation			
Simulation Pinhole size	n results	XY resolution[nm]	Z resolution[nm]
Simulation	Airy units	XY resolution[nm]	Z resolution[nm]
Simulation Pinhole size S	Airy units 1.08 1.94	XY resolution[nm] 310 309	Z resolution[nm] 1185 1364

If you see a windows blow, now you are ready to use the software.

6. SIMULATION

Now enter the parameters of the objective lens you consider using magnification and NA.

Next, choose MAICO laser channel with pull-down menu. Then the simulator output expected XY resolution[nm] and Z resolution[nm] depending on Pinhole size.

Objective	e lens				
Magn	ification		40]	
NA		0.	95]	
MAICO)	488nm	▼		
Laser	Channel	405nm			
		488nm			
Simulatior	n results	561nm			
Pinhole size	Airy units	638nm		n]	Z resolution[nm]
S	0.64	230			721
Μ	1.16	279			859
L	1.80	276			946

Now you can imagine, how much resolution can be achieved using MAICO in your environment.



7. PARAMETER LIMITATION

(1) For calculation reasons, the parameters that can be entered have operative ranges.

Magnification should be between 10 and 150. NA should be between 0 and 1.5.

If a value outside the operative range is entered, the number will be automatically corrected to the previous value after a warning message.

Objective	e lens		
Magni	ification	2	
NA		0.75	
MAICO) Channel	405nm v	
Lucor			
Simulation	n results		
Simulation Pinhole size	n results Airy units	XY resolution[nm]	Z resolution[nm]
Simulation Pinhole size	Airy units	XY resolution[nm] 310	Z resolution[nm] 1185
Simulation Pinhole size S	Airy units 1.08 1.94	XY resolution[nm] 310 309	Z resolution[nm] 1185 1364



(2) Even within the above ranges, the parameters may not be used in the calculation that are exactly as input values.

This is due to MAICO internal optics. The diameter of the optical flux that MAICO can handle is limited. It is expressed by the following formula: NA/magnification<= 0.0375.

If you enter an objective lens parameter that exceeds the limit, the following red text will be displayed.

Objectiv	e lens		
Magn	ification	20	
NA		0.8	
		405nm 💌	
Laser	Channel	4001111 •	
Laser Simulation	n results	XY resolution[nm]	Z resolution[nm]
Simulation Simulation	Channel	XY resolution[nm] 310	Z resolution[nm]
Simulation Pinhole size M	Channel n results Airy units 1.08 1.94	XY resolution[nm] 310 309	Z resolution[nm] 1185 1364

In this case, the calculation is not carried out with the entered NA value, but with the NA that can be effectively handled by MAICO.

For example, the maximum NA that can be handled by 20x magnification is 0.75 (0.75/20=0.0375). Therefore, even if 0.8 is input, only a resolution value that is the same as 0.75 will be output.

In actual MAICO operation, in such cases it is not possible to achieve an optical diameter that satisfies the objective NA of 0.8, and an optical diameter of up to NA 0.75 is used. The software displays the resolution at that NA 0.75. However, the field of view is not affected in such cases.

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9. CONTACT INFORMATION

Manufacturer

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