



Nikon

DS Camera Control Unit

DS-L3

DS Camera Head
DS-Fi2 / DS-Fi1 / DS-Vi1

DS Cooled Camera Head
DS-Qi1Mc / DS-Fi1c / DS-Ri1

< Instructions >

Camera Operation

Please Read
First

Photographing
Basics of DS-L3

Photographing and
Playing Images

Adding Annotations
and Measuring

Changing
Settings

Connecting to
PC, Printer, and
Network

Other
Information

Introduction

Thank you for purchasing the Nikon products.

This instruction manual has been prepared for users of the DS-L3 DS Camera Control Unit, DS-Fi2/DS-Fi1/DS-Vi1 DS Camera Head, and DS-Qi1Mc/DS-Fi1c/DS-Ri1 DS Cooled Camera Head.

To ensure correct usage, read this manual carefully before operating this product.

- No part of this manual may be reproduced or transmitted in any form without prior written permission from Nikon.
- The contents of this manual are subject to change without notice.
- The equipment described in this manual may differ from the actual product in its appearance.
- Although every effort has been made to ensure the accuracy of this manual, errors or inconsistencies may remain. If you note any points that are unclear or incorrect, please contact your nearest Nikon representative.
- Some of the equipment described in this manual may not be included in the set you have purchased.
- If you intend to use any other equipment with this product, read the manual for that equipment too.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Symbols used in this manual

This manual uses the following symbols.



This icon marks precautions or information that should be observed for safety. Depending on the severity of the risk, "WARNING" and "CAUTION" are indicated together with this icon.



This icon marks precautions or information that should be observed to avoid malfunction and failure of this product.



This icon marks notes or information that should be read before use. It also marks tips or additional information that may be helpful when using this product.

Trademarks in this manual

- Microsoft, Windows, and Internet Explorer are registered trademarks of Microsoft Corporation in the United States and other countries.
- Macintosh, Mac OS, Safari, and iPad are trademarks or registered trademarks of Apple Inc. in the United States and other countries.
- App Store is a service mark of Apple Inc.
- IOS is a trademark or registered trademark of Cisco Systems, Inc. in the United States and other countries, and is used under license by Apple Inc.
- Firefox is a trademark or registered trademark of Mozilla Foundation in the United States and other countries.
- Java and other trademarks including Java are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries.
- Intel Core 2 Duo is a registered trademark or a trademark of Intel Corporation in the United States and other countries.
- CompactFlash is a trademark of SanDisk Corporation.
- The PictBridge logo mark is a trademark.
- Products and brand names are trademarks or registered trademarks of their respective companies.
- The "TM" and ® marks are not used to identify registered trademarks and trademarks in manual.
- The character font data used in this equipment is provided by Morisawa & Company Ltd., and the related copyright belongs to Morisawa & Company Ltd.

Contents of the Manual

DS Camera Control Unit DS-L3 is composed of the following three volumes:

- ◆ **Camera Operation**
This manual. Explains how to install and connect DS-L3, the operation of the touch panel, and the operation of the DS camera head connected to DS-L3.
- ◆ **Quick Reference**
Provides a brief explanation on how to operate the DS-L3.
- ◆ **Microscope Operation**
Explains how to check the status of the microscope on the DS-L3 screen and how to operate the microscope.

Features of This Product

Nikon DS Camera Control Unit DS-L3 is a device to photograph or play pictures with a Nikon DS camera head or DS cooled camera head connected.

The live picture displayed on the touch panel LCD monitor can be captured and saved as a still image in a storage media device such as a compact flash (CF) card or USB drive. You can replay captured images, add annotations, or make an additional measurement on the screen.

This device is equipped with a microscope control function allowing the user to control the motorized equipment of a Nikon microscope or to detect and display the status of the microscope on the screen.

- **Support of various DS camera heads**

Nikon DS camera head DS-Fi2/DS-Fi1/DS-Vi1 or DS cooled camera head DS-Qi1Mc/DS-Fi1c/DS-Ri1 can be connected to this device. The connected DS camera head is automatically recognized and appropriate settings items are displayed depending on its resolution and the presence of cooling mechanism.

- **Built-in touch panel LCD monitor**

This device is equipped with 8.4-inch touch panel LCD monitor enabling on-screen operation for viewing and taking live pictures, replaying captured images, and configuring camera and microscope settings. The operation can be made by a stylus or a commercially available USB mouse. Its user-friendly button-based interface provides access to various DS-L3 functions.

- **Support for CF cards and USB memory sticks**

Captured images can be saved in a CF card and a USB memory stick. You can save an image in a specified storage media and a folder.

- **Output to an external monitor**

Images can be output to any commercially available XGA, SXGA, or 720p external monitor. The device supports the DDC (Display Data Channel) interface, enabling itself to automatically identify the video signal of any display that supports the same standard.

- **Consecutive capture with interval timer**

Multiple images can be automatically captured at intervals by specifying the number of pictures and the interval length. This function allows you to observe how the subject changes or to photograph a subject consecutively with different photographing conditions.

- **Annotations to images**

You can add grid, cross scale, or other scales, or annotations by text, line, or marker. Images can be captured with annotations added.

- **Brief measurement on the screen**

Distance, angle and circumference of a circle can be measured briefly by operation on the screen.

- **PC connection**

A PC can be connected to DS-L3 by the USB interface. You can use DS-L3 as a removable medium of the PC, or by installing a specialized PC application (NIS-Elements), you can load images to the PC and edit them.

- **Direct printing**

With a PictBridge-compatible printer connected to DS-L3 through the USB interface, you can print images directly from DS-L3.

- **Networking**

By connecting DS-L3 to your PC network, you can retrieve DS-L3 pictures to a PC or transfer pictures from DS-L3 to a PC.

- **Microscope control**

This device is equipped with a microscope control function allowing you to connect a Nikon microscope and to control its motorized equipment from the screen, or to detect and display the status of the microscope on the screen. Refer to a separate volume of this manual, "Microscope Operation" for details.

Configuration of This Manual

This instruction manual has the following items about operation of this product:

- Introduction
- Contents of the Manual
- Features of This Product
- Safety Precautions

Part 1 Please Read First

- Chapter 1 Before Use
- Chapter 2 Names of Parts and Their Functions
- Chapter 3 Installation and Connection
- Chapter 4 Preparing for Use
- Chapter 5 Working with Touch Panel

Part 2 Photographing Basics of DS-L3

- Chapter 6 Capturing Images with Simple Operations
- Chapter 7 Tips on Photographing

Part 3 Photographing and Playing Images

- Chapter 8 Capturing Images with Advanced Setting Menu — CAMERA MENU
- Chapter 9 Playing Back and Deleting Images — VIEW MENU

Part 4 Adding Annotations and Measuring

- Chapter 10 Preparation for Using Annotation Function and Measurement Function
- Chapter 11 Adding Lines and Annotations to an Image — TOOL MENU
- Chapter 12 On-Screen Measurement — TOOL BAR

Part 5 Changing Settings

- Chapter 13 Changing Settings — SETUP MENU

Part 6 Connecting to PC, Printer, and Network

- Chapter 14 Connecting to a PC
- Chapter 15 Performing Direct Printing
- Chapter 16 Connecting to Network

Part 7 Other Information

- Chapter 17 Differences in Operation Depending on DS Camera Head Models
- Chapter 18 Troubleshooting
- Chapter 19 Capturing from External I/O Devices
- Chapter 20 Daily Maintenance
- Chapter 21 Major Specifications

Table of Contents

Introduction	i
Contents of the Manual	ii
Features of This Product	iii
Configuration of This Manual	v
Safety Precautions	xiii

Part 1 Please Read First

Chapter

1

Before Use	2
1.1 Confirmation of Accessories	2
1.2 DS Camera Heads That Can Be Controlled from DS-L3	3
1.3 Peripheral Devices That Can Be Used	4

Chapter

2

Names of Parts and Their Functions	7
2.1 DS-L3 DS Camera Control Unit	7
2.2 DS Camera Head	9

Chapter

3

Installation and Connection	10
3.1 Installing DS-L3	10
3.1.1 Using Standard Stand for Installation	10
3.1.2 Mounting on Commercially Available Arm	10
3.2 Connecting DS-L3 and Peripheral Devices	11
3.2.1 Overall Connection	11
3.2.2 Connecting a DS Camera Head	12
(1) Attaching DS camera head to an optical device	12
(2) Connecting a DS camera head and DS-L3	13
3.2.3 Connecting an External Monitor	14
3.2.4 Connecting USB Peripheral Devices	15
3.2.5 Connecting PC or Printer by USB Cable	16
(1) Connecting a PC	16
(2) Connecting PictBridge-compatible printer	17
3.2.6 Connecting to Network (LAN)	18
(1) Connecting to LAN through a network hub	18
(2) Connecting to the PC directly without using LAN	19
3.2.7 Connecting AC Adapter	20

Chapter

4

Preparing for Use	21
4.1 Starting/Closing DS-L3	21
4.1.1 Starting DS-L3	21
4.1.2 Switching Off	22
4.2 Setting Display Language and Date and Time	23
4.2.1 Setting Display Language	23
4.2.2 Setting Date and Time	23
4.3 Preparing the Recording Medium	24
4.3.1 Handling Recording Medium	24
4.3.2 Inserting CF (Compact Flash) Card	26
(1) Inserting CF card	26
(2) Removing CF card	26
4.3.3 Connecting a USB Memory	27

Chapter
5

(1) Connecting and removing a USB memory	27
(2) Initializing a USB memory	27
4.3.4 Initializing Recording Medium	28
4.4 Adjusting Image Quality of External Monitor	29
Working with Touch Panel	30
5.1 Touch Panel Operation	30
5.1.1 Operation Using the Stylus	30
5.1.2 Operation Using a Mouse	31
5.1.3 Entering Characters with a Keyboard	31
5.2 Navigating through Screen Menus	32
5.2.1 Menu Configuration and Method of Displaying Menus	32
5.2.2 Operating the Task Bar	34
5.2.3 Switching the Menu	35
(1) Switching operation menus	35
(2) Switching between [CAMERA MENU], [VIEW MENU], and [TOOL MENU]	36
(3) Switching between screens of [TOOL SET MENU]	37
(4) Switching between screens of [INFO MENU]	37
(5) Switching between screens of [SETUP MENU]	38
5.2.4 Switching Operation Menu Size	39
5.2.5 Operating Buttons and Setting Screens of Operation Menu	40
5.2.6 Switching between Camera Control and Microscope Control	42

Part 2 Photographing Basics of DS-L3
Chapter
6

Capturing Images with Simple Operations	44
6.1 Operation of Capturing Images	44
6.2 Displaying [CAMERA MENU]	45
6.3 White Balance (Only for Color DS Camera Heads)	46
6.4 Checking Subject Conditions through Live Image	47
6.5 Exposure Compensation	48
6.6 Capturing Displayed Images	49
6.6.1 Capturing a Live Image	50
6.6.2 Capturing after Freezing the Live Image	51

Chapter
7

Tips on Photographing	52
7.1 Checking the Image Condition	52
7.1.1 Checking the Histogram of the Image	52
7.1.2 Checking the Camera Condition	52
7.1.3 Checking the Microscope Condition	53
7.2 Setting the Environment for Microscope Photographing	54
7.2.1 Setting up the Environment	54
(1) Adjusting the brightness of the environment	54
(2) Preventing tremor	54
7.2.2 Setting up the Microscope Condition	54
(1) Using an appropriate filter	54
(2) Setting the field diaphragm	55
(3) Setting the aperture diaphragm	55
(4) Adjusting the focus on the subject	55
(5) Adjusting the lighting	56
(6) Adjusting the exposure time	56
7.3 Calculating the Display Magnification for Microscopic Observation	57

Part 3 Photographing and Playing Images

Chapter 8

Capturing Images with Advanced Setting Menu 60

8.1	Operating Camera Menu	60
8.1.1	Displaying [CAM MENU]	60
8.1.2	Switching between [CAM MENU] Screens	61
8.2	Basic Operations of Photographing	62
8.2.1	Using Scene Modes and Custom Setting	63
	(1) Using a scene mode	63
	(2) Using custom setting	65
8.2.2	Setting the White Balance	66
8.2.3	Adjusting the Exposure	67
	(1) Compensating the exposure	68
	(2) Using the AE lock	69
	(3) Setting the exposure time	70
	(4) Setting the camera gain	71
8.2.4	Capturing Displayed Images	72
	(1) Capturing the live image directly	73
	(2) Capturing the image after having it pause	74
	(3) Performing consecutive capture with interval timer	75
	(4) Capturing a replayed image again	76
	(5) Capturing images with the screen divided into sub-screens on the left and right	77
	(6) Capturing an image together with scales, annotations, and measurement results	78
	(7) Capturing images by operations from PC	79
8.2.5	Photographing Procedure Using DF/FL Scene Mode	80
8.3	Configuring Photographing Details	82
8.3.1	Setting Items of the [CAM MENU: CAMERA] Screen	82
	(1) Switching the image mode (operation mode of the image pickup device)	83
	(2) Changing the exposure mode	86
	(3) Switching the metering mode	88
	(4) Switching the metering area	89
	(5) Using the AE lock	92
	(6) How to use function buttons	93
8.3.2	Setting Items of the [CAM MENU: IMAGE] Screen	94
	(1) Adjusting the image	95
8.3.3	Setting Items of the [CAM MENU: NR/SD/SET] Screen	98
	(1) Setting NR (noise reduction)	99
	(2) Selecting an SD (shading) value	100
	(3) Registering SD (shading) adjustment value	101
	(4) Registering a custom setting	102
	(5) Returning the photographing condition to the initial value	103
8.3.4	Setting Items of the [CAM MENU: SHOT/REC] Screen	105
	(1) Setting the shot mode	106
	(2) Specifying a save media and folder	107
	(3) Configuring log saving	108
	(4) Configuring the recording mode	109
	(5) Checking/changing an image file name	113

Chapter 9

Playing Back and Deleting Images 115

9.1	Operating the VIEW Menu	115
9.1.1	Displaying the [VIEW MENU]	115
9.2	Playing Back an Image	116
	(1) Playing back an image	116
	(2) Selecting an image from the thumbnail to play it back	118

	(3) Enlarging an image using the electronic zoom function	120
	(4) Splitting a window into right and left windows	121
9.3	Deleting an Image	122
	(1) Deleting an image from the folder	122
	(2) Selecting an image from the thumbnail window to delete it	123
	(3) Deleting a folder and all images inside it.....	124

Part 4 Adding Annotations and Measuring

Chapter 10

Preparation for Using Annotation Function and Measurement Function 126

10.1	Before Use	126
10.1.1	Notes about Annotation and Simplified Measurement	126
10.1.2	Configuring Units and Calibration	128
	(1) Switching unit settings	128
	(2) Switching calibration mode	129
10.1.3	Overlay.....	130
	(1) Overview of overlay	130
	(2) Using overlay	131

Chapter 11

Adding Lines and Annotations to an Image..... 133

11.1	Displaying the Tool Menu	134
11.2	Changing Scaling and Measurement Settings.....	135
11.2.1	Performing Basic Settings for Comment Function and Measurement Function	136
11.2.2	Configuring Cross Hairs	137
11.2.3	Setting How to Draw Grid Lines	138
11.2.4	Registering Calibration Settings.....	139
11.3	Operating Scales.....	141
11.3.1	Performing XY Measurement.....	141
11.3.2	Displaying X Scales (Cross Scales).....	142
11.3.3	Displaying Scales.....	143
11.3.4	Display Cross Hair and Circles	144
11.3.5	Displaying Grid on Screen	146
11.4	Adding Lines and Comments to an Image.....	147
11.4.1	Inserting Text Annotation.....	147
11.4.2	Drawing Straight Lines and Arrows	148
11.4.3	Drawing Free Lines	149
11.4.4	Counting Points Using Markers.....	150

Chapter 12

On-Screen Measurement..... 151

12.1	Displaying Toolbar	152
12.2	Measuring on an Image.....	153
12.2.1	Measuring Distance between Two Points	153
12.2.2	Measuring Length of a Perpendicular Line.....	154
12.2.3	Measuring Angle	155
12.2.4	Measuring Diameter and Circumference of Circle	156
12.2.5	Measuring the Area of a Polygon	157
12.2.6	Measuring Distance between Centers of Two Circles	158
12.2.7	Measuring Pitch Distance	159
12.3	Operating Measurement Results	160
12.3.1	Moving Measurement Result	160
12.3.2	Canceling the Last Measurement Result	160
12.3.3	Redoing Cancelled Measurement Result.....	160

12.3.4	Erasing an Arbitrary Measurement Result.....	160
12.3.5	Erasing All Measurement Results	161
12.3.6	Updating Display of Overlay.....	161
12.3.7	Writing Measurement Results to CSV File	161
12.3.8	Displaying or Hiding Overlay	162
12.3.9	Switching Calibration Settings.....	162

Part 5 Changing Settings

Chapter 13

13	Changing Settings	164
13.1	Operating Setup Menu	164
13.2	Configuring Basic Settings	167
13.2.1	Configuring Menu Display	168
(1)	Calling custom settings on startup	168
(2)	Changing preset of scene mode	169
(3)	Configuring the light source of microscope	170
(4)	Switching the language	171
(5)	Configuring the position and size of the menu	172
(6)	Changing the [INFO MENU] display setting	173
(7)	Setting to show [CAPTURE ICON] on the screen	174
13.2.2	Configuring Monitor.....	175
(1)	Adjusting the color balance of the internal LCD	175
(2)	Configuring the display mode of the internal LCD and external monitor	176
(3)	Configuring the backlight of the internal LCD.....	177
(4)	Mirroring images	178
(5)	Adjusting the color balance of external monitor output signal	179
(6)	Configuring the DDC interface	180
13.2.3	Configuring Function Buttons.....	181
13.2.4	Configuring Other Settings.....	183
(1)	Configuring USB (D) connector operating mode.....	183
(2)	Configuring the cooling camera	184
13.3	Configuring Network Settings	185
13.3.1	Configuring HTTP Server.....	186
(1)	Enabling or disabling network connection	186
(2)	Acquiring an IP address from the DHCP server	187
(3)	Specifying a fixed IP address and a subnet mask.....	188
(4)	Configuring user authentication against web browser access.....	189
(5)	Restricting the access from web browser by IP addresses	190
13.3.2	Configuring FTP Client.....	191
(1)	Enabling or disabling FTP client.....	191
(2)	Registering/changing FTP server settings	192
(3)	Switching FTP server (No.1 to No.5).....	193
(4)	Connectivity test against FTP server.....	194
13.4	Changing Image File Settings	195
13.4.1	Configuring a Target Folder.....	196
(1)	Configuring automatic folder creation on recording medium	197
(2)	Configuring a subfolder in the FTP server.....	197
(3)	Configuring automatic folder creation in FTP server	198
13.4.2	Configuring File Naming Convention	199
13.4.3	Initializing Recording Medium	200
13.5	Changing Overall Settings.....	201
13.5.1	Setting Date and Time	202
13.5.2	Configuring Capture Function	203

13.5.3	Configuring Electronic Zoom Factor.....	204
13.5.4	Configuring Printer Output	205
13.5.5	Configuring Other Settings.....	206
(1)	Setting the power-saving timer.....	206
(2)	Setting the mouse pointer speed	206
(3)	Setting the capture sound volume.....	207
(4)	Displaying a test chart.....	207
(5)	Calibrating the touch panel	208

Part 6 Connecting to PC, Printer, and Network

Chapter

14

Connecting to a PC 210

14.1	Connecting the DS-L3 to a PC	210
14.1.1	Setting the USB (D) Connector Operating Mode	210
14.1.2	Connecting the DS-L3 to a PC with a USB Cable	211
14.2	Using the DS-L3 as an External Recording Medium of PC	212
14.3	Accessing the DS-L3 Using NIS-Elements	213

Chapter

15

Performing Direct Printing 214

15.1	Connecting a Printer.....	214
15.1.1	Setting the USB (D) Connector Operating Mode	214
15.1.2	Connecting the DS-L3 to a Printer with a USB Cable	215
15.2	Printing an Image	216
15.2.1	Directly Printing a Live Image by Capturing	216
15.2.2	Printing a Saved Image.....	217
15.3	Changing Print Settings.....	218
15.3.1	Enabling or Disabling Printing with Frame	218
15.3.2	Selecting Print Mode (Real 10 or Normal Mode).....	218
15.3.3	Setting Compensation (Only in Real 10 Mode).....	219
15.3.4	Calculating the Magnification When Printed.....	220

Chapter

16

Connecting to Network..... 221

16.1	Things You can Do with Network	221
16.2	Connecting to Network	223
16.2.1	Items to Check.....	223
(1)	Network environment	223
(2)	PC OS and web browser.....	224
16.2.2	Configuring Network Settings.....	225
16.2.3	Connecting to the Network.....	226
(1)	Connecting to LAN via a network hub.....	226
(2)	Directly connecting to PC without going through LAN.....	227
16.3	Obtaining Images by Web Browser	228
16.3.1	Configuring PC and Web Browser	228
(1)	Changing firewall settings	228
(2)	Changing proxy server settings.....	229
(3)	Enabling Java applets	231
16.3.2	Operating Web Screen.....	234
(1)	How to connect to the DS-L3	235
(2)	Operating [ROOM1]/[ROOM3] screen	236
(3)	Operating [ROOM2] screen	240
16.4	Transferring Image to FTP Server	242
16.4.1	Configuring FTP Server on a PC	242

(1) Windows 7	242
(2) Mac OS X	245
16.4.2 Transferring Image to FTP Server	246
(1) Storing image to FTP server while being captured	246
(2) Transferring stored image to FTP server	247
16.5 Obtaining Images from the PC Using the FTP Command	248
16.6 Operating from the PC with the Telnet Command	249
16.7 Obtaining Images from the iPad	250

Part 7 Other Information

Chapter

17

Differences in Operation Depending on DS Camera Head Models.....252

17.1 DS-Fi2	253
17.2 DS-Fi1/DS-Fi1c	255
17.3 DS-Vi1	257
17.4 DS-Qi1Mc	259
17.5 DS-Ri1	262

Chapter

18

Troubleshooting.....265

18.1 Power Supply	265
18.2 Image Output	265
18.3 Menu Operation	266
18.4 View of Images	266
18.5 Saved Image Quality	268
18.6 Image Saving	268
18.7 System Operation	269
18.8 Network	269
18.9 USB-related Operation	270
18.10 Printing	270
18.11 Warning Message List	271
18.12 For Inquiries	273

Chapter

19

Capturing from External I/O Devices.....274

19.1 Functions of the EXT I/O Connector	274
19.2 Specifications of External I/O Devices	275

Chapter

20

Daily Maintenance.....276

20.1 Cleaning Utensils and Consumables	276
20.2 Cleaning the DS-L3 Main Body	276
20.3 Cleaning the DS-Camera Head	276
20.4 Cleaning Optical Devices	276
20.5 Storage	277
20.6 Periodic Inspections (Charged)	277

Chapter

21

Major Specifications.....278



21.1 DS Camera Control Unit DS-L3	278
21.2 DS Camera Head	283
21.3 AC Adapter	285
21.4 Others	285

Safety Precautions

WARNING and CAUTION Symbols

Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using this product. Do not discard this manual and keep it handy for easy reference.

Safety instructions in this manual are marked with the following symbols to indicate their importance. For your safety, always follow the instructions marked with these symbols.

Symbol	Description
 WARNING	Disregarding instructions marked with this symbol may lead to serious injury or death.
 CAUTION	Disregarding instructions marked with this symbol may lead to injury or property damage.



WARNING

1. Purpose of this product

The principal use of this product is to photograph and display pictures.

2. Read this manual carefully.

For your safety, read carefully this manual and other manuals supplied with the products that will be used together with this product. Be sure to read and observe the warnings and cautions described at the beginning of each manual.

3. Do not disassemble, repair, or modify this product.

Do not attempt to disassemble, repair, or modify this product. Doing so may result in electric shock or failure. Any failure or damage caused by such action will not be covered under warranty. Never attempt to disassemble, repair, and modify any part of this product which is not described in this manual. If you notice any problems with this product, contact your nearest Nikon representative.

Note especially that the DS-L3 AC adapter has a built-in high-voltage power source. Do never dismantle, repair, or modify it.

4. If the inside of this product is exposed due to breakage, never touch the exposed area.

If this product is broken due to falling, etc. and the inside is exposed, do not touch the exposed area. Doing so may cause an electric shock or personal injury on the jagged broken edge. Remove the battery or power cord and ask your nearest Nikon representatives for repair.

5. **Always use a 100 to 240 VAC (frequency of 50 to 60 Hz) power supply, and connect the power cord to the AC power socket directly.**

Use only the power supply specified in this manual. Failure to do so may cause electric shock or fire.

6. **Use the specified power cords.**

Make sure to use the specified power cord for the DS-L3 AC adapter. If any other power cords are used, it may cause malfunction or overheating of this product or fire.

- For details about the specified power cords, see "Chapter 21 Major Specifications".
- When plugging or unplugging the power cord, make sure that the product is switched off to avoid electrification.
- Because this equipment falls under the category of electric shock protection class I, always make sure it is grounded to a protective ground terminal.



WARNING

7. **Use the specified AC adapter.**

Be sure to use this product with the specified AC adapter. If any other AC adapter is connected, it may cause malfunction or overheating of this product or fire.

- For details about the specified AC adapter, see "Chapter 21 Major Specifications".
- Place the AC adapter in a well-ventilated location. Do not place anything such as paper on the AC adapter. It will reduce cooling and cause overheating.
- Before connecting the AC adapter, be sure to turn off the power supply of the DS-L3 DS Camera Control Unit without fail to prevent failure or malfunction.
- When turning off the DS-L3, check that green light for the POWER indicator is out before unplugging the AC adapter from the product or power cord from the AC power socket.

8. **Use the nearest AC socket with protective ground terminal whenever possible**

When you set up the connection between a PC, microscope, or other external devices and the DS-L3, be sure to supply power to such devices from an AC power socket with a protective ground terminal as close as possible to them using a power cord specified in their instruction manual.

Note that using a distant AC socket may cause malfunction due to voltage potential difference caused by the difference in electric conditions such as voltage, and that using a power cord other than those specified may cause product failure or malfunction, or fire.

9. **Connecting cables**

Be sure that the AC adapter and power cord of the devices are unplugged from the AC socket before connecting the DS-L3 and an external monitor with a DVI or RGB cable, a PC or other similar devices with a USB cable, or any other devices with a networking cable. Failure to do so may cause malfunction.

10. **Do not allow this product to become wet.**

Do not allow this product to become wet. It may cause malfunction, overheating, or electric shock. If this product becomes wet, immediately switch off DS-L3, unplug the power cord, and contact the point where you purchased the product.

11. **Do not allow any foreign material to enter this product.**

Do not allow foreign material to enter the inside of this product. It may cause malfunction. If any foreign material enters inside, stop using this product and contact your nearest Nikon representatives.

12. **Never use this product in a flammable or combustible environment.**

Using it in a combustible gas or dust environment may cause an explosion or fire.

13. **Do not encumber the heat dissipation of the device**

- Do not cover the vent of DS-L3. Doing so will raise the temperature inside the product causing malfunction or fire.
- Do not place an object on DS-L3 or DS Camera Head, or cover them with an object. Doing so will encumber heat dissipation and raise the temperature inside the product causing malfunction or fire.

14. **Handling cables**

Do not bend a cable excessively or twist it. Doing so will break the cable causing malfunction or fire.

15. **Precautions for handling flammable solvent**

This product uses the following flammable solvents.

- Absolute alcohol (ethyl or methyl alcohol): for cleaning the touch panel monitor.

Never put these solvents close to fire. Before using the solvent, read carefully the precautions specified by the manufacturer of the solvent to use it safely. When you use the solvent on this product, observe the following precautions.

- Never put the solvent close to this product when you turn on/off the power switch or plug in/out the power cord.
- Handle the solvent with care not to spill it.



WARNING

16. Disposal of this product

This product has a built-in fluorescent lamp that contains mercury. When you dispose it, ask a specialized company to handle it as special industrial waste, or dispose it yourself observing the regulations of your region. Do not dispose it as household waste.



CAUTION

1. Handle this product with care.

To avoid failure, be careful not to give the device an impact or strong vibration.

2. Precautions against electromagnetic interference

This product generates weak electromagnetic waves. Do not place the product close to a precision electric device. Doing so may affect the accuracy of the device. Place a radio or television some distance away from this product if the reception is affected.

3. Cautions on handling of the touch panel LCD monitor

- Do not hit or press the surface of the monitor strongly. The surface of the monitor is glass; it may break and injure you.
- Use a stylus for touch panel operation. Do never use a ballpoint pen or other hard or sharp objects. Doing so will make a scratch on the screen and cause malfunction. Use your finger if a stylus is not available. Do not let your nail contact the screen if you do so.
- Do not expose the touch panel monitor to direct sunlight or strong ultraviolet. Doing so may degrade its display characteristics.

4. Handling a DS cooled camera head

A DS cooled camera head has a built-in mechanism for cooling the image pickup device. This makes it easier to run with condensation compared with other ordinary electric devices when exposed to a rapid temperature change or left in a high-humidity environment for a long time.

Take special care about the environment when using the product for a long time. After a long period of its use, leave it idle at least several hours before switching it on again.

5. Do not orient the image pickup device to the sun or a high-power laser beam

Do not orient the photographing section of the DS camera head directly to the sun or a high-power laser beam. An excessive exposure to the light may cause browning and burn-in of the image pickup device, leading to malfunction.

6. Cautions on installation, assembling, connection, and maintenance

- When you do installation, assembling, connection, or cleaning, make sure that DS-L3 is switched off and the power cord plug is pulled off from the AC socket in order to avoid electrification, fire, and other accidents.
- In installation and assembling, be careful not to have your fingers or hands caught.
- When you attach the DS camera head to a microscope or other optical instruments, make sure that the device body and cables do not interfere with the moving part of the optical device.

7. Attaching a commercially available arm or mount

You can remove the stand arm unit at the back of DS-L3 and use the attachment hole to attach DS-L3 to a commercially available arm conforming to VESA 75 mm or to a stand or a mount conforming to UL1678.

Do not fix DS-L3 directly to a wall with the attachment hole at its back. Use an arm, stand, or mount whose maximum sustainable weight is at least 1.4 kg, and set DS-L3 at least 10 cm away from the wall or other objects.

**CAUTION****8. Precautions for installation/usage environment and storage environment**

This product is a precision optical device. Using or storing it under improper environment may result in a failure or degraded precision. When using or storing this product, observe the following conditions.

- **Installation/Usage environment**

Use this product in a location where the temperature is from 0 to +40°C and a relative humidity is 60% or less (no condensation).

- **Storage environment**

Choose a location where the temperature is from -20 to +60°C and a relative humidity is 90% or less (no condensation).

- Avoid high-temperature, high-humidity locations for installing and storing it.
- Do not place and use this product in a closed space such as a locker or a cabinet.
- Install this product so that there is at least 10 cm of clearance around this product.
- Install this product in a location that is free of dirt and dust.
- Install this product in a vibration-free area.
- Place this product in a place which allows easy removal of power cord from the AC inlet of the AC adapter in the event of an emergency.
- For safety's sake, unplug the power cord from the AC socket when you do not use DS-L3 for a long time.
- During storage, place a cover over this product to avoid dust.
- For details about the usage and storage environments for this product, see "Chapter 21 Major Specifications".

Part 1

Please Read First

This part explains what the user should know in advance about DS-L3 operation.

Those who use DS-L3 for the first time should read this part. Also refer to this part whenever you want to confirm basic operations during installation and connection of DS-L3, or during actual operation of DS-L3.

This part consists of the following chapters:

- Chapter 1 Before Use
- Chapter 2 Names of Parts and Their Functions
- Chapter 3 Installation and Connection
- Chapter 4 Preparing for Use
- Chapter 5 Working with Touch Panel


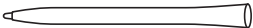

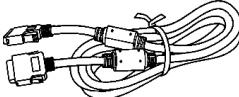
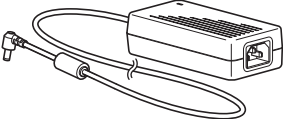

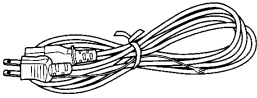

This chapter lets you confirm the DS-L3 accessories and explains which DS camera heads and peripheral devices can be connected to DS-L3.

1.1

Confirmation of Accessories

The following items should be contained in the packing box. Please make sure that you have everything.

If any items are missing, contact your nearest Nikon representative immediately.

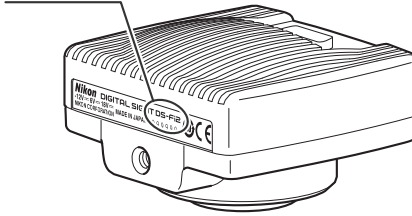
No.	Item	No.	Item
1	DS-L3 DS Camera Control Unit 	5	Stylus (with a holder) 
2	Instruction manual (This manual, Quick Reference, Microscope Operation instruction manual) 	6	DS camera cable (DS Camera I/F cable 20-26; 3.0 m) 
3	AC adapter 	7	DS Camera Head with C mount cap 
4	Power cord 	8	C mount adapter (optional) 

1.2 DS Camera Heads That Can Be Controlled from DS-L3

The six DS camera heads listed below can be connected DS-L3.

DS camera heads have different characteristics depending on the model. Please check the model name of your DS camera head before using it.

The model name of a DS camera head is found near the tripod mount.



Features of DS camera head models

DS camera head model name	Image pickup device	Cooling	Pixel-shifting function	Body color
DS-Fi2	2/3-inch, color, 5.24-megapixel	—	—	White
DS-Fi1	2/3-inch, color, 5.24-megapixel	—	—	White
DS-Vi1	1/1.8-inch, color, 2.11-megapixel	—	—	White
DS-Qi1Mc	2/3-inch, monochrome 1.5-megapixel	Equipped	—	Black
DS-Fi1c	2/3-inch, color, 5.24-megapixel	Equipped	—	Black
DS-Ri1	2/3-inch, color, 1.5-megapixel	Equipped	Equipped	Black

Note: Refer to “Chapter 21 Major Specifications” for DS camera head specifications.

✔ Pixel-shifting function

Pixel-shifting is a function that realizes, through a PC application, photographing with a resolution higher than what is expected for the pixel count of an image pickup device.

✔ Illustrations in this manual

The illustration of DS camera head examples that appear in this manual is that of DS-Fi2.

1.3 Peripheral Devices That Can Be Used

The following peripheral devices (sold separately) can be used for DS-L3.

(1) External monitor

DS-L3 has an 8.4-inch built-in touch-panel LCD monitor of 1024 x 768 pixels (XGA). You can also view images on an external monitor if you want to view them on a larger screen or a screen of a higher resolution (SXGA: 1280 x 1024 pixels; or 720p: 1280 x 720 pixels).

For an external monitor, use a PC monitor that supports one of the signal specifications shown below.

Standard name	Resolution	Vertical synchronization frequency	Interlace
XGA	1024 x 768	60 Hz	Non-interlaced
SXGA	1280 x 1024	60 Hz	Non-interlaced
720p	1280 x 720	60 Hz	Non-interlaced

DS-L3 has a DVI-I connector for video output to a digital monitor (DVI 1.0) or an analog RGB monitor. Use a DVI cable for connection to a digital monitor, and use a DVI cable for analog connection to connect to an analog RGB monitor.

Note: It is recommended to use the SXGA digital monitor to ensure the high resolution performance.

✔ Connection cables

When you purchase a DVI cable, we recommend selecting a cable length of 3 meters or shorter to prevent quality deterioration due to the noise generated from peripheral equipment.

(2) C mount lens

A C mount lens is used when photographing a subject other than those for microscope. Any lens that satisfies the following conditions may be used:

- Protrudes no more than 10 mm from the mount surface into the camera. (5 mm or less for DS-Ri1)
- The image circle of DS-Fi2, DS-Fi1, DS-Fi1c, DS-Qi1Mc, and DS-Ri1 is 2/3", and that of DS-Vi1 is 1/1.8". Use a lens for 1" or 2/3".
- When using diaphragm settings brighter than F2.8, you may observe slight light falloff around the periphery.

(3) CF (Compact Flash) card

Commercially available CF cards can be used as image storage media. Use a CF card of Type I.

Please use a model whose operation is verified by Nikon. Not every CF card is compatible with the DS-L3.

(4) USB memory

USB memory sticks can be used for image storage media.

Please use a model whose operation is verified by Nikon. Not every USB memory is compatible with the DS-L3.

(5) USB mouse

With a USB mouse connected, you can use the mouse to perform operations equivalent to those of the built-in touch panel LCD monitor.

A mouse is required for operating on the menu displayed on an external monitor.

Mouse operation is convenient for the annotation function (tool menu), which adds lines and comments to images, and for the measurement function (tool bar), which measures lengths and angles on the screen.

Please use a model whose operation is verified by Nikon. Not every USB mouse is compatible with the DS-L3.

(6) USB keyboard

With a USB keyboard connected, you can directly enter values, comments, and other information from the keyboard.

Please use a USB keyboard whose operation is verified by Nikon. Not every USB keyboard is compatible with the DS-L3.

(7) USB printer

Photographed images can be directly printed by connecting the equipment to a printer that supports PictBridge.

(8) USB hub

You will need a USB hub to use a USB memory stick, USB mouse, USB keyboard, and USB printer at the same time. Please use a model whose operation is verified by Nikon. Not every USB hub is compatible with the DS-L3.

Note 1: Only one tier of hubs can be connected to DS-L3.

Note 2: When you use a USB keyboard with a hub function, use the hub of the keyboard.

(9) USB cable

A USB cable is required for saving image files in a PC and for direct printing on a printer.

It is recommended to use an AB type cable that is compatible with USB 2.0.

✔ USB cables

Use a USB cable with ferrite core for stabilization of USB transfer, reduction of noise generated from the DS-L3 and its peripherals, and satisfaction of EMC standards.

(10) Network connection cable

A network connection cable is used for connecting DS-L3 to a network (LAN). Use a 10/100 Base-TX cable (category 5 or 5e).

With DS-L3 connected to the network, you can save image files in a PC through the network and control DS-L3 from a PC.

✔ Network cables

- To satisfy EMC standards, use a shielded cable.
- When connecting the DS-L3 to a LAN, use a straight cable. When connecting the DS-L3 to a PC, use a crossed cable.

(11) Personal computer (PC)

PC is necessary when processing image data photographed by DS-L3 or controlling DS-L3 remotely.

There are three methods to connect between the DS-L3 and the PC.

1. Connection through the network:

The PC controls the DS-L3 from a remote location or captures photographed images via network.

2. Connection through a USB cable (using DS-L3 as a removable media device):

The PC and the DS-L3 are connected with a USB cable to capture photographed images or to read or write data in a medium that is inserted in the DS-L3. (The DS-L3 is connected to the PC as a removable medium.)

3. Connection through a USB cable (with a specialized application on the PC):

Connect a PC and the DS-L3 with a USB interface to control the DS-L3 and to display live images or capture photographed images with the specified application software on a PC.

Running environment

The operating environment of the PC depends on the connection method.

1. Network connection

Machine	Windows PC or Mac OS PC
OS	Windows 7, or Mac OS 10.7 or later (web browser) / Mac OS X 10.6 (FTP server)

2. USB connection (connected as a removable media)

Machine	Windows PC
OS	Windows 7

3. USB connection(When an dedicated application “NIS-Elements” is used)

The minimum requirements for NIS-Elements is as follows (different from the recommended environment)

PC unit

Type	Windows PC equipped with USB 2.0
CPU	Intel Core 2 Duo or higher
Memory	2 GB or more (when 32-bit OS is used) 4 GB or more (when 64-bit OS is used)
Hard disc	2-GB available space is required at the time of installation
Video	1280x1024 pixels, High Color mode or better (True Color mode recommended)
OS	Windows 7, 32 bit/64 bit (Japanese/English)
Other	We recommend installing the Microsoft standard USB 2.0 device driver for the PC's USB controller.

PC monitor

Resolution	1280 x 1024 pixels or more (True Color mode, displayable monitor recommended)
------------	---

Note: Nikon does not guarantee that the software will work on all the PCs that comply with the operating environments described above. For detail information, contact your nearest Nikon representative.

This chapter explains names and functions of parts of DS-L3 and DS camera heads.

2.1

DS-L3 DS Camera Control Unit

DS-L3 overall view

Built-in monitor

Touch-panel 8.4-inch LCD monitor of XGA (1024 x 768 pixels).

Displayed on the screen are the live image from the DS camera head, replayed images, and operation menus.

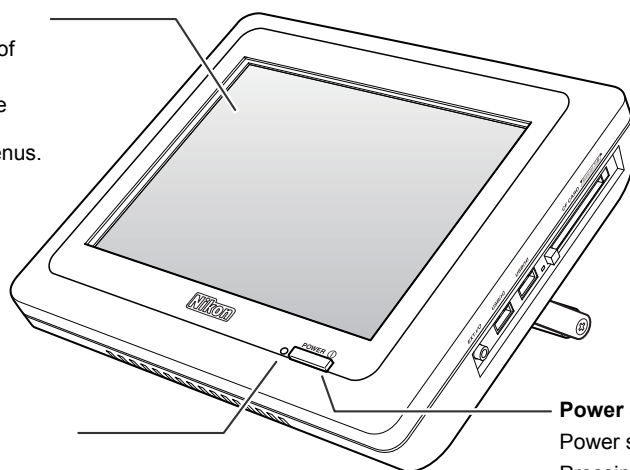
Use the accessory stylus for menu operation.

POWER indicator (green/red)

Power indicator of DS-L3.

It blinks in green when the power becomes on, and lights in green when the device becomes operable.

When DS-L3 becomes unable to operate normally with some fault, this indicator lights in red.

**Power switch**

Power switch of DS-L3.

Pressing the switch turns the power on, and pressing it again turns the power off.

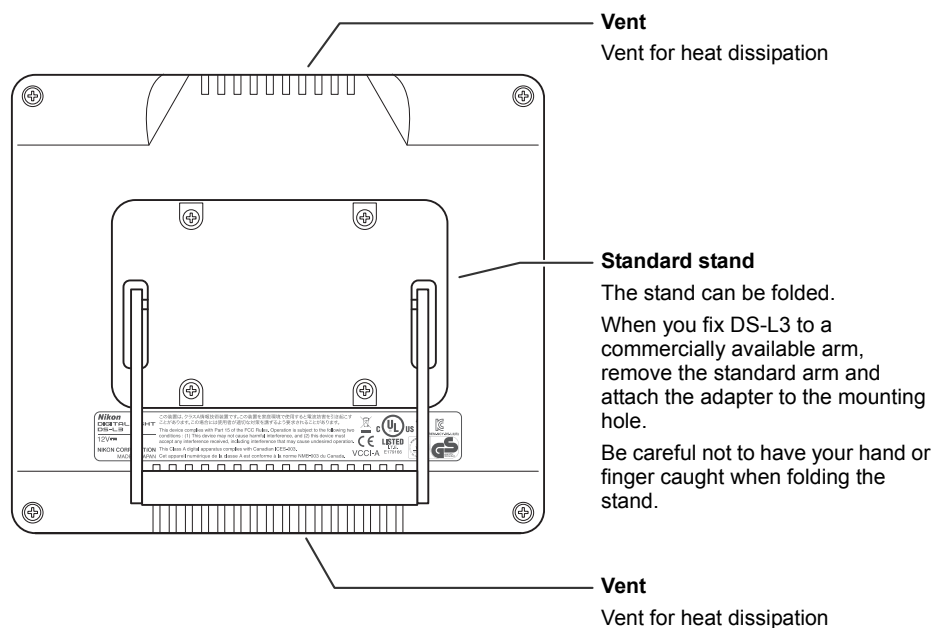
The POWER indicator lights up when the power is on.

Stylus

A stylus is supplied with the DS-L3 for operation on the touch-panel LCD monitor.

The stylus has a holder with double-sided sticky tape so that you can attach the stylus and holder to the DS-L3 and keep them together.

DS-L3 back side

**Vent**

Vent for heat dissipation

Standard stand

The stand can be folded.

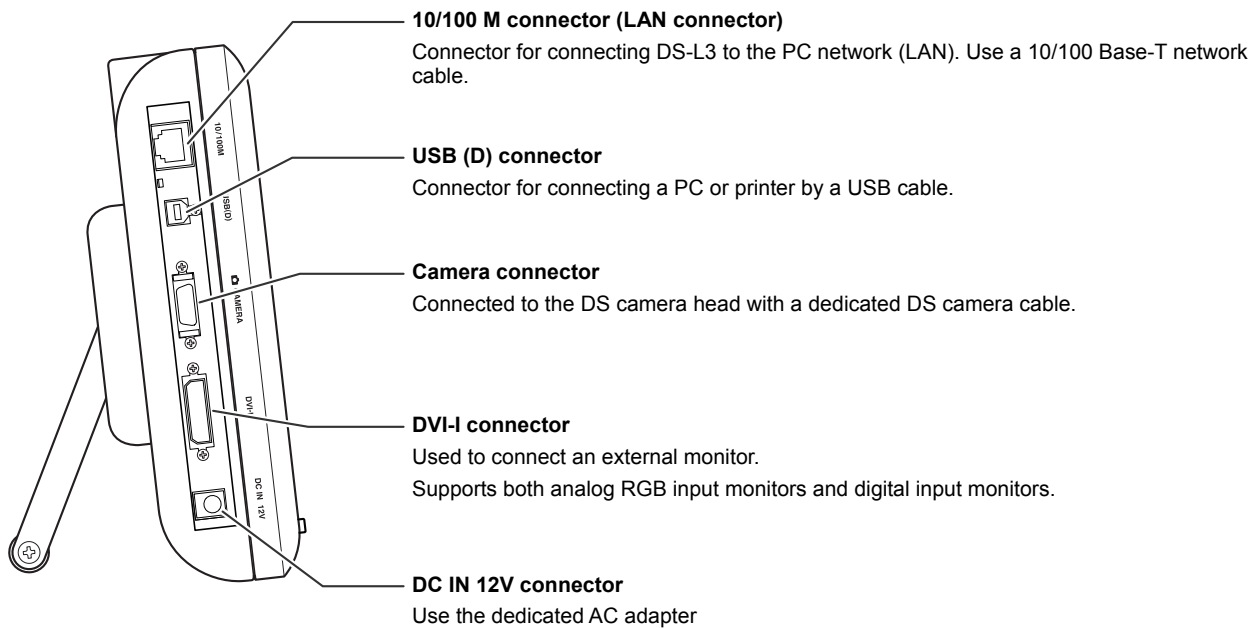
When you fix DS-L3 to a commercially available arm, remove the standard arm and attach the adapter to the mounting hole.

Be careful not to have your hand or finger caught when folding the stand.

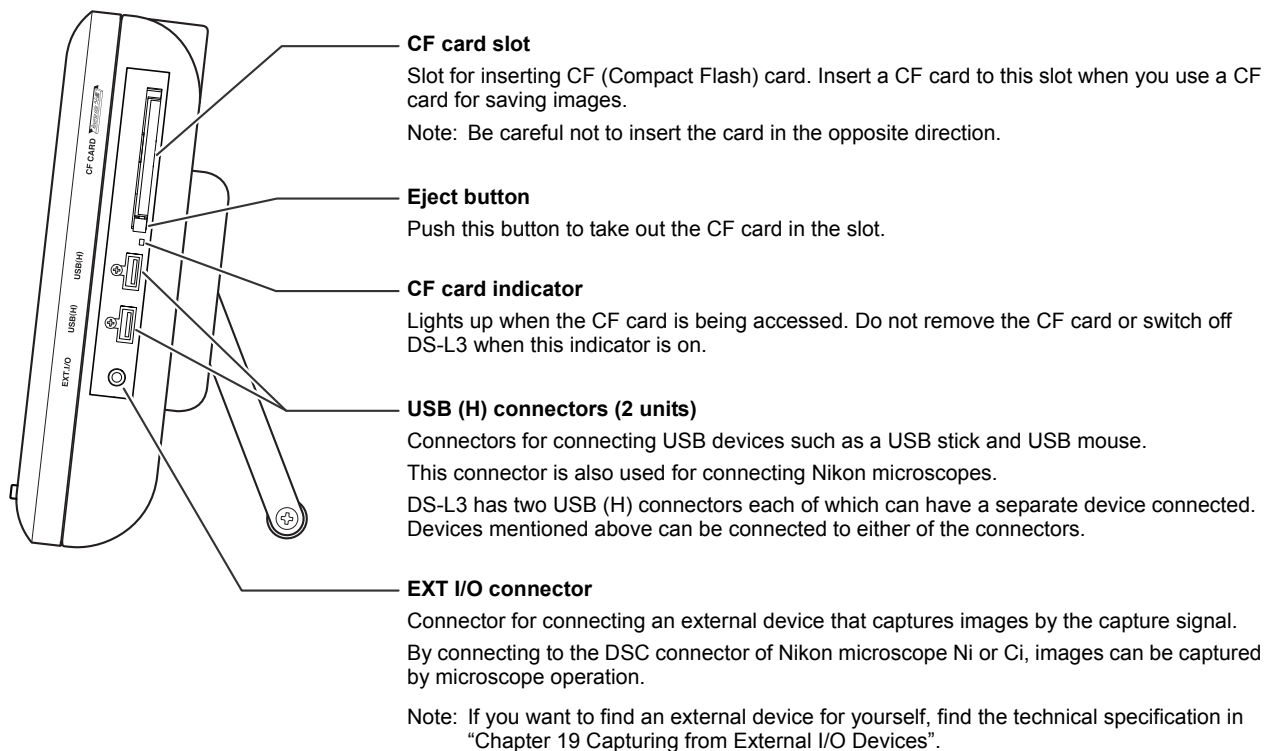
Vent

Vent for heat dissipation

Left side of the DS-L3



Right side of the DS-L3



⚠ Cautions on cable connection

Make sure that the power of the device is off when you connect or disconnect a cable. Plugging or unplugging the cable with the power on may cause malfunction.

2.2

DS Camera Head

Front side of DS camera head

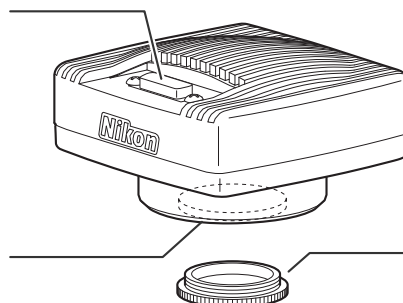
CAMERA OUT connector

Connector for connecting the DS camera head and DS-L3. Use the specialized DS camera cable for connecting them.

C mount

General-purpose mount for fixing a microscope or optical lens.

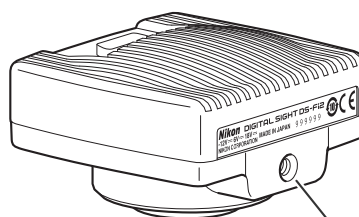
When you photograph with a microscope, fix the C mount adapter for connecting the microscope.

**C mount cap**

Cap for protection from dust.

To avoid dust adhering on the internal image pickup device, do not forget to put on the cap when you detach the DS camera head from an optical lens or microscope.

Front side of DS camera head

**Tripod mount**

Used when the DS camera head is fixed on a tripod mount.

! Cautions on DS camera cable connection

Make sure that the power of DS-L3 is off when you connect the DS camera cable. Plugging or unplugging the cable with the power on may cause malfunction.

This chapter explains how to install and connect DS-L3 and a DS camera head.

3.1

Installing DS-L3

! Cautions on installation

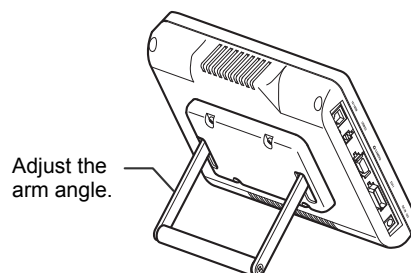
When you install DS-L3, make sure that there is at least a 10-cm space between DS-L3 and other objects so that heat is released from DS-L3.

3.1.1

Using Standard Stand for Installation

Install DS-L3 on a horizontal surface such as a desktop when using the standard stand.

Unfold the arm of the standard stand, and adjust its angle so that the touch panel stands at a desirable tilt angle.



3.1.2

Mounting on Commercially Available Arm

DS-L3 can be mounted on a commercially available arm of VESA 75 mm, or on a commercially available stand or mount of UL 1678.

Use one that suits the following conditions:

- DS-L3 weight: 1.8 kg
- Mounting screw hole: M4, depth 7 mm
- Screw tightening torque: 80 to 120 N·cm

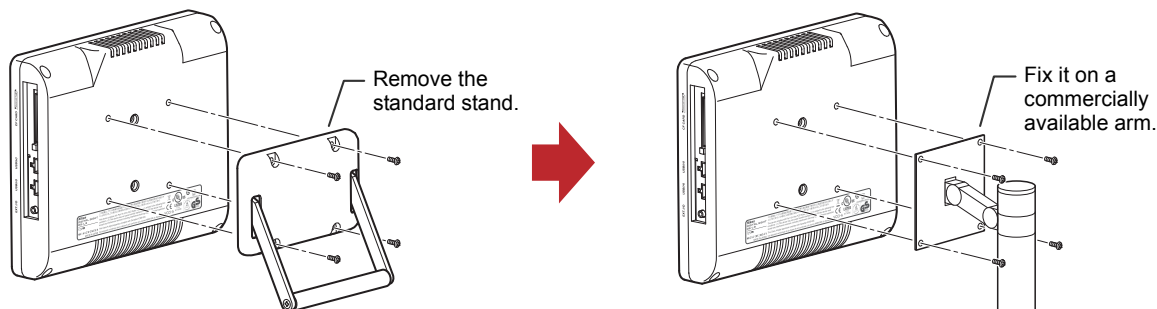
Described here is a procedure for fixing DS-L3 to a commercially available arm.

! Cautions on the built-in monitor

Be careful not to damage the surface of the built-in monitor in this procedure.

- 1 Remove the four screws and the standard stand at the back of DS-L3.
- 2 Fix the commercially available arm to DS-L3 using the four screws that have been fixing the standard stand.

To tighten and remove the screws, use a cross slot screwdriver for M4 screws.



! Caution: Be sure to mount DS-L3 on a stand or the like.

After removing the standard stand, be sure to mount DS-L3 on a commercially available arm, stand, or mount before using it. After removing the standard stand, do not use DS-L3 leaning on something because it may fall over.

3.2 Connecting DS-L3 and Peripheral Devices

❗ Be sure to turn the power off when plugging or unplugging cables.

Confirm that the power of devices is off before plugging or unplugging cables.

Connecting a cable when the power is on may cause malfunction or failure of the device or electrification.

3.2.1 Overall Connection

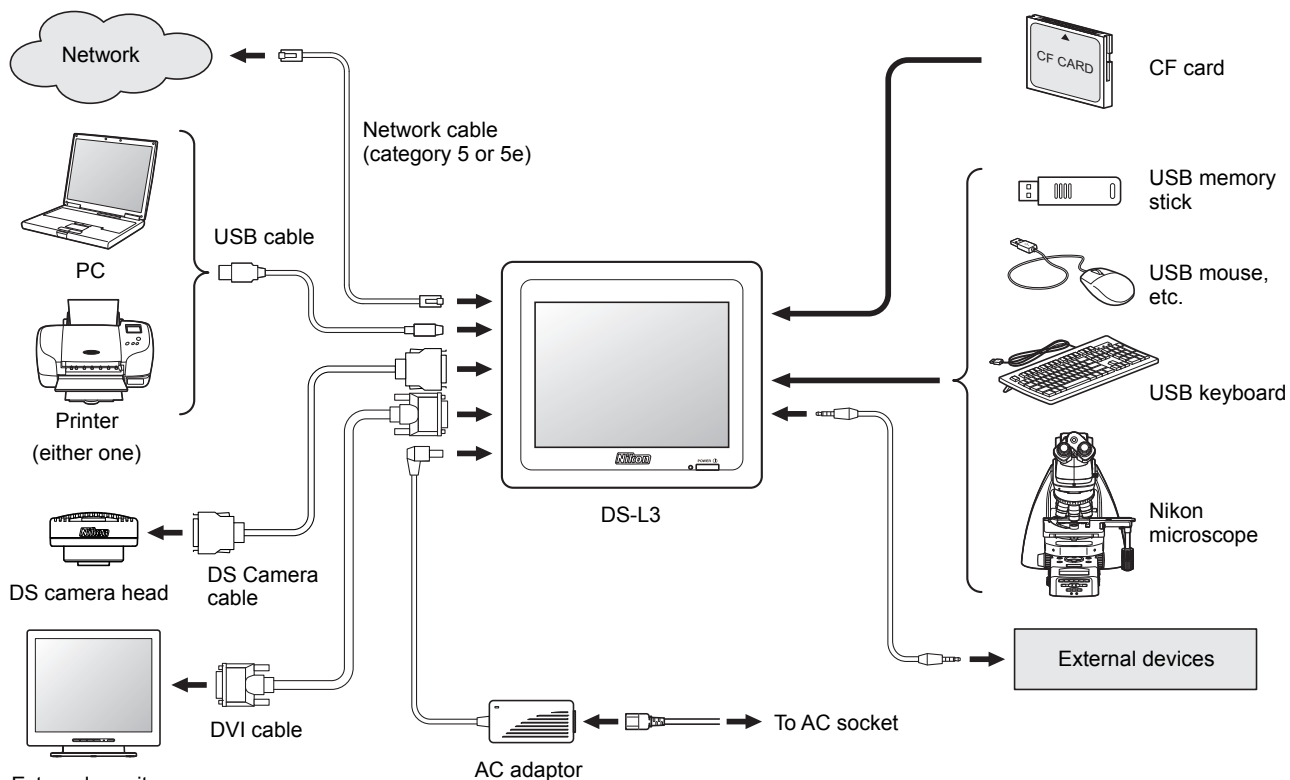


Illustration of overall connection

3.2.2 Connecting a DS Camera Head

This section shows the procedure for mounting a DS camera head on an optical device and for connecting it to DS-L3 using the accessory DS camera cable.

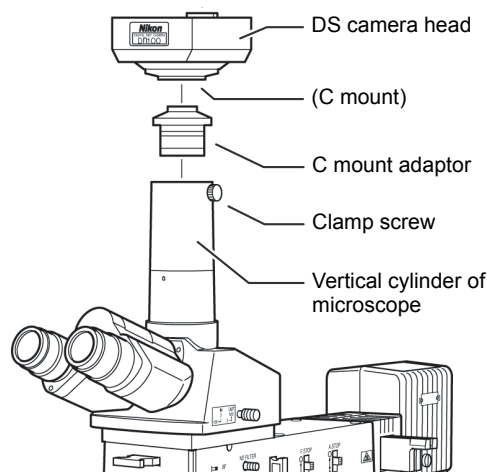
⚠ Cautions on DS camera head installation

- Mount the DS camera head before connecting the DS camera cable.
- Dust adhered on the image pickup device will affect the quality of photographed images. Attach the DS camera head to the optical device as soon as you remove the C mount cap. Do not leave the DS camera head with the cap removed.

(1) Attaching DS camera head to an optical device

Mounting the DS camera head on a microscope

- 1 Remove the C mount cap from the DS camera head.**
- 2 Make sure there is no dust on the C mount adapter.**
If there is, use an air blower or similar means to remove it.
- 3 Mount the C mount adaptor into the C mount on the DS camera head.**
Screw it in as far as it will go.
- 4 Insert the C mount adaptor to the camera port of the microscope, and tighten the clamp screw to fix it.**



Example of microscope mounting

✓ Using a relay lens

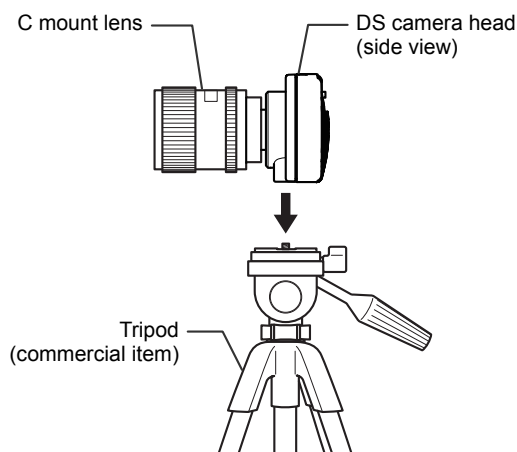
You can also attach a relay lens on the camera port. We recommend the x0.7 relay lens for the DS-Fi2, DS-Fi1, DS-Fi1c, DS-Qi1Mc, and DS-Ri1. We recommend the x0.55 relay lens for the DS-Vi1. When you have mounted the DS camera head on a microscope, be sure to read “7.2 Setting the Environment for Microscope Photographing”.

Installing a third-party C mount lens on the DS camera head

Select a mountable lens (see “1.3 Peripheral Devices That Can Be Used”), then screw it into the C mount of DS camera head.

The tripod mount on the DS camera head can also be used to mount the DS camera head on a tripod.

Note: Note that the image quality of DS-L3 is tuned for microscope photographing.



Example of using C mount lens and tripod

(2) Connecting a DS camera head and DS-L3

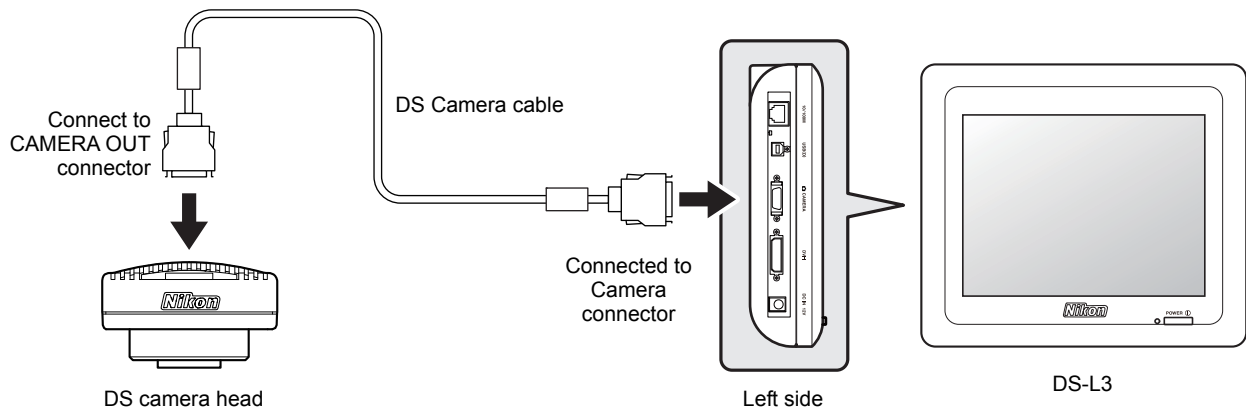
! Cautions on DS camera cable connection

- Attach the DS camera head to the optical device before connecting a DS camera cable.
- Make sure that the power of DS-L3 is off when you connect the DS camera cable. Plugging or unplugging the cable with the power on may cause malfunction.

1 Confirm that the power of DS-L3 is off.

2 Connect the **CAMERA** connector of DS-L3 and the **CAMERA OUT** connector of the DS camera head with the accessory camera cable.

Plug the camera cable into the connectors while pressing their locking tabs. When the cable is connected properly, the locking tabs will return to the original position to lock the connector.



Connecting a DS camera head and DS-L3

✓ Differences between DS camera heads

There are six DS camera heads that can be connected to DS-L3. Available functions and setting are different depending on the DS camera head model you use. Refer to "Chapter 17 Differences in Operation Depending on DS Camera Head Models" for details.

Note: The model of the connected DS camera head is automatically identified by DS-L3.

✓ Setting for the case when a cooled camera is used

When a DS cooled camera head (DS-Qi1Mc, DS-Fi1c, or DS-Ri1) is connected to DS-L3, the cooling function of the image pickup device takes effect. You can set the cooling temperature when DS-Qi1Mc or DS-Ri1 is connected.

Refer to "13.2.4 (2) Configuring the cooling camera" for the setting.

3.2.3 Connecting an External Monitor

You can display DS-L3 video signal on an external monitor when it is connected to DS-L3.

- 1 Confirm that the power of DS-L3 and the external monitor is off.
- 2 Use a commercially available DVI cable to connect the DVI-I connector of DS-L3 to the video input terminal of the external monitor.

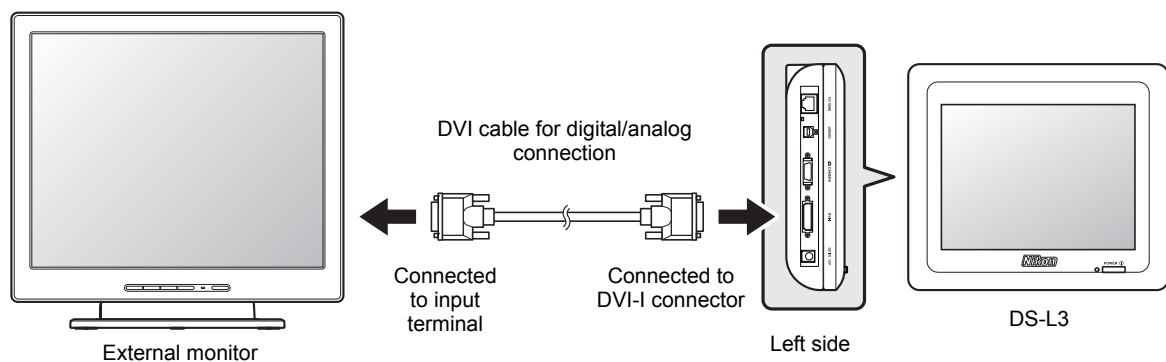
- **When a digital monitor is used:**

Use a DVI cable whose both ends are the DVI-D 24-pin connector. Connect the DVI-I connector of DS-L3 and the digital input terminal of the external monitor.

- **When an analog RGB display is used:**

Use a DVI cable for analog connection whose one end is a DVI-I 29-pin connector and the other end is a D-sub 15-pin connector. Connect the DVI-I connector of DS-L3 and the analog input terminal of the external monitor.

Note: In either case, fix the connector by tightening the screw of the cable connector using a screwdriver.



Connecting an external monitor to DS-L3

✓ Operation and setting of an external monitor

- On/off of the signal output to the external monitor is set by [SETUP MENU] > [MAIN]. XGA (1024 x 768), SXGA (1280 x 1024), or 720p (1280 x 720) can be selected as the video signal, and the color balance of the video can be adjusted. Refer to "13.2.2 Configuring Monitor" for details.
- The DS-L3 built-in touch panel LCD monitor can be disabled when an external monitor is connected. In this case, DS-L3 is operated by a USB mouse. Refer to "13.2.2 Configuring Monitor".

3.2.4 Connecting USB Peripheral Devices

There are two USB (H) connectors on the right side of DS-L3. You can connect USB devices such as a USB mouse and a USB keyboard, or can connect a Nikon microscope and control its motorized equipment. USB memory sticks can be connected as image storage media.

✔ Connecting USB memory stick

For connection of USB memory sticks, refer to “4.3.3 Connecting a USB Memory”.

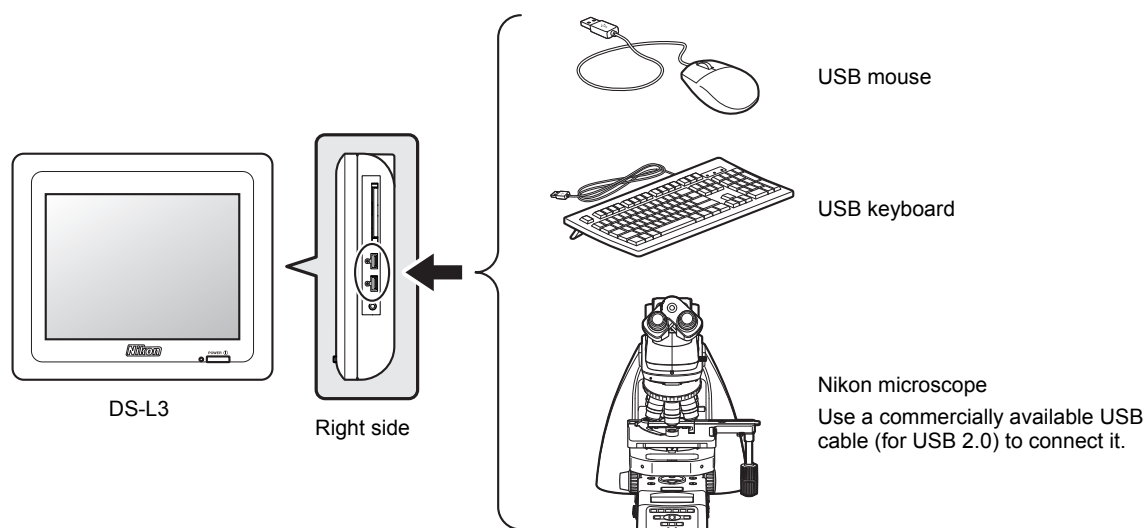
1 Confirm that the power of DS-L3 is off.

2 Connect your USB device.

When only one USB device is connected, connect the device to either one of the two USB (H) connectors on the DS-L3.

When two devices are connected simultaneously, connect each of them to the USB (H) connector.

When three or more devices are connected simultaneously, use a USB hub.



Connecting USB Peripheral Devices

✔ Connecting a USB device

- Only one tier of USB hubs can be connected to this product. Do not connect USB devices on the second tier or further because they are not recognized. When you use a USB keyboard with a hub function, use the hub of the keyboard.
- For Nikon microscopes that can be connected to DS-L3, refer to “21.1 DS Camera Control Unit DS-L3”.

✔ Mouse speed

The mouse pointer speed of the connected USB mouse can be specified by the setup menu. Refer to “13.5.5 (2) Setting the mouse pointer speed” for details.

✔ Using a keyboard

- Using a USB keyboard allows you to directly enter values, comments, and other information from the keyboard while a keypad for character input is displayed on the screen.
- One-byte alphanumeric characters and symbols displayed on the keypad in the screen can be entered from the USB keyboard.

3.2.5 Connecting PC or Printer by USB Cable

There is a USB (D) connector on the left side of DS-L3 for connecting a PC or printer.

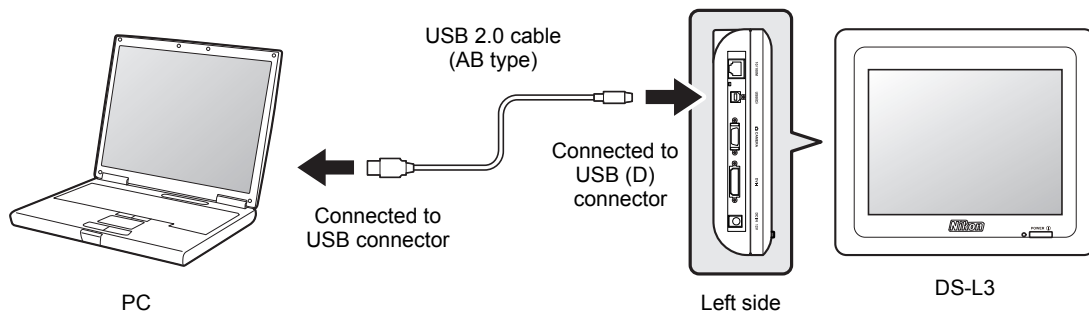
✓ Connecting PC or printer

A PC and a printer cannot be connected at the same time. If you need both, connect the printer to the PC and do printing from the PC.

(1) Connecting a PC

Use a commercially available USB 2.0 cable (AB type) for connecting a PC to DS-L3.

- 1 Confirm that the power of DS-L3 is off.
- 2 Connect the USB connector of the PC and the USB (D) connector of DS-L3 using a USB 2.0 cable (AB type).



Connecting PC with USB cable

✓ Setting for PC connection

When connecting a PC to DS-L3 using a USB cable, you need to set the USB interface setting to “PTP” or “vendor” (default: PTP).

Set it to “PTP” when you use DS-L3 as a removal media device of the PC, and set it to “vendor” when you use NIS-Elements. This setting is made on the [SETUP: MAIN] screen. Refer to “14.1.1 Setting the USB (D) Connector Operating Mode” for details.

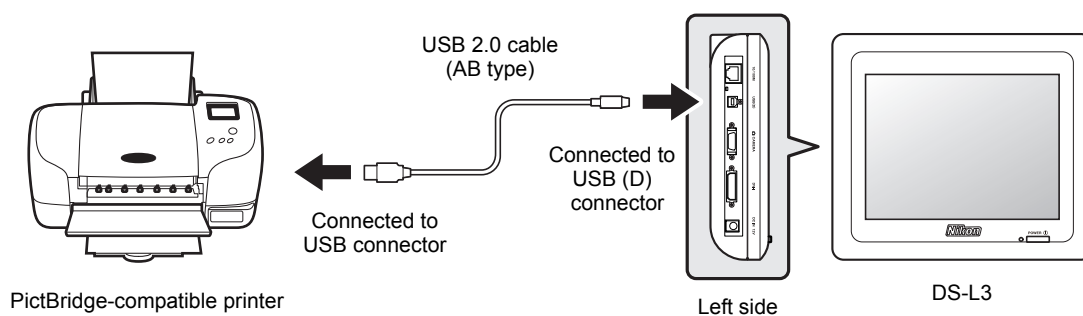
✓ USB cable

Use a USB cable with ferrite core for stabilization of USB transfer, reduction of noise generated from the DS-L3 and its peripherals, and satisfaction of EMC standards.

(2) Connecting PictBridge-compatible printer

When you connect a PictBridge-compatible printer to DS-L3, you can make a direct printing of images from DS-L3. When you connect a printer, use commercially available USB 2.0 cables (AB type) (USB cable may also be included with the printer).

- 1 Confirm that the power of DS-L3 is off.
- 2 Connect the USB connector of the printer and the USB (D) connector of DS-L3 using a USB 2.0 cable (AB type).



Connecting PictBridge-compatible printer by USB cable

✓ Setting for printer connection

When connecting a printer, you need to set the USB interface setting to "printer". This setting is made on the [SETUP: MAIN] screen. Refer to "15.1.1 Setting the USB (D) Connector Operating Mode" for details.

3.2.6 Connecting to Network (LAN)

The following two ways of connecting to the network are supported:

- (1) Connecting to LAN through a network hub
- (2) Connecting to the PC directly without using LAN

! Network cable

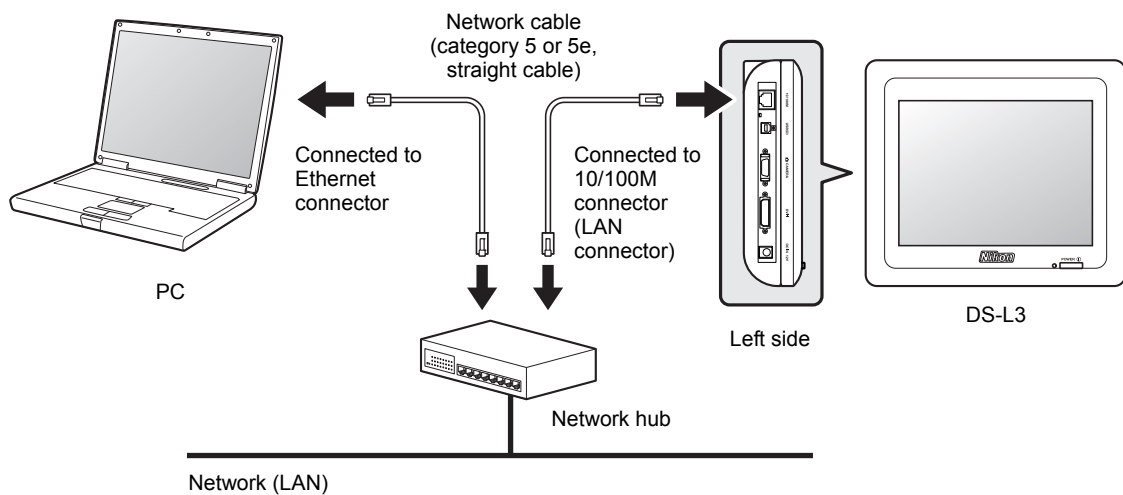
- Use 10/100 Base-TX cable (category 5 or 5e) for network connection.
- Use a shield type network cable to satisfy the EMC standards.
- Use a straight cable when connecting to LAN. Use a crossover cable when connecting to PC.

(1) Connecting to LAN through a network hub

! Before connecting to the network

When you connect DS-L3 to a network, you need to do the network setting properly according to the network configuration. Consult the network administrator of your organization for details.

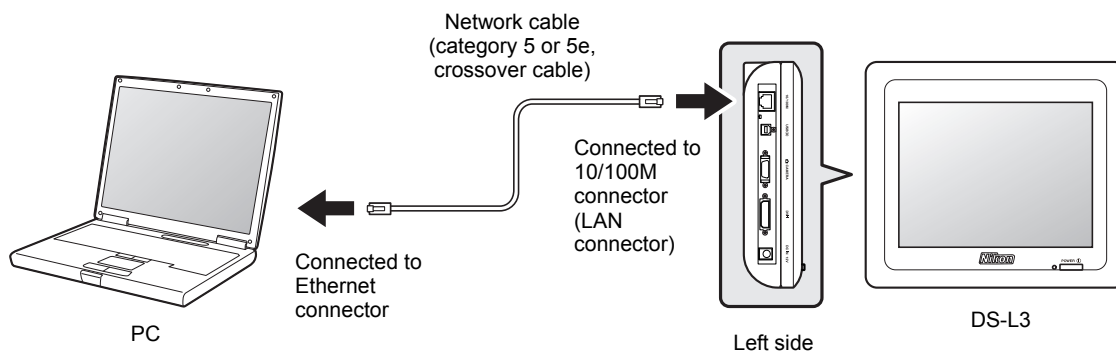
Connect DS-L3 to your network (LAN) through a network hub. Refer to the figure below for connecting network cables.



Connecting to LAN through a network hub

(2) Connecting to the PC directly without using LAN

Use a crossover network cable to connect the PC and DS-L3 directly without a network hub.



Connecting to the PC directly without using LAN

! IP address setting

When you connect a PC and DS-L3 using a crossover cable, set fixed IP addresses to PC and DS-L3.

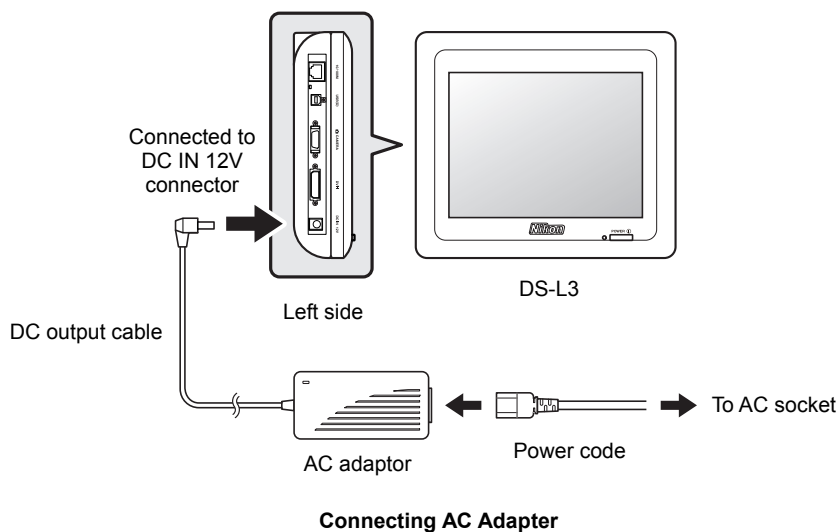
3.2.7 Connecting AC Adapter

Use the accessory AC adapter for power supply to DS-L3.

! Caution: Connection of the AC adapter and a power cord

- To avoid electrification, confirm that DS-L3 is switched off before connecting the AC adapter.
 - Connect the AC adapter after all other connections are finished.
 - Be sure to use the AC adapter dedicated to DS-L3.
 - Be sure to use a power cord that is specified by this manual. Using some other power cord may cause malfunction or fire. Refer to "Chapter 21 Major Specifications" for the power cord specification.
- Because this product falls under the category of electric shock protection class I, always make sure to connect it to an AC socket that has a protective ground terminal. If you have broken or lost the power cord, contact the point where you purchased the product.

- 1 Confirm that the power of DS-L3 is off.
- 2 Connect the DC output cable of the AC adapter to the 12 VDC-IN terminal on the left side of DS-L3.
- 3 Connect the specified power cord to the AC adapter.
- 4 Connect the plug of the power cord to the AC socket.



This section explains the preparation required before you use DS-L3 for observation or photographing.

4.1

Starting/Closing DS-L3

CAUTION: Power supply for the DS-L3

- Always use the POWER switch on the front of the DS-L3 to turn it on or off.
- When turning off the DS-L3, check that green light for the POWER indicator is out before unplugging the AC adapter from the product or power cord from the AC power socket.
- Always use a 100 to 240 VAC (frequency of 50 to 60 Hz) power supply, and connect the power cord to the AC power socket directly.
- Be sure to use the specified power supply.
- Be sure to use the specified power cord.
- Be sure to use the specified AC adapter.

4.1.1

Starting DS-L3

Follow the steps below to start DS-L3.

When using the microscope control function

When you connect a Nikon microscope and use the microscope control function of DS-L3, switch the microscope on before DS-L3. For how to switch on the microscope, refer to the manual of your microscope.

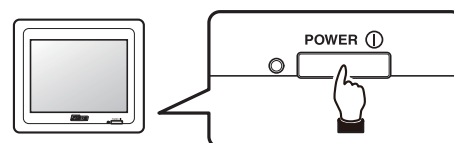
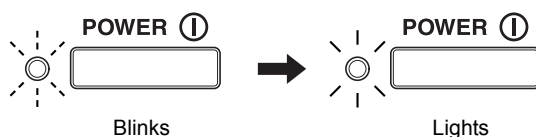
1

Press the power switch of DS-L3 to switch it on.

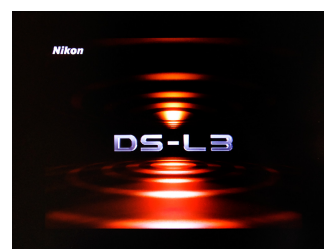
When the power is supplied, the start screen appears on the monitor and the POWER indicator (green) starts to blink.

Note: If some image corruption is seen on the start screen, it is not a sign of malfunction or failure of DS-L3.

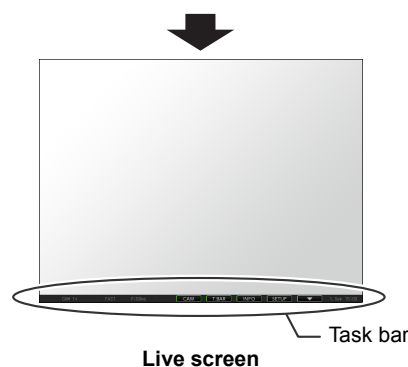
When DS-L3 has been started normally, the POWER indicator (green) stops blinking and becomes on, and the image (live image) captured by the DS camera head replaces the start screen on the monitor.



Operating power switch



Start screen



Live screen

2

Confirm that the live image and the task bar are displayed on the monitor.

Depending on the status of the optical device, you may not be able to determine if the image displayed on the monitor is the live image.

Especially when the DS camera head is connected to a microscope, the screen may become coarse with the maximum camera gain unless the lighting and focus are properly adjusted.

Note: If Nikon microscope Ni-E or Ni-U is connected and the DS camera head is not connected, the [Microscope control] screen is automatically displayed when DS-L3 is started.

✓ **When connecting the PC and the DS-L3 with a USB cable**

When a PC and DS-L3 are connected by a USB cable, confirm that DS-L3 has been normally started before starting application software on the PC.

✓ **Video output for external monitor**

When an external monitor is used, images can be displayed either on the external monitor or on the built-in monitor. For video output with an external monitor, refer to “13.2.2 Configuring Monitor”.

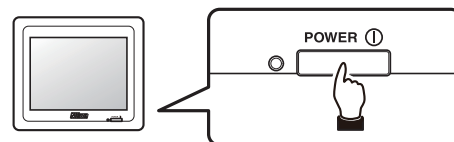
! **Errors on activation**

If an error is detected upon power-on, the POWER indicator lights red and an error message shows on the monitor. Read the error message and turn the power off. After eliminating the cause of the error, turn it on again. If you cannot remove the error condition, contact the point where you purchased the product.

4.1.2 Switching Off

1 Press the power switch of DS-L3 to switch it off.

Pressing the power switch when the power is on switches off DS-L3 and puts off the POWER indicator.



Operating power switch

✓ **Auto power saving**

To reduce energy consumption, you can set DS-L3 so that it enters the waiting state after a certain period of time of no operation. Refer to “13.5.5 (1) Setting the power-saving timer” for details.

Any operation during the waiting state returns DS-L3 to the operable state.

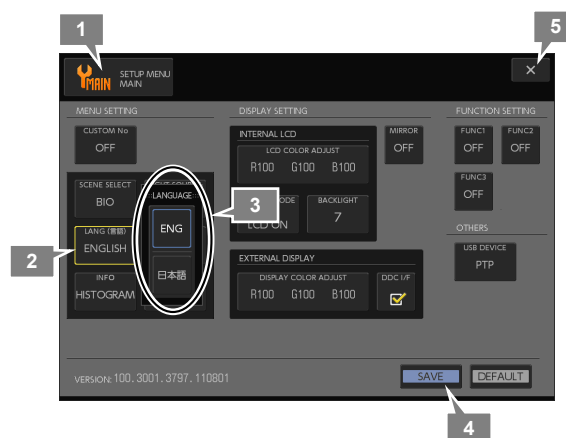
4.2 Setting Display Language and Date and Time

The minimum necessary settings for operating the system are explained here.

Note: See “Chapter 13 Changing Settings” for other initial setting items.

4.2.1 Setting Display Language

- 1 Display the [SETUP MENU: MAIN] screen.**
Press the [SETUP] button of the task bar to display the [SETUP MENU: MAIN] screen.
- 2 Select the [LANG] button.**
A submenu appears. Initially it is set to English.
- 3 Select [ENG] (English) or [Japanese] for the display language.**
The selected language will be indicated on the [Language (LANG)] button (or [LANG (Language)] button).
- 4 Press the [SAVE] button to save the setting.**
The display language is changed.
- 5 Press the top right [X] button to close the [SETUP MENU: MAIN] screen.**



Setting display language

4.2.2 Setting Date and Time

- 1 Display the [SETUP MENU: ADDITIONAL] screen.**
Press the [SETUP] button on the task bar to display the [SETUP MENU] screen, and press the [MENU SELECT] button and select [ADD].
- 2 Set the current date and time in the [DATE/TIME SET] area.**
Enter year in four digits, and month, day, hour and minutes in two digits.
Pressing the current value shows a keypad. Select digits and press the [ENTER] button.
Press the [CLR] button to clear what you have entered.
Press the [BS] button to go back one digit. Press [X] to close the keypad without changing the value.
- 3 Press the [SAVE] button to save the setting.**
- 4 Press the top right [X] button to close the [SETUP MENU: ADDITIONAL] screen.**



Setting date and time

✔ Setting time

The date and time information is used when an image file is saved. Set correct date and time.

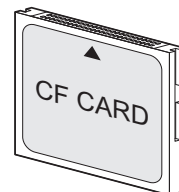
4.3 Preparing the Recording Medium

Images captured by this system can be stored in one of two types of media described below.

- **CF card (Compact Flash card)**

CF cards are card-type storage media used for digital cameras and other devices. Insert the card in the CF card slot on the right side of DS-L3.

DS-L3 supports CF cards of Type I.

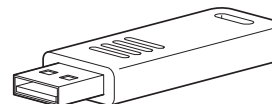


Example of CF card

- **USB Memory**

This is a FAT-formatted recording medium equipped with USB interface.

Connect it to the USB (H) connector on the right side of DS-L3.



Example of USB memory stick

! Operation assignment for capturing

DS-L3 allows you to specify the location where captured images are saved. Check the operation assignment setting in advance to make sure that images will be stored in the desired location. Refer to “13.5.2 Configuring Capture Function” for the setting.

- With [SAVE TO MEDIA] set on, images are stored in the storage media device connected to DS-L3.
- With [SAVE TO SERVER] set on, images are stored in the specified directory of a FTP server on the network.
- With [SAVE TO PC] set on, images are stored in the specified directory of the PC (with NIS-Elements in operation) connected through USB.

4.3.1 Handling Recording Medium

Cautions on handling a recording medium

! Handling a recording medium

Note the following when you use an external recording medium such as a CF card or USB memory stick:

- Carefully read the instructions for the recording medium to be used.
- Insert the recording medium in the correct orientation.
- Do not remove the recording medium or turn off the power while data is being written to it. This may cause loss of data or malfunction of the medium.
- Some types of recording media might not operate properly. Use a medium whose operation has been proven by Nikon.
- If the recording medium is not recognized, remove the card, and then insert it again. If it is not yet recognized, replace the medium with another one.
- Do not touch the terminal of the CF card with your hand or a metal object.

✓ Discarding or giving the recording medium to someone

Note that deleting data or initializing a recording medium using this system or a PC does not completely erase the data. Deleted files can sometimes be recovered from discarded recording media using commercially available software, potentially resulting in the malicious use of important data.

Before discarding a recording medium or transferring ownership to another person, erase all data using commercially available data deletion software, or initialize the medium and then completely fill it with images containing unimportant information.

You can physically destroy a memory to make the data unrecoverable. Care should be taken to avoid injury or damage to you or others when physically destroying the recording medium.

Initializing the recording medium

In order to use a recording medium such as a CF card or USB memory stick with this system, you need to initialize (format) it using this system. See “4.3.4 Initializing Recording Medium” for how to initialize a medium.

! Taking a backup of data

Data on a medium is completely erased when it is initialized. If it contains data you need to keep, take a backup of the data onto a PC or some other place.

Setting image source and image storage locations

This system allows you to connect multiple recording media and switch saving destination or location of replayed images. You need to always specify the target recording media and the folder where your images are saved before you start capturing images.

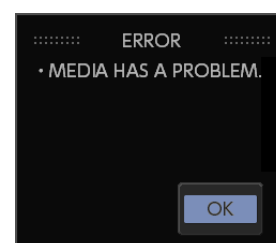
See “8.3.4 (2) Specifying a save media and folder” for details about setting destination for saving images.

Errors with media

A warning message is displayed on the touch panel LCD monitor if an image cannot be saved or played back due to an error.

If you see a message like this, remove the medium once and then connect it again. If you see the same message again, that recording medium may not be used any more.

In this case, use another recording medium or initialize the failed medium.



Warning Message for Recording Medium

✓ Life of a recording medium

Flash memory, used in various types of recording media, has a limitation in regard of the number of times of writing operations.

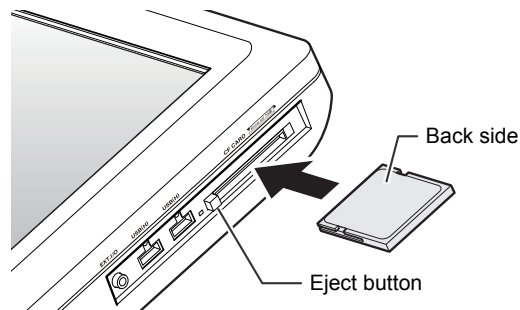
- If you write data on a flash memory in repeated manner for a long time, you may experience failure of reading and writing of data reducing reliability of data.
- If you experience errors with the recording medium even if you initialize the medium, replace it with another one.

4.3.2 Inserting CF (Compact Flash) Card

To use a CF (Compact Flash) card as the storage media device, insert the card in the CF card slot on the right side of DS-L3.

(1) Inserting CF card

- 1 **Confirm that the power of DS-L3 is off.**
Confirm that the POWER indicator on the front side is off.
- 2 **Insert the CF card into the slot with its back side (no label) up (or forward) and with its terminal end directed toward the equipment.**
Insert the CF card in the correct direction until you hear a click sound.
When the card is inserted deep enough, the eject button of the CF card slot rises.



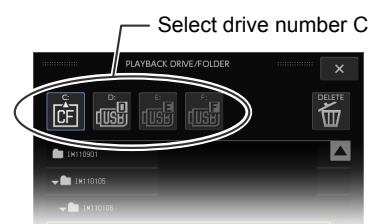
Inserting CF card

! Be careful about the direction of the CF card.

The CF card cannot be inserted in the opposite direction. Inserting the CF card forcibly may damage the CF card or DS-L3.

✓ Drive number of CF card

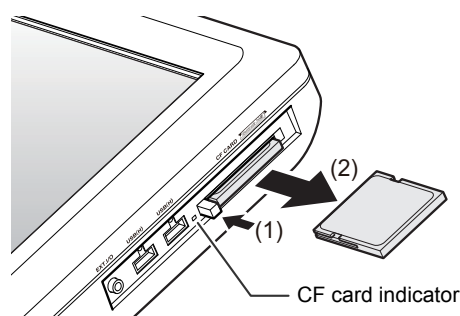
For a CF card, drive number C is always allocated.
Different media devices are identified by their drive numbers when specifying the storage location and replaying images.



Drive allocation example
(Setting the folder for replayed images)

(2) Removing CF card

- 1 **Confirm that the CF card indicator is off, or switch off DS-L3.**
- 2 **Press the eject button (1).**
The CF card is ejected.
- 3 **Pull out the CF card straight (2).**



Removing CF card

! Do not remove the CF card when it is accessed.

If you insert or remove the CF card to or from the DS-L3 when the power is on despite the procedure described above, do not remove the CF card or switch off the DS-L3 while the CF card indicator is on (to indicate that the card is being accessed for initialization, data storage or deletion, or data retrieval). Doing so may erase the data or cause failure of the CF card.

4.3.3 Connecting a USB Memory

Up to three USB memories can be connected to the system at the same time as a medium for saving and playing back images. You can use any FAT-formatted storage device compatible with USB 2.0 as well as USB memory.

! Do not remove the USB memory stick when it is accessed

If you insert or remove the USB memory stick to or from the DS-L3 when the power is on, do not remove the USB memory stick or switch off the DS-L3 while the USB memory access lamp is on (to indicate that the card is being accessed for initialization, data storage or deletion, or data retrieval). Doing so may erase the data or cause the failure of the product.

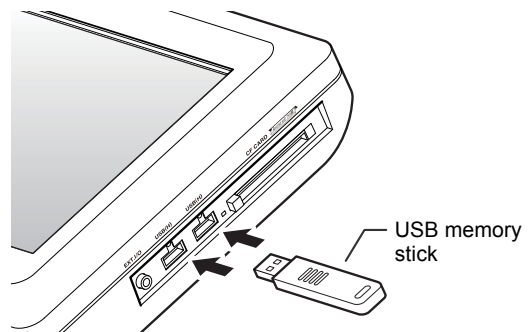
(1) Connecting and removing a USB memory

Connect a commercially available USB memory stick to the USB (H) connector on the right side of DS-L3.

DS-L3 has two USB (H) connectors, both of which can be connected at the same time. To connect three USB memory sticks, use a commercially available USB hub.

Note: DS-L3 recognizes up to three USB memory sticks.

When you remove a USB memory, make sure access to the memory (for saving and playing back an image) is complete (USB memory access lamp is off), or switch off the DS-L3. Remove the USB memory in a straight direction.



Inserting/removing a USB memory stick

✔ Drive assignment for USB memories

DS-L3 recognizes up to three USB memory sticks.

This system recognizes USB memories by assigning drive letters D, E and F in the order of detection.

A USB memory is identified by a drive letter when setting the saving destination or playing back an image.



Drive allocation example
(replaying folder setting)

(2) Initializing a USB memory

Initialize a USB memory as necessary.

Note: See "4.3.4 Initializing Recording Medium" for initialization procedures.

4.3.4 Initializing Recording Medium

A recording medium is initialized in the [SETUP MENU: FILE] screen.

1 Display the [SETUP MENU: FILE] screen

Press the [SETUP] button on the task bar to display the [SETUP MENU] screen, and press the [SETUP MENU SELECT] button and select [FILE].

2 Press the [FORMAT] button.

The [DRIVE] submenu appears. An icon for a drive that can be initialized is in white. An icon for an empty drive is in gray. For a CF card, drive number C is always allocated. Storage media devices connected to USB connectors are allocated to drive D, E, or F according to the order of their recognition.

3 Press the button for the desired medium (any of drive C to F).

To cancel initialization, press the [Cancel] button at the top without selecting a drive.

If you select a drive number, a media device initialization confirmation message is displayed.

4 Press YES to initialize the recording medium or NO to cancel initialization.



If you select YES, the recording medium is initialized.

5 Close [SETUP MENU: FILE] by pressing the [X] button.



Initialization of storage media

✓ In case of initialization failure

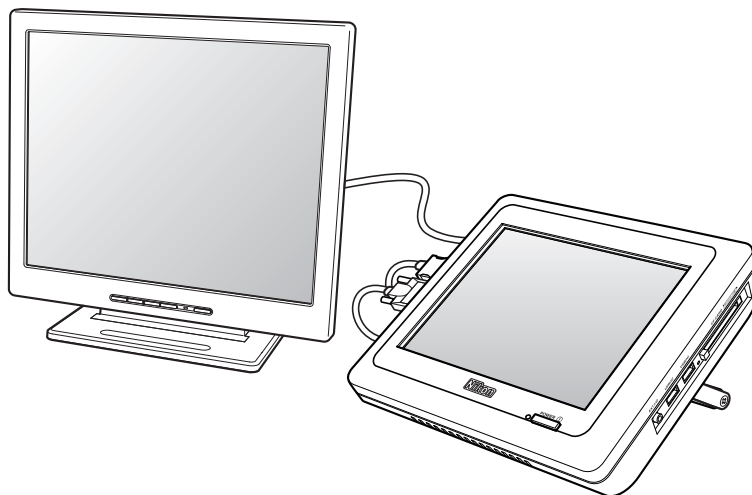
Initialization may fail if a recording medium has an error. A warning message indicating a medium error is displayed in this case.

! Data backup

Initializing a storage media device erases all data saved in it. If the media device contains data you need, backup it to PC or any other device.

4.4 Adjusting Image Quality of External Monitor

When you output video signals from the DS-L3 to an external monitor, adjust the image quality (brightness, contrast, etc.) of the external monitor so that images are displayed properly. For how you adjust the image quality, refer to the manual of the external monitor.



Example of connecting an external monitor

✓ Adjustment of DS-L3 output signal

By operation on the [SETUP MENU: MAIN] screen, you can set the following items, which have bearings on the quality of external monitors. Refer to “13.2.2 Configuring Monitor” for details.

- Display mode selection (XGA, SXGA, 720p)
- Color balance adjustment of output signal

✓ Adjustment of an external monitor using test charts

If the screen on the external monitor blurs, we suggest that you adjust the clock phase and the clock pitch on the external monitor.

DS-L3 has the capability to output “test charts” suitable for this adjustment. Press the [LCD CHART] button in the [OTHER] area on the [SETUP MENU: ADDITIONAL] screen, and an image with vertical lines are shown on the display. Adjust the external monitor so that this image is shown clearly.

Press the [x] button at the top right corner of the screen to close the test chart.

This chapter explains how to use the operation menus displayed on the DS-L3 touch panel LCD monitor.

5.1

Touch Panel Operation

DS-L3 has a built-in touch-panel-type LCD monitor, which displays the live image from the DS camera head, images that have been photographed and stored, various DS-L3 settings, and operation menus for image operation settings.

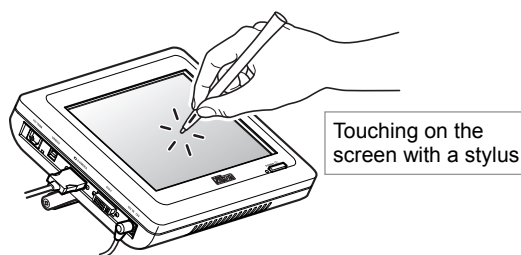
These operation menus can be used by touching on the screen with a stylus or by connecting a USB mouse. Furthermore, a USB keyboard is available for entering values and comments.

5.1.1

Operation Using the Stylus

Use the supplied Stylus for operating the screen of the touch panel.

To select buttons or menu items, gently touch the corresponding positions on the screen using the stylus.



Operation with a stylus

! Stylus operations

- Do not strike or push the touch panel screen too hard.
- Use the supplied stylus to tap the touch panel LCD monitor. Never use a sharp-pointed object, such as a ballpoint pen, to touch the panel screen.
- Instead of using the stylus, you can touch the panel with tip of your finger. Be careful not to let your finger nail scratch the screen.

✓ If stylus detection position is deviated

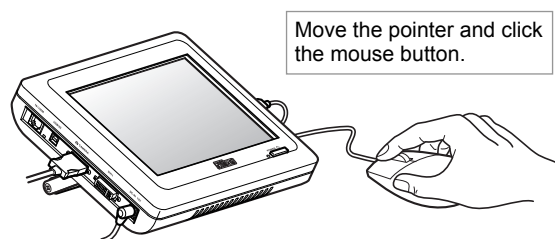
If a position detected by DS-L3 does not match the position you touched with the stylus, the touch panel detecting position can be adjusted by calibrating the touch panel. For how to calibrate the touch panel, see "13.5.5 (5) Calibrating the touch panel".

5.1.2 Operation Using a Mouse

A USB mouse can be used to operate the screen instead of the stylus.

A pointer is displayed on the screen when a USB mouse is connected. Use a mouse to move a cursor and click on the monitor using the mouse button instead of touching by stylus.

Drag your mouse instead of moving a stylus on the monitor surface for operations such as specifying a value on a slider or adding an annotation with a pen.



Operating with a mouse

✓ Using the USB mouse

- If you use an optical mouse, use a mouse pad designed for optical mouse. Choose a fabric-based, dark-colored mouse pad with few patterns.
- If a mouse is not detected when connected, disconnect it then connect it again.

✓ Mouse speed setting

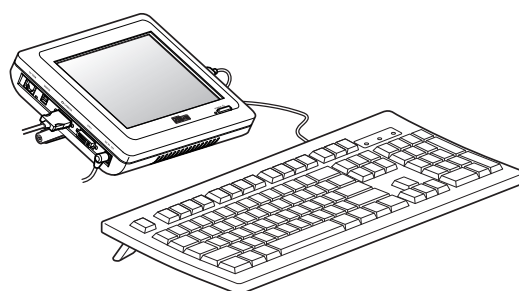
The mouse pointer speed can be set to one of three levels. Refer to “13.5.5 (2) Setting the mouse pointer speed” for setting details.

5.1.3 Entering Characters with a Keyboard

With a commercially available USB keyboard connected, you can directly enter values, comments, and other information from the keyboard.

While the keypad is displayed on the screen, operate the keyboard to enter values and characters.

Note: One-byte alphanumeric characters and symbols displayed on the keypad in the screen can be entered. No other characters can be entered.



Example of USB keyboard

✓ Key layout of keyboard

The DS-L3 recognizes the key layout of the keyboard according to the [LANG] button setting in the [SETUP MENU: MAIN] screen. (See “13.2.1 (4) Switching the language.”) If the display language is set to [ENGLISH], the DS-L3 recognizes the keyboard as English (US) layout. If the display language is set to Japanese, the DS-L3 recognizes the keyboard as Japanese (JIS) layout.

Note: The English layout and the Japanese layout differ in positions of some keys and in symbol input method.

5.2 Navigating through Screen Menus

This section explains the composition of the DS-L3 operation menus, as well as some basics on how to use them.

5.2.1 Menu Configuration and Method of Displaying Menus

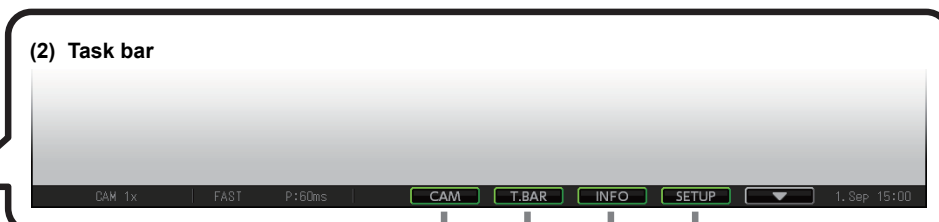
The composition of the DS-L3 operation menus is illustrated below.

Pressing a button on the task bar at the bottom of the screen displays a menu on the screen.

(1) Live image/replayed images



(2) Task bar



(3) [CAMERA MENU] *

- [CAMERA] screen Short/long
- [IMAGE] screen
- [NR/SD/SET] screen
- [SHOT/REC] screen

(4) [VIEW MENU] *

- [PLAY] screen
- [THUMBNAIL] screen

(5) [TOOL MENU] *

- [TOOL] screen
- [TOOL SET: MAIN] screen
- [TOOL SET: X HAIRS] screen
- [TOOL SET: GRID] screen
- [TOOL SET: CALIBRATION] screen

(6) [Tool bar]

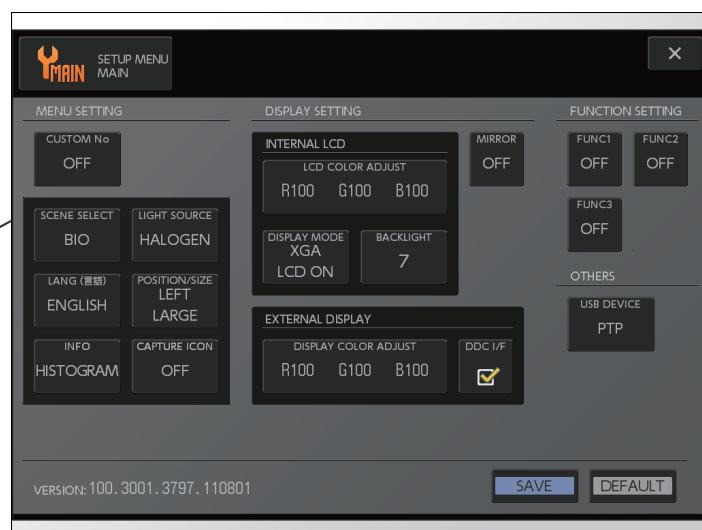


(7) [INFO MENU] *

- [HISTOGRAM] screen
- [CAM INFO]
- [MIC INFO] screen (When a microscope is connected)

(8) [SETUP MENU]

- [MAIN] screen
- [NETWORK] screen
- [FILE] screen
- [ADDITIONAL] screen



Note: The display size of menus marked with an asterisk can be selected from [LARGE] and [SMALL].

Operation menu composition and presentation

(1) Live image and replayed images

When a DS camera head is connected to DS-L3, switching DS-L3 on automatically displays the image (live image) from the DS camera head. You can display images that have been photographed (replay images) by operating [PLAY MENU].

You can also display two images simultaneously, the live image and replayed images, by dividing the screen in halves. The type of displayed image is indicated on the task bar (live image: CAM, still image: FREEZE, replayed image: VIEW).

(2) Task bar

The task bar is always displayed at the bottom of the screen. Arranged on the task bar are, from the left, the image mode and electronic zoom, the exposure mode, the exposure time, the buttons for displaying menus, and the current date and time.

When a Nikon microscope is connected, pressing the [▼] button on the task bar switches the screen to the [Microscope control] screen.

(3) [CAMERA MENU] *

This menu is for configuring the DS camera head settings for capturing images. There are four screens: [CAMERA], [IMAGE], [NR/SD/SET], and [SHOT/REC].

Pressing the [▼] button on the [CAMERA] short screen switches it to the long screen. Pressing the [▲] button on the [CAMERA] long screen switches it to the short screen.

This menu is displayed when the [CAM] button of the task bar is pressed; the position of the menu changes to left or right every time the button is pressed.

(4) [VIEW MENU] *

This menu is for replaying photographed images. You can display the desired image on the screen by selecting its media device, folder, and then the image file itself.

This menu is displayed by selecting [PLAY] by the [MENU SELECT] button from the [CAMERA MENU].

An image is displayed by selecting its filename by [FILE] of [VIEW MENU] and pressing the [PLAY] button. Pressing the [THUMB] button switches the screen to the [THUMB] screen, which lists thumbnails of photographed images. On this screen, you can select desired images, play or print them, or transfer them by FTP.

(5) [TOOL MENU] *

This menu is for adding texts and lines or for displaying cross hairs, a grid, or a scale on the screen using the annotation function.

This menu is displayed by selecting [TOOL] by the [MENU SELECT] button from the [CAMERA MENU].

Pressing the [TOOL SET] button of [TOOL MENU] displays the [TOOL SET] menu. The [TOOL SET] menu has [MAIN], [X HAIRS], [GRID], and [CALIB] screens to make annotation settings.

(6) [TOOL BAR]

This bar includes buttons for instantly measuring lengths and angles on the screen.

This menu is displayed when the [TOOL BAR] button of the task bar is pressed, and its position switches to the upper or lower area every time the [TOOL BAR] button is pressed.

(7) [INFO MENU] *

This menu is for showing the histogram (graph that indicates the distribution of brightness/darkness of an image) of an image, camera information, or microscope information.

This menu is displayed when the [INFO] button of the task bar is pressed, and its position switches to the upper or lower area every time the [INFO] button is pressed.

(8) [SETUP MENU]

This menu is for initialization of DS-L3. It includes four screens: [MAIN], [NETWORK], [FILE], and [ADD].

Pressing the [SETUP] button on the task bar switches the screen to that of [SETUP MENU].

To close [SETUP MENU], press the [Save] button at the bottom right corner of the screen to save the setting, and then press the [x] button at the top right corner to close the menu. The changes made on the screen are not reflected if you close the screen without saving them.



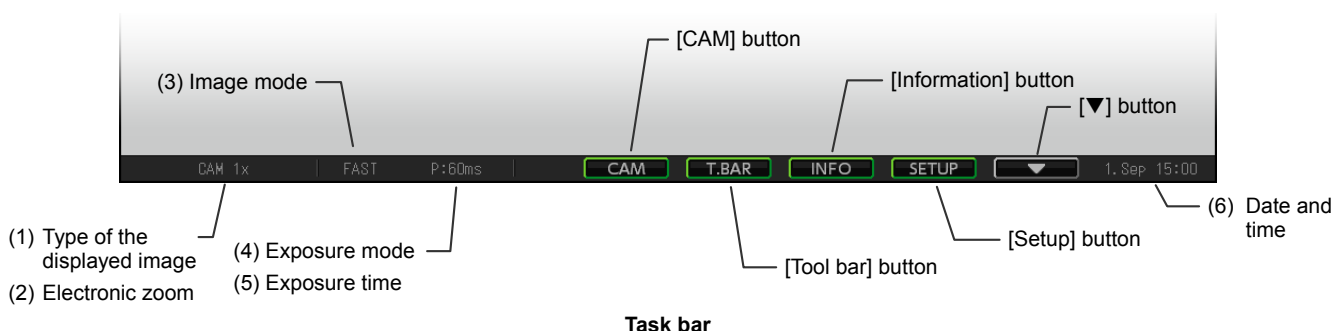
Menu display size

The display size of menus marked with an asterisk can be changed by the setting on the [SETUP MENU: MAIN] screen.

5.2.2 Operating the Task Bar

DS-L3 operation is made from menu screens.

A menu screen is displayed from the task bar at the bottom of the screen.



Information on task bar

The following items are displayed on the task bar:

Information shown on the task bar

	Information type	Details
(1)	Type of image	<ul style="list-style-type: none"> One-screen display: CAM (live image), FREEZE (still image ^{Note 1}), VIEW (replayed image) Two-screen display: FREEZE&CAM (still image ^{Note 2} and live image), VIEW&CAM (replayed image and live image), FREEZE&FREEZE (still image ^{Note 2} and still image ^{Note 1}), VIEW&FREEZE (replayed image and still image ^{Note 1}) <p>Note 1: Image by the [FREEZE] button (press [FREEZE] for live image) Note 2: Image when window is changed to the two-screen mode (live image not available with this mode)</p>
(2)	Electronic zoom	1x, 1.4x, 2x, 2.8x, 4x, 6x, 8x, 10x, 16x
(3)	Image mode	<ul style="list-style-type: none"> One-screen display: FULL, 2x2, 4x4, FAST, ROI-L, ROI-S, C.SCAN Two-screen display: FULL
(4)	Exposure mode	P: (PROG: program AE), S: (S. AE: shutter-priority), M: (MANU: manual), F: (F. AE: focus-priority)
(5)	Exposure time	130 μ s to 600 s (DS-Fi2: 130 μ s to 60 s, DS-Fi1/Vi1: 1 ms to 60 s, DS-Fi1c/Ri1/Qi1Mc: 1 ms to 600 s)

Operation of task bar buttons

The task bar has the following buttons to operate:

- **[CAM] button**
This button displays [CAMERA MENU] in the upper left section (or upper right section) of the screen. The position of this menu changes between left and right every time the button is pressed.
- **[TOOL BAR] button**
This button displays [TOOL BAR] in the upper right section of the screen. The position of this menu changes between up and down every time the button is pressed.
- **[INFO] button**
This button displays [INFO MENU] in the lower right section of the screen. The position of this menu changes between up and down every time the button is pressed.
- **[SETUP] button**
This button switches the screen to [SETUP MENU]. When [SETUP MENU] is displayed, other operation menus as well as the task bar are closed.
- **[▼] button**
This button switches between the [Camera control] screen and the [Microscope control] screen when a DS camera head and a Nikon microscope are connected. The screen does not change if only one of them is connected.

5.2.3 Switching the Menu

[MENU SELECT] is displayed in the title area of [CAMERA MENU], [TOOL SET MENU], [INFO MENU], and [SETUP MENU]. Pressing this button switches between screens of different menus and windows.

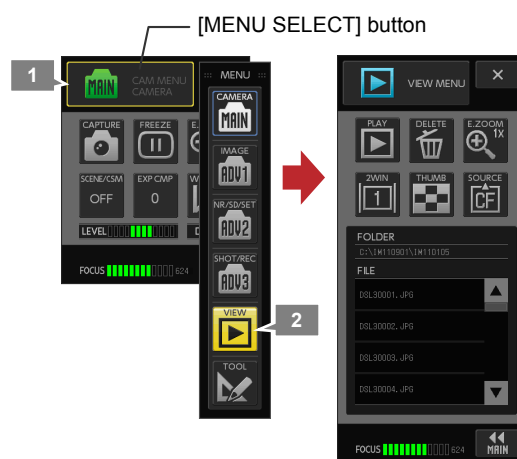
(1) Switching operation menus

- 1 Press the [MENU SELECT] button on a menu screen.

The [MENU] submenu is opened.

- 2 Press a desired button.

The menu switches to the desired menu.



Switching operation menus
([CAMERA MENU] → [VIEW MENU])

(2) Switching between [CAMERA MENU], [VIEW MENU], and [TOOL MENU]

Pressing the [CAM] button on the task bar provides access to [CAMERA MENU], [VIEW MENU], and [TOOL MENU]. The following screens can be displayed by pressing the [CAMERA MENU] button and selecting a button on the pulldown menu.

[CAMERA MENU: CAMERA]

Short screen
(basic screen)



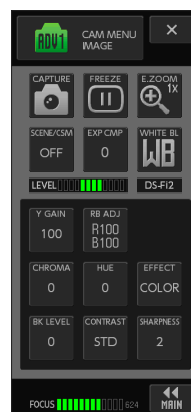
[CAMERA MENU: CAMERA]

Long screen
(detailed screen)



[CAMERA MENU: IMAGE]

screen



[CAMERA MENU: NR/SD/SET]

screen



The menu on this screen allows you to observe and capture images with simple operations.

Operation buttons on this screen are common and displayed in any [CAMERA MENU].

They are also displayed in the [Camera/microscope control] menu of the [Microscope operation] screen.

This screen is displayed when the [▼] button of the short screen is pressed. The short screen appears again when the [▲] button is pressed.

This menu is for settings of image mode, exposure mode, and photometry mode.

You can place three favorite buttons at the button of the screen.

This menu is for settings of hue and contrast of images.

The operation items in the upper section of the screen are the same as the [CAMERA] screen.

This menu is for registration of the noise reduction setting, shading setting, and custom setting, as well as for clearing setting values.

The operation items in the upper section of the screen are the same as the [CAMERA] screen.

[CAMERA MENU: SHOT/REC] screen



This screen is for the configuration of the continuous mode (consecutive capture with interval timer) and image recording.

The operation items in the upper section of the screen are the same as the [CAMERA] screen.

[VIEW MENU] screen



Menu screen for playing back captured images.

You can replay and delete images, turn the two screen mode on and off, and display image thumbnails.

[TOOL MENU] screen



Menu screen for simplified measure on an image or adding annotations to an image.

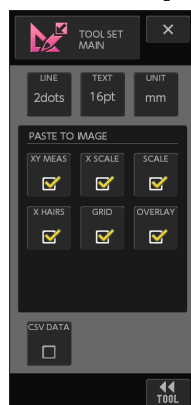
Pressing the [TOOL SET] button changes the screen to the [TOOL SET] menu.

(3) Switching between screens of [TOOL SET MENU]

Pressing the [TOOL SET] button of [TOOL MENU] changes the content of the operation menu to that of [TOOL SET MENU]. The following screens can be displayed by pressing the [MENU SELECT] of [TOOL SET MENU].

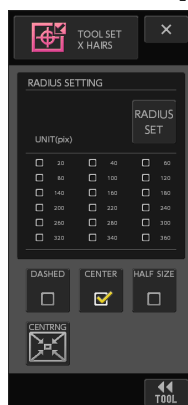
Note: Click the [◀ TOOL] button to return from [TOOL SET MENU] to [TOOL MENU].

[TOOL SET: MAIN] menu



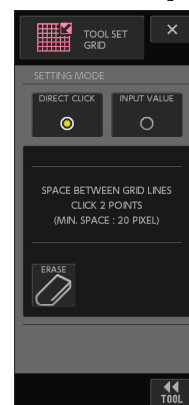
This menu is for the basic settings of the annotation function and settings for saving captured images.

[TOOL SET: X HAIRS] menu



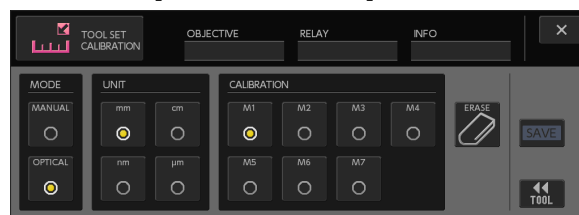
This menu is for settings of cross hairs and concentric circles.

[TOOL SET: GRID] menu



This menu specifies the granularity of the grid.

[TOOL SET: CALIB] menu



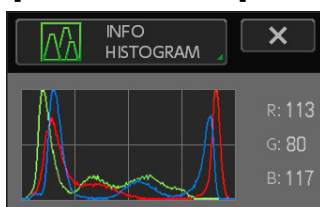
This menu is to register calibration of the unit of measurement reference. DS-L3 provides two ways of calibration: [MANUAL], in which a subject with a known length is used as the reference, and [OPTICAL], in which the magnification of an optical device is used as the reference.

(4) Switching between screens of [INFO MENU]

Pressing the [INFO] button on the task bar displays [INFO MENU].

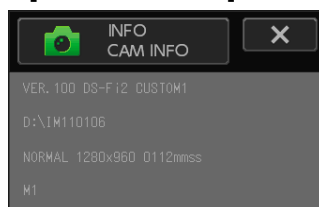
The following screens can be displayed by pressing the [MENU SELECT] of [INFO MENU].

[INFO: HISTOGRAM] menu



This menu displays the distribution of the brightness of the image for each color of RGB. Displayed on the right of the graphs are the average values for the colors.

[INFO: CAM INFO] menu



Displays camera related information such as currently selected scene mode and the save folder.

[INFO: MIC INFO] menu



Displays the microscope information when a Nikon microscope is connected.

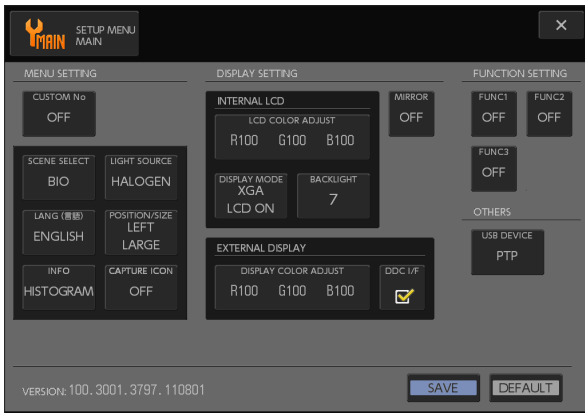
✓ The content of the [INFO: MIC INFO] menu

- The content of the [INFO: MIC INFO] menu varies depending on the connected microscope.
- The [INFO: MIC INFO] menu is not displayed when a Nikon microscope is not connected to DS-L3.

(5) Switching between screens of [SETUP MENU]

Pressing the [SETUP] button on [TOOL MENU] displays [SETUP MENU] in the entire screen range. The following screens can be displayed by pressing the [MENU SELECT] of [SETUP MENU].

[SETUP MENU: MAIN] screen



This screen makes the basic settings of DS-L3.

As the basic settings, there are custom settings for startup, menu display settings, monitor related settings, settings for the function buttons of the [Camera menu: Main] screen, USB device mode settings, and the cooling temperature setting used when a cooled camera is connected.

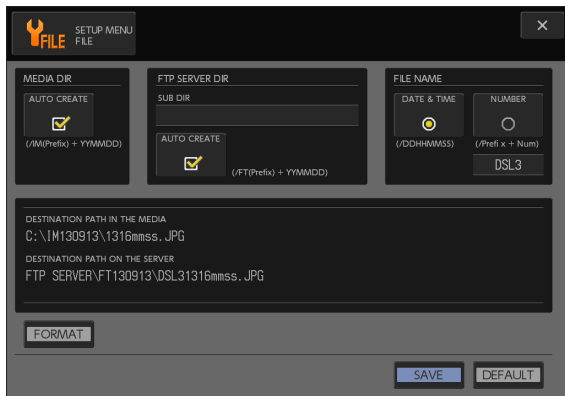
[SETUP MENU: NETWORK] screen



This screen allows you to make various settings for using DS-L3 connected to the network.

You can make settings of the network basics, the HTTP server function, and FTP server connection.

[SETUP MENU: FILE] screen



This screen is for settings of the files and folder for saving images.

You can configure filenames and folders of a storage media device and a FTP server. You can also initialize a storage media device.

[SETUP MENU: ADDITIONAL] screen



This screen makes overall settings of DS-L3.

You can configure settings of date and time, capture operation, electronic zoom magnification, the printer, and other items.

5.2.4 Switching Operation Menu Size

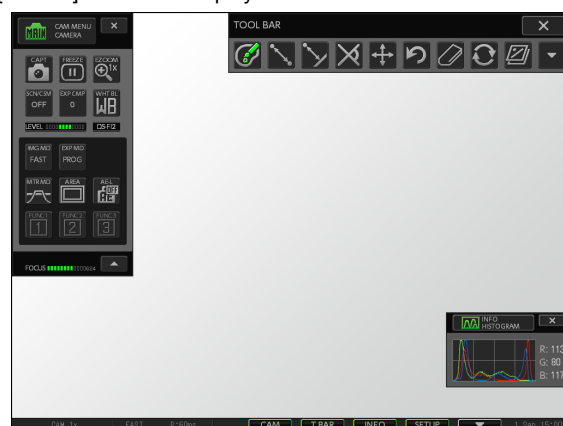
The size of menus that are displayed by pressing the [CAM] button or [INFO] button can be switched to [LARGE] or [SMALL]. If these menus are displayed with a normal size, the image display area becomes small, which may disturb smooth observation and operation. Selecting [SMALL] display size secures a large image display area.

For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

[LARGE] size menu display



[SMALL] size menu display



Switching the size of operation menus

✓ Display size and display content

- The display size of [TOOLBAR] and [SETUP MENU] remains unchanged.
- The following buttons are shown differently in [LARGE] size menus and [SMALL] size menus.

[CAMERA MENU : CAMERA] Short screen

Large menu	Small menu
[CAPTURE]	[CAPT]
[E.ZOOM]	[EZOOM]
[SCENE/CSM]	[SCN/CSM]
[CAM GAIN]	[CAM GN]
[WHITE BL]	[WHT BL]

[CAMERA MENU : CAMERA] Long screen

Large menu	Small menu
[IMG MODE]	[IMG MD]
[EXP MODE]	[EXP MD]
[EXP TIME]	[EXP TIM]
[MTR MODE]	[MTR MD]
[MTR AREA]	[AREA]

[CAMERA MENU : IMAGE] screen

Large menu	Small menu
[CHROMA]	[CHRM]
[BK LEVEL]	[BK LVL]
[CONTRAST]	[CNTRST]
[SHARPNESS]	[SHRPNS]

[CAMERA MENU : SHOT/REC] screen

Large menu	Small menu
[SHOT MODE]	[SHOT]
[INTERVAL]	[INTRVL]
[SAVE LOG]	[SV LOG]
[REC MODE]	[REC MD]

[TOOL MENU] screen

Large menu	Small menu
[E.ZOOM]	[EZOOM]
[OVERLAY]	[OVERLY]
[ERASE ALL]	[ERASE]
[XY MEAS]	[XY MSR]

[TOOL SET: MAIN] screen

Large menu	Small menu
[XY MEAS]	[XY MSR]
[OVERLAY]	[OVERLY]
[CSV DATA]	[CSV]

[TOOL SET: X HAIRS] screen

Large menu	Small menu
[HALF SIZE]	[HALF]
[CENTRNG]	[CNTRNG]

[TOOL SET: CALIBRATION] screen

Large menu	Small menu
[MANUAL]	[MANU]
[OPTICAL]	[OPT]

✓ Menus of the microscope control screen

The menu size setting applies to some menus of the microscope control screen.

When the menu size is set to [LEFT SMALL] or [RIGHT SMALL] on the [SETUP MENU: MAIN] screen of the camera control screen, the following menus in the microscope control screen are displayed in the small size.

- [CAM-MIC] menu
- [M.INFO] menu

5.2.5 Operating Buttons and Setting Screens of Operation Menu

You can make the following operations by pressing buttons displayed on the operation menu.

Instantly executing the function allocated to the button

You can instantly execute a function or turn it on/off.

- **Example: [CAPTURE] button, [FREEZE] button, etc.**

Pressing the [CAPTURE] button changes the color of the button to yellow and starts image capturing instantly.

The [FREEZE] button, on the other hand, turns on/off of still image. The first press on the button shows a green frame around the button and captures a still image from the live image. On the second press of the button, the green frame disappears and the screen shows the live image.

Executing function instantly
Example:
[CAPTURE]



Turns on/off of the function with every press.
Example:
[FREEZE]

Executing a function instantly

Selecting a setting from the options displayed on the submenu

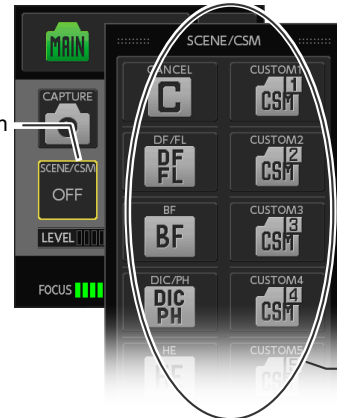
You can select a setting or an operation option from the buttons displayed in the submenu.

- **Example: [SCENE/CSM] button**

Pressing the [SCENE/CSM] button shows a submenu on which you can select with a button a desired scene mode or custom setting.

Some submenus of this type include the [Cancel] button that allows you to close the submenu without making any selection. You can close the submenu without changing the setting by pressing the [Cancel] button.

Displays option submenu.
Example:
[SCENE/CSM]



Select a setting from the options.

Selecting an option from submenu

Setting a value on the submenu displayed

You can set photographing conditions, image adjustment, and other values using buttons and sliders displayed on the submenu.

- **Example: [EXP CMP] button**

Pressing this button displays a submenu for value setting in which you can set the value with the following operations:

- **Moving the slider tab (yellow indicator) to left or right:**
You can manipulate values intuitively. Large and subtle changes are possible.
- **Pressing on the slider at the right or left of the tab**
You can shift the value with a certain amount (“jump”).
- **Pressing [◀]/[▶] buttons:**
You can shift the value with a smallest step (“step”). This operation suits the case where you want to make subtle adjustment of the value.

Press the [OK] button to commit the value. The submenu closes and the value you have just set is displayed on the button.

Displays the submenu for setting a value.
Example:
[EXP CMP]



Specify a value with the slider and buttons, and commit the value with the [OK] button.

Setting a value on a submenu

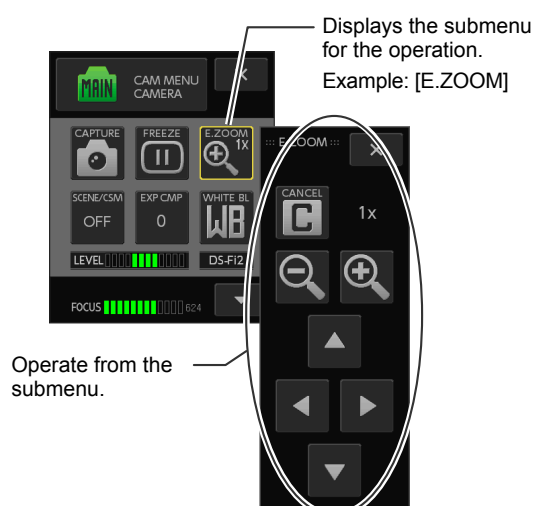
Operating on a submenu displayed

You can display a submenu and make various operations on it.

- **Example: [E.ZOOM] button**

Pressing the [E.ZOOM] button displays a submenu that allows you to make operations such as changing magnification, moving the display position, and canceling enlarged display.

Some submenus of this type include the [x] button for closing the submenu. In the case of [E.ZOOM], you can close the submenu maintaining the enlarged display.



Operating from the submenu

5.2.6 Switching between Camera Control and Microscope Control

When a DS camera head and a Nikon microscope are connected to DS-L3, you can control both of them. In addition to the normal [Camera control] screen, the [Microscope control] screen is added. You can switch these screens by the [▼] button on the task bar.

- **Camera control**

This screen is ordinarily displayed when a DS camera head is connected. This screen allows you to configure the DS camera head settings, to capture and play images, to add annotations on images, and to make measurements.

- **Microscope control**

This screen is displayed when a Nikon microscope is connected to the USB (H) connector. DS-L3 controls the motorized equipment of the microscope and displays the detected status of the microscope on the screen.

✓ Operation method of the microscope control screen

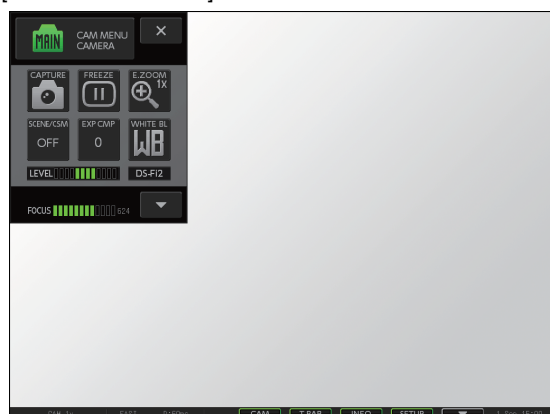
For how you operate the microscope control screen, refer to a separate volume of this manual, "Microscope Operation".

Switching screens

When a DS camera head is connected to DS-L3, switching DS-L3 on automatically displays the top screen of Camera control.

When both a DS camera head and a Nikon microscope are connected, pressing the [▼] button on the task bar switches between top screens of Camera control and Microscope control.

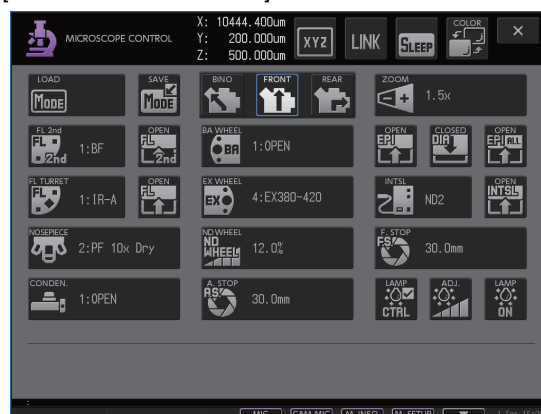
[CAMERA CONTROL] screen



Switched by the
[▼] button



[MICROSCOPE CONTROL] screen



Switches to the [MICROSCOPE
CONTROL] screen.

Switches to the [CAMERA
CONTROL] screen.

Switching between Camera Control and Microscope Control

Part 2

Photographing Basics of DS-L3

This part explains basic operations of DS-L3 for photographing (capturing) images.

This part consists of the following chapters:

- Chapter 6 Capturing Images with Simple Operations
- Chapter 7 Tips on Photographing

This chapter explains how you operate on the [CAMERA MENU: CAMERA] short screen to capture images.

✔ What is “capturing”?

“Capturing” is an operation to save the image on the screen in a storage media device as a still image.

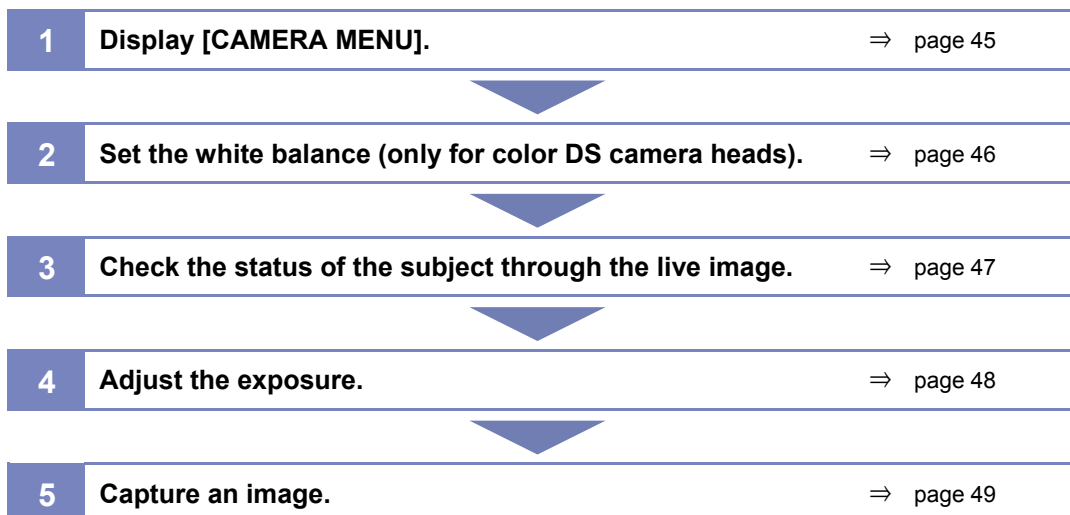
DS-L3 allows you to capture the live image from the DS camera head, or to add annotations to the live image or replayed images and capture them together with the annotations.

✔ Capturing operation

The [CAMERA MENU] buttons explained in this chapter are also displayed in the [Microscope control] and [Camera/microscope] screens. You can also capture images on the [Camera/microscope] screen with the same operation.

6.1 Operation of Capturing Images

Images are captured in the following steps:



6.2 Displaying [CAMERA MENU]

To make capture operations, you need to display [CAMERA MENU] on the screen. Display [CAMERA MENU] with the following steps:

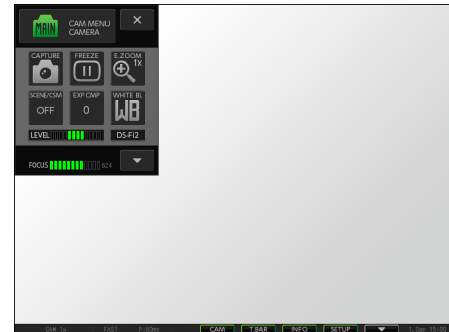
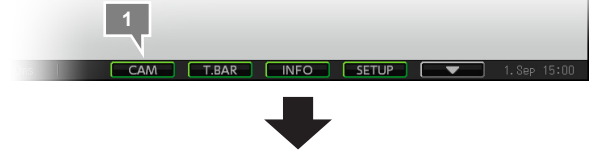
1 Press the [CAM] button on the task bar.

The [CAMERA MENU: CAMERA] short screen is displayed in the upper left (or upper right) section of the screen.

Note: The position of the menu changes to left or right every time the [CAM] button on the task bar is pressed.

✔ If a screen other than [CAMERA MENU] is displayed

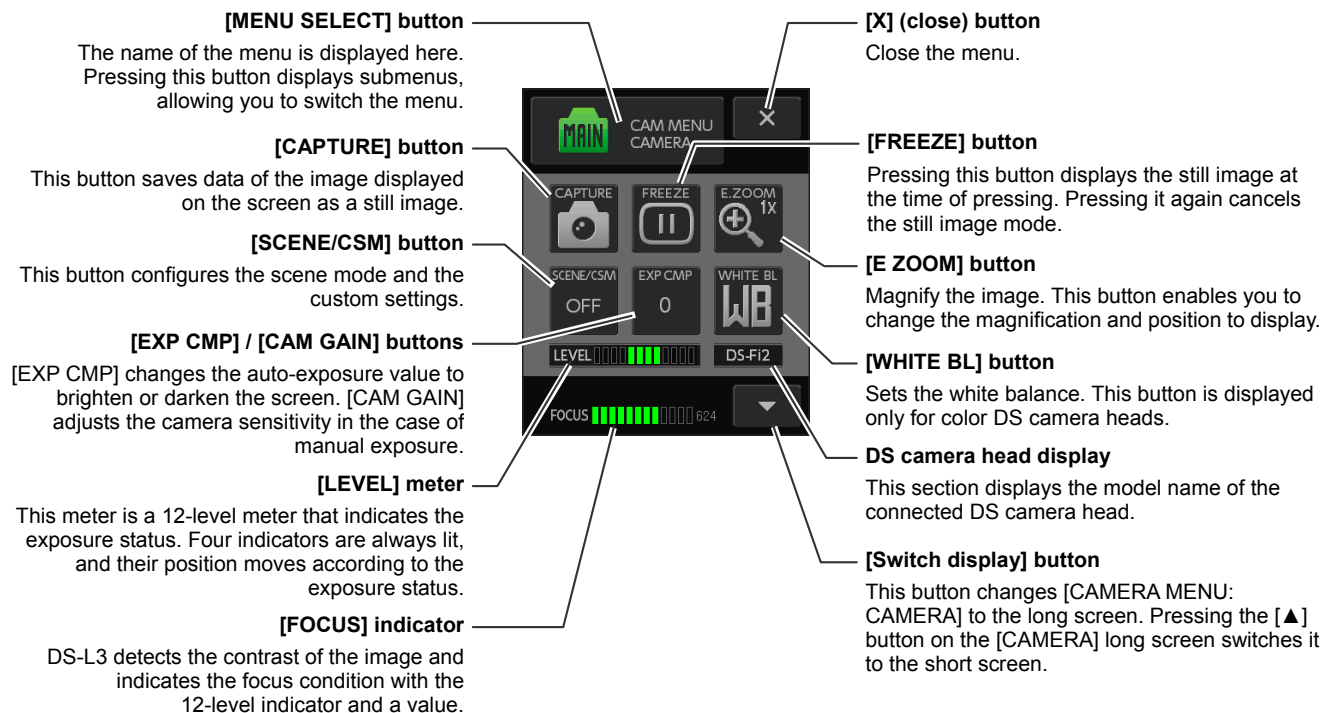
If a screen other than [CAMERA MENU: CAMERA] is displayed, you can change it to [CAMERA MENU: CAMERA] by selecting [Camera] using the [MENU SELECT] button or pressing the [◀ MAIN] button.



Displaying [CAMERA MENU]

Items on the [CAMERA MENU: CAMERA] short screen

The [CAMERA MENU: CAMERA] short screen displays buttons that can be used commonly among the [CAMERA MENU] menus. Displayed on this screen are minimum buttons and indicators that are required for capturing images.



Items on the [CAMERA MENU: CAMERA] short screen

✔ Menu size

The display size of the [CAM MENU: CAMERA] short screen can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [CAM MENU: CAMERA] short screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[CAPTURE]	[E.ZOOM]	[SCENE/CSM]	[CAM GAIN]	[WHITE BL]
Small menu	[CAPT]	[EZOOM]	[SCN/CSM]	[CAM GN]	[WHT BL]

6.3 White Balance (Only for Color DS Camera Heads)

White balance is the process of correcting color bias due to difference of the light source and adjusting the color of white so that white objects appear really white in the photograph. In this system, you can set the white balance manually when a color DS camera head (DS-Fi2, Fi1, Vi1, Fi1c, or Ri1) is connected.

✓ Adjusting the white balance when observing by a microscope

- When using diascope illumination for microphotography, adjust the white balance while you are photographing a transparent part of the preparation.
- When using episcopic illumination for microphotography or using a lens, adjust the white balance using a white subject.
- For fluorescent photographing, we recommend that the white balance be adjusted under normal light conditions before photographing. If the screen is excessively dark or bright, adjust the luminous energy of the light source or the iris diaphragm, or use an ND filter to obtain the appropriate white balance.

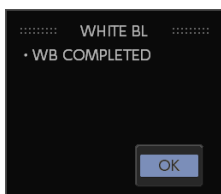
- 1 Prepare an evenly white subject such as a sheet of paper, and adjust the DS camera head position so that the entire photographing scope of the DS camera head is covered by the subject.**

Configure the illumination for observation or capturing.

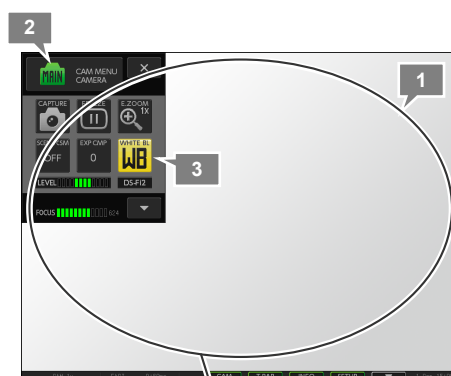
- 2 Display [CAMERA MENU].**

- 3 Press the [WHITE BL] button.**

The white balance is set, and the setting completion message is displayed.



White balance setting completed



Set an evenly white subject so that it covers the entire photographing area.

Setting white balance

- 4 Remove the white paper placed in step 1 from the photographing area.**

✓ Settings at the power-on time

The setting of white balance is saved when the power is turned off. The white balance setting is applied when the power is turned on again. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the white balance setting specified by the custom setting is used.

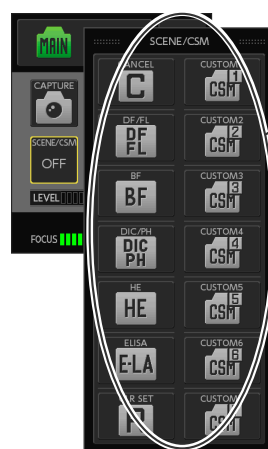
Using scene mode or custom setting

You may want to adjust the contrast or hue in accordance with the photographed subject, or may want to photograph with desired settings.

DS-L3 has “scene modes”, which are photographing conditions for typical subjects. You can photograph a subject with a suitable setting by selecting an appropriate scene mode. You can save any photographing condition as a “custom setting”, which can be retrieved and used like a scene mode.

To use a scene mode or custom setting, press [SCENE/CSM] of [CAMERA MENU]. A submenu is displayed; select a desired scene mode or custom setting by pressing a button.

Note: The selected scene mode or custom setting is displayed on the [SCENE/CSM] button of [CAMERA MENU]. The scene mode name or the custom setting comment is displayed on the [FOCUS] indicator.



Select a scene mode or custom setting.

To cancel the selection of the scene mode or custom setting, execute [CLR SET] on the [CAMERA MENU: NR/SD/SET] screen.
Note: Other settings are also cleared.

Using scene mode or custom setting

✓ Details on scene modes and custom setting

- For details on scene modes and custom settings, refer to “8.2.1 Using Scene Modes and Custom Setting”.
- The scene mode displayed on the menu changes according to the setting of [Select scenes] of the [SETUP MENU: MAIN] screen. Refer to “13.2.1 Configuring Menu Display” for details.

6.4 Checking Subject Conditions through Live Image

When you have completed white balance adjustment, check the subject condition with the live image and adjust the layout and focus.

1 Adjust the layout so that the desired part of the subject is photographed.

Adjust the orientation of the subject and magnification of the optical element.

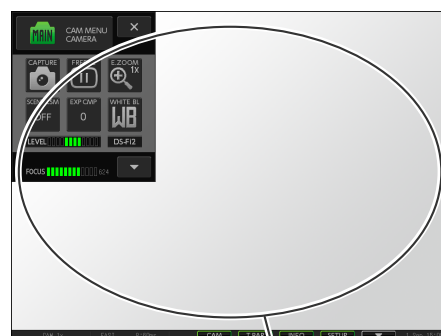
2 Adjust the illumination to the appropriate brightness for the subject while looking into the eyepiece.

3 Focus the camera on the desired part of the subject.

Check the focus on [FOCUS] of [CAMERA MENU] as necessary.

✔ To focus the camera on a dark subject

If the subject is dark making the exposure time long and the focusing difficult, we recommend that you use the [DF/FL] scene mode. For how you operate the [DF/FL] scene mode, refer to “8.2.5 Photographing Procedure Using DF/FL Scene Mode”.



Adjust the layout, brightness, and focus.

Checking Subject Conditions through Live Image

How to read focus indicator

The [FOCUS] indicator of [CAMERA MENU] detects the contrast of the image and displays the degree of the focus with the 12-level indicator and a value.

The [FOCUS] indicator lights according to the contrast of the image; it may not reflect the actual focus condition. When you actually focus the camera on the subject, do it by looking at the screen. The maximum value shown in the [FOCUS] indicator depends on the image mode or other conditions. Generally, the higher the contrast, the greater the value.

The maximum value shown in the [FOCUS] indicator depends on the image mode or other conditions. Generally, the higher the contrast, the greater the value.



[FOCUS] indicator

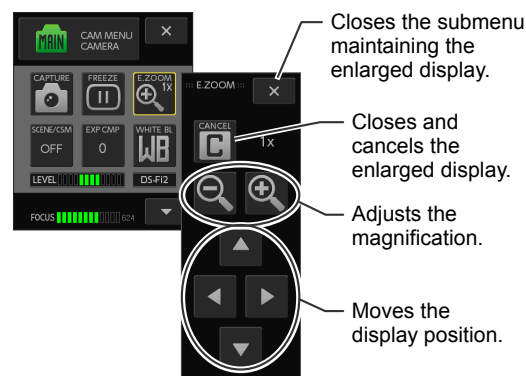
Enlarging the subject by electronic zoom

When the subject cannot be enlarged on the screen due to the restriction of the optical device or the subject itself, you can still enlarge the image using the electronic zoom of DS-L3.

Press the [E.ZOOM] button of [CAMERA MENU] to use electronic zoom. The [E.ZOOM] submenu is displayed; adjust the magnification by the [+] and [-] buttons, and move the display position by the up, down, left, and right buttons.

Pressing the [Cancel] button resets the magnification of electronic zoom to 1x, closes the submenu, and returns to the normal display. To close the submenu maintaining the electronic zoom, press the [x] button.

Note: The magnification made by electronic zoom remains after the submenu is closed.



Using electronic zoom

✔ Using electronic zoom

- Electronic zoom is a function to enlarge a section of an image. Therefore, the larger the magnification is, the lower the image quality is.
- Electronic zoom can only magnify images. It cannot reduce the display size than normal.
- Electronic zoom is effective only for display on the screen. Note that electric zoom does not take effect for an image captured and saved while it is enlarged by electronic zoom.

✔ Automatic cancellation of electric zoom

The following operation automatically cancels the enlargement by electronic zoom.

- Selection of a scene mode or custom setting, change of the image mode, clear of settings (when it affects the image mode), replay of images, switching between two-screen and one-screen modes.

6.5 Exposure Compensation

Exposure compensation is a function that changes the automatic exposure value calculated by the system and adjusts the brightness of the entire screen. The exposure compensation is available only when the exposure mode is automatic (program AE, shutter-priority, focus-priority)

✓ Exposure adjustment

When the exposure of photometry area is adjusted properly by automatic exposure, the four indicators in the center of the [Level] indicator lights up.

This condition does not necessarily mean that the target area is in a proper exposure. You can tune the exposure for the subject by exposure adjustment.

- 1 Display [CAMERA MENU].
- 2 Press the [EXP CMP] button.
- 3 Set a value on the [EXP COMP] submenu to adjust the exposure compensation.

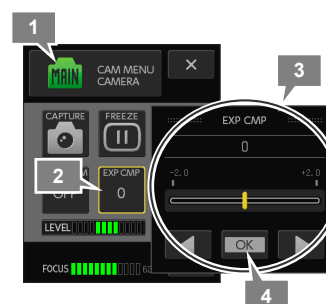
Adjust the value while checking exposure with the live image.

The compensation range is ± 2.0 and the step is $1/3$.

- 4 Press the [OK] button to finish the setting.

Pressing the [OK] button closes the submenu. The value being set is displayed on the [EXP CMP] button.

To change the setting, start the procedure from pressing the [SUB F] button again.



Exposure adjustment

✓ Settings at the power-on time

The setting of exposure compensation is saved when the power is turned off. The saved exposure compensation value is applied when the power is turned on again. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the exposure adjustment setting specified by the custom setting is used.

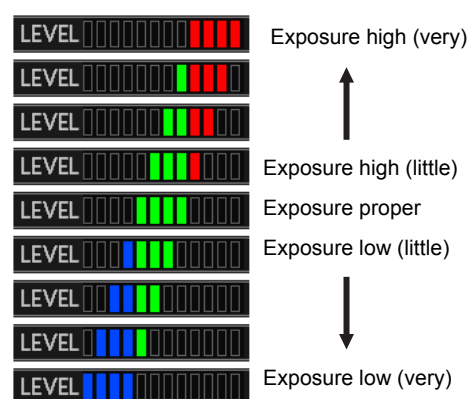
How to read the level meter

The [LEVEL] meter of [CAMERA MENU] shows the exposure condition.

There are 12 indicators; four in the center are green, four on the right are red, and four on the left are blue. The exposure condition is indicated by the position of indicators being lit up.

Four indicators are always lit, and the four in the center (green) are lit up during proper exposure.

The position of lit up indicators moves to the right as the exposure becomes high, and to the left as it becomes low. To change the exposure setting, operate again from the [EXP CMP] button.



Level meter display

6.6 Capturing Displayed Images

This button saves the image displayed on the monitor as a still image file.

! Cautions on saving images

Do not remove the storage media device while images are saved. Doing so may prevent the images from stored properly or damage DS-L3 or the storage media device.

The CF card indicator of DS-L3 lights up when the CF card is accessed. The access lamp of the USB memory stick lights up when it is accessed. Watch these indicators to find if they are accessed.

✓ Settings for saving image files

Check the following settings before photographing:

- **Selection of storage location (for saving the image in a media device, server, or PC, or printing it)**
DS-L3 allows you to save the captured image in a storage media device, a FTP server on the network, or the PC connected by USB, or to output it to a PictBridge-compatible printer for printing. Refer to “13.5.2 Configuring Capture Function” for the setting.
- **Selection of the storage drive and folder**
When you specify storage media for saving images, you need to specify a drive (for storage media) and a folder. Refer to “8.3.4 Setting Items of the [CAM MENU: SHOT/REC] Screen” for the setting.
- **Setting of the recording mode (live image or full image, file type, and image size)**
This setting specifies details of stored images. Refer to “8.3.4 Setting Items of the [CAM MENU: SHOT/REC] Screen” to specify the setting properly so that images are stored in the desired manner.

✓ Consecutive capture with interval timer

DS-L3 allows you to do “consecutive capture”, in which images are captured automatically at intervals. Refer to “8.2.4 (3) Performing consecutive capture with interval timer” when you do consecutive capture.

✓ Capture sound

You hear a capture sound when you capture an image. Refer to “13.5.5 (3) Setting the capture sound volume” if you want to change the sound volume setting.

✓ Saving annotations and measurement results

When you have made annotations such as pen drawing and text comments, or measured lengths, angles, or other, you can save the image with the results of these operations embedded in the image.

For details on the annotation and measurement functions, refer to “Chapter 11 Adding Lines and Annotations to an Image” and “Chapter 12 On-Screen Measurement”.

6.6.1 Capturing a Live Image

You can capture images displayed on the monitor, and save them as image files in the specified location.

1 Check the live image.

Check that the object is displayed at the proper brightness and with focus on the desired part.



Check the live image.

Checking the live image

2 Press the [CAPTURE] button of [CAM MENU].

The image file is stored in the specified location.

You hear a capture sound when you do capturing. While the image is being saved, the pointer shape changes and the "Saved..1/1" message appears on the task bar.

Upon completion of saving, the operable state returns.



Capturing live image

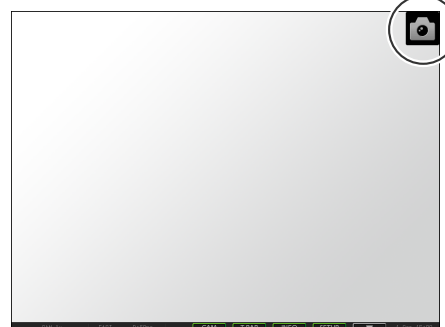
Keeping [CAPTURE ICON] on the screen for quick capture of live images

You can display and keep [CAPTURE ICON] on a corner of the screen by setting so on the [SETUP MENU: MAIN] screen.

By using [CAPTURE ICON] on the screen, you can quickly capture the image on the monitor without opening [CAMERA MENU].

For details, refer to "13.2.1 (7) Setting to show [CAPTURE ICON] on the screen".

Press [CAPTURE ICON] to capture a live image.



Example of [CAPTURE ICON] display
(when the upper right is selected)

6.6.2 Capturing after Freezing the Live Image

You can temporarily stop the live image to have a still image, and capture and save it as an image file.

1 Check the live image.

Check that the object image is displayed as desired.

2 Press the [FREEZE] button of [CAM MENU].

The image at the point when the button is pressed is displayed as a still image.

While the still image is displayed, a blue frame appears around the [FREEZE] button. [FREEZE] is displayed on the task bar.

Pressing the [FREEZE] button again releases the freeze status. The live image returns and the task bar display changes from [FREEZE] to [CAM].

Note: Buttons that cannot be used when a still image is displayed are grayed out.

3 Check the still image state.

Check that the still image is displayed as desired.

To obtain the still image again, press the [FREEZE] button to release freezing and press it again while checking the live image.

4 To save the image, press the [CAPTURE] button.

A capture sound is emitted, and the still image is captured and saved in the specified save folder.

While the image is being saved, the pointer shape changes on the touch panel LCD monitor. The “Saved..1/1” message appears on the task bar to indicate that the image has been saved.

✓ Use of the [FREEZE] button and image source settings

With the [FULL IMAGE] selected as the image source on the [REC MODE] menu accessed from the [CAM MANU: SHOT/REC], pressing the [FREEZE] button displays a still image in the [FULL] image mode.

Press the [FREEZE] button again to switch from the still image mode and the [FULL] image mode.



Getting and capturing a still image



Task bar (still image)

This chapter provides useful tips for photographing.

7.1

Checking the Image Condition

7.1.1

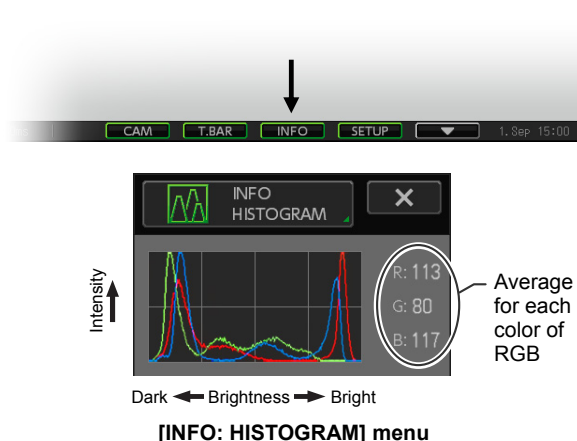
Checking the Histogram of the Image

When you press the [HISTOGRAM] button on the task bar, the [HISTOGRAM] window appears at the right bottom of the screen.

On the [INFO: HISTOGRAM] menu, the system calculates the distribution of brightness of the image and shows it as a histogram.

The histogram indicates distribution of brightness for each RGB color which allows fine adjustment of the exposure level.

- The horizontal axis indicates brightness (dark to light from left to right).
- The vertical axis indicates appearance frequency.
- On the right to the histogram, average values of RGB colors are shown.



✓ Reading and compensating the exposure

When the distribution reaches the right end of the histogram, the bright part of the image is saturated (white-out). When the distribution reaches the left end of the histogram, the dark part of the image is collapsed (black-out).

It is preferred that no white-out and black-out occurs in the entire image, but, in some cases, adjustment is necessary.

If a bright part of the image is important, adjust the distribution to the left. If a dark part is important, adjust the distribution to the right.

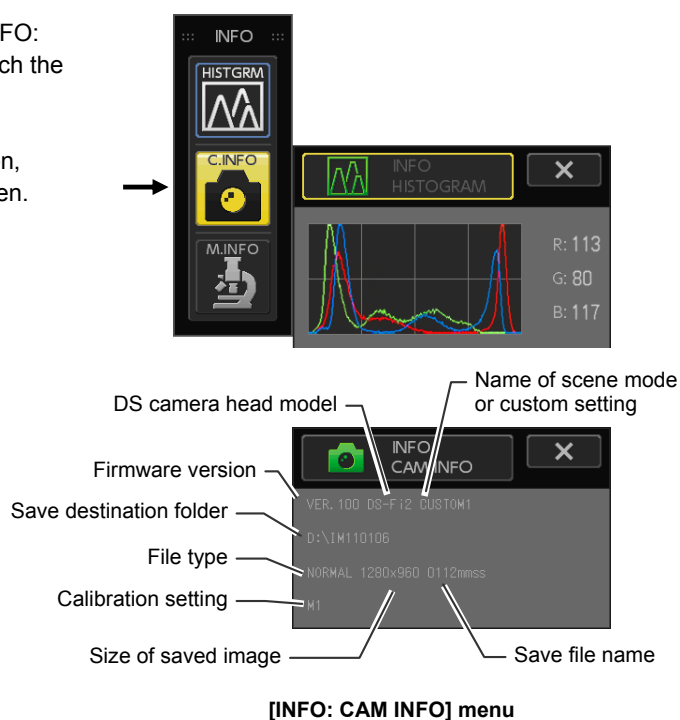
By adjusting the distribution in accordance with the important level, it is possible to prevent insufficient gradation during image processing.

7.1.2

Checking the Camera Condition

Pressing the title section of the [INFO: HISTOGRAM] or [INFO: MIC INFO] menu shows a submenu, by which you can switch the window to the [INFO: CAM INFO] menu.

The [INFO: CAM INFO] menu shows the camera information, by which you can confirm the camera condition on the screen.

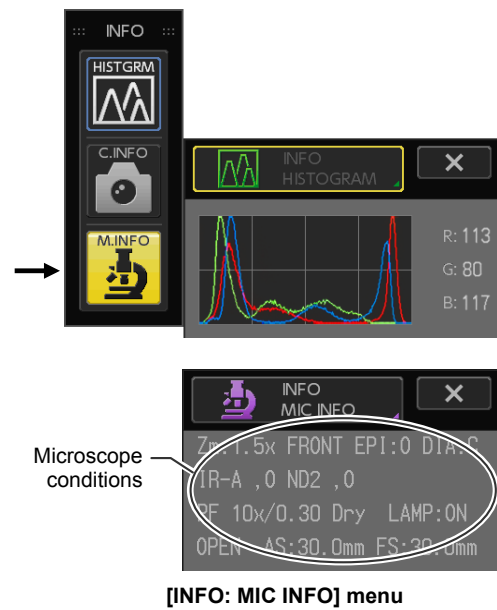


7.1.3 Checking the Microscope Condition

When DS-L3 and a Nikon microscope are connected by a USB cable, pressing the title section of the [INFO: HISTOGRAM] or [INFO: CAM INFO] menu shows a submenu, by which you can switch the window to the [INFO: MIC INFO] menu.

The [INFO: MIC INFO] menu shows the microscope information, by which you can confirm the microscope condition on the screen.

For the content of the [MICROSCOPE INFORMATION] screen, refer to a separate volume of this manual, "Microscope Operation".



✓ Menu size

The display size of the [INFO] screen can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see "13.2.1 (5) Configuring the position and size of the menu".

7.2 Setting the Environment for Microscope Photographing

When you have attached the DS camera head to a microscope, set up the environment for microscope photographing referring to the following description.

7.2.1 Setting up the Environment

(1) Adjusting the brightness of the environment

When you photograph a dark specimen by a fluorescent microscope, the light in the room may come into the illumination optical path of the microscope; do the photographing after making the room dark.

Cover the binocular section by the caps to shut the light out.

(2) Preventing tremor

Microscope photographing is made with a high resolution so that a little tremor affects the image quality. Place the microscope on a backlash-free robust desk standing on a stable floor, so that a tremor does not reach the microscope.

You can reduce the impact of tremors by using a vibration isolation table that suits your microscope. Be careful, especially during photographing, not to touch the table on which the microscope is placed.

7.2.2 Setting up the Microscope Condition

(1) Using an appropriate filter

For color images

Insert an NCB filter in the illumination optical path.

For monochrome images

Insert a filter that suits the photographing purpose in the illumination optical path.

Generally, a GIF (Green Interference) filter achieves a good contrast. Using a filter of the complementary color of the specimen makes the contrast sharp.

✓ Using a filter

- The way a filter is inserted and removed depends on the microscope. Refer to the manual of your microscope.
- A third-party color compensation filter (CC filter) can be inserted into the illumination optical path of the microscope to compensate for changes in color balance caused by the length of the exposure time.
- When using a phase contrast microscope or an interference microscope (two luminous fluxes or multiple luminous fluxes), you can enhance contrast using a green interference filter (GIF) or a monochrome interference filter (IF).
- We recommend that you use both an NCB filter and GIF (green interference) filter for DS-Qi1Mc.
- Some microscope model may require a heat-wave absorbing filter.

✓ What is an NCB filter?

An NCB (neutral color balance) filter is a color-balancing compensation filter used to adjust color temperature to daylight values in microscopes that use a halogen bulb as a light source.

✓ What is a complementary color?

For example, green and magenta, red and cyan, and blue and yellow are all pairs of complementary colors. When complementary colors overlap, their respective hues cancel each other out.

(2) Setting the field diaphragm

Adjust the field diaphragm so that it circumscribes the viewfield. The field diaphragm has a significant impact on contrast, especially for fluorescent specimens against dark backgrounds.

Note: For how to adjust the field diaphragm, refer to the manual of your microscope.

(3) Setting the aperture diaphragm

Adjust the aperture diaphragm in the following way according to the lighting.

For diascope illumination

Generally, the numeric value of the condenser aperture diaphragm should be adjusted to approximately 70% to 80% of the numerical aperture (NA) of the objective.

For episcopic illumination

Generally, the aperture diaphragm should be adjusted to approximately 70% to 80% of the size of the pupil of the objective that can be seen by removing the eyepiece and looking into the eyepiece tube.

✓ Adjustment of aperture diaphragm

- For details of the aperture diaphragm adjustment, refer to the manual of your microscope.
- For photographed images that have greater depth of focus, close down the aperture diaphragm. Note that closing down the aperture may limit the performance of the objective.

✓ What is depth of focus?

“Depth of focus” refers to the in-focus range along the direction vertical to the specimen surface. Although reducing the aperture diaphragm extends the depth of focus, doing so will also reduce resolution. Adjust the aperture diaphragm in accordance with your needs.

(4) Adjusting the focus on the subject

Adjust the focus of the microscope so that the image can be clearly seen on the monitor.

✓ Adjusting the focus on a dark subject

- If the subject is dark making the exposure time long and the focusing difficult, we recommend that you use the [DF/FL] scene mode.
- For how you operate the [DF/FL] scene mode, refer to “8.2.5 Photographing Procedure Using DF/FL Scene Mode”.

(5) Adjusting the lighting

When photographing a color image, the color reproducibility of the image depends on the lamp voltage.

When a halogen lamp is used as the light source, increasing the lamp voltage produces a bluish light, while decreasing the lamp voltage produces a reddish light.

Except in cases where it is specifically necessary to adjust the tone, the voltage should be set to the proper level for microphotography, which depends on the microscope being used. Since this level varies for each type of microscope, refer to your microscope's instruction manual.

Note: If the lamp voltage changes, adjust the white balance once again.

✔ White balance when observing by a microscope

Consider the following when you adjust the white balance while viewing on the microscope.

- When using diascope illumination for microphotography, adjust the white balance while you are photographing a transparent part of the preparation.
- When using episcopic illumination for microphotography or using a lens, adjust the white balance using a white subject.
- For fluorescent photographing, we recommend that the white balance be adjusted under normal light conditions before photographing. If the screen is excessively dark or bright, adjust the luminous energy of the light source or the iris diaphragm, or use an ND filter to obtain the appropriate white balance.

(6) Adjusting the exposure time

An exposure time in the range of 60 ms to 4 ms is appropriate for a normal photographing. Adjust the light intensity for the microscope using an ND filter to get an appropriate exposure time.

When automatic exposure is set for DS-L3, the camera gain and the exposure time are automatically changed to obtain an appropriate exposure. For this reason, a weak light intensity causes a high camera gain making the image coarse, and a long exposure time making the focusing difficult.

✔ What is an ND filter?

An ND filter is a filter that affects only the amount of light passed, not the color balance of the light. For example, an "ND2" filter cuts transmitted light in half, while an "ND16" filter reduces transmitted light to 1/16th of actual levels.

7.3

Calculating the Display Magnification for Microscopic Observation

✓ Pixel sizes of image pickup device on DS camera heads

The table below shows the pixel size (the maximum number of pixels stored) of image pickup device and the effective area (area for the effective number of pixels stored) of each DS camera head.

DS camera head	Pixel size (μm)		Recorded pixel count		Effective area (mm)		
	Width	Height	Width	Height	Width	Height	Diagonal
DS-Fi2/Fi1/Fi1c	3.4	3.4	2560	1920	8.7	6.53	10.88
DS-Vi1	4.4	4.4	1600	1200	7.04	5.28	8.8
DS-Qi1Mc/Ri1	6.45	6.45	1280	1024	8.26	6.6	10.57

Use the following formula for calculating the magnification of the subject on the monitor.

- Magnification on the monitor

$$= \frac{\text{Optical magnification (objective lens magnification X relay lens magnification)} \times \text{Diagonal size of monitor display}}{\text{Diagonal size of effective area for image pickup device}}$$

Calculation example: built-in monitor (8.4 inch, diagonal: 213 mm)

DS camera head	Magnification of optical device (example)	Magnification of the subject on the monitor
DS-Fi2/Fi1/Fi1c	Objective lens: 40x Relay lens: 0.7x	$40 \times 0.7 \times 213 \text{ mm} / 10.88 \text{ mm} = \text{Approx. } 550$
DS-Vi1	Objective lens: 40x Relay lens: 0.55x	$40 \times 0.55 \times 213 \text{ mm} / 8.8 \text{ mm} = \text{Approx. } 530$
DS-Qi1Mc/Ri1	Objective lens: 40x Relay lens: 0.7x	$40 \times 0.7 \times 213 \text{ mm} / 10.57 \text{ mm} = \text{Approx. } 560$

✓ Magnification when printed

See “15.3.4 Calculating the Magnification When Printed” for details.

Part 3

Photographing and Playing Images

This part explains how to configure various settings to observe and capture images with desired conditions, how to display the captured images on the monitor, and how to delete them.

This part consists of the following chapters:

- Chapter 8 Capturing Images with Advanced Setting Menu
- Chapter 9 Playing Back and Deleting Images

This chapter explains how to operate on [CAM MENU] screens to observe and capture images with desired conditions.

8.1 Operating Camera Menu

8.1.1 Displaying [CAM MENU]

1 Press the [CAM] button on the task bar.

The [CAM MENU: CAMERA] short screen is displayed in the upper left (or upper right) section of the screen.

Note: The position of the menu changes to left or right every time the [CAM] button on the task bar is pressed.

2 Press the [▼] button in the bottom right corner to change the [CAM MENU: CAMERA] screen to the long screen (detailed screen).

Press the [▲] button in the bottom right corner of the long screen (detailed screen) to return to the short screen.

✓ If a screen other than [CAM MENU] is displayed

If a screen other than [CAM MENU: CAMERA] is displayed, you can change it to [CAMERA MENU: CAMERA] by selecting [CAMERA] using the [MENU SELECT] button or pressing the [◀ MAIN] button.



Short screen



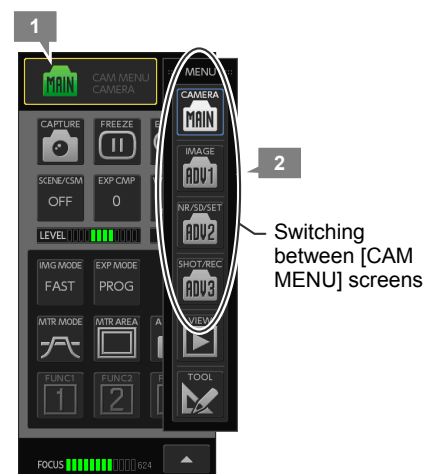
Long screen

Displaying [CAM MENU]

8.1.2 Switching between [CAM MENU] Screens

There are four [CAM MENU] screens: [CAMERA], [IMAGE], [NR/SD/SET], and [SHOT/REC]. Make the following operation to switch between [CAM MENU] screens.

- 1 Press the [MENU SELECT] button of [CAM MENU].
The [MENU] submenu is displayed.
- 2 Press a button of the desired screen from among [CAMERA], [IMAGE], [NR/SD/SET], and [SHOT/REC].
The [CAM MENU] screen switches.



Switch between [CAM MENU] screens

Button	Screen	Function
	[CAMERA] short screen (basic screen)	<p>This screen allows you to observe and capture images with simple operations. This screen has buttons of [CAPTURE], [FREEZE], [E.ZOOM], [SCENE/CSM], [EXP CMP], and [WHITE BL], and contains the [LEVEL] meter for indicating exposure status, the [FOCUS] indicator for indicating the focus condition, and the model name of the DS camera head connected.</p> <p>Note 1: Buttons and indicators displayed in the short screen can be commonly used in camera menus.</p> <p>Note 2: When the exposure mode of the long screen is [MANU] (manual), the [EXP CMP] button is displayed as the [CAM GAIN] button.</p>
	[CAMERA] long screen (detailed screen)	<p>This screen allows you to configure the image mode and photometry settings. In addition to the functions of the short screen, this screen includes buttons of [IMG MODE], [EXP MODE], [MTR MODE], [MTR AREA], and [AE LOCK]. You can place three buttons at the bottom of the screen.</p>
	[IMAGE] screen	<p>This menu is for settings of hue and contrast of images. This screen includes buttons of [Y GAIN], [RB ADJ], [CHROMA], [HUE], [EFFECT], [BK LEVEL], [CONTRAST], and [SHARPNESS].</p>
	[NR/SD/SET] screen	<p>This screen is used for registration of the noise reduction setting, shading setting, and custom setting, as well as for clearing setting values. This screen includes buttons of [NR], [SD], [SD SET], [CLR SET], and [CSM SET].</p>
	[SHOT/REC] screen	<p>This screen configures settings of continuous shot mode (consecutive capture with interval timer) and settings of storing images. This screen includes buttons of [SHOT MODE], [DRIVE], [SAVE LOG], and [REC MODE].</p>

✓ How to operate [CAM MENU] screens

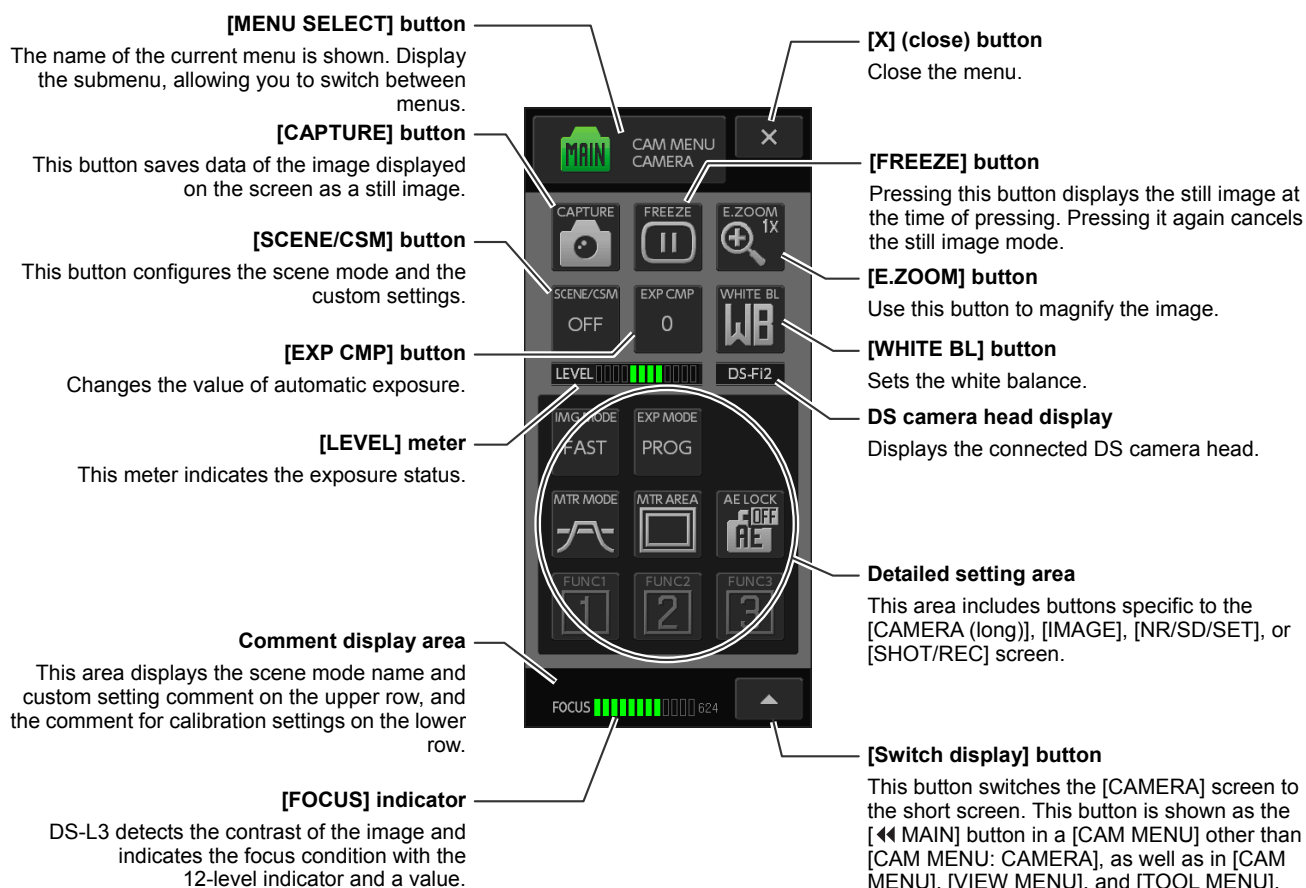
For details of [CAM MENU] screens, refer to “8.2 Basic Operations of Photographing” and “8.3 Configuring Photographing Details”.

8.2 Basic Operations of Photographing

This section explains operations common among different camera menus.

Common items of [CAM MENU]

The upper half and bottom of the [CAM MENU] contains buttons and indicators common among different [CAM MENU] screens.



Common items of [CAM MENU]

✓ [CAMERA MENU] screen size

The display size of the [CAMERA MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [CAM MENU: CAMERA] long screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[CAPTURE]	[E.ZOOM]	[SCENE/CSM]	[CAM GAIN]	[WHITE BL]
Small menu	[CAPT]	[EZOOM]	[SCN/CSM]	[CAM GN]	[WHT BL]

8.2.1 Using Scene Modes and Custom Setting

DS-L3 has “scene modes”, which are photographing conditions for typical subjects. You can photograph a subject with a suitable setting by selecting an appropriate scene mode.

You can save up to seven items of photographing conditions as “custom settings”, which can be retrieved and used like scene modes.

✓ Disabling scene modes and custom settings

A selected scene mode or custom setting cannot be disabled in the [SCENE/CSM] submenu. To disable the selection, press the [CLR SET] button of the [CAM MENU: NR/SD/SET] screen to clear settings.

(1) Using a scene mode

You may want to adjust the contrast or hue in accordance with the photographed subject, or may want to photograph with desired settings.

For typical subject, several image capture conditions are provided as “scene modes”. Selecting a scene mode enables you to capture images with the settings suitable to the subject. Select a scene mode in accordance with the subject.

1 Press the [SCENE/CSM] button of [CAM MENU].

The [SCENE] submenu appears.

Displayed on the left of the submenu are the [CANCEL] button and scene mode selection buttons, on the right are [CUSTOM1] to [CUSTOM7] buttons.

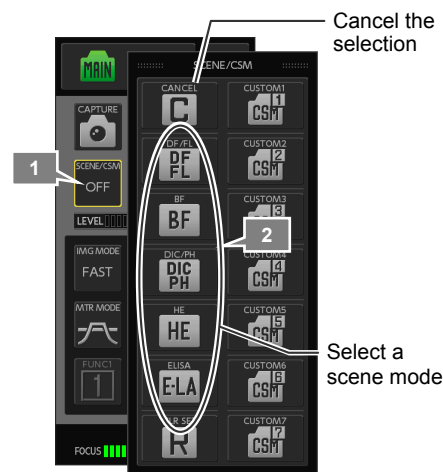
2 Press the corresponding button to select a scene mode.

The submenu closes, and the selected scene mode is displayed on the [SCENE/CSM] button of [CAM MENU]. To cancel the selection, press the [CANCEL] button of the submenu.

Note: The scene mode displayed on the submenu changes according to the setting of [Select scenes] of the [SETUP MENU: MAIN] screen. Refer to “13.2.1 (2) Changing preset of scene mode” for how to change the selection of the scene.

3 Confirm that the scene mode name is displayed in the comment area of [CAM MENU].

Scene mode name is displayed on the [CAM MENU], [VIEW MENU], or [TOOL MENU] screen unless the mode is set to [OFF].



Using a scene mode

✓ Settings at the power-on time

The selected scene mode is saved when the power is turned off and the saved scene mode will be applied when the power is turned on again. However, if the custom setting is set to be enabled at the time of startup, the custom mode setting will be applied.

For details, refer to “13.2.1 (1) Calling custom settings on startup”.





✓ Changing the scene mode setting

- After selecting a scene, you can change the settings such as the exposure mode, exposure compensation, camera gain, and exposure time. However, those changes cannot be saved to the scene mode. Pressing the [CLR SET] button of the [SCENE/CSM] submenu changes the setting of [CAM MENU: IMAGE] items to the initial value.
- To save an arbitrary setting, use “Custom Setting”. For details about registering a custom setting, see “8.3.3 (4) Registering a custom setting”.






List of scene modes

The scene modes displayed on the [SCENE/CSM] submenu change according to the setting of [Select scenes] of the [SETUP MENU: MAIN] screen. The following scene modes are available depending on the [SCENE SELECT] setting.


When [SCENE SELECT] is [IND]

Button	Scene mode	Description
	Wafer / IC chip	Suitable for a wafer or IC chip.
	Metal / ceramic	Suitable for capturing a metal specimen. Bright parts of a metal specimen are expressed as white, and dark parts are expressed as transparent. This mode can also be used for ceramic and plastic specimens.
	Circuit board	Suitable for capturing a circuit board, etc. This mode can reduce white-out in bright parts of the object, such as component leads and solder joints, thereby enabling defects to be detected easily. This mode is also suitable for high-contrast objects such as gears and other metal components.
	FPD (Flat Panel Display)	Suitable for the color filters for flat display devices, such as LCD monitor and plasma display.

When [SCENE SELECT] is [BIO] (default)

Button	Scene mode	Description
	Dark field / fluorescence	This mode is used when photographing a dark subject. The camera gain (sensitivity) is improved for better operability of positioning and focusing. Use the [E MODE] function button in combination with this mode to capture an image with less noise. For details, refer to "8.2.5 Photographing Procedure Using DF/FL Scene Mode".
	Bright field	This mode is used for general stained specimens. Note: When [LED (BIO MIC)] is selected as a light source on the [SETUP MENU: MAIN] screen, "LED BF (bright field)" is displayed in the comment display area. When [HALOGEN] is selected, "BF" is displayed.
	Differential interference / phase contrast	Contrast is enhanced for differential interference and phase contrast photography purposes.
	HE staining	This mode is provided for photographing of HE stained specimen. It is optimized for color reproduction specific to HE. Note: This mode is displayed when [HALOGEN] is selected as a light source on the [SETUP MENU: MAIN] screen. (Not displayed when [LED (BIO MIC)] is selected.)
	Enzyme labeled antibody method	This mode is provided for photographing of ELISA (Enzyme labeled antibody method). It is optimized for color reproduction specific to DAB. Note: This mode is displayed when [HALOGEN] is selected as a light source on the [SETUP MENU: MAIN] screen. (Not displayed when [LED (BIO MIC)] is selected.)

When [SCENE SELECT] is [OTHERS]

Button	Scene mode	Description
	Asbestos	This mode is used to photograph the asbestos specimens. This mode is optimized for the colors specific to chrysotile (immersed in a liquid with refractive index of 1.550), crocidolite (immersed in a liquid with refractive index of 1.680 or 1.700), and amosite (immersed in a liquid with refractive index of 1.680).

✓ About [Select scenes]

For details of [Select scenes], refer to "13.2.1 (2) Changing preset of scene mode".

(2) Using custom setting

You can save up to seven DS-L3 photographing conditions as “custom settings”.

By registering custom settings, you can switch the photographing settings in a similar manner as in the scene mode selection.

1 Press the [SCENE/CSM] button of [CAM MENU].

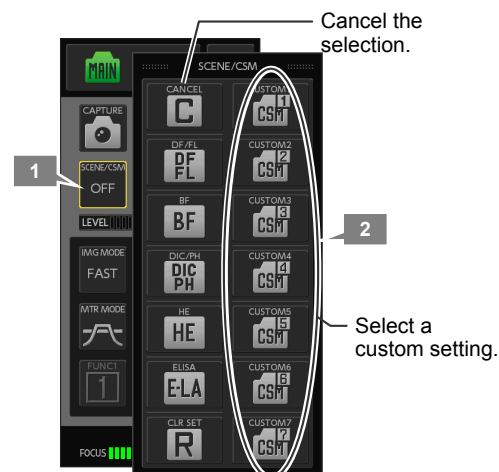
The [SCENE/CSM] submenu is displayed.

Displayed on the left of the submenu are the [CANCEL] button and scene mode selection buttons, on the right are [CSM1] to [CSM7] buttons.

2 Select a custom setting by pressing a button from among [CSM1] to [CSM7].

The submenu closes, and the selected scene mode is displayed on the [SCENE/CSM] button of [CAM MENU].

Note: The scene mode displayed on the submenu changes according to the setting of [Select scenes] of the [SETUP MENU: MAIN] screen. Refer to “13.2.1 (2) Changing preset of scene mode” for how to change the selection of the scene.



Using custom setting

✓ Comments of custom settings

You can enter any comment for a custom setting. When a custom setting is selected, its comment is displayed in the comment area of [CAM MENU], [VIEW MENU], or [TOOL MENU].

Comment entered at the time of registration



Comment of a custom setting

✓ Registration of a custom setting and automatic selection at the time of startup

- For how to register a custom setting, refer to “8.3.3 (4) Registering a custom setting”.
- You can configure DS-L3 to start up with the desired custom setting selected, when the power is turned on. For the setting method, refer to “13.2.1 (1) Calling custom settings on startup”.

8.2.2 Setting the White Balance

White balance is the process of correcting color bias due to difference of the light source and adjusting the color of white so that white objects appear really white in the photograph. In this system, you can set the white balance manually when a color DS camera head (DS-Fi2, Fi1, Vi1, Fi1c, or Ri1) is connected.

✓ Adjusting the white balance

The white balance can be adjusted using the live image or an image of paused live image. You cannot adjust the white balance by a replayed image.

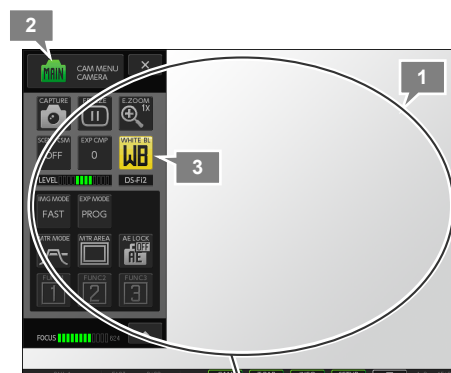
- 1 Prepare an evenly white subject such as a sheet of paper, and adjust the DS camera head position so that the entire photographing scope of the DS camera head is covered by the subject.**

Adjust the lighting on the subject in order to set the illumination condition to suit for observation or capturing.

- 2 Display [CAM MENU].**

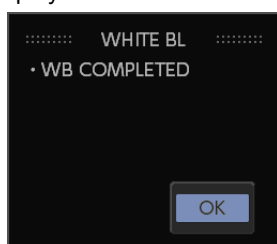
- 3 Press the [WHITE BL] button.**

The white balance is set, and the setting completion message is displayed.



Set an evenly white subject so that it covers the entire photographing area.

Setting white balance



White balance setting completed

- 4 Remove the white paper placed in step 1 from the photographing scope.**

✓ Settings at the power-on time

The setting of white balance is saved when the power is turned off. The white balance setting is applied when the power is turned on again. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the white balance setting specified by the custom setting is used.

✓ White balance measurement area

The same area used for photometry is used for adjusting the white balance. For the photometry area setting, refer to "8.3.1 (4) Switching the metering area".

✓ Failure in white balance adjustment

White balance adjustment may fail if you do it with an uneven subject.

In such cases, a confirmation message shows; do the white balance adjustment again following the above procedure.

8.2.3 Adjusting the Exposure

Compensate the exposure to adjust the brightness while checking the live image.

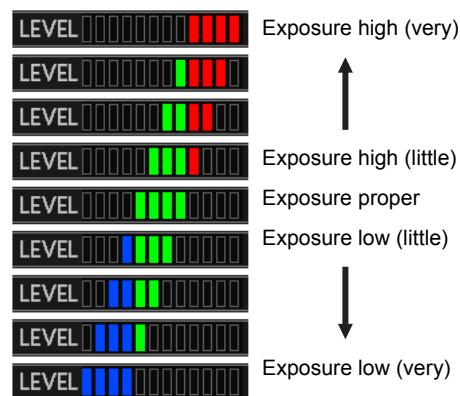
How to read the level meter

The [LEVEL] meter of [CAM MENU] shows the exposure condition.

There are 12 indicators; four in the center are green, four on the right are red, and four on the left are blue. The exposure condition is indicated by the position of indicators being lit up.

Four indicators are always lit, and the four in the center (green) are lit up during proper exposure.

The position of lit up indicators moves to the right as the exposure becomes high, and to the left as it becomes low. To change the setting, operate again from the [EXP CMP] button.



Level meter display

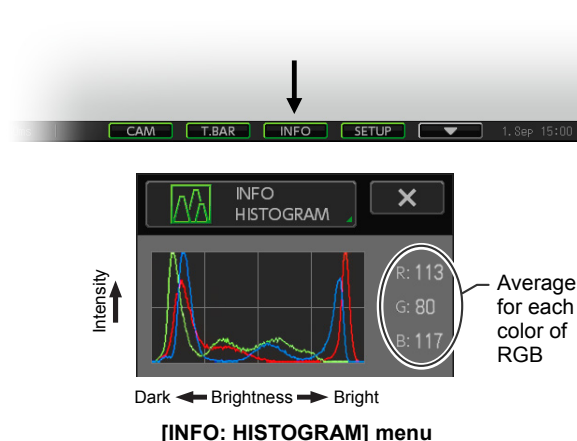
Checking the Histogram of the Image

When you press the [HISTOGRAM] button on the task bar, the [HISTOGRAM] window appears at the right bottom of the screen.

On the [HISTOGRAM] menu, the system calculates the distribution of brightness of the image and shows it as a histogram.

The histogram indicates distribution of brightness for each RGB color which allows fine adjustment of the exposure level.

- The horizontal axis indicates brightness (dark to light from left to right).
- The vertical axis indicates appearance frequency.
- On the right to the histogram, average values of RGB colors are shown.



[INFO: HISTOGRAM] menu

✓ Reading and compensating the exposure

When the distribution reaches the right end of the histogram, the bright part of the image is saturated (white-out). When the distribution reaches the left end of the histogram, the dark part of the image is collapsed (black-out).

It is preferred that no white-out and black-out occurs in the entire image, but, in some cases, adjustment is necessary.

If a bright part of the image is important, adjust the distribution to the left. If a dark part is important, adjust the distribution to the right.

By adjusting the distribution in accordance with the important level, it is possible to prevent insufficient gradation during image processing.

✓ Switching the [INFO MENU] display

Depending on the setting of the [SETUP MENU: MAIN] screen, pressing the [INFO] button of the task bar may show the [INFO: CAM INFO] or [INFO: MIC INFO] window. To switch the window to the [INFO: HISTOGRAM], press the [MENU SELECT] button of the [INFO] menu and select the [HISTOGRAM] button on the submenu.

(1) Compensating the exposure

Exposure compensation is a function that changes the automatic exposure value calculated by the system and adjusts the brightness of the entire screen.

Exposure adjustment can be done when the exposure mode is automatic (program AE, shutter-priority, or focus-priority).

✓ Exposure adjustment

When the exposure of photometry area is adjusted properly by automatic exposure, the four indicators in the center of the [Level] indicator lights up.

This condition does not necessarily mean that the target area is in a proper exposure. You can tune the exposure for the subject by exposure adjustment.

- 1 Display the [CAM MENU: CAMERA] long screen.
- 2 Confirm that the exposure mode is either program AE, shutter-priority, or focus-priority.

Confirm that either [PROG] (program AE), [S. AE] (shutter-priority), or [F. AE] (focus-priority) is shown on the [EXP MODE] button.

Note: When it is [MANU] (manual), the [EXP CMP] button is displayed as the [CAM GAIN] button.

- 3 Press the [EXP CMP] button.
- The [EXP COMP] submenu appears.
- 4 Operate on the [EXP CMP] submenu to adjust the exposure value.

- **Setting range:** ± 2.0 (1/3 step)

Adjust it viewing the exposure on the live image.

- 5 Press the [OK] button to commit the setting.

Pressing the [OK] button closes the submenu, and the configured value is displayed on the [EXP CMP] button.

To change the setting, operate again from the [EXP CMP] button.



Adjusting the exposure
(Program AE, shutter-priority, focus-priority)

✓ Settings at the power-on time

The setting of exposure compensation is saved when the power is turned off. The saved exposure compensation value will be applied when the power is turned on again. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the exposure adjustment setting specified by the custom setting is used.

(2) Using the AE lock

When the exposure mode is program AE, shutter-priority, or focus-priority, you can adjust the exposure at any position on the subject and fix the exposure value.

Use this function when you observe the specimen with a fixed exposure or when the brightness of the part for which the exposure is to be adjusted is significantly different from the other parts.

- 1 Display the [CAM MENU: CAMERA] long screen.
- 2 Confirm that the exposure mode is either program AE, shutter-priority, or focus-priority.

Confirm that either [PROG] (program AE), [S. AE] (shutter-priority), or [F. AE] (focus-priority) is shown on the [EXP MODE] button.

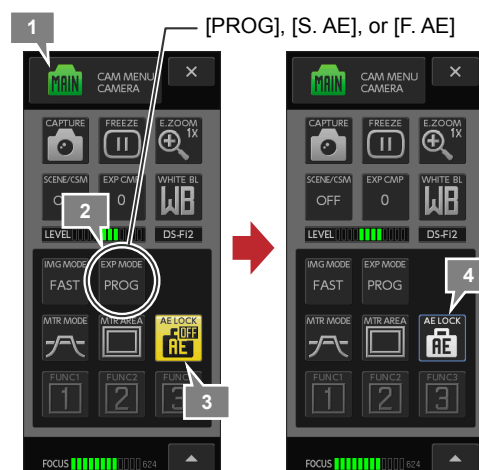
Note: When the exposure mode is [MANU] (manual exposure), the [AE LOCK] button is not shown.

- 3 Press the [AE LOCK] button at the position for which you want to lock the exposure.

The current exposure is locked. A blue frame is shown around the [AE LOCK] button, and the [OFF] mark on the icon disappears.

- 4 To release the AE lock, press the [AE LOCK] button again.

[OFF] appears on the [AE LOCK] button icon.



Using AE lock
(Program AE, shutter-priority, focus-priority)

✓ Automatic release of the AE lock

The AE lock is released when the DS-L3 is turned off. It is also released with an operation on the [CAM MENU], [SCENE/CSM], [EXP CMP], [EXP MODE], [CLR SET], or [F MODE] button.

(3) Setting the exposure time

When the exposure mode is Shutter-priority AE or Manual, you can set the exposure time (shutter speed) arbitrarily.

✓ How to adjust the exposure

DS-L3 determines the exposure by the combination of exposure time and camera gain.

1 Display the [CAM MENU: CAMERA] long screen.

2 Confirm that the exposure mode is set to shutter-priority or manual.

Confirm that either [S. AE] (shutter-priority) or [MANU] (manual exposure) is shown on the [EXP MODE] button.

Note: When it is [PROG] (program AE) or [F. AE] (focus-priority), the [EXP TIME] button is not displayed.

3 Press the [EXP TIME] button of [CAM MENU].

The [EXP TIME] submenu appears.

4 Use the button and slider on the [EXP TIME] submenu to adjust the exposure time value.

The exposure time setting range varies depending on the DS camera head.

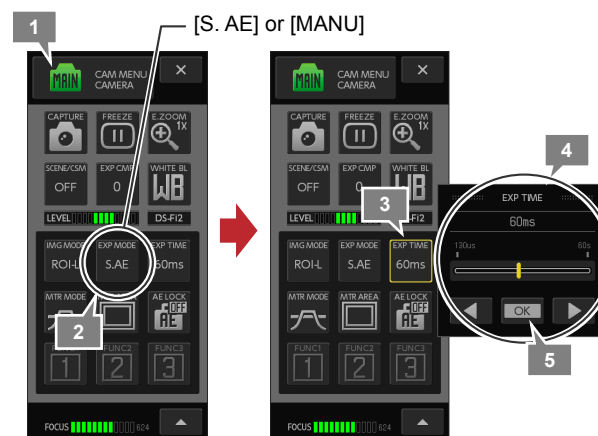
• Setting range

130 μ s, 150 μ s, 200 μ s, 300 μ s, 400 μ s, 600 μ s, 800 μ s, 1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms, 6 ms, 8 ms, 10 ms, 15 ms, 20 ms, 30 ms, 40 ms, 60 ms, 80 ms, 100 ms, 150 ms, 200 ms, 300 ms, 400 ms, 600 ms, 800 ms, 1 s, 1.5 s, 2 s, 3 s, 4 s, 6 s, 8 s, 10 s, 15 s, 20 s, 30 s, 40 s, 60 s, 80 s, 100 s, 150 s, 200 s, 300 s, 400 s, and 600 s (48 levels)

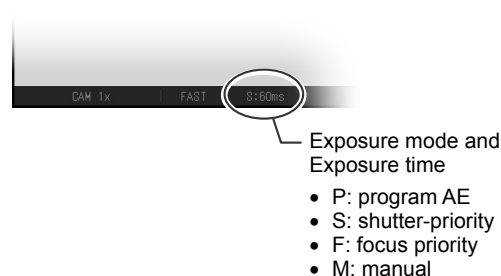
Adjust it viewing the live image.

5 Press the [OK] button.

The submenu closes, and the configured exposure time is shown on the [EXP TIME] button and the task bar.



Configuring exposure time (shutter-priority or manual)



Confirming the task bar display

✓ The setting range of exposure time for different DS camera heads

The table below shows the setting ranges of exposure time for different DS camera heads.

DS-Fi2	130 μ s, 150 μ s, 200 μ s, 300 μ s, 400 μ s, 600 μ s, 800 μ s, 1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms, 6 ms, 8 ms, 10 ms, 15 ms, 20 ms, 30 ms, 40 ms, 60 ms, 80 ms, 100 ms, 150 ms, 200 ms, 300 ms, 400 ms, 600 ms, 800 ms, 1 s, 1.5 s, 2 s, 3 s, 4 s, 6 s, 8 s, 10 s, 15 s, 20 s, 30 s, 40 s, and 60 s (41 steps)
DS-Fi1 / DS-Vi1	1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms, 6 ms, 8 ms, 10 ms, 15 ms, 20 ms, 30 ms, 40 ms, 60 ms, 80 ms, 100 ms, 150 ms, 200 ms, 300 ms, 400 ms, 600 ms, 800 ms, 1 s, 1.5 s, 2 s, 3 s, 4 s, 6 s, 8 s, 10 s, 15 s, 20 s, 30 s, 40 s, and 60 s (34 steps)
DS-Fi1c / DS-Ri1 / DS-Qi1Mc	1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms, 6 ms, 8 ms, 10 ms, 15 ms, 20 ms, 30 ms, 40 ms, 60 ms, 80 ms, 100 ms, 150 ms, 200 ms, 300 ms, 400 ms, 600 ms, 800 ms, 1 s, 1.5 s, 2 s, 3 s, 4 s, 6 s, 8 s, 10 s, 15 s, 20 s, 30 s, 40 s, 60 s, 80 s, 100 s, 150 s, 200 s, 300 s, 400 s, and 600 s (41 steps)

✓ Setting for power-on

The exposure time setting is saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the exposure time setting specified by the custom setting is used.

(4) Setting the camera gain

When the exposure mode is Manual, you can adjust the exposure arbitrarily by setting the shutter speed and camera gain (sensitivity). The camera gain is used to set the sensitivity of the image pickup device. When a higher value is set for the camera gain, darker objects can be captured. However, higher sensitivity is likely to cause more noises in the image.

✓ How to adjust the exposure

DS-L3 determines the exposure by the combination of exposure time and camera gain.

1 Display the [CAM MENU: CAMERA] long screen.

2 Confirm that the exposure mode is set to manual.

Confirm that [MANU] (manual exposure) is shown on the [EXP MODE] button.

Note: When it is [PROG] (program AE), [S.AE] (shutter-priority), or [F.AE] (focus-priority), the [CAM GAIN] button is shown as the [EXP CMP] button.

3 Press the [CAM GAIN] button of [CAM MENU].

The [CAMERA GAIN] submenu appears.

4 Use the button and slider of the [CAMERA GAIN] submenu to adjust the camera gain value.

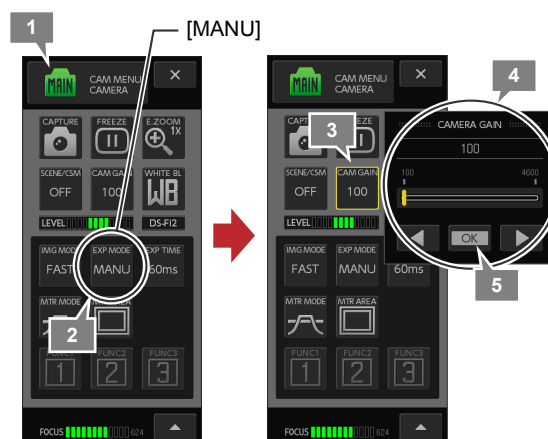
The camera gain setting is common among different DS camera heads and is as follows:

- **Setting range**
100, 120, 140, 170, 200, 240, 280, 340, 400, 480, 560, 680, 800, 960, 1130, 1360, 1600, 1920, 2250, 2700, 3200, 3840, and 4600 (23 levels)

Adjust it viewing the live image.

5 Press the [OK] button.

The submenu closes.



Setting the camera gain (manual)

✓ Settings at the power-on time

The camera gain setting is saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the camera gain setting specified by the custom setting is used.

8.2.4 Capturing Displayed Images

You can capture images displayed on the monitor, and save them as image files in the specified location.

! Cautions on saving images

Do not remove the storage media device while images are saved. Doing so may prevent the images from stored properly or damage DS-L3 or the storage media device.

The CF card indicator of DS-L3 lights up when the CF card is accessed. The access lamp of the USB memory stick lights up when it is accessed. Watch these indicators to check if they are accessed.

✔ Settings for saving image files

Check the following settings before photographing:

- **Selection of storage location (for saving the image in a media device, server, or PC, or for printing it)**
DS-L3 allows you to save the captured image in a storage media device, a FTP server on the network, or the PC connected by USB, or to output it to a PictBridge-compatible printer for printing. Refer to “13.5.2 Configuring Capture Function” for the setting.
- **Selection of the storage drive and folder**
When you specify storage media for saving images, you need to specify a drive (for storage media) and a folder. Refer to “8.3.4 Setting Items of the [CAM MENU: SHOT/REC] Screen” for the setting.
- **Setting of the recording mode (live image or full image, file type, and image size)**
This setting specifies details of stored images. Refer to “8.3.4 Setting Items of the [CAM MENU: SHOT/REC] Screen” to specify the setting properly so that images are stored in the desired manner.

✔ Image file name

- An image file name is automatically given during capturing. Select [DATE & TIME] or [NUMBER] on the [SETUP MENU: FILE] screen as the file naming convention. For details, see “13.4.2 Configuring File Naming Convention”.
- You can check the file name of an image to be saved at the next capture in the [FILE] area of the [CAM MENU: SHOT/REC] screen. Furthermore, in the [SINGLE] shot mode, you can set an arbitrary image file name in the [FILE] area. For how to operate file names, see “8.3.4 (5) Checking/changing an image file name”.

✔ Consecutive capture with interval timer

DS-L3 allows you to do “consecutive capture” in which images are captured automatically at intervals. Refer to “8.2.4 (3) Performing consecutive capture with interval timer” when you do consecutive capture.

✔ Capture sound

You hear a capture sound when you capture an image. Refer to “13.5.5 (3) Setting the capture sound volume” if you want to change the sound volume setting.

✔ Saving annotations and measurement results

When you have made annotations such as pen drawing and text comments, or measured lengths, angles, or other, you can save the image with the results of these operations embedded in the image.

For details on the annotation and measurement functions, refer to “Chapter 11 Adding Lines and Annotations to an Image” and “Chapter 12 On-Screen Measurement”.

(1) Capturing the live image directly

You can capture images displayed on the monitor, and save them as image files in the specified location.

1 Check the live image.

Check that the object is displayed at the proper brightness and with focus on the desired part.



Check the live image.

Checking the live image

2 Press the [CAPTURE] button on the MAIN menu.

The image is captured and the image file is saved in the specified destination.

You hear a capture sound when you do capturing. While the image is being saved, the pointer shape changes and the "Saved..1/1" message appears on the task bar.

Upon completion of saving, the operable state returns.



Capturing live image

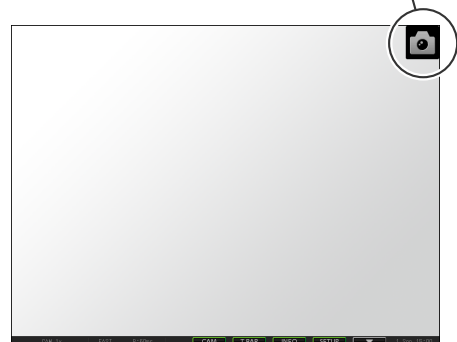
Keeping [CAPTURE ICON] on the screen for quick capture of live images

You can display and keep [CAPTURE ICON] on a corner of the screen by setting so on the [SETUP MENU: MAIN] screen.

By using [CAPTURE ICON] on the screen, you can quickly capture the image on the monitor without opening [CAMERA MENU].

For details, refer to "13.2.1 (7) Setting to show [CAPTURE ICON] on the screen".

Press [CAPTURE ICON] to capture a live image.



Example of [CAPTURE ICON] display
(when the upper right is selected)

(2) Capturing the image after having it pause

You can temporarily stop the live image to have a still image, and capture and save it as an image file.

1 Check the live image.

Confirm that the subject is displayed in the desired condition.

2 Press the [FREEZE] button of [CAM MENU].

The image at the point when the button is pressed is displayed as a still image

While the still image is displayed, a blue frame appears around the [FREEZE] button. [FREEZE] is displayed on the task bar.

Pressing the [FREEZE] button again releases the freeze status. The live image returns and the task bar display changes from [FREEZE] to [CAM].

Note: Buttons that cannot be used when a still image is displayed are grayed out.

3 Check the still image state.

Check that the still image is displayed as desired.

To obtain the still image again, press the [FREEZE] button to release freezing and press it again while checking the live image.

4 To save the image, press the [CAPTURE] button.

A capture sound is emitted, and the image is captured in accordance with the settings and saved to an image file in the specified save folder.

While the image is being saved, the pointer shape changes on the touch panel LCD monitor. The "Saved..1/1" message appears on the task bar to indicate that the image has been saved.



Check the image condition.

Confirmation of the live image and the still image



Getting and capturing a still image



Task bar (still image)

(3) Performing consecutive capture with interval timer

When the continuous shot mode is set, you can consecutive capture (with interval timer) by the [CAPTURE] button of [CAM MENU].

✔ Shot mode setting

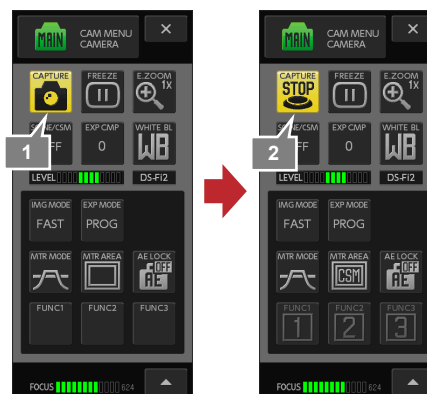
The continuous shot mode setting is made on the [CAM MENU: SHOT/REC] screen. Refer to “8.3.4 (1) Setting the shot mode” for setting details.

1 To start the consecutive capture, press the [CAPTURE] button on the [CAM MENU].

The first shot of the consecutive capture is captured and the icon of the [CAPTURE] button changes to “STOP”.

The second and subsequent shots are captured automatically at the specified interval until the specified number of shots is captured. When the specified number of images has been captured, the consecutive capture terminates automatically.

Note: The consecutive capture setting (continuous shot mode, number of shots, and shot interval) is maintained so that pressing the [CAPTURE] button again starts consecutive capture.



Starting and stopping consecutive capture

2 To stop the consecutive capture halfway, press the [CAPTURE] button again.

✔ The display of the task bar during consecutive capture

During consecutive capture, the shot count is displayed on the task bar when images are captured.

- Example: When five pictures have been shot with the shot count setting of 10, it shows “SAVED 5/10”.

✔ Image capture condition change during consecutive capture

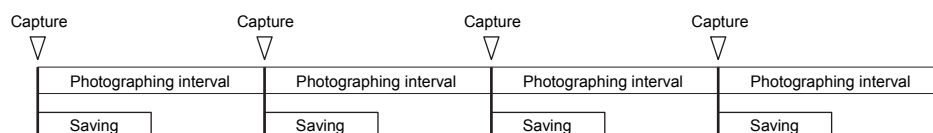
You can change the photographing condition by the operation menu on the screen even when consecutive capture is in progress.

- You can change the exposure or focus during consecutive capture to capture the changes of the object's appearance.
- If it is necessary to capture the object under a fixed condition to observe time variation of the object, etc., do not change the condition during consecutive capture.

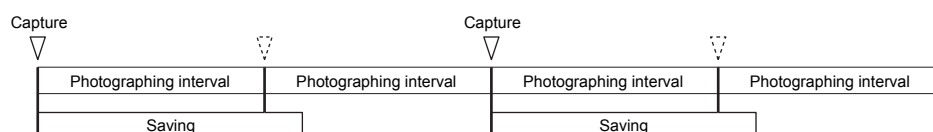
The case when photographing interval cannot be maintained

In the case when it takes longer time to store images in the storage media device, saving an image may take longer than the specified interval, in which case some pictures are discarded. When you capture important images, be sure to test the operation before you start consecutive capture.

• Normal consecutive capture



• When some pictures are discarded



Limitation during consecutive capture

There are the following limitations during consecutive capture.

- (1) [TOOL BAR] and [SETUP MENU] on the task bar are disabled (grayed out).
- (2) Among the [MENU SELECT] buttons of the [CAM MENU] screen, [VIEW] and [TOOL] are disabled (grayed out).
- (3) Printing is not possible for consecutive capture.

(4) Capturing a replayed image again

When a photographed image is displayed (replayed) on the screen, pressing the [CAPTURE] button of [CAM MENU] captures the image on the screen once again.

✓ Replaying photographed images

For how to replay photographed images, refer to “Chapter 9 Playing Back and Deleting Images”.

1 Display [VIEW MENU] to replay the desired image.

While an image is replayed, [VIEW] is displayed on the task bar and the [x] button is displayed in the top right corner of the screen.

Note: The [INFO] button cannot be used.

2 Display [CAM MENU] using the [MENU SELECT] button.

The operation menu switches to that of [CAM MENU] while the image continues to be replayed.

Note 1: The [◀ MAIN] button of the [VIEW MENU] is useful to display the [CAM MENU: CAMERA] screen.

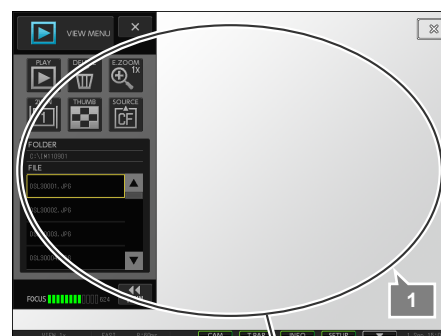
Note 2: Operations on [CAM MENU] are restricted during the replay of the image. Disabled buttons are grayed out.

3 Press the [CAPTURE] button.

The replayed image is saved as a separate file.

✓ Capturing a replayed image

When you capture a replayed image, it is saved in 1280 x 960 size regardless of the DS camera head type used or recording mode settings.



Replay the desired image.

Replaying photographed images



Replaying photographed images

(5) Capturing images with the screen divided into sub-screens on the left and right

By operation on the [2WIN] button of [VIEW MENU], you can divide the screen into two sub-screens on the left and right, each of which can capture separate images.

DS-L3 allows you to save the two screens as an image without change.

- 1 **Display [VIEW MENU] and operate the [2WIN] button to set the two-screen mode, and arrange the screen into the desired condition.**

For details of the two-screen mode, refer to “9.2 (4) Splitting a window into right and left windows”.

- 2 **Specify the display range or other details on the screen to set the desired display condition.**
- 3 **Display [CAM MENU] using the [MENU SELECT] button.**

The operation menu switches to that of [CAM MENU] with the two-screen mode maintained.

Note 1: The [◀ MAIN] button of the [VIEW MENU] is useful to display the [CAM MENU: CAMERA] screen.

Note 2: Operations on [CAM MENU] are restricted during the replay of the image. Disabled buttons are grayed out.

- 4 **Press the [CAPTURE] button.**

The content displayed on the monitor is saved to an image file.

- 5 **To cancel the two-screen mode, change the [2WIN] button to [OFF] on [VIEW MENU].**

- ✓ **Display of the scales, annotation, and measurements when on/off the two-screen mode**

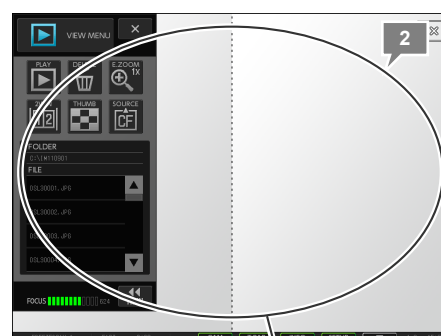
Switching the screen mode to or from the two-screen mode clears all annotations and measurement results. Scales (XY measurement, X scale, scale, and cross hairs) are maintained without change.

- ✓ **Image mode for two-screen display**

If you select the two-screen display mode, the image mode automatically switches to [FULL]. Setting the image mode to other than [FULL] during the two-screen display mode switches the screen to the one-screen display mode.



Operating the [2WIN] button



Arrange the screen into the desired condition.

Example of two-screen display



Capturing two-screens

(6) Capturing an image together with scales, annotations, and measurement results

DS-L3 allows you to display scales, to write lines and comments, and to measure lengths and angles on the screen. You can capture an image together with these operation results embedded in the image.

✓ Adding annotations and performing measurements

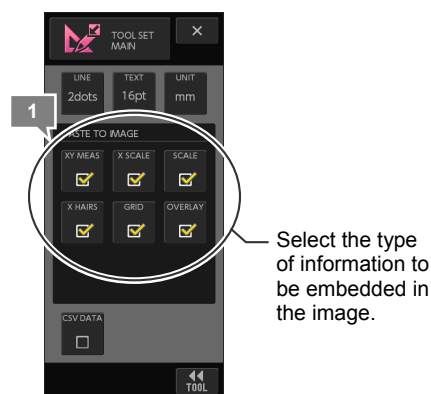
For details on the annotation and measurement functions, refer to “Chapter 11 Adding Lines and Annotations to an Image” and “Chapter 12 On-Screen Measurement”.

- 1 Display the [TOOL SET: MAIN] screen, and operate in the [PASTE TO IMAGE] area to select the type of information to be embedded in the image.

The following types of information can be embedded in the image.

- XY scales
- X scales (cross scales)
- Scales
- Cross hairs
- Grids
- Overlay (straight line, curved line, text, measurement result)

Note: For how to operate on the tool setting screen, refer to “11.2.1 Performing Basic Settings for Comment Function and Measurement Function”.



Operating the scale and annotation buttons

- 2 Display the target image on the monitor.

There are the following restrictions depending on the image mode.

- For the live image, replayed images, and still images, the tool menu and the tool bar functions cannot be used when the image mode is ROI-L, ROI-S, or C.SCAN.
- For the two-screen mode, these functions can be used only when the image mode is FULL.

For details, refer to the remarks below.

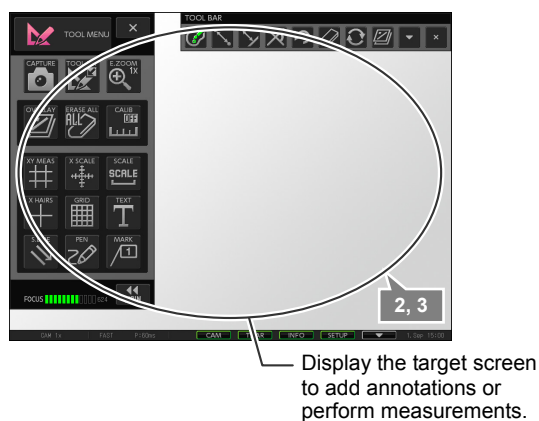
- 3 Add annotations or measure lengths and angles.

Add annotations using [TOOL MENU] and perform measurement using [TOOL BAR].

- 4 Display [TOOL MENU] or [CAM MENU].

- 5 Press the [CAPTURE] button.

Among scales on the screen, annotations, and measurement results that are displayed on the monitor, those specified in step 1 will be recorded without change as an image file in which they are embedded.



Adding annotations and performing measurements

✓ Automatic switching of the image mode

- When the image mode is [ROI-L/S] or [C.SCAN] with the live image, selecting the tool menu or tool bar automatically switches the image mode to [FULL].
- When images are replayed with the image mode being [ROI-L/S] or [C.SCAN], selecting the tool menu or tool bar automatically switches the image mode to [FULL], stops the replaying, and displays the live image.
- When the image is pausing with the image mode being [ROI-L/S] or [C.SCAN], selecting the tool menu or tool bar automatically switches the image mode to [FULL], releases the pausing condition, and displays the live image.
- In the case of two-screen mode, the image mode automatically switches to [FULL]. Setting the image mode to other than [FULL] during the two-screen mode switches the screen to the one-screen mode.



Capturing an image with [TOOL MENU]

(7) Capturing images by operations from PC

Capturing images from a PC connected by USB

When a PC is connected by a USB cable, you can capture images using the application “NIS-Elements” and store image files in the hardware disk of the PC directly.

When you connect a PC, set [USB DEVICE] of [OTHER] area of the [SETUP MENU: MAIN] screen to [Vendor]. With this setting, [PC saving] is shown in the [Capture operation assignment] area of the [SETUP MENU: ADDITIONAL] screen.

The storage destination on the PC is specified by NIS-Elements operation. For the configuration procedure, refer to the manual of NIS-Elements.

✔ PC connection and operation

- Refer to “3.2.5 (1) Connecting a PC” for how to connect a PC.
- For how to operate NIS-Elements, refer to the manual of NIS-Elements.

Capturing images from a PC through the network

When DS-L3 is connected to the network, you can access it from a PC on the network to capture images by web browser operations. You can directly download images onto the PC.

✔ Connecting to and using the network

- Refer to “3.2.6 Connecting to Network (LAN)” for how to connect to a PC.
- For how to operate a PC connected to the network, refer to “Chapter 16 Connecting to Network”.

8.2.5 Photographing Procedure Using DF/FL Scene Mode

When you capture the image of a dark subject or a fluorescent specimen, use [DF/FL] of [SCENE/CSM].
The operation of the [DF/FL] scene mode is different from other scene modes because it handles dark subjects.

✔ Setting the recording mode

Before capturing images, press the [REC MODE] button of the [CAM MENU: SHOT/REC] screen and do the following on the submenu. Configure the parameters properly according to how you intend to use the image and the condition of the subject.

- Image source: [FULL IMAGE] / [LIVE IMAGE]
- Image size
- File type

Registration of the [F MODE] button and [E MODE] button

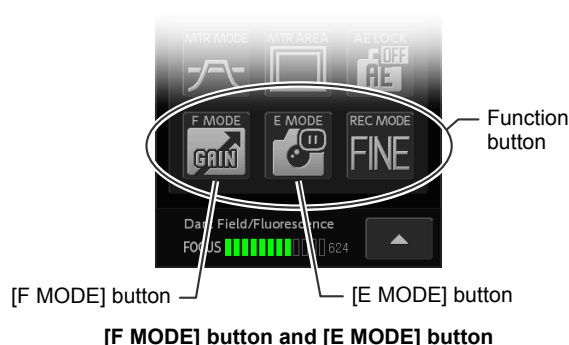
Registering the [F MODE] and [E MODE] buttons as function buttons of the [CAM MENU: CAMERA] long screen helps you operate in the [DF/FL] scene mode.

• [F MODE] mode button ([Focus assist mode] button)

Pressing this button changes [EXP MODE] to [MANU] and adjusts the exposure to raise the camera gain so that the exposure time will not be long. This exposure condition is maintained for the live image display; adjust the brightness with the camera gain and exposure time.

• [E MODE] button ([Exposure assist mode] button)

When this button is pressed, DS-L3 makes the exposure with a lower camera gain and makes the image pause. The image is displayed on the screen as a still image. Press the [CAPTURE] button to save the image.



[F MODE] button [E MODE] button

[F MODE] button and [E MODE] button

Note: These buttons cannot be used unless they are registered as function buttons. For how to register function buttons, refer to “13.2.3 Configuring Function Buttons”.

Photographing Procedure Using [DF/FL] Scene Mode

1 Adjust the white balance with a normal lighting before you set the subject.

If the image on the screen looks too dark or vignetting occurs, adjust the illumination, diaphragm, and/or ND filters.

2 Set the subject.

3 Press the [SCENE/CSM] button and select [DF/FL] from the submenu.

The [DF/FL] scene mode is enabled, and the camera gain is raised to make the exposure time as short as possible for focusing.

4 Set the image mode as necessary.

When photographing a dark subject, using an image mode for 2x2 or 4x4 binning will sharpen the sensitivity.

5 Set the photometry mode and photometry area as necessary.

Select a photometry mode suitable for the subject to change the photometry area size, to move it, or to customize it.



Set the subject after adjusting the white balance.

White balancing and setting the subject



Selecting the [DF/FL] scene mode

6 Press the [F MODE] button.

[EXP MODE] is changed to [MANU] and the exposure is adjusted raising the camera gain so that the exposure time will not be long.

This high-camera-gain exposure condition is maintained for the live image display; adjust the brightness with the camera gain and exposure time as necessary.

Note: A higher camera gain will lead to more noises for a dark subject.

7 Focus the camera on the subject.**8 Adjust [CAM GAIN] and [EXP TIME] to get the desired exposure.**

Make exposure adjustment if you are not using [F MODE].

9 Press the [E MODE] button.

DS-L3 makes an exposure setting of low camera gain and low noise for still image capturing.

A blue frame appears around the [FREEZE] button, and the still image is displayed on the screen.

10 Check the condition of the captured still image.

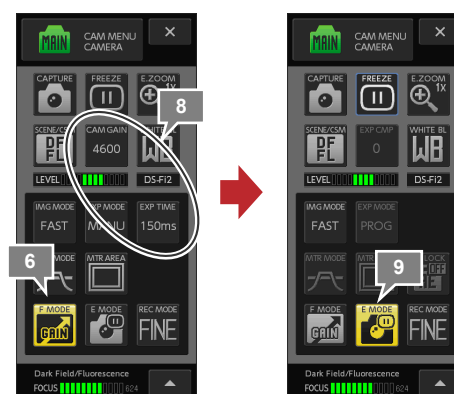
If the exposure result of the [E MODE] button is not satisfactory, close the still image by the [FREEZE] button, adjust the brightness by camera gain and exposure time while checking the live image, and then press the [E MODE] button to do exposure again.

Note: Adjust the exposure, or adjust the contrast and hue on the [CAM MENU: IMAGE] screen as necessary.

11 To save the image, press the [CAPTURE] button.

You hear the capture sound, and the image is captured according to the setting and is saved to an image file in the storage folder.

A different pointer shape shows on the touch panel LCD monitor while the image is saved. The task bar shows [SAVED 1/1] indicating that the image has been saved.



Using [F MODE] button and [E MODE] button



Focus on the subject using [F MODE] and check the image status by [E MODE]

Focusing and checking the image



Capturing an image

✓ **Finishing the [DF/FL] scene mode**

- When you finish the DF/FL scene mode, select some other scene mode or a custom setting.
- To cancel the pause set by the [E MODE] button, press the [FREEZE] button to close the still image and display the live image.

8.3 Configuring Photographing Details

[CAM MENU] includes setting screens of [CAMERA], [IMAGE], [NR/SD/SET], and [SHOT/REC] allowing you to configure various settings for viewing and capturing images.

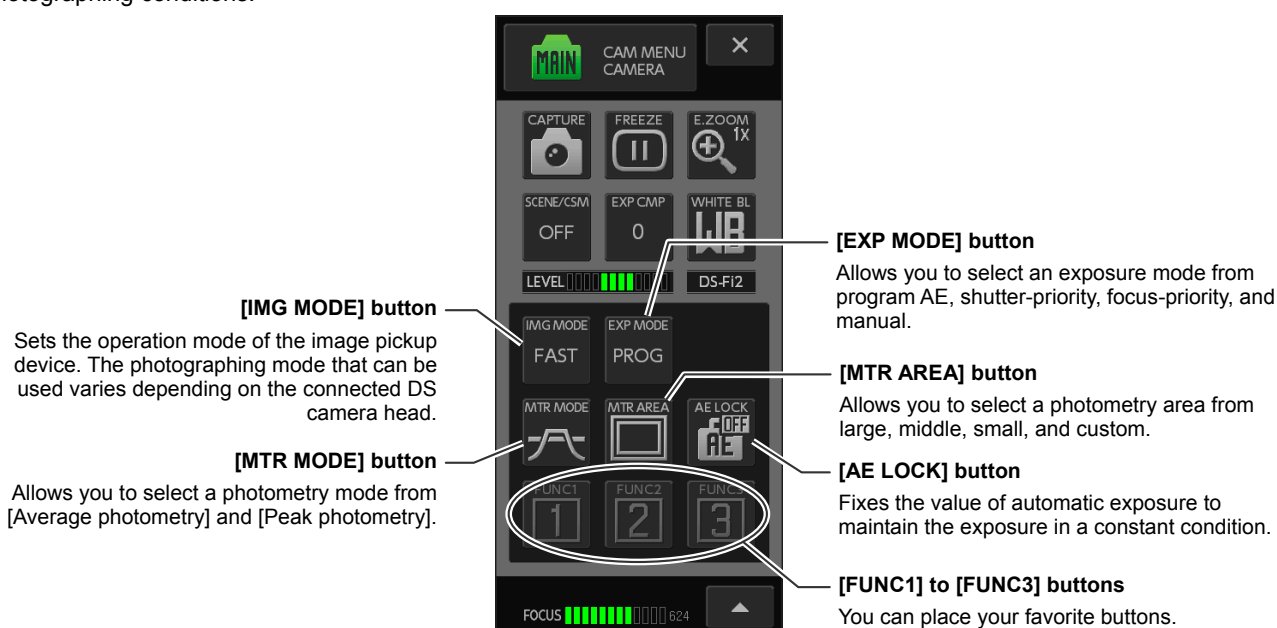
This section explains setting items of each screen in detail.

✓ Common operation items of CAM MENU

The upper half and bottom of the [CAM MENU] contains operation sections and indicators common among different screens. For how to operate these items, refer to “8.2 Basic Operations of Photographing”.

8.3.1 Setting Items of the [CAM MENU: CAMERA] Screen

The lower section of the [CAM MENU: CAMERA] long screen includes the following buttons for configuring basic photographing conditions.



[CAM MENU: CAMERA] long screen

Setting items of the [CAM MENU: CAMERA] screen

Button	Setting items	Reference
IMG MODE	Allows you to set the operation mode of the image pickup device for capturing images.	p.83
EXP MODE	Allows you to select from four options: program AE, shutter-priority, focus-priority, and manual.	p.86
MTR MODE	Allows you to select the mode (photometry mode) for measuring the brightness of the subject from “average photometry” and “peak hold photometry”.	p.88
MTR AREA	Allows you to select an area size (measurement area) for measuring the brightness of the subject. You can also set an arbitrary size and position of the photometry area.	p.89
AE LOCK	Fixes the exposure in the automatic exposure mode.	p.92
FUNC1 to FUNC3	You can assign any functions.	p.93

✓ [CAMERA MENU] screen size

The display size of the [CAMERA MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [CAM MENU: CAMERA] long screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[IMG MODE]	[EXP MODE]	[EXP TIME]	[MTR MODE]	[MTR AREA]
Small menu	[IMG MD]	[EXP MD]	[EXP TIM]	[MTR MD]	[AREA]

(1) Switching the image mode (operation mode of the image pickup device)

You can set the operation mode of the image pickup device for capturing images.

1 Display the [CAM MENU: CAMERA] long screen.

2 Press the [IMG MODE] button.

The [IMG MODE] submenu is displayed.

3 Select an image mode from the options below.

The image mode options displayed vary depending on the DS camera head used.

- [FULL]
- [2x2]
- [4x4]
- [FAST]
- [ROI-L]
- [ROI-S]
- [C. SCAN]

Selecting an image mode closes the submenu, and the text on the [IMG MODE] button changes in accordance with the selection.

Note: For details of each image mode, refer to the table below.

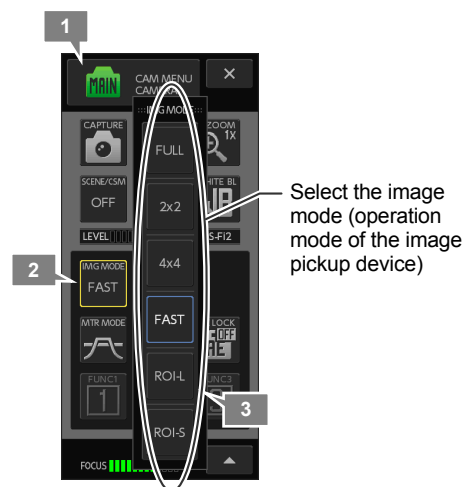


Image mode setting

! The size of the image saved

- The image size of each image mode varies depending on the DS camera head used.
- The size of the image actually saved varies depending on the *image size* setting and the *recording mode* setting of the [CAM MENU: SHOT/REC] screen.

! Image display speed

The display speed (refresh frequency) of the live image varies largely depending on the selection of the image mode. We recommend a fast image mode such as [FAST] for cases when you photograph a moving subject or do focus adjustment.

Image mode options

Option	Setting description	Use
FULL	This mode captures all pixels on the image pickup device. You will get high-definition images since photographing is made with the maximum resolution of the DS camera head.	Recording/displaying high-definition images
2x2	This mode obtains the image output on the image pickup device by integrating each 2X2 pixel range into one pixel (binning). This achieves four times the sensitivity, and therefore is suitable for photographing a dark subject.	Recording/displaying binning images
4x4	This mode obtains the image output on the image pickup device by integrating each 4X4 pixel range into one pixel (binning). This achieves 16 times the sensitivity, and therefore is suitable for photographing a dark subject.	Recording/displaying binning images
FAST	This mode compresses the information on the image pickup device to half the original size, doubling the speed of obtaining the image. The fast display speed of this mode suits a moving subject.	Recording/displaying images
ROI-L	This mode displays only the center area of the image pickup device in the full screen range. Capturing the image obtains the entire image on the image pickup device.	Recording/displaying fast partial images
ROI-S	This mode obtains and displays a lateral belt-shape area in the center of the image pickup device. Upper 1/4 and lower 1/4 of the screen are blacked out.	Recording/displaying fast partial images
C. SCAN	This mode obtains and displays a lateral belt-shape area in the center of the image pickup device. Upper 1/4 and lower 1/4 of the screen are blacked out.	Recording/displaying fast partial images

✔ Image modes selectable for each DS camera head

The applicable image mode options vary depending on the DS camera head connected. Refer to the table below for applicable image modes for each DS camera head.

✔ Automatic change of the image mode

In some cases, the image mode automatically changes with the following operations:

- **Selection of [SCENE/CSM]:**
The mode changes to the one registered as the scene mode/custom setting.
- **Execution of [CLR SET]:**
Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen changes the mode to [FAST] for DS-Fi2, Fi1, and Fi1c, and to [FULL] for DS-Vi1, Qi1Mc, and Ri1.
- **Setting [2WIN] display on:**
[FULL] is always selected as the image mode for the two-screen mode.
- **Selection of a function from [TOOL MENU] or [TOOL BAR]:**
If the image mode is [ROI-L], [ROI-S], or [C.SCAN], it automatically changes to [FULL].

✔ Image display for ROI-L/S and C.SCAN modes

- When the DS-L3 is not used with NIS-Elements software and the ROI-L/S or C.SCAN image mode is selected, the center portion of image data from the pickup device is shown.
- When the DS-L3 is connected to the PC with NIS-Elements software, the desired portion of the image data acquired can be displayed.

Image modes and sizes that can be selected for each DS camera head

The tables below show image modes selectable for each DS camera head type and details of each image mode.

DS-Fi2

Image mode	Read mode	Scan method	Frame rate	Recommended pixel count for recording
FULL	Frame read	Interlace	10 fps	2560 x 1920
2x2	Double integration	Interlace	18 fps	1280 x 960
4x4	Quadruple integration	Interlace	29 fps	640 x 480
FAST	Double speed	Progressive	21 fps	1280 x 960
ROI-L	Frame ROI	Interlace	19 fps	1280 x 960
ROI-S	Double speed ROI	Progressive	37 fps	1280 x 480

* Default: FAST

DS-Fi1 / DS-Fi1c

Image mode	Read mode	Scan method	Frame rate	Recommended pixel count for recording
FULL	Frame read	Interlace	5.9 fps	2560 x 1920
2x2	Double integration	Interlace	10 fps	1280 x 960
4x4	Quadruple integration	Interlace	17 fps	640 x 480
FAST	Double speed	Progressive	12 fps	1280 x 960
ROI-L	Frame ROI	Interlace	12 fps	1280 x 960
ROI-S	Double speed ROI	Progressive	23 fps	1280 x 480

* Default: FAST

DS-Vi1

Image mode	Read mode	Scan method	Frame rate	Recommended pixel count for recording
FULL	All pixels read	Progressive	15 fps	1600 x 1200
2x2	Double integration	Progressive	27 fps	800 x 600
FAST	Double speed	Progressive	29 fps	800 x 560
C. SCAN	Center scanning	Progressive	29 fps	800 x 560

* Default: FULL

DS-Qi1Mc

Image mode	Read mode	Scan method	Frame rate	Recommended pixel count for recording
FULL	All pixels read	Progressive	19 fps	1280 x 1024
2x2	Double integration	Progressive	31 fps	640 x 480
4x4	Quadruple integration	Progressive	48 fps	320 x 240
ROI-L	ROI (720p)	Progressive	24 fps	1280 x 720
ROI-S	ROI (480p)	Progressive	32 fps	640 x 480

* Default: FULL

DS-Ri1

Image mode	Read mode	Scan method	Frame rate	Recommended pixel count for recording
FULL	All pixels read	Progressive	19 fps	1280 x 1024
ROI-L	ROI (720p)	Progressive	24 fps	1280 x 720
ROI-S	ROI (480p)	Progressive	32 fps	640 x 480

* Default: FULL

✔ Image mode selection and annotation/measurement

Selecting [ROI-L], [ROI-S], or [C.SCAN] as the image mode clears all scales, annotations, and measurements on the screen.

(2) Changing the exposure mode

This system provides four exposure modes: the Program AE mode, the Shutter-priority AE mode, the Manual mode, and the focus-priority mode. You can switch the mode as required.

Note: The exposure mode is the Shutter-priority for [DF/FL] (Dark field/Fluorescence) scene mode, and the Program AE for other scene modes.

1 Display the [CAM MENU: CAMERA] long screen.

2 Press the [EXP MODE] button.

The [EXP MODE] submenu appears.

3 Select an exposure mode from the options below.

For details of each option, refer to the table below.

- [PROG] (default)
- [S.AE]
- [MANU]
- [F.AE]

When you select any of the above, the submenu closes and the icon of the [EXP MODE] button changes accordingly.



Exposure mode setting

Exposure mode options

Option	Description
PROG	Program AE. The exposure time and camera gain are automatically set according to the brightness of the subject. Suitable for bright objects.
S.AE	Shutter-priority. The camera gain is automatically set according to the manual setting of the exposure time. Suitable when stable responsiveness is wanted for automatic exposure. (e.g., with a stereoscopic microscope)
MANU	Manual exposure mode. The user sets both the exposure time and camera gain manually. Suitable when capture is repeated under a specific exposure setting or for a specific purpose such as fluorescence microscopy and observation under a stereoscopic or metallurgical microscope.
F.AE	Focus-priority. Increases the camera gain to keep the exposure time short for an easier focusing operation during capture of a dark object. Bright spots or banding noise may increase with this mode. Use the [E MODE] function button in combination with this mode to facilitate image capture with less noise. Press the [E MODE] button to change to the Exposure assist mode. Exposure time becomes longer, the camera gain lower, and the noise less compared to the F.AE mode. Captured data is shown as a still image.

✓ Automatic change of the exposure mode

In some cases, the exposure mode changes with the following operations:

- **Selection of [SCENE/CSM]:**
The mode changes to the one registered as the scene mode/custom setting.
- **Execution of [CLR SET]:**
Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen changes the exposure mode to [PROG].
- **Enabling [F MODE] (focus assist mode):**
Setting the [F MODE] (function button) on changes the exposure mode to [MANU].
- **Enabling [E MODE] (exposure assist mode):**
Setting the [E MODE] (function button) on changes the exposure mode to [MANU].

✔ Program AE setting

The table below shows the maximum camera gain and the longest exposure time for program AE.

DS camera head	Camera gain	Exposure time
DS-Fi2	630	1 s
DS-Fi1 / Fi1c	630	1 s (60 ms for ROI-S)
DS-Vi1	630	1 s (60 ms for C.SCAN)
DS-Qi1Mc/Ri1	630	1 s

✔ Focus-priority mode and focus assist mode

Differences in the DS-L3 operation process between using the focus-priority mode and focus assist mode are as follows:

- **When [F.AE] (focus priority) is selected with [EXP MODE] button**
If brightness of a subject changes as objectives are switched or diaphragm is adjusted, the camera gain is automatically adjusted to minimize user's task of focusing. Camera gain: 4600 max; exposure time: 150 ms max.
- **When the focus assist mode is selected with [F MODE] button**
As [F MODE] button is pressed, F.AE automatically adjusts the exposure, then the exposure mode changes to [MANU] automatically. Using the [F MODE] is suitable for application where switching of objectives or illumination is less frequent. Camera gain: 4600 max.

✔ Exposure time for the F.AE (focus priority) mode

The maximum exposure time for the F.AE mode depends on the DS camera head used and the setting for [IMG MODE]. See the table below for details.

DS Camera Head	FULL	2x2	4x4	FAST	ROI-L	ROI-S
DS-Fi2	100 ms	60 ms	40 ms	60 ms	60 ms	30 ms
DS-Fi1 / Fi1c	200 ms	100 ms	80 ms	100 ms	100 ms	60 ms

DS Camera Head	FULL	2x2	FAST	C.SCAN
DS-Vi1	80 ms	40 ms	40 ms	40 ms

DS Camera Head	FULL	2x2	4x4	ROI-L	ROI-S
DS-Qi1Mc	60 ms	40 ms	30 ms	60 ms	40 ms

DS Camera Head	FULL	ROI-L	ROI-S
DS-Ri1	60 ms	60 ms	40 ms

(3) Switching the metering mode

Select a mode to measure the brightness of the object (the metering mode).

Note: The average photometry mode is suitable for most cases. Use the peak mode for a large object with uneven brightness to observe brighter areas.

1 Display the [CAM MENU: CAMERA] long screen.

2 Press the [MTR MODE] button.

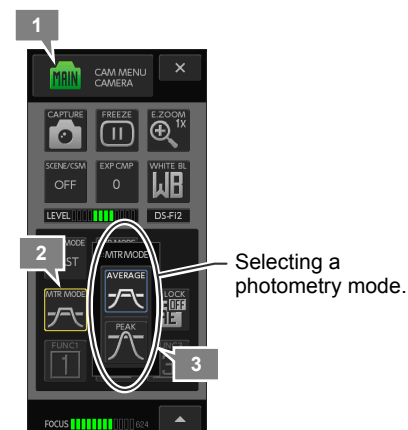
The [MTR MODE] submenu appears.

3 Select a photometry mode from the options below.

For details of each option, refer to the table below.

- [AVERAGE] (default)
- [PEAK]

When you select a metering mode, the submenu closes and the icon of the [MTR MODE] button changes accordingly.



Photometry mode setting

Photometry mode options

Option	Description
Average	Average photometry mode. The average exposure in the photometry area is adjusted to a predetermined value. Suitable for most cases, this mode is used typically in bright-field microscopy for a subject with even brightness over the entire surface when viewed on the monitor.
Peak	Peak hold photometry mode. The highest (peak) exposure in the photometry result is adjusted to a predetermined value. Suitable for objects with some bright areas and a dark background.

✓ Automatic change of the photometry mode

In some cases, the photometry mode changes with the following operations:

- **Selection of [SCENE/CSM]:**
The mode changes to the one registered as the scene mode/custom setting.
- **Execution of [CLR SET]:**
Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen changes the photometry mode to [AVERAGE].

(4) Switching the metering area

Select the size of the area for metering brightness of the object (metering area) and move the area to an arbitrary position on the screen if necessary.

1 Display the [CAM MENU: CAMERA] long screen.

2 Press the [MTR AREA] button.

The [MTR AREA] submenu appears.

3 Select a size of the metering area.

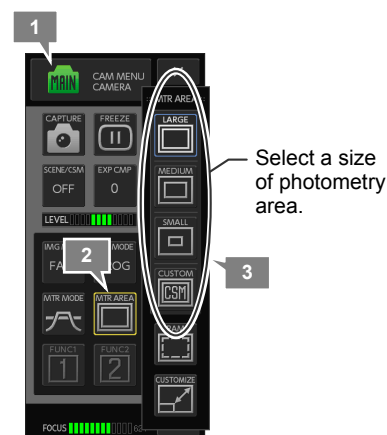
For details of each option, refer to the table below.

- [LARGE] (default)
- [MEDIUM]
- [SMALL]
- [CUSTOM]

When you select a metering area size, the icon of the [MTR AREA] button changes accordingly.

When [LARGE], [MEDIUM], or [SMALL] metering area size is selected, the metering area is positioned at the screen center.

Note: The photometry area is used for white balancing.



Switching the size of photometry area

Options of photometry area

Option	Description
Large	This mode measures the brightness in the 90%-size area of the photographed image.
Medium	This mode measures the brightness in the 50%-size area of the photographed image.
Small	This mode measures the brightness in the 20%-size area of the photographed image.
Custom	The photographer specifies the photometry area. Refer to "Customizing the photometry area" for setting details.

✔ Setting for power-on

- The size and position of the photometry area is saved at the time of power-off and recovered at the next power-on. If [[CUSTOM No] is set to a registered custom option number in the [SETUP MENU: MAIN], the photometry area size specified by the custom setting is used.
- If the metering area is set to [CUSTOM] for custom settings registration, the resulting metering area will be half the size of [SMALL] with (or a quarter). The position is set to the center.

✔ Automatic change of the photometry area

In some cases, the photometry area changes with the following operations:

• Selection of [SCENE/CSM]:

The photometry area size is changed to the value registered in the scene mode/custom setting. The area position becomes the center of the screen. If the metering area is set to [CUSTOM] for custom settings registration, the resulting metering area will be half the size of [SMALL] with (or a quarter). The position is set to the center.

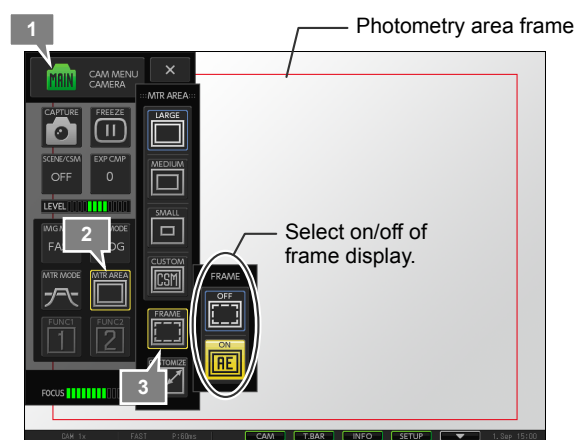
• Execution of [CLR SET]:

Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen changes the photometry area size to [LARGE] and its position to the center.

Displaying the frame of the photometry area

Display the frame marking the metering area range. This system allows you to operate normally even if the metering area frame is displayed.

- 1 Display the [CAM MENU: CAMERA] long screen.**
- 2 Press the [MTR AREA] button.**
The [MTR AREA] submenu appears.
- 3 Press the [FRAME] button.**
The [FRAME] submenu appears.
- 4 Select the photometry area display using the [ON] and [OFF] buttons.**
Selecting any of them closes the submenu.
When [ON] is selected, the photometry area frame is shown on the screen.



Photometry area frame display

✓ Photometry area frame display

The photometry area frame becomes off with the following operations:

- **Power-off:**
The on/off of the frame display is not saved. The photometry area frame becomes off when the power is turned on.
- **Pause:**
The frame display becomes off when the live image pauses. Resuming the live image returns the frame display on.
- **Setting two-screen mode on:**
Switching the screen to the two-screen mode sets the frame display off. Changing the live image back to the one-screen mode returns the frame display on.
- **Displaying [VIEW MENU] and [TOOL MENU] (including [TOOL SET])**
The frame display becomes off when any of these menus is displayed. When the screen returns to [CAM MENU] and the live image is in the one-screen mode, the frame display returns to on.

Customizing the photometry area

DS-L3 allows you to specify the photometry area in any way. You can specify the area on the screen and move it to a desired position or to the center.

- 1** Display the [CAM MENU: CAMERA] long screen.

- 2** Press the [MTR AREA] button.

The [MTR AREA] submenu is displayed.

- 3** Press the [CUSTOMIZE] button.

[CAM MENU] closes and the [CUSTOMIZE] menu opens.

- 4** Operate on the [CUSTOMIZE] menu to specify any photometry area.

The following operations can be made on the [CUSTOMIZE] menu:

- **Setting a new photometry area:**

Press the [NEW AREA] button, and specify two points on the screen that define a rectangle area.

Specifying two points on the screen displays the rectangle that includes these points as its diagonal vertices, and specifies the rectangle as the photometry area.

- **Moving the photometry area:**

Press the [MOVE] button, and specify a point with a stylus or mouse. The photometry area moves by aligning its center with the specified point.

Note: You cannot move the photometry area outside the screen.

- **Moving the photometry area to the center of the screen:**

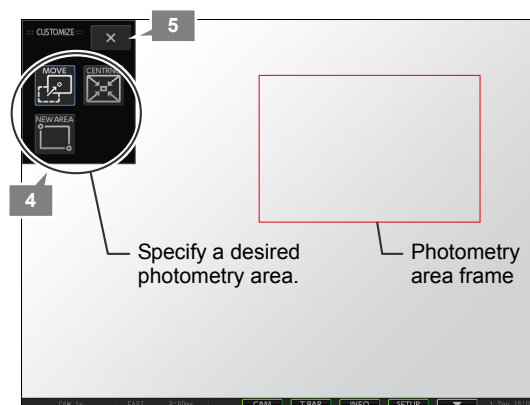
Pressing the [CENTRNG] button moves the photometry area to the center of the screen without changing its size.

- 5** When the photometry area setting is completed, press the [X] button to close the [CUSTOMIZE] menu.

The [CAM MENU: CAMERA] long screen is displayed again.

Customizing the [NEW AREA] of the photometry area automatically brings the photometry area into effect. When you return to [CAM MENU], the [MTR AREA] button has changed to [CUSTOM].

Note: Setting the frame on displays the photometry area frame on the screen allowing you to see the actual photometry area.



Customizing the photometry area

✔ **Setting of photometry area for power-on**

- The size and position of the photometry area is saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] is set to a registered custom option number in the [SETUP MENU: MAIN], the photometry area size specified by the custom setting is used. The position is set to the center.
- If the metering area is set to [CUSTOM] for custom settings registration, the resulting metering area will be half the size of [SMALL] with (or a quarter). The position is set to the center.

(5) Using the AE lock

When the exposure mode is Program AE, Shutter-priority AE, or focus-priority, it is possible to adjust and lock the exposure for a particular part of the object.

Use this function when you observe the specimen with a fixed exposure or when the brightness of the part for which the exposure is to be adjusted is significantly different from the other parts.

- 1 Display the [CAM MENU: CAMERA] long screen.
- 2 Confirm that the exposure mode is either program AE, shutter-priority, or focus-priority.

Confirm that either [PROG] (program AE), [S. AE] (shutter-priority), or [F. AE] (focus-priority) is shown on the [EXP MODE] button.

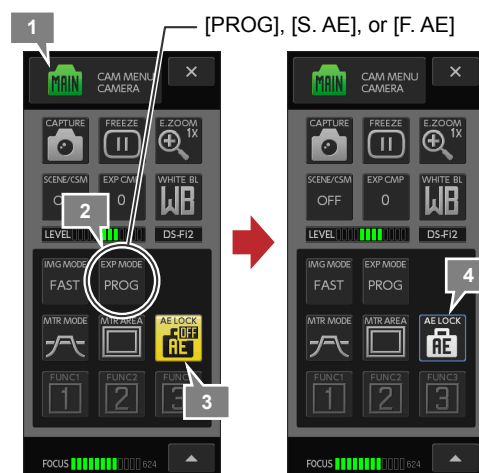
Note: When the exposure mode is [MANU] (manual exposure), the [AE LOCK] button is not shown.

- 3 Press the [AE LOCK] button at the position for which you want to lock the exposure.

The exposure is fixed at this time. A blue frame is shown around the [AE LOCK] button, and the [OFF] mark on the icon disappears.

- 4 To release the AE lock, press the [AE LOCK] button again.

[OFF] appears on the [AE LOCK] button icon.



Using AE lock
(Program AE, shutter-priority, focus-priority)

✓ Automatic release of the AE lock

The AE lock is released when:

- DS-L3 is turned off; or
- [SCENE/CSM], [EXP MODE], [CLR SET], [EXP CMP], or [F MODE] button is operated.

(6) How to use function buttons

In the bottom of the [CAM MENU: CAMERA] long screen, you can place buttons of frequently-used functions as three function buttons, which can be operated on [CAM MENU].

The following functions can be assigned to function buttons:

Screen	Function (button)
[CAM MENU: IMAGE]	Brightness, RB adjustment, chroma, hue, color effect, black level, contrast, and sharpness
[CAM MENU: NR/SD/SET]	NR, SD, clear setting, and custom setting (registration)
[CAM MENU: SHOT/REC]	Continuous shot mode, log saving, and recording mode
—	F mode (focus assist mode), E mode (exposure assist mode)
[TOOL MENU]	XY measurement, X scale, scale, cross hairs, grid, text, straight line, pen, and marker



Function button 1 to 3

Function buttons

✓ How to register function buttons

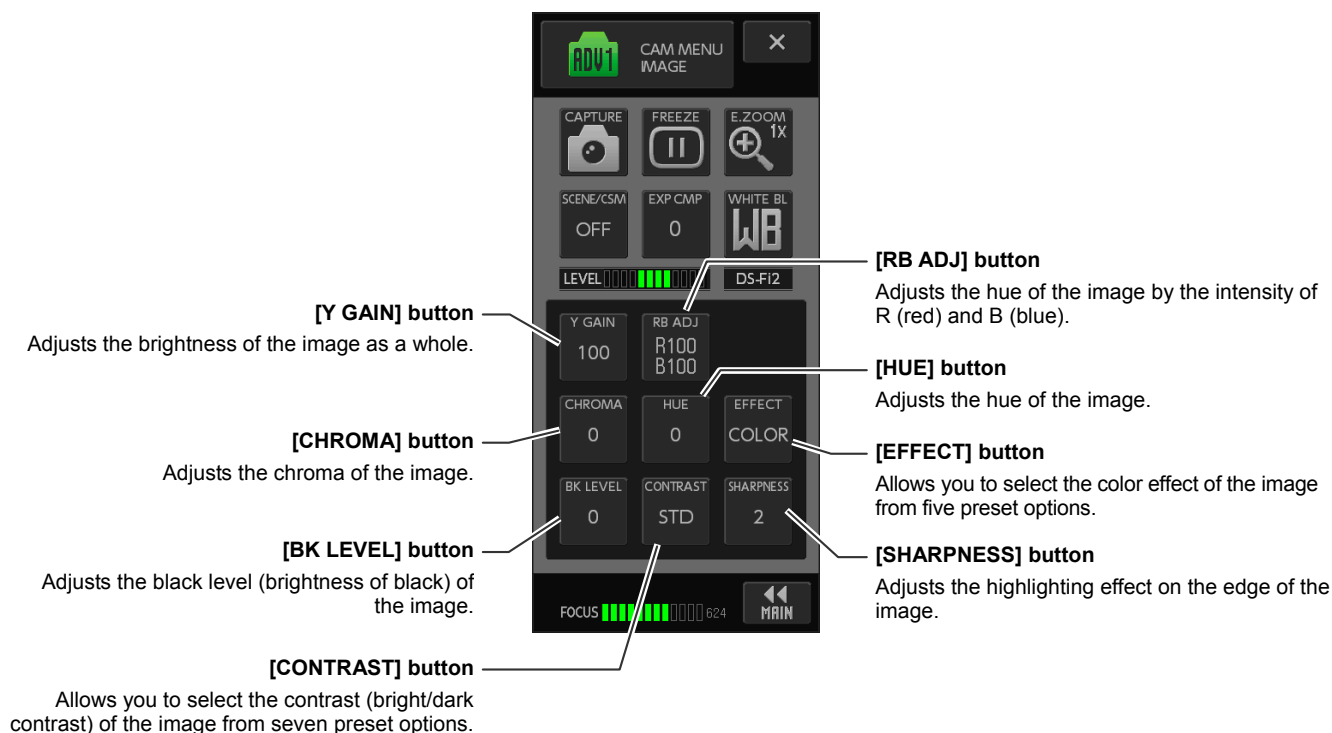
For how to register functions as function buttons, refer to “13.2.3 Configuring Function Buttons”.

[F MODE] button and [E MODE] button

Of the functions that can be assigned to a function button, [F MODE] and [E MODE] functions are only accessible after their functions are assigned to a function button. [F MODE] and [E MODE] buttons are not displayed on the default menu. For details, refer to “13.2.3 Configuring Function Buttons”.

8.3.2 Setting Items of the [CAM MENU: IMAGE] Screen

There are following setting items on the [CAM MENU: IMAGE] screen:



Displayed items of the [CAM MENU: IMAGE] screen

Setting items of the [CAM MENU: IMAGE] screen

Button	Setting item	Reference
Y GAIN	Adjusts the brightness of the image as a whole.	p.96
RB ADJ	Adjusts the hue of the image by the intensity of R (red) and B (blue).	p.96
CHROMA	Adjusts the chroma of the image.	p.96
HUE	Adjusts the hue of the image.	p.96
EFFECT	Allows you to select the color effect of the image from five preset options.	p.96
BK LEVEL	Adjust the black level (brightness of black) of the image.	p.96
CONTRAST	Allows you to select the contrast (bright/dark contrast) of the image from seven preset options.	p.97
SHARPNESS	Adjust the highlighting effect on the edge of the image.	p.96

✓ [CAMERA MENU] screen size

The display size of the [CAMERA MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [CAM MENU: IMAGE] screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[CHROMA]	[BK LEVEL]	[CONTRAST]	[SHARPNESS]
Small menu	[CHRM]	[BK LVL]	[CNTRST]	[SHRPNS]

(1) Adjusting the image

The [CAM MENU: IMAGE] screen allows you to adjust the brightness, hue, contrast, and other details of the image.

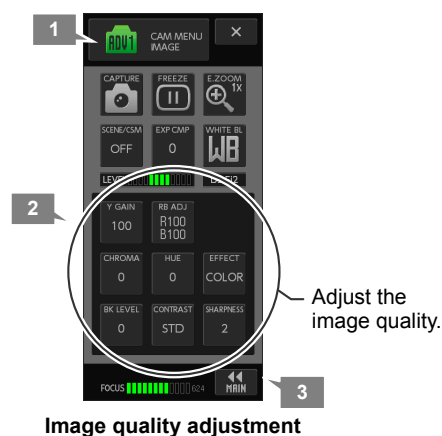
- 1 Display the [CAM MENU: IMAGE] screen.
- 2 Press one of the following buttons to open a submenu for image adjustment.

For details of each setting, refer to the description below.

- Brightness
- Color effect
- RB adjustment
- Black level
- Chroma
- Contrast
- Hue
- Sharpness

- 3 Press the [◀ MAIN] button to return to the [CAM MENU: CAMERA] menu.

Pressing the [X] button closes [CAM MENU].



✔ Setting for power-on

The settings in the [CAM MENU: IMAGE] screen are saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the setting specified by the custom setting is used.

✔ Automatic change of setting values

In some cases, settings of items on the [CAM MENU: IMAGE] screen may be changed by the following operations:

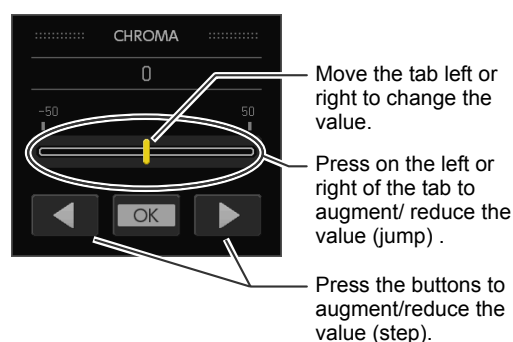
- **Selection of [SCENE/CSM]:**
The mode changes to the one registered as the scene mode/custom setting.
- **Execution of [CLR SET]:**
Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen changes the setting value of each item to the initial value.

Image adjustment operation

Adjustment is made by the buttons and slider in the submenu. Adjust the image to the desired condition viewing the live image.

- (1) Pressing the [◀] or [▶] buttons below the slider changes the value with the smallest steps. The [▶] button makes the value larger and the [◀] button makes it smaller. The amount of the value changed by one operation is called a “step”.
- (2) Pressing the yellow tab of the slider and moving it left or right makes larger changes in the value. The value becomes larger when the tab is moved right, and smaller when moved left.
- (3) Pressing any part of the slider other than the tab position changes the value by a “step” or by several times the value of a step. The value becomes larger when the right side of the tab is pressed, and smaller when the left side is pressed. The amount of the value changed by one operation is called a “jump”.

Press the [OK] button to commit the setting value. On a submenu that only has button selections, pressing a button commits the selection.



Setting items of the [CAM MENU: IMAGE] screen

- **Brightness:**

Adjusts the brightness of the image as a whole. A value can be selected from the 20 to 260 range, where 100 indicates the brightness captured at white balancing (initial value: 100, step: 1, jump: 5).



[Y GAIN] submenu

- **RB adjustment:**

Adjusts the hue of the image by the intensity of R (red) and B (blue).

A value can be selected from the 50 to 150 range, where 100 indicates the brightness captured at white balancing (initial value: 100, step: 1, jump: 5).

Note: This menu is not displayed when DS-Qi1Mc is connected.



[R ADJUST/ B ADJUST] submenu

- **Chroma:**

Adjusts the chroma. A value can be selected from the -50 to +50 range (initial value: 0, step: 1, jump: 5).

Note: This menu is not displayed when DS-Qi1Mc is connected.



[CHROMA] submenu

- **Hue:**

Adjusts the hue of the image. A value can be selected from the -50 to +50 range (initial value: 0, step: 1, jump: 5).

Note: This menu is not displayed when DS-Qi1Mc is connected.



[HUE] submenu

- **Color effect:**

A color effect of the image can be selected from five preset options (initial setting: color; monochrome for DS-Qi1Mc).

Note 1: [BLUE-B] is an effect to show [NEGA] in a blue-to-white gradation.

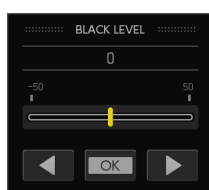
Note 2: For DS-Qi1Mc, only [B&W] and [NEGA] are displayed.



[EFFECT] submenu

- **Black level:**

Adjusts the black level (brightness of black) of the image. (Initial value: 0, step: 1, jump: 5)

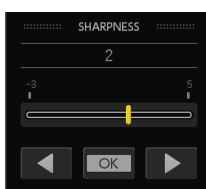


[BK LEVEL] submenu

- **Sharpness:**

Adjusts the highlighting effect on the edge of the image. A value can be selected from the -3 (soft) to +5 (sharp) range (initial value: 2, step: 1, jump: 1).

Note: This menu is not displayed when DS-Qi1Mc is connected.



[SHARPNESS] submenu

- **Contrast:**

Select a tone curve for adjusting the contrast of the image from the following preset options (initial value: standard). Select a setting that is appropriate for observing the subject.

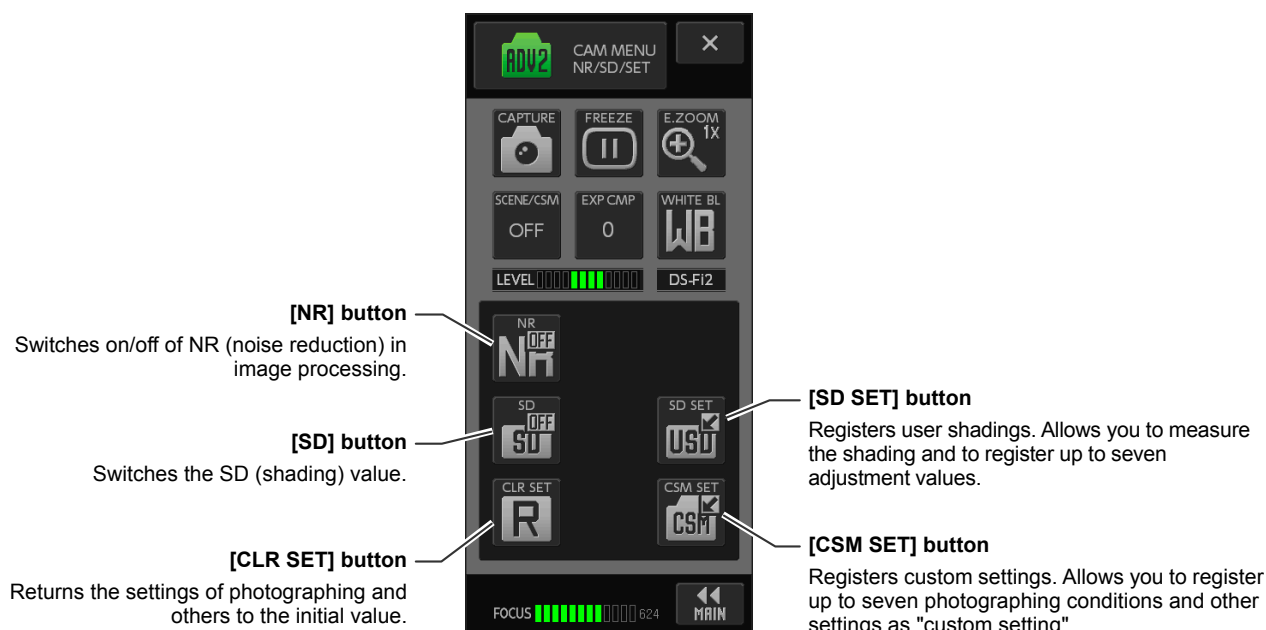
Option	Description
WIDE D (Wide dynamic range)	Use this option when you need a gradation covering from the darkest section to the brightest section for a subject that has high-brightness reflection. Recommended for: IC chips, substrates, gears, etc.
WEAK (Weak contrast)	Use this option to reduce the contrast. Recommended for: cells, tissue, and other ordinary subjects.
STD (Standard contrast)	Use this option for ordinary photographing. Recommended for: cells, tissue, and other ordinary subjects.
STRONG (Strong contrast)	Use this option to have strong contrast in the image. Recommended for: cells, tissue, and other ordinary subjects.
LINEAR	Use this option to obtain an output that is straight (linear) relative to the input. Use this option to study the light intensity differences from the photographed data. Recommended for: DIC observation, PH observation.
METAL	Use this option to obtain a high-contrast image while suppressing the irregularity in brighter sections. Recommended for: metal tissue, ceramic materials.
ENH	Use this option to make observation with high contrast. Recommended for: metal tissue, ceramic materials, documentation photograph with lens, etc.



[CONTRAST] submenu

8.3.3 Setting Items of the [CAM MENU: NR/SD/SET] Screen

There are following setting items on the [CAM MENU: NR/SD/SET] screen:



Displayed items of the [CAM MENU: NR/SD/SET] screen

Setting items of the [CAM MENU: NR/SD/SET] screen

Button	Description	Reference
NR	Switches on/off of NR (noise reduction) in image processing.	p.99
SD	Switches the SD (shading) value.	p.100
SD SET	Registers user shadings. Allows you to measure the shading and to register up to seven adjustment values.	p.101
CSM SET	Registers custom settings. Allows you to register up to seven photographing conditions and other settings as "custom setting".	p.102
CLR SET	Returns the settings of photographing and others to the initial value.	p.103

✓ [CAMERA MENU] screen size

The display size of the [CAMERA MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see "13.2.1 (5) Configuring the position and size of the menu".

(1) Setting NR (noise reduction)

DS-L3 can reduce image noises by averaging out multiple frames. Follow the steps below to switch the noise reduction on and off.

1 Display the [CAM MENU: NR/SD/SET] screen.

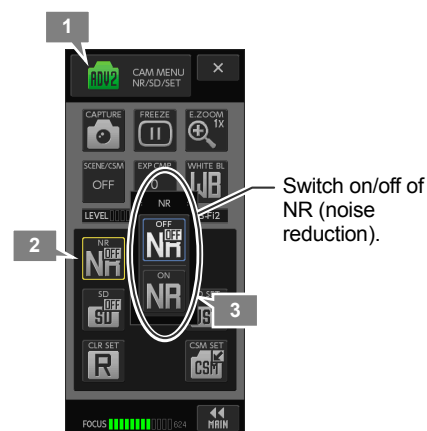
2 Press the [NR] button.

The [NR] submenu is displayed.

3 Press one of the following buttons in the submenu to switch the noise reduction (NR) on or off.

- [OFF] (default)
- [ON]

Selecting any of these buttons closes the submenu, and the icon of the [NR] button changes in accordance with the selection.



Setting NR (noise reduction)

NR (noise reduction) options

Option	Description
OFF	Noise reduction is not used. (default)
ON	Noise reduction is used.

✔ Effect of noise reduction

Setting the noise reduction on reduces noises in the screen showing a clear image.

However, setting noise reduction on creates residual images; set it off when you photograph a moving object or need quicker responses for focusing or other occasions.

✔ Setting for power-on

The noise reduction setting is saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the setting specified by the custom setting is used.

✔ Automatic change of setting values

In some cases, the on/off of noise reduction changes with the following operations:

- **Selection of [SCENE/CSM]:**
The mode changes to the one registered as the scene mode/custom setting.
- **Execution of [CLR SET]:**
Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen sets noise reduction off.

(2) Selecting an SD (shading) value

Shading adjustment refers to correction of unevenness in sensitivity between the center and rim of the screen due to lower light intensity or other causes. You can perform shading adjustment by the illumination and optics methods.

DS-L3 provides two type of shading adjustment: standard adjustment values of 10% to 50% and seven user-defined adjustment values.

✔ Use of the standard adjustment values and user-defined shadings

- Use the 10% to 50% standard adjustment values for compensating the light intensity degradation from the center to the rim of the screen.
Select a value viewing the screen.
- A user-defined shading is used for correcting an asymmetrical unevenness. The shading condition is measured in advance, and an adjustment value that has been registered is used.

1 Display the [CAM MENU: NR/SD/SET] screen.

2 Press the [SD] button.

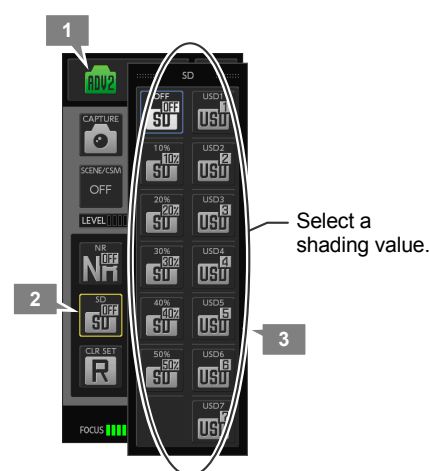
The [SD] submenu is displayed.

3 Select a shading adjustment value from the following options:

For details of each option, refer to the table below.

- [OFF]
- [10%] to [50%]
- [USD1] to [USD7]

Selecting any of them closes the submenu, and the icon of the [SD] button changes.



Setting an SD (shading) value

SD (shading) adjustment value options

Option	Description
OFF	Shading is not performed.
10% to 50%	Sets the shading adjustment value to 10%, 20%, 30%, 40%, or 50%, respectively.
User SD1 to SD7	Uses a registered user-defined shading adjustment value. Up to seven values can be registered.

✔ Registration of user-defined shading adjustment values

You need to register adjustment values in advance to use user-defined shading. For how to register them, refer to “(3) Registering SD (shading) adjustment value”.

Adjustment is not made if you select an unregistered user-defined shading.

✔ Setting for power-on

The shading adjustment value selection is saved at the time of power-off and recovered at the next power-on. If [CUSTOM No] has been configured in the [SETUP MENU: MAIN], the setting specified by the custom setting is used.

✔ Automatic change of setting values

In some cases, the SD adjustment value changes with the following operation:

• Execution of [CLR SET]:

Executing [CLR SET] in the [CAM MENU: NR/SD/SET] screen sets SD adjustment value off.

✔ Shading disabled with ROI-L/S or C.SCAN mode

If the image mode is set to [ROI-L], [ROI-S], or [C.SCAN], shading adjustment is disabled, and the [SD] and [SD SET] buttons will be unavailable.

(3) Registering SD (shading) adjustment value

Follow the steps below to register a user-defined shading adjustment value.

- 1 Find an evenly colored subject, and set it so as to be viewed across the entire screen.

Make sure that there is no obstacle to block the light.

- 2 Display the [CAM MENU: NR/SD/SET] screen.

- 3 Press the [SD SET] button.

The [SD SET] submenu is displayed.

- 4 Press the [MEAS START] button.

The shading is measured, and a blue frame shows on the button when it is completed.

Note: The measurement data may not be obtained properly when the shading is large.

- 5 Press a desired button from among [USD1] to [USD7] for specifying the registration number.

Pressing a button shows a blue frame on the button, indicating that the [OK] button can now be pressed.

Note: The step 4 and 5 can be interchanged.

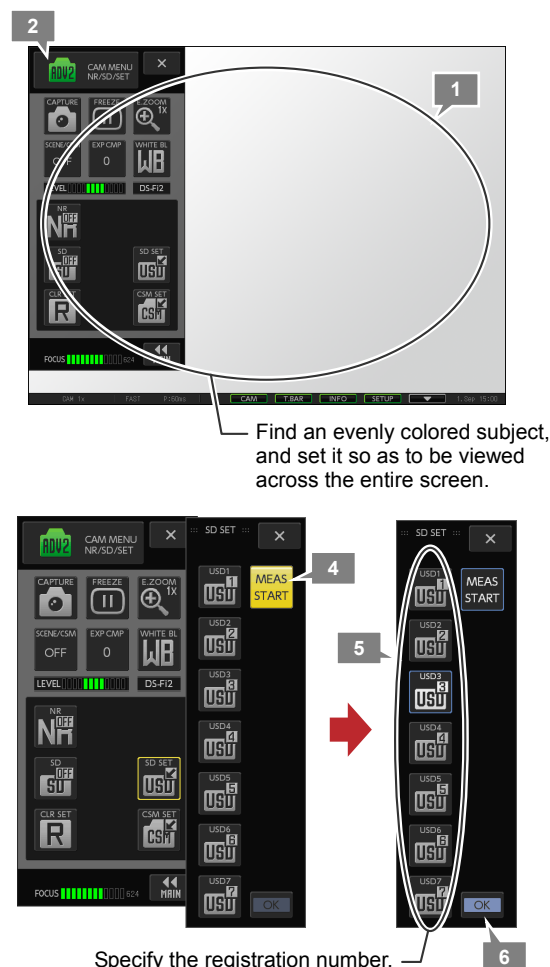
- 6 Press the [OK] button to register the user-defined shading adjustment value.

The [SD SET] submenu closes.

Note: When you have registered a user-defined shading adjustment value and closed the [SD SET] submenu, the [SD] button shows the registered user-defined shading adjustment value being selected.

✓ Shading disabled with ROI-L/S or C.SCAN mode

If the image mode is set to [ROI-L], [ROI-S], or [C.SCAN], shading adjustment is disabled, and the [SD] and [SD SET] buttons will be unavailable.



Registration of user-defined shading adjustment values

(4) Registering a custom setting

The current setting for image capturing can be saved as a “custom mode”. Up to seven settings can be saved as custom modes.

1 Set conditions for image capturing.

Set desired conditions for image capturing by referring to the description of this chapter.

2 Display the [CAM MENU: NR/SD/SET] screen.

3 Press the [CSM SET] button.

The [CSM SET] submenu is displayed.

4 Press a desired button from among [CSM1] to [CSM7] for specifying the registration number.

After selecting a custom mode, you may press the [OK] button to save the custom setting.

5 Press the [CMNT] button, if necessary, to add a comment to the custom setting with up to 15 characters.

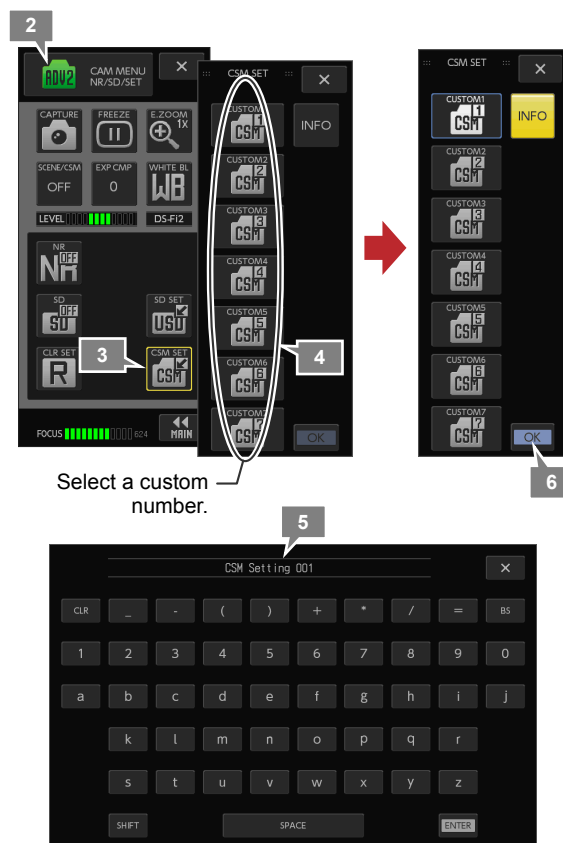
When you press the [CMNT] button, the keypad appears. Press any keys to enter the necessary information.

The upper-case and lower-case characters can be switched by the [SHIFT] button. To delete the entry, press the [CLR] button. To move backward by one character, press the [BS] button. Pressing the [X] button closes the keypad without saving the comment.

6 To register the custom setting, press the [OK] button.

The current setting is saved as the selected custom mode and the [CSM Setting] submenu closes.

Note: When you have registered a custom setting and closed the [CSM SET] submenu, the [SCENE/CSM] button shows that the custom setting is selected.



Registering custom setting

✓ Recall of a custom setting and automatic selection at the time of startup

- For how to recall a custom setting, refer to “8.2.1 (2) Using custom setting”.
- You can configure DS-L3 to start up with the desired custom setting selected, when the power is turned on. For the setting method, refer to “13.2.1 (1) Calling custom settings on startup”.

✓ Comments of custom settings

Selecting a custom setting by the [SCENE/CSM] button shows the comment, entered when the custom setting was registered, at the bottom of [CAM MENU].

Comment entered at the time of registration



Comment of a custom setting

✓ Photographing conditions resisted as custom settings

- Image mode (FULL, 2x2, 4x4, FAST, ROI-L, ROI-S, or C.SCAN)
- Exposure mode (program AE, shutter-priority, focus-priority, or manual)
- Exposure time setting value
- Camera gain setting value
- Exposure adjustment value
- White balance
- Photometry mode, photometry area
- Image adjustment (brightness, RB adjustment, chroma, hue, color effect, black level, contrast, sharpness)
- Image quality adjustment setting (NR/SD)

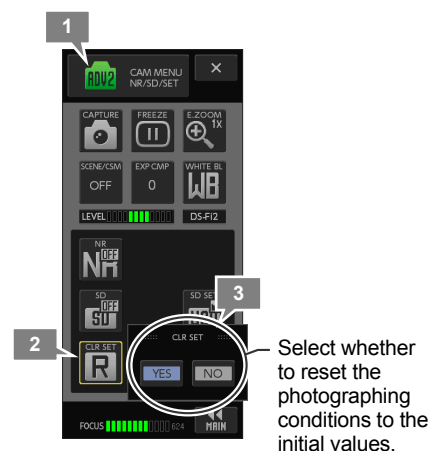
(5) Returning the photographing condition to the initial value

You can reset the photographing conditions configured in [CAM MENU] to the initial values with a simple operation. Operate in the following procedure:

- 1 **Display the [CAM MENU: NR/SD/SET] screen.**
- 2 **Press the [CLR SET] button.**
A message displays for confirmation of the setting clear operation.
- 3 **To reset the photographing condition settings to the initial values, press [YES]; not to reset, press [NO].**
The photographing condition is reset to the initial values if you press [YES].






✓ White balance setting

Executing [CLR SET] does not clear the current white balance setting. Adjust the setting as needed.



Returning the photographing condition to the initial value

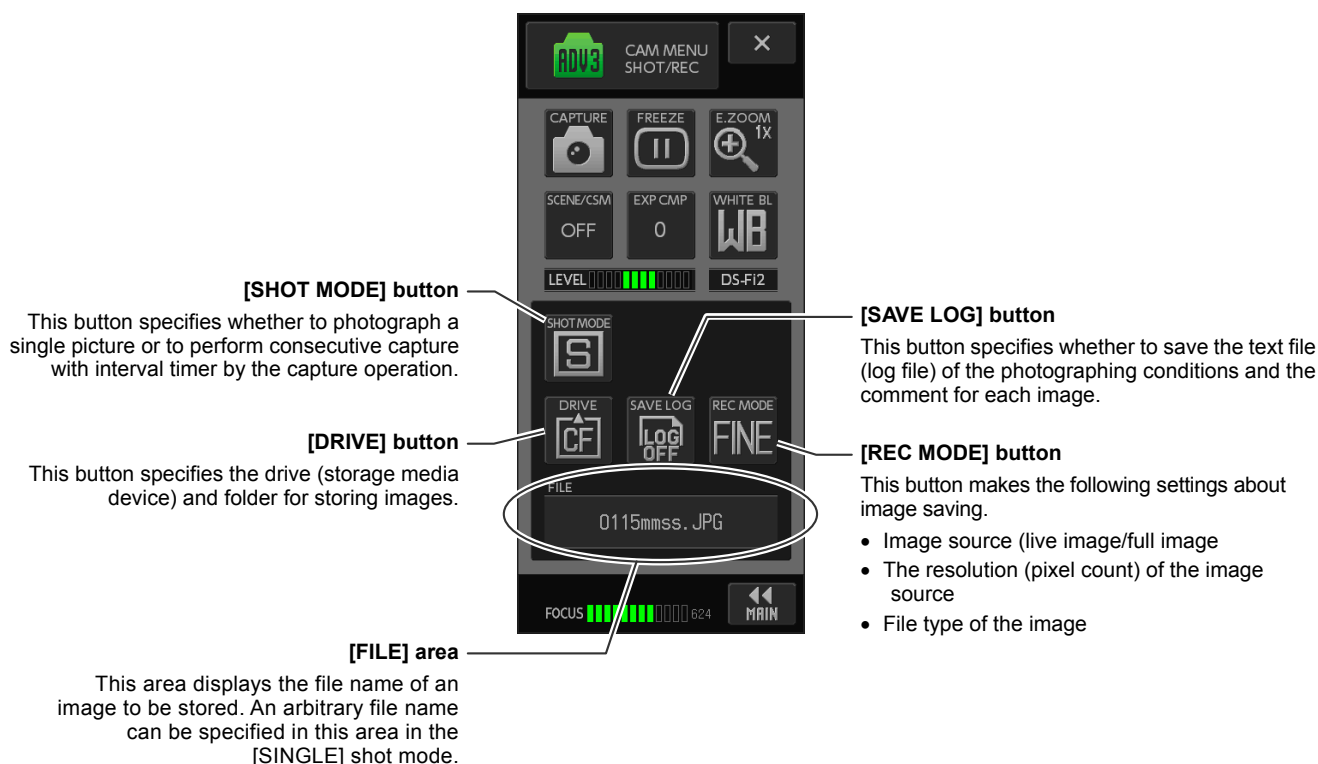
Items to be reset to the initial values by [CLR SET]

Button	Screen	Function	Description
	[CAM MENU: CAMERA]	Pause	Cancel → Live image display
		Electronic zoom	1x
		Scene/custom	OFF
		Exposure adjustment	0
		Camera gain	Canceled (since the exposure mode is PROG)
		Image mode	FAST (DS-Fi2, DS-Fi1, DS-Fi1c) FULL (DS-Vi1, DS-Ri1, DS-Qi1Mc)
		Exposure mode	PROG
		Photometry mode	Average
		Photometry area	Large
		Frame	No change
		Customizing/moving (photometry area)	Center
		AE lock	OFF
		FUNC1 to FUNC3	No change in the function assignment
	[CAM MENU: IMAGE]	Brightness	100
		RB adjustment	100, 100
		Chroma	0
		Hue	0
		Color effect	Color (DS-Fi2, DS-Fi1, DS-Fi1c, DS-Vi1, and DS-Ri1) Monochrome (DS-Qi1Mc)
		Black level	0
		Contrast	Standard
		Sharpness	2
	[CAM MENU: NR/SD/SET]	NR	OFF
		SD	OFF
	[CAM MENU: SHOT/REC]	Continuous shot mode, drive, log saving, and recording mode	No change
	[VIEW MENU]	Replaying	Canceling replayed image → video display
		Electronic zoom	1x
		Two-screen mode	One screen

Note: The setting content of [TOOL MENU], [TOOL BAR], and [SETUP MENU] is not changed by [CLR SET].

8.3.4 Setting Items of the [CAM MENU: SHOT/REC] Screen

There are following setting items on the [CAM MENU: SHOT/REC] screen:



Displayed items of the [CAM MENU: SHOT/REC] screen

Setting Items of the [CAM MENU: SHOT/REC] Screen

Button	Description	Reference
SHOT MODE	This button specifies whether to photograph a single picture or to perform consecutive capture with interval timer by the capture operation.	p.106
DRIVE	This button specifies the drive (storage media device) and folder for storing images.	p.107
SAVE LOG	This button specifies whether to record the text file (log file) of the photographing conditions and a comment for each image.	p.108
REC MODE	This button allows you to select an image source (live image or full image) and to select the size (pixel count) of the stored image and the file type of the image.	p.109
FILE area	When the shot mode is set to [SINGLE], you can specify an arbitrary file name for an image to be saved at the next capture.	p.113

✓ [CAMERA MENU] screen size

The display size of the [CAMERA MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [CAM MENU: SHOT/REC] screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[SHOT MODE]	[INTERVAL]	[SAVE LOG]	[REC MODE]
Small menu	[SHOT]	[INTRVL]	[SV LOG]	[REC MD]

(1) Setting the shot mode

Select a shot mode from “One Shot” (single image capturing) and “Consecutive capture” (with interval timer).

1 Display the [CAM MENU: SHOT/REC] screen.

2 Press the [SHOT MODE] button.

The [SHOT MODE] submenu appears.

3 Select a shot mode.

For details of the options, refer to the table below

- [SINGLE]
- [CONT]

When you press either button, the submenu closes and the icon of the [SHOT] button changes accordingly.

When [CONT] is selected, the [COUNT] button and the [INTVAL] button appear on the [CAM MENU: NR/SD/SET] screen. Set the number of images to be captured and the capturing interval in accordance with steps 4 and 5 below.

4 Press the [COUNT] button and set the number of images to be captured on the [COUNT] submenu. Then press the [OK] button to finish the setting.

For the setting range, refer to the table below.

- Count: (default: 2)

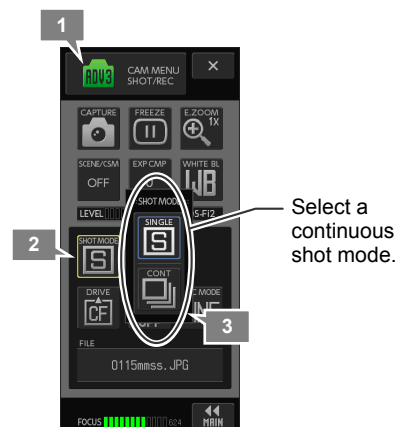
The specified value is indicated on the [COUNT] button.

5 Press the [INTVAL] button and set an interval between shots on the [INTERVAL] submenu. Then press the [OK] button to finish the setting.

For the setting range, refer to the table below.

- Interval (default: 10 s)

The specified value is indicated on the [INTERVAL] button.

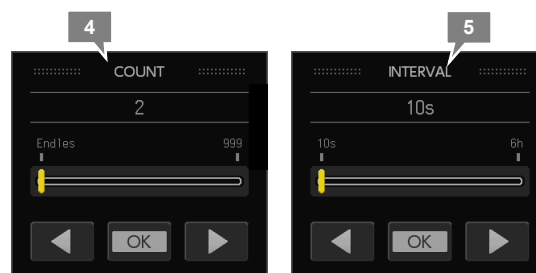


Single shot



Continuous shot

Selecting a continuous mode



Configuring the count and interval of photographing

Starting and stopping consecutive capture

- To start consecutive capture, press the [CAPTURE] button of [CAM MENU].
- The [CAPTURE] button icon changes to show “STOP” during consecutive capture. Pressing the [CAPTURE] button again at this time stops consecutive capture. For details, refer to “8.2.4 (3) Performing consecutive capture with interval timer”.

The display of the task bar during consecutive capture

During consecutive capture, the shot count is displayed on the task bar when images are captured.

- Example: When five pictures have been shot with the shot count setting of 10, it shows “SAVED 5/10”.

Continuous mode options

Option	Description
SINGLE	Photographing is done only once.
CONT	Photographing is done according to the interval timer setting and count specified.
COUNT (Photographing count)	Endless, 2 to 999 (1 step)
INTERVAL (Photographing interval)	10 s, 15 s, 20 s, 30 s, 45 s, 60 s, 1 m 30 s, 2 m, 3 m, 4 m 30 s, 6 m, 10 m, 15 m, 20 m, 30 m, 45 m, 60 m, 1 h 30 m, 2 h, 3 h, 4 h 30 m, 6 h (s: second, m: minute, h: hour; 22 steps)

(2) Specifying a save media and folder

To save an image, you need to specify a drive (recording medium) and a folder to save it. The folder specified as the destination to save the image is called a “save folder”.

1 Display the [CAM MENU: SHOT/REC] screen.

2 Press the [DRIVE] button.

The [SAVE DRIVE/FOLDER] submenu is displayed.

3 Specify a drive (storage media device) and a folder to save images on the [SAVE DRIVE/FOLDER] submenu.

• Selecting a drive

Select a drive letter of the recording medium (CF card: C, USB memory stick: D, E, or F in the order of connection). The icon of the drive that has a storage media device connected is illuminated, indicating that it can be selected. The selected drive is marked with a blue frame.

• Selecting a folder

When a drive is selected, the folders within the drive root are displayed. Select a folder from the list. The selected folder is marked with a yellow frame. (The frame is not shown if a drive root is selected.)

• Creating a new folder

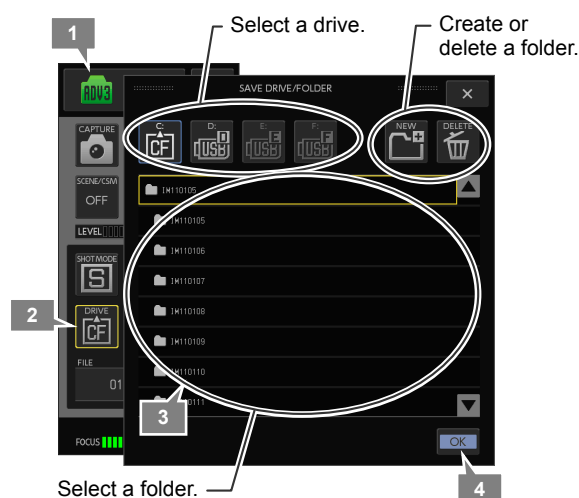
A new folder can be created within the folder selected from the folder list. Press the [NEW] button on the [SAVE FOLDER] submenu. The keypad appears. Enter an arbitrary folder name (maximum of 30 characters) and press the [ENTER] button.

• Deleting a folder

To delete the folder selected from the folder list, press the [DEL] button. A confirmation message appears. Press [YES] or [NO].

4 After selecting a drive and a folder, press the [OK] button to finish the setting.

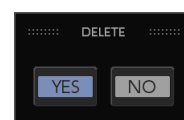
The [SAVE FOLDER] submenu closes and the save folder is set.



Selecting a folder for saving images



Selecting a new folder name (keypad)



Confirmation of folder deletion

! Finishing the setting

If you changed the destination folder, press the [OK] button before closing the [SAVE DRIVE/FOLDER] submenu. If you press the [X] button to close the submenu, the destination folder will not be changed.

! Changing the recording medium configuration

- When the recording medium assigned to the destination folder is removed, images are saved onto another recording medium if there is. When you change the configuration of the recording medium, be sure to check the destination setting
- If [Capture operation assignment] of the [SETUP MENU: MAIN] screen is [Media storage], an attempt of capturing an image when all storage media devices are removed displays a “NO MEDIA” warning message.

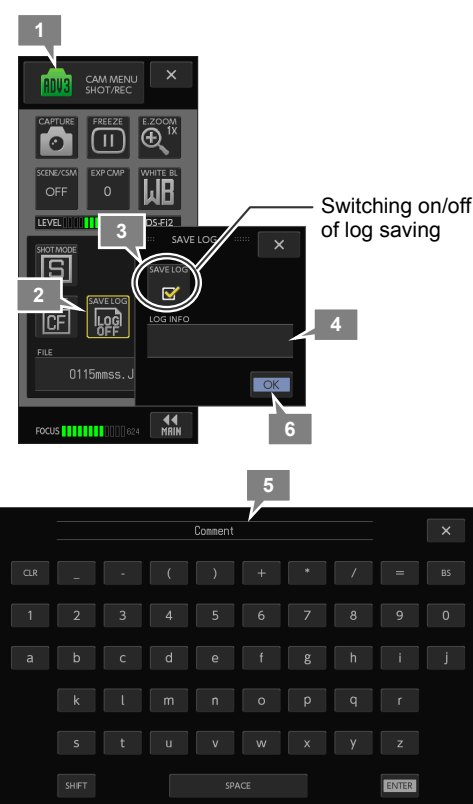
✓ Automatic folder generation

If the automatic folder creation is set to ON in the [SETUP MENU: FILE] window, a folder is created within the specified destination folder and the image file is saved in the created folder.

(3) Configuring log saving

When capturing images, the DS-L3 can store photographing conditions and an arbitrary log comment for each image file as a text file ("log file").

- 1 **Display the [CAM MENU: SHOT/REC] screen.**
- 2 **Press the [LOG] button.**
The [SAVE LOG] submenu appears.
- 3 **Select whether to save the log or not with the [SAVE LOG] checkbox.**
When the checkbox is selected, log saving is enabled and the background color of the [LOG INFO] input field turns gray, enabling comment input operation.
- 4 **Press the input field [LOG INFO] to enter a comment.**
Pressing the entry field displays the keypad.
- 5 **Enter any text (maximum of 40 characters).**
Input the required information using the keypad, and press the [ENTER] button to register it.
Use the [SHIFT] button to switch the case. Use the [CLR] button to erase the entered content, and use the [BS] button to move back one character. Pressing the [X] button closes the keypad without changing the texts.
- 6 **To return to the [CAM MENU: SHOT/REC] screen, press the [OK] button.**
Pressing the [X] button closes the [SAVE LOG] submenu without saving the setting.



On/off of log saving and entering a comment

Log saving options

Option	Description
SAVE LOG (checkbox)	Turn on the checkbox to save the file of image capture log. Photographing conditions and comment texts are saved as a log file at the time of capturing an image.

Content of the log file

A log file of photographing record is created for each image file. The name of a log file is "the filename of the image + extension.txt".

The following data is recorded in the log.

Example: Log file sample

```
14192818.JPG 2011/12/14 19:28:18

LOG:LOG SAMPLE ABCD 123

CAM: DS-Fi2 IMG MODE: FULL
EXP MODE: PROG EXP TIME: 80 ms EXP_CMP: +0.3 CAM_GAIN: 200 Y_GAIN: 100
CONTRAST: STD EFFECT: COLOR RB_ADJ:100/100/
BK_LEVEL: +00 CHROMA: +00 HUE: +00
AE_LOCK: OFF MTR AREA: SMALL MTR_MODE: AVERAGE
NR: OFF SHARPNESS: +04 SD: OFF
NAME: DS-L3
DS-L3 (MAC:00-90-B5-43-03-EA)
```

Note: The [LOG:] field of a log file includes a comment entered in the [CAM MENU: SHOT/REC] screen (in the above example, "LOG SAMPLE ABCD 123").

(4) Configuring the recording mode

You can configure the source, size, and file type of the image to be saved.

✔ Automatic change of the image size (resolution)

- With [FULL IMAGE] selected as image source of the recording mode, the [IMAGE MODE] setting is automatically switched to [FULL] when capturing an image. Three image sizes are available to choose from to save the image data.
- With [LIVE IMAGE] selected as image source of the recording mode, image size used for recording depends on the setting for [IMAGE MODE].

When [IMAGE MODE] is set to [FULL] and the largest value is selected for the image size, for example, DS-L3 may in some cases automatically reduce the image size despite the setting. This can happen when you switch the image mode to [2x2], [4x4], [ROI-L/S], or [C.SCAN], which will cause output of image data from a DS camera head to be smaller than the specified image size.

Note, however, that DS-L3 does not automatically change the image size if data output from a DS camera head is larger than the image size specified.

Check the image size for the recording mode carefully, especially when you change the image mode from one to another while [LIVE IMAGE] is selected as image source.

Selecting the source of the image

Select the “live image” on the monitor or the “full image” on the image pickup device as the source of the image to be saved.

1 Display the [CAM MENU: SHOT/REC] screen.

2 Press the [REC MODE] button.

The [REC MODE] submenu is displayed.

3 Press one of the following buttons to select the image source to be saved.

For details of the options, refer to the table below.

- [LIVE IMAGE]
- [FULL IMAGE]

The image size selection button at the bottom of the submenu may change depending on the selection.

4 Press the [OK] button to return to the [CAM MENU: SHOT/REC] menu.

Pressing the [X] button closes the [REC MODE] submenu without saving the setting.



Selecting the image source

Recording mode: image source options

Option	Description
Live image	Saves the live image on the monitor with the capture operation. Resolution of the image saved depends on the image data size setting.
Full image	[IMAGE MODE] is automatically set to [FULL] upon image capture operation and the image is saved based on the image pickup device output. When [FAST] or [ROI] has been selected as [IMG MODE] of the [CAM MENU: CAMERA] menu, the image size displayed on the monitor is reduced. However, if you have also selected [FULL IMAGE] for [REC MODE], you can save with a capture operation a high resolution image based on the full output from the image pickup device.

✔ Capturing a replayed image

When you capture a replayed image, it is saved in the 1280 x 960 size. The image source cannot be changed.

✔ Capturing an image shown in the two-screen mode

When you capture an image displayed in the two-screen mode, you can select an image size from those listed in the “FULL” column of tables in the “Recording mode: image size options” section below. Note that the 2560 x 1920 size for DS-Fi2, DS-Fi1, and DS-Fi1c is not available when in the two-screen mode. Additionally, the image source cannot be changed.

Selecting the size of the image

You can specify the size of the image to be saved.

1 Display the [CAM MENU: SHOT/REC] screen.

2 Press the [REC MODE] button.

The [REC MODE] submenu is displayed.

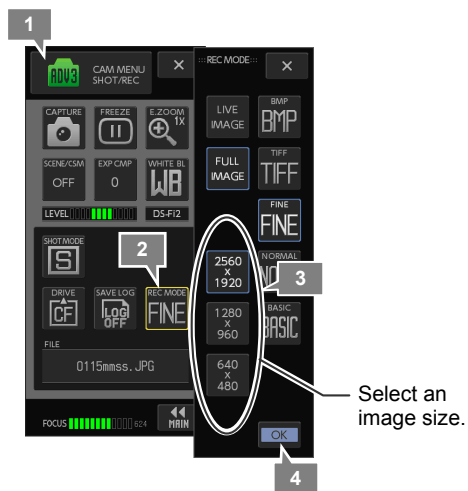
3 Select the size of the image.

When [FULL IMAGE] is selected as the image source, three options are shown for the image size. When [LIVE IMAGE] is selected, one to three options are shown according to the current image mode.

Select the desired image size.

4 Press the [OK] button to return to the [CAM MENU: SHOT/REC] menu.

Pressing the [X] button closes the [REC MODE] submenu without saving the setting.



Selecting the image size

Recording mode: image size options

Three options of selectable image sizes are displayed depending on the DS camera head connected, the image mode setting, and the image source (full image/live image).

The tables below show image modes that can be used for each DS camera head type and image sizes for each image mode.

✔ Image size when [FULL IMAGE] is selected

If the image source of [REC MODE] is set to [FULL IMAGE], DS-L3 automatically changes the image mode to [FULL] when an image is captured.

DS-Fi2 / DS-Fi1 / DS-Fi1c

Image mode	Saved image size (live image)	Saved image size (full image)
FULL	2560 x 1920, 1280 x 960, 640 x 480	2560 x 1920, 1280 x 960, 640 x 480
2x2	1280 x 960, 640 x 480	
4x4	640 x 480	
FAST	1280 x 960, 640 x 480	
ROI-L	1280 x 960, 640 x 480	
ROI-S	1280 x 480, 640 x 480	

DS-Vi1

Image mode	Saved image size (live image)	Saved image size (full image)
FULL	1600 x 1200, 800 x 600, 400 x 300	1600 x 1200, 800 x 600, 400 x 300
2x2	800 x 600, 400 x 300	
FAST	800 x 560, 400 x 280	
C. SCAN	1600 x 560, 800 x 560	

DS-Qi1Mc

Image mode	Saved image size (live image)		Saved image size (full image)	
	Monochrome, 8 bits	RAW, 12 bits	Monochrome, 8 bits	RAW, 12 bits
FULL	1280 x 1024 640 x 512 320 x 256	1280 x 1024	1280 x 1024 640 x 512 320 x 256	1280 x 1024
2x2	640 x 480 320 x 240	640 x 480		
4x4	320 x 240	320 x 240		
ROI-L	1280 x 720	1280 x 720		
ROI-S	640 x 480 320 x 240	640 x 480		

DS-Ri1

Image mode	Saved image size (live image)	Saved image size (full image)
FULL	1280 x 1024, 640 x 512, 320 x 256	1280 x 1024, 640 x 512, 320 x 256
ROI-L	1280 x 720	
ROI-S	640 x 480, 320 x 240	

✔ Capturing a replayed image

When you capture a replayed image, it is saved in the 1280 x 960 size.

✔ Capturing an image shown in the two-screen mode

When you capture an image displayed in the two-screen mode, select an image size listed for the [FULL] image mode. Note that the 2560 x 1920 size for DS-Fi2, DS-Fi1, and DS-Fi1c is not available when in the two-screen mode. Select 1280 x 960 or 640 x 480.

Selecting the file type of the image to be saved

You can specify the file type of the image to be saved.

- 1 Display the [CAM MENU: SHOT/REC] screen.
- 2 Press the [REC MODE] button.
The [REC MODE] submenu is displayed.
- 3 Press one of the following buttons to select the image file type to be saved.

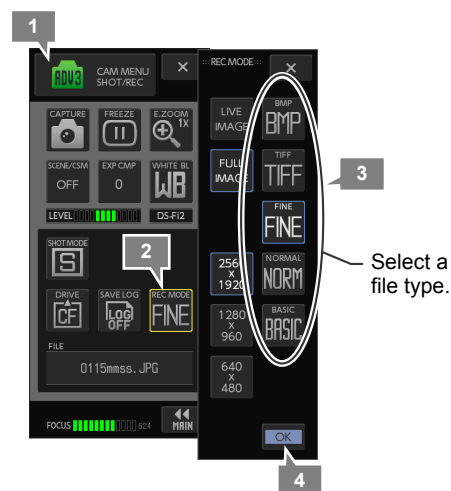
For details of the options, refer to the table below.

- [BMP]
- [TIFF]
- [FINE]
- [NORM]
- [BASIC]
- [RAW] (for DS-Qi1Mc)

The icon of the [REC MODE] changes depending on the selection.

- 4 Press the [OK] button to return to the [CAM MENU: SHOT/REC] menu.

Pressing the [X] button closes the [REC MODE] submenu without saving the setting.



Selecting a file type

Recording mode: file type selection options

Option	Description
BMP	Color DS camera head: Images are saved as uncompressed 24-bit BMP files. Monochrome DS camera head: Images are saved as uncompressed 8-bit BMP files.
TIFF	Color DS camera head: Images are saved as uncompressed 24-bit TIFF (RGB) files. Monochrome DS camera head: Images are saved as uncompressed 8-bit TIFF files.
FINE	Images are saved as 1/4-compressed JPEG files.
NORM	Images are saved as 1/8-compressed JPEG files.
BASIC	Images are saved as 1/16-compressed JPEG files.
RAW	For DS-Qi1Mc only: Images are saved as uncompressed 12-bit RAW files.

✓ Capturing a replayed image or capturing in two-screen display mode with DS-Qi1Mc

When you use DS-Qi1Mc to capture a replayed image or an image displayed in the two-screen mode, the [RAW] file type is not available.

✓ Image files

Exif 2.2 data is inserted in the file except for the bmp format data.

(5) Checking/changing an image file name

File names in accordance with the file naming convention in the [SETUP MENU: FILE] screen are displayed in the [FILE] area at the lower part of the [CAM MENU: SHOT/REC] screen.

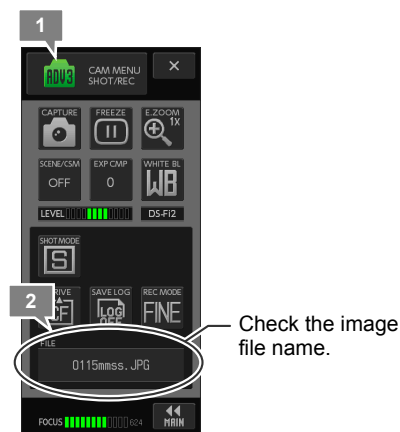
Checking image file name

You can check the [FILE] area for the file name of an image to be saved at the next capture.

1 Display the [CAM MENU: SHOT/REC] screen.

2 Check the file name in the [FILE] area.

The [FILE] area displays the name of a file to be saved at the next capture.



Checking image file name

✓ Name shown in the [FILE] area and actual file name given

- When [DATE & TIME] is specified for naming convention on the [SETUP MENU: FILE] screen, an image file name is given based on the day, hour, minute, and second (two digits for each) at the time of capture (Example: The file name of an image captured at 15:00:47 on the day of 1st is "01150047.JPG."). The file name is displayed in the "0115mmss.JPG" format in the [FILE] area based on the date and time when the [CAM MENU: SHOT/REC] screen is displayed.
- When [NUMBER] is specified for naming convention on the [SETUP MENU: FILE] screen, there is no difference between the file name in the [FILE] area and the actual file name.

Changing image file name

When capture operation is set to [SINGLE] (single image capturing), you can set a desired file name for the image to be saved at the next capture by operating the [FILE] area.

1 Display the [CAM MENU: SHOT/REC] screen.

2 Confirm that the [SHOT MODE] button is set to [SINGLE].

When the [SHOT MODE] button is set to [CONT] (consecutive image capture using the interval timer), no image file name can be changed.

3 Press the [FILE] area.

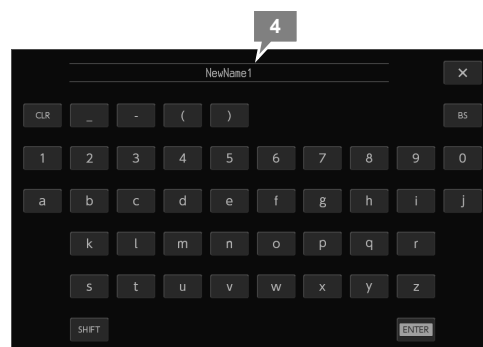
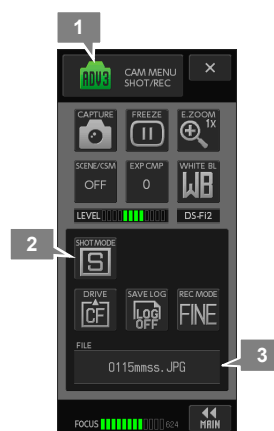
A keypad appears.

4 Enter a desired file name (up to 16 characters except for extension).

Press keys on the keypad to enter a new file name, and press the [ENTER] button to register the file name.

Use the [SHIFT] button to switch upper-case characters and lower-case characters. To delete entered characters, press the [CLR] button. To go back by one character, press the [BS] button. Pressing the [X] button closes the keypad without saving the text.

When the keypad is closed with the [ENTER] button, the entered file name (with an extension) is displayed in the [FILE] area.



Changing image file name

✓ File name setting

File name setting on the [CAM MENU: SHOT/REC] screen is effective only for the next capture operation. Once capture operation is performed, the image is stored with the set file name and the [FILE] area returns to the automatic setting status. If you want to give a desired file name to another image, perform the file name setting anew.

✓ Operations that clear file name setting

Any of the following operations clears the setting of a desired file name and restores the file name to one automatically given according to the naming convention specified on the [SETUP MENU: FILE] screen.

- Capture operation was performed and the image was stored with the set file name.
- No file name was entered with the file name setting keypad and the [ENTER] button was pressed.
- The continuous shot mode is set to [CONT]. (If you set the continuous shot mode back to [SINGLE] before any capture operation, the set file name is effective.)

✓ If a file with the same name exists in a save location

If a file with the same name exists in a save location, the DS-L3 operates as follows according to the save location.

- If a file with the same name exists in the destination media, the image is stored to a file under the set name with a number (1 to 9) added to the end. If a file name with numbers 1 to 9 already exist, the file with the number 9 added is overwritten by subsequent files.
- If a file with the same name exists in the server, the file is overwritten and a new image file is stored with the same name.

This chapter describes how to play back shot images saved onto the recording medium and display them on the monitor.

9.1 Operating the VIEW Menu

9.1.1 Displaying the [VIEW MENU]

1 Press the [CAM] button on the task bar.

The [CAM MENU: CAMERA] short window appears at the upper left (or upper right) of the window.

2 Press the [MENU SELECT] button on the [CAM MENU] and then press the [PLAY] button.

The [VIEW MENU] appears.

✓ Menu displayed when the [CAM] button is pressed

As you use the DS-L3, [CAMERA MENU], [VIEW MENU], or [TOOL MENU] may be displayed when pressing the [CAM] button on the task bar.

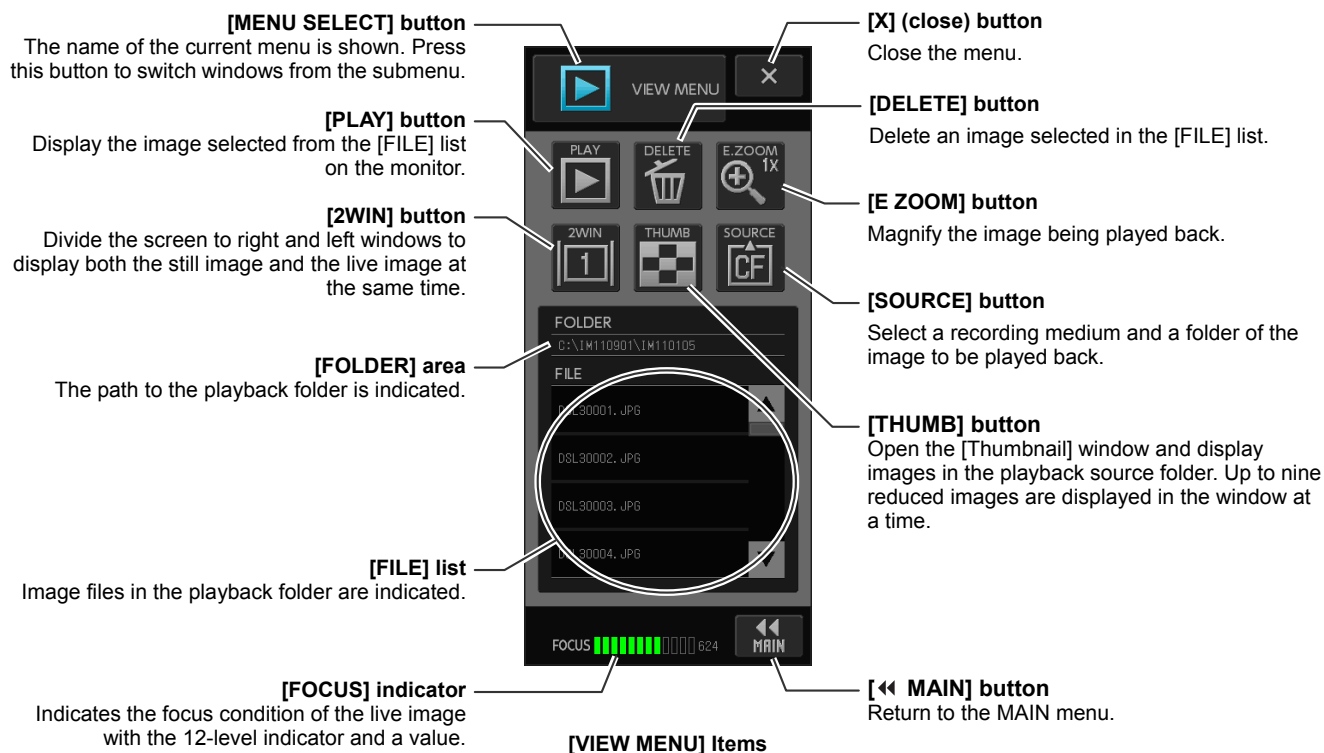
If [VIEW MENU] is not displayed, press the menu button and select [VIEW] from the menu to open [VIEW MENU].



Displaying the [VIEW MENU]

Items on the VIEW menu

The [VIEW MENU] includes the following display items.



[VIEW MENU] Items

✓ [VIEW MENU] screen size

The display size of the [VIEW MENU] screens can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see "13.2.1 (5) Configuring the position and size of the menu".

9.2 Playing Back an Image

This section describes how to play back image files saved onto the recording medium connected to the DS-L3.

✓ Medium used for playback

The DS-L3 can play back only images saved onto the recording medium (CF card or USB memory) connected to the DS-L3 and cannot play back images on the FTP server.

(1) Playing back an image

To play the image, perform the following procedure.

- 1 Open the VIEW menu.**
Information on the folder set as a destination folder of the image is displayed in the [FOLDER] display area and the [FILE] list.
Select the desired folder.

- 2 To switch the folder of the image to be played back, press the [SOURCE] button and select the desired drive and folder.**

When you press the [SOURCE] button, the [PLAYBACK DRIVE/FOLDER] submenu appears.

Selecting a drive (recording medium):

Select a drive select button (C to F) on the upper part of the submenu to specify a drive. Selectable drive icons are highlighted.

- **C** CF card
- **D to F** USB memory

Selecting a folder:

When a drive is selected, all the folders in that drive are displayed in the folder list. The list corresponds to the folder hierarchy. When you select a folder, the list of the subfolders included in the folder is displayed.

Determining selection:

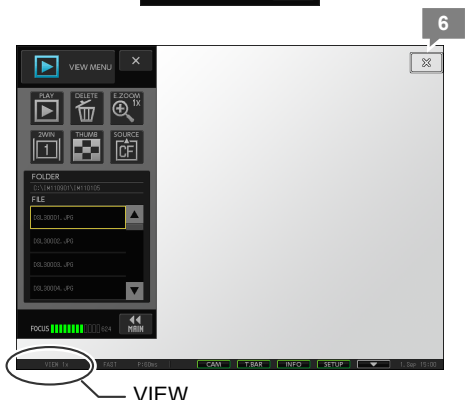
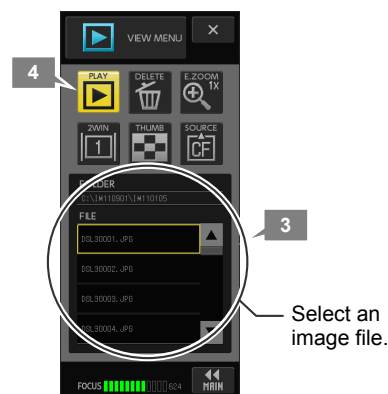
Press the [OK] button to determine the drive and folder. The submenu closes.

The selected folder path is shown in the [FOLDER] area. The list of files included in the folder is displayed in the [FILE] area.

- 3 Select an image file from the list.**
The selected file is marked with a yellow frame.
- 4 Press the [PLAY] button.**
The selected image appears on the monitor and "VIEW" is displayed on the left of the task bar, indicating that playback is in progress.
- 5 To change the image, repeat steps 3 and 4.**
To play the image saved onto another drive or folder, repeat the procedure from step 2.
- 6 To close the playback image and exit the playback, press the [X] button at the upper right corner of the window.**

The [FREEZE] button is selected during playback. The playback image can also be closed to exit the playback by pressing the [FREEZE] button to cancel the pause mode.

The live image returns and the display in the task bar changes from "VIEW" to "CAM".



Playing Back an Image File

✔ Playback folder setting

Shifting to the operation menu other than the VIEW menu resets the VIEW folder settings and the folder same as the destination folder is set. When you open the VIEW menu, the information on the folder set as the destination is always displayed.

✔ Using to another menu while playing back an image

When you press the [MENU SELECT] button of the VIEW menu while playing back an image, the operation menu can be switched with the image still on the screen.

- When you switch to [CAM MENU], the [FREEZE] button is selected (a blue frame is displayed). Press the button to release the still image state. The image playback stops.
- Operations for the [CAM MENU] settings are restricted while the image is being played back. When you display the [CAM MENU] while the image is being played back, disabled buttons are displayed in gray.

✔ Capturing a playback image

You can capture an image being played back using the image capture operation.

- An annotation can be added and simplified measurement can be applied to the playback image (See “Chapter 11 Adding Lines and Annotations to an Image” and “Chapter 12 On-Screen Measurement”). Images can be captured including the annotation and measurement results.
- When you capture a playback image, it is saved in the 1280 x 960 size regardless of the saved image or the size setting for storing images.

✔ Comments at the beginning of playback and measurement results

When playback of an image is started, comments (annotations) that have been written and measurement results are completely cleared.

Scales (XY measurement, X scale, scale, cross line, and grid) are displayed as they are.

The same applies to when playback is complete.

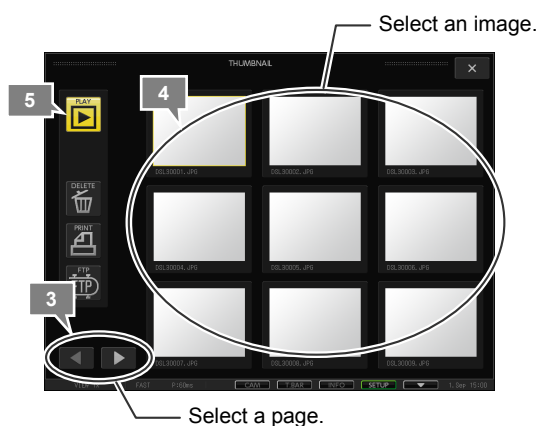
(2) Selecting an image from the thumbnail to play it back

You can select a saved image from the thumbnail list which displays up to nine reduced images at a time.

- 1 Open the VIEW menu.**
Change the playback folder as required.
- 2 Press the [THUMB] button.**
The thumbnail window opens and displays the images within the selected folder as thumbnails.
Nine thumbnail images are displayed in the window at a time.
To return to the VIEW menu, press the [X] button at the upper right corner of the thumbnail window.
- 3 Press the page switching button at the lower left of the window, if necessary, to change the thumbnail page.**
If the folder contains more than nine images, use the page switching buttons to change the thumbnail page.
- 4 Select the thumbnail of an image to be played.**
The selected thumbnail is marked with a yellow frame.
- 5 Press the [PLAY] button.**
The selected image appears on the touch panel monitor.
- 6 To close the image, press the [X] button at the upper right corner of the window.**
The live image returns.

✓ Canceling reading of thumbnail

If a folder contains many images, it takes time to read them when opening the thumbnail. Press the [STOP] button during reading of the thumbnail to cancel image reading.

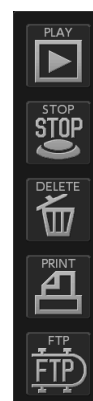


Displaying Thumbnail of Images

Operating the thumbnail window

On the left of the thumbnail window, the [PLAY], [STOP], [DELETE], [PRINT], and [FTP] buttons are displayed. These buttons allow you to perform the corresponding operations.

- **[PLAY] button:** Plays the selected image.
- **[STOP] button:** Aborts the loading of thumbnail images. (Enabled during thumbnail images are being loaded only.)
- **[DELETE] button:** Deletes the selected image.
- **[PRINT] button:** Prints the selected image. For details about the print function, see “Chapter 15 Performing Direct Printing”.
- **[FTP] button:** Transfers the selected image to the FTP server. For details about the FTP function, see “Chapter 16 Connecting to Network”.



Buttons in the Thumbnail Window

✓ Operating multiple images collectively

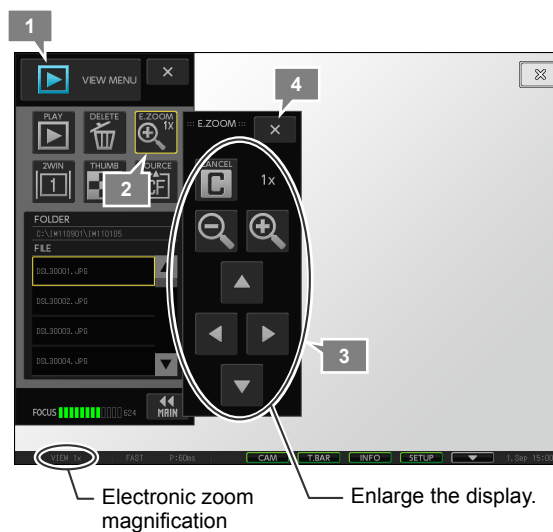
Multiple images displayed in the thumbnail window on the current page can be selected.

Press the [DELETE], [PRINT] or [FTP] button at this state to operate multiple images collectively.

(3) Enlarging an image using the electronic zoom function

You can enlarge the playback image by using the electronic zoom function.

- 1 Open the VIEW menu and play an arbitrary image.**
- 2 Press the [E ZOOM] button.**
The [E ZOOM] submenu appears.
- 3 On the [E ZOOM] submenu, enlarge the playback image on the screen.**
The magnification of the electronic zoom is indicated on the left of the task bar.
 - **Changing the display magnification**
Change the display magnification using the [+] and [-] buttons (loupe buttons).
 - **Moving the display position**
Move the display position using the up, down, right, and left arrow buttons.
 - **Canceling the enlarged display**
Press the [CANCEL] button to return the display magnification to 1x and close the submenu.
- 4 To close the [E ZOOM] submenu, press the [X] button of the submenu.**



Enlarging the Playback Image (Electronic Zoom)

(4) Splitting a window into right and left windows

Pressing the [2WIN] button in the [VIEW MENU] splits the window into right and left windows to display different images side by side. This operation allows you to compare a playback image with a live image or compare between still images.

- 1 Open the [VIEW MENU].
- 2 Press the [2WIN] button and split the monitor display into right and left windows with the [ON] and [OFF] buttons in the submenu.

- **OFF** Resets the 2-window display mode.
- **ON** Splits the display into right and left windows.

The following images are displayed according to the display during operation.

(1) Still image and live image:

When the display is switched to 2-window display while a live image is being displayed, the still image is displayed on the left side, the live image on the right side, and "FREEZE&CAM" on the task bar.

(2) Still image and still image:

When the [FREEZE] button in the [CAM MENU] is pressed in the state of (1), still images are displayed on the right and left sides, and "FREEZE&FREEZE" is displayed on the task bar.

(3) Playback image and live image:

When the display is switched to 2-window display while a captured image is being played back, the playback image is displayed on the left side, the live image on the right side, and "VIEW&CAM" on the task bar.

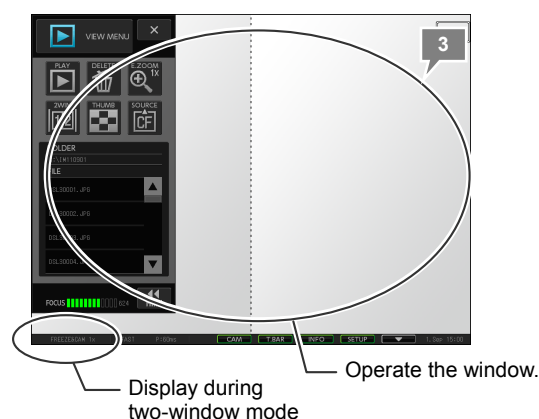
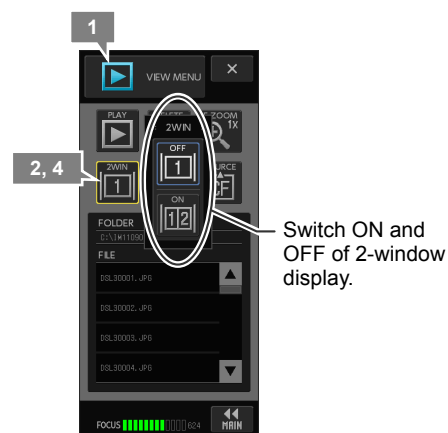
(4) Playback image and still image:

When the [FREEZE] button in the [CAM MENU] is pressed in the state of (3), the playback image and the still image can be displayed side by side, and "VIEW&FREEZE" is displayed on the task bar.

Note: When an image is played back in the 2-window display mode, the image is played back in the left window.

- 3 Perform operations (such as moving display range) to be the desired window display condition.
 - In the 2-window display mode, only the middle area of each image is displayed on the right and left windows. Pointing at the right and left edges of each window with a stylus (or by clicking with the mouse) slides the image laterally to display the hidden part. The display range of each window can be moved independently only at an electronic zoom magnification of 1x.
 - Operating the electronic zoom in the 2-window display mode allows enlarged display of the right and left windows. The display range of each window cannot be moved independently at other electronic zoom magnifications than 1x. Both right and left windows can be moved simultaneously with the up, down, right, and left buttons of the electronic zoom.
- 4 To reset the 2-window display mode, repress the [2WIN] button and select [OFF] in the submenu.

The 2-window display mode is reset.



Splitting the Display into Two Windows

✓ Display of the scales, annotation, and measurements when on/off the two-window display

When the display is switched to or from the 2-window display, all comments and measurement results are cleared but scales (XY measurement, X scale, scale, and cross hairs) are displayed as they are.

✓ Image mode for the two-window display

If you select the two-screen display mode, the image mode automatically switches to [FULL], and image is captured in the size specified for the [FULL] image mode. Setting the image mode to other than [FULL] during the two-screen display mode switches the screen to the one-screen display mode.

Note that the 2560 x 1920 size for DS-Fi2, DS-Fi1, and DS-Fi1c is not available when in the two-screen mode. Select 1280 x 960 or 640 x 480.

9.3 Deleting an Image

You can delete an image on the VIEW menu. Images can be deleted in any of the following three methods.

- (1) Deleting an image from the folder
- (2) Selecting an image from the thumbnail window to delete it
- (3) Deleting a folder and all images inside it

! Deleting images

- The image once deleted cannot be restored any more. Be careful not to delete important images by mistake. It is recommended that important images be transferred to the personal computer, etc. and saved.
- When you check the content of the recorded medium on the personal computer, you can change the property of each image to “Read Only”. Images with “Read Only” property cannot be deleted by the operation of this system. If you attempt to delete such images, a warning message appears.
- When setting the property of the image file to “Read Only” if a log file or CSV file is saved, also change the property of related log files and CSV files.

(1) Deleting an image from the folder

To delete an image from the [FILE] list in the playback folder separately, perform the following procedure.

- 1 Open the [VIEW MENU] screen.**
Select the desired folder to show the list in the [FILE] area.
- 2 Select an image to be deleted from the list.**
Name of the selected file will be shown in a yellow box.
- 3 Press the [DELETE] button.**
A confirmation for deletion message appears.
- 4 To delete the image, press the [YES] button. Pressing the [NO] button cancels the operation.**
When [YES] is selected, the image is deleted and the [FILE] list is updated.
Note: Even if the image being played is deleted, the image remains displayed and does not return to the live image.



Deleting Images Individually

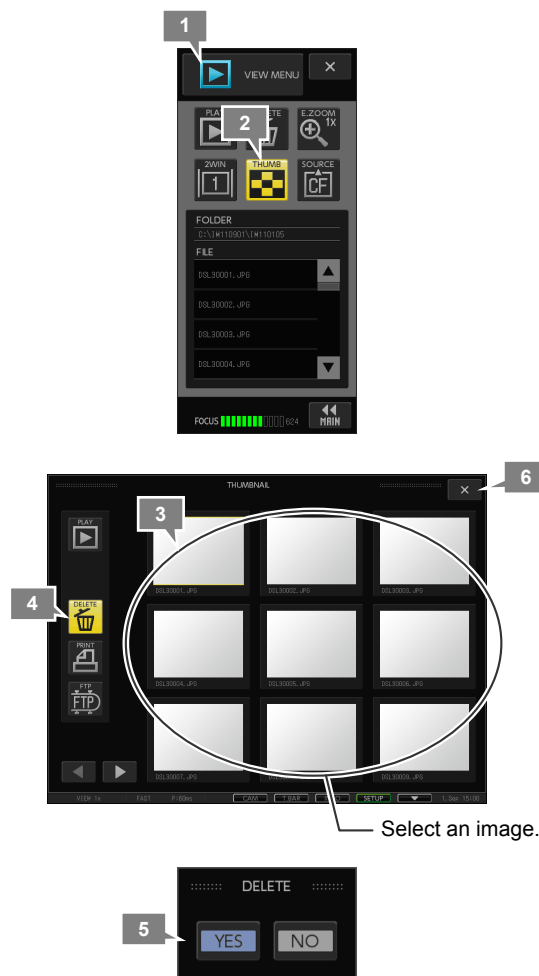
! The case where an image cannot be deleted

You cannot delete an image when the recording medium is locked or the image is set as “Read-Only”. A warning message appears in such cases.

(2) Selecting an image from the thumbnail window to delete it

To select and delete an image from the thumbnail list, perform the following procedure.

- 1 Open the [VIEW MENU] screen.**
Select the desired folder to show the list in the [FILE] area.
- 2 Press the [THUMB] button.**
The thumbnail window opens and displays the images within the selected folder as thumbnails.
- 3 Select an image to be deleted from the thumbnail window.**
The selected image is marked with a yellow frame.
Multiple images in the thumbnail can be selected and deleted at a time.
Switch thumbnail windows as needed with the page change button at the lower left of each window.
- 4 Press the [DELETE] button.**
A confirmation for deletion message appears.
- 5 To delete the image, press the [YES] button. Pressing the [NO] button cancels the operation.**
When [YES] is selected, the image is deleted.
Note: The thumbnail window is updated by re-opening the thumbnail or changing the page.
- 6 To return to the VIEW menu, press the [X] button at the upper right corner of the window.**



Selecting and Deleting an Image from the Thumbnail

! The case where an image cannot be deleted

You cannot delete an image when the recording medium is locked or the image is set as "Read-Only". A warning message appears in such cases.

(3) Deleting a folder and all images inside it

To delete all images and the folder containing them, perform the following procedure.

- 1 Display the [VIEW MENU].
- 2 Press the [SOURCE] button.
- 3 Select the drive (recording medium) which contains a folder to be deleted and select the folder.

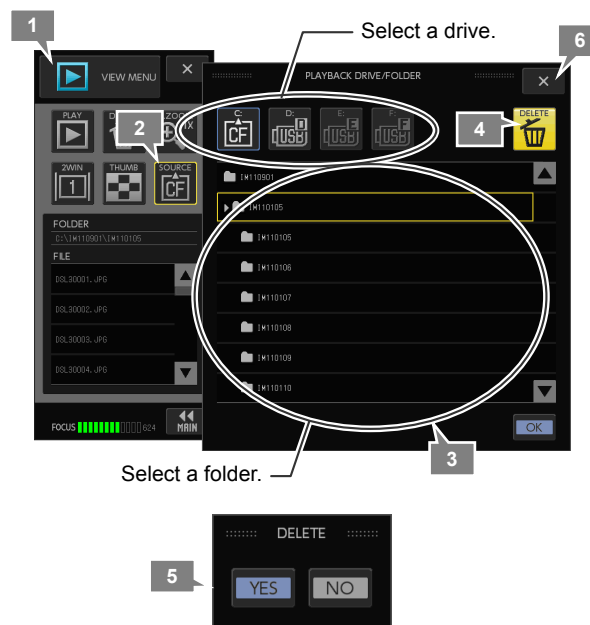
Use a [DRIVE SELECT] button (C to F) on the upper part of the submenu to select a drive.

- C CF card
- D to F USB memory

When a drive is selected, all the folders in that drive are displayed in the folder list.

Select a folder to be deleted. Name of the selected file will be shown in a yellow box.

- 4 Press the [DELETE] button.
A confirmation for deletion message appears.
- 5 To delete the folder, press the [YES] button. Pressing the [NO] button cancels the operation.
When [YES] is selected, the folder is deleted and the folder list is updated.
- 6 Press the [X] button to close the submenu.



Deleting a Folder of Images

! The case where an image cannot be deleted

A confirmation message appears in the following cases:

- You cannot delete a folder when the recording medium is locked or the folder is set as "Read-Only".
- If the selected folder contains a "Read-Only" image file, the folder and the image file are not deleted. However, the other image files are deleted.

✓ Deleting a folder from the list of the saved folders

You can delete a folder by deleting its name on the [SAVE DRIVE/FOLDER] list accessed from the [DRIVE] button on the [CAMERA MENU: SHOT/REC] screen.

Part 4

Adding Annotations and Measuring

This part describes how to perform operations when using the annotation function and the measurement function of the DS-L3.

This part consists of the following chapters.

- Chapter 10 Preparation for Using Annotation Function and Measurement Function
- Chapter 11 Adding Lines and Annotations to an Image
- Chapter 12 On-Screen Measurement

This chapter describes notes on adding annotations and using the measurement function and settings required for operation.

10.1

Before Use

The following functions for images are available in this system.

- **Displaying scales**

The system is provided with a function to display XY measurement, X scale (cross scale), scale, cross hairs, grid line, etc. for live images and playback images. Use the [TOOL] menu to operate this function. Different from other annotation functions and measurement functions, this function can set whether to include scales in image files for each item.

- **Annotation**

You can add annotations to a live or playback image. Annotations include arbitrary text and marker (number) among others. Use [TOOL] operation menu to add annotations.

- **Measurement**

You can measure length, angle or diameter of an object on a live or playback image in a simple manner. Use the [TOOL BAR] dedicated for this purpose.

10.1.1

Notes about Annotation and Simplified Measurement

! Notes about annotation and simplified measurement

Note the following when you use annotation and simplified measurement.

- **Calibration:**

Be sure to check the calibration setting before measuring an object using the annotation or simplified measurement function. This system has two settings for calibration: "Optical" and "Manual".

- When you select "Optical", the measurement criteria calculated from the optical equipment zoom magnification is used.
- When you measure an object with arbitrary criteria, select "Manual".

- **Switching calibration mode:**

When calibration mode is switched, annotation and measurement results become as follows.

- Scales and annotation function execution results are drawn as they are.
- Measurement function execution results are completely deleted.

- **Capturing while using annotation or simplified measurement function:**

DS-L3 behaves in the following manner if you use the [CAPTURE] button while using annotation or simplified measurement:

- If you execute continuous shot by pressing the [CAPTURE] button while a scale is being shown or an annotation is being added, the DS-L3 will display the [TOOL MENU: MAIN] screen after continuous shot session is completed.
- If you execute continuous shot by pressing the [CAPTURE] button while simplified measurement is running, after continuous shot session is completed DS-L3 will abort the measurement session to display the [TOOL MENU: MAIN] screen. To clear the aborted measurement, press the [UPDATE DISPLAY] button.

- **Annotation and measurement for replayed images:**

When a scale is displayed or measurement is performed, etc., on a replayed image saved in the TIFF or JPEG format, resulting values are shown based on the calibration settings saved for the image. Note that, on a capture of a replayed image, unit and calibration settings for the original image are not applied to the scale or measurement values; they are shown in pixel unit.

- **Precision:**

Precision of this system's measurement is not high.

- **Electronic Zooming:**

When an image is enlarged with the electronic zoom, scales, annotations added, and measurement results are also enlarged.

Clearing scales, annotations, and measurement results automatically

Displayed scales, annotations, and measurement results are automatically cleared (erased) when the following operations are performed.

- **Changing image mode:**
When [Image mode] is set to [ROI-L], [ROI-S], or [C.SCAN] in the [CAM MENU: CAMERA] long window, scales, annotations, and measurement results are completely cleared.
- **Playing back image:**
When an image is played back by the [VIEW MENU], annotations and measurement results are cleared. The same applies to when playback is complete.
- **2-window display:**
When [2WIN] display is set to ON/OFF in the [VIEW MENU], annotations and measurement results are cleared.
- **Switching calibration settings:**
When calibration settings are changed by the [TOOL MENU] or [TOOLBAR], only measurement results are cleared.
- **All clear:**
When [ERASE ALL] is performed by the [TOOL MENU] or [TOOLBAR], annotations and measurement results are cleared.

Adding annotations and performing measurement

Annotation and measurement can be applied to both live and playback images.

- **Live image**
You can add annotation and measurement for a live image being observed. The annotation and measurement results can be saved when the image is captured.

✓ Live image mode

Addition of annotations and measurement operation for live images are enabled in any of the following image modes.

- FULL
- 2x2, 4x4
- FAST

When the image mode is set to ROI-L/S or C. SCAN, the image mode automatically changes to FULL.

- **Playback image**
You can add annotation and simplified measurement for a captured image. The annotation and measurement results can be saved if you perform capture operation again.
Note: When a scale is displayed or measurement is performed, etc., on a replayed image saved in the TIFF or JPEG format, resulting values are shown based on the calibration settings saved for the image. Note that, on a capture of a replayed image, unit and calibration settings for the original image are not applied to the scale or measurement values; they are shown in pixel unit.

Saving the results

Annotation function and measurement function execution results are saved in images by capturing them. Settings are made on the [Tool setting: Main] window. Settings are made on the [Tool setting: Main] window. For details, see "11.2.1 Performing Basic Settings for Comment Function and Measurement Function".

- **Pasting to an image ([PASTE TO IMAGE] area)**
Annotation or measurement results can be pasted (or embedded) in an image when captured. The results saved with this method cannot be deleted or edited. They always appear when the image is played back.
- **No saving**
When pasting to the screen and saving to a tool file are disabled, no annotation or measurement results are saved and the playback image will contain no results.

! Pasting the results

If you shoot images with annotation function and measurement function execution results pasted, you cannot delete only the annotation function and measurement function execution results from the shot images.

10.1.2 Configuring Units and Calibration

In order to display measurement and scale on the screen, it is important to configure unit and reference of length.

✓ Configuring unit and calibration

Units and registered calibration settings are used for scale and measurement functions.

- Unit is configured in the [TOOL SET: MAIN] screen.
- Calibration setting can be changed either in [TOOL MENU] or [TOOLBAR]. If you modify calibration in one screen, the setting is also changed in the other screen.
Calibration can be registered only in the [TOOL SET: CALIB] screen.
- When calibration is set to [OFF], you cannot change the unit.

✓ Annotation and measurement for replayed images

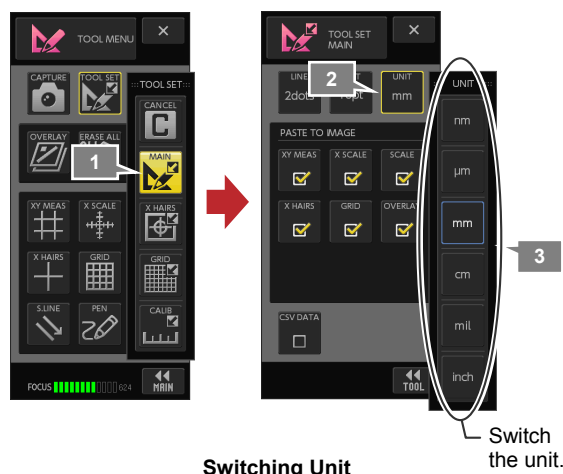
When a scale is displayed or measurement is performed, etc., on a replayed image saved in the TIFF or JPEG format, resulting values are shown based on the calibration settings saved for the image. Note that, on a capture of a replayed image, unit and calibration settings for the original image are not applied to the scale or measurement values; they are shown in pixel unit.

(1) Switching unit settings

Unit, or reference of length, can be selected from six types: nm, μm , mm, cm, mil or inch.

- 1 Display the [TOOL SET: MAIN] screen.**
Open the Tool menu, press the [TOOL SET] button and press the [MAIN] button in [TOOL SET] button.
- 2 Press the [UNIT] button and select a unit to use from the submenu.**
 - **Unit: mm (initial setting)**
nm, μm , mm, cm, mil, inch (six types)

When a unit is selected, the submenu closes and the [UNIT] button icon changes according to selection.
- 3 To return to [TOOL MENU], press the [◀ TOOL] button. To close [TOOL SETUP] screen, press the [X] button.**



! Switching the unit and overlay information

If you switch the unit, the results of annotation and measurement are as follows:

- XY measurement, cross scale, scale and concentric circle are updated in accordance with the unit setting.
- Annotations remain the same when the unit is changed.
- The unit of the simplified measurement result is changed.

(2) Switching calibration mode

Calibration is to set a reference of length. The DS-L3 provides two types of calibration modes: “optical” and “manual”. You can register up to seven calibrations (M1 to M7) and can select a desired one.

1 Display [TOOL MENU] or [TOOLBAR].

2 Press the [CALIB] button.

The [CALIB] submenu appears.

Note: To modify the calibration settings from [TOOLBAR], press the [SHOW ALL] button to display all buttons.

3 Select a calibration button.

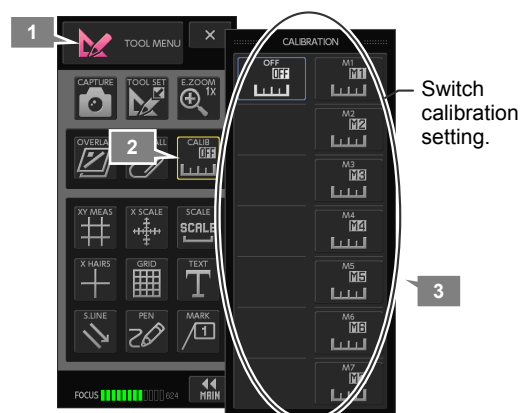
- [OFF] No calibration value is used.
- [M1] to [M7] Registered calibration settings

Selecting a calibration value closes the submenu and changes the [CALIB] button icon.

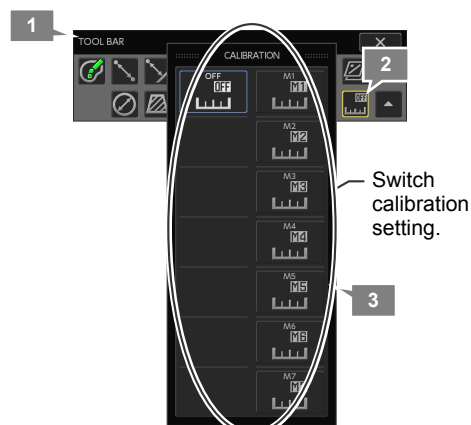
! Calibration settings and overlay information

If you switch calibration setting, the results of annotation and measurement are treated as follows:

- XY measurement, cross scale, scale and concentric circle are updated in accordance with the calibration value.
- Annotations remain the same when the unit is changed.
- Measurement results are completely cleared.



Switching Calibration Setting
(Using [TOOL MENU])



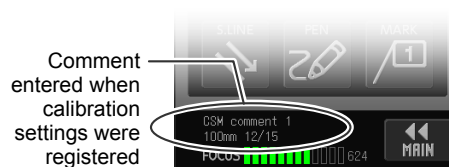
Switching Calibration Setting
(Using [TOOLBAR])

✓ Registering calibration settings

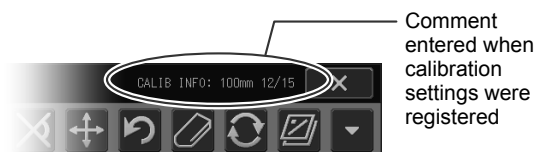
Calibration settings must be registered in advance. For registering calibration values, see “11.2.4 Registering Calibration Settings”.

✓ Comment of calibration settings

Comments can be registered for calibration settings. The comment entered is shown in the registration number icon ([M1] to [M7]) of the [CALIB] submenu. The comment is also shown in the comment display area found in the upper part of [CAM MENU] screen and the lower part of the [VIEW MENU] and [TOOL MENU] screens when a calibration registration number ([M1] to [M7]) is selected.



Comment of Calibration Settings
(on the [TOOL MENU] screen)



Comment of Calibration Settings
(on the [TOOL BAR] screen)

10.1.3 Overlay

Annotations and measurement drawings are written into “overlay”.

(1) Overview of overlay

You can think of an overlay as a transparent sheet covered on a shot image.

Annotations (text, straight line, pen and marker) and measurement results are rendered on an overlay. You can hide an overlay to temporarily hide the rendered results or show the overlay to make all the results appear at once.

- By using an overlay, you can add an annotation and perform measurement without modifying an original image.
- Drawing rendered in an overlay can be saved with an image when captured or printed using the direct printing feature.

✔ Content of overlay

- Out of functions operated from the [TOOL MENU], execution results of the annotation function (text, straight line, pen, and marker) are drawn on an overlay. Scales (XY measurement, X scale, scale, cross hairs, and grid line) are not drawn on an overlay. The display of each item can be independently switched to ON and OFF.
- All results of measurement are rendered in an overlay.

(2) Using overlay

Displaying and hiding an overlay

You can use the [OVERLAY] button on the [TOOL BAR] of the [TOOL MENU] to display or hide an overlay.

- 1 **Display [TOOL MENU] or [TOOLBAR].**
- 2 **Press the [OVERLAY] button.**
The [OVERLAY] submenu appears.
- 3 **Press the [ON] button to display or the [OFF] button to hide the overlay.**

- [ON] Displays overlay.
- [OFF] Hides overlay.

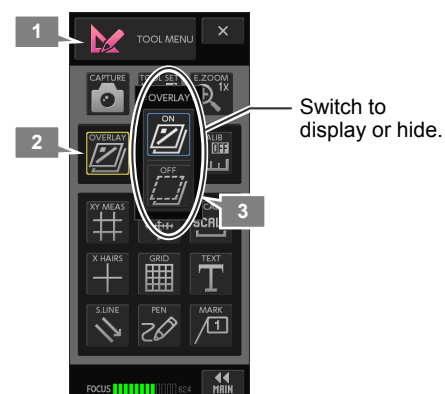
The [OVERLAY] button icon switches in accordance with the selection.

✓ Automatic display of overlay

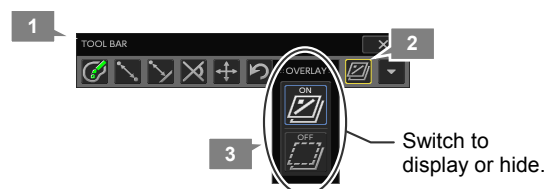
Even when you are hiding an overlay, it automatically appears when you press a button on [TOOL MENU] or [TOOL BAR] that will draw something on the overlay.

✓ Displaying and hiding annotations

- Since the annotation function (text, straight line, pen, and marker) is drawn on an overlay, it is switched according to the overlay display/hide setting.
- The display of each item of scales (XY measurement, X scale, scale, cross hairs, and grid line) can be independently switched to ON and OFF.



Switching to Display/Hide the Overlay
(Using [TOOL MENU])



Switching to Display/Hide the Overlay
(Using [TOOLBAR])

Clearing overlay content

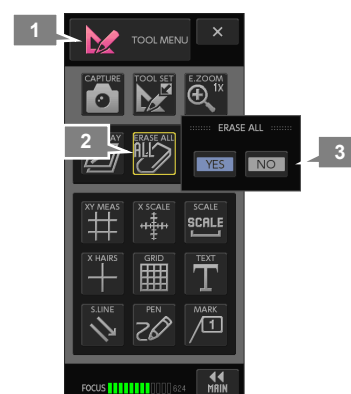
You can clear overlay content in one operation.

- 1 **Display [TOOL MENU] or [TOOLBAR].**
- 2 **Press the [ERASE ALL] button.**
A confirmation message appears.
Note: To erase all overlay contents from the [TOOLBAR], press the [SHOW ALL] button to display all buttons.
- 3 **Press the [YES] button to erase all or the [NO] button to cancel the operation.**

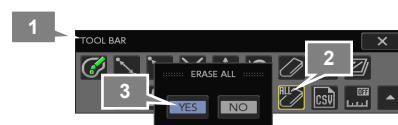
Information rendered in the overlay is cleared.

✓ Clearing overlay

- The content will not be restored once cleared.
- The display/hide setting can be made for each item of scales (XY measurement, X scale, scale, cross hairs, and grid line). Therefore, these items cannot be deleted by the erase-all operation.
- Pressing the [ERASE ALL] button completely erases rendered contents of annotations and measurement results. You cannot keep only a part of rendered overlay contents. To erase rendered contents for each overlay item (text, straight line, pen, and marker), press the [ERASE] button in the menu of each item.



**Clearing All Overlay Contents
(Using [TOOL MENU])**



**Clearing All Overlay Contents
(Using [TOOLBAR])**

✓ Automatically clearing displayed overlay contents

Displayed overlay contents (annotations and measurement results) are automatically cleared (erased) when the following operations are performed.

- **Changing image mode:**
When [Image mode] is set to [ROI-L], [ROI-S], or [C.SCAN] in the [CAM MENU: CAMERA] long window, scales, annotations, and measurement results are completely cleared.
- **Playing back image:**
When an image is played back by the [VIEW MENU], annotations and measurement results are cleared. The same applies to when playback is complete.
- **2-window display:**
When [2WIN] display is set to ON/OFF in the [VIEW MENU], annotations and measurement results are cleared.
- **Switching calibration settings:**
When calibration settings are changed by the [TOOL MENU] or [TOOLBAR], only measurement results are cleared.
- **All clear:**
When [ERASE ALL] is performed by the [TOOL MENU] or [TOOLBAR], annotations and measurement results are cleared.

Annotation can be added through the tool menu. You can do the following operations.

Displaying/hiding scales

Item	Description	See
XY measurement	Two cross lines are displayed on the screen. Horizontal (X) and vertical (Y) distance can be measured.	11.3.1 (p.141)
X scale (cross scale) display	Horizontal (X) and vertical (Y) scales are displayed on the screen. Approximate size of an object can be measured.	11.3.2 (p.142)
Scale display	A scale is displayed at the bottom right of the screen. Approximate size of an object can be measured.	11.3.3 (p.143)
Cross hairs with circle display	Cross hairs with concentric circles are displayed at the center of the screen. Center, horizontal side or vertical side of an object can be adjusted. Settings of cross hairs and circles can be changed as required (in [TOOL SET: X HAIRS] screen).	11.3.4 (p.144)
Grid display	Grid can be displayed on the screen. Distance between grid lines can be arbitrarily specified with a numeric value or by two points on the screen (in [TOOL SET: GRID] screen).	11.3.5 (p.146)

Operating annotations

Item	Description	See
Text comment	An alphanumeric text comment can be added to an arbitrary location of the screen.	11.4.1 (p.147)
Straight lines	A straight line or arrow can be drawn on the screen.	11.4.2 (p.148)
Pen drawing	Any line can be drawn on the screen.	11.4.3 (p.149)
Counting with marker	A marker with a number can be drawn on an arbitrary location of the screen. Points on the screen can be numbered with markers.	11.4.4 (p.150)

✔ Using mouse

When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

✔ Clearing scales and annotations automatically

Displayed scales and annotations are automatically cleared (erased) when the following operations are performed.

- **Changing image mode:**
When [Image mode] is set to [ROI-L], [ROI-S], or [C.SCAN] in the [CAM MENU: CAMERA] long window, scales, annotations, and measurement results are completely cleared.
- **Playing back image:**
When an image is played back by the [VIEW MENU], annotations and measurement results are cleared. The same applies to when playback is complete.
- **2-window display:**
When [2WIN] display is set to ON/OFF in the [VIEW MENU], annotations and measurement results are cleared.
- **Switching calibration settings:**
When calibration settings are changed by the [TOOL MENU] or [TOOLBAR], only measurement results are cleared.
- **All clear:**
When [ERASE ALL] is performed by the [TOOL MENU] or [TOOLBAR], annotations and measurement results are cleared.

11.1 Displaying the Tool Menu

1 Press the [CAM] button on the task bar.

The [CAM MENU] appears on the top left (or top right) of the screen.

2 Press the [MENU SELECT] button on the [CAM MENU].

The [TOOL MENU] appears.

✓ Menu displayed when the [CAM] button is pressed

As you use the DS-L3, [CAMERA MENU], [VIEW MENU], or [TOOL MENU] may be displayed when pressing the [CAM] button on the task bar.

If [VIEW MENU] is not displayed, press the menu button and select [VIEW] from the menu to open [VIEW MENU].

✓ Switching the TOOL menu location

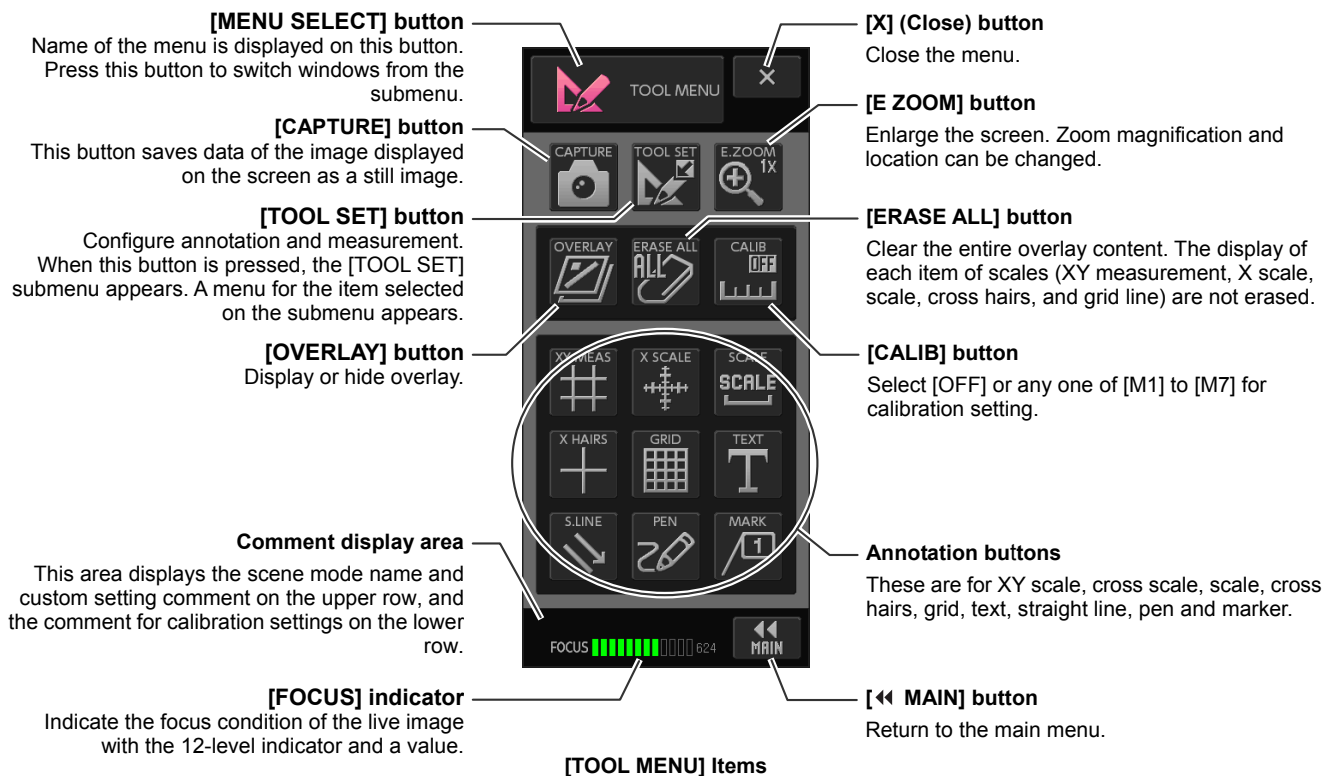
If you press the [CAM] button on the task bar while the TOOL menu is displayed on the screen, the location of the menu switches from right to left or vice versa. If you press the [CAM] button while both the tool menu and toolbar are displayed, location of them will be swapped from right to left or vice versa.



Displaying the [TOOL MENU]

Items on the [TOOL MENU]

The [TOOL MENU] includes the following display items.



[TOOL MENU] Items

✓ [TOOL MENU] screen size

The display size of the [TOOL MENU] screen can be changed on the [SETUP MENU: MAIN] screen. For setting the display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [TOOL MENU] screen are shown differently in [LARGE] and [SMALL] size menus as shown below.

Large menu	[E.ZOOM]	[OVERLAY]	[ERASE ALL]	[XY MEAS]
Small menu	[EZOOM]	[OVERLY]	[ERASE]	[XY MSR]

11.2 Changing Scaling and Measurement Settings

— TOOL SET Menu —

Scaling and measurement can be configured using the [TOOL SET] button on the tool menu.

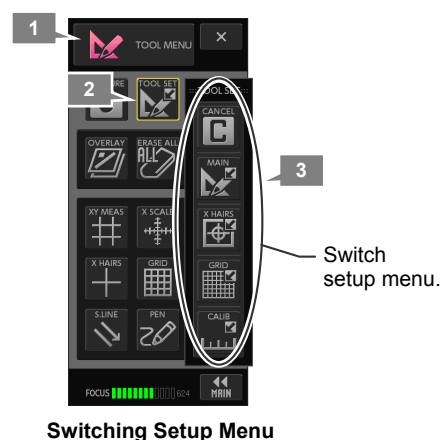
- 1 Display the [TOOL MENU] screen.
- 2 Press the [TOOL SET] button.
The [TOOL SET] button appears.
- 3 Press a desired button on the [TOOL SET] button to show a desired setup menu.

The menu changes as you select:

- **Main:** [TOOL SET: MAIN] screen
- **Cross Hairs:** [TOOL SET: X HAIRS] screen
- **Grid Line:** [TOOL SET: GRID] screen
- **Calibration:** [TOOL SET: CALIB] screen
- **Cancel** Cancels selection.

Operate the [MENU SELECT] button on each menu on [TOOL SET] to switch to another menu.

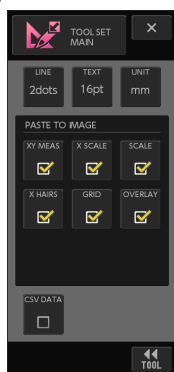
- 4 Configure settings in each menu. If you see the [SAVE] button, press it to save the settings.
Content of the setting for each screen is described in the following pages.
- 5 Press the [◀ TOOL] button to return to [TOOL MENU].
Press the [X] button to close the menu.



Switching Setup Menu

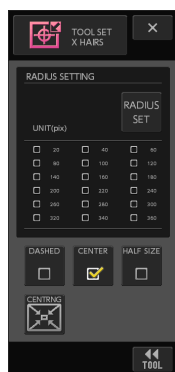
TOOL setup menus

[TOOL SET: MAIN]



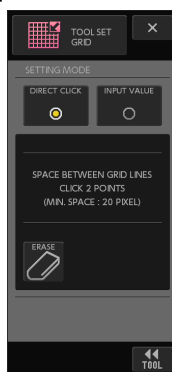
Configures basic settings as well as saving settings with CSV files.

[TOOL SET: X HAIRS]



Cross hairs and circles.

[TOOL SET: GRID]



Sets up how to draw grid lines and draws grid.

[TOOL SET: CALIB]



Registers calibration settings to be basic lengths for measurement.

✓ Displaying [TOOL SET] menus

You cannot operate any annotation or measurement while a [TOOL SET] menu is displayed. [T.BAR] on the task bar is grayed out, indicating that operation is restricted.

✓ [TOOL SET] screen size

The [TOOL SET] screen size changes according to the setting of the [TOOL MENU] screen size. To change the [TOOL MENU] display size, see “13.2.1 (5) Configuring the position and size of the menu”.

Some buttons in the [TOOL SET] screens are shown differently in [LARGE] and [SMALL] size menus as shown below.

Screen	[TOOL SET: MAIN]			[TOOL SET: X HAIRS]		[TOOL SET: CALIBRATION]	
Large menu	[XY MEAS]	[OVERLAY]	[CSV DATA]	[XY MEAS]	[CENTRNG]	[MANUAL]	[OPTICAL]
Small menu	[XY MSR]	[OVERLY]	[CSV]	[XY MSR]	[CNTRNG]	[MANU]	[OPT]

11.2.1 Performing Basic Settings for Comment Function and Measurement Function

The following settings can be done on the [TOOL SET: MAIN] screen.

- **[LINE] button (line width)**

Set the line width used in annotation and measurement. Select one of three line widths: [1dot], [2dots] or [3dots]. Changing this setting does not affect lines already drawn by the Straight Line and Pen tool.

- **[TEXT] button**

Set the text size used in annotation and measurement. Select from the three sizes: [12pt], [16pt] or [24pt]. Changing this setting does not affect text already drawn by the Text and Marker tool.

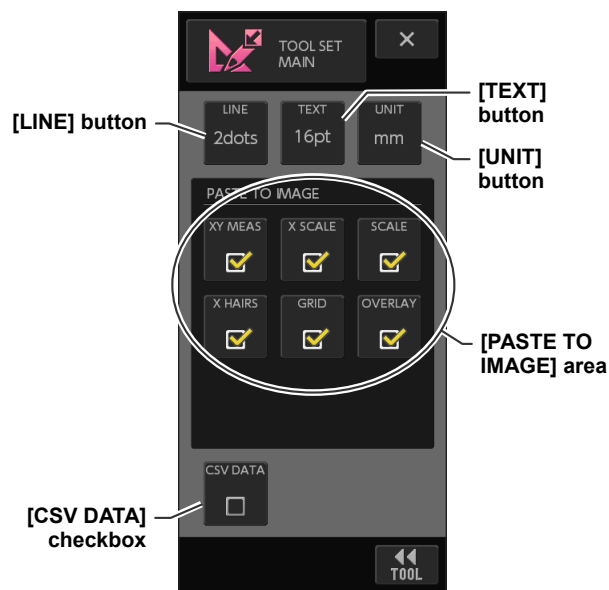
- **[UNIT] button**

Set unit used in annotation and measurement. Select from six units: [nm], [μ m], [mm], [cm], [mil] or [inch].

- **[PASTE TO IMAGE] area**

Select what information will be added to an image when shot. Select or clear the six checkboxes: [XY MEAS], [X SCALE], [SCALE], [X HAIRS], [GRID] and [OVERLAY]. These settings are also applied to printing and obtaining a live image on the web screen.

Note: Items for [OVERLAY] are annotations and measurement results.



[TOOL SET: MAIN] Screen

✓ Adding annotations and measurement results

Scales pasted to images and rendered overlay contents (annotations and measurement results) cannot be deleted later.

- **[CSV DATA] checkbox**

Specify whether to save measurement results to a CSV file. If you select the checkbox, the measured results are automatically saved to a CSV file when an image is saved. The file will have the same name as the image and an extension of ".csv". Annotation information will not be saved to the CSV file.

Note: A CSV file can be saved by pressing the [CSV] button on the [TOOLBAR].

✓ CSV file format

A CSV file contains information like the one shown below.

	A	B	C	D	E	F	G
1							
2			Res1	Res2	Res3	Unit	
3	1	Distance between Two Points	3.5			cm	
4	2	Distance between Two Points	0.57			cm	
5	3	Distance between Line & Point	0.96			cm	
6	4	Distance between Line & Point	0.96			cm	
7	5	Distance between Line & Point	1.6			cm	
8	6	Distance between Line & Point	1.9			cm	
9	7	Angle	165			deg.	
10	8	Angle	32			deg.	
11	9	Angle	117			deg.	
12	10	Diameter & Circumference	5.1	16		cm	
13	11	Diameter & Circumference	5.9	18		cm	
14							

Figure: Example of the CSV File

11.2.2 Configuring Cross Hairs

The following settings can be done on the [TOOL SET: X HAIRS] screen.

- **[RADIUS SETTING] area**

Configure concentric circles displayed with cross hairs.

Pressing the [RADIUS SET] button changes the screen to the [RADIUS SETTING] menu screen. In this screen, you can select checkboxes to set whether to display or hide concentric circles of a size from 20 to 360. Pressing the [UNIT] button switches the unit of concentric circles between [pix] (pixel) and the unit set in the [TOOL SET: MAIN] screen.

Pressing the [X] button after settings have been completed returns the screen from the [RADIUS SETTING] screen to the [TOOL SET: X HAIRS] screen. Confirm that check marks are added to the selected sizes.

- **[DASHED] checkbox**

Specify whether cross hairs are drawn with solid or dashed lines. When you select the checkbox, the cross hairs will be drawn in dashed lines. Circles are always drawn in solid lines.

- **[CENTER] checkbox (paint center)**

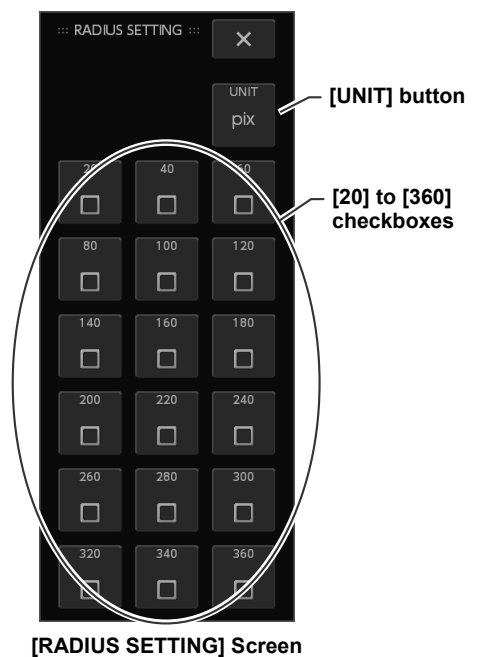
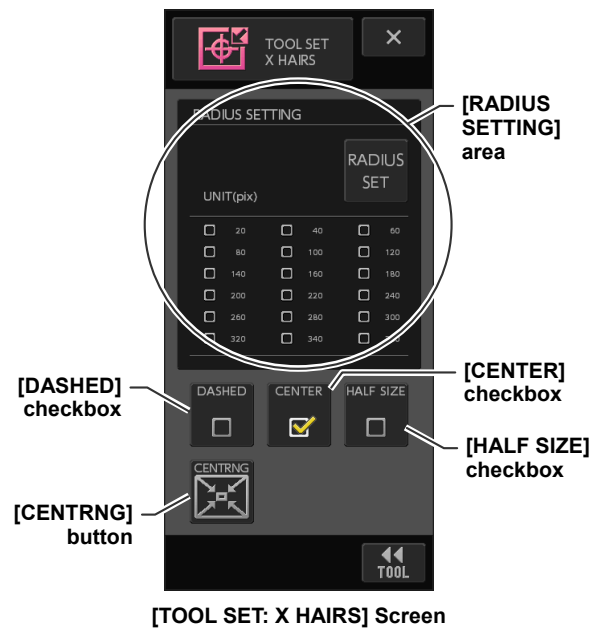
Specify whether to paint the intersection of the cross hairs.

- **[HALF SIZE] checkbox (half size)**

Draw cross hairs in half the normal size. The display size of the concentric circle does not change.

- **[CENTRNG] button (centering)**

Restore the cross hairs to the center after it is moved.



11.2.3 Setting How to Draw Grid Lines

The [TOOL SET: GRID] screen is used to specify how grid is drawn.

- **[SETTING MODE] area**

Select a grid drawing method. Select either [DIRECT CLICK] or [INPUT VALUE] by pressing either button.

- **[DIRECT CLICK]**

Specify two points on the screen to draw grid lines based on the width and height between the two points. (The minimum distance is 20 pixels.)

If you want to redraw grid, press the [ERASE] button to clear the grid lines and specify the two points again.

- **[INPUT VALUE]**

Enter the width and height numerically. Choose the reference point either from [TOPLEFT] or [CENTER].

- **[ERASE] button**

Clear the settings of the grid lines. This button appears only when [DIRECT CLICK] is selected.

- **[WIDTH] input field**

Enter a numerical value for distance between vertical grid lines. Press the input field; the keypad appears. This field appears when [INPUT VALUE] is selected.

- **[HEIGHT] input field**

Enter a numerical value for distance between horizontal grid lines. Press the input field. The keypad appears. This field appears when [INPUT VALUE] is selected.

- ✓ **Entering values**

When you select the input field, a keypad appears. Press the numerical keys to enter a desired value and then press the [ENTER] button.

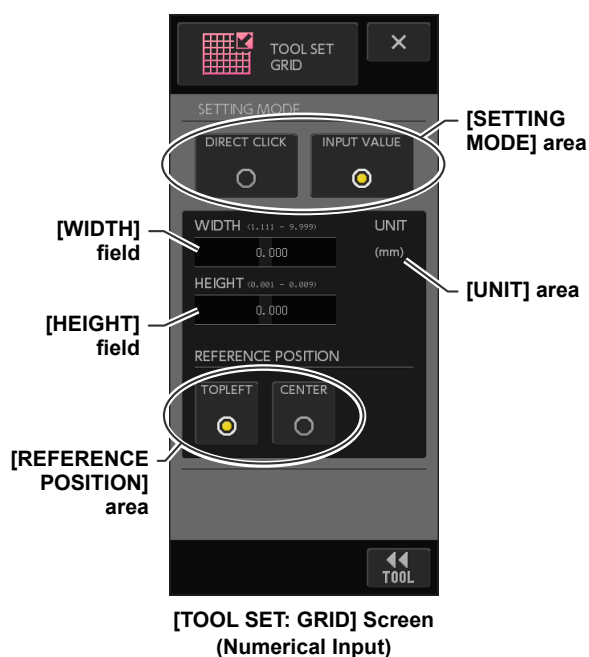
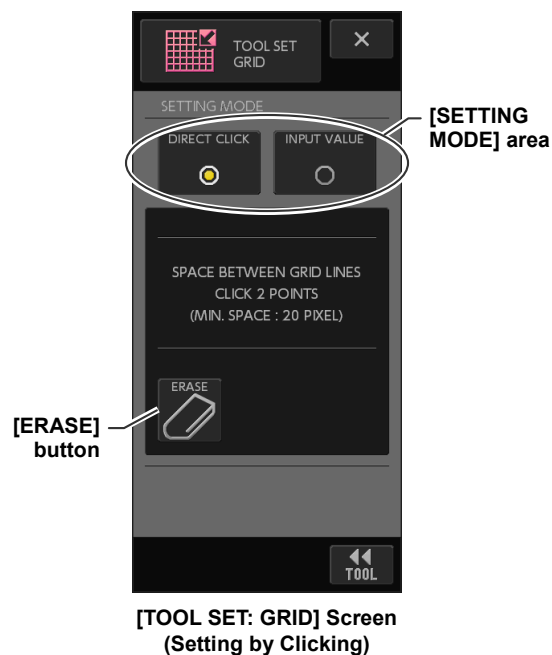
To erase the entered value, press the [CLR] button. To go back to the previous character, press the [BS] button. Pressing the [X] button closes the keypad without modifying values.

- ✓ **Displaying unit**

The unit set in the [TOOL SET: MAIN] screen is displayed in the [UNIT] area. When number of digits is too large to display the value by the unit currently selected, the unit to be used is automatically changed.

- **[REFERENCE POSITION] area**

Select the reference point of grid lines from [TOPLEFT] or [CENTER]. This area appears when [INPUT VALUE] is selected.



11.2.4 Registering Calibration Settings

Calibration values to be reference lengths when displaying scales and making measurement can be registered on the [TOOL SET: CALIB] screen.

✓ Registering calibration settings

The DS-L3 has two types of calibration registration: [OPTICAL] and [MANUAL].

- **[OPTICAL]** This type allows you to input the magnification of optical equipment such as microscope. The DS-L3 calculates a calibration value from the entered value.
- **[MANUAL]** This type allows you to register an arbitrary calibration value by displaying an object of known length and specifying the length on the screen.

Required tools

Prepare the following tools for registration using the [MANUAL] setting.

- **Object of known length**

How to register

Follow the procedures described below to register user-configured calibration.

- 1 Display the [TOOL SET: CALIB] screen.**
Press the [TOOL SET] button and press the [CALIB] button on the submenu.
- 2 Select [MANUAL] or [OPTICAL] from the [MODE] area.**
- 3 Perform either of the following operations according to the selected mode.**

When [OPTICAL] is selected with DS-L3 and the microscope not connected with a USB cable

- 1. Enter the magnification of the objective of the optical equipment in the input field of the [OBJECTIVE] area.**
- 2. If a relay lens is in use, enter the magnification of the relay lens in the input field of the [RELAY] area.**
When no relay lens is used, enter "1.00".
- 3. Enter comment information (up to 11 characters) in the input field of the comment area.**

The entered comment is displayed in the comment area of the [CAMERA MENU], [VIEW MENU], [TOOL MENU], and [TOOLBAR] when any of [M1] to [M7] is selected in the calibration setting.

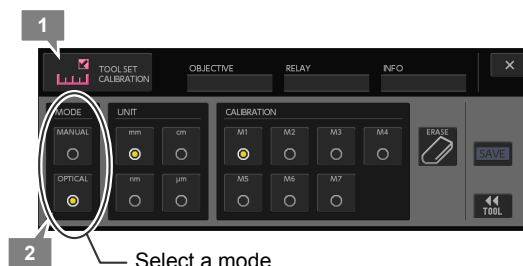
When [OPTICAL] is selected with DS-L3 and the motorized microscope connected with a USB cable

- 1. Enter the magnification of the relay lens in the input field of the [RELAY] area.**

Magnification is shown in the input field of the [OBJECTIVE] area based on the microscope information configured in advance. This value cannot be edited here.

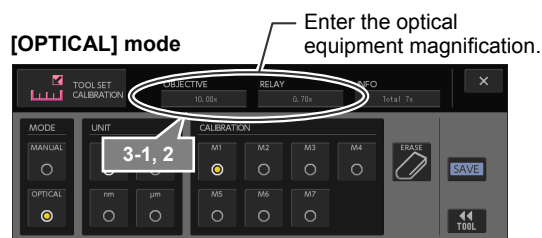
This magnification information is also registered to the setting of calibration for a nosepiece with the matching number.

Note: The [INFO] area is hidden as the name of the microscope connected to the system is automatically registered as a comment.



Select a mode.

Selecting a Mode



✓ Notes:

- If the AZ100M microscope is connected to DS-L3, upon detection of AZ-ICI coaxial illuminator attached to the microscope the system automatically performs adjustment by multiplying the objective magnification by 1.25 to determine a measurement value. For the [RELAY] area, you only need to enter the magnification (0.6x) of the vertical tube on AZ100M, but not the magnification for the coaxial illuminator.
- When the MA200 microscope is connected to DS-L3, be sure that the magnification module turret is set at a click-stop position. Otherwise, the registration button cannot be selected.

When [MANUAL] is selected

1. Project an object of known length on the screen.
2. Draw a calibration line (between (A) and (B) in the figure) on the screen according to the object to be a reference.

Note: Use the mouse to draw the line accurately.

Specify the starting and ending points. A line is drawn between them. To retry, press the [ERASE] button and redraw the line.

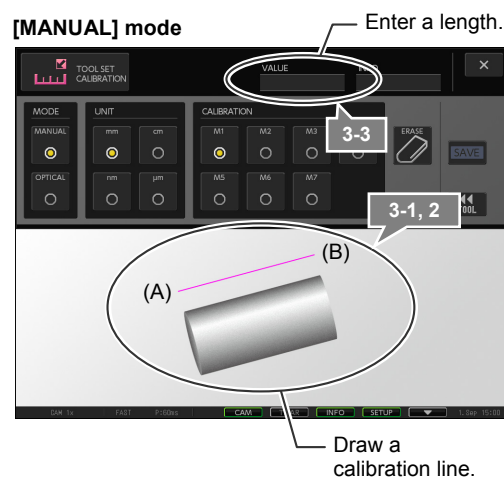
3. Enter the length of the object in the input field of the [VALUE] area.

✓ Entering values

When you select the input field, a keypad appears. Press the numerical keys to enter a desired value and then press the [ENTER] button. (Input range: 0.01 to 99999.99)

To erase the entered value, press the [CLR] button. To go back to the previous character, press the [BS] button. Pressing the [X] button closes the keypad without modifying values.

Note: To erase entered values and calibration lines, use the [ERASE] button.



Entering Values for Each Mode

4. Set the unit of the length in the [UNIT] area.

Select a unit from [nm], [μ m], [mm], and [cm] radio buttons.

5. Enter a comment (maximum 11 characters) into the input field of the [INFO] area as required.

When you press the input field, the keypad appears. Press keys to enter information and press [ENTER] to finish input.

The entered comment is displayed in the comment area of the [CAMERA MENU], [VIEW MENU], [TOOL MENU], and [TOOLBAR] when any of [M1] to [M7] is selected in the calibration setting.

6. Press one of [M1] to [M7] in the [CALIBRATION] area to select the number of registration destination.

If any comment is registered to the number selected, the comment is shown in the upper-right section of the [CALIBRATION] area.

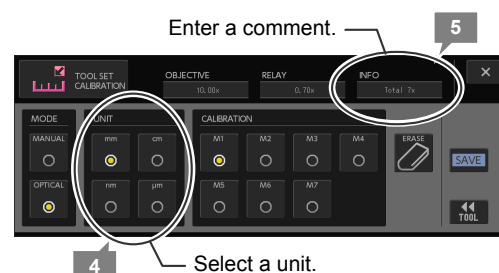
7. Register the settings using the [SAVE] button.

When registration of the calibration setting is completed, the registered calibration setting becomes valid.

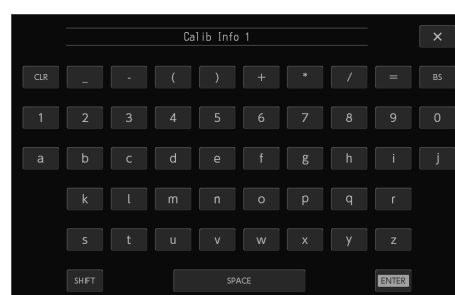
If required values are not entered, this save operation is disabled. Selecting a registration number having calibration setting information and pressing the [SAVE] button overwrites the setting information for that number.

8. Press the [◀ TOOL] button to return to the [TOOL MENU]. Press the [X] button to close the [TOOL SET: CALIB] screen.

The settings are discarded if calibration values are not saved.



Selecting a Unit and Entering a Comment



Keypad for Entering Comment

Comment registered to the selected registration number is shown here.



Registering Calibration Settings

11.3 Operating Scales

You can display measurement lines in the X and Y directions on the screen to measure lengths and also display scales such as X scale (cross scale), scale, cross hairs (and concentric circles), and grid.

✓ When adding scales to the live image

When adding scales to a live image, the image and scales may be misaligned depending on the status of the object. In this case, use the [FREEZE] button to take a still image and add scales.

✓ Displaying scales on a replayed image

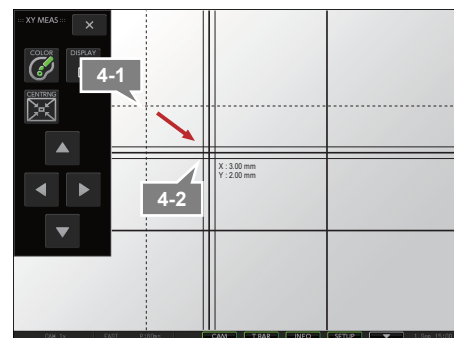
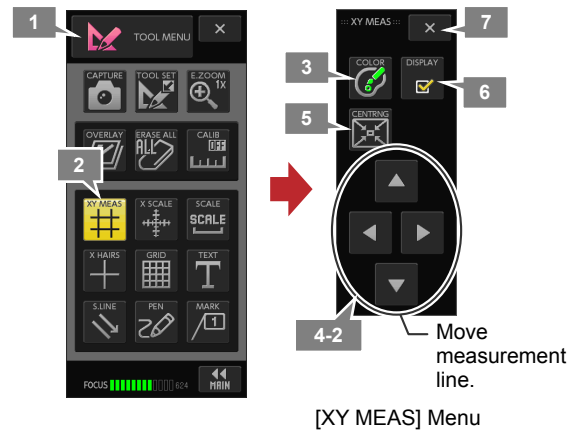
When a scale is displayed on a replayed image saved in the TIFF or JPEG format, values are shown based on the calibration settings saved for the image. Note that, on a capture of a replayed image, unit and calibration settings for the original image are not applied to the scale or measurement values; they are shown in pixel unit.

Use the [TOOL MENU] for operating scales. You can perform the following operations.

11.3.1 Performing XY Measurement

Draw two horizontal lines and two vertical lines on the screen. You can measure the X-direction distance and Y-direction distance simultaneously.

- 1 **Display the [TOOL MENU].**
- 2 **Press the [XY MEAS] button.**
The [XY MEAS] menu appears and measurement lines are displayed on the screen.
Distance between vertical measurement lines (length along X direction) and distance between horizontal measurement lines (length along Y direction) are displayed at the intersection of the lines.
- 3 **Press the [COLOR] button to select color of the lines.**
You can change line color later.
- 4 **Move the measurement lines to a desired location.**
 1. **Select a point on the measurement line.**
Guiding lines appear at both sides of the line.
 2. **Move the measurement line using the stylus (like dragging by mouse) on the screen or movement buttons on the [XY MEAS] menu.**
- 5 **To return the measurement line to the center of the screen, press the [CENTRNG] button.**
- 6 **To display or hide XY measurement lines, use the [DISPLAY] checkbox on the [XY MEAS] menu.**
- 7 **To return to the [TOOL MENU], press the [X] button on the [XY MEAS] menu.**



XY Measurement Operation

✓ XY measurement display

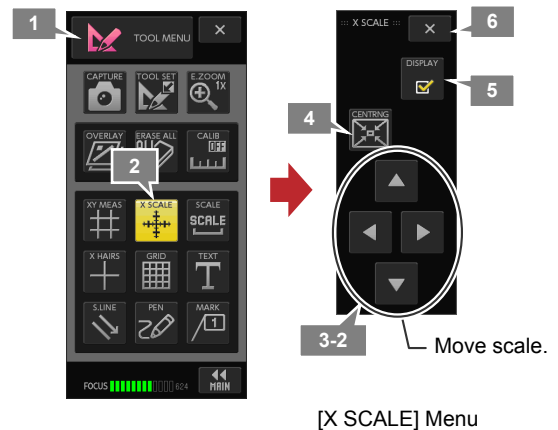
- The XY measurement values are coupled with unit and calibration settings. If you change the settings, location of measurement lines does not change but values of measured results are updated.
- While the [XY MEAS] menu is shown, you can move measured results displayed on the screen using the stylus (in the same way as dragging with the mouse).
- The width of XY measurement lines and character size of the dimension can be changed on the [TOOL SET: MAIN] screen.
- The ON/OFF setting of the XY measurement remains when the power is turned off. If you turn the power off with the XY measurement being displayed, it appears automatically when you turn the power on again.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

11.3.2 Displaying X Scales (Cross Scales)

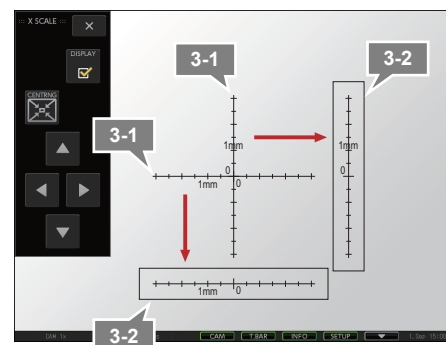
The X-axis and Y-axis scales (called cross scales) can be displayed on the screen.

When cross scales are displayed, you can grasp approximate size of an object. X scale and Y scale can be independently moved. So you can move either scale near the object to make measurement easier.

- 1 Display the [TOOL MENU].**
- 2 Press the [X SCALE] button.**
The [X SCALE] menu appears and X-axis scale and Y-axis scale appear on the screen.
- 3 Move each scale to a desired location.**
Following operations must be done while the [X SCALE] menu is displayed.
 - 1. Select a scale with a stylus.**
Frame lines are displayed around the selected scale.
 - 2. Move the scales using the stylus (in the same as dragging with the mouse) on the screen or movement buttons on the [X SCALE] menu.**
- 4 To return the cross scale to the center, press the [CENTRNG] button.**
- 5 To display or hide scales, use the [DISPLAY] checkbox on the [X SCALE] menu.**
- 6 To return to the [TOOL MENU], press the [X] button on the [X SCALE] menu.**



[X SCALE] Menu



Operating Cross Scales

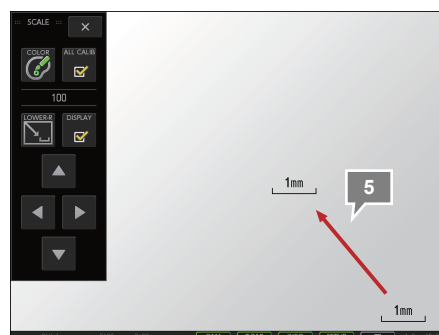
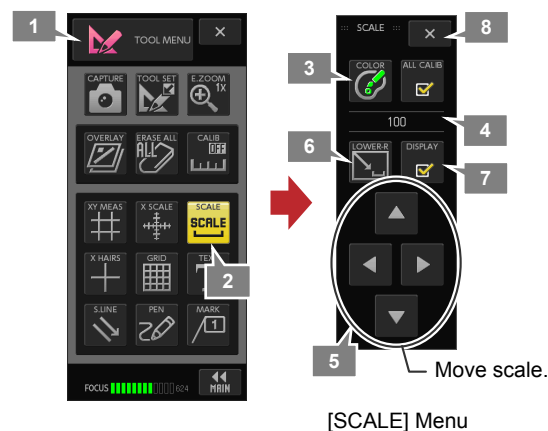
✓ Cross scale display

- The cross scale values are coupled with unit and calibration settings. If you change the settings, location of the scales does not change but numbers on the scales are updated.
- The scales may not be displayed depending on the unit and calibration settings. In this case, change the unit setting.
- The ON/OFF setting of the cross scales remains when the power is turned off. If you turn the power off with the cross scales being displayed, they appear automatically when you turn the power on again.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

11.3.3 Displaying Scales

A scale can be displayed on the screen. When a scale is displayed, you can grasp approximate size of an object.

- 1 **Display the [TOOL MENU].**
- 2 **Press the [SCALE] button.**
The [SCALE] menu appears and a scale is displayed at bottom right of the screen.
- 3 **Press the [COLOR] button to select color of the scale (You may need to turn on or off the [ALL CALIB] checkbox first).**
You can change the color later.
- 4 **To change the length of the scale, select the length value field and enter a desired value (You may need to turn on or off the [ALL CALIB] checkbox first).**
If you press the scale length value field, a keypad appears. Press keys to enter a desired value and press [ENTER] to commit the value.
If you press the [X] button, the keypad closes without updating the value.
Note: You cannot change the unit. If the value is changed to a value that does not fit the displayable size, the length will be shown as 10 times, 100 times, etc. or 1/10, 1/100, etc.
- 5 **You can move the scale to an arbitrary position.**
To move the scale, use the stylus in a similar manner to mouse dragging, or press a movement button on the [SCALE] menu.
- 6 **To return the scale to the bottom right of the screen, press the [LOWER-R] button.**
- 7 **To display or hide the scale, use the [DISPLAY] checkbox on the [SCALE] menu.**
- 8 **To return to the [TOOL MENU], press the [X] button on the [SCALE] menu.**



Displaying Scale

☑ [ALL CALIB] checkbox

Select the target for applying color or length settings. Select this checkbox to apply the selected scale color or length to all the calibration setting numbers M1 to M7, or clear the checkbox to apply the change to currently selected calibration only.

☑ Scale display

- The scale values are coupled with unit and calibration settings. If you change the settings, the value does not change but the length of the scale is changed.
- A dimension may not be displayed on the scale and "ERROR" may be displayed depending on the calibration value settings. This happens, for example, when the entire screen size is set to 1 mm. In this case, change the unit setting.
- The character size of a dimension of the scale can be changed on the [TOOL SET: MAIN] screen.
- The ON/OFF setting of the scale remains when the power is turned off. If you turn the power off with the scale being displayed, it appears automatically when you turn the power on again.
- You cannot rotate the scale.
- The scale disappears automatically when a captured image is replayed because the image has an attached scale. When the replayed image is closed and the live image returns, the scale appears again automatically. The scale can be shown by pressing the [SCALE] button even while the image is being replayed.

11.3.4 Display Cross Hair and Circles

Cross hairs and concentric circles can be displayed on the screen.

The displayed cross hairs and circles can be used for centering of an object and horizontal or vertical adjustment of the object. The cross hairs can be moved to a desirable location so that it is convenient for viewing an object.

1 Display the [TOOL MENU].

2 Press the [X HAIRS] button.

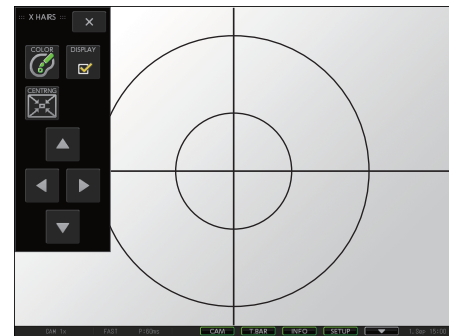
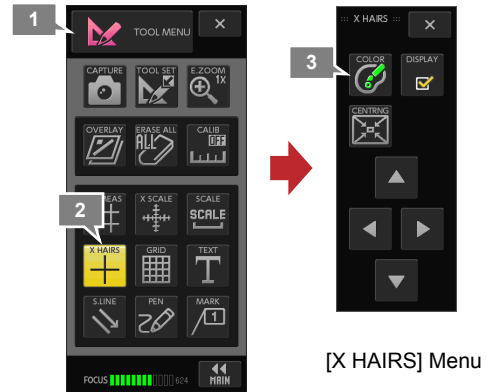
The [X HAIRS] menu appears and cross hairs and circles are displayed on the screen in accordance with the settings of [TOOL SET: X HAIRS].

3 Press the [COLOR] button to select the color.

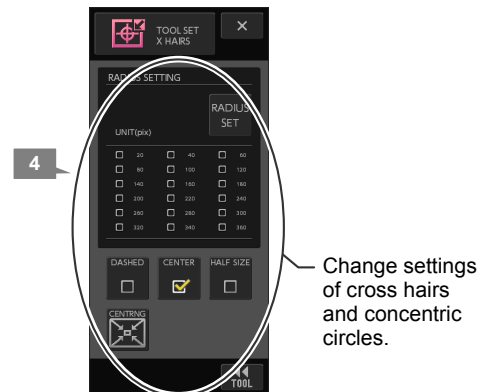
You can change the color later.

4 To change the settings of cross hairs and circles, open [TOOL SET: X HAIRS] screen and do the following settings: (See “11.2.2 Configuring Cross Hairs”.)

- **[RADIUS SETTING] area**
Specify the size of a concentric circle to be displayed using checkboxes representing the size from 20 to 360.
- **[DASHED] checkbox**
Select the line type of cross hairs solid or dashed. Circles are always drawn in solid line.
- **[CENTER] checkbox**
Specify whether the intersection of the cross hairs are painted.
- **[HALF SIZE] checkbox**
Specify whether to draw cross hairs in normal size or half size.
- **[CENTRNG] button**
Restore the cross hairs and concentric circle to the center after it is moved.

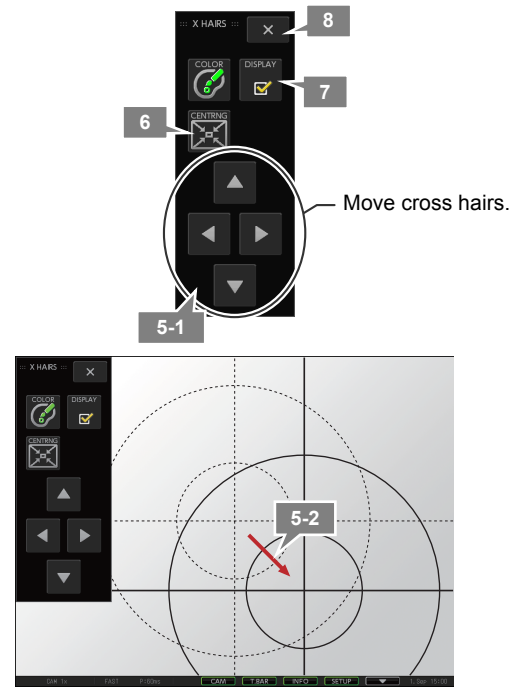


Displaying Cross Hairs and Concentric Circles



Display Settings of Cross Hairs and Concentric Circles ([TOOL SET: X HAIRS] Screen)

- 5** Use either of the following methods to move cross hairs.
 1. Press movement buttons of the [X HAIRS] menu.
 2. Use the stylus (like dragging by mouse) to move the intersection of the cross hairs on the screen.
- 6** Press the [CENTRNG] button to restore the cross hairs to the center of the screen.
- 7** To display or hide cross hairs and circles, use the [DISPLAY] checkbox on the [X HAIRS] menu.
- 8** To return to the [TOOL MENU], press the [X] button on the [X HAIRS] menu.



Moving Cross Hairs and Concentric Circles

✓ Cross-hairs and concentric circle display

- The display of the concentric circle is coupled with unit and calibration settings. If you change the settings, the size of the concentric circles changes. The cross-hair display does not change.
- The line width of the concentric circle and cross hairs can be changed on the [TOOL SET: MAIN] screen.
- The ON/OFF setting of the cross hairs (concentric circle) remains when the power is turned off. If you turn the power off with the cross hairs being displayed, they appear automatically when you turn the power on again.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

11.3.5 Displaying Grid on Screen

Grid can be displayed on the screen.

Interval between grid lines can be arbitrarily set, which is available for positioning an object or horizontal or vertical adjustment of the object.

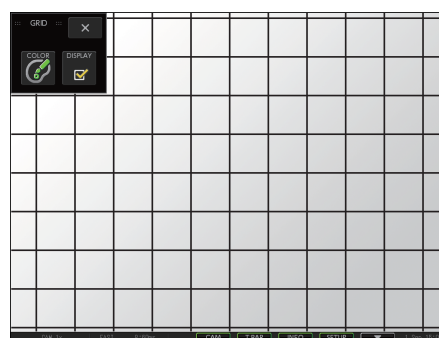
- 1 **Display the [TOOL MENU].**
- 2 **Press the [GRID] button.**
The [GRID] menu appears and grid lines are displayed on the screen in accordance with the settings in the [TOOL SET: GRID] screen.
- 3 **Use the [COLOR] button to select color.**
You can change color later.
- 4 **To change distance between grid, open the [TOOL SET: GRID] screen and do the following settings:**
 1. Select a method for setting grid distance from option buttons in the [SETTING MODE] area.
 2. Do the following depending on the method you have selected.

If [DIRECT CLICK] is selected:

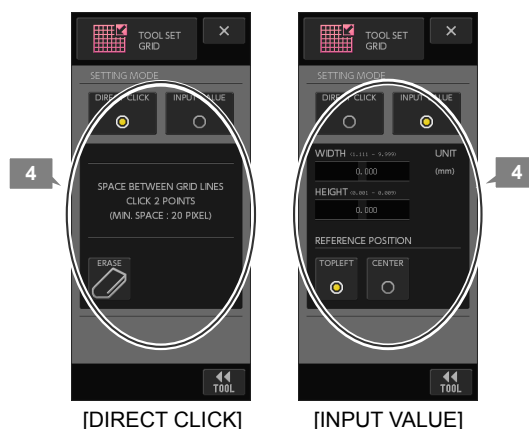
Specify two points on the screen to create grid. If you want to change settings, press the [ERASE] button to clear the grid before you set again.

If [INPUT VALUE] is selected:

Enter the width and height numerically. Choose the reference point either from [TOPLEFT] or [CENTER]. Press the input field, the keypad appears. Press keys to enter a desired value and press [ENTER] key to commit entry.
- 5 **Use the [DISPLAY] checkbox on the [GRID] menu to display or hide grid lines.**
- 6 **To return to the [TOOL MENU], press the [X] button of the [GRID] menu.**



Displaying Grid



Changing Grid Settings
([TOOL SET: GRID] Screen)

✓ Grid display

- The display of grid does not change even when the setting of unit and calibration is changed.
- The line width of the grid lines can be changed on the [TOOL MENU: MAIN] screen.
- The ON/OFF setting of the grid lines remains when the power is turned off. If you turn the power off with the grid lines being displayed, they appear automatically when you turn the power on again.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

11.4 Adding Lines and Comments to an Image

Annotations such as lines and comments can be added to an image.

✓ Adding a comment to a live image

When a comment is added to a live image, the comment may not be placed at the correct position in the image depending on the object status. In this case, acquire a still image with the [FREEZE] button and then add a comment.

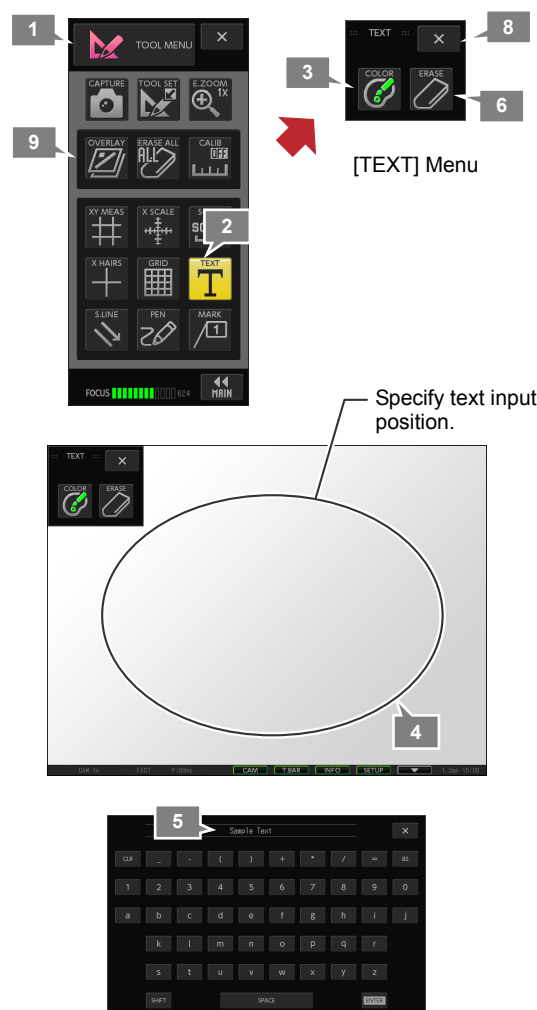
Use the [TOOL MENU] to operate the annotation function. You can perform the following operations.

11.4.1 Inserting Text Annotation

Alphanumeric text can be placed in any place on the screen.

- 1 **Display the [TOOL MENU].**
- 2 **Press the [TEXT] button.**
The [TEXT] menu appears.
- 3 **Use the [COLOR] button to select color.**
The color selected here applies to text that is entered from the next time. You cannot change color of the text already entered.
- 4 **Specify location of text input on the screen.**
If you specify the location, the keypad appears.
- 5 **Enter desired text using the keypad up to 40 characters.**
Press the [SHIFT] button for switching upper and lower case. Use the [CLR] button to erase what you have entered. Press [BS] to backspace one character.
Press the [ENTER] button when the text is entered. Press the [X] button to close the keypad without saving the text.
- 6 **Press the [ERASE] button on the [TEXT] menu to delete the entered text.**
Pressing the [ERASE] button deletes all the text you have entered.
- 7 **Repeat steps 3 to 5 if you want to continue entering another text.**
- 8 **Press the [X] button on the [TEXT] menu to return to the [TOOL MENU].**
- 9 **To display or hide entered text, switch to display or hide overlay.**

You cannot selectively display or hide only text. Switch to display or hide the entire overlay.



Entering Text Comment

✓ Text annotation display

- The display of text annotation does not change even when the setting of unit and calibration is changed.
- The text size can be changed on the [TOOL SET: MAIN] screen. Note that the size of the text already entered does not change.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

11.4.2 Drawing Straight Lines and Arrows

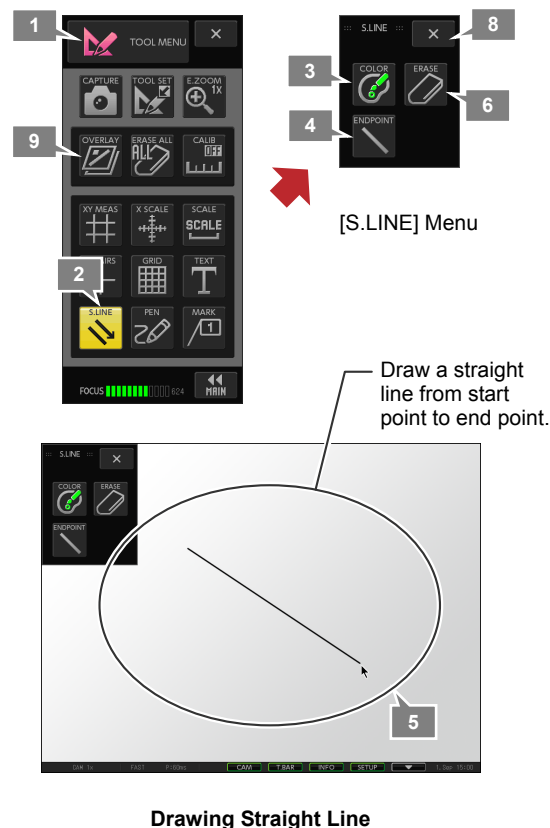
You can draw a straight line or arrow by specifying two points on the screen.

- 1 **Display the [TOOL MENU]**
- 2 **Press the [S LINE] button.**
The [S LINE] menu appears.
- 3 **Press the [COLOR] button to select color.**
The color selected here applies to lines that are drawn from the next time. You cannot change color of the lines already drawn.
- 4 **Press the [ENDPOINT] button on the [S LINE] menu.**
Select shape of an endpoint from [LINE] or [ARROW].
- 5 **Move the stylus on the screen from the starting point to ending point to draw a straight line.**
Move the stylus slowly. If you move the stylus fast, the line may be broken in the middle.
If you have selected [ARROW] for the endpoint shape, the end of the line will have arrow shape.
- 6 **To erase the line you have drawn, press the [ERASE] button on the [S LINE] menu.**
Pressing the [ERASE] button deletes all the straight lines you have drawn.
- 7 **Repeat steps 3 to 5 if you want to continue drawing another line.**
- 8 **Press the [X] button on the [S LINE] menu to return to the [TOOL MENU].**
- 9 **To display or hide a rendered line, switch to display or hide overlay.**

You cannot selectively display or hide only straight lines. Switch to display or hide the entire overlay.

✔ Straight line display

- The display of straight lines does not change even when the setting of unit and calibration is changed.
- The width of the straight lines can be changed on the [TOOL SET: MAIN] screen. Note that the width of the straight lines already drawn does not change.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.



11.4.3 Drawing Free Lines

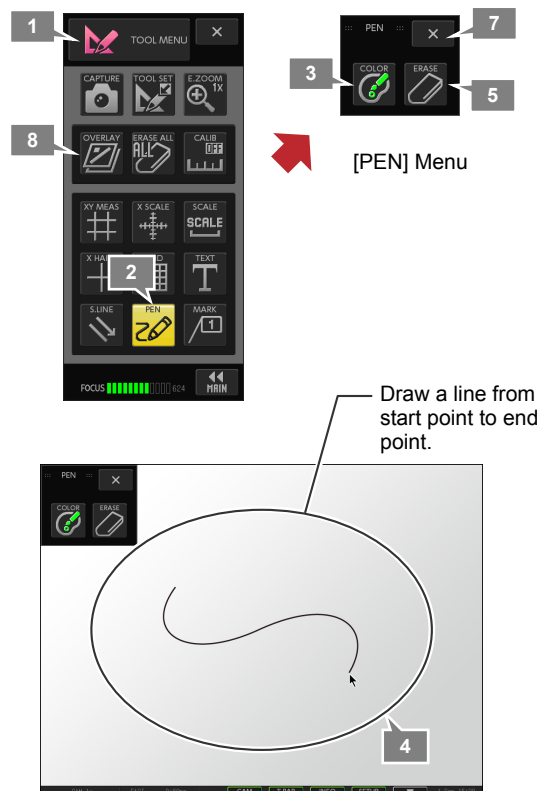
You can draw a free line on the screen.

- 1 Display the [TOOL MENU].**
- 2 Press the [PEN] button.**
The [PEN] menu appears.
- 3 Press the [COLOR] button to select color.**
The color selected here applies to lines that are drawn from the next time. You cannot change color of the lines already drawn.
- 4 Draw a free line on the screen using the stylus.**
A line is drawn along the track where the stylus has touched.
Move the stylus as slowly as possible. If you move the stylus fast, you cannot draw a smooth line.
- 5 To erase all lines you have drawn, press the [ERASE] button on the [PEN] menu.**
Pressing the [ERASE] button deletes all the lines you have drawn using the PEN tool.
- 6 Repeat steps 3 to 4 if you want to continue drawing another line.**
- 7 Press the [X] button on the [PEN] menu to return to the [TOOL MENU].**
- 8 To display or hide a line drawn using the stylus, switch to display or hide overlay.**

You cannot selectively display or hide only lines drawn by the stylus. Switch to display or hide the entire overlay.

✔ Line display

- The lines drawn on the screen do not change even though the setting of unit and calibration is changed.
- The width of the PEN lines can be changed on the [TOOL SET: MAIN] screen. Note that the width of the lines already drawn does not change.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

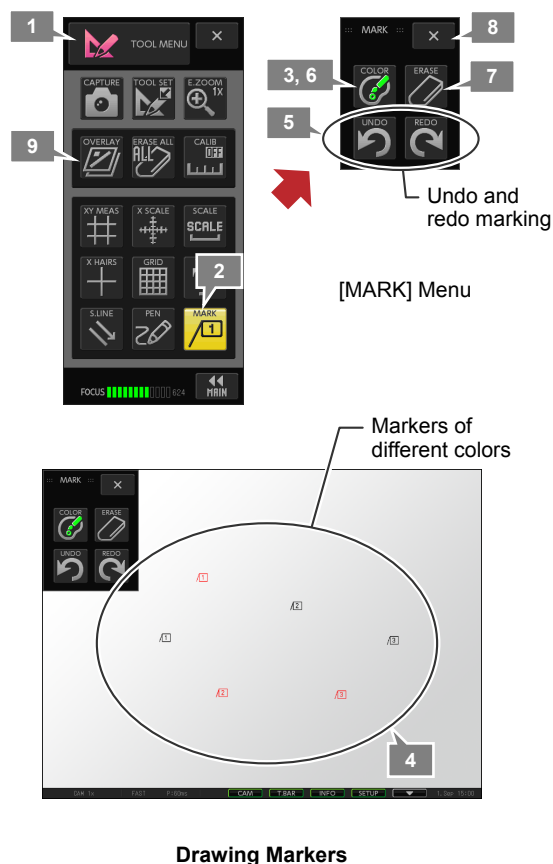


Drawing Free Line

11.4.4 Counting Points Using Markers

You can draw a numbered marker (called marker) on an arbitrary point on the screen and count the number of points. Markers of the same color are serially numbered. You can use six colors, that is, six series of markers.

- 1 **Display the [TOOL MENU].**
- 2 **Press the [MARK] button.**
The [MARK] menu appears.
- 3 **Press the [COLOR] button to select color of markers.**
The counter values are independent for each color of markers.
- 4 **Specify arbitrary points on the screen one by one.**
Markers are drawn on the specified points with numbers (1 to 99) in the order of touch.
- 5 **You can cancel or redo a mark, as required, using the [UNDO] or [REDO] button respectively.**
You can restore up to ten operations.
- 6 **To change the color of markers, select color using the [COLOR] button on the [MARK] menu.**
If you change color, the counter starts from one.
If you switch to one of previously used colors, the counter starts from the next number of the markers of the color.
- 7 **To erase markers you have drawn, press the [ERASE] button on the [MARK] menu.**
The value of the markers is also reset.
- 8 **Press the [X] button on the [MARK] menu to return to the [TOOL MENU].**
- 9 **To display or hide markers, switch to display or hide overlay.**
You cannot selectively display or hide only markers. Switch to display or hide the entire overlay.



✓ Marker display

- The display of markers does not change even when the setting of unit and calibration is changed.
- The line and character size of markers can be changed on the [TOOL SET: MAIN] screen. Note that the character size of the markers already drawn does not change.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.
- If you want to specify multiple points using a stylus, do so at an interval of about a second. If you select one point after another too quickly, the DS-L3 may fail to recognize them. In such a case, specify the point again.

Use the [TOOLBAR] to operate the measurement function. You can perform the following operations using the measurement function.

Operation of measurement

Item	Description	See
Distance between two points	Measures the distance between the two points specified on an image.	12.2.1 (p.153)
Length of perpendicular line	Length of a perpendicular line drawn from a point to a reference line drawn between two points on an image.	12.2.2 (p.154)
Angle	Angle between two straight lines drawn on the screen.	12.2.3 (p.155)
Diameter and circumference of circle	Diameter and circumference of a circle drawn with three points on the circumference.	12.2.4 (p.156)
Area of polygon	Area of a polygon drawn on the screen	12.2.5 (p.157)
Distance between centers of two circles	Distance between centers of two circles each drawn with three points on circumference.	12.2.6 (p.158)
Pitch length	Length of several perpendicular lines drawn from desired points to a reference line and distance between points (pitch distance).	12.2.7 (p.159)

Operation of measurement result

Item	Description	See
Moving measurement result	Measurements displayed on the screen can be moved using the stylus (in the same way as dragging with the mouse).	12.3.1 (p.160)
Canceling the last measurement result	Cancels the last measurement result and erases displayed measurement results.	12.3.2 (p.160)
Redoing cancelled measurement result	Redisplays measurement result cancelled just previously.	12.3.3 (p.160)
Erasing an arbitrary measurement result	Selects the number of measurement results and erases an arbitrary measurement result.	12.3.4 (p.160)
Clearing all measurement results	Clears rendered overlay contents including all measurement results.	12.3.5 (p.161)
Updating display of overlay	Updates screen display and displays all measurement results.	12.3.6 (p.161)
Writing measurement results to CSV file	Writes measurement results to a CSV file.	12.3.7 (p.161)
Displaying or hiding overlay	Displays or hides overlay.	12.3.8 (p.162)
Switching calibration settings	Selects [OFF] or any one of [M1] to [M7] for calibration settings to be the reference for length measurement.	12.3.9 (p.162)

✔ Using mouse

When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

✔ Clearing measurement results automatically

Measurement results on the screen are automatically cleared (erased) when the following operations are performed.

- **Changing image mode:** When [Image mode] is set to [ROI-L], [ROI-S], or [C.SCAN] in the [CAM MENU: CAMERA] long window, scales, annotations, and measurement results are completely cleared.
- **Playing back image:** When an image is played back by the [VIEW MENU], annotations and measurement results are cleared. The same applies to when playback is complete.
- **2-window display:** When [2WIN] display is set to ON/OFF in the [VIEW MENU], annotations and measurement results are cleared.
- **Switching calibration settings:** When calibration settings are changed by the [TOOL MENU] or [TOOLBAR], only measurement results are cleared.
- **All clear:** When [ERASE ALL] is performed by the [TOOL MENU] or [TOOLBAR], annotations and measurement results are cleared.

12.1 Displaying Toolbar

1 Press the [TOOL BAR] button on the task bar.

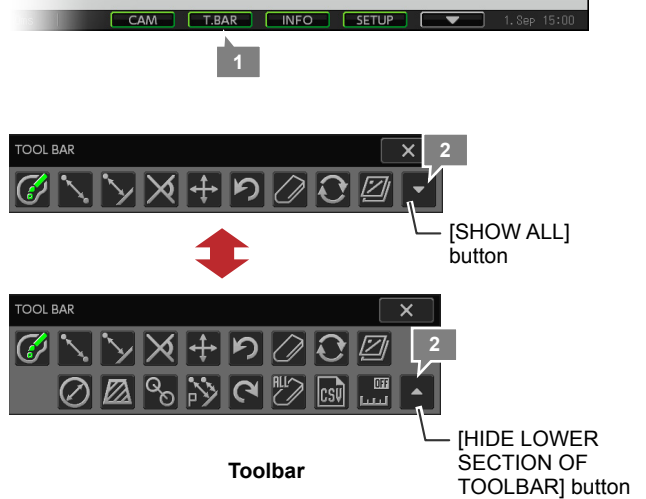
The toolbar appears.

If you press the [TOOL BAR] button of the task bar while the toolbar is displayed, the location of the toolbar switches from top to bottom or vice versa.

2 Select how much of the toolbar is displayed using the [SHOW ALL] and [HIDE LOWER SECTION OF TOOLBAR] buttons.

The toolbar has two rows of buttons. The buttons on the lower row are hidden when the toolbar is opened.

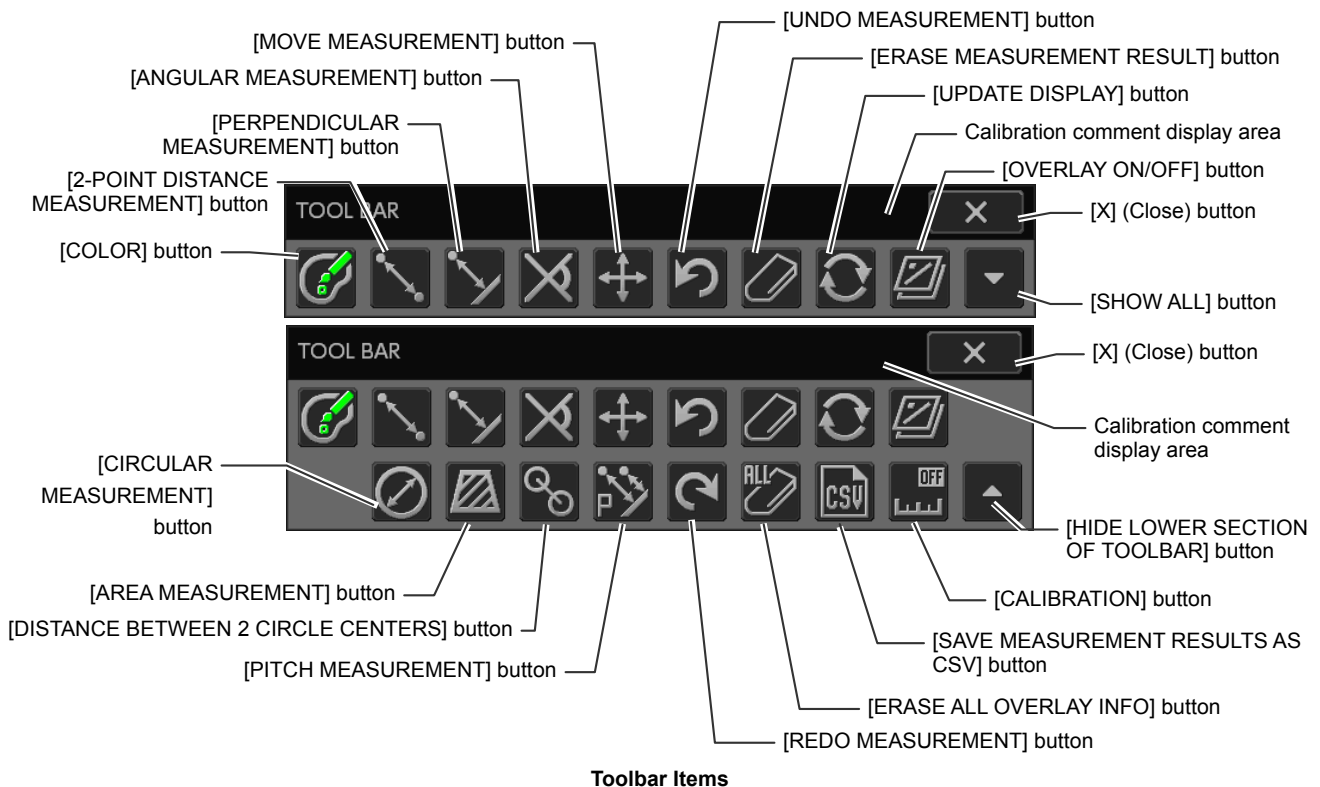
Press [SHOW ALL] on the bottom right of the toolbar to show all buttons. Pressing the [HIDE LOWER SECTION OF TOOLBAR] button hides buttons in the lower row.



! Image mode when the measurement function is used

When the measurement function is used while the image mode is set to [ROI-L], [ROI-S], or [C.SCAN], the image mode automatically changes to [FULL].

Items on the Toolbar



12.2 Measuring on an Image

Measurement allows you to measure distance, angle, a diameter of a circle or area of a polygon on an image.

! Configuring calibration

- Before starting the measurement, make sure that you have selected the right calibration setting. If you change the current setting to another after starting the measurement, the results obtained to that point are lost.
- The comment registered in the selected calibration setting is displayed at the upper right of the toolbar.

✓ Measuring on an live image

When measurement is performed on a live image, the image and measurement result may be misaligned depending on the status of the object. In this case, use the [FREEZE] button to take a still image and start measurement.

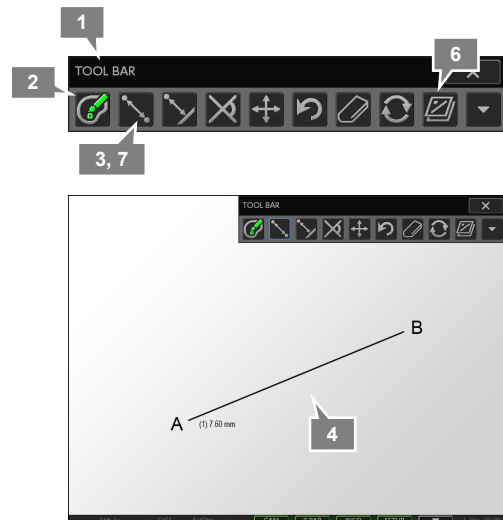
✓ Performing measurements on a replayed image

When measurement is performed on a replayed image saved in the TIFF or JPEG format, values are shown based on the calibration settings saved for the image. Note that, on a capture of a replayed image, unit and calibration settings for the original image are not applied to the scale or measurement values; they are shown in pixel unit.

12.2.1 Measuring Distance between Two Points

You can measure the distance between the two points specified on an image.

- 1 Display the toolbar.**
- 2 Press the [COLOR] button to select color of measurement results.**
- 3 Press the [2-POINT DISTANCE MEASUREMENT] button.**
A blue frame appears around the button.
- 4 Specify two arbitrary points (A and B on the figure) and check distance between the two points.**
If you specify the starting and end points, a measurement line is drawn between them and the distance between the two points are shown.
- 5 Repeat step 4 if you want to continue measurement.**
- 6 To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 7 To end measurement, press the [2-POINT DISTANCE MEASUREMENT] button to deselect the tool.**



Measuring Distance between Two Points

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

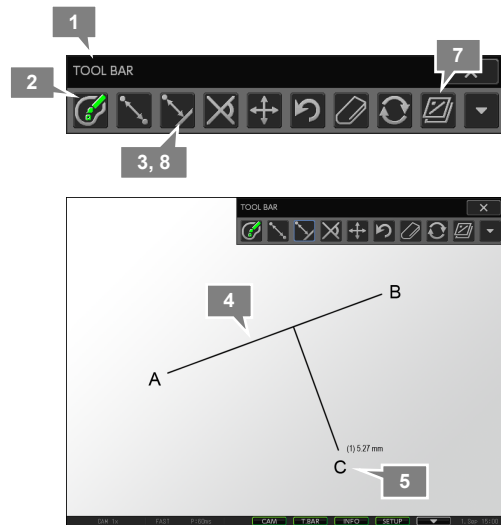
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.2 Measuring Length of a Perpendicular Line

You can measure length of a perpendicular line drawn from a point to a reference line drawn between two points on an image.

- 1 **Display the toolbar.**
- 2 **Press the [COLOR] button to select color of measurement results.**
- 3 **Press the [PERPENDICULAR MEASUREMENT] button.**
A blue frame appears around the button.
- 4 **Specify two arbitrary points (A and B on the figure) to draw a reference line for measurement.**
- 5 **Specify an arbitrary point (C in the figure) from which you want to measure distance to the reference line.**
If you specify the point, a perpendicular line is drawn from the point to the reference line and its distance is shown.
- 6 **Repeat step 5 to continue measuring another perpendicular line from the same reference line.**
- 7 **To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 8 **To end measurement, press the [PERPENDICULAR MEASUREMENT] button to deselect the tool.**



Measuring Distance from Reference Line

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

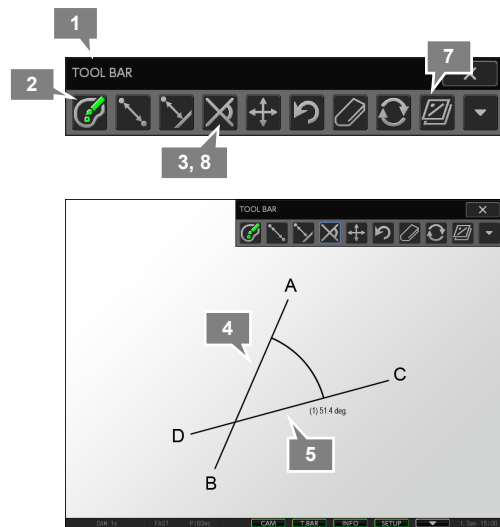
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.3 Measuring Angle

You can measure angle between two straight lines drawn on the screen.

- 1 Display the toolbar.**
- 2 Press the [COLOR] button to select color of measurement results.**
- 3 Press the [ANGULAR MEASUREMENT] button.**
A blue frame appears around the button.
- 4 Draw the first line by specifying two arbitrary points (A and B on the figure) on the screen.**
If you specify the starting and end points, a line for measurement is drawn between them.
- 5 Draw the second line by specifying two arbitrary points (C and D on the figure) on the screen.**
If you draw two lines, an angle surrounded by two intersecting lines is shown.
If an angle cannot be measured such as when you specify the same point for starting and ending points of a line or two lines are completely parallel, "NG" is displayed.
- 6 Repeat steps 4 and 5 to continue measuring another angle.**
- 7 To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 8 To end measurement, press the [ANGULAR MEASUREMENT] button to deselect the tool.**



Measuring Angle

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

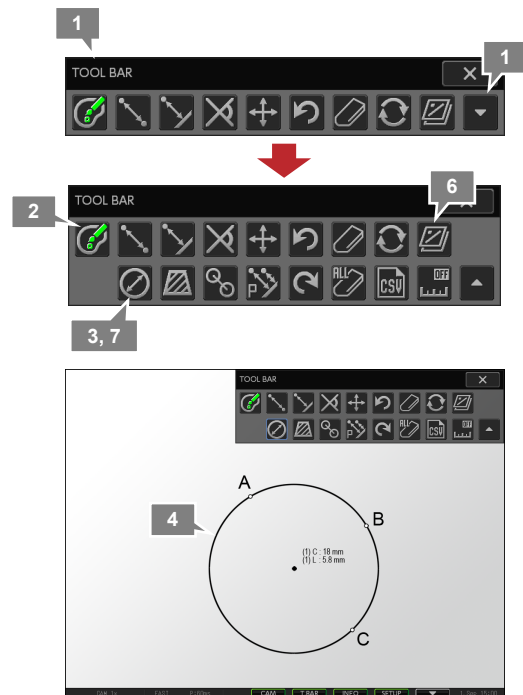
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When lines for measurement are drawn on the screen so that they do not cross, measurement results are displayed at the end of the screen or behind the toolbar in some cases
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.4 Measuring Diameter and Circumference of Circle

You can measure diameter and circumference of a circle drawn on the screen.

- 1 **Display the toolbar and press the [SHOW ALL] button.**
- 2 **Press the [SELECT COLOR] button to select color of measurement results.**
- 3 **Press the [CIRCULAR MEASUREMENT] button.**
A blue frame appears around the button.
- 4 **Specify three points (A, B and C on the figure) on circumference of a circle you want to draw on the screen.**
A circle whose circumference passes on the three points is drawn and its diameter and circumference values are shown near the center of the circle.
- 5 **Repeat step 4 to continue measuring another circle.**
- 6 **To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 7 **To end measurement, press the [CIRCULAR MEASUREMENT] button to deselect the tool.**



Measuring Diameter and Circumference of Circle

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

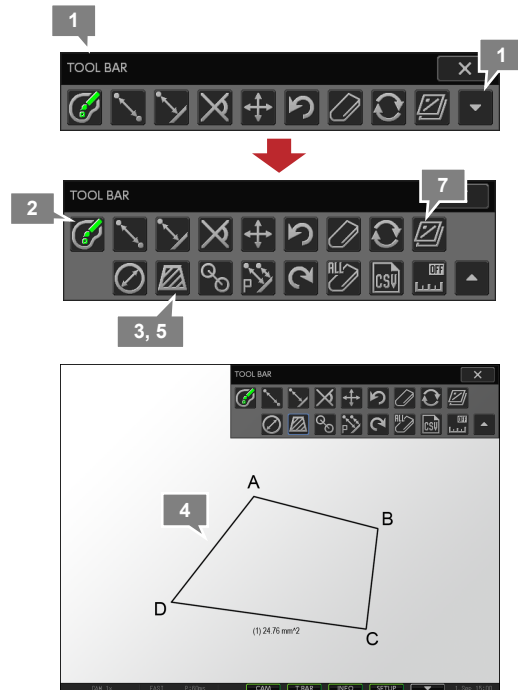
✓ Measurement result display

- If setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.5 Measuring the Area of a Polygon

You can measure the area of a polygon drawn on the screen.

- 1 **Display the toolbar and press the [SHOW ALL] button.**
- 2 **Press the [COLOR] button to select color of measurement results.**
- 3 **Press the [AREA MEASUREMENT] button.**
A blue frame appears around the button.
- 4 **Specify vertexes of a polygon (A, B, C and D in the figure) on the screen one by one.**
- 5 **Press the [AREA MEASUREMENT] button again.**
The starting and end points (D and A in the figure) are connected and the area of the surrounding shape is shown.
Note: If you draw a side that crosses another side, area cannot be measured and "NG" is displayed.
- 6 **Repeat steps 3 to 5 to continue measuring another polygon.**
- 7 **To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.



Measuring Area of Polygon

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

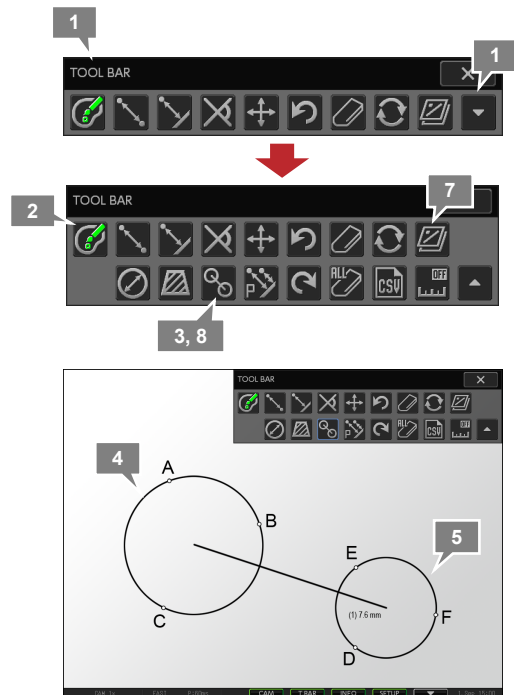
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.6 Measuring Distance between Centers of Two Circles

You can measure distance between centers of two circles drawn on the screen.

- 1 **Display the toolbar and press the [SHOW ALL] button.**
- 2 **Press the [COLOR] button to select color of measurement results.**
- 3 **Press the [DISTANCE BETWEEN 2 CIRCLE CENTERS] button.**
A blue frame appears around the button.
- 4 **Specify three points (A, B and C on the figure) on circumference of the first circle you want to draw.**
A circle whose circumference passes on the three points is drawn on the screen.
- 5 **Specify three points (D, E and F on the figure) on circumference of the second circle.**
Another circle whose circumference passes on the three points is drawn on the screen. A straight line is drawn from the center of the first circle to that of the second, and distance between the two circles is shown.
- 6 **Repeat steps 4 and 5 to continue measuring distance of other circles.**
- 7 **To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 8 **To end measurement, press the [DISTANCE BETWEEN 2 CIRCLE CENTERS] button to deselect the tool.**



Measuring Distance between Centers of Two Circles

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

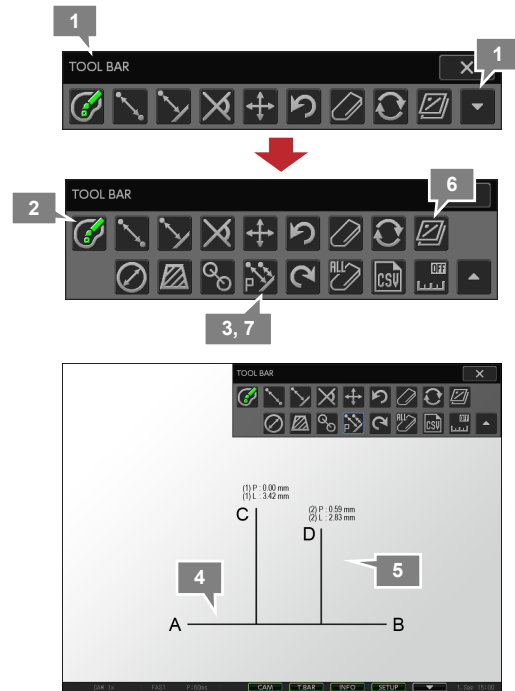
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.2.7 Measuring Pitch Distance

You can measure length of several lines drawn from desired points to a reference line. For the second and subsequent points, difference between points (pitch distance) can also be measured.

- 1 Display the toolbar and press the [SHOW ALL] button.**
- 2 Press the [COLOR] button to select color of measurement results.**
- 3 Press the [PITCH MEASUREMENT] button.**
A blue frame appears around the button.
- 4 Specify two arbitrary points (A and B in the figure) on the screen to draw a reference line.**
A reference line is drawn from the starting point to the end point.
- 5 Specify arbitrary points (C and D in the figure) you want to measure.**
If you specify a point, a perpendicular line is drawn from the point to the reference line. The length of the perpendicular line is shown.
For the second and subsequent points, distance from the previous point (pitch distance) is shown as well as the distance to the reference line.
- 6 To display or hide the measured result, switch to display or hide overlay.**
You cannot selectively display or hide only the measured result. Switch to display or hide the entire overlay.
- 7 To end measurement, press the [PITCH MEASUREMENT] button to deselect the tool.**



Measuring Pitch Distance

✓ Undoing and redoing measurement

You can cancel and redo measurement by pressing the [UNDO MEASUREMENT] or [REDO MEASUREMENT] button respectively.

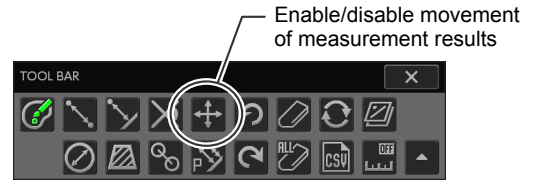
✓ Measurement result display

- If the setting of calibration is changed, all measured results are cleared.
- The line width and character size of measurement result can be changed on the [TOOL SET: MAIN] screen.
- When stylus operation is not easy or accurate positioning is required, mouse operation is recommended. Use a commercially available USB mouse for operation.

12.3 Operating Measurement Results

12.3.1 Moving Measurement Result

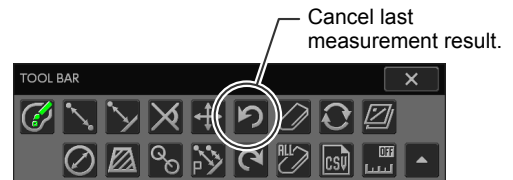
Press the [MOVE MEASUREMENT] button (a blue frame appears around the button) to move measurement results shown on the screen. You can use the stylus in the same way as dragging with the mouse to move the measurement to another location. Pressing the button again disables the movement.



Moving Measurement Result

12.3.2 Canceling the Last Measurement Result

If you press the [UNDO MEASUREMENT] button, the most recent measurement is cancelled and display of its result is deleted.



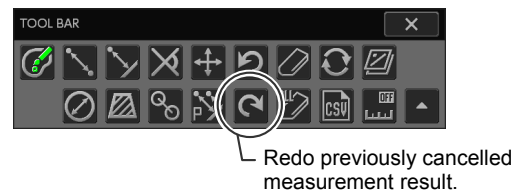
Canceling Last Measurement Result

12.3.3 Redoing Cancelled Measurement Result

Redisplay the measurement result last cancelled.

Press the [REDO MEASUREMENT] button to redisplay the measurement result deleted by the [UNDO MEASUREMENT] button most recently.

Note: Nothing happens if the button is pressed unless you have cancelled a measurement result.



Redoing Cancelled Measurement Result

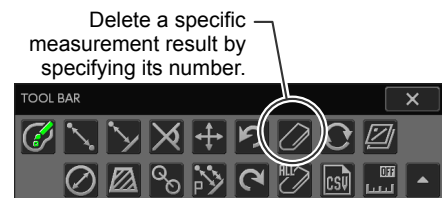
12.3.4 Erasing an Arbitrary Measurement Result

An order number given to each measurement result is shown.

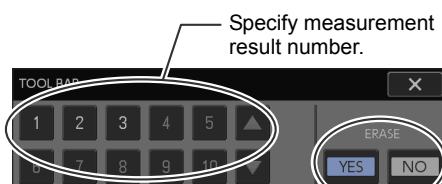
Press the [ERASE MEASUREMENT RESULT] button on the toolbar. The toolbar display changes and buttons for selecting execution order of measurement results are shown.

- If the execution history contains more than ten results, switch the screen with the upper and lower arrow buttons to the right of the numerical buttons.
- A number that can be erased is shown in white. A number that cannot be erased (already erased or not executed) is shown in gray.

Press the number and press [YES] under the "ERASE ?" message. The measurement result having that order number is deleted.



[ERASE MEASUREMENT RESULT] Button



Erasing Measurement Result

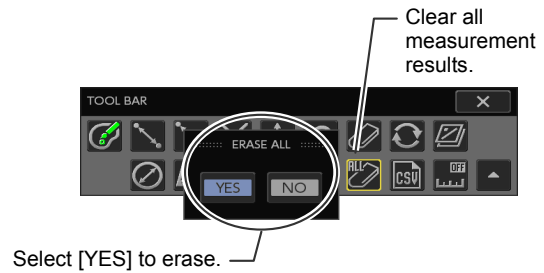
12.3.5 Erasing All Measurement Results

Press [ERASE ALL OVERLAY INFO] on the toolbar to erase the drawn items in the overlay including all the measurement results.

If you press the button, a confirmation message is displayed. Press [YES] to erase results or [NO] to cancel the operation.

If you select [YES], the drawn items in the overlay (all measurement results, text, straight lines, pen lines, markers) are erased.

Note: All overlay information can be erased by the [TOOL MENU] and [TOOLBAR].



Clearing All Measurement Results

12.3.6 Updating Display of Overlay

If you repeat measurement operations or the overlapped display area is deleted due to measurement clearance or deletion, there may be a case where previous measurement results disappear.

If this happens, press the [UPDATE DISPLAY] button on the toolbar to update the screen. All the measurement results will be displayed again.

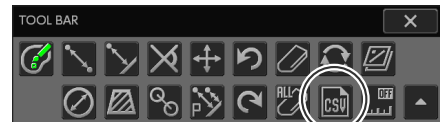


Updating Display of Overlay

12.3.7 Writing Measurement Results to CSV File

Press the [SAVE MEASUREMENT RESULTS AS CSV] button to write measurement results to a CSV-format file (extension “.csv”). The saving location of a CSV file is the same as the saving location for images.

Note: See “11.2.1 Performing Basic Settings for Comment Function and Measurement Function” for the content of an output CSV file.



Writing CSV File

✔ Automatically saving a CSV file

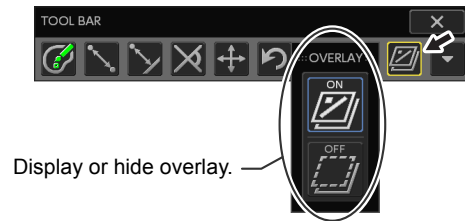
You can configure so that a CSV file is automatically saved when the image is captured. See “11.2.1 Performing Basic Settings for Comment Function and Measurement Function”.

12.3.8 Displaying or Hiding Overlay

Measurement results are rendered on an overlay. You can display or hide all the results at once by displaying or hiding the overlay.

Pressing the [OVERLAY] button on the toolbar displays the [OVERLAY] submenu, allowing you to display or hide overlay.

Note: You can display or hide an overlay with either the tool menu or toolbar.



Displaying or Hiding Overlay

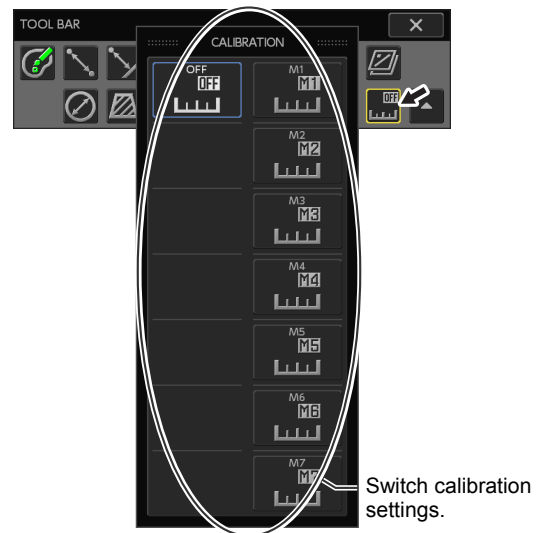
12.3.9 Switching Calibration Settings

Select [OFF] or any one of [M1] to [M7] for calibration settings to be the reference for length measurement.

Calibration must have been set in advance. For how to set calibration, see “11.2.4 Registering Calibration Settings”.

Note 1: All the executed measurement results are cleared if you switch calibration setting.

Note 2: You can switch calibration settings by [TOOL MENU] and [TOOLBAR].

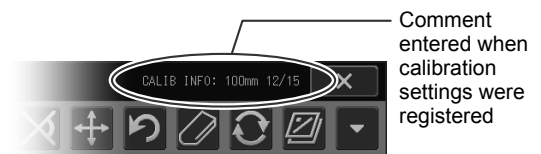


Switching Calibration Settings

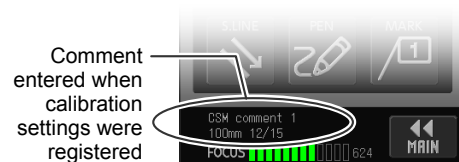
✓ Comment of calibration settings

Comments can be registered for calibration settings.

The comment entered is shown in the registration number icon ([M1] to [M7]) of the [CALIB] submenu. The comment is also shown in the comment display area found in the upper part of [CAM MENU] screen and the lower part of the [VIEW MENU] and [TOOL MENU] screens when a calibration registration number ([M1] to [M7]) is selected.



Comment of Calibration Settings
(on the [TOOL BAR] screen)



Comment of Calibration Settings
(on the [TOOL MENU] screen)

Part 5

Changing Settings

This part describes how to change the initial settings of the DS-L3 using the [SETUP MENU].

This part consists of the following chapter.

- Chapter 13 Changing Settings

This chapter describes the initial settings of the DS-L3.

13.1 Operating Setup Menu

Displaying the Setup menu

Press the [SETUP] button on the task bar to display [SETUP MENU].

When you display the [SETUP MENU] screen, the status bar and other operating menus will automatically disappear.



[SETUP] button



Displaying Setup Menu

Switching the [SETUP MENU] screens

There is the [MENU SELECT] button on the top left corner of the [SETUP MENU] screen.

If you press this button, [SETUP] submenu is displayed. You can switch the [SETUP MENU] screen to any of the following screens.

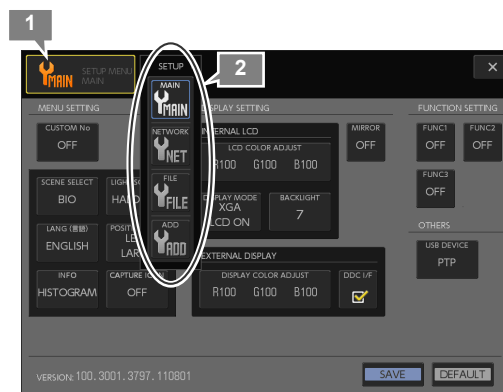
- 1 Press the [MENU SELECT] button of the [SETUP MENU].

The [MENU] submenu opens and four buttons are displayed: [MAIN], [NETWORK], [FILE] and [ADD].

- 2 Press a desired button.

The setup menu display changes.

Note: For display information of each screen, see the next page.



Switching Setup Menu Screen

[SETUP MENU] screens

The Setup Menu has the following screens:

- **[SETUP MENU: MAIN] screen**

Configures basic settings of the DS-L3 including custom settings used for startup, menu display settings, internal/external monitor settings, function button settings, USB device mode settings, and cooling temperature settings when a DS cooled camera head is used.



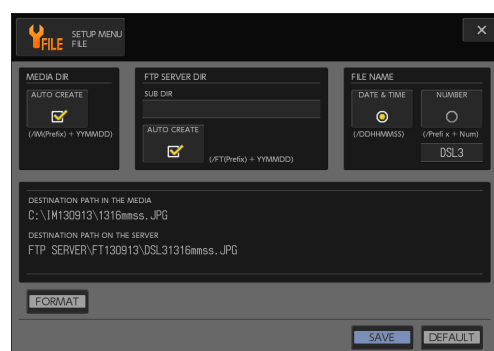
- **[SETUP MENU: NETWORK] screen**

Configures several settings for connecting the system to the network including basic settings, HTTP server settings, and settings for connecting to an FTP server.



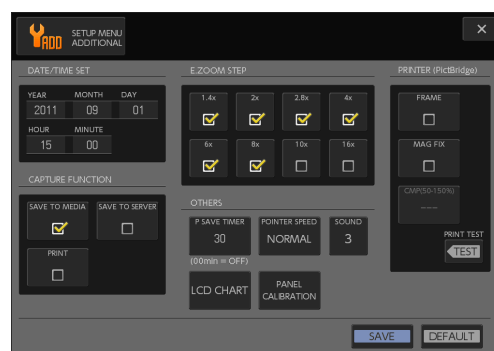
- **[SETUP MENU: FILE] screen**

Configures folders and files for saving images including folders on a recording medium and FTP server, file names and initialization of medium.



- **[SETUP MENU: ADDITIONAL] screen**

Configures overall settings of this system including date and time, capture operation, electronic zoom factor, printer and others.



Resetting the settings to initial state

All [SETUP MENU] screens have [SAVE] and [DEFAULT] buttons on the bottom right corner of each screen.

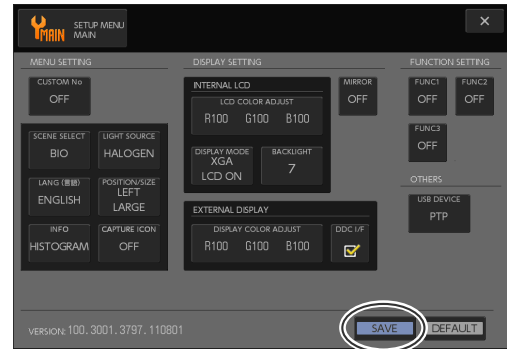
- **Saving settings**

Settings configured in each screen are saved by pressing the [SAVE] button. Note that pressing the [X] (close) button, instead of the [SAVE] button, restores to the state before change.

! Save settings in each screen.

When settings are changed, be sure to save the updated settings before going to another screen of the [SETUP MENU].

If you go to another screen or close the screen without saving the settings, the updated settings are lost and the previous settings are restored.



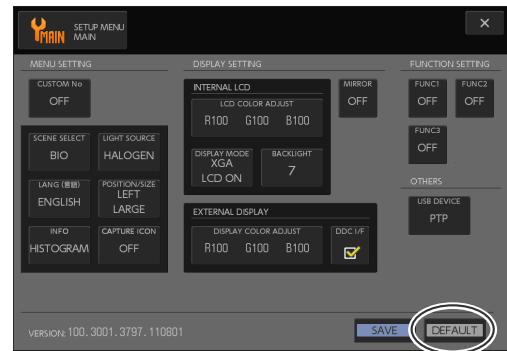
Save settings.

Saving Settings

- **Resetting settings to initial settings**

To clear settings of each screen, press the [DEFAULT] button. A confirmation message appears. To reset the settings to initial settings, select [YES]. The updated settings are lost and the initial state of each item is saved.

To close the confirmation message without resetting the settings, select [NO].



Reset settings to initial settings.



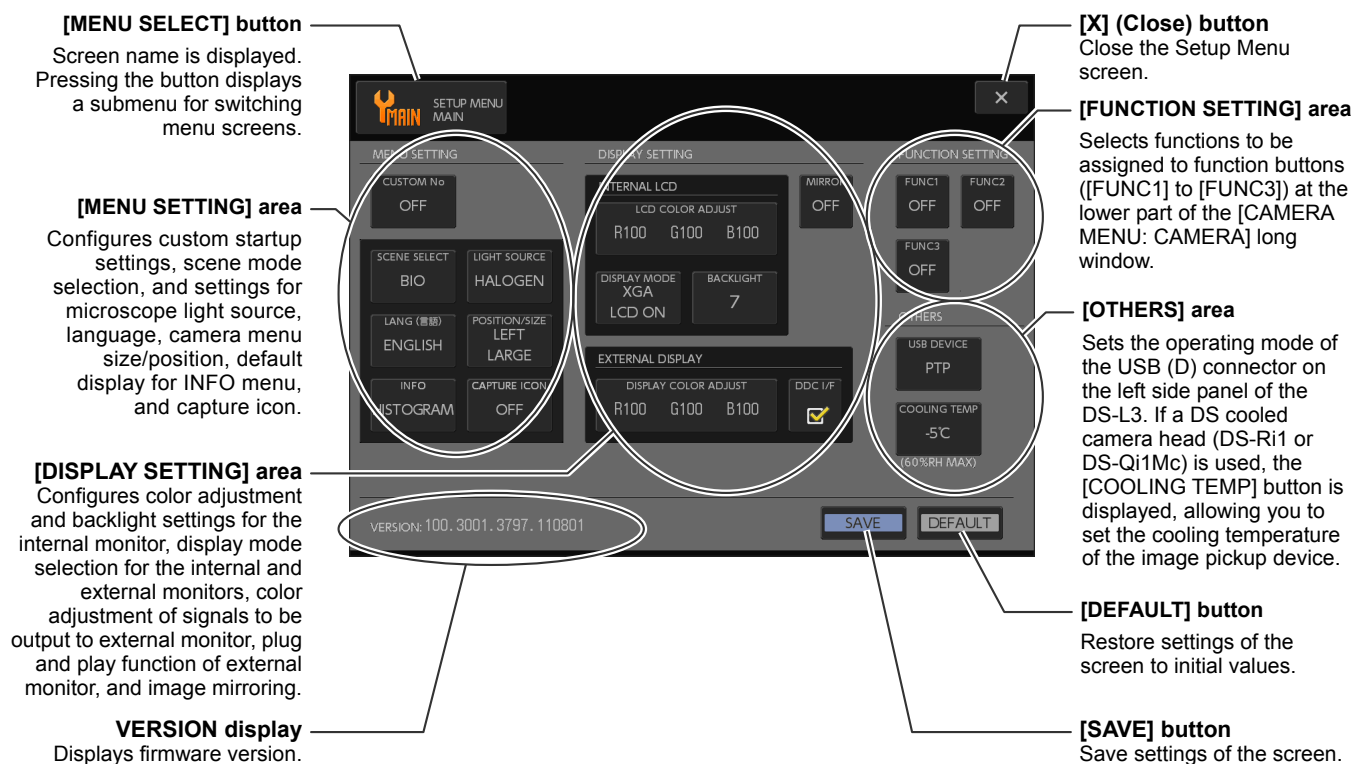
Resetting Settings to Initial Settings

13.2 Configuring Basic Settings

— [SETUP MENU: MAIN] Screen —

Pressing the [SETUP] button on the task bar display the [SETUP MENU: MAIN] screen. The [SETUP MENU: MAIN] screen is also displayed by selecting [MAIN] from the [MENU SELECT] button while another screen of the [SETUP MENU] is displayed.

Items on the [SETUP MENU: MAIN] screen



[SETUP MENU: MAIN] Screen Items

13.2.1 Configuring Menu Display

— [MENU SETTING] Area —

Configure the following settings in the [MENU SETTING] area of the [SETUP MENU: MAIN] screen.

Item	Choice	Initial Setting	See
(1) Calling custom settings on startup	[OFF], [CUSTOM1] to [CUSTOM7]	[OFF]	p.168
(2) Changing preset of scene mode	[IND], [BIO], [OTHERS]	[BIO]	p.169
(3) Configuring the light source of microscope	[HALOGEN], [LED (BIO MIC)]	[HALOGEN]	p.170
(4) Switching the language	[ENG], [日本語]	[ENG]	p.171
(5) Configuring the position and size of the menu	[LEFT LARGE], [RIGHT LARGE], [LEFT SMALL], [RIGHT SMALL]	[LEFT LARGE]	p.172
(6) Changing the [INFO MENU] display setting	[HISTGRM], [C.INFO], [M.INFO]	[HISTOGRAM]	p.173
(7) Setting to show [CAPTURE ICON] on the screen	[OFF], [LEFT UP], [RIGHT UP], [LEFT DOWN], [RIGHT DOWN]	[OFF]	p.174

(1) Calling custom settings on startup

Desired custom settings can be automatically called when the DS-L3 is turned on.

1 Display the [SETUP MENU: MAIN] screen.

2 Press the [CUSTOM No.] button on the [MENU SETTING] area.

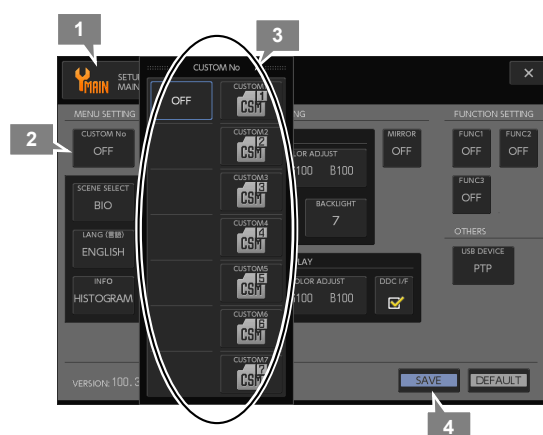
The [CUSTOM No.] submenu appears.

3 Select the custom settings to be called on startup.

- [CUSTOM1] to [CUSTOM7]
- [OFF] (initial setting)

When a custom number is selected, the submenu closes and the selected content is displayed in the [CUSTOM No.] button.

4 Press the [SAVE] button.



Custom Settings for Setup

Choice for Custom Settings

Choice	Setting
OFF	No custom setting is used during startup. The capture conditions at the last power-off are applied. (Initial setting)
CUSTOM1 to CUSTOM7	When the DS-L3 is turned on, the selected custom settings are called and are set for the [SCENE/CUSTOM] button in the [CAMERA MENU] screen.

(2) Changing preset of scene mode

Three types of scene mode preset ([IND], [BIO], and [OTHERS]) are selectable in accordance with object to be observed.

1 Display the [SETUP MENU: MAIN] screen.

2 Press the [SCENE SELECT] button in the [MENU SETTING] area.

The [SCENE SELECT] submenu appears.

3 Select the preset of the scene mode.

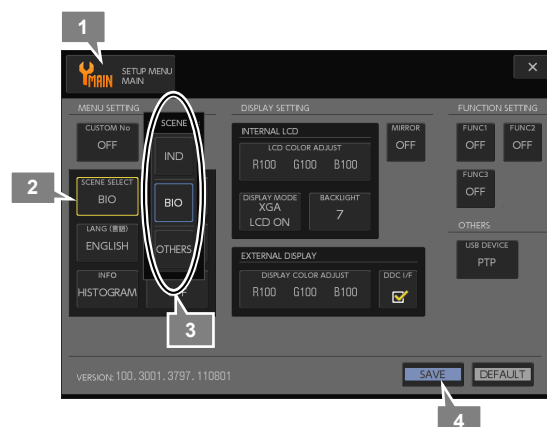
For details of choice, see the table below.

- [IND]
- [BIO] (initial setting)
- [OTHERS]

When one of these has been selected, the submenu closes and the selected content is displayed in the [SCENE SELECT] button.

4 Press the [SAVE] button.

The choice of the [SCENE/CUSTOM] button changes.



Setting Scene Mode Selection

Choice of Scene Selection

Choice	Setting
IND	Enables scene mode suitable for industrial microscopes.
BIO	Enables scene mode suitable for biological microscopes. (Initial setting)
OTHERS	Enables scene mode suitable for observation of asbestos.

✓ Selection of scene mode

Use the [SCENE/CUSTOM] button in the [CAMERA MENU] to select a scene mode.

(3) Configuring the light source of microscope

Select [HALOGEN] or [LED (BIO MIC)] as the light source used for the microscope.

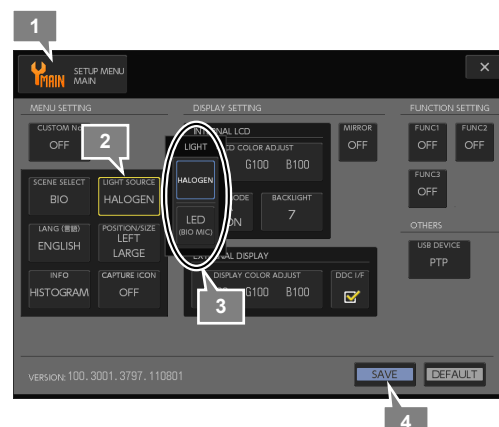
- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [LIGHT SOURCE] button in the [MENU SETTING] area.
The [LIGHT SOURCE] submenu appears.
- 3 Select the light source type used for the microscope.

For details of choice, see the table below.

- [HALOGEN] (initial setting)
- [LED (BIO MIC)]

When one of these has been selected, the submenu closes and the selected content is displayed in the [LIGHT SOURCE] button.

- 4 Press the [SAVE] button.



Configuring Microscope Light Source

Choice of Light Source Selection

Choice	Setting
HALOGEN	Select this when a halogen lamp is used for the light source of the microscope. (initial setting)
LED (BIO MIC)	Select this when LED illumination is used for the light source of the microscope.

✓ Light source setting and scene mode

When [LED (BIO MIC)] is selected in the light source setting, [HE] and [ELA] are not displayed in the [BIO] scene mode. The LED light source does not allow these microscopy methods.

✓ Note on [LED (BIO MIC)] mode

The [LED (BIO MIC)] mode for the light source setting is optimized for the high-intensity LED (Eco Illumination) used for Nikon ECLIPSE Ci-E/Ci-L, E100, E200, and other microscope models. For details of LED light source types covered by the [LED (BIO MIC)] mode, contact your nearest Nikon representative.

(4) Switching the language

You can switch display language on the screen between English and Japanese.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [LANG] button on the [MENU SETTING] area.

The [LANG] submenu appears.

- 3 Select the desired language.

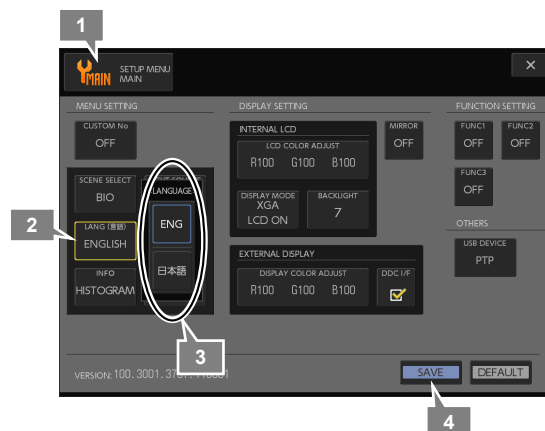
For details of choice, see the table below.

- [ENG] (initial setting)
- [日本語]

When one of these has been selected, the submenu closes and the selected content is displayed in the [LANG (言語)] button.

- 4 Press the [SAVE] button.

The display language of menu screens changes.



Switching Language

Choice of Language

Choice	Setting
ENG	Switches the display language to English. (Initial setting)
日本語	Switches the display language to Japanese.

✓ Key layout of USB keyboard

Key layout setting depends on language selection. If the display language is set to [ENGLISH], the DS-L3 recognizes the keyboard as English (US) layout. If the display language is set to Japanese, the DS-L3 recognizes the keyboard as Japanese (JIS) layout.

Note: The English layout and the Japanese layout differ in positions of some keys and in symbol input method.

(5) Configuring the position and size of the menu

Set the location of [CAMERA MENU] displayed when the [CAM] button on the task bar is pressed.

1 Display the [SETUP MENU: MAIN] screen.

2 Press the [POSITION/SIZE] button in the [MENU SETTING] area.

The [POSITION/SIZE] submenu appears.

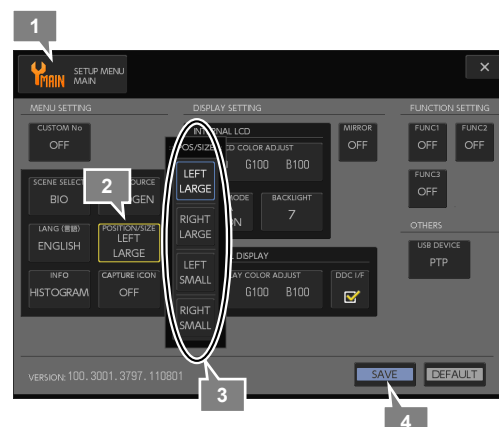
3 Select the initial display location of the [CAMERA MENU].

For details of choice, see the table below.

- [LEFT LARGE] (initial setting)
- [RIGHT LARGE]
- [LEFT SMALL]
- [RIGHT SMALL]

When one of these has been selected, the submenu closes and the selected content is displayed in the [POSITION/SIZE] button.

4 Press the [SAVE] button.



Configuring Menu Size/Position

Choice of Menu Location

Choice	Setting
LEFT LARGE	Displays the camera menu on the left of the screen. The [CAMERA MENU] and [INFO] screens are displayed in the default size. (initial setting)
RIGHT LARGE	Displays the camera menu on the right of the screen. The [CAMERA MENU] and [INFO] screens are displayed in the default size.
LEFT SMALL	Displays the camera menu on the left of the screen. The [CAMERA MENU] and [INFO] screens are displayed in the smaller size.
RIGHT SMALL	Displays the camera menu on the right of the screen. The [CAMERA MENU] and [INFO] screens are displayed in the smaller size.

(6) Changing the [INFO MENU] display setting

Specify which window ([INFO: HISTOGRAM], [INFO: CAM INFO], or [INFO: MIC INFO] menu) should be displayed when the [INFO] button on the task bar is pressed.

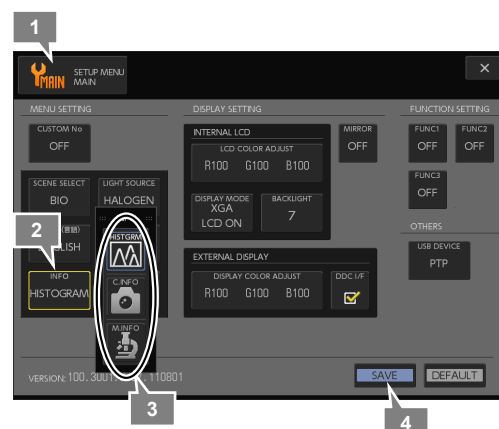
- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [INFO] button in the [MENU SETTING] area.
The [INFO] submenu appears.
- 3 Select a menu to be displayed first as [INFO MENU].

For details of choice, see the table below.

- [HISTOGRAM] (initial setting)
- [C.INFO]
- [M.INFO]

When either of the items has been selected, the submenu closes and the selected item is displayed in the [INFO] button.

- 4 Press the [SAVE] button.



Selecting an INFO Menu to Be Displayed First

Choice of Info Menu Display

Choice	Setting
HISTOGRAM	The [INFO: HISTOGRAM] window appears when the [INFO] button on the task bar is pressed. (Initial setting)
C. INFO	The [INFO: CAM INFO] window appears when the [INFO] button on the task bar is pressed.
M. INFO	The [INFO: MIC INFO] window appears when the [INFO] button on the task bar is pressed. If no microscope is connected to DS-L3, selecting this causes the [INFO: HISTOGRAM] window to appear.

✓ Display of [INFO MENU] when no microscope is connected:

If no microscope is connected to the USB (H) connector of the DS-L3, the [INFO: MIC INFO] menu is not displayed.

(7) Setting to show [CAPTURE ICON] on the screen

You can keep [CAPTURE ICON] displayed on a corner of the screen. By pressing [CAPTURE ICON] on the screen, you can capture the live image quickly without opening [CAMERA MENU].

1 Display the [SETUP MENU: MAIN] screen.

2 Press the [CAPTURE ICON] button in the [MENU SETTING] area.

The [CAPTURE] submenu appears.

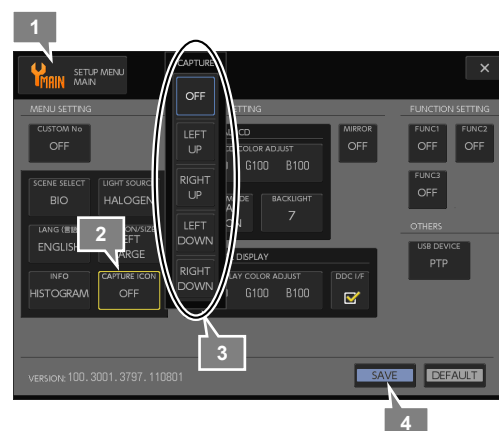
3 Select a corner on which [CAPTURE ICON] is to be displayed.

For details of choice, see the table below.

- [OFF] (initial setting)
- [LEFT UP]
- [RIGHT UP]
- [LEFT DOWN]
- [RIGHT DOWN]

When one of the items has been selected, the submenu closes and the selected item is displayed in the [CAPTURE ICON] button.

4 Press the [SAVE] button.



Selecting the Position of [CAPTURE ICON] on the Screen

Choice of Capture Icon Display

Choice	Setting
OFF	[CAPTURE ICON] will not be kept on the screen. To capture live images, press the [CAPTURE] button of [CAMERA MENU] or [TOOL MENU].
LEFT UP	[CAPTURE ICON] is kept displayed on the upper left corner of the screen.
RIGHT UP	[CAPTURE ICON] is kept displayed on the upper right corner of the screen.
LEFT DOWN	[CAPTURE ICON] is kept displayed on the lower left corner of the screen.
RIGHT DOWN	[CAPTURE ICON] is kept displayed on the lower right corner of the screen.

13.2.2 Configuring Monitor

— [DISPLAY SETTING] Area —

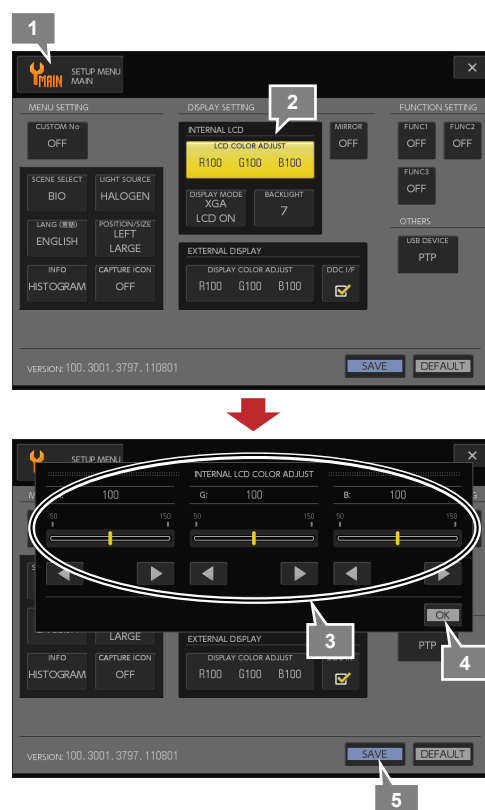
Configure the following settings in the [DISPLAY SETTING] area of the [SETUP MENU: MAIN] screen.

Item	Choice	Initial Setting	See
(1) Adjusting the color balance of the internal LCD	[50] to [150] (each of R, G, and B colors)	100 for each	p.175
(2) Configuring the display mode of the internal LCD and external monitor	[XGA / LCD ON], [SXGA / LCD OFF], [720P / LCD OFF], [XGA / LCD OFF]	[XGA / LCD ON]	p.176
(3) Configuring the backlight of the internal LCD	[1] to [9]	[5] or [7]	p.177
(4) Mirroring images	[OFF], [H], [V], [180°]	[OFF]	p.178
(5) Adjusting the color balance of external monitor output signal	[50] to [150] (each of R, G, and B colors)	100 for each	p.179
(6) Configuring the DDC interface	ON, OFF	ON	p.180

(1) Adjusting the color balance of the internal LCD

Adjust the color balance of video to be displayed on the internal LCD of the DS-L3.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [LCD COLOR ADJUST] button in the [DISPLAY SETTING] - [INTERNAL LCD] area.
The [INTERNAL LCD COLOR ADJUST] window appears.
- 3 Adjust each gain for R (red), G (green) and B (blue) by looking at the screen.
The window shows a slider and adjustment buttons of each gain of R, G and B in this order from left.
 - Setting range: 50 to 150 (initial setting: 100) for each color (R/G/B)
Perform adjustment using the slider and left and right adjustment buttons.
- 4 Press the [OK] button.
The [INTERNAL LCD COLOR ADJUST] window closes.
- 5 Press the [SAVE] button.
The configured color balance is saved.



Configuring Color Balance of Internal LCD

Internal LCD Color Balance Adjustment Setting Range

Choice	Setting
R, G, B	Adjust each gain for R (red), G (green), and B (blue) within a range of 50 to 150 (initial setting: 100). Each value can be adjusted in units of step 1 (jump 5).

(2) Configuring the display mode of the internal LCD and external monitor

Set the resolution of video signal to be output to the external monitor and ON/OFF of the internal LCD.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [DISPLAY MODE] button in the [DISPLAY SETTING] - [INTERNAL LCD] area.
The [DISPLAY MODE] submenu appears.
- 3 Select the display mode of the external monitor and the internal LCD.

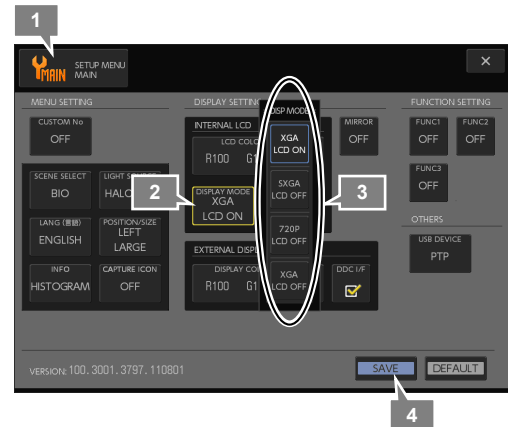
For details of choice, see the table below.

- [XGA / LCD ON] (initial setting)
- [SXGA / LCD OFF]
- [720P / LCD OFF]
- [XGA / LCD OFF]

When one of these has been selected, the submenu closes and the selected content is displayed in the [DISPLAY MODE] button.

- 4 Press the [SAVE] button.
A reboot request message for the DS-L3 appears.
- 5 To switch the setting, turn off the DS-L3 and then turn it on.

The display mode of the internal LCD and the external monitor switches.



Configuring Display Mode

Choice of Display Mode

Choice	Setting
XGA / LCD ON	Outputs XGA (1024 x 768) signal to the external monitor. The same video as the external monitor is displayed on the internal LCD. (Initial setting)
SXGA / LCD OFF	Outputs SXGA (1280 x 1024) signal to the external monitor. Nothing is displayed on the internal LCD.
720P / LCD OFF	Outputs 720p (1280 x 720) signal to the external monitor. Nothing is displayed on the internal LCD
XGA / LCD OFF	Outputs XGA (1024 x 768) signal to the external monitor. Nothing is displayed on the internal LCD.

To reset display mode at startup

If the DS-L3 is turned on without connecting the external monitor with [SXGA / LCD OFF], [720P / LCD OFF], or [XGA / LCD OFF] (internal LCD OFF setting) selected, nothing is displayed on the internal LCD disabling any operation in some cases.

In this case, perform the following procedure to reset the display mode setting.

- 1 Turn off the DS-L3.
- 2 Press the power switch to turn on the DS-L3 and repress the power switch while the POWER indicator is blinking to turn off the DS-L3.

After this operation, the [DISPLAY MODE] setting is changed to [XGA / LCD ON].

- 3 Turn on the DS-L3.

A screen is displayed on the internal LCD.

✓ When the [DDC I/F] checkbox is selected

While the [DDC I/F] checkbox is selected, the DS-L3 detects the external monitor connection status.

If the DS-L3 is turned on without connecting the external monitor while the internal LCD monitor is set to OFF, the DS-L3 recognizes that no monitor is connected and automatically sets the internal LCD monitor to ON to start it. However, if the external monitor is disconnected after the DS-L3 is turned on, the internal LCD monitor is not set to ON.

In this case, turn off the power and reconnect the external monitor, and then turn on the power. Then the internal LCD monitor is automatically set to OFF.

(3) Configuring the backlight of the internal LCD

Set the backlight brightness of the internal LCD.

1 Display the [SETUP MENU: MAIN] screen.

2 Press the [BACKLIGHT] button in the [DISPLAY SETTING] - [INTERNAL LCD] area.

The [BACKLIGHT] submenu appears.

3 Set the backlight brightness of the internal LCD.

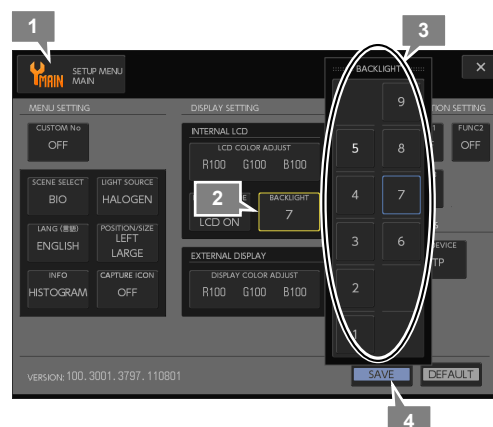
- [1] to [9] (initial setting: [5] or [7])

When one of these has been selected, the submenu closes and the backlight brightness changes. Set appropriate brightness.

The current setting is displayed in the [BACKLIGHT] button.

4 Press the [SAVE] button.

The brightness setting is saved.



Configuring Internal LCD Backlight

Choice of Backlight

Choice	Setting
1 to 9	Set appropriate brightness in accordance with the operating environment. (Initial setting: 5 or 7)

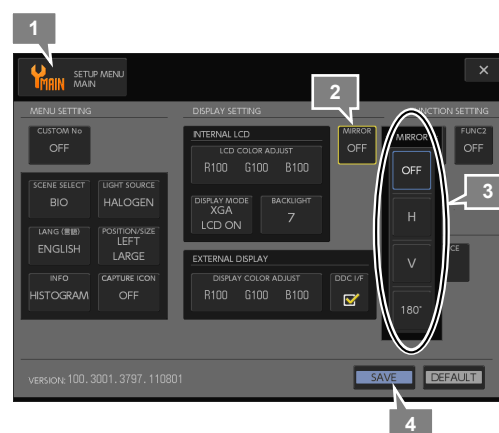
(4) Mirroring images

Configure mirroring and rotation of a live image. Use desired settings in accordance with the position of DS camera head or the status and orientation of a specimen.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [MIRROR] button on the [DISPLAY SETTING] area.
The [MIRROR] submenu appears.
- 3 Press one of the following buttons to configure the look of a live image.
 - [OFF] (initial setting)
 - [H]
 - [V]
 - [180°]

When one of these has been selected, the submenu closes and the live image status changes. The current setting is displayed in the [MIRROR] button.

- 4 Press the [SAVE] button.
Mirroring and rotation settings are saved.



Configuring Image Mirroring and Rotation

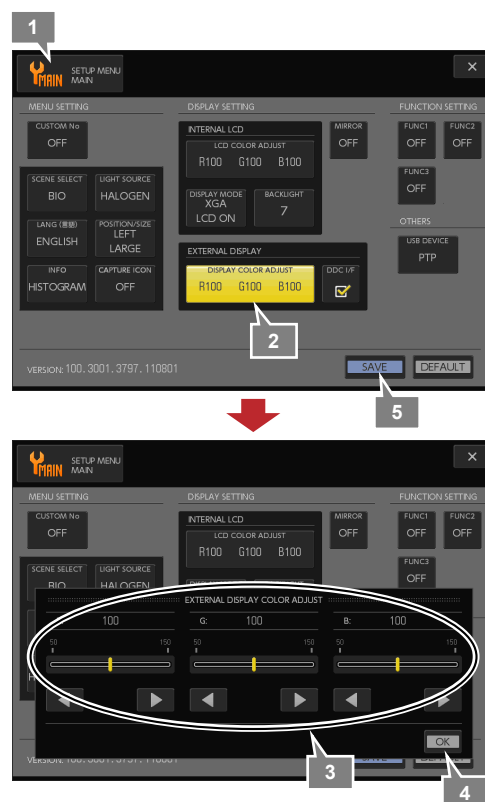
Choice of Image Mirroring

Choice	Setting
OFF	Performs neither mirroring nor rotation. (Initial setting)
H	Reverses an image horizontally. (Flip horizontal)
V	Reverses an image vertically. (Flip vertical)
180°	Rotates an image by 180 degrees.

(5) Adjusting the color balance of external monitor output signal

Adjust the color balance of the video signal to be output from the DVI-I connector of the DS-L3.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [DISPLAY COLOR ADJUST] button in the [DISPLAY SETTING] - [EXTERNAL DISPLAY] area
The [EXTERNAL DISPLAY COLOR ADJUST] window appears.
- 3 Adjust each gain for R (red), G (green), and B (blue) while viewing the external monitor screen.
The window shows a slider and adjustment buttons of each gain of R, G and B in this order from left.
 - Setting range: 50 to 150 (initial setting: 100) for each color (R/G/B)
 Perform adjustment using the slider and left and right adjustment buttons.
- 4 Press the [OK] button.
The [EXTERNAL DISPLAY COLOR ADJUST] window closes.
- 5 Press the [SAVE] button.
The configured color balance is saved.



Configuring Color Balance of External Monitor

External Monitor Color Balance Adjustment Setting Range

Item	Setting
R, G, B	Adjust each gain for R (red), G (green), and B (blue) within a range of 50 to 150 (initial setting: 100). Each value can be adjusted in units of step 1 (jump 5).

(6) Configuring the DDC interface

The DS-L3 is provided with the plug and play function for external monitor conforming to the DDC IF (VESA DDC-2B). You can set the checkbox to select whether to use the plug and play function.

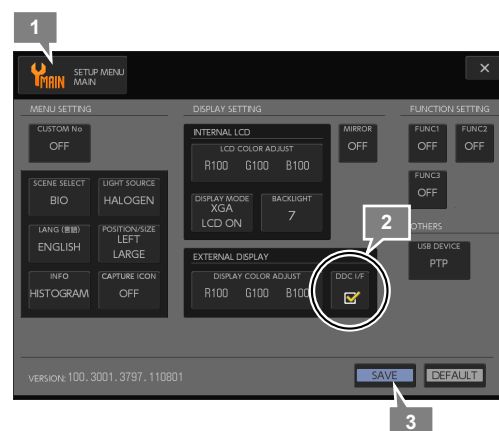
- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Set the [DDC I/F] checkbox in the [DISPLAY SETTING] - [EXTERNAL DISPLAY] area in accordance with the external monitor to be used.

Set the checkbox correctly in accordance with the external monitor to be used.

- ON/OFF (Initial setting: ON)

- 3 Press the [SAVE] button.

The DDC interface setting is saved.



Configuring DDC Interface

DDC I/F Checkbox Setting

Choice	Setting
ON	Select this checkbox when using an external monitor conforming to the DDC interface. (Initial setting)
OFF	Clear this checkbox when using an external monitor that does not conform to the DDC interface.

✓ When the [DDC I/F] checkbox is selected:

When the [DDC I/F] checkbox is selected, the following function is enabled.

- When no external monitor is connected, data is automatically displayed on the internal LCD (when [SXGA / LCD OFF], [720P / LCD OFF] or [XGA / LCD OFF] is selected).
- When an external monitor that does not conform to SXGA or 720p is connected, the resolution is automatically changed to XGA and display data is output to the external monitor (when [SXGA / LCD OFF] or [720P / LCD OFF] is selected).

13.2.3 Configuring Function Buttons

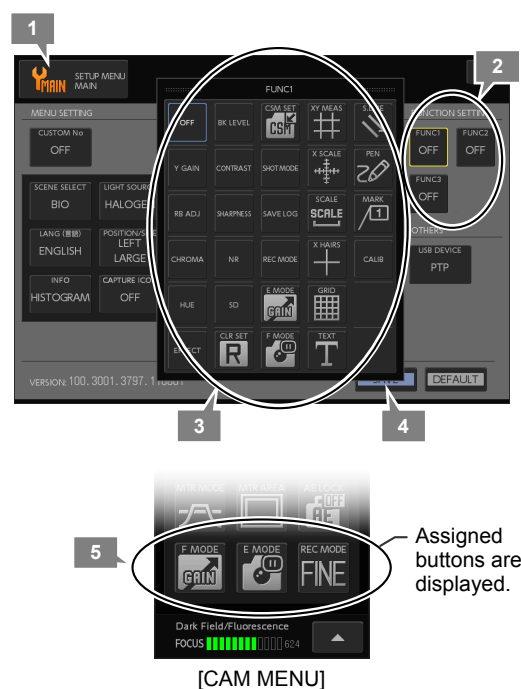
— [FUNCTION SETTING] area —

Configure the following settings in the [FUNCTION SETTING] area of the [SETUP MENU: MAIN] screen.

Item	Choice
Setting functions for function buttons 1 to 3	Brightness, RB adjustment, chroma, hue, color effect, black level, contrast, sharpness, NR, SD, setting clear, custom setting (registration), continuous shooting mode, log save, recording mode, F mode (focus assist mode), E mode (exposure assist mode), XY measurement, X scale (cross scale), scale, cross hairs, grid, text, straight line, pen, marker, calibration, OFF (no setting)

Three function buttons are located at the lower part of the [CAM MENU: CAMERA] long window. These buttons are frequently used and can be operated from the [CAM MENU].

- 1 Display the [SETUP MENU: MAIN] screen.**
- 2 Press the [FUNC1], [FUNC2] or [FUNC3] button in the [FUNCTION SETTING] area.**
The submenu appears and functions assignable to the selected button are displayed.
- 3 Press the desired buttons to assign functions.**
The selected functions are displayed in the [FUNC1] to [FUNC3] buttons. If you use no function button, select [OFF].
Note: Assigned buttons are grayed out and can no longer be assigned. One function cannot be assigned to two or more buttons.
- 4 Press the [SAVE] button.**
The function button setting is saved.
- 5 Display the [CAM MENU: CAMERA] long window and confirm that the function buttons have been set correctly.**



Configuring Function Buttons



Functions Assignable to Function Buttons

The following functions can be assigned to the function buttons.

Function (Button)	Screen
Brightness, RB adjustment, chroma, hue, color effect, black level, contrast, sharpness	[CAM MENU: IMAGE]
NR, SD, setting clear, custom setting (registration)	[CAM MENU: NR/SD/SET]
Continuous shooting mode, log save, recording mode	[CAM MENU: SHOT/REC]
F mode (focus assist mode), E mode (exposure assist mode)	—
XY measurement, X scale (cross scale), scale, cross hairs, grid, text, straight line, pen, marker, calibration	[TOOL MENU]

[F MODE] button and [E MODE] button

Among buttons assignable to function buttons, the following two function buttons have their own functions that are not displayed in normal operation menus.

Button	Button Name	Function
	[F MODE] button (Focus assist mode button)	<p>The [F MODE] button is used in an environment requiring a high frame rate (for focusing on a dark object, for example) in dark field observation or fluorescence microscopy using a microscope.</p> <ul style="list-style-type: none"> Pressing this button changes the [EXPOSURE MODE] to [MANU], allowing exposure adjustment by increasing the camera gain to prevent long exposure time. Since a live image is displayed with the exposure state of the high camera gain maintained, adjust brightness as needed with the camera gain and exposure time. To return to the normal settings of camera gain and exposure time from the manual mode (high camera gain) after the [F MODE] button is pressed, change the [EXPOSURE MODE] to [PROG].
	[E MODE] button (Exposure assist mode button)	<p>The [E MODE] button is used to view and shoot an image with a low camera gain and little noise after focusing using the [F MODE] button or while a live image is being displayed with the manual exposure mode and a high camera gain in dark field observation or fluorescence microscopy using a microscope.</p> <ul style="list-style-type: none"> Pressing this button causes the DS-L3 to start automatic exposure and display the captured image on the screen as a still image. A blue frame appears around the [II] button. Press the [CAPTURE] button to actually save images. If good exposure result is not obtained with the [E MODE] button, reset the pause mode and adjust brightness with the camera gain and exposure time, and then repress the [E MODE] button to start exposure. When good exposure result is obtained, press the [CAPTURE] button to save an image. To return to live image with the normal camera gain and exposure time from the pause mode after exposure by pressing the [F MODE] button, reset the pause mode and change the [EXPOSURE MODE] to [PROG].

13.2.4 Configuring Other Settings

— [OTHERS] area —

Configure the following settings in the [OTHERS] area of the [SETUP MENU: MAIN] screen.

Item	Choice	Initial Setting	See
(1) Configuring USB (D) connector operating mode	[PTP], [VNDR], [PRN]	[PTP]	p.183
(2) Configuring the cooling camera	[-5°C], [-10°C]	[-5°C]	p.184

(1) Configuring USB (D) connector operating mode

Configure the operating mode (device mode) of the USB (D) connectors on the left side of the DS-L3. You need to configure correct settings according to usage when connecting a PC or printer.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [USB DEV] button in the [OTHERS] area.
The [USB DEV] submenu appears.
- 3 Select the USB (D) connector operating mode.

For details of setting, see the table below.

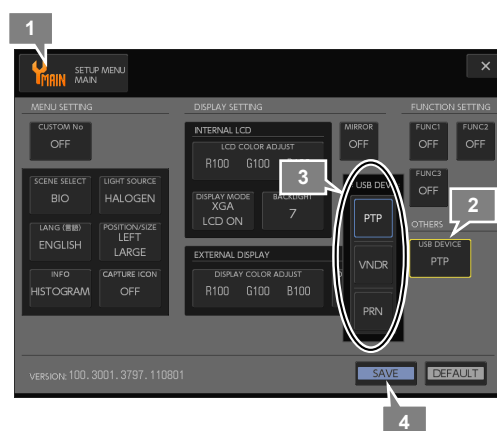
- PTP (initial setting)
- VNDR
- PRN

When one of these has been selected, the submenu closes and the selected content is displayed in the [USB DEV] button.

- 4 Press the [SAVE] button.

When you change the setting, a reboot request message for the DS-L3.

- 5 To switch the setting, turn off the DS-L3 and then turn it on.



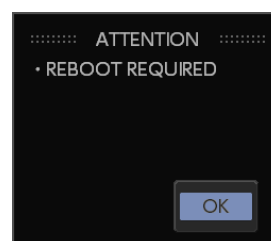
Configuring Operating Mode of the USB (D) Connector

USB Device Setting

Choice	Setting
PTP	Select this mode when connecting the DS-L3 to a PC to be used as an external recording medium of the PC. (Initial setting) This mode allows you to open files in the CF card or USB memory of DS-L3 from an application on the PC and to transfer files between PC and DS-L3.
VNDR	Select this mode when connecting the DS-L3 to a PC to use the dedicated application "NIS-Elements" on the PC and when saving files in a folder in the PC when capture is performed on the DS-L3.
PRN	Select this mode when connecting a PictBridge supporting printer to the DS-L3 to directly print images by capture operation or operation from displayed thumbnail.

Switching of the USB device setting

To switch the operation mode of the USB (D) connector, you need to turn off the DS-L3 and then turn it on. When you press the [SAVE] button after changing the setting, a reboot request message for the DS-L3 appears. Be sure to power off and on the DS-L3 before connecting the USB (D) connector.



(2) Configuring the cooling camera

When a DS cooled camera head DS-Qi1Mc or DS-Ri1 is connected, the [COOLING TEMP] button is displayed in the [OTHERS] area of the [SETUP MENU: MAIN] screen. Use this button to set the image pickup device cooling temperature of the DS cooled camera head.

- 1 Display the [SETUP MENU: MAIN] screen.
- 2 Press the [COOLING TEMP] button in the [OTHERS] area.

The [COOLING TEMP] submenu appears.

- 3 Select the cooling temperature of the image pickup device.

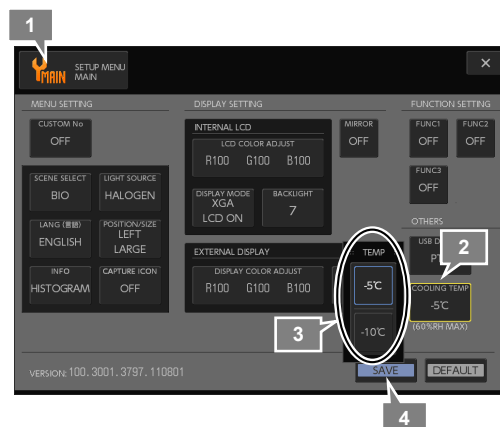
For details of the setting, see the table below.

- -5°C (initial setting)
- -10°C

When one of these has been selected, the submenu closes and the selected content is displayed in the [COOLING TEMP] button.

- 4 Press the [SAVE] button.

The cooling temperature setting is saved.



Configuring Cooling Camera

Cooling Temperature Setting

Choice	Setting
-5°C	Sets the image pickup device cooling temperature to "Ambient temperature -5°C" (Initial setting). Note: This choice is available at an ambient humidity of 80%RH or less.
-10°C	Sets the image pickup device cooling temperature to "Ambient temperature -10°C". Note: This choice is available only at an ambient humidity of 60%RH or less. When the DS-L3 is turned off, the cooling temperature setting automatically returns to -5°C.

! Note on condensation

When the cooling temperature is set to -10°C at a high ambient humidity, condensation is formed. When you set the cooling temperature to -10°C, be sure to make sure that the ambient humidity is not more than 60%RH.

13.3 Configuring Network Settings

— [SETUP MENU: NETWORK] Screen —

Select [NETWORK] using the [MENU SELECT] button in the [SETUP MENU] screen. The [SETUP MENU: NETWORK] screen appears. In this screen, you can configure several settings for connecting this system to the network.

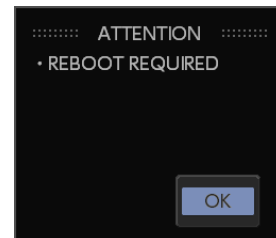
Items on the [SETUP MENU: NETWORK] screen



[SETUP MENU: NETWORK] Screen Items

✓ Changing network settings

System power may have to be turned off and on to enable changes to some network-related settings of this system. In this case, an alert message of "REBOOT REQUIRED" appears when you save the setting on the [SETUP MENU: NETWORK] screen.



13.3.1 Configuring HTTP Server

— [INTERNAL SERVER] area, [AUTHENTICATED IP ADDRESSES] area —

In the [INTERNAL SERVER] area, you can configure basic settings for connecting this system to the network and settings for using this system as an HTTP server.

Item	Setting Item	Initial Setting	See
(1) Enabling or disabling network connection	[NETWORK] checkbox: Enable/Disable	Enable	p.186
(2) Acquiring an IP address from the DHCP server	[DHCP] checkbox: Enable/Disable	Disable	p.187
(3) Specifying a fixed IP address and a subnet mask	[IP ADDRESS] field, [SUBNET MASK] field	192.168.20.2 255.255.255.0	p.188
(4) Configuring user authentication against web browser access	[USER ID] field, [PASSWORD] field	nikon passwd	p.189
(5) Restricting the access from web browser by IP addresses	[AUTHENTICATED IP ADDRESSES]: [No.1] to [No. 5]	No.1: 192.168.20.1	p.190

(1) Enabling or disabling network connection

Specifies whether to connect this system to the network. When you enable the network connection, the HTTP server feature automatically functions and you can access this system via a web browser from a PC.

⚠ Caution: Before connecting to the network

Carefully check if settings are correct before plugging into the network. A wrong setting may cause a failure in your network.

✔ Network connection

No network connection is made unless this setting is enabled even if a network cable is connected.

1 Display the [SETUP MENU: NETWORK] screen.

2 Select the [NETWORK] checkbox on the [INTERNAL SERVER] area.

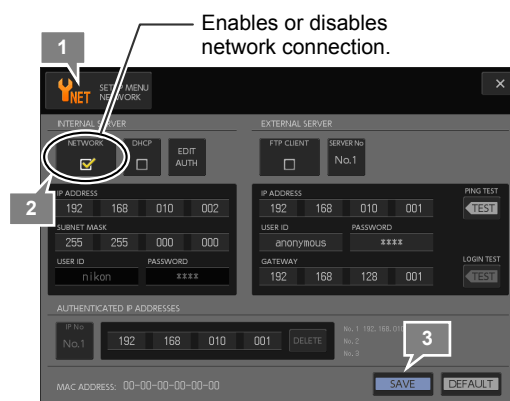
Select the checkbox if you want to connect to the network. Clear it to disconnect from the network.

- Enable/Disable (Initial setting: Enable)

When the [NETWORK] checkbox is selected (enabled), the HTTP server function works automatically, allowing access to the DS-L3 from the PC through the web browser.

3 Press the [SAVE] button.

The network connection setting is saved.



Enabling or Disabling Network Connection

[NETWORK] Checkbox Setting

Choice	Setting
Enable	Makes network connection, enabling the HTTP server of the DS-L3. (Initial setting)
Disable	Makes no network connection.

✔ Enabling/disabling network connection

When the [NETWORK] checkbox is cleared (disabled), the setting items in the [SETUP MENU: NETWORK] screen are grayed out, disabling the network connection setting.

To make a connection to the network, select the [NETWORK] checkbox and then perform advanced settings.

(2) Acquiring an IP address from the DHCP server

Configure the following setting to acquire an IP address from the DHCP server on the network.

1 Display the [SETUP MENU: NETWORK] screen.

2 Enable or disable the [DHCP] checkbox in the [INTERNAL SERVER] area.

Select (enable) the [DHCP] checkbox to acquire an IP address from the DHCP server.

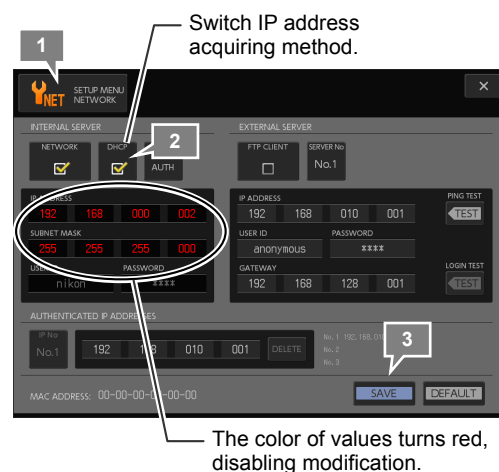
- Enable/Disable (Initial setting: Disable)

When the [DHCP] checkbox is selected, the characters in the [IP ADDRESS] field and [SUBNET MASK] field change to red, disabling entry.

Immediately after enabling the [DHCP], “--- --- ---” is shown in the [IP ADDRESS] and [SUBNET MASK] fields. Turn off the DS-L3, then turn it on, and values are indicated in the fields after the IP address is notified from the DHCP server.

3 Press the [SAVE] button.

The above setting is saved.



Acquiring an IP address from the DHCP Server

[DHCP] Checkbox Setting

Choice	Setting
Enable	Acquires an IP address from the DHCP server on the network.
Disable	Manually enter an IP address and a subnet mask required for network connection. (Default)

! Changing IP address

Turn off and on the DS-L3 after you changed the IP address acquiring method.

! Using DHCP server

To use the DHCP server, it must exist on your network. If you use the DS-L3 in an environment that contains no DHCP server, clear (disable) the [DHCP] checkbox and use the DS-L3 with a fixed IP address.

✓ Network connection

When the [DHCP] checkbox is selected, the DS-L3 acquires an IP address automatically from the DHCP server on the network during startup.

(3) Specifying a fixed IP address and a subnet mask

When a fixed IP address is used without using the DHCP server, you must manually enter an IP address and subnet mask.

Note: You cannot enter these values if the [DHCP] checkbox is selected.

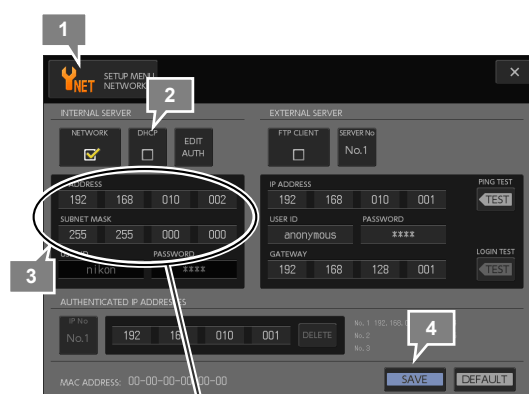
- 1 Display the [SETUP MENU: NETWORK] screen.
- 2 Make sure the [DHCP] checkbox on the [INTERNAL SERVER] area is cleared.
- 3 Enter an IP address and subnet mask assigned by the network administrator into [IP ADDRESS] and [SUBNET MASK] fields.

When you press each input field, a keypad appears. Press the desired key to enter a correct number and press the [ENTER] button.

Press the [CLR] button to erase the input. Press the [BS] button to backspace one character. Pressing the [X] button closes the keypad without changing the value.

- 4 Press the [SAVE] button.

The IP address and subnet mask setting is saved.



Enter a valid IP address and subnet mask.

Specifying IP Address and Subnet Mask

IP Address/Subnet Mask Setting

Item	Setting
IP ADDRESS	IP address is a number to identify equipment on the network. The DS-L3 conforms to IPv4.
SUBNET MASK	Subnet mask is a number to correctly recognize each IP address.

! Changing the IP address

Turn off and on the system when you changed a method for obtaining an IP address.

! Specifying a fixed IP address

If you plan to use a fixed IP address, consult the network administrator of your organization and specify the IP address and subnet mask officially given from the administrator. A wrong IP address may cause a failure in your network.

(4) Configuring user authentication against web browser access

Specify whether to restrict access from a web browser by enabling user authentication.

❗ Editing the authentication setting

- To change the user authentication which allows users to access the internal server (HTTP server) of the DS-L3, press the [EDIT AUTH] button and enter the current valid password.
- Password entry is not required if “anonymous” is set for [USER ID]. Press the [EDIT AUTH] button to activate the [USER ID] and [PASSWORD] fields of the [INTERNAL SERVER] area.
- In case you forget your password, press the [DEFAULT] button to clear the password setting.

1 Display the [SETUP MENU: NETWORK] screen.

2 Press the [EDIT AUTH] button.

The [EDIT AUTH] submenu appears.

3 Press the [INPUT] button.

The keypad opens for password entry. To cancel this operation, press the [CANCEL] button.

4 Enter the password that allows you to access the internal server (HTTP server) of the DS-L3, and press the [ENTER] button.

Enter the password specified in the [PASSWORD] field of the [INTERNAL SERVER] area.

When the correct password is entered, the [USER ID] and [PASSWORD] fields of the [INTERNAL SERVER] area become active for entry.

5 Enter a user name and password in the [USER ID] field and [PASSWORD] field in the [INTERNAL SERVER] area (up to 10 characters for each).

When you press an input field, a keypad appears. Press the desired key to enter information and press the [ENTER] button.

6 Press the [SAVE] button.

The user ID and password setting is saved.



Configuring User ID and Password

User ID/Password Setting

Item	Setting
USER ID	Enter a user ID used for access from the web browser (up to 10 alphanumeric characters). If user authentication is not required, set to “anonymous”. The initial setting is “nikon”.
PASSWORD	Enter a password used for access from the web browser (up to 10 alphanumeric characters). If the user ID is set to “anonymous”, the password setting is ignored. The initial setting is “passwd”.

❗ User authentication for access from web browser

If you are accessing from a web browser to a system where user ID is not set to “anonymous”, the user authentication dialog box appears. If you fail to type correct user name and password, you cannot access the system.

✔ When user authentication is not required

If user authentication is not required, set the [USER ID] field to “anonymous”.

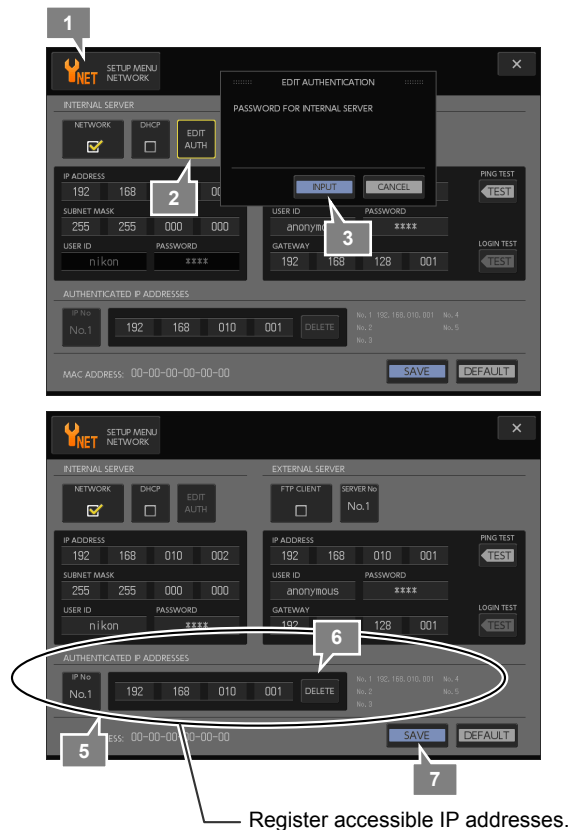
(5) Restricting the access from web browser by IP addresses

You can set up to five IP addresses which can access the internal server (HTTP server) of the DS-L3.

! Editing the authentication setting

- To change the user authentication which allows users to access the internal server (HTTP server) of the DS-L3, press the [EDIT AUTH] button and enter the current valid password.
- Password entry is not required if “anonymous” is set for [USER ID]. Press the [EDIT AUTH] button to activate the [USER ID] and [PASSWORD] fields of the [INTERNAL SERVER] area.
- In case you forget your password, press the [DEFAULT] button to clear the password setting.

- 1 Display the [SETUP MENU: NETWORK] screen.**
- 2 Press the [EDIT AUTH] button.**
The [EDIT AUTH] submenu appears.
- 3 Press the [INPUT] button.**
The keypad opens for password entry. To cancel this operation, press the [CANCEL] button.
- 4 Enter the password that allows you to access the internal server (HTTP server) of the DS-L3, and press the [ENTER] button.**
Enter the password specified in the [PASSWORD] field of the [INTERNAL SERVER] area.
When the correct password is entered, the [AUTHENTICATED IP ADDRESSES] area becomes active.
- 5 Select a number (No. 1 to No. 5) with the [IP No] button and enter an IP address.**
When you press the IP address input field, the keypad appears. Enter a numeric value or asterisk by pressing corresponding keys, and press the [ENTER] key.
To delete the entry, press the [CLR] button. To move backward by one character, press the [BS] button. Pressing the [X] button closes the keypad without changing the value.
The registered IP address is shown in the [AUTHENTICATED IP ADDRESSES] area.
- 6 To delete a registered IP address, select its number with the [IP No] button and press the [DELETE] button.**
- 7 Press the [SAVE] button.**
The user ID and password setting is saved.



Register accessible IP addresses.
Setting the IP Addresses Accessible to the Internal Server

IP Address Authentication Setting

Item	Setting
No. 1 to No. 5	Set IP addresses which can access the internal server of the DS-L3 (No. 1: 192.168.20.1 by initial setting).

! IP addresses accessible to the internal server

- To allow the DS-L3 to be accessed from web browser, the IP address of the terminal (such as a PC) which uses the web browser must have been registered in the [AUTHENTICATED IP ADDRESSES] area of the DS-L3.
- IP address setting can use an asterisk. If you set “192.168.10.*”, terminals with IP addresses 192.168.10.0 to 192.168.10.255 are allowed to access the internal server. Note, however, that if you permit accesses from a wide range of terminals, it may cause a security problem. Set IP addresses according to the policy of your organization.

✓ Access restriction by IP addresses

- If access restriction by IP addresses is not necessary (that is, access from any IP addresses is accepted), set “****” in one of [No. 1] to [No. 5].
- To prohibit access from web browser, clear the settings of [No. 1] to [No. 5] to blank.

13.3.2 Configuring FTP Client

— [EXTERNAL SERVER] Area —

The [EXTERNAL SERVER] area allows you to configure settings for connecting to an FTP server from this system and performs connectivity test against the FTP server.

Item	Setting Item	Initial Setting	See
(1) Enabling or disabling FTP client	[FTP CLIENT] checkbox: Enable/Disable	Disable	p.191
(2) Registering/changing FTP server settings	[IP ADDRESS] field, [USER ID] field, [PASSWORD] field, [GATEWAY] field	192.168.20.1, anonymous, none, 0.0.0.0	p.192
(3) Switching FTP server (No.1 to No.5)	[No.1] to [No.5]	[No.1]	p.193
(4) Connectivity test against FTP server	[PING TEST] button, [LOGIN TEST] button	—	p.194

(1) Enabling or disabling FTP client

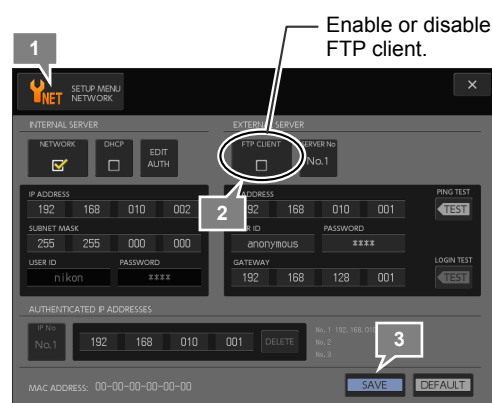
Disables or enables use of FTP client feature.

- 1 Display the [SETUP MENU: NETWORK] screen.
- 2 Select the [FTP CLIENT] checkbox on the [EXTERNAL SERVER] area.

Select the checkbox if you want to connect to an FTP server. Clear it if you do not use an FTP server.

- Enable/Disable (Initial setting: Disable)

- 3 Press the [SAVE] button.



Enabling or Disabling FTP Client

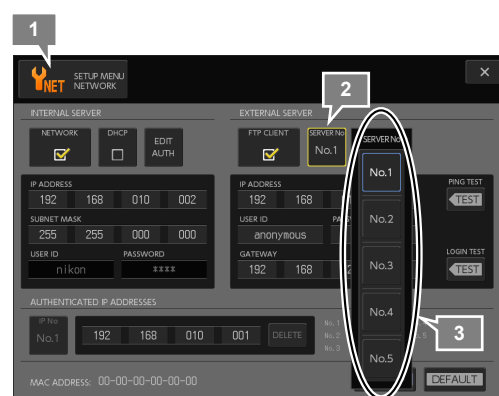
[FTP CLIENT] Checkbox Setting

Choice	Setting
Enable	Enables the FTP client feature.
Disable	Disables the FTP client feature. (Initial setting)

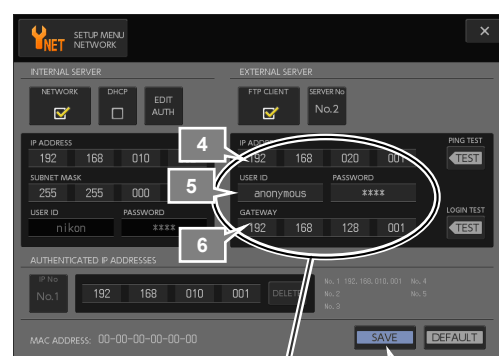
(2) Registering/changing FTP server settings

Configure settings for the FTP server to connect.

- 1 **Display the [SETUP MENU: NETWORK] screen.**
- 2 **Press the [SERVER No] button.**
The [SERVER No] submenu appears.
- 3 **Press one of the [No.1] to [No.5] buttons to select the number of FTP server to be used.**
Registered FTP server settings (IP address and user ID) are displayed.
Note: The gateway setting is common to all servers.
- 4 **Enter the IP address of the target FTP server in the [IP ADDRESS] field.**
When you press an input field, a keypad appears.
Press the desired key to enter a correct number.
- 5 **Enter the user name and password for connecting to the FTP server in the [USER ID] and [PASSWORD] fields.**
When you press an input field, a keypad appears. Press the desired key to enter information and press the [ENTER] button.
If the FTP server allows access from an anonymous user, enter "anonymous" for user name.
- 6 **If the setting of a gateway is required, specify the IP address of the gateway in the [GATEWAY] field as specified by the network administrator.**
When you press an input field, a keypad appears. Press the desired key to enter a correct number and press the [ENTER] button.
Note: The gateway setting is common to all servers.
- 7 **Press the [SAVE] button.**
The settings are stored with the server number.



Select the number of FTP server to connect.



Configure settings required for connection.

Configuring FTP Server

FTP Server Setting

Choice	Setting
IP ADDRESS	Set the IP address of the FTP server to connect.
USER ID	Set a user ID required for connection to the FTP server. For an FTP server that allows access from an anonymous user, enter "anonymous" for user name.
PASSWORD	Set a password required for connection to the FTP server. If you connect to the server with "anonymous", the password entry is ignored.
GATEWAY	Set the address of equipment that connects between networks.

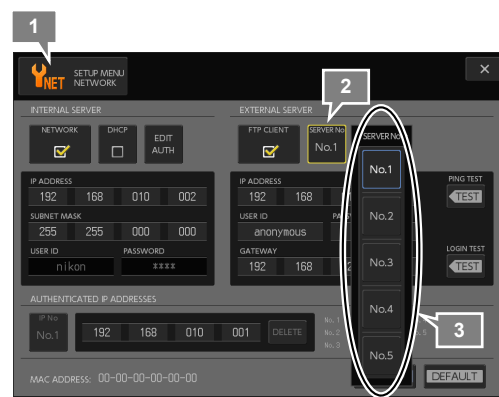
✓ Configuring gateway

A gateway is a device for connecting different networks and allows proper communication between them. If your network is separated from another network with a gateway, you must specify the IP address of the gateway. Especially, if you are accessing an FTP server residing on a different network group, you need gateway settings.

(3) Switching FTP server (No.1 to No.5)

Up to five FTP servers can be registered. You can switch FTP server as required. You can use a different FTP server depending on who uses the system or types and usage of an object on an image.

- 1 Display the [SETUP MENU: NETWORK] screen.
- 2 Press the [SERVER No] button.
The [SERVER No] submenu appears.
- 3 Press one of the [No.1] to [No.5] buttons to select the number of FTP server to be used.
 - [No.1] to [No.5] (Initial setting: [No.1])
 Registered FTP server settings (IP address and user ID) are displayed.
 Note: The gateway setting is common to all servers.
- 4 Press the [SAVE] button.
The selected server number setting is enabled.



Switch FTP server to connect.

Switching FTP Server

FTP Server Switching

Choice	Setting
No.1 to No.5	Select the settings of the FTP server to connect. (Initial setting: [No.1])

(4) Connectivity test against FTP server

You can perform connectivity test with an FTP server.

❗ Before connectivity test

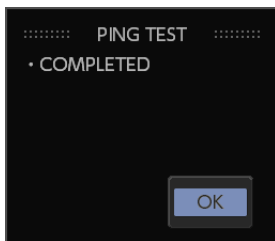
Prior to running a connectivity test, save the current settings using the [SAVE] button on the [SETUP MENU: NETWORK] screen. If you fail to press the [SAVE] button, the network settings are not updated.

Connectivity test by PING

Tests if a target FTP server can be found on the network.

Press the [PING TEST] button. A packet is sent to the IP address of the FTP server.

If the packet reaches the server and it returns a response, the message "COMPLETED" is displayed.

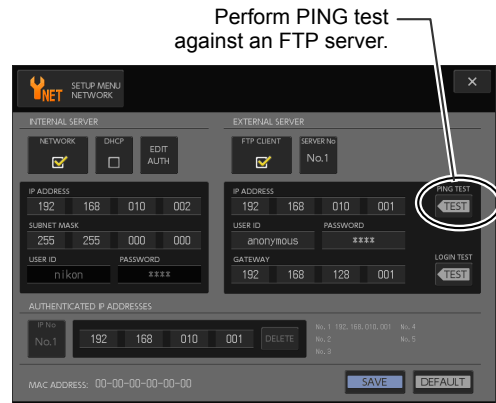


Note: The message "ERROR" is displayed if there is no response from the server within a predetermined time.

✔ When no response is returned for PING test

There may be no response to PING if security mechanism such as packet filter, firewall or security gateway is introduced. Restart the DS-L3 before disabling server's security mechanism and retrying the test.

Even though no response is returned to PING, if you are sure you can login to the server by using [LOGIN] – [TEST] described below, connection to the FTP server has no problem.



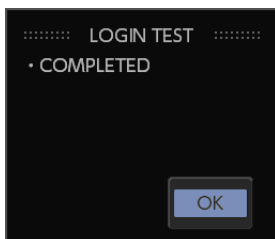
Performing Connectivity Test by PING

Login test

Tests if you can login to a target FTP server.

Press the [LOGIN TEST] button to log in to the FTP server with the specified user name and password.

If login is successful, "COMPLETED" is displayed



Note: The message "ERROR" is displayed if the server denies login. If you cannot log in to the server, check settings of both this system and the server.



Performing Login Test

13.4 Changing Image File Settings

— [SETUP MENU: FILE] Screen —

Select [FILE] using the [MENU SELECT] button in the [SETUP MENU] screen. The [SETUP MENU: FILE] screen appears. In this screen, you can direct automatic creation of a folder for saving an image file and setting of the file name.

Items on [SETUP MENU: FILE] screen



[SETUP MENU: FILE] Screen Items

13.4.1 Configuring a Target Folder

— [MEDIA DIR] and [FTP DIR] Areas —

Specify a destination folder for a recording medium or FTP server using the [MEDIA DIR] and [FTP SERVER DIR] areas respectively.

Item	Setting	Initial Setting	See
(1) Configuring automatic folder creation on recording medium	[AUTO CREATE] checkbox: Enable/Disable	Enable	p.197
(2) Configuring a subfolder in the FTP server	[SUB DIR] input field	Blank	p.197
(3) Configuring automatic folder creation in FTP server	[AUTO CREATE] checkbox: Enable/Disable	Enable	p.198

Name of folder created automatically

When you capture an image with the automatic folder creation set, a folder, whose name is generated in accordance with the capture date of the image, is automatically created in a storage folder in the recording medium or in the home folder in the FTP server. The image file is saved onto either of the folders.

The generated folder names are as follows. Files are automatically classified based on a date:

- **Recording medium:** "IM + Date (YYMMDD)"
- **FTP server:** "FT + Date (YYMMDD)"

✔ File storage folder when no folder is created automatically

If you do not use the automatic folder creation to save a file in the recording medium, an image file is saved directly in the topmost storage folder. If you do not use the automatic folder creation to save a file in the FTP server, an image file is saved directly in the topmost storage folder of the home folder or a specified subfolder.

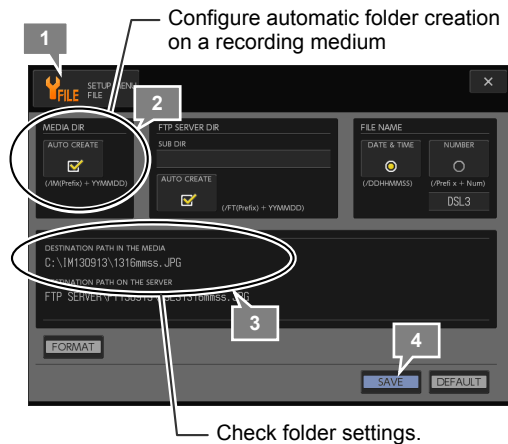
(1) Configuring automatic folder creation on recording medium

Set whether to automatically create a folder in the storage folder of a recording medium when saving images on the recording medium.

- 1 Display the [SETUP MENU: FILE] screen.
- 2 Enable or disable the [AUTO CREATE] checkbox in the [MEDIA DIR:] area.
 - Enable/Disable (Initial setting: Enable)

Select the checkbox if you want to enable automatic folder creation (Enable). Clear it to disable automatic creation (Disable).
- 3 Check the current folder settings by looking at Path Information area.
- 4 Press the [SAVE] button.

The auto creation setting is saved.



Configuring Automatic Folder Creation

Automatic Folder Creation Setting

Choice	Setting
Enable	Creates a folder automatically on a recording medium. (Initial setting) A folder is automatically created in the storage folder of the recording medium with a name of "IM + Date (YYMMDD)" and image files are saved in the folder.
Disable	Creates no folder automatically on a recording medium. Image files are saved directly in the storage folder of the recording medium.

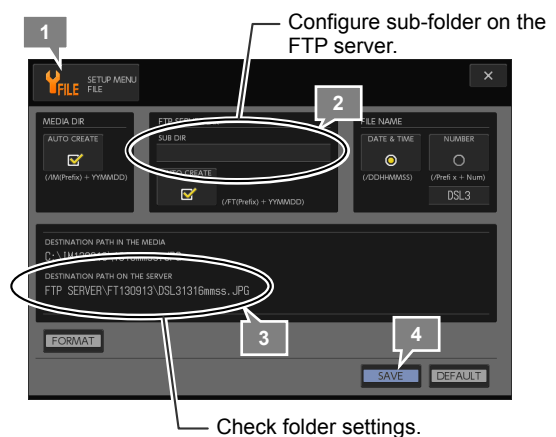
(2) Configuring a subfolder in the FTP server

You can set up a subfolder in the home folder of the FTP server.

- 1 Display the [SETUP MENU: FILE] screen.
- 2 Enter a subfolder name in the [SUB DIR] field of the [FTP SERVER DIR] area.

When you press the input field, a keypad appears. Press keys to enter a folder name, and press the [ENTER] button.
- 3 Check the current folder settings by looking at Path Information area.
- 4 Press the [SAVE] button.

The auto creation setting is saved.



Configuring Automatic Folder Creation

Subfolder Setting

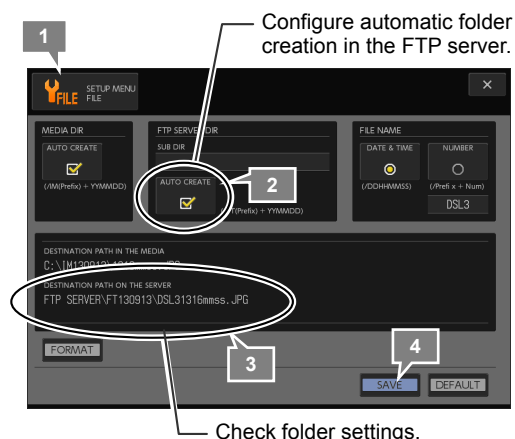
Item	Setting
SUB DIR	Set a name for the target subfolder in the FTP server with up to 30 characters. (Initial setting: blank) If the [SUB DIR] input field is left blank, image files will be saved in the following manner: <ul style="list-style-type: none"> • With the [AUTO CREATE] checkbox selected, a folder is automatically created in the home folder with a name of "FT + Date (YYMMDD)" and image files are saved in the folder. • With the [AUTO CREATE] checkbox cleared, image files are saved directly in the home folder.

(3) Configuring automatic folder creation in FTP server

Set whether to automatically create a folder in the home folder or the subfolder (if configured) of the FTP server when saving images in the FTP server.

- 1 Display the [SETUP MENU: FILE] screen.
- 2 Enable or disable the [AUTO CREATE] checkbox in the [FTP SERVER DIR:] area.
 - Enable/Disable (Initial setting: Enable)

Select (enable) the checkbox to automatically create a folder. Clear (disable) it when auto creation is not performed.
- 3 Check the current folder settings by looking at Path Information area.
- 4 Press the [SAVE] button.
The auto creation setting is saved.



Configuring Automatic Folder Creation

Automatic Folder Creation Setting

Choice	Setting
Enable	Creates a folder automatically in the FTP server. (Initial setting) A folder is automatically created directly in the home folder or a specified subfolder in the FTP server with a name of "FT + Date (YYMMDD)" and image files are saved in the folder.
Disable	Creates no folder automatically in the FTP server. Image files are saved directly in the home folder or a specified subfolder in the FTP server.

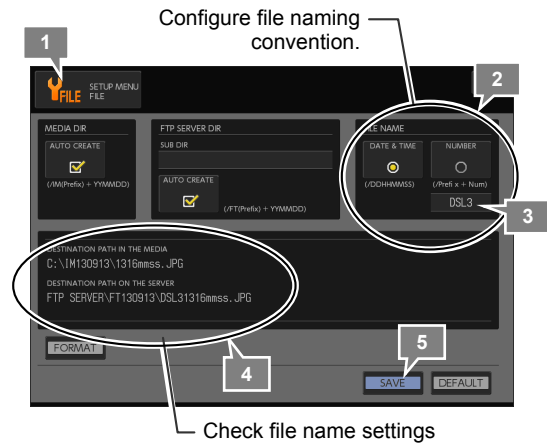
13.4.2 Configuring File Naming Convention

— [FILE NAME] Area —

The [FILE NAME] area allows you to specify file name convention for an image file to be saved.

There are two types of setting: [DATE & TIME] setting based on capturing date and time and [NUMBER] setting based on a serial number.

- 1 **Display the [SETUP MENU: FILE] screen.**
- 2 **Select image file name convention from the radio button on the [FILE NAME] area:**
For details of the setting, see “File Naming Convention Setting” below.
 - [DATE & TIME] (Initial setting)
 - [NUMBER]
- 3 **To change the file name prefix, enter a desired prefix of up to eight characters in the prefix input field:**
Press the input field. A keypad appears. Enter a desired prefix. Press [ENTER] to commit the value.
Note: When set to [DATE & TIME], the prefix is not attached to the file saved onto a recording medium.
- 4 **Check the file name settings in the Path information area.**
- 5 **Press the [SAVE] button.**
The file naming convention setting is saved.



Configuring File Naming Convention

File Naming Convention Setting

Choice	Setting
DATE & TIME	A file is named based on capturing date (DD) and time (HHMMSS). (Initial setting) When the file name is saved in a medium, no prefix is added. Example: “DDHHMMSS.extension” (saving in a medium) “DSL3 + DDHHMMSS.extension” (saving in FTP server)
NUMBER	A file is named based on a 4-digit serial number. If the destination folder name or the file name is changed, the number is reset to “0001”. Example: “DSL3 + 4-digit serial number.extension”
Prefix	Set a prefix of up to eight characters at the top of an image file name. (Initial setting: DSL3) When the input field is specified, a keypad appears. Note: When [DATE & TIME] is selected, no prefix is added to files saved in a recording medium.

❗ Configuring file name

You can set the file name of an image to be saved at the next capture in the [FILE] area of the [CAM MENU: SHOT/REC] screen (only in [SINGLE] continuous shot mode).

Once an image file name has been set in the [FILE] area, the naming convention change is not applied until an image is saved with an arbitrary file name in the capture operation even if the file naming convention is actually changed on the [SETUP MENU: FILE] screen.

13.4.3 Initializing Recording Medium

You can initialize a recording medium using the [FORMAT] button.

1 Display the [SETUP MENU: FILE] screen.

2 Press the [FORMAT] button.

The [FORMAT] submenu appears and buttons [C] to [F] (drives) and [CANCEL] are displayed.

Icons of initializable drives are displayed in white and icons of disconnected drives are displayed in gray in the drive buttons.

Note: Recording media connected to the DS-L3 are identified by drive numbers C to F. A drive number C is always assigned to a CF card, and drive numbers D, E, and F are assigned to recording media connected to the USB connectors in the order of recognition.

3 Press a desired drive button (C to F) to initialize a recording medium.

Pressing the [CANCEL] button closes the submenu.

When one of the drive buttons [C] to [F] is pressed, a message to confirm recording medium initialization appears.

4 Press [YES] if you want to initialize the medium, or [NO] to cancel the operation.

If you select [YES], the specified medium is initialized.



Initializing Recording Medium



Confirming Initialization

Recording Media Initialization

Choice	Setting
C	Initializes the CF card inserted into the slot on the right side of the DS-L3.
D to F	Initializes recording media connected to the USB connectors of the DS-L3. The DS-L3 assigns drive numbers D to F in the order of recognition. When two or more recording media are connected, check the correspondence between drive numbers and connected media in advance.

✔ In case of initialization failure

A recording medium with its write protect switch enabled cannot be initialized.

Initialization may fail if a recording medium has an error.

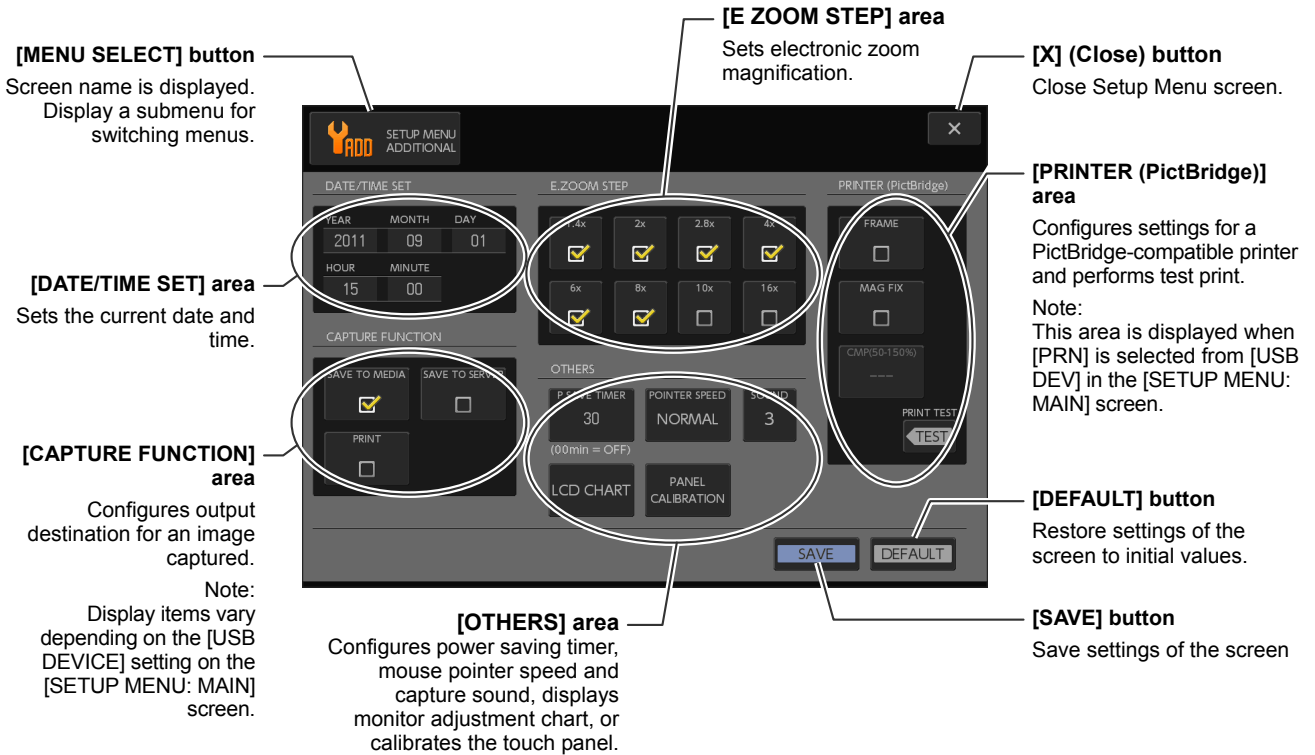
A warning message indicating a medium error is displayed in this case.

13.5 Changing Overall Settings

— [SETUP MENU: ADDITIONAL] Screen —

Select [ADD] using the [MENU SELECT] button in the [SETUP MENU] screen. The [SETUP MENU: ADDITIONAL] screen appears. This screen allows you to configure various settings for handling this system.

Items on the [SETUP MENU: ADDITIONAL] screen



[SETUP MENU: ADDITIONAL] Screen Items

13.5.1 Setting Date and Time

— [DATE/TIME SET] Area —

The [DATE/TIME SET] area allows you to set the current date and time.

✓ Internal clock of the system

The date and time are displayed on the right side of the status bar.

The internal clock may fail to keep correct time if the DS-L3 is left for a few days without power supply. Set the date and time immediately after the power is turned on. Set correct date and time especially when you use automatic folder and file name generation since date and time are used for that feature.

1 Display the [SETUP MENU: ADDITIONAL] screen.

2 Set date and time in the [DATE/TIME SET] area.

When you press each input field, a keypad appears. Press the desired key to enter a correct value. Press [ENTER] to commit the value.

Enter year in four digits and the rest in two digits.

3 Press the [SAVE] button.



Setting Date and Time

Date/Time Setting

Item	Setting
YEAR, MONTH, DAY, HOUR, MINUTE	<ul style="list-style-type: none"> • Year (2000 to 2099) • Month (1 to 12) • Day (1 to 31) • Hour (0 to 23) • Minute (0 to 59)

13.5.2 Configuring Capture Function

— [CAPTURE FUNCTION] Area —

Specify a DS-L3 action when you capture an image.

- 1 Display the [SETUP MENU: ADDITIONAL] screen.
- 2 Specify an action performed when an image is captured in the [CAPTURE FUNCTION] area.

Select an action with the following checkboxes. Two or more actions are selectable.

For details of the setting, see the table below.

- [SAVE TO MEDIA] (Initial setting)
- [SAVE TO SERVER]
- [SAVE TO PC] ^{Note}
- [PRINT] ^{Note}

Note: Display items vary depending on the [USB DEVICE] setting on the [SETUP MENU: MAIN] screen (see the table below).

USB device setting	SAVE TO MEDIA	SAVE TO SERVER	SAVE TO PC	PRINT
PTP	✓	✓	—	—
Vender	✓	✓	✓	—
Printer	✓	✓	—	✓

- 3 Press the [SAVE] button.

The action setting is saved.



Configure an action to be performed when capturing an image.

Configuring an Action when Capturing an Image

Action Setting for Capturing an Image

Item	Setting
SAVE TO MEDIA	Saves an image file in a recording medium connected to the DS-L3. (Initial setting)
SAVE TO SERVER	Saves an image file in the specified FTP server.
SAVE TO PC	Saves an image file in an arbitrary folder in a PC connected to the DS-L3. When [SAVE TO PC] is selected, other items are grayed out and can no longer be selected. Note: This item is selectable only when [USB DEVICE] of the DS-L3 is set to [VNDR]. The save destination on the PC is specified by the application NIS-Elements.
PRINT	Outputs images to a printer connected to the DS-L3. This setting is not applied to consecutive capture with interval timer. Note: This item is selectable only when [USB DEVICE] of the DS-L3 is set to [PRN].

✓ If no action is selected for capturing an image

If all the checkboxes in the [CAPTURE FUNCTION] area are cleared, an alert message appears at the time of capturing.

✓ Print setting

The [PRINT] checkbox setting is disabled for consecutive capture with interval timer. The image by consecutive capture is not printed.

13.5.3 Configuring Electronic Zoom Factor

— [E ZOOM STEP] Area —

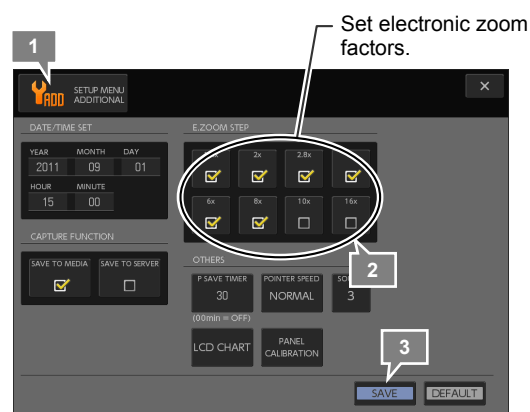
The [E.ZOOM STEP] area allows you to set zooming levels of the electronic zoom used to enlarge or shrink a live or playback image.

The electronic zoom can be operated by a [E ZOOM] button found on [CAM MENU], [PLAY MENU] or [TOOL MENU].

✓ Electronic zoom

Electronic zoom is a function to enlarge a real image using digital processing.

- 1 Display the [SETUP MENU: ADDITIONAL] screen.
- 2 In the [E.ZOOM STEP] area, select zooming levels you want to make available by marking the relevant checkboxes.
 - 1.4x, 2x, 2.8x, 4x, 6x, 8x, 10x, 16x
(Initial setting: 1.4x to 8x selected)
- 3 Press the [SAVE] button.



Configuring Electronic Zoom Magnification

Electronic Zoom Step Setting

Item	Setting
E.ZOOM STEP	1.4x, 2x, 2.8x, 4x, 6x, 8x, 10x, 16x (Initial setting: 1.4x to 8x selected)

13.5.4 Configuring Printer Output

— [PRINTER (PictBridge)] Area —

The [PRINTER (PictBridge)] area allows you to configure settings related to image output to a PictBridge-compliant printer.

✓ Display in the [PRINTER (PictBridge)] area

The [PRINTER (PictBridge)] area is displayed when [USB DEVICE] in the [SETUP MENU: MAIN] screen is set to [PRN].

1 Display the [SETUP MENU: ADDITIONAL] screen.

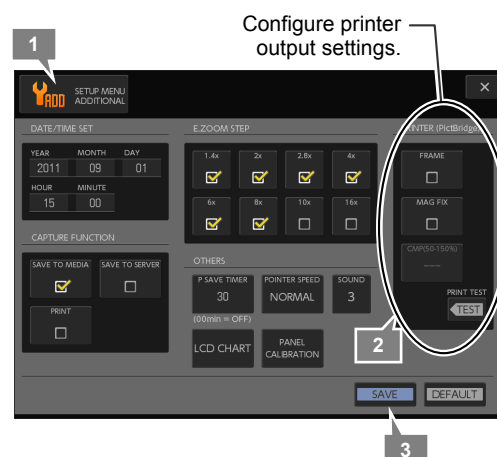
2 Configures printer output settings in the [PRINTER(PictBridge)] area.

The [PRINTER (PictBridge)] area contains the following checkboxes and buttons. For details of settings for each item, see the table below.

- [FRAME] checkbox (Initial setting: Disable)
- [MAG FIX] checkbox (Initial setting: Disable)
- [CMP(50-150%)] button
- [PRINT TEST] button

3 Press the [SAVE] button.

The print output setting is saved.



Configuring Printer Output

Print Output Setting

Item	Setting
[FRAME] checkbox	Specify whether to print an image with a frame at paper edges. (Initial setting: Disable (without frame)) When this checkbox is selected, print with a frame is output.
[MAG FIX] checkbox	Select Normal print mode or Real 10 print mode. (Initial setting: Disable (Norma)) When this checkbox is selected, Real 10 mode is selected. <ul style="list-style-type: none"> • Normal mode: Prints an image with an appropriate magnification so that the image matches the printer paper size. • Real 10 mode: Prints an image with fixed magnification so that the printed image becomes the specified size. To correct magnification, use the [CMP(50-150%)] button. For how to set magnification, see "15.3.3 Setting Compensation (Only in Real 10 Mode)".
[CMP(50-150%)] button	Used to set a scaling ratio in the Real 10 mode. When this button is pressed, a keypad appears. Enter a desired scaling ratio and press the [ENTER] button.
[PRINT TEST] button	Used to perform test print. Print is output with a scale (in pixel unit) for magnification correction overlaid.

✓ Print output

- A scaling ratio used in printing depends on a printer model. To utilize the Real 10 printing, you must adjust (or compensate) the scaling ratio by actually checking print output on your printer.
- Only an image is printed. Other information such as a file name is not printed. The printer settings used (such as paper type and size) are what have been set in the printer. See the instruction guide of the printer for details.

✓ PictBridge standard

The PictBridge is an industrial standard defined by digital camera and printer manufactures for ensuring interoperability between a digital camera and printer. This standard allows you to print an image on a digital camera by directly sending it to a printer without requiring an intervening PC. See the official PictBridge site, <http://www.cipa.jp/pictbridge/>, for details.

13.5.5 Configuring Other Settings

— [OTHERS] area —

The [OTHERS] area allows you to configure miscellaneous settings related to handling of this system.

Item	Setting	Initial setting	See
(1) Setting the power-saving timer	00 (OFF) to 99 minutes	30 minutes	p.206
(2) Setting the mouse pointer speed	[FAST], [NORM], [SLOW]	[NORM]	p.206
(3) Setting the capture sound volume	[OFF], [1] to [7]	[3]	p.207
(4) Displaying a test chart	Test chart display: ON/OFF	—	p.207
(5) Calibrating the touch panel	Adjustment of touch panel detecting position	—	p.208

(1) Setting the power-saving timer

Specify time to wait until the DS-L3 enters the standby mode while it is not being operated.

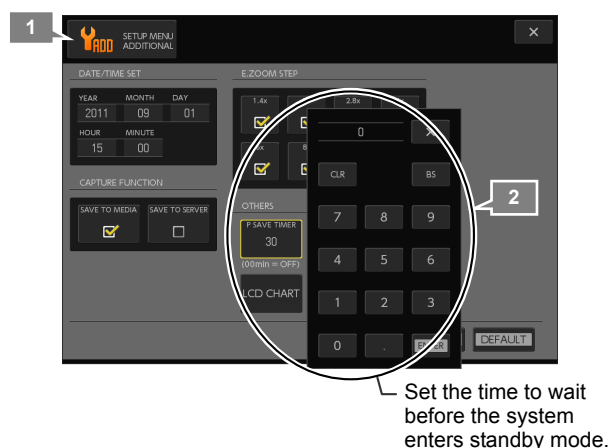
- 1 Display the [SETUP MENU: ADDITIONAL] screen.
- 2 Press the [P SAVE TIMER] button in the [OTHERS] area and specify time to wait until the DS-L3 enters the standby mode.

When the [P SAVE TIMER] button is pressed, a keypad for numerical input appears. Enter a correct value and press the [ENTER] button to determine the setting.

- Setting range: 0 to 99 minutes (Initial setting: 30 minutes)
- Setting zero (0) disables power saving feature. In this case the system never enters standby mode however long the system remains not operated.

- 3 Press the [SAVE] button.

The power-saving timer setting is saved.



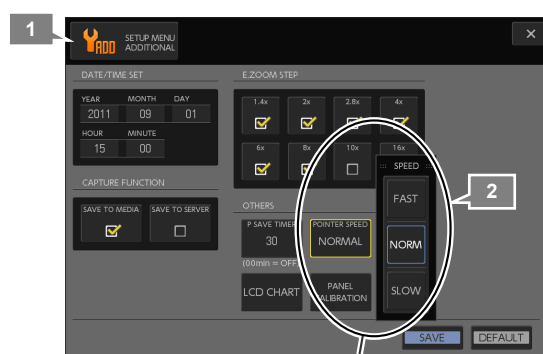
Configuring the power saving timer

(2) Setting the mouse pointer speed

Specify the mouse pointer moving speed when a mouse is connected to the DS-L3.

- 1 Display the [SETUP MENU: ADDITIONAL] screen.
 - 2 Press the [POINTER SPEED] button in the [OTHERS] area and select the mouse pointer moving speed with the buttons of the [POINTER SPEED] submenu.
- [FAST], [NORM], [SLOW] (Initial setting: NORM)
- 3 Press the [SAVE] button.

The mouse speed setting is saved.



Set the mouse pointer moving speed.

Setting the Mouse Pointer Speed

(3) Setting the capture sound volume

Specify the capture sound volume of the DS-L3.

- 1 Display the [SETUP MENU: ADDITIONAL] screen.
 - 2 Press the [SOUND] button in the [OTHERS] area and specify the operation sound volume with the buttons of the [SOUND] submenu.
 - [OFF], [1] to [7] (Initial setting: 3)

To mute the operation sound, select [OFF].
 - 3 Press the [SAVE] button.
- The capture sound volume setting is saved.



Set the capture sound volume.

Setting the Capture Sound Volume

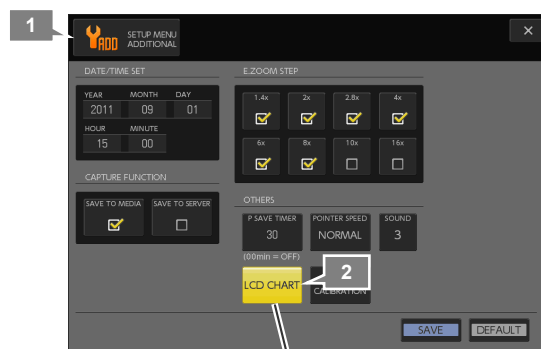
(4) Displaying a test chart

Display a test chart for adjusting monitors when external monitors are used.

- 1 Display the [SETUP MENU: ADDITIONAL] screen.
 - 2 Press the [LCD CHART] button in the [OTHERS] area to display a test chart.

A 1-dot pitch black-and-white mesh chart appears.

Adjust the clock phase and clock pitch on the display. For adjustment method, see the instruction guide for the display. The automatic adjustment function is available for some display types.
 - 3 To close the test chart, press the [X] button at the top right of the screen.
- The screen returns to the [SETUP MENU: ADDITIONAL] screen.



Display a test chart.

Displaying a Test Chart

(5) Calibrating the touch panel

Make adjustment (calibration) of the touch panel detecting position so that the position touched with a stylus is correctly detected. If a position detected by DS-L3 does not match the position you touched with the stylus, perform the following procedure to calibrate the touch panel.

- 1 **Display the [SETUP MENU: ADDITIONAL] screen.**
- 2 **Press the [PANEL CALIBRATION] button in the [OTHERS] area.**
The screen changes to the [PANEL CALIBRATION] screen.
- 3 **Press the [START] button to calibrate the touch panel.**
Pressing the [START] button displays a target button at the upper left of the screen.
Pressing the [CANCEL] button reopens the [SETUP MENU: ADDITIONAL] screen without calibrating the touch panel.

! Indicating targets

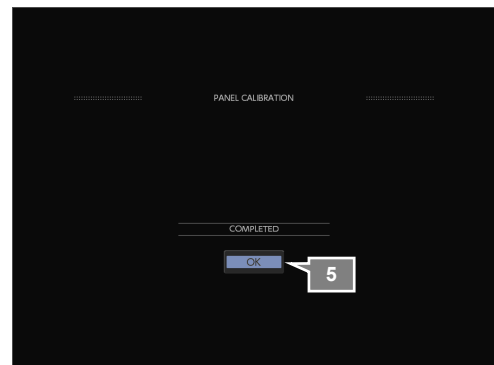
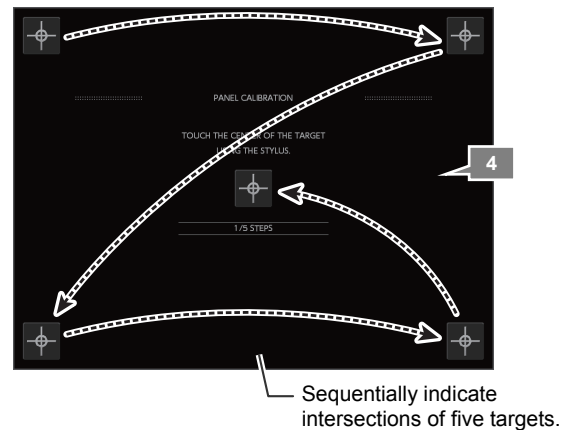
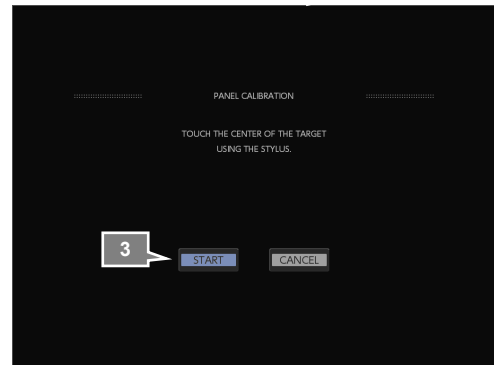
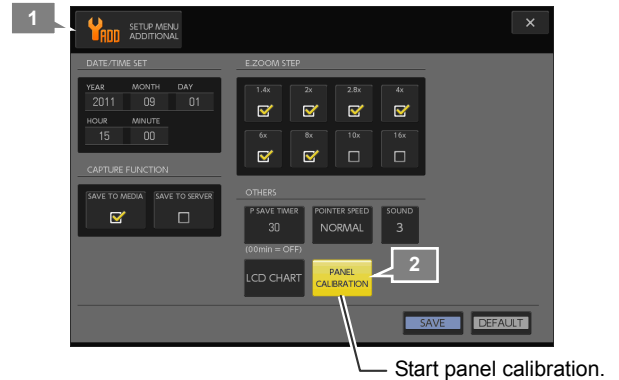
Be sure to use the stylus to indicate the target.
Note that, if panel calibration is started with a USB mouse, the mouse pointer disappears and mouse operation is disabled.

- 4 **Indicate the center (intersection of cross hairs) of the target button displayed at five locations by using the stylus.**
Target buttons are displayed in the order of (1) upper left ⇒ (2) upper right ⇒ (3) lower left ⇒ (4) lower right ⇒ (5) center. Indicate the center as accurately as possible with the stylus.
Upon completion of indication for all target buttons, a confirmation message "COMPLETED" appears on the screen.
- 5 **Press the [OK] button.**
The [PANEL CALIBRATION] screen closes and the [SETUP MENU: ADDITIONAL] screen reopens.

✓ Deviation of detection position

The touch panel detecting position may look deviated depending on conditions such as stylus angle and your viewing position/angle relative to the touch panel.

Calibrate the touch panel in the actual operating environment to solve this problem.



Calibration of touch panel

Part 6

Connecting to PC, Printer, and Network

This part describes names of major components of the DS-L3 and the configuration of this system.

This part consists of the following chapters.

- Chapter 14 Connecting to a PC
- Chapter 15 Performing Direct Printing
- Chapter 16 Connecting to Network

14.1

Connecting the DS-L3 to a PC

Perform the following to connect the DS-L3 to a PC with a USB cable.

Item	Initial Setting	See
Setting the USB (D) Connector Operating Mode	[PTP]	14.1.1
Connecting the DS-L3 to a PC with a USB Cable	—	14.1.2

14.1.1

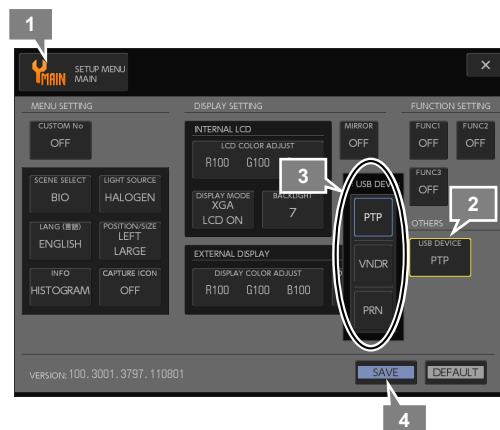
Setting the USB (D) Connector Operating Mode

The USB (D) connector operating mode (device mode) must be set according to equipment to connect and the purpose of use.

- 1 Press **[SETUP]** on the task bar to open the **[SETUP MENU: MAIN]** screen.
- 2 Press the **[USB DEVICE]** button in the **[OTHERS]** area.
The **[USB DEV]** submenu appears.
- 3 Select **[PTP]** or **[VNDR]** according to the purpose of use.
The **[USB DEV]** submenu has the following choice. For details of the setting, see the table below.
 - **[PTP]** (Initial setting)
 - **[VNDR]**
 - **[PRN]**

When one of these has been selected, the submenu closes and the selected content is displayed in the **[USB DEVICE]** button.

- 4 Press the **[SAVE]** button.
If the setting is modified, a message to prompt restart of the DS-L3 appears.
- 5 To change the setting, turn off and on the DS-L3.



Setting USB (D) Connector Operating Mode

USB Device Setting

Choice	Setting
PTP	Select this mode when using the DS-L3 as an external recording medium of the PC. (Initial setting) This mode allows you to open files in the CF card or USB memory of DS-L3 from an application on the PC and to transfer files between PC and DS-L3.
VNDR	Select this mode when accessing the DS-L3 using dedicated application "NIS-Elements" on the PC. This mode allows you to directly acquire images by operation on the NIS-Elements and modify the DS-L3 settings. This mode also allows you to save images in an arbitrary folder in the PC when capture is performed on the DS-L3. The save destination on the PC is specified by the NIS-Elements.
PRN	Select this mode when connecting a PictBridge-compliant printer to the DS-L3 to directly print images by capture operation or operation from displayed thumbnail.

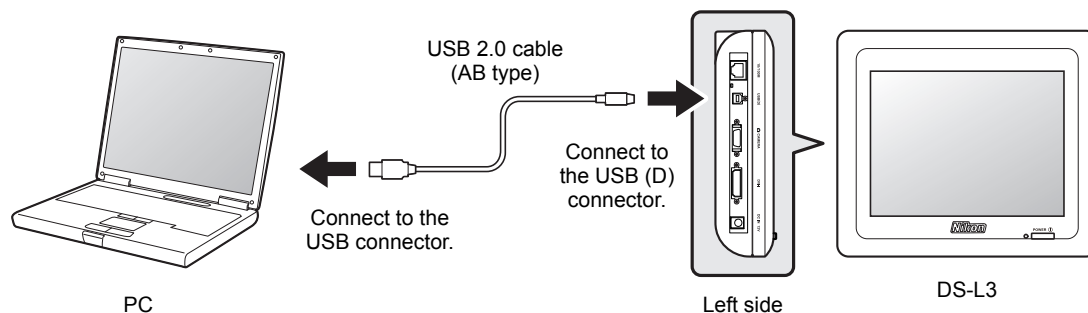
14.1.2 Connecting the DS-L3 to a PC with a USB Cable

Use a commercially available USB 2.0 cable (AB type) for connection between DS-L3 and PC.

! Note on connecting a USB cable

Be sure to connect a USB cable while the DS-L3 is turned off.

- 1 Confirm that the DS-L3 power is shut off.
- 2 Connect a USB 2.0 cable (AB type) between the PC's USB connector and the USB (D) connector of the DS-L3.



Connecting PC with a USB Cable

✓ USB cables

Use a USB cable with ferrite core for stabilization of USB transfer, reduction of noise generated from the DS-L3 and its peripherals, and satisfaction of EMC standards.

14.2 Using the DS-L3 as an External Recording Medium of PC

— Connection with PTP setting —

When [PTP] is selected as a USB device of the DS-L3, the DS-L3 is recognized as an external recording medium of PC if it is connected to the PC with a USB cable.

1 Check the DS-L3 settings and connection with the PC referring to “14.1 Connecting the DS-L3 to a PC”.

After checking the connection, turn off the DS-L3.

2 Run the PC.

Wait until Windows starts up and the PC enters the standby state.

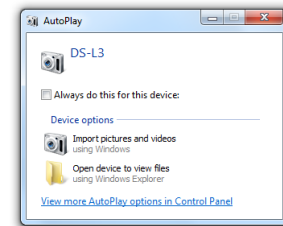
3 Turn on the DS-L3.

After the DS-L3 has started, connection with the DS-L3 is recognized by the PC and the [AutoPlay] dialog box appears. Perform necessary processing following the instructions in the dialog box.

On the PC, you can reference recording media of the DS-L3 as external recording media.

Note 1: The [AutoPlay] dialog box may not be displayed depending on the setting.

Note 2: The Windows standard device driver is installed as needed at the first connection.



Example of Display of [AutoPlay] Dialog Box

4 Perform necessary operations on the PC.

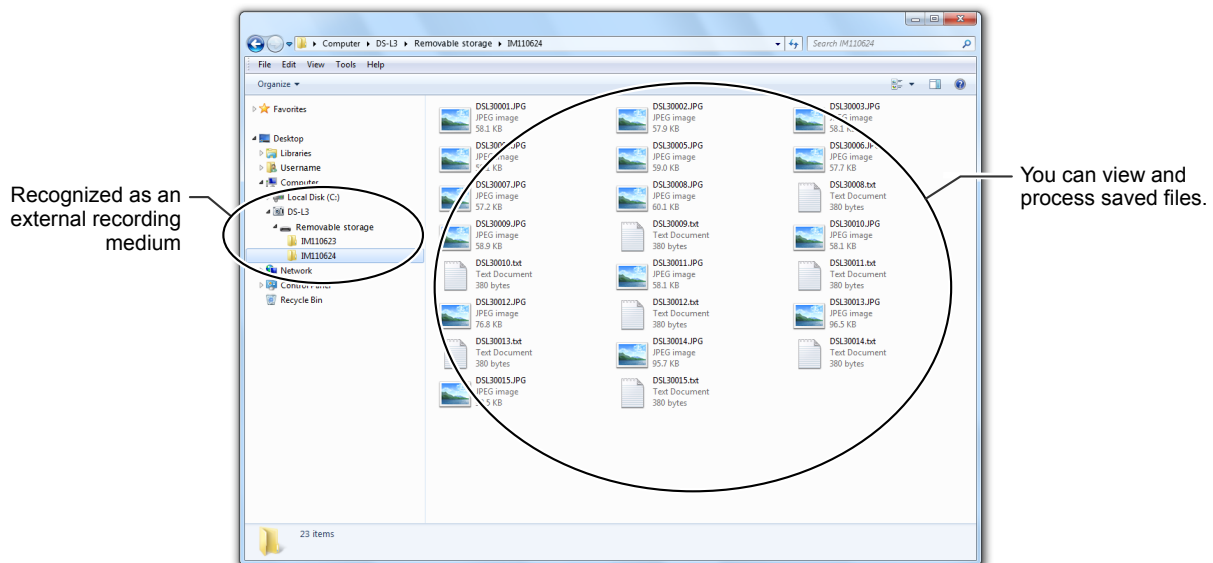
The following operations are available on the PC.

- Move, copy, and delete files.
- View, process, and save files.

The recording medium of the DS-L3 contains captured image files, log files, and measurement result CSV files. Perform necessary processing.

5 Upon completion of necessary operations, turn off the DS-L3 and disconnect the USB cable.

Turn off the power of the DS-L3 and then disconnect the USB cable.



Example of File Display Using Microsoft Explorer

14.3 Accessing the DS-L3 Using NIS-Elements

— Connection with VNDR setting —

When [VNDR] is selected as a USB device of the DS-L3, DS-L3 operations are possible on the PC using the dedicated application “NIS-Elements” if the DS-L3 is connected to the PC with a USB cable.

Before making a connection

Perform the following operations before connecting the DS-L3 to the PC.

- 1 Run the PC.**
Wait until Windows starts up and the PC enters the standby state.
- 2 Install the application NIS-Elements in the PC.**
For the installation procedure, see the document supplied with the NIS-Elements.

Operating procedure

- 1 Configure DS-L3 settings and check connection with the PC referring to “14.1 Connecting the DS-L3 to a PC”.**
Turn off the DS-L3 and then connect the USB cable.
- 2 Run the NIS-Elements.**
Run the NIS-Elements before turning on the DS-L3.
- 3 Turn on the DS-L3.**
After the DS-L3 has started, connection with the DS-L3 is recognized by the PC.
Note: The device driver for the DS-L3 is installed at the first connection.
- 4 Perform necessary operations using the NIS-Elements.**
The NIS-Elements allows the following operations.
 - DS-L3 operations
 - Image import
 - Image processing
 - List print function
 - Microscope control (through DS-L3)
- 5 Upon completion of necessary operations, turn off the DS-L3 and disconnect the USB cable.**
Turn off the power of the DS-L3 and then disconnect the USB cable.

✔ Operating NIS-Elements

For how to operate the NIS-Elements, see the document supplied with the NIS-Elements.

✔ Restrictions when using NIS-Elements

When the DS-L3 is connected to a PC and the NIS-Elements software is used on the PC, some functions of the DS-L3 are disabled. Buttons of disabled functions are grayed out and unselectable.

This chapter describes how to connect a PictBridge-compliant printer to the DS-L3 and output images to the printer.

✔ PictBridge standard

PictBridge is a standard provided for digital camera and printer manufacturers to ensure interconnection, allowing direct print of digital camera images with a printer without using a PC.

For details of the PictBridge standard, visit the PictBridge website “<http://www.cipa.jp/pictbridge/>”.

15.1 Connecting a Printer

Perform the following to make a connection between the DS-L3 and a printer with a USB cable.

Item	Initial Setting	See
Setting the USB (D) Connector Operating Mode	[PTP]	15.1.1
Connecting the DS-L3 to a Printer with a USB Cable.	—	15.1.2

15.1.1 Setting the USB (D) Connector Operating Mode

The USB (D) connector operating mode (device mode) must be set according to equipment to connect and the purpose of use.

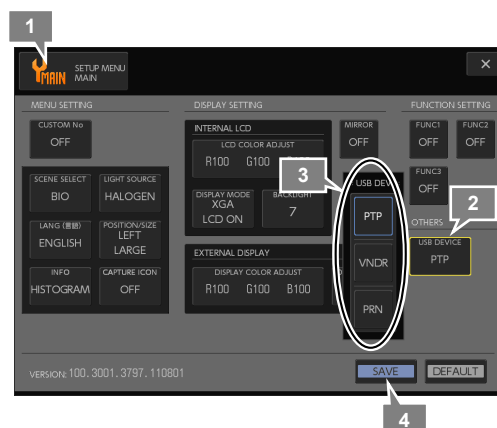
- 1 Press **[SETUP]** on the task bar to open the **[SETUP MENU: MAIN]** screen.
- 2 Press the **[USB DEVICE]** button in the **[OTHERS]** area.
The **[USB DEV]** submenu appears.
- 3 Select **[PRN]**.

The **[USB DEV]** submenu has the following choice. For details of the setting, see the table below.

- **[PTP]** (initial setting)
- **[VNDR]**
- **[PRN]**

When one of these has been selected, the submenu closes and the selected content is displayed in the **[USB DEVICE]** button.

- 4 Press the **[SAVE]** button.
If the setting is modified, a message to prompt restart of the DS-L3 appears.
- 5 To change the setting, turn off and on the DS-L3.



Setting USB (D) Connector Operating Mode

USB Device Setting

Choice	Setting
PTP	Select this mode when using the DS-L3 as an external recording medium of the PC. (Initial setting)
VNDR	Select this mode when accessing the DS-L3 using dedicated application “NIS-Elements” on the PC.
PRN	Select this mode when connecting a PictBridge-compliant printer to the DS-L3 to directly print images by capture operation or operation from displayed thumbnail.

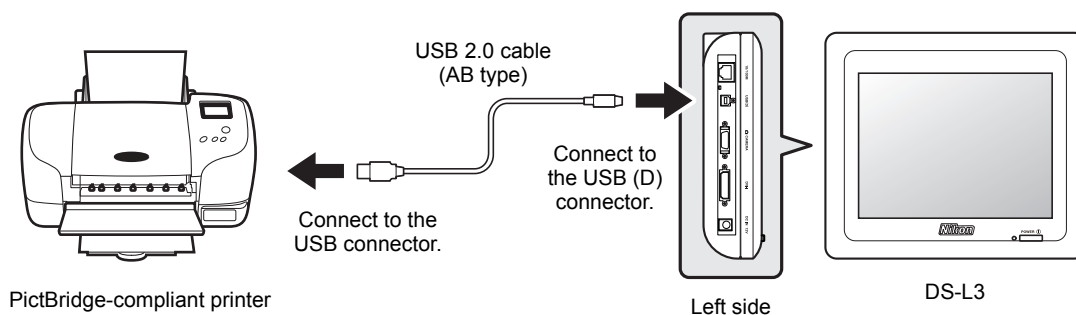
15.1.2 Connecting the DS-L3 to a Printer with a USB Cable

Use a commercially available USB 2.0 cable (AB type) for connection between DS-L3 and a printer. (This type of cable may be supplied with the printer.)

! Note on connecting a USB cable

Be sure to connect a USB cable while the DS-L3 is turned off.

- 1 Confirm that the DS-L3 power is shut off.
- 2 Connect a USB 2.0 cable (AB type) between the printer's USB connector and the USB (D) connector of the DS-L3.



Connecting PictBridge-Compliant Printer with a USB Cable

✓ USB cables

Use a USB cable with ferrite core for stabilization of USB transfer, reduction of noise generated from the DS-L3 and its peripherals, and satisfaction of EMC standards.

15.2 Printing an Image

In this system, you can print a live image directly or saved image later.

✓ Printer errors

If a printer error (such as paper end) is detected during printing, print operation in the DS-L3 is not completed in some cases. In this case, the print operation is completed by canceling the print operation at the printer side. Then take necessary action (such as replenishing paper) and retry printing.

15.2.1 Directly Printing a Live Image by Capturing

When you press the [CAPTURE] button in the operation menu, you can print the live image directly in a printer.

✓ Actions taken in capturing image

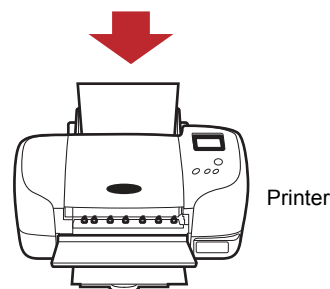
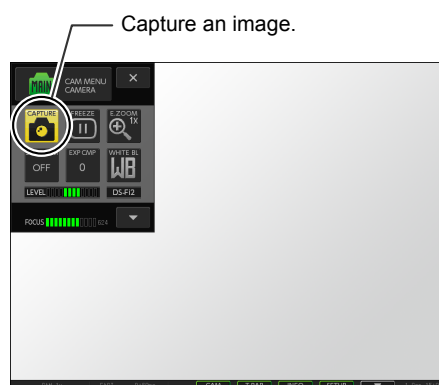
To print an image in capturing operation, set the [CAPTURE FUNCTION] area in the [SETUP MENU: ADDITIONAL] screen.

You can save an image in the recording medium or the FTP server and print it out at the same time or only print out the image without saving it.

For how to set the [CAPTURE FUNCTION] area, see "13.5.2 Configuring Capture Function".

✓ Operation at the time of consecutive capture with interval timer

Printing is not available for consecutive capture.



Printer

Printing Image by Capturing

15.2.2 Printing a Saved Image

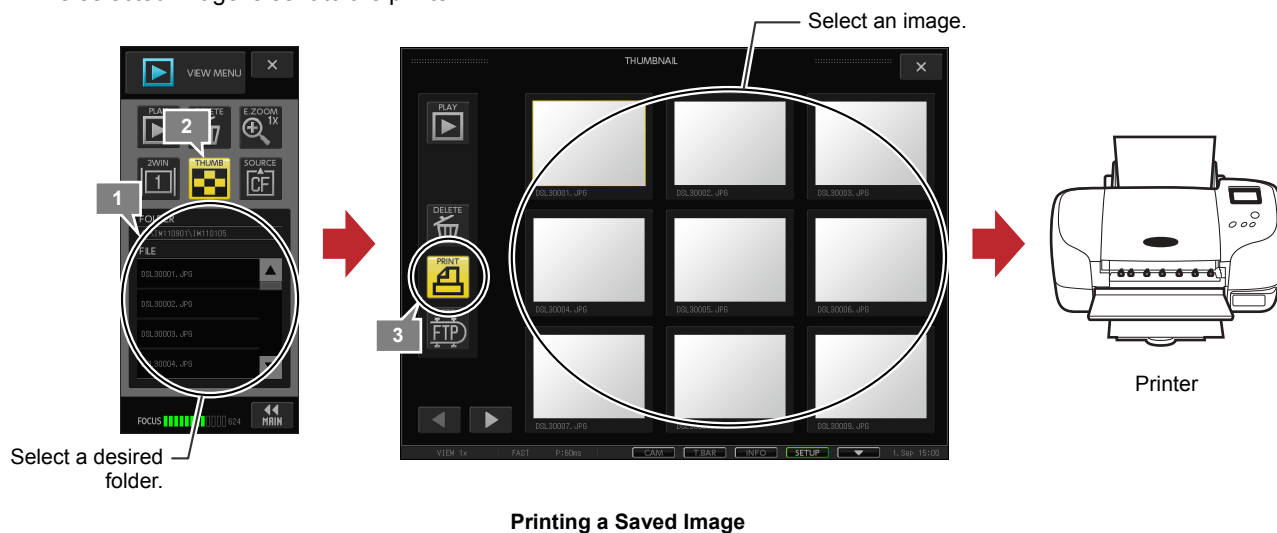
To print images saved in the recording medium, perform the following procedure from the thumbnail screen.

- 1 Press the [SOURCE] button in the [VIEW MENU] and select a desired folder by switching drives and folders.
- 2 Press the [THUMB] button in the [VIEW MENU].

The [THUMBNAIL] screen opens and all image files in the selected folder are displayed.

- 3 Select a desired image and press the [PRINT] button.

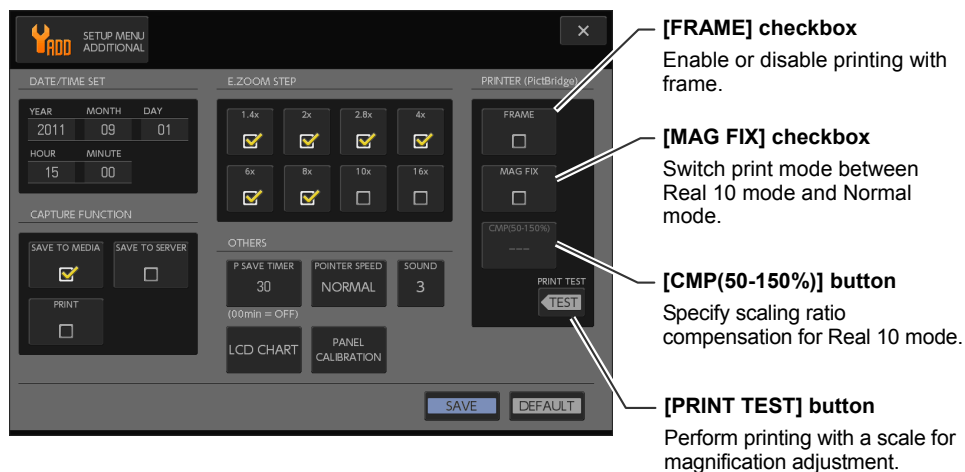
The selected image is sent to the printer.



15.3 Changing Print Settings

Print settings can be done in the [PRINTER] area in the [SETUP MENU: ADDITIONAL] screen. There are the following settings.

Item	Initial Setting	See
Enabling or Disabling Printing with Frame	Disable	15.3.1
Selecting Print Mode (Real 10 or Normal Mode)	Normal mode	15.3.2
Setting Compensation (Only in Real 10 Mode)	-	15.3.3



[SETUP MENU: ADDITIONAL] Screen

15.3.1 Enabling or Disabling Printing with Frame

The [FRAME] checkbox allows you to specify whether to add a frame (or edge) when printing. Checking the box enables printing with a frame.

✓ Printing with a frame

The frame function may not be available depending on the printers. In this case, even though the [FRAME] checkbox is selected, printing is performed without a frame.

15.3.2 Selecting Print Mode (Real 10 or Normal Mode)

Select the [MAG FIX] (Real 10) checkbox to switch between the "Real 10" and "Normal" mode. The print mode is normal if cleared, or Real 10 if selected.

• Normal mode

An image is printed in a size that fits the printer paper form.

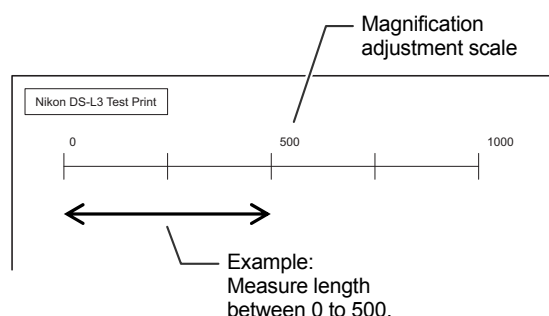
• Real 10 mode

An image is printed in a size specified using the [CMP(50-150%)] (compensation) button. By compensating scaling factor (between 50% and 150%), you can precisely control the size of the object being printed.

15.3.3 Setting Compensation (Only in Real 10 Mode)

To adjust the printing magnification used in printing in the Real 10 mode, follow the procedures below.

- 1 Open the [SETUP MENU: ADDITIONAL] screen and press the [PRINT TEST] button in the [PRINTER (PictBridge)] area to print an object image.
An image with the overlaid scale in pixels is printed.
- 2 Physically measure the dimension of the scale on the print.
Example: Measure distance between 0 and 500 pixels.
- 3 Use the following conversion formula to calculate dimension of the scale on the object from reading of the scale (in pixels).



Conversion formula:

- Dimension of scale on object

$$\frac{\text{Reading of scale (in pixels)} \times \text{Pixel size of image pickup device}}{\text{Optical magnification (objective lens magnification} \times \text{relay lens magnification)}}$$

Example of calculation: Reading of scale = 500 pixels

DS Camera Head	Pixel size of Image Pickup Device	Optical Equipment Magnification (Example)	Dimension of Scale on Object
DS-Fi2 DS-Fi1 DS-Fi1c	3.4 μm	Objective lens: 40x Relay lens: 0.7x	500 pixels x 3.4 μm / (40x X 0.7x) = Approx. 61 μm
DS-Vi1	4.4 μm	Objective lens: 40x Relay lens: 0.55x	500 pixels x 4.4 μm / (40x X 0.55x) = Approx. 100 μm
DS-Qi1Mc DS-Ri1	6.45 μm	Objective lens: 40x Relay lens: 0.7x	500 pixels x 6.45 μm / (40x X 0.7x) = Approx. 120 μm

- 4 Press the [CMP(50-150%)] button and enter scaling ration compensation value.
When this button is pressed, a keypad appears. Enter a desired number and press the [ENTER] key.
Adjust magnification so that the following equation is true.
Dimension of the scale on the print / Dimension of the scale on the object = Magnification factor of optical equipment
- 5 Repeat steps 1 to 4 and obtain a more precise value.



Set compensation.
Setting Compensation

15.3.4 Calculating the Magnification When Printed

✔ Pixel sizes of image pickup device on DS camera heads

The table below shows the pixel size (the maximum number of pixels stored) of image pickup device and the effective area (area for the effective number of pixels stored) of each DS camera head.

DS camera head	Pixel size (μm)		Recorded pixel count		Effective area (mm)		
	Width	Height	Width	Height	Width	Height	Diagonal
DS-Fi2/Fi1/Fi1c	3.4	3.4	2560	1920	8.7	6.53	10.88
DS-Vi1	4.4	4.4	1600	1200	7.04	5.28	8.8
DS-Qi1Mc/Ri1	6.45	6.45	1280	1024	8.26	6.6	10.57

Use the following formula for calculating the magnification of the subject on printing paper.

- Magnification on printing paper

$$\frac{\text{Optical magnification (objective lens magnification} \times \text{relay lens magnification)} \times \text{Diagonal size of printing paper}}{\text{Diagonal size of effective area for image pickup device}}$$

Calculation example: L-size paper (diagonal: 163 mm)

DS Camera head	Magnification of optical device (example)	Magnification of the subject on a printing paper
DS-Fi2/Fi1/Fi1c	Objective lens: 40× Relay lens: 0.7x	$40 \times 0.7 \times 163 \text{ mm} / 10.88 \text{ mm} = 420$
DS-Vi1	Objective lens: 40× Relay lens: 0.55x	$40 \times 0.55 \times 163 \text{ mm} / 8.8 \text{ mm} = 410$
DS-Qi1Mc/Ri1	Objective lens: 40× Relay lens: 0.7x	$40 \times 0.7 \times 163 \text{ mm} / 10.57 \text{ mm} = 430$

This chapter describes how to connect the DS-L3 to the PC's network and use the DS-L3.

16.1

Things You can Do with Network

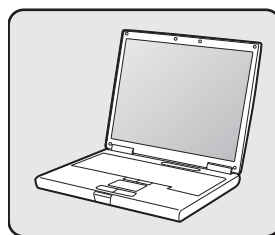
When you connect this system to the PC network (LAN: Local Area Network), the following operations are available via the network.

Obtaining images on a PC with web browser

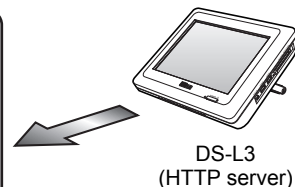
You can perform operation with this system worked as an HTTP server using a web browser on a PC on a network. See "16.3 Obtaining Images by Web Browser" for details.

- Obtaining a live image
- Obtaining a captured image
- Controlling the DS-L3 simply using the Control Pad

Note: Depending on image update frequency, about four web browsers can be viewed at the same time by accessing the DS-L3.



PC

DS-L3
(HTTP server)

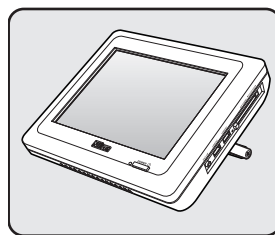
Obtaining a live image or captured image from this system using a web browser on a PC

Transferring images to the FTP server

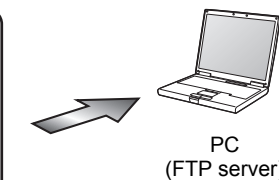
Images can be transferred to a PC (FTP server) on the network using the FTP client feature of this system. See "16.4 Transferring Image to FTP Server" for details.

- Transferring an image to the FTP server when it is captured
- Transferring the images already captured to the FTP server

Note: Up to five FTP servers can be specified. You can transfer images to an individual folder by registering different login users.



DS-L3

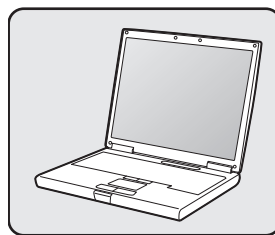
PC
(FTP server)

Saving/transferring an image in/to a PC (FTP server) using this system

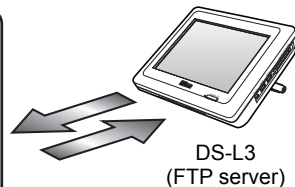
Obtaining images using the FTP command

You can perform operation by sending the FTP command from a PC on a network with the DS-L3 working as an FTP server. The following operations are available. (See "16.5 Obtaining Images from the PC Using the FTP Command".)

- Sending captured images to the PC
- Transferring images to the DS-L3
- Performing advanced control for the DS-L3



PC

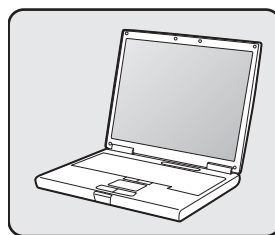
DS-L3
(FTP server)

Sending/receiving images and performing advanced control by sending FTP command from a PC

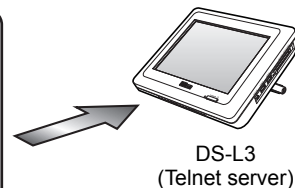
Operating with the Telnet command

You can perform operation by sending the Telnet command from a PC on a network with the DS-L3 working as a Telnet server. The following operation is available. (See "16.6 Operating from the PC with the Telnet Command".)

- Performing advanced control for the DS-L3



PC

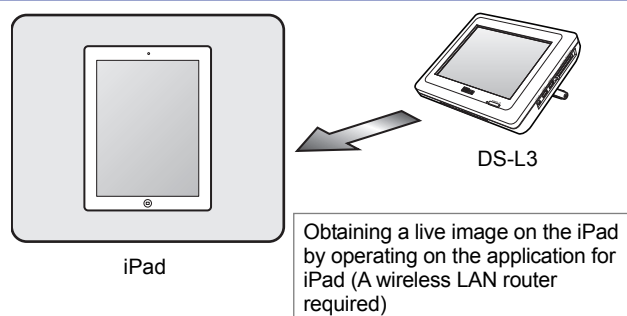
DS-L3
(Telnet server)

Performing advanced control for DS-L3 by sending Telnet command from a PC

Obtaining images using the iPad

You can view the live image on the iPad by installing the application for iPad and connecting to the DS-L3 via wireless LAN. The following operation is available on the iPad. (See “16.7 Obtaining Images from the iPad”.)

- **Obtaining a live image**



! Network settings

You need to configure network-related settings correctly in order to connect this system to the network. Before doing so, you must consult the network administrator of your organization for correct setup information. See “16.2 Connecting to Network” for how to configure network-related settings. See “13.3 Configuring Network Settings” for network setting items.

16.2 Connecting to Network

You need to configure this system correctly to fit your network environment in order to connect this system to the network.

! Network settings on a PC

This document assumes PC-side network configuration is complete. Consult the network administrator of your organization for details on the network configuration.

16.2.1 Items to Check

Check the following items before connecting this system to the network.

- (1) **Network environment**
- (2) **PC OS and web browser**

(1) Network environment

Verify the following items with your system administrator before configuring the network.

- Whether use of the FTP on LAN is permitted (if you plan to use the FTP)
- Whether Image transfer on LAN is permitted
- IP address management scheme
 - Whether use of a fixed IP address is permitted
 - Whether the DHCP server is running (if you plan to obtain IP address automatically)

✔ Obtaining a fixed IP address

- Assignment of a fixed IP address to this system is recommended if you plan to use a PC web browser to access this system. Consult the network administrator of your organization if you plan to use a fixed IP address.
- You can determine the subnet mask and gateway address if you obtain a fixed address.
- You may need to report the MAC address of a product in order to apply for an IP address. The MAC address of this system is displayed on the [SETUP MENU: NETWORK] screen.

✔ Use of DHCP server

If this system is configured to use automatic address acquisition from a DHCP server, the IP address of this system may dynamically change. You may need to use a different IP address at a different time in order to access this system from a web browser. The IP address of this system is displayed on the [SETUP MENU: NETWORK] screen.

(2) PC OS and web browser

When a web browser is used

Use a PC with the following recommended OS and web browser if you plan to access this system from a web browser on a PC.

- **Windows**
 - Windows 7
 - Internet Explorer 8.0 or later, or Firefox 3.6 or later
- **Macintosh**
 - Mac OS 10.7 or later
 - Safari 5.1 or later, Firefox 3.6 or later

When an FTP server is used

In order to transfer images from this system to an FTP server, a PC is necessary and FTP server functionality must be configured in it. Make sure your server PC has one of the following OS installed.

- **Windows**
 - Windows 7

✔ FTP server functionality on Windows

You must install the FTP server component on Windows 7. Check if the component is already installed as well as the type of OS installed.

- **Macintosh**
 - Mac OS X 10.6

✔ Note on Mac OS X 10.7 and later

Mac OS X 10.7 and later do not support access to a PC from the DS-L3 using the FTP server function. If you are planning to use the FTP server function on a Mac OS, we recommend Mac OS X 10.6 or earlier versions.

Note: Mac OS X 10.7 and later support access to the DS-L3 from a PC via web browser.

16.2.2 Configuring Network Settings

This section describes the settings required to connect this system to the network.

Example settings of this document

This section uses the following settings as an example. See “13.3 Configuring Network Settings” for details of each item.

- **IP address acquisition:** Fixed
- **IP address of DS-L3:** 192.168.10.2
- **IP address of the FTP server:** 192.168.10.1
- **Subnet mask:** 255.255.0.0
- **Gateway:** 192.168.128.1
- **Authenticated IP addresses:** No.1: 192.168.10.1

IP addresses are different depending on the environment. Use IP addresses assigned by the network administrator of your organization in setting up your system.

Setting procedure

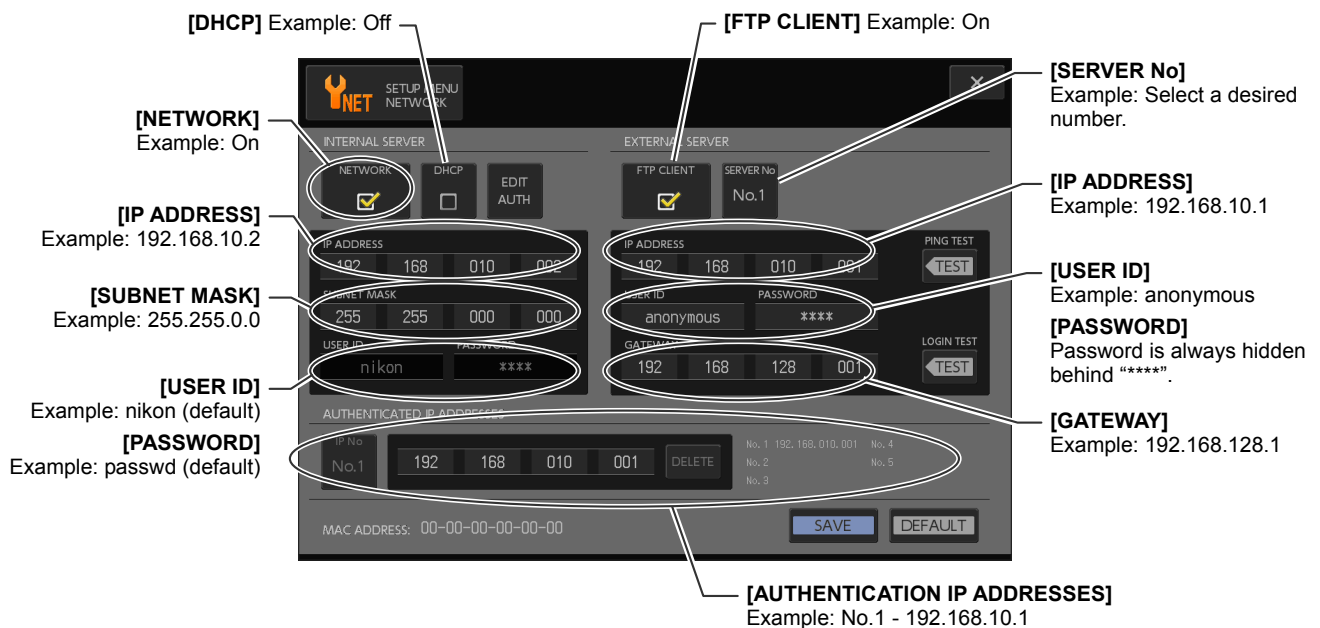
Network configuration is done in the [SETUP MENU: NETWORK] screen.

1 Display the [SETUP MENU: NETWORK] screen.

Press the [SETUP MENU] button on the status bar. Operate [MENU SELECT] to switch the screen to [SETUP MENU: NETWORK].

2 Follow example below to set each item.

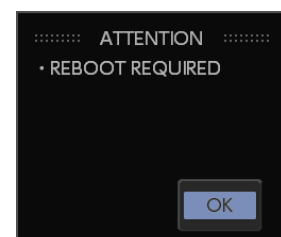
3 Press the [SAVE] button to save settings.



[SETUP MENU: NETWORK] Screen Display Items

✓ Changing network configurations

System power may have to be turned off and on to enable changes to some network-related settings of this system. In this case, a confirmation message appears prompting you to restart the DS-L3 when settings are saved on the [SETUP MENU: NETWORK] screen.



16.2.3 Connecting to the Network

There are two ways for connecting to the network.

- (1) **Connecting to a LAN via a network hub.**
- (2) **Directly connecting to a PC without going through a LAN.**

! Network cable

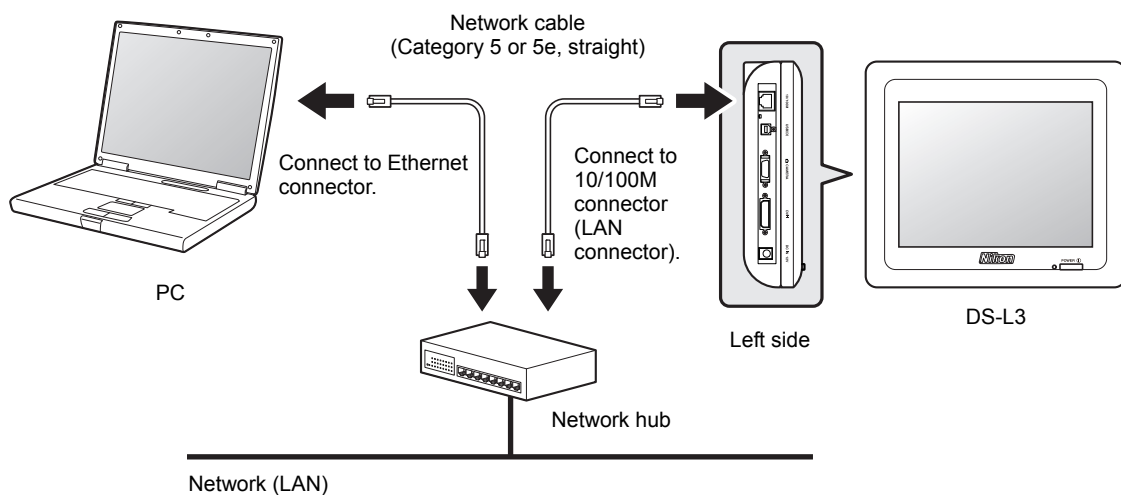
- Use a 10/100Base-TX cable (Category 5 or 5e) for network connection.
- Use a shielded network cable to satisfy the EMC standards.
- Use a straight cable to connect to a LAN. Use a cross cable to directly connect to a PC.

(1) Connecting to LAN via a network hub

! Before connecting to the network

Before connecting to the network, configure network settings correctly in accordance with the configuration of the network you are going to connect to. Consult the network administrator of your organization for details.

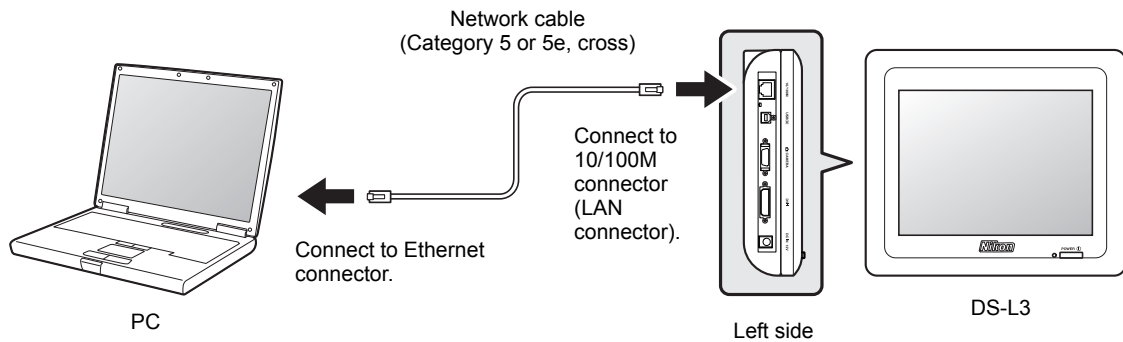
Connect to your network (LAN) via a network hub. Connect the network cable, referring to the following figure.



Connecting to LAN via a Network Hub

(2) Directly connecting to PC without going through LAN

Use a cross-wired network cable to directly connect a PC and the system without using a network hub.



Directly Connecting to PC without going through LAN

! IP address settings

Use a fixed IP address for both the PC and this system when connecting them directly using a cross cable.

16.3 Obtaining Images by Web Browser

The following operations can be done when a web browser is used to access this system.

- **Obtaining a live image**
Observe the preview of a live image on the PC and save the image into the PC if necessary.
- **Downloading a captured image**
Download an image stored in a recording medium onto a PC.

! Access restriction by user authentication and IP addresses

The DS-L3 allows you to restrict access from web browser by user authentication and IP addresses. If you connect to the DS-L3 from a web browser, confirm the following beforehand.

• Access restriction by user authentication

When the access restriction by user authentication is used, the user authentication dialog appears when the DS-L3 is accessed from a web browser and requires entry of a user ID and password. If the correct user ID and password are entered, the access is accepted.

For details about user authentication setting, see “13.3.1 (4) Configuring user authentication against web browser access”.

• Access restriction by IP addresses

When the access restriction by IP addresses is used, the DS-L3 accepts access only from PCs having the permitted IP addresses.

Confirm the IP address of the PC you use and check that the IP address is among those specified in the [AUTHENTICATED IP ADDRESSES] area of the [SETUP MENU: NETWORK] screen.

For details about access restriction by IP addresses, see “13.3.1 (5) Restricting the access from web browser by IP addresses”. For details about how to check the IP address of the PC you use, refer to the PC's operation manual or help.

! Number of access for viewing live image

The nominal maximum number of PCs (web browsers) that can simultaneously connect to this system and display images from the system is four although the actual number may vary depending on how frequently the images are updated.

16.3.1 Configuring PC and Web Browser

This section describes the PC and web browser settings for accessing this system. The following settings are required:

- (1) **Changing firewall settings**
- (2) **Changing proxy server settings**
- (3) **Enabling Java applets**

(1) Changing firewall settings

In order to protect from unauthorized entry to a PC, OS and virus protection software include firewall functionality.

If you enable firewall functionality, exclude reception at a UDP port number “52102” from the protection list. This port number is used by this system.

See help for your OS or document for your virus protection software on how to configure the settings.

! Firewall settings

No communication can be done between the system and PC unless you change the firewall settings. Be sure to change the settings.

(2) Changing proxy server settings

When connecting from a web browser to this system, disable the use of a proxy server.

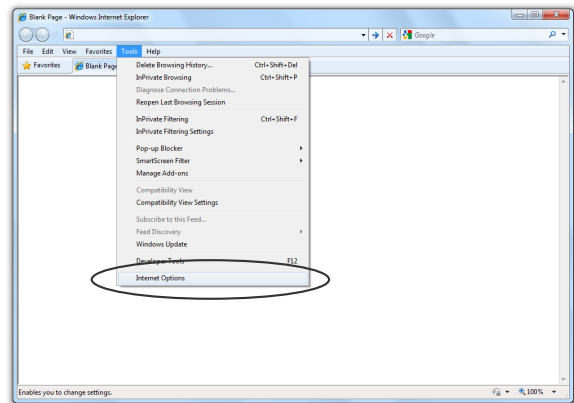
Examples for Internet Explorer and Firefox on Windows are presented here. If you plan to use other OS or web browser, use the following examples as a guide.

Proxy server settings

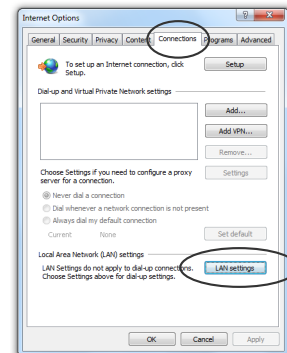
No communication can be done between the system and PC unless you change proxy server settings. Be sure to change the settings.

Internet Explorer

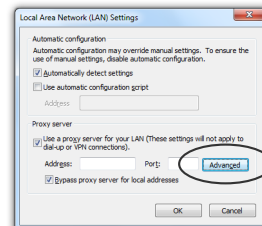
- 1 **Start Internet Explorer on your PC.**
- 2 **Select [Internet Options] from the [Tools] menu.**
A dialog box appears.



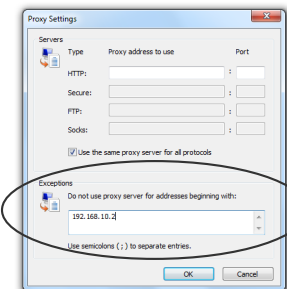
- 3 **Select the [Connections] tab and click the [LAN Settings] button.**
The [Local Area Network (LAN) Settings] dialog box appears.



- 4 **Click the [Advanced] button.**
If the [Advanced] button is disabled, select the [Use a proxy server for your LAN] checkbox.
The [Proxy Settings] dialog box appears.

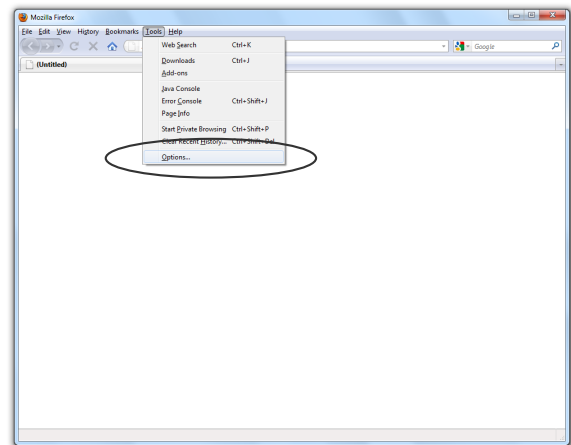


- 5 **Write the IP address of this system in the [Exceptions] field.**
Enter a dot (period) per three-digit IP address component. If the component starts with "0" or "00," skip "0" or "00" and enter the IP address.
- 6 **Click [OK] for every open dialog box to close the dialog boxes.**
The settings are enabled.

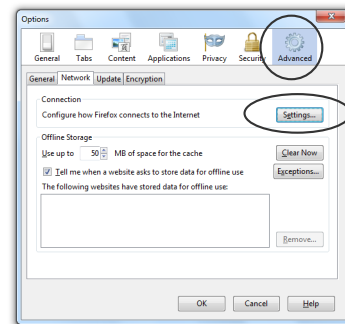


Firefox

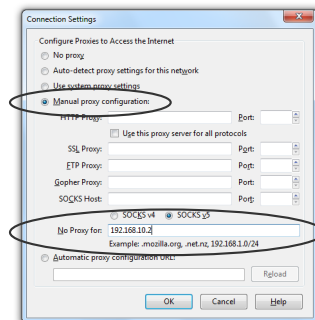
- 1 Start Firefox on your PC.
- 2 Select [Options] from the [Tools] Menu.
The [Options] dialog box appears.



- 3 Select [Advanced] and click [Settings] on the [Network] tab.
The [Connection Settings] dialog box appears.



- 4 Select [Manual proxy configuration].
- 5 Write the IP address of this system in the [No Proxy for:] field.
Enter a dot (period) per three-digit IP address component. If the component starts with "0" or "00", skip "0" or "00" and enter the IP address.
- 6 Click [OK] for every open dialog box to close the dialog boxes.
The settings are enabled.



(3) Enabling Java applets

In order to view a live image via a web browser at a satisfactory speed, you have to enable Java applets on the web browser (only when [ROOM1] is used).

✓ For the terminal which do not use Java

On a PC on which Java is not installed or enabled, DS-L3's [ROOM1] screen is not displayed normally. To view a live image without using Java, access the [ROOM3] screen via the web browser. On the [ROOM3] screen, however, note that the minimum interval of image updating is longer than the [ROOM1] screen.

Examples for Internet Explorer and Firefox on Windows, and Safari and Firefox on Macintosh are presented here. If you plan to use other OS or web browser, use the following examples as a guide.

! Installing the latest version of Java on Windows

In order to view a live image of this system from a web browser, Java in version 7 or later must be installed on a PC. If Java is not installed on your PC, follow the procedures below to install Java in version 7 or later.

1 Connect your PC to the Internet and start web browser.

You need to connect your PC to the Internet in order to install Java.

2 Access the following site with a web browser and download the Java installation file.

- <http://www.java.com/en/download/>

3 Execute the downloaded file and install Java.

Follow instructions on the screen to install Java.

Note 1: If you plan to connect this system and PC with a cross cable, or you are going to use this system on a network without Internet connection, complete Java installation in an Internet-connected environment beforehand.

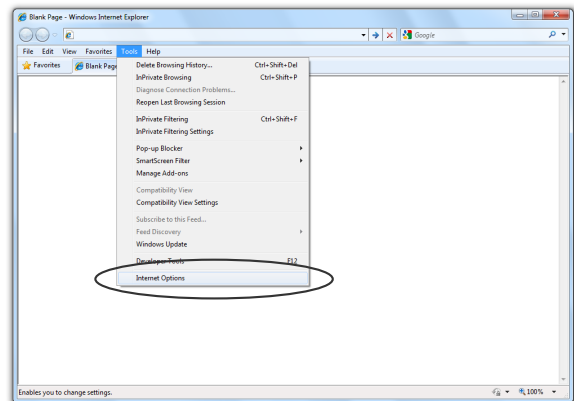
Note 2: On Macintosh, Java is not installed by initial setting for the Mac OS X 10.7 and later versions. Open "Java Preferences" in the Utilities folder and install the latest version.

Internet Explorer (Windows)

1 Start Internet Explorer on your PC.

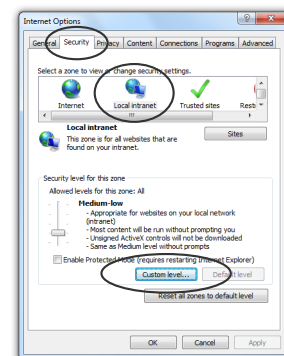
2 Select [Internet Options] from the [Tools] menu.

The [Internet Options] dialog box appears.



3 Choose [Local Intranet] in the [Security] tab and click the [Custom Level] button.

The [Security Settings – Local Intranet Zone] dialog box appears.



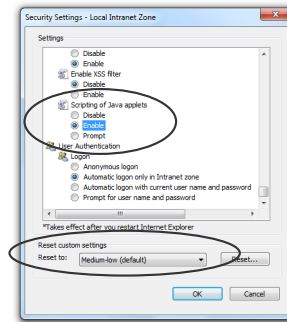
4 Configure [Java VM].

Enable Java execution by selecting any security level of [High], [Medium-High] or [Medium].

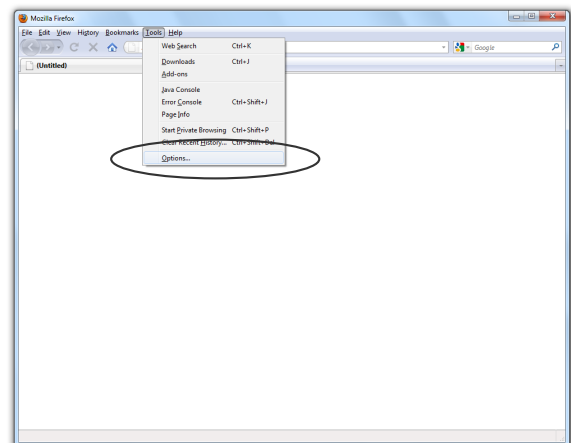
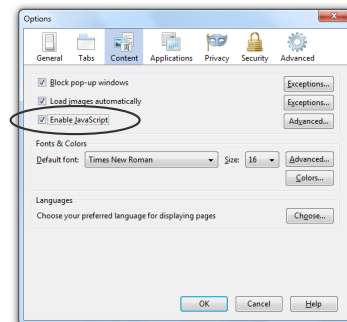
Set [Scripting of Java Applets] in [Settings] to [Enable].

5 Click [OK] for every open dialog box.

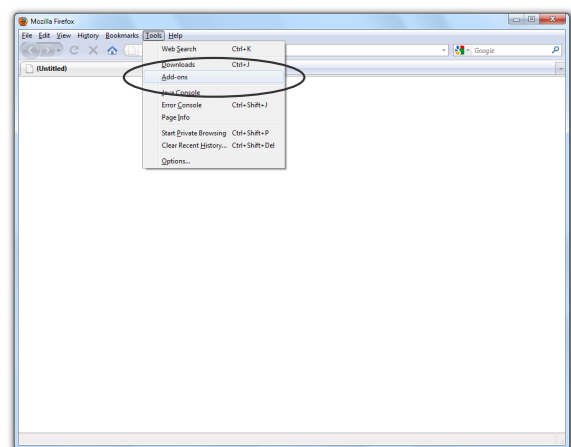
The settings are enabled.

**Firefox (Windows)****1 Start Firefox on your PC.****2 Select [Options] from the [Tools] menu.**

The [Options] dialog box appears.

**3 Open the [Content] tab in the [Options] dialog box and select the [Enable JavaScript] checkbox.****4 Click [OK] to close the dialog box.****5 Select [Add-ons] from the [Tools] menu.**

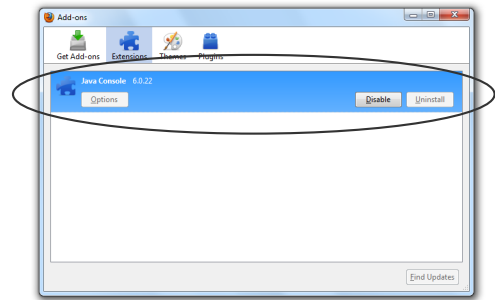
The [Add-ons] dialog box appears.



- 6 Open the [Advanced] tab of the [Add-ons] dialog box and make sure [Java Console] is enabled.

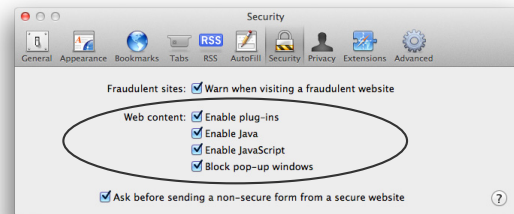
If [Java Console] is not displayed, install Java.

- 7 Click [OK] to close the dialog box.



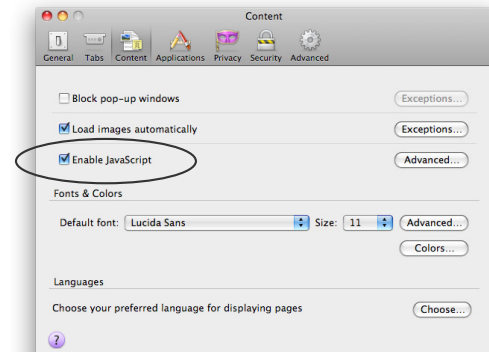
Safari (Macintosh)

- 1 Start Safari on your PC.
- 2 Select [Preferences] from the [Safari] menu.
- 3 Select [Security].
Click a top right button if the [Security] icon is not displayed.
- 4 Select the following checkboxes:
 - [Enable plug-ins]
 - [Enable Java]
 - [Enable JavaScript]
- 5 Click the close button to close the dialog box.



Firefox (Macintosh)

- 1 Start Firefox on your PC.
- 2 Select [Preferences] in the [Firefox] menu.
- 3 Select [Content].
Click the top right button if the [Content] icon is not displayed.
- 4 Select the [Enable JavaScript] checkbox.
- 5 Click the close button to close the dialog box.



16.3.2 Operating Web Screen

Access the IP address of this system from your web browser to display the web screen of this system.

The following operations on the web screen are available.

- **Obtain a live image ([ROOM1] or [ROOM3] screen)**

Preview a live image on your PC and save the live image on your PC if necessary. This operation is available if you are using one of the following combinations of OS and web browsers.

- **Download captured images ([ROOM2] screen)**

Download images stored on a recording medium into your PC.

Required environment for the [ROOM1] or [ROOM3] screen

The [ROOM1] screen works in the following environment. It may not be displayed properly on other environments.

OS	Web Browser
Windows 7	Internet Explorer 8.0 or later, or Firefox 3.6 or later
Mac OS X 10.7 or later	Safari 5.1 or later, or Firefox 3.6 or later

Java applets must be enabled to use [ROOM1].

✔ [ROOM1] screen and [ROOM3] screen

The available functions are almost the same for the [ROOM1] screen and the [ROOM3] screen. On the [ROOM3] screen, however, the minimum interval of live image updating is longer than the [ROOM1] screen because [ROOM3] does not use Java applets.

If you use a typical PC, use the [ROOM1] screen. Use the [ROOM3] screen only in special environment such as on a PC to which Java is not installed.

(1) How to connect to the DS-L3

Connect to this system from your web browser and display the web screen of this system.

- 1 **Start web browser on your PC.**
- 2 **Enter the IP address of this system in the URL address field of web browser (example: `http://192.168.10.2/`)**

If the user authentication is set, the user authentication dialog appears. Enter the correct user ID and password.

The entrance screen appears on the web browser window if connection is successful.

Note: When the authentication IP addresses are set on the DS-L3, the IP address of the PC must be among those addresses. For details, see “13.3.1 (5) Restricting the access from web browser by IP addresses”.

- 3 **Start web operation.**

Operations are done in [ROOM1], [ROOM2], or [ROOM3]. Select the desired tab.

- **[ROOM1] tab**

You can view a live image (Java). The live image is updated in a predetermined interval.

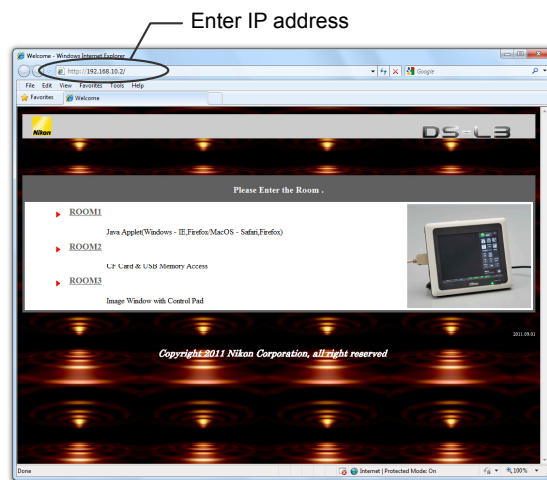
- **[ROOM2] tab**

You can download an image file stored in a recording medium on your PC.

- **[ROOM3] tab**

You can view a live image on the PC (without use of Java). The live image is updated in a predetermined interval.

- 4 **End web browser when you finish the operations.**



Entrance Screen

! [ROOM1] tab

A live image will not be displayed on the [ROOM1] tab unless the latest version of Java is installed.

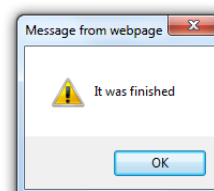
Notes

- You cannot access this system from multiple web browsers running on one PC at one time.
- The web screen response may slow down if this system is accessed from multiple PCs at one time. Normally, you can comfortably use the system from up to four PCs accessing at the same time.
- The image quality, time interval and electronic zoom settings displayed on the [ROOM1] or [ROOM3] preview screen may be different from the actual settings used in the screen when more than one PC is accessing the system at the time. Settings of the preview screen of the last PC that operated [ROOM1] or [ROOM3] will take effect.

Note: The screen and display examples presented in this document are different depending on the PC OS and web browser being used.

Using the Web browser

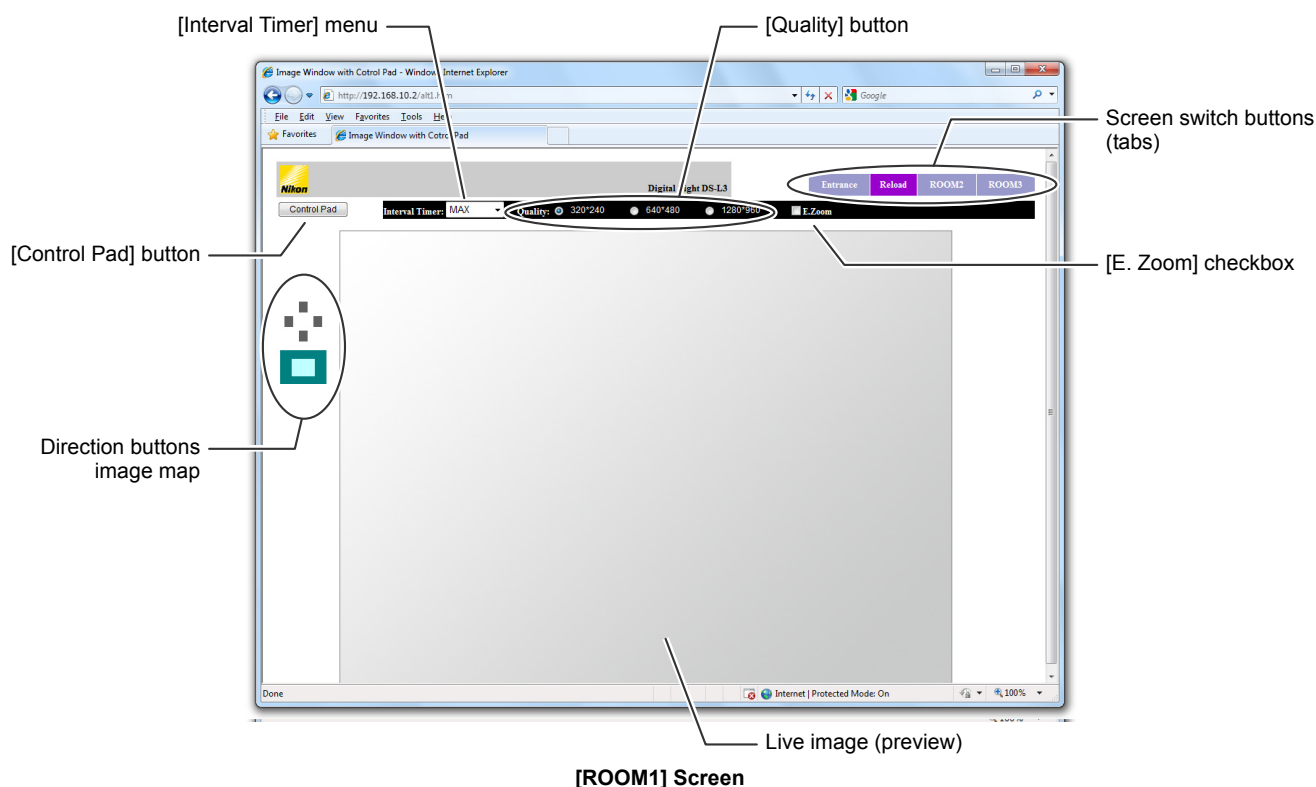
- You may experience behavioral difference and functional limitation depending on your PC environment and version of the web browser.
- This system presents four web screens: [Entrance], [ROOM1], [ROOM2], and [ROOM3]. Do not use the [Back] button to switch web screen. Click the top right tab on the screen instead. If you use the [Back] button to switch the screen, the screen may not be updated. Refresh the screen using [Refresh] on the [View] menu in this case. Click the [Reload] tab to update the content of the screen to the latest state.
- A sub window may not be displayed if you enable the popup block feature of the web browser. Disable the block feature to display the sub window.
- Occasionally, the page may not be displayed properly when you switch to another screen. Refresh the page with [Refresh] in this case.
- When you close the web browser, the ending message such as the one on the right may appear. Click [OK] to close the window.



(2) Operating [ROOM1]/[ROOM3] screen

On the [ROOM1] or [ROOM3] screen, preview of the live image of this system is displayed. You can capture the image when you want.

When the [ROOM1] or [ROOM3] screen is opened, a live image preview of this system is displayed in specified size. You can automatically update the preview image by specifying interval.



! In case live image is not displayed

- Use of Java applets must be enabled in order to use the [ROOM1] screen. See "16.3.1 Configuring PC and Web Browser". If you use a PC or terminal which cannot use Java applets, use the [ROOM3] screen.
- If the live image preview is not displayed in [ROOM1] or [ROOM3] screen, check if the personal firewall of your virus protection software is blocking communication with the system.

• Screen switch buttons (Tabs)

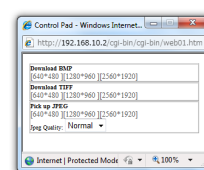
- **[Entrance] button:** Return to the [Entrance] screen.
- **[Reload] button:** Update the [ROOM1] screen. The button changes to [ROOM1] when the screen switches to [ROOM3].
- **[ROOM2] button:** Display the [ROOM2] screen.
- **[ROOM3] button:** Display the [ROOM3] screen. The button changes to [Reload] when the screen switches to [ROOM3].

• [Control Pad] button

Display the [Control Pad] window.

You can save the latest live image to a file in BMP, TIFF, or JPEG format on this window through operations for changing image capture conditions and image adjustment.

Click the top right [X] button to close the [Control Pad] window. If you move to another window ([Entrance], [ROOM1], [ROOM 2], or [ROOM3]), the sub window will automatically close.



[Control Pad] Window

- **[Interval Timer] menu**

Selects live image update interval from the following items. The preview screen is refreshed at intervals specified in this menu. The preview screen can also be refreshed by clicking the [Reload] button.

- **Seconds:** Updates live image at specified intervals. You can select an interval time from 200 ms (for [ROOM1] only), 500 ms, 1 sec, 2 sec, 4 sec, 8 sec, 15 sec, 30 sec, 1 min, 5 min, and 10 min.
- **[MAX]:** Updates the preview image with the maximum possible interval (for [ROOM1] only). The actual update frequency varies depending on the state of the system and network speed.

- **Update frequency of preview screen**

- The setting in the [Interval Timer] menu is just a hint. The actual update interval is determined by the system status and network speed.
- If the [ROOM1] screen is being viewed in multiple PCs at the same time, the last settings made are reflected to every web browser. The same preview image is displayed in the same time interval on every PC.

- **[Quality] button**

Specify the size of the preview image. An image size corresponding to the number of pixels of the DS camera head is displayed.

DS Camera Head	Display Size
DS-Fi2 / DS-Fi1 / DS-Fi1c	320 x 240 (80 K), 640 x 480 (0.3 M), 1280 x 960 (1.2 M)
DS-Vi1	400 x 300 (120 K), 800 x 600 (0.5 M), 1600 x 1200 (2 M)
DS-Qi1Mc / DS-Ri1	320 x 256 (80 K), 640 x 512 (0.3 M), 1280 x 1024 (1.3 M)

If you make the size larger, the display speed of the preview image becomes slower. Select an appropriate size for your purpose.

A certain size cannot be used depending on the system configuration. You cannot click that image quality button.

- **[E. Zoom] checkbox, direction buttons and image map**

The [E. Zoom] checkbox allows you to enable or disable electronic zoom. Checking the box displays the direction buttons and image map. The preview screen is enlarged two times.

The image map is a white rectangle. The gray area in the rectangle indicates the portion being enlarged. You can move the enlarged portion by directly clicking on the desired location on the image map or by indirectly using four direction buttons up, down, left or right.

Clearing the [E. Zoom] checkbox ends electronic zooming. The direction buttons and image map disappear. The normal preview screen is back.

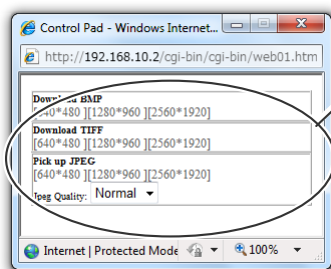
- **Preview image**

This screen allows you to check the live image of this system prior to bringing it into a PC. If you change the window size, the size of the preview image will also change accordingly.

Note: The screen is temporarily cluttered if you change the camera mode from the menu while you are viewing the preview image. Wait some time until the image is properly displayed with the new mode.

Operating Control Pad screen

Pressing the [Control Pad] button opens the [Control Pad] window. This window allows the following operations.



[Control Pad] Window Display Items

Obtaining image file

An image file can be obtained in BMP, TIFF, or JPEG format.

- **Download BMP**
Save an image of the specified size in BMP format.
- **Download TIFF**
Save an image of the specified size in TIFF format.
- **Pick up JPEG**
Save an image of the specified size in JPEG format.
- **Jpeg Quality**
Select JPEG image quality from Fine (high), Normal, or Basic (low).

Saving BMP or TIFF Live Image ([Download BMP]/[Download TIFF])

Download a live image to a PC as a BMP-format or TIFF-format image file.

- 1 Click the image size link in the [Download BMP] or [Download TIFF] field according to the desired image format.**

The image size link display varies depending on the DS camera head in use. (See the table below.)

Click the link to display a dialog box to specify image file processing method.

- 2 Select [Save].**

The OS standard file save dialog box appears.

- 3 Select an image file storage folder and change the file name as needed.**

- 4 Click the [Save] button to save the image file.**

The image displayed at the time when this button is clicked is saved.

✔ BMP and TIFF file names set by initial settings

Names of BMP and TIFF files are set as follows in the initial settings.

DS Camera Head	Initial Setting File Name
DS-Fi2 / DS-Fi1 / DS-Fi1c	BMP format: IMG640.bmp, IMG1280.bmp, IMG2560.bmp TIFF format: IMG640.tif, IMG1280.tif, IMG2560.tif
DS-Vi1	BMP format: IMG400.bmp, IMG800.bmp, IMG1600.bmp TIFF format: IMG400.tif, IMG800.tif, IMG1600.tif
DS-Qi1Mc / DS-Ri1	BMP format: IMG320.bmp, IMG640.bmp, IMG1280.bmp TIFF format: IMG320.tif, IMG640.tif, IMG1280.tif

Saving live image in JPEG format ([Pick up JPEG])

Obtain a live image in JPEG format.

1 Select image quality from the [Jpeg Quality] menu in the [Pickup JPEG] section.

You can select one from the three levels: [Fine] (1/4 compression), [Normal] (1/8 compression) and [Basic] (1/16 compression). The file size becomes larger as quality becomes higher.

2 Click the image size link to open an image.

The image size link display varies depending on the DS camera head in use. (See the table below.)

Click the link to open a JPEG image on the web browser. A JPEG image may be opened by another application depending on the setting.

3 Right-clicking the image being displayed and selecting [Save Picture As] also displays the same dialog box.

The OS standard dialog box for saving a file appears.

4 Select a folder for saving the image file and change the file name if necessary.

The name of the image file is set as "outjpeg.jpg" in the initial setting

5 Click the [Save] button to save the image file.

The image captured at the time you pressed the button is saved.

✓ Images to be saved

A BMP or TIFF image is obtained when the link in the [Download BMP] or [Download TIFF] field is clicked. Since there is a time lag from the time when a preview image was obtained, the preview image may be different from the obtained image. The time lag from the preview image increases as the set image size increases.

A JPEG image is displayed when the link in the [Pick up JPEG] field is clicked. Save the image by operating the web browser. Since there is a little time lag from the time when the link was clicked, but the obtained image can be saved as it is.

✓ Link display and image with each DS camera head in use

The image size link display varies depending on the DS camera head in use.

DS Camera Head	Link Display
DS-Fi2 / DS-Fi1 / DS-Fi1c	[640 * 480], [1280 * 960], [2560 * 1920]
DS-Vi1	[400 * 300], [800 * 600], [1600 * 1200]
DS-Qi1Mc / DS-Ri1	[320 * 256], [640 * 512], [1280 * 1024]

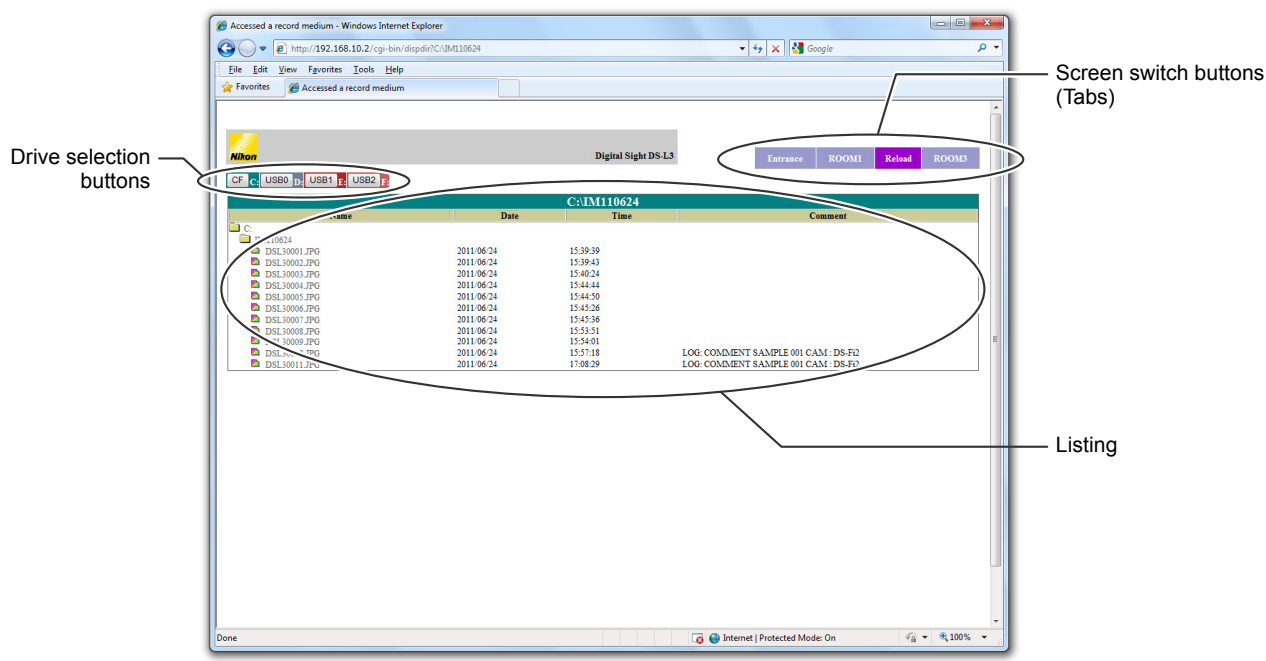
! Cautions

- If you click [Cancel] in the file saving dialog box, the preview image may cease to update. In this case, wait some time until it resumes updating or restart web browser.
- The window may be closed while the image file is being downloaded.
- If you directly open an image file on this system from a PC on a network, the original window may be closed. If this happens, download the file first and then open it.

(3) Operating [ROOM2] screen

On the [ROOM2] screen, you can download an already captured image file into your PC.

If you open the [ROOM2] screen, a list of recording medium content is displayed. Folders and image files in the recording medium have links. Clicking the links opens the folders and downloads image files.



[ROOM2] Screen

- **Screen switch buttons (tabs)**

- **[Entrance] button:** Return to the [Entrance] screen.
- **[ROOM1] button:** Display the [ROOM1] screen.
- **[Reload] button:** Update the [ROOM2] screen.
- **[ROOM3] button:** Display the [ROOM3] screen.

- **Drive selection buttons**

Selects a drive whose listing you want to show:

- **[CF/C:] button:** Show listings of a CF card inserted in the CF card slot of the DS-L3.
- **[USB0/D:] to [USB2/F:] buttons:** Show listings of recording media attached to one of USB connectors.

- **Listing**

Up to two levels of folders from the top of a recording medium and files within the highest folder are displayed.

- Clicking the folder icon or folder name shows folders and BMP/JPEG/TIFF image files under the folder.
- Icon, file name, and date/time of creation are shown with an image file. If log save is set, log comment is also shown. The DS camera head model name is automatically included in the log comment.

✓ Displaying the file list

- It may take time to display the list if many files are saved in one folder.
- Up to 100 folders or files are shown in a list. If more folders or files exist, "There are more than 100 files," is shown at the bottom of the list.

Downloading an Image File

- 1 Click the icon or file name of a desired image file in the listing of the [ROOM2] screen.

A file download confirmation message appears.

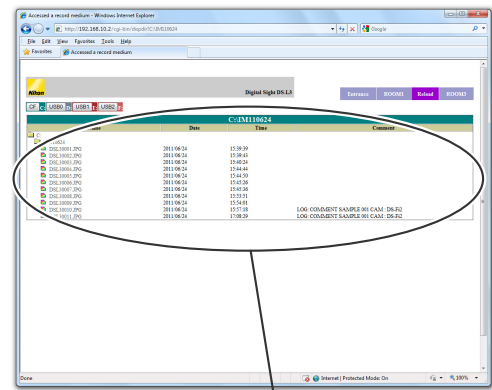
- 2 Click [Save].

The OS standard file saving dialog box is displayed.

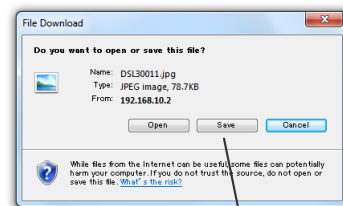
- 3 Select a saving location of the image file and change the file name if necessary.

Even if you click an image file on a listing, the image may not be opened. If this happens, download the image file first then open it.

To download an image file and save it into your PC, open the image file and select “Save As” operation, or right-click the image file link and select “Save As” from the menu.



Right-click the desired image to select it and select [Save As].



Select [Save].

Downloading Image File

16.4 Transferring Image to FTP Server

You can use the FTP client of this system for accessing an FTP server on the network. You can do the following operations with an FTP server.

- **Save a live image directly to an FTP server.**
Save a live image to an FTP server with capturing operations.
- **Transfer an already captured and saved image to an FTP server.**
Transfer an image stored on a recording medium to an FTP server.

This system allows you to register up to five target FTP servers and use one by switching between them. Users can transfer images directly to their individual folder by registering different login users.

✔ Network configuration on a PC

In order to use this feature, network configuration (LAN connection) on the PC must be complete.

Consult the network administrator of your organization for details of network configuration.

16.4.1 Configuring FTP Server on a PC

In order to transfer images from this system to a PC, enable an FTP server on the PC.

This document describes only basic settings. For detailed settings, see documents such as online help of the OS or FTP server software.

! Caution

In configuring an FTP server on a PC, you need to install an FTP server component and add users to the PC.
In order to accomplish the work, you need to log in to a PC as a user having administrative privilege to the PC. Ask the PC's administrator for help as necessary.

(1) Windows 7

Adding the FTP server component (IIS)

If Internet Information Services (IIS) has not been added as a component, it must be installed.

- 1 Open [Programs and Features] in the [Control Panel], and select [Turn Windows features on or off].
- 2 Open [Internet Information Services], select the [FTP Service] checkbox under [FTP Server] and the [IIS Management Console] checkbox under the [Web Management Tools], and then press the [OK] button.

Installation starts.

Adding a user

Create a new user account.

- 1 Open [Administrative Tools] in the [Control Panel] and then open [Computer Management].
- 2 Select [Computer Management (Local)] - [System Tools] - [Local Users and Groups].
- 3 Right click [Users] and select [New User...].
- 4 Enter a user name and password.

Use up to eight upper or lower-case alphanumeric characters so that you can set the same information as the external FTP server settings in the DS-L3. Clear the [User must change password at next logon] checkbox.

Creating an FTP site

Create an FTP site and set the basic access right.

- 1 Open **[Administrative Tools]** in the **[Control Panel]** and then open **[Internet Information Services (IIS) Manager]**.
- 2 Open the icon of the PC (PC name) in the left pane of the window, right-click **[Sites]** and select **[Add FTP Site...]**.
The **[Add FTP Site]** dialog box appears.

- 3 Specify **[FTP site name]** and **[Content Directory] - [Physical path]** in the **[Site Information]** screen, and click **[Next]**.

Enter an arbitrary site name. Specify the home folder of the transfer destination. When you transfer an image file, the folder specified in the DS-L3 is created in this folder and the image file is saved in it.

Example:

When you set "C:\SPFTP" for the home folder, and the DS-L3 is configured so that the FTP folder is automatically created, the FTP transfer folder is "C:\DSFTP\FTyymmdd\". ("yymmdd" stands for year, month, and day with a two-digit number for each.)

- 4 Set **[No SSL]** for **[SSL]** in the **[Binding and SSL Settings]** screen and click **[Next]**.

Leave other settings at their default settings.

- 5 Perform the following setting in the **[Authentication and Authorization Information]** screen.

- **[Authentication]**
Set to **[Basic]**. To enable anonymous login, select the **[Anonymous]** checkbox.
- **[Authorization] - [Allow access to]**
Select **[Specified users]** and enter the created user name. To enable anonymous login, set **[All users]** or **[Anonymous users]**. (Note that when you set **[Anonymous users]**, users other than an anonymous user cannot log in.)
- **[Permissions]**
Select both **[Read]** and **[Write]** checkboxes.

Note: To log in with an anonymous user, set **[Anonymous]** for the user ID in the external FTP server setting in the DS-L3.

- 6 Click the **[Finish]** button in the **[Add FTP Site]** dialog box.

The FTP server function starts and information on the created FTP server site is displayed in the **[Internet Information Services (IIS) Manager]** window.

✔ Access right of the home folder

If you cannot access the home folder you have set, you may need an access right to the home folder. For details on how to set the access right, see the information on the OS help, etc.

Configuring a different folder for each user

By configuring the following setting on the FTP server, the destination folder can be switched in accordance with the logged-in user. You can register the setting for five FTP servers in the DS-L3 and switch user information by an easy operation.

- 1 Open the [Internet Information Services (IIS) Manager] and select the FTP site on the left side pane.**
The items that can be executed are displayed in the middle part of the window.
- 2 Open [FTP Authentication] and enable [Basic Authentication].**
After this setting, select the FTP site on the left side pane to display the items that can be executed in the middle part of the window.
- 3 Open [FTP Authorization Rule] and click [Add Allow Rule...].**
The [Add Allow Authorization Rule] dialog box appears.
- 4 Select [Specified users], enter the user name, and select the [Read] and [Write] checkboxes in [Permissions].**
- 5 Press the [OK] button to close the [Add Allow Authorization Rule] dialog box.**
- 6 Open [FTP User Isolation], select [User name directory] under [Do not isolate users. Start users in:], and then click [Apply].**
Close the [Internet Information Services (IIS) Manager].
- 7 Open [Computer Management] from [Administrative Tools] in [Control Panel], and open [Computer Management (Local)] – [System Tools] – [Local Users and Groups] – [Users].**
- 8 Double-click the user you want to set to open [Properties] and specify [Home Folder] - [Local Path] in the [Profile] tab (under the home folder).**
Example of setting:
When home folder is set to “C:\DSFTP” and home folder local path of DS-L3 user is set to “C:\DSFTP\DS1”, and automatic creation of FTP folder on the DS-L3 side is set, the FTP transfer folder becomes “C:\DSFTP\DS1\FTyymmdd\” (yymmdd: a two-digit number for each).
- 9 Set the local path of other users to “C:\DSFTP\DS2” or “C:\DSFTP\DS3”.**
You can provide a folder for each user.
Upon completion of these settings, close the [Computer Management].
- 10 Set the user name and password that were set for the FTP server in the DS-L3.**
Open the [SETUP MENU: NETWORK] screen and select the desired [SERVER No] in the [EXTERNAL FTP SERVER] area, and then set the [USER ID] and [PASSWORD].
For details of the setting, see “13.3.2 (2) Registering/changing FTP server settings”.

(2) Mac OS X

This section describes how to set Mac OS X. Log in with a user ID of the system administrator before configuring the following settings.

❗ Mac OS X compatible version

The following describes the operating procedure with Mac OS X 10.6.

Mac OS X 10.7 does not support access to a PC from the DS-L3 using the FTP server function.

Adding an FTP server feature

- 1 Select **[System Preferences]** from the **[Apple]** menu.
- 2 Click **[Sharing]** from **[Internet & Wireless]**.
- 3 Select the **[File Sharing]** checkbox.
Shared folders of the logged-in users are listed.
- 4 Select the **[Share files and folders using FTP]** checkbox.

The setting items may be different in previous versions. See online help of the OS for details.

Adding a user

- 1 Click **[Account]** in the **[System Preferences]** Window.
- 2 In the **[Account]** window, click the **[+]** (add) button (or **[New User]**) and set the user ID and password you have set in **[External Server]** in the DS-L3.
- 3 Closes the window.

You can check the IP address of the server by clicking **[Ethernet Connected]** in **[Network]** in **[System Preferences]**.

Setting the home folder and per-DS-L3-user folders

In Mac OS, if you add a user, a home folder having the same name as the user name will be automatically created under **[Macintosh HD]** - **[Users]**.

If you transfer an image file, an FTP folder specified in the DS-L3 will be created under the home folder and the image file is stored there.

Example settings:

When you set "DS1" for the user name and set up a subfolder on the DS-L3 with automatic folder creation enabled, the FTP transfer folder is "/Users/DS1/Specified subfolder name/FTyymmdd/". ("yymmdd" stands for the year, month and day.)

Each time you add an account, a per-user folder is created. If you add multiple DS-L3 users, target folders for them are automatically distinguished.

The original access rights of a created folder on Macintosh are read/write by the user and read-only by other users. Do not change the access rights because doing so risks failure of image transfer and deletion of image files by other user.

Configuring and checking network

You can also use **[Macintosh HD]** - **[Applications]** - **[Utilities]** - **[Network Utility.App]** for configuring and checking the network settings.

- **[Info] tab:** Information such as IP Address is displayed
- **[Ping] tab:** Ping command can be sent

To use the similar feature like Windows Command Prompt, select **[Macintosh HD]** - **[Applications]** - **[Utilities]** - **[Terminal.App]** and display a terminal screen.

16.4.2 Transferring Image to FTP Server

Image transfer to an FTP server can be done with either of the following:

- (1) **Storing image to FTP server while being captured**
- (2) **Transferring stored image to FTP server**

Settings for storing image on an FTP server while being captured

If you want to store an image on an FTP server while the image is being captured, configure the following settings.

- **Configure the FTP client function of DS-L3.**
Enable [FTP CLIENT] in the [EXTERNAL SERVER] area of the [SETUP MENU: NETWORK] screen, and configure [SERVER No], [IP ADDRESS], [USER ID], and [PASSWORD] settings. See “13.3.2 Configuring FTP Client”.
- **Configure settings about FTP folder and file name.**
Configure settings for automatic folder/file name creation in the [FTP SERVER DIR] and [FILE NAME] areas of the [SETUP MENU: FILE] screen. See “13.4.1 (2) Configuring a subfolder in the FTP server”, “13.4.1 (3) Configuring automatic folder creation in FTP server” and “13.4.2 Configuring File Naming Convention”.
- **Configure the capture function.**
Select [SAVE TO SERVER] in the [CAPTURE FUNCTION] area of the [SETUP MENU: ADDITIONAL] screen. See “13.5.2 Configuring Capture Function”.

! Overwriting the file with the same name

On sending an image to an FTP server, no check is done to ensure no file with the same name exists. In order to avoid overwriting of an image file, configure so that a file name contains date and time information.

You can use a serial number for file names to avoid this trouble. Note that the serial number is reset to “0001” when the name of the storage folder or file is changed. A previously saved file may be overwritten and deleted.

(1) Storing image to FTP server while being captured

This system allows you to store an image to an FTP server while the system is capturing the image.

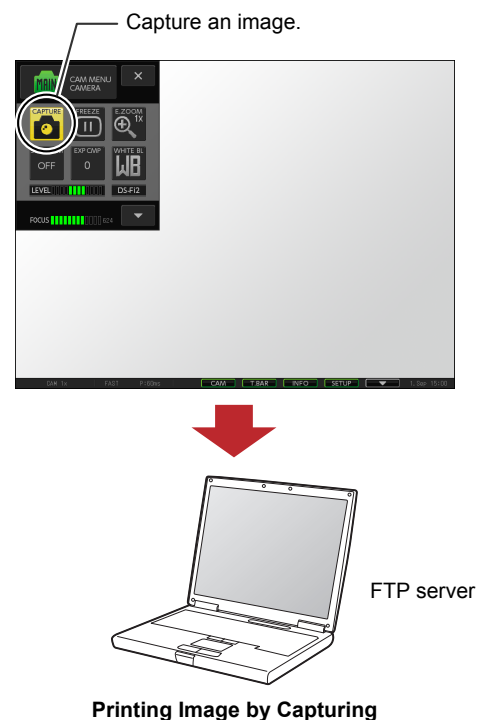
A live image can be saved as it is in the FTP server when you capture the image on the touch panel LCD monitor.

✓ Action taken during image capturing

By setting options in the [Capture Function] area, you can save a live image on a recording medium or an FTP server while being printed, or directly store it on the FTP server without saving it on the recording medium.

✓ Consecutive capture with interval timer

When saving images to an FTP server with consecutive capture, the number of capturing times may be decreased if more time is required for FTP transfer than the shooting interval. Test this feature before using.

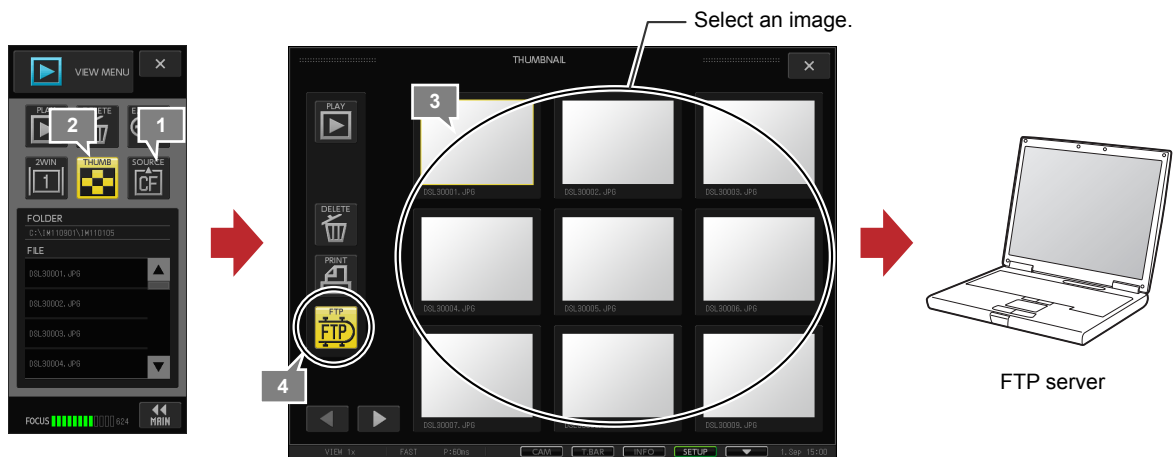


(2) Transferring stored image to FTP server

Images stored in a recording medium can be transferred to an FTP server by operation from the thumbnail window.

- 1 Press the [SOURCE] button in the [VIEW MENU] and select a desired folder by switching drives and folders.
- 2 Press the [THUMB] button in the [VIEW MENU].
The [THUMBNAIL] window opens and all image files in the selected folder are displayed.
- 3 Select the desired image and press the [FTP] button.
The selected image is marked with a yellow frame.
- 4 Press the [FTP] button.
The selected image is sent to the FTP server.

Note: Multiple images displayed in the thumbnail on the current page can be selected and transferred to an FTP server.



Transferring Stored Image

✓ In case no image is saved on FTP server

Make sure you have configured the network settings of this system correctly and set correct user name and password for logging into the FTP server.

16.5 Obtaining Images from the PC Using the FTP Command

You can obtain a live image of the DS-L3 by executing the FTP command from the PC.

! Executing FTP command

Before executing the FTP command, be sure to consult the network administrator of your organization. Since unique settings may be made in some organizations, executing the FTP command may cause a network error.

Perform operation on the command prompt screen to execute the FTP command from the PC.

1 Open Windows [Command Prompt] and enter the IP address of DS-L3 to make a connection.

For an example of DS-L3 IP address of "192.168.10.2":

- **Example:** FTP 192.168.10.2

2 Execute the ls command to search the "RAMIBOX" folder.

3 Execute the cd RAMIBOX command.

The following file names are displayed virtually.

- IMG**.bmp
- IMG***jpg
- IMG***tif

An image size value such as 2560 and 1280 is displayed in the "****" area.

The file update time at this time is "0:00", but the Get command issuing time is set in the file that is actually obtained.

4 Execute the Get command to one file out of the files shown above to obtain the live image at the time.

✓ In case of image acquisition failure

While PC and DS-L3 are connected with a USB cable and accesses are made frequently between them, image file acquisition using the FTP command fails in some cases. In that case, stop access through the USB cable.

16.6 Operating from the PC with the Telnet Command

You can operate the DS-L3 by executing the Telnet command from the PC.

! Executing Telnet command

Before executing the Telnet command, be sure to consult the network administrator of your organization. Since unique settings may be made in some organizations, executing the Telnet command may cause a network error.

1 Open Windows [Command Prompt] and enter the IP address of DS-L3 to make a connection.

For an example of DS-L3 IP address of "192.168.10.2":

- **Example:** Telnet 192.168.10.2

2 Execute the Telnet command.

For executable Telnet commands, see the Telnet command list.

Telnet command list

A detailed command list is available. If you need it, contact your nearest Nikon representative.

16.7 Obtaining Images from the iPad

You can obtain a live image shown on the DS-L3 using the DS-L3 Viewer application for iPad.

To use this function, the following environment is required:

- **A wireless LAN router that supports communication with the iPad is connected to the DS-L3 using a straight LAN cable.**
- **iOS 4.3 or higher version is installed to the iPad.**
- **The DS-L3 Viewer application program is installed to the iPad (Find “DS-L3 Viewer” at App Store to download the application).**

For details on the procedure for setting and using the DS-L3 and iPad, see the DS-L3 Viewer operation manual that can be downloaded from the DS-L3 Viewer page at App Store.

! Notes on multiple access

If more than one iPad accesses the DS-L3 concurrently, images will be slower to appear. Normally, communication should be relatively smooth between the DS-L3 and up to four iPads at a time.

Do not try to access the DS-L3 via the web browser while the DS-L3 is communicating with the iPad via the DS-L3 Viewer: images may not be shown normally.

Part 7

Other Information

This part provides various information required to operate the DS-L3.

This part consists of the following chapters.

- Chapter 17 Differences in Operation Depending on DS Camera Head Models
- Chapter 18 Troubleshooting
- Chapter 19 Capturing from External I/O Devices
- Chapter 20 Daily Maintenance
- Chapter 21 Major Specifications

Differences in Operation Depending on DS Camera Head Models

The following six types of DS camera heads can be connected to the DS-L3.

Some menus vary depending on the DS camera head to be used.

DS Camera Heads Connectable to DS-L3

DS Camera Head Model	Image Pickup Device	Cooling	Pixel Shift Function	Body Color
DS-Fi2	2/3-inch color 5.24-megapixel	—	—	White
DS-Fi1	2/3-inch color 5.24-megapixel	—	—	White
DS-Vi1	1/1.8-inch color 2.11-megapixel	—	—	White
DS-Qi1Mc	2/3-inch monochrome 1.5-megapixel	Provided	—	Black
DS-Fi1c	2/3-inch color 5.24-megapixel	Provided	—	Black
DS-Ri1	2/3-inch color 1.5-megapixel	Provided	Provided	Black

Scan method

Two scan methods (Interlace scan and Progressive scan) are available for obtaining images from the image pickup device.

- The Interlace scan can obtain an image by scanning a screen twice. Odd scanning lines are scanned first and even scanning lines are scanned next, which may cause color deviation in a moving object.
- The Progressive scan can obtain an image by scanning a screen once. Since all scanning lines are scanned sequentially, natural images without color deviation can be obtained even in the case of moving object.

Scan method is automatically set when the image mode is selected and can no longer be changed.

17.1 DS-Fi2

DS-Fi2 is a color DS camera head that has a 2/3-inch image pickup device of 5.24 megapixels (5M pixels).

Screen items that change when DS-Fi2 is used

When DS camera head DS-Fi2 is used, the following screen items change.

- **Image mode selection item:** [IMG MODE] submenu in the [CAM MENU: CAMERA] long window
- **Recording mode selection item:** [REC MODE] submenu in the [CAM MENU: SHOT/REC] window
- **Exposure time setting range:** [EXP TIME] submenu in the [CAM MENU: CAMERA] long window (130 μ s to 60 s)

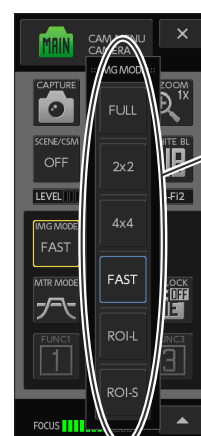
Image modes available for DS-Fi2

The image pickup device operating mode when capturing an image with the DS camera head is referred to as “image mode”.

Select an image mode from the [IMG MODE] submenu in the [CAM MENU: CAMERA] long window.

- **Image mode:**
Set the image pickup device operating mode. Image resolution and live image display speed change according to the selection, and the capacity of image file stored when the image is captured changes.

Note: For details of setting items, see the table below.



Selecting Image Mode (DS-Fi2)

Image Modes Available for DS-Fi2

Image Mode	Read Mode	Scan Method	Frame Rate	Recommended Number of Recording Pixels	Setting	Use
FULL	Frame read	Interlace	10 fps	2560 x 1920	Obtains information of all pixels of the image pickup device. High-definition images can be obtained. We also recommend this mode for long-time exposure.	High-definition image recording/display
2x2 (Binning)	Double integration	Interlace	18 fps	1280 x 960	Adds image pickup device's pixel output in units of 2 x 2 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases four times.	Added image recording/display
4x4 (Binning)	Quadruple integration	Interlace	29 fps	640 x 480	Adds image pickup device's pixel output in units of 4 x 4 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases 16 times.	Added image recording/display
FAST (Initial setting)	Double speed	Progressive	21 fps	1280 x 960	Obtains an image at double speed by compressing information from the image pickup device to 1/2. This mode is effective for moving objects because of high display speed. We recommend this mode normally.	Image recording/display
ROI-L	Frame ROI	Interlace	19 fps	1280 x 960	Expands information around the center of image pickup device to entire screen to display an image.	Fast partial image recording/display
ROI-S	Double speed ROI	Progressive	37 fps	1280 x 480	Clips a portion around the center of image pickup device horizontally into strips to display an image. The upper 1/4 and lower 1/4 of the screen become black strips.	Fast partial image recording/display

Setting recording mode when DS-Fi2 is used

Image source, image size, and file type to be stored when an image is captured are set with the [REC MODE] submenu of the [CAM MENU: SHOT/REC] screen.

- **Image source:**
Select live image or full image as an image to be captured.
- **Image size:**
Selectable sizes are displayed in the buttons according to image mode and image source.
- **File type:**
Select the type of image to be stored. The capacity of image file to be stored varies depending on image size and file type settings.



Setting Recording Mode (DS-Fi2)

Selection of Image Source (Live Image and Full Image)

Choice	Setting
Live Image	An image is saved based on the live image on the monitor when the image is captured. Image resolution varies depending on the image size setting, but the image on the monitor is recorded as it is in principle.
Full Image	An image is saved based on the image pickup device output when the image is captured. When [FAST] or [ROI] image mode is selected, image size on the monitor is small. However, if the recording mode is set to [FULL], a high-definition image can be saved based on the output of all pixels of the image pickup device when the image is captured.

Image Size Setting

Image Mode	Image Size (Live Image)	Image Size (Full Image)
FULL	2560 x 1920, 1280 x 960, 640 x 480	2560 x 1920, 1280 x 960, 640 x 480
2x2	1280 x 960, 640 x 480	
4x4	640 x 480	
FAST	1280 x 960, 640 x 480	
ROI-L	1280 x 960, 640 x 480	
ROI-S	1280 x 480, 640 x 480	

File Size of Each File Type

Image Size	BMP Format	TIFF Format	JPEG Format FINE	JPEG Format NORMAL	JPEG Format BASIC
2560 x 1920	14 MB	14 MB	4 MB	1.9 MB	1.2 MB
1280 x 960	3.6 MB	3.6 MB	1.0 MB	480 kB	320 kB
1280 x 480	1.8 MB	1.8 MB	520 kB	240 kB	160 kB
640 x 480	900 kB	900 kB	260 kB	120 kB	80 kB

✓ JPEG image file size

JPEG image file size varies greatly depending on objects. Use the file size values in this table as guideline.

17.2 DS-Fi1/DS-Fi1c

DS-Fi1 and DS-Fi1c are color DS camera heads that have a 2/3-inch image pickup device of 5,240,000 pixels (5M pixels) respectively. DS-Fi1c has an image pickup device cooling function for an ambient temperature of -20°C.

Screen items that change when DS-Fi1 or DS-Fi1c is used

When DS camera head DS-Fi1 or DS-Fi1c is used, the following screen items change.

- **Image mode selection item:** [IMG MODE] submenu in the [CAM MENU: CAMERA] long window
- **Recording mode selection item:** [REC MODE] submenu in the [CAM MENU: SHOT/REC] window
- **Exposure time setting range:** [EXP TIME] submenu in the [CAM MENU: CAMERA] long window (DS-Fi1: 1 ms to 60 s, DS-Fi1c: 1 ms to 600 s)

✓ Cooling function of DS-Fi1c

The image pickup device cooling function of DS-Fi1c always works while power is supplied. There is no setting item.

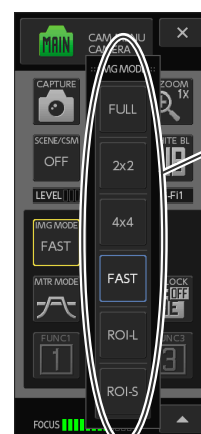
Image modes available for DS-Fi1/DS-Fi1c

The image pickup device operating mode when capturing an image with the DS camera head is referred to as “image mode”.

Select an image mode from the [IMG MODE] submenu in the [CAM MENU: CAMERA] long window.

- **Image mode:**
Set the image pickup device operating mode. Image size and live image display speed change according to the selection, and the capacity of image file stored when the image is captured changes.

Note: For details of setting items, see the table below.



Selecting Image Mode (DS-Fi1/DS-Fi1c)

Image Modes Available for DS-Fi1/DS-Fi1c

Image Mode	Read Mode	Scan Method	Frame Rate	Recommended Number of Recording Pixels	Setting	Use
FULL	Frame read	Interlace	5.9 fps	2560 x 1920	Obtains information of all pixels of the image pickup device. High-definition images can be obtained. We also recommend this mode for long-time exposure.	High-definition image recording/display
2x2 (Binning)	Double integration	Interlace	10 fps	1280 x 960	Adds image pickup device's pixel output in units of 2 x 2 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases four times.	Added image recording/display
4x4 (Binning)	Quadruple integration	Interlace	17 fps	640 x 480	Adds image pickup device's pixel output in units of 4 x 4 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases 16 times.	Added image recording/display
FAST (Initial setting)	Double speed	Progressive	12 fps	1280 x 960	Obtains an image at double speed by compressing information from the image pickup device to 1/2. This mode is effective for moving objects because of high display speed. We recommend this mode normally.	Image recording/display
ROI-L	Frame ROI	Interlace	12 fps	1280 x 960	Expands information around the center of image pickup device to entire screen to display an image.	Fast partial image recording/display
ROI-S	Double speed ROI	Progressive	23 fps	1280 x 480	Clips a portion around the center of image pickup device horizontally into strips to display an image. The upper 1/4 and lower 1/4 of the screen become black strips.	Fast partial image recording/display

Setting recording mode when DS-Fi1 or DS-Fi1c is used

Image source, image size, and file type to be stored when an image is captured are set with the [REC MODE] submenu of the [CAM MENU: SHOT/REC] screen.

- **Image source:**
Select live image or full image as an image to be captured.
- **Image size:**
Selectable sizes are displayed in the buttons according to image mode and image source.
- **File type:**
Select the type of image to be stored. The capacity of image file to be stored varies depending on image size and file type settings.



Setting Recording Mode (DS-Fi1/DS-Fi1c)

Selection of Image Source (Live Image and Full Image)

Choice	Setting
Live Image	An image is saved based on the live image on the monitor when the image is captured. Image resolution varies depending on the image size setting, but the image on the monitor is recorded as it is in principle.
Full Image	An image is saved based on the image pickup device output when the image is captured. When [FAST] or [ROI] image mode is selected, image size on the monitor is small. However, if the recording mode is set to [FULL], a high-definition image can be saved based on the output of all pixels of the image pickup device when the image is captured.

Image Size Setting

Image Mode	Image Size (Live Image)	Image Size (Full Image)
FULL	2560 x 1920, 1280 x 960, 640 x 480	2560 x 1920, 1280 x 960, 640 x 480
2x2	1280 x 960, 640 x 480	
4x4	640 x 480	
FAST	1280 x 960, 640 x 480	
ROI-L	1280 x 960, 640 x 480	
ROI-S	1280 x 480, 640 x 480	

File Size of Each File Type

Image Size	BMP Format	TIFF Format	JPEG Format FINE	JPEG Format NORMAL	JPEG Format BASIC
2560 x 1920	14 MB	14 MB	4 MB	1.9 MB	1.2 MB
1280 x 960	3.6 MB	3.6 MB	1.0 MB	480 kB	320 kB
1280 x 480	1.8 MB	1.8 MB	520 kB	240 kB	160 kB
640 x 480	900 kB	900 kB	260 kB	120 kB	80 kB

✓ JPEG image file size

JPEG image file size varies greatly depending on objects. Use the file size values in this table as guideline.

17.3 DS-Vi1

DS-Vi1 is a color DS camera head that has a 1/1.8-inch image pickup device of 2.11 megapixels (2M pixels).

Screen items that change when DS-Vi1 is used

When DS camera head DS-Vi1 is used, the following screen items change.

- **Image mode selection item:** [IMG MODE] submenu in the [CAM MENU: CAMERA] long window
- **Recording mode selection item:** [REC MODE] submenu in the [CAM MENU: SHOT/REC] window
- **Exposure time setting range:** [EXP TIME] submenu in the [CAM MENU: CAMERA] long window (1 ms to 60 s)

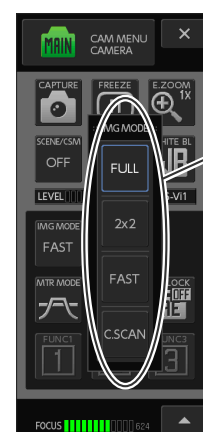
Image modes available for DS-Vi1

The image pickup device operating mode when capturing an image with the DS camera head is referred to as “image mode”.

Select an image mode from the [IMG MODE] submenu in the [CAM MENU: CAMERA] long window.

- **Image mode:**
Set the image pickup device operating mode. Image size and live image display speed change according to the selection, and the capacity of image file stored when the image is captured changes.

Note: For details of setting items, see the table below.



Selecting Image Mode (DS-Vi1)

Image Modes Available for DS-Vi1

Image Mode	Read Mode	Scan Method	Frame Rate	Recommended Number of Recording Pixels	Setting	Use
FULL (Initial setting)	All pixels read	Progressive	15 fps	1600 x 1200	Obtains information of all pixels of the image pickup device. High-definition images can be obtained. We also recommend this mode for long-time exposure. We recommend this mode normally.	High-definition image recording/display
2x2 (Binning)	Double integration	Progressive	27 fps	800 x 600	Adds image pickup device's pixel output in units of 2 x 2 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases four times.	Added image recording/display
FAST	Double speed	Progressive	29 fps	800 x 560	Expands information around the center of image pickup device to entire screen to display an image. This mode is effective for moving objects because of high display speed.	Image recording/display
C. SCAN	Center scan	Progressive	29 fps	800 x 560	Clips a portion around the center of image pickup device horizontally into strips to display an image. Black strips are displayed at the upper and lower parts of the screen.	Fast partial image recording/display

Setting recording mode when DS-Vi1 is used

Image source, image size, and file type to be stored when an image is captured are set with the [REC MODE] submenu of the [CAM MENU: SHOT/REC] screen.

- **Image source:**
Select live image or full image as an image to be captured.
- **Image size:**
Selectable sizes are displayed in the buttons according to image mode and image source.
- **File type:**
Select the type of image to be stored. The capacity of image file to be stored varies depending on image size and file type settings.



Setting Recording Mode (DS-Vi1)

Selection of Image Source (Live Image and Full Image)

Choice	Setting
Live Image	An image is saved based on the live image on the monitor when the image is captured. Image resolution varies depending on the image size setting, but the image on the monitor is recorded as it is in principle.
Full Image	An image is saved based on the image pickup device output when the image is captured. When [FAST] or [C. SCAN] image mode is selected, image size on the monitor is small. However, if the recording mode is set to [FULL], a high-definition image can be saved based on the output of all pixels of the image pickup device when the image is captured.

Image Size Setting

Image Mode	Image Size (Live Image)	Image Size (Full Image)
FULL	1600 x 1200, 800 x 600, 400 x 300	1600 x 1200, 800 x 600, 400 x 300
2x2	800 x 600, 400 x 300	
FAST	800 x 560, 400 x 280	
C. SCAN	1600 x 560, 800 x 560	

File Size of Each File Type

Image Size	BMP Format	TIFF Format	JPEG Format FINE	JPEG Format NORMAL	JPEG Format BASIC
1600 x 1200	5.6 MB	5.6 MB	1.6 MB	720 kB	480 kB
1600 x 560	2.6 MB	2.6 MB	750 kB	340 kB	220 kB
800 x 600	1.4 MB	1.4 MB	400 kB	180 kB	120 kB
800 x 560	1.3 MB	1.3 MB	370 kB	170 kB	110 kB
400 x 300	350 kB	350 kB	100 kB	50 kB	30 kB
400 x 280	330 kB	330 kB	90 kB	50 kB	30 kB

✓ JPEG image file size

JPEG image file size varies greatly depending on objects. Use the file size values in this table as guideline.

17.4 DS-Qi1Mc

DS-Qi1Mc is a monochrome DS camera head that has a 2/3-inch image pickup device of 1.5 megapixels (1.3M pixels). DS-Qi1Mc has an image pickup device cooling function for cooling up to an ambient temperature of -10°C.

Screen items that change when DS-Qi1Mc is used

When DS camera head DS-Qi1Mc is used, the following screen items change.

- **Image mode selection item:** [IMG MODE] submenu in the [CAM MENU: CAMERA] long window
- **Image adjustment setting item:** [CAM MENU: IMAGE] screen
- **Recording mode selection item:** [REC MODE] submenu in the [CAM MENU: SHOT/REC] window
- **Cooling temperature setting:** [OTHERS] area in the [SETUP MENU: MAIN] screen
- **Exposure time setting range:** [EXP TIME] submenu in the [CAM MENU: CAMERA] long window (1 ms to 600 s)

Image modes available for DS-Qi1Mc

The image pickup device operating mode when capturing an image with the DS camera head is referred to as “image mode”.

Select an image mode from the [IMG MODE] submenu in the [CAM MENU: CAMERA] long window.

- **Image mode:**
Set the image pickup device operating mode. Image size and live image display speed change according to the selection, and the capacity of image file stored when the image is captured changes.

Note: For details of setting items, see the table below.



Select image mode (operating mode for the image pickup device).

Selecting Image Mode (DS-Qi1Mc)

Image Modes Available for DS-Qi1Mc

Image Mode	Read Mode	Scan Method	Frame Rate	Recommended Number of Recording Pixels	Setting	Use
FULL (Initial setting)	All pixels read	Progressive	19 fps	1280 x 1024	Obtains information of all pixels of the image pickup device. High-definition images can be obtained. We also recommend this mode for long-time exposure. We recommend this mode normally.	High-definition image recording/display
2x2 (Binning)	Double integration	Progressive	31 fps	640 x 480	Adds image pickup device's pixel output in units of 2 x 2 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases four times.	Added image recording/display
4x4 (Binning)	Quadruple integration	Progressive	48 fps	320 x 240	Adds image pickup device's pixel output in units of 4 x 4 (horizontal x vertical) to obtain an image. This mode is effective for capturing dark objects because the sensitivity increases 16 times.	Added image recording/display
ROI-L	ROI (720p)	Progressive	24 fps	1280 x 720	Clips a portion around the center of image pickup device horizontally into strips to display an image. The upper 1/7 and lower 1/7 of the screen become black strips. This mode is effective if an angle of view of 16:9 (high definition) is required.	Fast partial image recording/display
ROI-S	ROI (480p)	Progressive	32 fps	640 x 480	Expands 640 x 480 pixels around the center of image pickup device to entire screen to display an image. When an image is captured, entire screen is displayed.	Fast partial image recording/display

Image adjustment when DS-Qi1Mc is used

DS-Qi1Mc is a monochrome DS camera head. It differs from a color DS camera head in the following.

- **No white balance setting:**
Because there is no need to set white balance, the [WHITE BL] button is not provided in the common area of the [CAM MENU].
- **No color adjustment:**
There is no color adjustment items (RB adjustment, chroma, hue, and sharpness) in the [CAM MENU: IMAGE] screen. Adjust brightness, color effect (only monochrome/negative), black level, and contrast.



Image Adjustment Items (DS-Qi1Mc)

Setting recording mode when DS-Qi1Mc is used

Image source, image size, and file type to be stored when an image is captured are set with the [REC MODE] submenu of the [CAM MENU: SHOT/REC] screen.

- **Image source:**
Select live image or full image as an image to be captured.
- **Image size:**
Selectable sizes are displayed in the buttons according to image mode and image source.
- **File type:**
Select the type of image to be stored. The capacity of image file to be stored varies depending on image size and file type settings.



Setting Recording Mode (DS-Qi1Mc)

Note: For details of setting items, see the table below.

Selection of Image Source (Live Image and Full Image)

Choice	Setting
Live Image	An image is saved based on the live image on the monitor when the image is captured. Image resolution varies depending on the image size setting, but the image on the monitor is recorded as it is in principle.
Full Image	An image is saved based on the image pickup device output when the image is captured. When [2x2] or [ROI] image mode is selected, image size on the monitor is small. However, if the recording mode is set to [FULL], a high-definition image can be saved based on the output of all pixels of the image pickup device when the image is captured.

Image Size Setting

Image Mode	Image Size (Live Image)		Image Size (Full Image)	
	Monochrome 8 bits	RAW 12 bits	Monochrome 8 bits	RAW 12 bits
FULL	1280 x 1024 640 x 512 320 x 256	1280 x 1024	1280 x 1024 640 x 512 320 x 256	1280 x 1024
2x2	640 x 480 320 x 240	640 x 480		
4x4	320 x 240	320 x 240		
ROI-L	1280 x 720	1280 x 720		
ROI-S	640 x 480 320 x 240	640 x 480		

File Size of Each File Type

Image Size	BMP Format	TIFF Format	JPEG Format FINE	JPEG Format NORMAL	JPEG Format BASIC	RAW Format (TIFF)
1280 x 1024	3.8 MB	3.8 MB	1.1 MB	510 kB	340 kB	2.6 MB
1280 x 720	2.7 MB	2.7 MB	780 kB	360 kB	240 kB	1.8 MB
640 x 512	960 kB	960 kB	260 kB	120 kB	80 kB	—
640 x 480	900 kB	900 kB				600 kB
320 x 256	240 kB	240 kB	65 kB	30 kB	20 kB	150 kB
320 x 240	230 kB	230 kB				—

✓ JPEG image file size

JPEG image file size varies greatly depending on objects. Use the file size values in this table as guideline.

Saving an image file in RAW format

The DS-Qi1Mc allows you to save an image file in the RAW format.

In the RAW format, 12-bit monochrome RAW data is saved as a TIFF format image. This storage format is suitable for processing images using a PC. Saving an image in the RAW format has an advantage of reducing the image file capacity to about 2/3 of the conventional TIFF format.

Note the following when you save images in the RAW format.

- If capturing image source is set to [LIVE] in the [REC MENU] in the [CAM MENU: SHOT/REC] screen, an image of the same size as the image mode set at the time is saved. Similarly, if the image source is set to [FULL], an image of a size of 1280 x 1024 pixels is always saved.
- In the RAW format, only live image is saved during capturing because data from the camera is saved as it is. No image of 2-window or comment/measurement can be saved with this format.
- A RAW-format image file saved in the DS-L3 may not be displayed with the PC's browser.
- A RAW-format image saved in the DS-L3 is darker than an image saved in other formats.

Setting cooling temperature of image pickup device

DS-Qi1Mc has an image pickup device cooling function for cooling up to an ambient temperature of -10°C. While DS-Qi1Mc is in use, cooling temperature setting items are displayed in the [OTHERS] area of the [SETUP MENU: MAIN] screen.

Pressing the [COOLING TEMP] button displays the submenu. Select a cooling temperature [-5°C] or [-10°C]. Then press the [SAVE] button in the [SETUP MENU: MAIN] screen to save the setting.



Select cooling temperature.

Setting Cooling Temperature (DS-Qi1Mc)

17.5 DS-Ri1

DS-Ri1 is a color DS camera head that has a 2/3-inch image pickup device of 1.5 megapixels (1.3M pixels). DS-Ri1 has an image pickup device cooling function for cooling up to an ambient temperature of -10°C.

Screen items that change when DS-Ri1 is used

When DS camera head DS-Ri1 is used, the following screen items change.

- **Image mode selection item:** [IMG MODE] submenu in the [CAM MENU: CAMERA] long window
- **Image adjustment setting item:** [CAM MENU: IMAGE] screen
- **Recording mode selection item:** [REC MODE] submenu in the [CAM MENU: SHOT/REC] window
- **Cooling temperature setting:** [OTHERS] area in the [SETUP MENU: MAIN] screen
- **Exposure time setting range:** [EXP TIME] submenu in the [CAM MENU: CAMERA] long window (1 ms to 600 s)
- **Pixel shift function:** When NIS-Elements is used

Image modes available for DS-Ri1

The image pickup device operating mode when capturing an image with the DS camera head is referred to as “image mode”.

Select an image mode from the [IMG MODE] submenu in the [CAM MENU: CAMERA] long window.

- **Image mode:**
Set the image pickup device operating mode. Image size and live image display speed change according to the selection, and the capacity of image file stored when the image is captured changes.

Note: For details of setting items, see the table below.



Selecting Image Mode (DS-Ri1)

Image Modes Available for DS-Ri1

Image Mode	Read Mode	Scan Method	Frame Rate	Recommended Number of Recording Pixels	Setting	Use
FULL (Initial setting)	All pixels read	Progressive	19 fps	1280 x 1024	Obtains information of all pixels of the image pickup device. High-definition images can be obtained. We also recommend this mode for long-time exposure. We recommend this mode normally.	High-definition image recording/display
ROI-L	ROI (720p)	Progressive	24 fps	1280 x 720	Clips a portion around the center of image pickup device horizontally into strips to display an image. The upper 1/7 and lower 1/7 of the screen become black strips. This mode is effective if an angle of view of 16:9 (high definition) is required.	Fast partial image recording/display
ROI-S	ROI (480p)	Progressive	32 fps	640 x 480	Expands 640 x 480 pixels around the center of image pickup device to entire screen to display an image. When an image is captured, entire screen is displayed.	Fast partial image recording/display

Setting recording mode when DS-Ri1 is used

Image source, image size, and file type to be stored when an image is captured are set with the [REC MODE] submenu of the [CAM MENU: SHOT/REC] screen.

- **Image source:**
Select live image or full image as an image to be captured.
- **Image size:**
Selectable sizes are displayed in the buttons according to image mode and image source.
- **File type:**
Select the type of image to be stored. The capacity of image file to be stored varies depending on image size and file type settings.



Select image source (live or full), image size, and file type

Note: For details of setting items, see the table below.

Setting Recording Mode (DS-Ri1)

Selection of Image Source (Live Image and Full Image)

Choice	Setting
Live Image	An image is saved based on the live image on the monitor when the image is captured. Image resolution varies depending on the image size setting, but the image on the monitor is recorded as it is in principle.
Full Image	An image is saved based on the image pickup device output when the image is captured. When [ROI] image mode is selected, image size on the monitor is small. However, if the recording mode is set to [FULL], a high-definition image can be saved based on the output of all pixels of the image pickup device when the image is captured.

Image Size Setting

Image Mode	Image Size (Live Image)	Image Size (Full Image)
FULL	1280 x 1024, 640 x 512, 320 x 256	1280 x 1024, 640 x 512, 320 x 256
ROI-L	1280 x 720	
ROI-S	640 x 480, 320 x 240	

File Size of Each File Type

Image Size	BMP Format	TIFF Format	JPEG Format FINE	JPEG Format NORMAL	JPEG Format BASIC
1280 x 1024	3.8 MB	3.8 MB	1.2 MB	560 kB	375 kB
1280 x 720	2.7 MB	2.7 MB	860 kB	400 kB	265 kB
640 x 512	960 kB	960 kB	290 kB	130 kB	90 kB
640 x 480	900 kB	900 kB			
320 x 256	240 kB	240 kB	75 kB	35 kB	25 kB
320 x 240	230 kB	230 kB			

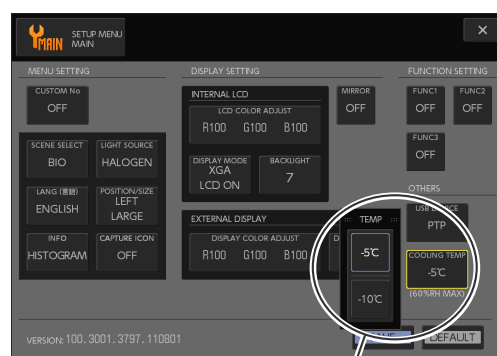
✓ JPEG image file size

JPEG image file size varies greatly depending on objects. Use the file size values in this table as guideline.

Setting cooling temperature of image pickup device

DS-Ri1 has an image pickup device cooling function for cooling up to an ambient temperature of -10°C. While DS-Ri1 is in use, cooling temperature setting items are displayed in the [OTHERS] area of the [SETUP MENU: MAIN] screen.

Pressing the [COOLING TEMP] button displays the submenu. Select a cooling temperature [-5°C] or [-10°C]. Then press the [SAVE] button in the [SETUP MENU: MAIN] screen to save the setting.



Select a cooling temperature.

Setting Recording Mode (DS-Ri1)

Pixel shift function

When DS-Ri1 is used, the pixel shift function is available using the PC application NIS-Elements.

High-definition shooting using the pixel shift function is made available by connecting the DS-L3 to a PC with a USB cable and using the NIS-Elements. For details of this function, see the NIS-Elements instruction guide.

Note: When capturing a high-definition image using the pixel shift function, slight operation sound is generated from the moving part in the DS camera head, but this is not a problem.

This chapter describes items to check if the system does not function as you expected, and meaning and handling of the warning messages.

Incorrect use might prevent this system from providing primary performance even though the system is not damaged. If a symptom such as those in the following table occurs, take action as described in the table before requesting repair.

If a problem that is not listed in the table occurs or if a problem that occurred is not resolved by taking action as described in the table, disconnect the power cable of the device, and then contact your nearest Nikon representative.

The following table lists issues only for operating the DS-L3 main body and DS Camera Head. For issues on using the DS-L3 connected to the Nikon microscope, see the separate "Microscope Operation" instruction manual.

18.1

Power Supply

Symptom	Possible cause	Action
The power does not come on.	The AC adapter is not connected.	Connect the DC output cable of the attached AC adapter to the 12VDC IN connector of the DS-L3.
	The power supply cord is connected incorrectly to the AC adapter.	Use the specified power supply cord to plug the AC inlet of the AC adapter into the AC outlet.
	The power switch is off.	Pressing the power switch turns on the power of the DS-L3. Pressing again the power switch turns off the power of the DS-L3.
The power is turned off.	The Power Save Timer is working.	If no button is pressed during a predetermined period, this system enters the standby status automatically. It returns from the standby when any action is taken. Change the auto power save setting on the [SETUP MENU: ADDITIONAL] window.
The device is hot when touched.	The system is used in a hot or confined space.	Use the DS-L3 within the operating environment described in "21 Major Specifications". When having an unusual odor such as a burning smell, turn off the power switch, disconnect the power plug of the AC adapter, and request repairs.

18.2

Image Output

Symptom	Possible causes	Action
Images are not displayed on the embedded monitor.	The DS camera head is not connected.	Turn off the DS-L3, and using the attached DS camera cable, securely connect the Camera Out connector of the DS camera head to the Camera connector of the DS-L3.
	The C mount cap is attached on the DS camera head.	Remove the C mount cap.
	The subject image does not enter the optical device.	Set the subject image to be captured correctly.
	The optical path of the optical device is not set in the camera side.	Set the optical path correctly.
	The illumination or exposure setting of the optical device is improper.	Use illumination appropriate for the subject to adjust exposure properly.
Images are not displayed on the embedded monitor. (when the external monitor is connected)	The display of the embedded monitor is set to off.	Change the setting of the [DISPLAY MODE] button in [INTERNAL LCD] of the [SETUP MENU : MAIN] window.

Symptom	Possible causes	Action
Images are not displayed on the embedded monitor. (when the external monitor is not connected)	Connection to the external monitor is removed in a state where images are output to only the external monitor.	Connect the external monitor.
		Reset the output setting of the embedded monitor and external monitor. (Turn on the power of the DS-L3 again, turn off it while the Power indicator is blinking, and then turn on the power again.)
Images are not displayed on the external monitor.	Cables are connected incorrectly.	Use the commercial DVI cable (digital/analog) to connect the DVI-I connector of the DS-L3 to the video input connector of the external monitor.
	The external monitor does not support the video format of the DS-L3.	Use an XGA, SXGA, or 720p-capable external monitor.
A noise shows up in the edge of the screen when projecting images onto a monitor or projector.	The phase of output signals does not accord with the display device.	Press the [LCD CHART] button in the [SETUP MENU : ADDITIONAL] window to display LCD charts for a monitor, and adjust a clock phase and clock pitch in the display device (for details on the adjustment, see the instructions manual of the display device). To exit, press the [X] button on the top right.

18.3 Menu Operation

Symptom	Possible causes	Action
The screen cannot be operated.	The embedded monitor is operated without using a stylus.	Use the attached stylus for operating the embedded monitor. When the stylus cannot be prepared, operate the screen by a light touch with your fingertips. Do not touch the screen with a sharp or hard object.
	The display of the external monitor cannot be operated.	When images are output to only the external monitor, connect a USB mouse to the DS-L3 and then operate the display.
The detected position does not match the position touched with the stylus.	The touch panel detecting position is deviated.	Calibrate the touch panel.

18.4 View of Images

Symptom	Possible cause	Action
The image blurs.	The optical device is out of focus.	Bring the optical device into focus by operating the focus drive or focusing ring.
	The aperture diaphragm is closed too much when using the microscope.	Adjust the aperture diaphragm to 70 to 80 percent of the numerical aperture of the objective, or 70 to 80 percent of the pupil of the objective.
	The magnifying power of the optical device is too much.	As a guide, use 500 to 1000 times the numerical aperture of the objective for the magnifying power.
	The electronic zoom is being used for observation.	Use of the electronic zoom may cause an image to blur depending on the magnification.
	The sharpness setting is low.	Revise the setting of [SHARPNESS] in the [CAMERA MENU : IMAGE] window.
		For the external monitor, adjust the sharpness setting for the monitor.
	The system is used in a place subject to frequent vibration.	Use the system in a stable, vibration-free place.
	The exposure time is too long.	If setting the exposure time long for a subject in motion, the subject is blurred. Change the exposure mode to shutter priority or manual, and set the exposure time to a fast value. When there is difficulty in focusing a dark subject, it is recommended to use focus priority.

Symptom	Possible cause	Action
The image is too dark or too bright.	Illumination for the subject is improper.	Adjust the illumination correctly.
		Adjust surrounding illumination correctly.
	The exposure is not adequate.	In program AE or focus priority mode, perform exposure compensation. Or set the photometry area and photometry mode properly.
		In shutter priority mode, set the exposure time properly, or perform exposure compensation. Or set the photometry area and photometry mode properly.
		In manual exposure, set the exposure time and camera gain properly.
	The image adjustment is improper.	Set the CHRM, HUE, or contrast properly in the [CAMERA MENU: IMAGE] window.
	The image adjustment of the monitor is improper.	Adjust the display image quality of the monitor properly.
The contrast is low.	The illumination is too bright or too dark.	Adjust brightness of the illumination properly.
		Adjust the exposure.
	Light around the subject affects contrast.	Darken the interior, or put the cap on the binocular region for a microscope.
	In the optical device (microscope) side, the setting of field diaphragm and aperture diaphragm is improper.	Adjust the field diaphragm to near the size circumscribing the field. Adjust the aperture diaphragm to 70 to 80 percent of the numerical aperture of the objective.
	In the optical device (microscope) side, filter selection is improper.	For a phase contrast microscope or interference microscope (dual beam or multiple), insert the specified filter. For negative-positive images, generally, inserting a green interference filter (GIF) improves contrast. When a complementary color filter of the color of the specimen is inserted, contrast becomes strong.
	The contrast of the subject itself is low.	Consider the illumination or microscopy method.
	The image adjustment is improper.	Set the CHRM, HUE, contrast, or SFT properly in the [CAMERA MENU: IMAGE] window.
	The image adjustment of the monitor is improper.	Adjust the display image quality of the monitor properly.
Color reproducibility is not good.	The color temperature of the illumination is improper.	Adjust the illumination of the optical device so that the subject is seen in the right color.
	The illumination is too bright or too dark.	Adjust brightness of the illumination properly.
		Adjust the exposure.
	The white balance is not set properly.	Obtain the white balance under the same conditions as for the observation and photography.
	The setting of the camera gain is too high.	Adjust the camera gain properly.
	The image adjustment is improper.	Set the CHRM, HUE, or contrast properly in the [CAMERA MENU: IMAGE] window.
	The color balance of the monitor is improper.	Adjust the color balance of output signals properly in the [Setup Menu : Main] window.
	The image adjustment of the monitor is improper.	Adjust the display image quality of the monitor properly.
The image quality is rough.	The camera gain is set too high.	Noise due to a high camera gain causes roughness of the image. Adjust the brightness adequately and then adjust the camera gain and the exposure time.

18.5 Saved Image Quality

Symptom	Possible causes	Action
Size of the saved image is too small.	The image mode (control mode of the image pickup device) is set other than [FULL].	Change the image mode to settings achieving a high-definition image.
	The image source of the record mode (actually captured image) is set to [Live Image].	Set the record mode to [FULL IMAGE] on the CAM [MENU: SHOT/REC] window. Save a file based on the output image of all components of the image pickup device at the time of capture.
	The image size of the record mode (actually captured image) is set to a small value.	Change the image size of the record mode to a large value on the CAM [MENU: SHOT/REC] window.
	The file type of the image is set to JPEG BASIC.	Select BMP or TIFF for [REC] setting on the CAM [MENU: SHOT/REC] window. To use the JPEG format, select JPEG NORMAL or JPEG FINE.
The overlay information cannot be read because the resolution of an acquired image is low.	The resolution of a saved image is low.	Change the settings of the image mode and record mode (image source, image size, and file type).
The timing is off even if an image is temporarily stopped.	The frequency of updating live images is slow.	Select the image mode so that the frequency of updating images (frame rate) becomes high. Select the settings of the record mode achieving the desired resolution.

18.6 Image Saving

Symptom	Possible cause	Action
An image cannot be saved onto the recording medium.	The recording medium is not inserted correctly.	Insert the CF card to the card slot or connect the USB memory stick to the USB port of the DS-L3 correctly.
	The Compact Flash (CF) card (Type I) is not used.	Use the CF card (Type I).
	The CF card or USB memory is not formatted.	Format the card by pressing the [FORMAT] button on the [SETUP MENU: FILE] window.
	This system does not support the recording medium in use.	Use the supported recording medium.
	The remaining space of the recording media is insufficient.	Replace the media with media having sufficient remaining space.
		Delete saved images to make room.
		Format the media by pressing the [FORMAT] button on the [SETUP MENU: FILE] window.
The saved image cannot be read.	An error exists in the settings of Media Dir.	Check that the desired folder is set as Media Dir correctly.
	The settings of the save folder and the playback folder are incorrect.	Check that the folder is correctly set as a playback folder.
	The recording medium is damaged.	Replace the recording medium.

18.7 System Operation

Symptom	Possible cause	Action
Date or time is incorrect.	The AC adapter remains disconnected for a long period of time.	If the AC adapter remains disconnected for a long period of time, the backup function declines, and the inner clock is reset. Connect the AC adapter and turn on the power, and set the correct date and on the [SETUP MENU: ADDITIONAL] window.
The mouse does not work properly or at all.	It is a Nikon non-proven component.	Use a component whose operation has been proven by Nikon.
	Two tiers of USB hubs are used.	Use only a single-tier hub.

18.8 Network

Symptom	Possible cause	Action
The system cannot access the network. (A PING cannot be passed between the PC and DS-L3)	The network cable is not connected properly.	Connect it correctly.
	The network cable is not correct.	Check that the category of the network cable is correct for the network.
		Use a straight cable to connect the system via the hub.
		Use a cross cable to connect the system directly to the network connector of the personal computer without using the hub.
	The network settings are not correct.	Set the network correctly. Take particular note of the setting of the IP address or network enablement. To perform data transmission and reception between different network groups, make sure to specify the gateway address.
	DHCP is set in the environment where no DHCP server is installed.	To assign IP addresses dynamically using DHCP, the DHCP server must be connected to the network.
The DS-L3 cannot be accessed from a web browser. (Although a PING can be passed from the PC to the DS-L3, an error occurs if the IP address of the DS-L3 is accessed from a browser.)	The firewall is set.	Change the setting.
	The proxy setting of the PC has a defect.	Add the IP address of the DS-L3 to the exception setting.
Even if displaying ROOM1 in a web browser, live images are not displayed.	A firewall is set.	Change the settings of the firewall.
	Java installed in the PC is not the latest version.	Be sure to install the latest version of Java.
No image can be saved in the FTP server. (Although a PING can be passed from the DS-L3 to the FTP server, images cannot be saved in the FTP server.)	The FTP client function of the DS-L3 is not enabled.	Enable [FTP CLIENT] in the [SETUP MENU : NETWORK] window, and set required items correctly.
	Settings on the FTP server are not correct.	Check that the FTP server operates. Check that the access right is set correctly.
	The login account to the FTP server is not correct.	Enter the correct user ID and password.
	The firewall is set.	Change the setting.
Images are overwritten when saved in the FTP server.	The file name is not created automatically.	Select the [DATE] checkbox in the [SETUP MENU: FILE] window to set the automatic file name based on the date and time setting.

18.9 USB-related Operation

Symptom	Possible causes	Action
Cannot be connected normally.	The setting of the USB device of the DS-L3 is improper.	Correctly set [USB DEVICE] in the [OTHERS] area of the [SETUP MENU : MAIN] window according to connected devices or intended use.
	The performance of the PC does not satisfy the required specifications for using the DS-L3.	Use a PC satisfying requirements.
	A computer or OS which the DS-L3 does not support is used.	The DS-L3 supports PCs where the following OS is running: • Windows 7 Macintosh is not supported.
	The USB device driver is not installed correctly to the PC.	To use the DS-L3 as the external media of the PC (for setting PTP), install a USB host driver made by Microsoft Corporation. Note: Operating may be abnormal if using the device driver attached with the USB board. To use the NIS-Elements (for setting Vendor), install the dedicated device driver and microscope device driver.
Cannot transmit data normally.	USB 2.0 or USB 1.1-certified products are not used for each USB board, USB cable, and USB hub.	Use USB 2.0 or USB 1.1-certified products for each USB board (on the PC), USB cable, and USB hub. When connecting USB 1.1-certified products, the transfer rate is slower than that of USB 2.0-certified products.
	Two USB hubs are used.	Keep a USB hub up to one tier.
When downloading images in a row, the same image is downloaded.	Images are downloaded at intervals shorter than five seconds.	Images are updated once every five seconds. If files are read out at intervals shorter than five seconds, the latest image cannot always be obtained.
A warning is displayed in the PC.	A USB 1.1 port is connected.	The warning representing "A USB device connected to a USB hub which is not high-speed" that is displayed in the task tray of the PC indicates that the DS-L3 is connected to a USB 1.1 port. This is not an error. Note: The DS-L3 operates as a USB 1.1 device.

18.10 Printing

Symptom	Possible cause	Action
The image cannot be printed by a PictBridge compatible printer.	The printer is not connected properly.	Connect a printer to the USB (D) connector of the DS-L3.
	The power to the printer is not turned on.	Turn on the power to the printer. If the power is on, turn off and then turn on the power to the printer and retry printing.
	The USB device mode setting is not correct.	To connect a PictBridge printer, set [USB DEVICE] to [PRINTER] in the [OTHERS] area of the [SETUP MENU : MAIN] window.
	Consumables such as paper and ink run out.	Refill or replace the consumables by referring to the instruction manual of the printer and retry printing.

18.11 Warning Message List

Displayed information	Description	Action
NO MEDIA	Media is not connected.	Recording media is not connected. Connect recording media.
MEDIA HAS A PROBLEM.	Writing to the recording media failed.	Check the setting of the destination to save images, and select recording media having sufficient space. When the recording media approaches the end of life, replace it with new recording media.
OUT OF MEDIA SPACE	The recording media does not have free space needed for saving images.	Replace the recording media, or delete unnecessary files from the recording media and perform capture operation again.
Cannot be saved. (MEDIA LOCKED)	Because the protection switch of the recording media is on (write inhibit), the file cannot be written.	Set the protection switch of the recording media to off.
MEDIA ERROR	Unsupported media is connected.	Replace the media with another media the DS-L3 supports.
Cannot be deleted. (MEDIA LOCKED)	Because the protection switch of the recording media is on (write inhibit), the file or folder cannot be deleted, or the media cannot be formatted.	Set the protection switch of the recording media to off.
Cannot be deleted. (MEDIA LOCKED)	Because the attribute (property) of the folder or file is "Read only", they cannot be deleted.	Connect the recording media to the PC, and change the file or folder to a writable state (clear the checkbox for "Read only" of the attribute (property)).
FTP HAS A PROBLEM.	Images cannot be saved in the FTP server.	Check the network settings. Before saving images, perform a PING test and login test to check that you can successfully connect to the network.
NO PRINTER	The printer is not connected.	Connect the printer.
	The power of the printer is off.	Turn on the printer.
PRINTING FAILED.	For some reason, the print process could not be completed.	Check whether or not the printer runs out of paper or ink.
DESTINATION NOT SPECIFIED (DESTINATION)	The output destination at the time of capture is not specified. Or, the setting of the output destination is invalid.	Check the setting of the operating allocation at the time of capture, and select the output destination according to the current DS-L3 state.
FILE ALREADY EXISTS.	When trying to save an image, a file or folder with the same name has been found on the recording media.	Set the automatic creation of the name of a folder or file, or change the destination folder to save the folder or file to save it.
FILE READING FAILED.	For some reason, the specified file could not be refreshed.	Specify files supported by the system.
FILE JPEG ERROR	For some reason, the JPEG file could not be expanded (refreshed).	The JPEG file may be corrupted. When this error occurs for another captured image, replace the recording media.
WHITE BALANCE FAILED.	The white balance could not be obtained correctly.	Prepare a uniform subject and set the white balance again.
SD CALCULATION FAILED.	The metering of shading failed.	Prepare a uniform subject and meter shading again.
CAMERA MENU DISABLED	Because startup processing is in progress, the menu of the camera control window cannot be operated.	Operate the menu after the DS-L3 completely starts up.
NO CAMERA	The DS camera head is connected incorrectly.	Turn off the DS-L3, attach the DS camera head correctly, and then turn on the power again.
CANNOT GET IP FROM DHCP	An IP address could not be acquired from a DHCP server.	If a DHCP server exists on the network, check the connection status of the network. If no DHCP server exists, set a DHCP server not to be used in the [SETUP MENU : NETWORK] window.

Displayed information	Description	Action
INCORRECT PASSWORD	A wrong password was entered for editing the authentication setting of the internal server.	Enter the correct password.
PC APPLICATION FAILED TO START.	The startup of the PC application could not be detected.	Start up the PC application and perform the processing again.
PC APPLICATION BUSY	Because the PC application is working, communication cannot be performed.	Check the state of the PC application, after confirming that it is now ready to communicate, perform the processing again.
SYSTEM ERROR	A critical error occurred inside the system.	Turn on the system again. If this error occurs frequently, please contact your supplier.
INTERNAL ERROR	A critical error occurred inside the system.	Turn on the system again. If this error occurs frequently, please contact your supplier.
REBOOT REQUIRED	An item requiring restart is set in the setup menu.	Restart the DS-L3 to enable the settings.

18.12 For Inquiries

In order to answer your inquiry immediately, please check the following contents beforehand and contact your supplier.
(photocopy and fill out this form)

Date of entry : / /

Contact Information			
Company			
Division			
Contact name			
Address			
Phone number		E-mail address	

Product Information			
Date of purchase	/ /	Store name	
DS-L3	Serial no. [] Version * []	* You can find the version number at the lower left of the [SETUP MENU: MAIN] screen.	
DS camera head	Model []	Serial no.	[]
Accessories	Provide information of CF card, USB drive, USB mouse, microscope, etc. used with the product. Manufacturer [] Model [] Manufacturer [] Model [] Manufacturer [] Model []		

Product Environment			
Temperature	°C	Humidity	%
External device connection	<input type="checkbox"/> Network <input type="checkbox"/> Microscope	<input type="checkbox"/> External monitor Model []	<input type="checkbox"/> EXT I/O connector []
Power supply	<input type="checkbox"/> With a ground <input type="checkbox"/> Without a ground		

PC and Related Information (for a PC related problem)			
PC	Manufacturer [] Memory capacity []	Model [] CPU and frequency []	
OS	<input type="checkbox"/> Windows 7 32 bit <input type="checkbox"/> Windows 7 64 bit <input type="checkbox"/> Other []		
PC connection	<input type="checkbox"/> USB Cable length [] m <input type="checkbox"/> Network		
Application software	<input type="checkbox"/> NIS-Elements Package [] <input type="checkbox"/> Other Product name []	Version [] Version []	

Problem Details	
First occurred	<input type="checkbox"/> immediately after product introduction <input type="checkbox"/> during use <input type="checkbox"/> when product was turned on for the first time after changing peripheral device connections <input type="checkbox"/> after firmware upgrade for DS-L3 <input type="checkbox"/> after firmware upgrade for the camera head <input type="checkbox"/> after OS upgrade for the PC <input type="checkbox"/> other []
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Occasionally (Number of occurrence: [] times, every [] hours)
Symptom	Please let us know about the problem as detailed as possible to the best of your knowledge. For image-related defects, please provide any example images, if possible.

This chapter provides technical information for connecting external I/O devices to the EXT I/O connector of the DS-L3.

Inputting a trigger signal from the external device to the EXT I/O connector of the DS-L3 enables trigger capture.

When connecting the DSC connector of the Nikon MIC Ni series or Ci series, images can be captured by button operation on the side of the MIC.

Note: Before connecting external I/O devices, make sure to turn off the DS-L3 and external devices.

19.1

Functions of the EXT I/O Connector

The EXT I/O connector has the following three functions:

(1) Perform capture operation when a capture signal is input from external

As in the case of capturing by pressing the [CAPTURE] button of [CAMERA MENU], this function operates the DS camera head in normal image mode (FULL, 2x2, 4x4, FAST, ROI-L, ROI-S, and C.SCAN), and capture an image when a capture signal is input.

The circuit related to capture is represented at the part from 3 pin to GND shown in the circuit diagram on the next page.

- **Capture input signal** : Capturing by switch-on (close) between 3 pin and GND

(2) Perform trigger capture when a trigger signal is input from external (supported DS camera heads: DS-Qi1Mc)

This function operates the DS camera head in trigger mode combining it with the NIS-Elements.

The circuit related to trigger capture is represented as the whole of the circuit diagram shown in the next page.

- **Trigger input signal** : Triggered by switch-off (open) between 3 pin and GND

Note: The logic is opposite to that of capture.

(3) Output a synchronous signal to external devices

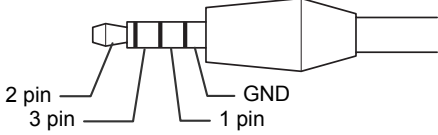
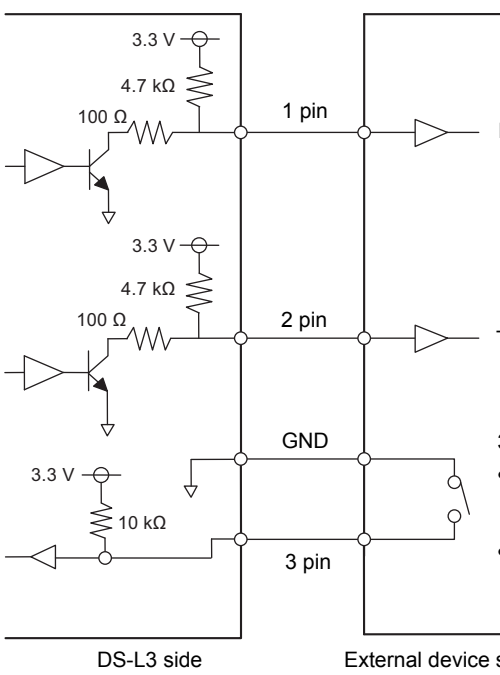
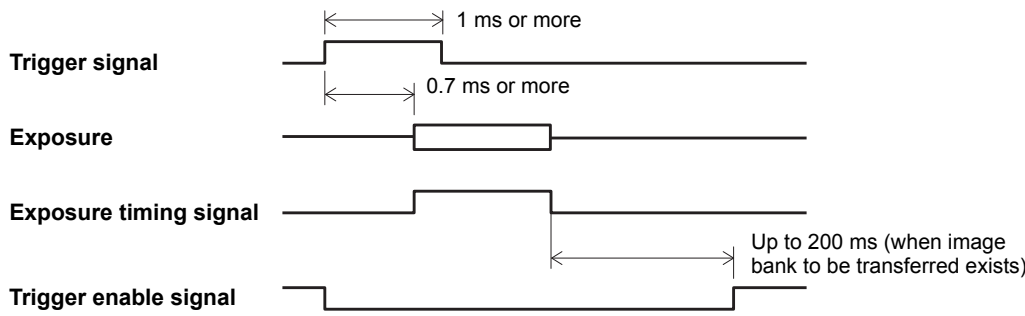
When capturing images (including capture by trigger operation), an exposure timing signal is output to the external device to notify the camera status.

The circuit related to a synchronous signal is represented at the part from 1 pin to GND shown in the circuit diagram on the next page.

- **Exposure timing signal** : Between 1 pin and GND, Lo Active

19.2 Specifications of External I/O Devices

To prepare an external I/O device, select the product satisfying the following specifications.

Connection connector	<p>ø3.5 4-pole pin mini-plug</p> <ul style="list-style-type: none"> 1 pin: Exposure timing signal (Output : HI active) 2 pin: Trigger enable signal (Output : HI active) 3 pin: External trigger (Input : HI active) 
Connection circuit diagram	 <p>DS-L3 side</p> <p>External device side</p> <p>3 pin (input pulse width: 1 ms or more)</p> <ul style="list-style-type: none"> In trigger mode: trigger signal (triggers exposure to start when switch-off state) In other modes: capture signal (captures the image when switch-on state) <p>Note: A TTL/LVTTL-level signal also can be input to 3 pin.</p> <p>In trigger capture, exposure is performed by detecting the rising edge of a trigger signal. At this time, values set in advance from PC applications such as the NIS-Elements are used for the exposure time and camera gain.</p>
Signal timing	<p>The following describes the timing sequence of trigger capture:</p>  <ul style="list-style-type: none"> There is a time lag of up to 0.7 ms from when a trigger signal is input until exposure starts. Once a trigger signal is input, the next trigger signal is not received until the next capture becomes available. Therefore, a trigger signal input during this period is invalid. After the rising edge of a trigger enable signal, trigger signals can be input. For details on how to operate trigger capture, see the instructions attached with your application software.

This chapter describes how to maintain the system.

To prolong the performance of this system, Nikon recommends you to perform daily maintenance.

20.1 Cleaning Utensils and Consumables

Cleaning utensils

- Soft-tip brush ^{Note}
- Soft cloth (nonwoven cloth, cotton cloth, or gauze) ^{Note}

Note: Use the cleanroom wiper in the cleanroom.

Consumables

- Neutral detergent (only when the product main body is very dirty)
- Absolute alcohol (ethyl alcohol or methyl alcohol) (for cleaning the surface of the monitor)

20.2 Cleaning the DS-L3 Main Body

- Wipe off stains on the DS-L3 main body or cables with a soft cloth or others. If the product is very dirty, gently wipe stains using gauze moistened with a small amount of diluted neutral detergent.
- Do not use organic solvent (such as alcohol, ether, and thinner) on coated parts, plastic parts, or printed parts. It causes discoloration or exfoliation of printed characters.
- Gently wipe off stains on the surface of the panel of the embedded monitor with a soft and clean cotton cloth, lens tissue, or gauze. Only if the lens becomes dirty with fingerprints or grease stains, slightly dampen a piece of soft, clean cotton cloth, lens tissue, or gauze with absolute alcohol (ethyl or methyl alcohol) and gently wipe away the stains.
 - Since absolute alcohol is highly flammable, be careful in handling it so that it does not ignite.
 - Observe the manufacturer's handling instructions when handling absolute alcohol.

20.3 Cleaning the DS-Camera Head

- Wipe off stains on the DS camera head main body with a soft cloth or others in a state where the C mount cap is attached. If the product is very dirty, gently wipe stains using gauze moistened with a small amount of diluted neutral detergent.
- Do not use organic solvent (such as alcohol, ether, and thinner) on coated parts, plastic parts, or printed parts. It causes discoloration or exfoliation of printed characters.
- Blow off duct in the mount of the DS camera head with an air blower.

! Cleaning in the DS Camera Head

Blow off duct in the mount of the DS camera head with an air blower. However, do not touch the components in the DS camera head as far as possible. Especially, never touch the glass filter on the front of the image pickup device.

When the glass filter of the image pickup device is touched, or dust adhered to the glass filter cannot be removed, make sure to ask your supplier cleaning.

20.4 Cleaning Optical Devices

Prevent dust or fingerprints from being attached to the lens of optical devices. Stains on the lens degrade the visibility of images.

For details on how to clean optical devices, see the instructions of your optical device.

20.5 Storage

- When the product is not in use, turn off the power. When the product is not used for a long period of time, unplug the power supply cord of the AC adapter.
- Store the product in a location satisfying the storage environment conditions described in “Chapter 21 Major Specifications”.
- Store this system in a location with low humidity where mold is unlikely to form.
- Make sure to attach the C mount cap to store the DS camera head.
- During storage, place a plastic cover over the equipment to prevent dust accumulation
Before placing the plastic cover, turn off the power switch for the DS-L3 and wait for the DS-L3 to cool down.

20.6 Periodic Inspections (Charged)

Periodic inspections are recommended in order to maintain the performance of this system. Consult your Nikon representative for details about periodic inspections.

This chapter provides a summary of major specifications of the DS-L3 and each DS camera head.

21.1

DS Camera Control Unit DS-L3

Model	DS camera control unit DS-L3
-------	------------------------------

Image recording

Shooting mode	Single shooting / Continuous shooting (Shooting count: 2 to 999 exposures / Loop, Interval of continuous shooting: 10 s, 15 s, 20 s, 30 s, 45 s, 60s , 1 m 30 s, 2 m, 3 m, 4 m 30 s, 6 m, 10 m, 15 m, 20 m, 30 m, 45 m, 60 m, 1 h 30 m, 2 h, 3 h, 4 h 30 m, 6 h)
Recording media	CF card (Compact flash card Type I-capable) USB memory (FAT16 / FAT32-capable)
File format	<p>For using a color DS camera head:</p> <p>BMP: Uncompressed 24 bits</p> <p>TIFF: Uncompressed 24 bits</p> <p>JPG FINE: Compression ratio approx. 1/4</p> <p>JPG NORMAL: Compression ratio approx. 1/8</p> <p>JPG BASIC: Compression ratio approx. 1/16</p> <p>For using a monochromatic DS camera head:</p> <p>BMP: Uncompressed 8 bits</p> <p>TIFF: Uncompressed 8 bits</p> <p>JPG FINE: Compression ratio approx. 1/4</p> <p>JPG NORMAL: Compression ratio approx. 1/8</p> <p>JPG BASIC: Compression ratio approx. 1/16</p> <p>RAW: Uncompressed 12 bits (Only for DS-Qi1Mc)</p>
Exif information	Comply with Exif 2.2
Log save	Text format, log 40 characters

Camera control

Scene mode	IND.: Four types (Wafer I/C, Metal, CIR Board, FPD) BIO : Five types (DF/FL, BF, DIC/PH, HE, ELA) OTHER : One type (Asbestos)
Custom mode / Custom setting	Seven types (User-settable, Custom 1 to Custom 7)
Exposure mode	Program AE / Shutter priority / Focus priority / Manual
Photometry mode	Average photometry / Peak photometry, AE lock available
Photometry area	Small / Medium / Large / Custom Photometry area movable, Photometry area size changeable, Photometry area displayable
Exposure compensation	-2EV to +2EV, 1/3EV step
Electric shutter	<p>Program AE: For DS-Fi2: 130 μs to 1s (For ROI-S: 130 μs to 60 ms) For DS-Fi1/Fi1c: 1 ms to 1 s (For ROI-S: 1ms to 60 ms) For DS-Vi1: 1 ms to 1 s (For C.SCAN: 1ms to 60ms) For DS-Ri1/Qi1Mc: 1 ms to 1 s</p> <p>Shutter priority / Manual: 130 μs, 150 μs, 200 μs, 300 μs, 400 μs, 600 μs, 800 μs, 1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms, 6 ms, 8 ms, 10 ms, 15 ms, 20 ms, 30 ms, 40 ms, 60 ms, 80 ms, 100 ms, 150 ms, 200 ms, 300 ms, 400 ms, 600 ms, 800 ms, 1 s, 1.5 s, 2 s, 3 s, 4 s, 6 s, 8 s, 10 s, 15 s, 20 s, 30 s, 40 s, 60 s, 80 s, 100 s, 150 s, 200 s, 300 s, 400 s, 600 s (48 levels) For DS-Fi2: 130 μs to 60 s For DS-Fi1/Vi1c: 1 ms to 60 s For DS-Fi1c/Ri1/Qi1Mc: 1 ms to 600 s</p> <p>Focus priority: For DS-Fi2: 130 μs to 150 ms For DS-Fi1/Fi1c/DS-Vi1/Ri1/Qi1Mc: 1 ms to 150 ms</p>
Camera gain (ISO sensitivity)	Program AE / Shutter priority: 100 to 630 Focus priority: 100 to 4600 Manual: 100, 120, 140, 170, 200, 240, 280, 340, 400, 480, 560, 680, 800, 960, 1130, 1360, 1600, 1920, 2250, 2700, 3200, 3840, 4600 (23 levels)

Image processing

Shading correction	OFF, 10%, 20%, 30%, 40%, 50%, User-settable (User SD1 to User SD7)	
White balance	Setting method, Red / Blue gain adjustable	
Contrast (tone) compensation	Seven types (WIDE D / WEAK / STD / STRONG / LINEAR / METAL / ENH)	
Contour processing (sharpness)	Nine-level switch style (-3: soft to +5: sharp)	
Hue adjustment	-50 to +50 (1 step)	
Saturation adjustment	-50 to +50 (1 step)	
Brightness	20 to 260 (1 step)	
RB adjustment	50 to 150 (1 step)	
Black level	-50 to +50 (1 step)	
Special effect (color effect)	Five types (COLOR / B&W / NEGA / BLUE-B / SEPIA; only B&W / NEGA are available for a monochromatic camera)	
Noise reduction (NR)	Available (On / Off)	
Setting clear items	Temporary stop Clear → Live image display Electric zoom 1x (when including image mode change) Scene / Custom OFF Exposure compensation 0 Camera gain Clear (exposure mode: for PROG) Image mode FAST (DS-Fi2 / DS-Fi1 / DS-Fi1c) FULL (DS-Vi1 / DS-Ri1 / DS-Qi1Mc) Exposure mode PROG Photometry mode Average Photometry area Large Frame No change Customize / Move Center AE lock OFF FUNC1 to FUNC3 No change in function assignment Brightness 100 RB adjustment 100, 100 CHRM 0 HUE 0 Color effect COLOR (DS-Fi2 / DS-Fi1 / DS-Fi1c / DS-Vi1 / DS-Ri1) B&W (DS-Qi1Mc) SFT 0 Contrast STD Sharpness 2 NR OFF SD OFF Continuous shooting mode, drive, log save, record mode No change Playback Playback image clear → Movie display Magnification for electric zoom during playback, the end of playback, after switching two-window mode on/off 1x Dual-window Single window	

Tool functions

Length measurement	Two points distance, perpendicular measurement, measurement of distance between center points of two circles, angular measurement, circular measurement, area measurement, pitch measurement
Calibration	OFF, M1 to M7 (seven types registerable) Inputting optical device information / Using user registration data
Annotation	Count marking, text input, pen drawing (line, curve), scale display, cross, grid, X scale (cross scale), XY measurement
Scale / measurement information	Embedded in an image, and saved in CSV format

Display processing part

LCD monitor	8.4-inch TFT LCD monitor (1027 x 768, XGA)
Back light	Nine levels (1 to 9)
External output format	Digital (DVI standard 1.0-compliant) or analog RGB (0.7 Vp-p) [75Ω] SXGA / 720p / XGA selection SXGA 1280 x 1024 @ 60 Hz non-interlaced 720p 1280 x 720 @ 60 Hz non-interlaced XGA 1024 x 768 @ 60 Hz non-interlaced Synchronous signal Vertical / Horizontal separation (TTL VESA standard-compliant)
Screen freeze (temporary stop)	Available
Zoom display	Electric zoom 1 to 16 times, zoom position movable
Playback display	One exposure display / Thumbnail display (9 exposures) CF card, USB memory playback
Dual-window display	Still image ^(Note1) and live image, replayed image and live image, still image ^(Note1) and still image ^(Note2) , replayed image and live image ^(Note2) (display position movable) Note 1: Image when window is changed to the two-screen mode (live image not available with this mode) Note 2: Image by the [FREEZE] button (press [FREEZE] for live image)
Operation menu display	CAMERA (MAIN) / IMAGE (ADV1) / NR/SD/SET (ADV2) / SHOT/REC (ADV3) / VIEW / TOOL / T.BAR / INFO / SETUP
Language setting	Japanese / English
Date setting	Year / Month / Date / Hour / Minute
Power save timer	00 (off), 01 to 60 minutes
Level meter	Nine levels for exposure (three-color four-series indicator glow mode)
Focus indicator	Contrast detection mode, 12 levels
Histogram	Available
Image reverse	Horizontal (right and left reverse), vertical (up and down reverse), 180-degree rotation
Capture sound volume	OFF, 1 to 7 (seven levels)

I/O connector

Camera interface	LVDS 3 pairs
CF card	Type I (only CF cards are supported)
USB (D) connector (USB 2.0 device interface)	PTP function (PC connection) / Vender unique function (PC connection) / Direct print function (PictBridge-compatible printer connection)
USB (H) connector (USB 2.0 host interface)	Two systems USB memory (FAT16/FAT32-capable), USB mouse, USB keyboard, Nikon microscope (For applicable models, refer to the separate "Microscope Operation" instruction manual.)
DVI-I connector	For connecting external monitors (XGA/SXGA/720p) VESA DDC2B-compliant, plug & play function-capable
Power jack	For connecting AC adapter 2 pins (polarity: center minus)
10/100Base-T connector	For connecting network (IEEE802.3-compliant, 10Base-T / 100Base-TX, DHCP-capable) HTTP server function (web browser display, image transfer) Telnet server function (DS-L3 control) FTP server function (image transfer) FTP client function (image transfer)

Power

Input rating	12 VDC $\pm 5\%$, 2.5 A
Power consumption	70 VA (for connecting DS camera head, DS AC adapter)

Others

Outer dimensions (width x height x depth)	230 x 200 x 52 mm
Weight	Approx. 1.8 kg
Fixed part structure	Standard stand (stand style of free stop hinge) VESA (75 mm) arm stand / UL1678-applicable stand, fixable to the mount (The mounting hole is common to the standard stand)
Operating environment	Temperature: 0 to +40°C Humidity: 60% RH Max. (no condensation) Altitude: 2000 m Max. Pollution degree: Degree 2 Overvoltage category (AC adapter): Category II Electric shock protection class: Class I Only for indoor use
Storage environment	Temperature: -20 to +60°C Humidity: 90% RH Max. (no condensation)
Acoustic Noise	Less than 70 dB

21.2

DS Camera Head

DS Camera Head

	DS-Fi2	DS-Fi1	DS-Vi1
Image pickup device	5.24 million pixel interline CCD for 2/3 square pixel		2.11 million pixel interline CCD for 1/1.8 square pixel
Color / Black and white	Color		
Infrared blocking filter	Embedded		
Maximum frame rate ^{Note}	10 (FULL) 18 (2x2) 29 (4x4) 21 (FAST) 19 (ROI-L) 37 (ROI-S)	5.9 (FULL) 10 (2x2) 17 (4x4) 12 (FAST) 12 (ROI-L) 23 (ROI-S)	15 (FULL) 27 (2x2) 29 (FAST) 29 (C.SCAN)
Number of recording pixels	2560 x 1920 1280 x 960 1280 x 480 640 x 480		1600 x 1200 1600 x 560 800 x 600 800 x 560 400 x 300 400 x 280
Quantization	14 bit	12 bit	
Sensitivity	Equivalent to ISO 64 (Contrast: Standard, Camera sensitivity: For setting x1)		Equivalent to ISO 100 (Contrast: Standard, Camera sensitivity: For setting x1)
Lens mount	C mount Protrusion dimensions from the mount surface to the inside of the camera: 10 mm or less Image circle: ø11 mm		C mount Protrusion dimensions from the mount surface to the inside of the camera: 10 mm or less Image circle: ø8.9 mm
Outer dimensions	82 (W) x 77.5 (D) x 48 (H) mm	77 (W) x 76 (D) x 44 (H) mm	
Weight	270 g	260 g	
Fixed tripod mount	Tripod screw for the camera		
Body color	White		
Image pickup device cooling	None		

Note: Description surrounded by parentheses indicates the control mode for the image pickup device (image mode).

DS Cooled Camera Head

	DS-Qi1Mc	DS-Fi1c	DS-Ri1
Image pickup device	1.50 million pixel interline CCD for 2/3 square pixel	5.24 million pixel interline CCD for 2/3 square pixel	1.50 million pixel interline CCD for 2/3 square pixel
Color / Black and white	Monochromatic	Color	
Infrared blocking filter	None	Embedded	
Maximum frame rate ^{Note}	19 (FULL) 31 (2x2) 48 (4x4) 24 (ROI-L) 32 (ROI-S)	5.9 (FULL) 10 (2x2) 17 (4x4) 12 (FAST) 12 (ROI-L) 23 (ROI-S)	19 (FULL) 24 (ROI-L) 32 (ROI-S)
Number of recording pixels	1280 x 1024 1280 x 720 640 x 512 640 x 480 320 x 256 320 x 240	2560 x 1920 1280 x 960 1280 x 480 640 x 480	1280 x 1024 1280 x 720 640 x 480
Quantization	12 bit		
Sensitivity	Equivalent to ISO 800 (Contrast: Standard, Camera sensitivity: For setting x1)	Equivalent to ISO 64 (Contrast: Standard, Camera sensitivity: For setting x1)	Equivalent to ISO 200 (Contrast: Standard, Camera sensitivity: For setting x1)
Lens mount	C mount Protrusion dimensions from the mount surface to the inside of the camera: 10 mm or less Image circle: ø11 mm		C mount Protrusion dimensions from the mount surface to the inside of the camera: 5 mm or less Image circle: ø11 mm
Outer dimensions	77 (W) x 76 (D) x 44 (H) mm		
Weight	290 g	290 g	350 g
Fixed tripod mount	Tripod screw for the camera		
Body color	Black		
Image pickup device cooling	Peltier cooling		

Note: Description surrounded by parentheses indicates the control mode for the image pickup device (image mode).


21.3

AC Adapter

Model	EA1050E-120
Manufacturer	EDAC POWER Electronics Co., Ltd.
Input rating	100-240 VAC $\pm 10\%$, 50-60 Hz, 1.8 A Max.
Output rating	12 VDC $\pm 5\%$, 3.5 A Max.
Power cord	For using at 100-120V areas: UL listed detachable cord set, 3 conductor type (3 conductor grounding Type SVT, NO.18 AWG, 3m long maximum, rated at 125V AC minimum) For using at 220-240V areas: Approved according to EU/EN standards, 3 conductor type (3 conductor grounding Type H05VV-F 1 mm ² , 3m long maximum, rated at 250V AC minimum) For using in Japan: Detachable cord set with a PSE mark, 3 conductor type (3 conductor grounding Type VCTF 3x0.75mm ² , 3m long maximum, rated at 125V AC minimum)
Outer dimensions (length x width x height)	120 (L) x 60 (W) x 35 (H) mm
Weight	253 g (not including the power cord)
Operating environment	Temperature: 0 to +40°C Humidity: 10 to 90% RH (no condensation)
Storage environment	Temperature: -20 to +85°C Humidity: 5 to 90% RH (no condensation)
Safety standards	C-UL-US and GS listed, and CE and PSE compliant

21.4

Others

Applicable standards	<ul style="list-style-type: none"> • C-UL-US listed • FCC Part 15B Class A <p>Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.</p> <ul style="list-style-type: none"> • CAN ICES-003 (A) / NMB-003 (A) • Australian EMI (AS/NZS CISPR22) • VCCI-A <p>Note: This is a Class A product based on the standard of the VCCI Council. If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.</p> <p>CE marking</p> <ul style="list-style-type: none"> • Low Voltage Directive • EMC Directive 
Compliance standards	<ul style="list-style-type: none"> • Exif (Exchangeable image file format) Version 2.2 <p>Note: This standard is intended to enhance the coordination between a digital camera and printer and get high-quality print output easily. When using a printer compatible with this standard, optimal print output is provided by using capture information. For details, see the instructions of your printer.</p> <ul style="list-style-type: none"> • PictBridge <p>Note: Each manufacturer of digital cameras and printers insures the interconnection according to this standard. This standard is for directly printing images of a digital camera on a printer without a PC.</p>