DIGIMICRO

Counter
MFC-200
User's Manual

Thank you for purchasing the Nikon DIGIMICRO Counter MFC-200.

Read thoroughly this user's manual before starting operation to be sure of getting optimum performance and longer service life from the unit.

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About WARNING and CAUTION symbols used in the manual

Nikon products are designed with full consideration of safety. However, improper use or failure to observe precautions may result in injury or damage to property. Thoroughly read this user's manual before you use the product, and use the product appropriately. We recommend that you download or bookmark the manual so that you can refer to it whenever necessary.

This manual uses the following symbols to highlight what requires special attention for safety. Be sure to follow the instructions with those symbols.

Symbol	Description
⚠ **WARNING**	Failure to follow the instructions may result in death or a serious injury.
⚠ **CAUTION**	Failure to follow the instructions may result in injury or property damage.

⚠ WARNING

1. Purpose of Using the Product

This product is designed to be connected to the DIGIMICRO MF-501 or MF-1001 to indicate the travel distance on a digital display. Do not use the product for any purposes other than its intended use.

2. Do Not Disassemble or Modify

Do not disassemble or modify the product. Such actions may cause a malfunction and/or electrical shock. If you notice an abnormality, contact your local Nikon representative.

3. Check the AC Adapter

This product gets its power from an AC adapter. Be sure to use the product with the dedicated AC adapter. Use of any other AC adapter is extremely hazardous as this may cause a failure, abnormal heat generation, or fire.

[Specified AC adapter]

AC adapter	: ATS065T-P120
Input rating	: 100 to 240 VAC, 1.4 A
Output rating	: 12 VDC ±5%, 5 A
Type	: Center negative
Safety standards	: UL, cUL, GS, PSE, BSMI, CB, RCM, CCC, KC, PSB, EAC, BIS, NOM, SMARK, ISC, ST-COA, SII, SABS, COC+LOA, UKCA

- To prevent any failure or fire, do not use the AC adapter in a poorly ventilated narrow place. Do not cover or place anything on the AC adapter as doing so may obstruct heat dissipation, resulting in abnormal heat generation.
- To prevent any failure or malfunction, always ensure that the power of the product is turned off before connecting the AC adapter.

4. Connections to the AC Power Cord of the AC adapter

Connect the socket of the power cord to the AC inlet on the AC adapter.
Plug in the other end of the cord to an AC line outlet with the ground conductor (earth conductor).
Use only the power cord set described below.

[For 100 to 120 V area]

- Use only UL listed, detachable cord set, 3 conductor grounding type SVT No. 18 AWG rated at 125 V, 7 A minimum.
- In the case of using the extension cord, use only the power cord with the PE (protective earth) wire.

[For 220 V to 240 V area]

- Use only the 3 pole power cord set, which must be approved according to EU/EN standards.
- Class I equipment should be connected to PE (protective earth) terminal.
- In the case of using the extension cord, use only the power cord with the PE wire.

⚠ WARNING

5. Do Not Splash Water or Allow Foreign Matter to Enter the Product

To prevent the product from a failure or abnormal heat generated by a short circuit, never wet the product or any other devices used with it or allow them to be contaminated by foreign matter. If they should get wet or foreign matter such as a piece of paper should get inside the product or peripheral devices, immediately turn off the power of this product, and then remove the AC power cord of the AC adapter from the outlet. Avoid operating the product in this condition and contact your local Nikon representative.

6. Do Not Excessively Bend or Twist the Power Cord and Cables

Do not excessively bend or twist the power cord and cables. Such actions may damage the cord or cables, causing an ignition or fire.

⚠ CAUTION

1. Turn the Power OFF before Installation or Cable Connection/Disconnection

To prevent any failure or malfunction, always turn off the power when installing the product or connecting or removing the cables.

2. Do Not Connect Unauthorized Devices to Connectors on the Rear Panel

To prevent any failure or accident, do not connect any product other than those shown in the user's manual to the connectors on the rear panel of the product.

3. Precautions for Installation and Storage

- Be careful not to get your fingers or hands pinched.
- This product is precision equipment. In order to prevent any failure and maintain accuracy, always handle the product with sufficient care and avoid applying a shock or strong vibrations.
- If the product is not to be used for a long time, turn off the power of this product and remove the AC power cord of the AC adapter from the outlet.
- To prevent any malfunction, securely connect the grounding terminal and the frame terminal of the AC power cord of the AC adapter to the ground. In addition, install the product away from sources generating noise (for example, high-voltage wires, high-current circuits, or high-power relays).

Notes on the use of the product

Handle with care

This product is precision equipment. Handle the product carefully to avoid shock.

Installation

Install the product in a stable, vibration-free place. Do not install the product near direct sunlight, in an excessively dusty environment, or in a place subject to extreme temperature change. Do not use the product in an environment that exceeds the operating temperature range (0°C to 40°C).

Function switches

Always turn off the power when setting the functions.

AC adapter

This product gets its power from an AC adapter. Always use the dedicated AC adapter.

Acrylic panel

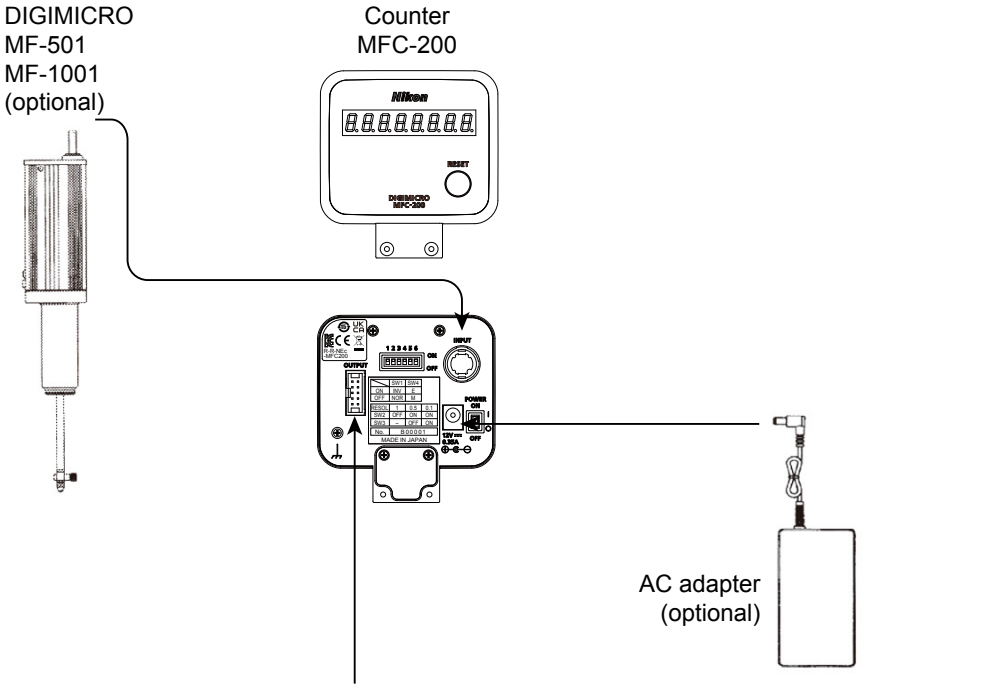
The front panel of the product is made of acrylic. Avoid using organic solvents or the like to clean the panel, as doing so might cause whitening on its surface.

Disposal

When disposing of the product, follow the laws and regulations of your country or region.

Table of Contents

1 System Configuration



Manufacturer: Mitutoyo Corporation
Measurement data input unit (optional) (Relevant info)
Printer DP-1VA LOGGER (optional)*1
and
optional printer MF-9P (discontinued model)

Relevant info: Supported units
- IT-020U (Applies to SN:C00001 and after)*1
- IT-016U*1
- IT-007R*1
- USB-ITN-D
- U-WAVE series*2

*1: Cable 936937 is required for connection with the Counter.
*2: Cable 02AZD790D is required for connection with the Counter.

Note:
- The plug of the AC power cord conforms to a two-pole plug with a grounding wire. For an outlet with no grounding slot, use a conversion adapter (optional) as shown in the right and securely connect the grounding wire to a grounded antenna or grounding terminal.

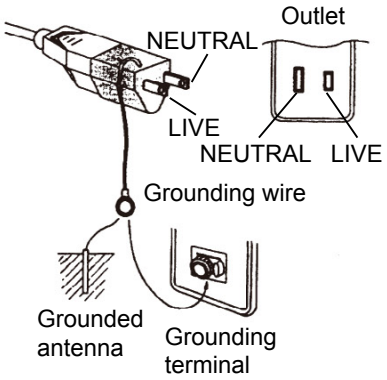
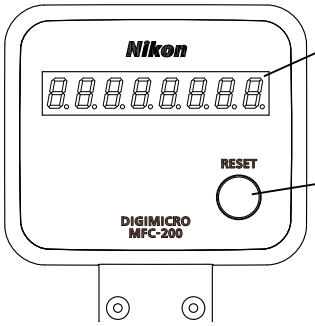


Figure 1

Note:
- If you want to connect and use products other than the above, please contact your local Nikon representative.

2 Names and Functions of Components

2.1 Front



Display

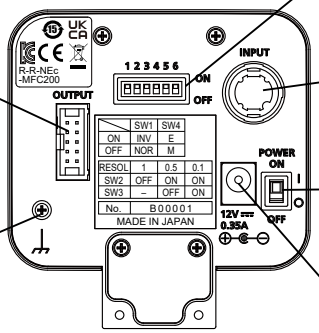
Green LED indicates an 8-digit number (including a minus sign).

RESET switch

Resets the readout to zero.
Also used to reset an error.

Figure 2

2.2 Rear



Output connector

For connection with a printer and measurement data input unit via a dedicated cable

Frame terminal

Used to ground the product.
Nominal screw diameter: M2
Tightening torque: 0.1 Nm

Function switches

Used to set functions (see pages 6 and 7).

Input connector

Used to connect the DIGIMICRO.

Power switch

Turns on or off the product.

Power input connector

For connection with a dedicated AC adapter (optional) (+12 VDC, center negative)

Figure 3

3 Operation

3.1 Setting function switches

⚠ CAUTION

- When setting the function switches, use a long thin tool with a fine tip, such as a bamboo skewer. Attempting to set the switches by using a fingernail might cause injury.

Note: Please set the functions before securing this product to the DIGIMICRO. Once this product is attached to the DIGIMICRO, the DIGIMICRO obscures the function switches making it difficult to change settings.

Set the functions following the instructions on pages 6 and 7.

3.2 Connecting to the DIGIMICRO

⚠ CAUTION

- Care must be taken not to get your fingers caught during installation.
- When removing the product, loosen the screws (two locations) while supporting the product. Be careful not to drop the product.

Secure the product to the DIGIMICRO using the screws provided with the product as shown in Figure 4.

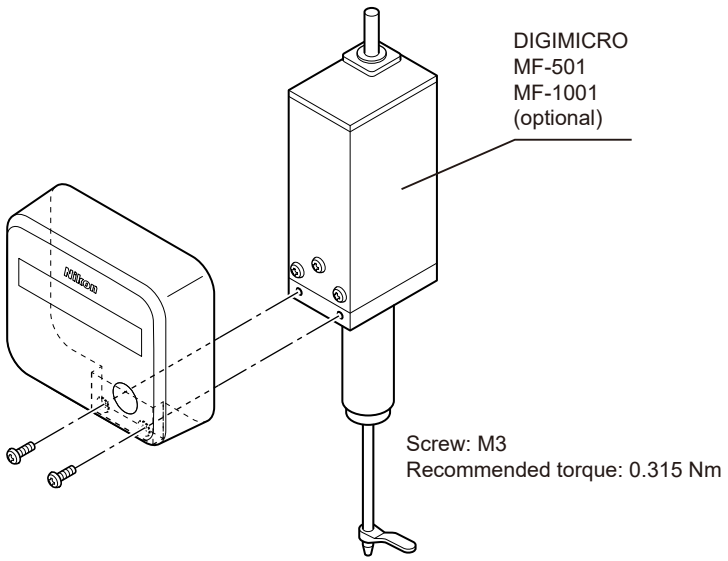


Figure 4

3.3 Connecting an AC adapter and the DIGIMICRO

⚠ WARNING

- Before turning on the product, make sure the dedicated AC adapter is connected. Do not use any other adapter with this product.

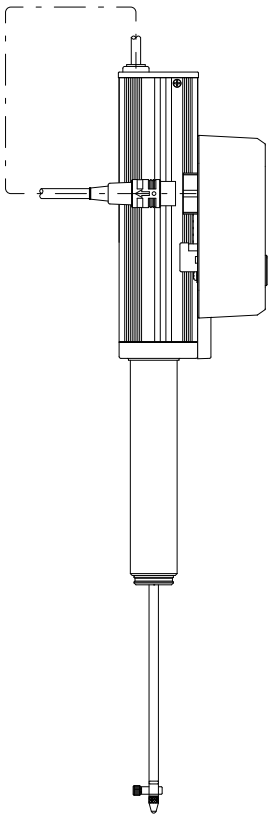
⚠ CAUTION

- Always turn off the power when installing the product or connecting or removing the cables.
- Do not connect devices other than those shown in Figure 1 to the connectors on the rear panel of this product. In addition, securely connect the grounding terminal of the AC power cord.

(1) Make sure that the power of the product is turned off. Then, insert the AC adapter plug into the power input connector and insert the AC power cord plug into a outlet.

Be sure to ground the AC power cord. (See Figure 1 on page 1)

(2) Hold the root of the DIGIMICRO connector and connect it to the input connector so that the white markings on both connectors face each other (see Figure 5).



Notes on connector connection

To connect to the DIGIMICRO:

Hold the root of the connector and connect it so that the white markings face each other.

To remove from the DIGIMICRO:

Hold the tip of the connector (indicated by the arrow) and remove it from the DIGIMICRO.

Connection to the frame terminal

Nominal screw diameter: M2

Tightening torque: 0.1 Nm

Figure 5

3.4 Confirming function switch setting

Turn on the power and check the setting of function switches. If they are not properly set, turn off the power and perform it again from the beginning.

3.5 An example of typical measurement

The figure shown below indicates a case in which the DIGIMICRO MF-501 or MF-1001 (optional) and this product are installed on the DIGIMICRO Stand (optional).

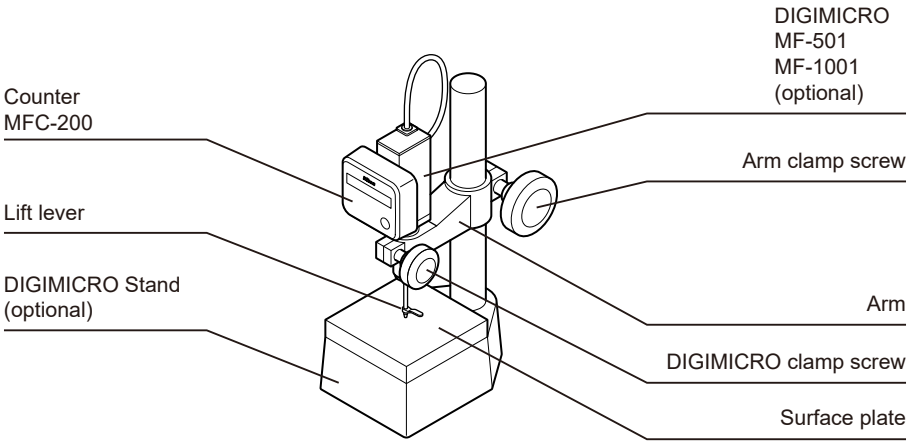


Figure 6

(1) Securing the DIGIMICRO

Secure the stem of the DIGIMICRO to the arm with the DIGIMICRO clamp screw.

Note: Tightening the screw with an excessive force may deform the stem and impair operation.

(2) Moving the DIGIMICRO

⚠ CAUTION

- While tightening the arm clamp screw, always support the arm. Failure to do so may result in falling of the DIGIMICRO together with the arm, causing damage to the DIGIMICRO and surface plate.
- Tightening the head clamp screw and lever without the DIGIMICRO installed may cause equipment failure.

Move the DIGIMICRO together with the arm until the probe comes into contact with the surface plate on the DIGIMICRO Stand, and then secure the DIGIMICRO by manually tightening the arm clamp screw.

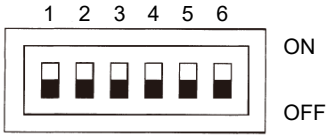
(3) Zero reset

Turn the power on, hold the probe against the surface plate, and press the RESET switch on the product to reset the Counter to zero.

4 Function Switches

⚠ CAUTION

- Always turn off the power when setting the functions.



Initial state

Initial setting SW1 : NOR
SW2 : 1 µm
SW3 : –
SW4 : mm
SW5 : –
SW6 : –

(1) SW1: Setting of direction

Used to match the counting direction to the travel direction of the scale.

SW1 = Off (NOR) : Movement in the positive direction is counted when the scale is moved in a direction in which the spindle rises.

SW1 = On (INV) : Movement in the negative direction is counted when the scale is moved in a direction in which the spindle rises.

(2) SW2 and SW3: Setting of minimum readout

The minimum readout is set by the combination of SW2 and SW3.

Table 1

SW2	SW3	Displayed in mm (SW4 = OFF)	Displayed in inch (SW4 = ON)
OFF	—	1 µm	0.00005”
ON	OFF	0.5 µm	0.00002”
ON	ON	0.1 µm	0.000005”

Table 2 Display format

Minimum readout	Display	Range of counts displayed
1 µm	0.001	-9999.999 to 9999.999
0.5 µm	0.000.5	-999.999.5 to 999.999.5
0.1 µm	0.000.1	-999.999.9 to 999.999.9
0.00005”	0.000.05	-99.999.95 to 99.999.95
0.00002”	0.000.02	-99.999.98 to 99.999.98
0.000005”	0.000.005	-9.999.995 to 9.999.995

(3) SW4: Setting of display unit

SW4 = Off: Display counts in millimeters

SW4 = On: Display counts in inches

(4) SW5: Not used

(5) SW6: Not used

5 Interfacing to External Devices

5.1 Connecting the measurement data input unit

The display data of the product can be sent to a computer.

Supported devices: IT-020U (Applies to SN:C00001 and after), IT-016U, IT-007R, USB-ITN-D, and U-WAVE series (manufacturer: Mitutoyo Corporation)

Please refer to each User's manual for details.

Note: There is no reset command for the measurement data input unit.

5.2 Connecting a printer

The display data of the product can be printed out.

Supported printer: DP-1VA LOGGER (manufacturer: Mitutoyo Corporation) and MF-9P (Discontinued model)

For the operation of the printer, refer to the relevant instruction manual.

5.3 Correspondence between display modes and output data

Table 3

Display format	Display resolution	Display format (data displayed on the Counter)	RS-232C format (data displayed on a computer)	Printer format (data output to the printer)
Length (mm)	1 µm	±9999.999	±9999.999	±999.999 M
	0.5 µm	±999.999.5	±999.9995	±99.9995 M
	0.1 µm	±999.999.9	±999.9999	±99.9999 M
Length (inch)	0.00005”	±99.999.95	±99.99995	±9.99995 I
	0.00002”	±99.999.98	±99.99998	±9.99998 I
	0.000005”	±9.999.995	±9.999995	±9.99999 I

Notes on printer output:

- If the value is out of the range shown in the table, an asterisk, “ ✻ ”, is will be printed.
- DP-1VA LOGGER does not support E mode for printing.

Note on the measurement data input unit:

- The measurement data input unit manufactured by Mitutoyo Corporation features a six-digit display.

6 Error Alarming and Error Handling

Should an error occur, an error code appears. Check the cause of the error and reset the alarm condition.

Table 4

Error code	Cause	How to reset the alarm condition
Error 1	Overspeed • Counting speed has exceeded its limit. • Signal disturbance caused by a fault (e.g. noise)	• Keep clear of any source generating noise. • Press the RESET switch or turn the power off and back on again.
Error 2	Counting overflow • The count value is out of range.	• Press the RESET switch or turn the power off and back on again.
Error 3	CPU runaway • CPU runaway caused by a disturbance (e.g. noise) • Instantaneous failure of power supply	• Turn the power off and back on again. • Keep clear of any source generating noise.
Error 4	Erroneous signal detected • Signal disturbance caused by a fault (e.g. noise) • DIGIMICRO signal failure (e.g. disconnection)	• Keep clear of any source generating noise. • Press the RESET switch or turn the power off and back on again.

If the error persists, refer to “7 Troubleshooting” on page 10.

7 Troubleshooting

Should the product fail to operate properly, locate a possible cause of the trouble by referring to the table below.

Table 5

Trouble	Check to see if:
• Power is not supplied to the product.	• Power supply cable has no problem. • Encoder is properly connected. • The dedicated AC adapter is used.
• Faulty counting • A message “Error X” appears frequently.	• Function switches are properly set. • Connectors are appropriately connected. • DIGIMICRO travel speed is appropriate. • There are no sources generating noise in the vicinity of the product. • Input connector and cable have no problem. • The frame terminal is grounded. • The AC power cord of the AC adapter is grounded.
• No counting	• Input connector and cable have no problem. • The input connector is disconnected.
• Erroneous display	• Function switches are properly set. • There are no sources generating noise in the vicinity of the product. • The frame terminal is grounded.
• Poor accuracy	• No mechanical deflection or play is seen. • No irregular temperature rise is seen. • The stem of the DIGIMICRO is properly tightened with the clamp screws. • Clamping of the clamp screw is not loose. • Excessive load is not applied to the DIGIMICRO.
• Printer error	• The printer and Counter are securely connected with a dedicated cable. (For the operation and handling of the printer, refer to its instruction manual.)
• Communication error with the measurement data input unit	• An appropriate communication cable is used and not broken or disconnected. (For operation and handling of the measurement data input unit, refer to the relevant instruction manual.)

8 Performance and Specifications

1.	Display	: 7-segment green LED, 8 digits (including minus sign), zero blanking, floating minus sign
2.	Minimum reading	: 0.1 µm (Can be switched to 0.5 µm or 1 µm using function switches.)
3.	Response speed	: 500 mm/s (when the DIGIMICRO MF-501 or MF-1001 is connected)
4.	Functions	: Resetting, alarm, connection to a measurement data input unit, connection to printer DP-1VA LOGGER
5.	Power supply	: +12 VDC (when an optional AC adapter is used)
6.	Power consumption	: Approx. 4 W
7.	Operating temperature	: 0°C to 40°C
8.	Storage temperature	: -20°C to 60°C
9.	External dimensions (in mm)	: 80 (width) x 84.3 (height) x 25.5 (depth) (projection not included)
10.	Weight	: Approx. 95 g
11.	Protection class	: Class III
12.	Conforming standards	: CE

EMC Directive
RoHS Directive

This product conforms to EN standards and shows the CE Marking.
This product has been tested and found to comply with the limits for a Class A device, pursuant to EMC DIRECTIVE. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This product must not be used in residential areas.

KC

사용자안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다 .

WEEE

This symbol indicates that this product is to be collected separately.

The following apply only to users in European countries.

- This product is designated for separate collection at an appropriate collection point. Do not dispose of as household waste.
- For more information, contact the retailer or the local authorities in charge of waste management.

UKCA

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAN ICES-3 (A)/NMB-3 (A)

9 Input and Output Connectors

9.1 Input connector

- Model: RP17A-13RA-12SD (manufacturer: Hirose Electric Co., Ltd.),
  12-pin circular connector (receptacle)
- Matching connector: RP17A-13P-12PC (manufacturer: Hirose Electric Co., Ltd.) (plug)

Table 6 Pin assignment and signal names

Pin No.	Signal name	Description	Pin No.	Signal name	Description
1	FG	Frame ground	7	N.C.	Open
2	FG	Frame ground	8	0V	0V power supply
3	Ain	Signal, phase A	9	L+	Power supply for LED
4	Vref	Signal center level	10	0V	0V power supply
5	Bin	Signal, phase B	11	Vcc	+12V power supply
6	Vref	Signal center level	12	0V	0V power supply

9.2 Output connector

- Model: XG4C-1034 (manufacturer: OMRON Corporation)
  10-pin

Table 7 Pin assignment and signal names

Pin No.	Signal Name	I/O	Description
1	0V		Signal Ground
2	DATA	O	Send Data
3	CK	O	Clock to Send
4	(NC)		Open
5	/REQ	I	Request
6	(NC)		Open
7	(NC)		Open
8	(NC)		Open
9	(NC)		Open
10	FG		Frame Ground

10 Accessories

- Clamp screws for the DIGIMICRO x 2 JIS B 1111 cross-recessed pan head machine screw Nominal diameter M3, length 6 mm
- Safety Precautions x 1
- Product warranty x 1

11 Repair

If you need repair, contact your local Nikon representative.

Repairs covered by the warranty

- A natural failure occurred within the warranty period (one year after the date of purchase), and the product warranty is present.
- After repair, the same part failed in normal handling conditions within six months after the date of return from the previous repair, and the relevant documentation for the previous repair is present.

Any other cases constitute out-of-warranty repairs. Store the product warranty so that it is not lost.

For details, contact your local Nikon representative.

12 Contact information

Table 8 Contact information

Region	Company name	Address	Phone
Japan	NIKON CORPORATION	Shinagawa Intercity Tower C, 2-15-3, Konan, Minato-ku, Tokyo 108-6290, Japan	+81-3-6433-3726
China	NIKON PRECISION (SHANGHAI) CO., LTD.	11-12F, Tower 5, Crystal Plaza No. 36, Ping Jia Qiao Road, Pudong New District, Shanghai 200126, China	+86-21-6841-2050
Korea	NIKON INSTRUMENTS KOREA CO., LTD.	21F, City Air Tower, 36, Teheran-ro 87gil, Gangnam-gu, Seoul, 06164, South Korea	+82-2-6288-1900
Europe (Belgium)	NIKON METROLOGY EUROPE NV	Interleuvenlaan 86 3001 Leuven Belgium	+32-16-74-01-01
Europe (UK)	NIKON METROLOGY UK LTD.	Nottingham EMA, Argosy Road Castle Donington Derby DE74 2SA United Kingdom	+44-1332-811-349
USA	NIKON METROLOGY, INC.	12701 Grand River, Brighton Avenue, MI 48116 U.S.A.	+1-810-220-4360

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