Nikon

DIGIMICRO COUNTER
MFC-101A

INSTRUCTION MANUAL

Thank you for purchasing Nikon Digimicro Counter MFC-101A.
Read thoroughly this instruction book before starting operation to be sure of getting optimum performance and longer service life from the unit.

N.B. Export of the products* in this manual is controlled under the Japanese Foreign Exchange and Foreign Trade Law. Appropriate export procedure shall be required in case of export from Japan.
***Products: Hardware and its technical information (including software)**

About WARNING and CAUTION symbols used in the manual

Nikon products are designed with safety taken into consideration. Improper use of the products or a failure to follow the suggestions contained in their instruction manuals may result in personal injury or damage property. Thoroughly read the this instruction manual before you use the equipment. Store the manual in a convenient place so that you can always refer to it whenever you need it.

The warning symbols appearing in the manual are used to indicate where it is required to follow the instructions (safety hints).

Symbols	Description
	Failure of instructions may result in fatalities or a serious injury.
	Failure of instructions may damage personnel or surrounding properties.

⚠WARNING

1. Purpose

   This equipment is designed to indicate the position and linear displacement volume on a digital display with high accuracy, when used in combination with the Nikon Digital Micrometer or Position Scale. Never use it for other purposes. The equipment must be used in strict accordance with this manual to avoid serious accidents and/or personal injuries.

2. Do Not Disassemble.

   Disassembly may cause malfunction and/or electrical shock. Do not disassemble the parts other than those mentioned in this manual. If you notice any malfunction, notify your nearest Nikon representative.

3. AC Adapter

   This instrument gets its power from an AC adapter. Use only the AC adapter described below. Use of nay other AC adapter is extremely hazardous as this may cause equipment failure, abnormal generation of heat, and fire.

   [Specified AC adapter]

   AC adapter : Model SPU 24-105, SPU 25A-105
   (Maker: Sinpro Electronics Co., Ltd.)

   Input Rating : 100 to 240 Vac, 0.7 A

   Output rating : DC12 V, 2A

   - To prevent equipment failure and fire, set the AC adapter in a well-ventilated place. Do not cover up or set anything over the AC adapter as this will obstruct heat radiation and lead to abnormal generation of heat.
   - To prevent equipment failure and malfunction, always ensure that the power switch on the MFC-101A is turned OFF before connecting the AC adapter. (The power is turned OFF when the power switch is not pressed in.)

⚠WARNING

4. **Connections to Power Supply Cord**

   Connect the socket of the power supply cord to the AC inlet on the AC adapter.

   Plug in the other end of the cord to an AC line receptacles with the ground conductor (earth conductor).

   Use only the power supply 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 case of using the extension cord, use only the power supply cord with the PE (protective earth) wire.**

   [For 220 V to 240 V area]

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

5. **Do Not Spill Water**

   The instrument is not made to water-proof structure, therefore, use in the place exposed to water and/or oil shall be avoided. Use in the dusty place shall also be avoided. Case of the instrument shall not be wiped by solvents such as thinner.

⚠CAUTION

1. **Turn the Power OFF during Assembly and Cable Connection/Disconnection**

   To prevent equuipment failure and malfunction, always turn the power OFF (press the power switch on the MFC-101A so that it is not pressed in) during assembly and cable connection.

2. **Connectors on the Back Panel**

   To prevent equipment failure and accidents, do not connect any equipment other than those mentioned in this manual.

3. **Assembly, Installation, and Storage Precautions**

   - **Be careful not get your fingers and hands pinched.**
   - **This product is a precision instrument. In order to prevent equipment failure and to maintain accuracy, avoid use or storage in an inappropriate environment.**
   - **To preven equipment failure, always handle with great care, and avoid impacts and strong vibrations.**
   - **If the instrument is not to be used for along time, the power of the MFC-101A should be turned OFF (the power switch sounld not be pressed in) and the AC adapter should be disconnected.**

Notes on the use of the equipment

1. Handling

This product is a piece of precision gaging equipment. Use of the equipment for any other purpose is not recommended.

2. Installation

Install the equipment on a rigid, vibration-free location. Do not locate the equipment near direct sunlight, in excessively dusty environment or in a place liable to thermal change.

3. Function switches

Turn off power before setting the functions.

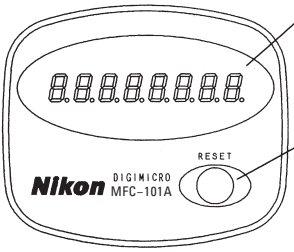
4. AC adapter

The Nikon MFC-101A is powered by the AC adapter. Always use the one designed for the equipment.

Table of Contents

1. Equipment Overview

1) Front panel



Display

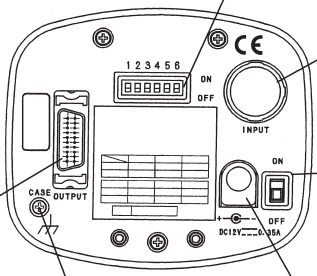
Green LED that indicates a signed (minus) 8-digit number.

RESET switch

Resets the read out to zero. Used to reset an error.

FIG. 1-1

2) Rear panel



Function switches

Used to set the functions (see page 6).

Input connector

Used to connect Digimicro.

Power switch

Turns on and off the MFC-101A.

Output connector

For the connection with a computer (RS-232C interface) and MF-9PW printer via the specified cable

Frame terminal

Power input connector

For the AC adapter provided with the MFC-101A

FIG. 1-2

2. System Configuration

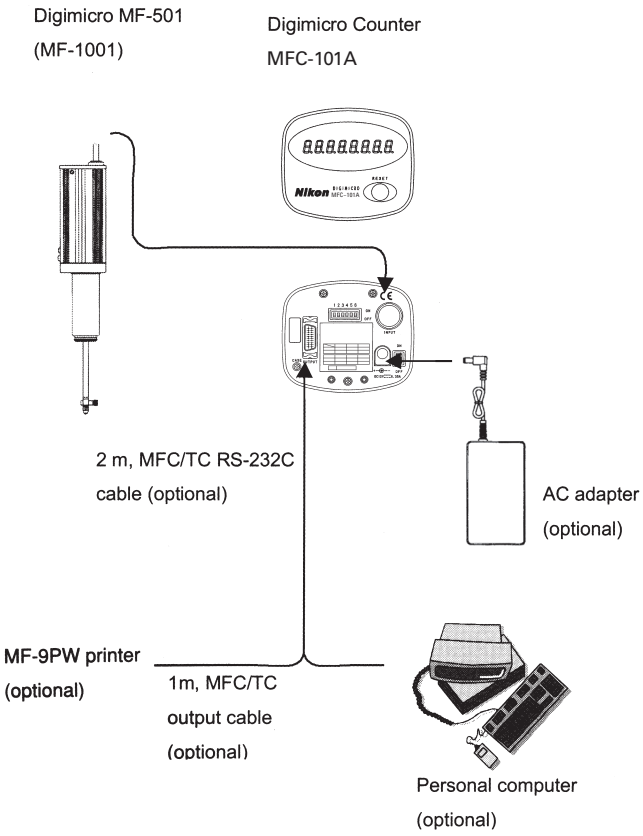


FIG. 2

3. Operation

1) Setting function switches

Set the functions following the instructions in Section 4.

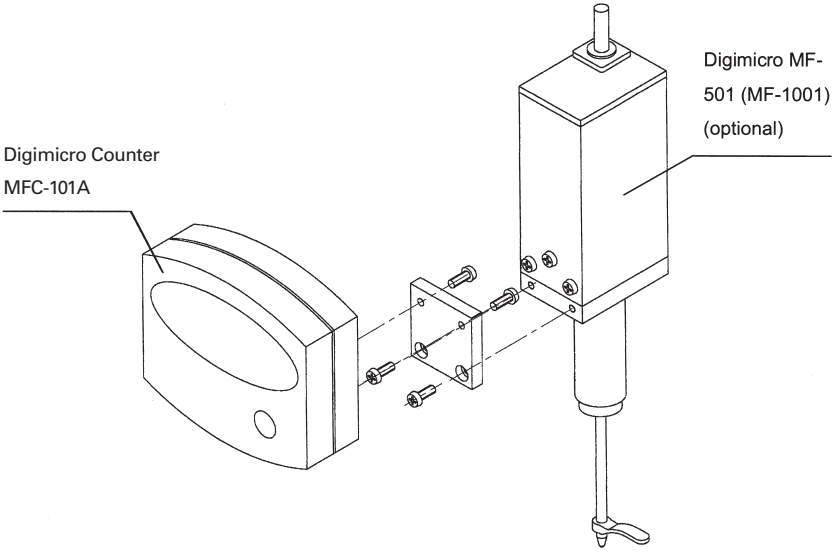
Note: Please set the functions before installing the MFC-101A to Digimicro. The setting of the function switch becomes hard because the switch is hidden in Digimicro after once installed.

2) Connecting to Digimicro

⚠CAUTION

- Care must be taken not to allow your fingers to be caught in during installation.

Secure the MFC-101A to Digimicro using the four screws provided with it as shown in Figure 3.



(The Digimicro MF-501 (MF-1001) and the mounting bracket have already been fitted.)

FIG. 3

3) Connecting AC adapter and Digimicro

⚠WARNING

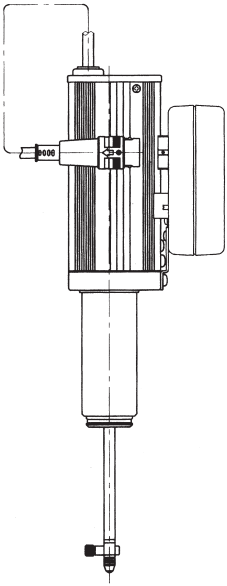
- Make sure the AC adapter designed for the MFC-101A is connected before you turn on the equipment. If any other adapter is used, avoid using it and contact your local Nikon dealer.

⚠CAUTION

- Always turn off the power before connecting or disconnecting the cables connected to the MFC-101A.
- The connectors on the rear panel are provided for connecting the peripheral equipment shown on page 2.

(1) Make sure the power has been turned off before fitting the AC adapter plug to the power input connector and connecting the other end of the connector to a receptacle.

(2) Hold the root of the Digimicro connector and connect to the input connector so that the white markings face each other (see Figure 4).



Notes on connector connection

To fit to the Digimicro:

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

To remove it from the Digimicro:

Hold the tip of connector (near the arrow) and remove it from the Digimicro.

FIG. 4

4) Confirming function switch setting

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

5) An example of typical measurement

The illustration shown below indicates a case in which the MF-501 (MF-1001) Digimicro (optional) and MFC-101A are installed to the measurement stand (optional).

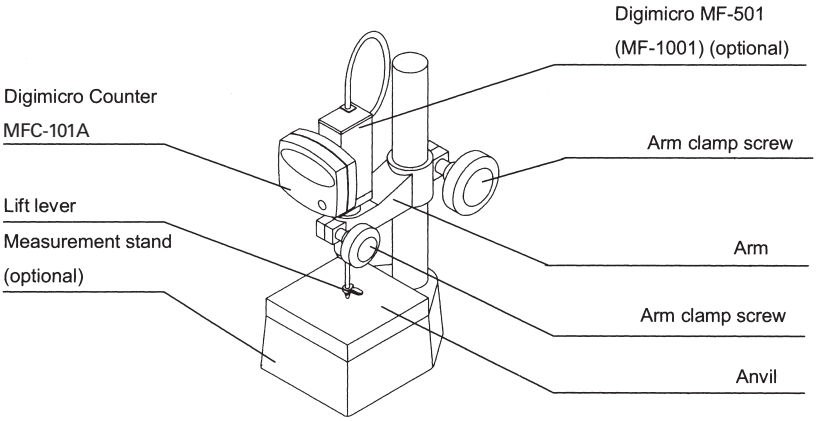


FIG. 5

(1) Securing the Digimicro

Secure the stem of the Digimicro to the arm by tighten the clamp screw.

Note: Tightening the screw with an excessive force may cause the stem out of shape and impair operation.

(2) Moving the Digimicro

Move the Digimicro together with the arm until the probe comes into contact with the anvil on the measurement stand and secure the Digimicro by tightening the arm clamp screw.

⚠CAUTION

- Always tighten the arm clamp screw with the stem supported. Digimicro may fall together with the arm unless you support the arm.

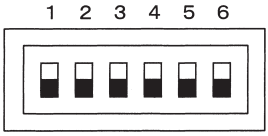
(3) Zero reset

Turn power on and hold the probe against the anvil to reset the Digimicro to zero by pressing the RESET switch of the MFC-101A.

4. Function Switches

⚠CAUTION

- Always turn power off before you set the functions.



Initial state

Initial setting
SW1 : NOR
SW2 : 1 μm
SW3 : —
SW4 : mm
SW5 : —
SW6 : 4800bps

(1) SW1: Setting of direction

Used to make the counting direction correspond to the travel of scale.

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

SW1 = On (INV): Movement in the negative direction is counted when the scale is moved to 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"

Display format **TABLE 2**

Minimum readout	Display	Range of counts displayed
1 μ m	0.001	−9999.999～9999.999
0.5 μ m	0.000.5	−999.999.5～999.999.5
0.1 μ m	0.000.1	−999.999.9～999.999.9
0.00005"	0.000.05	−99.999.95～99.999.95
0.00002"	0.000.02	−99.999.98～99.999.98
0.000005"	0.000.005	−9.999.995～9.999.995

(3) SW4: Setting of display unit

SW4 = Off: Display counts in millimeters

SW4 = On: Display counts in inches

(4) SW5: Not used

(5) SW6: Setting of RS-232C interface baud rate

SW6 = Off: Set the baud rate to 4,800 bps.

SW6 = On: Set the baud rate to 9,600 bps.

For any other interface specifications, see page 9.

5. Error Code List

Should an error occur, an error code appears and an alarm sounds. Take an appropriate action by referring the list shown below.

TABLE 3

Error code	Cause	Resetting
Error 1	Overspeed • Counting speed has exceeded	• Press the RESET switch or turn off power and back on again.
Error 2	Counting overflow • The counting value is out of range	Press the RESET switch or turn off power and back on again.
Error 3	CPU run away • CPU run away caused by a disturbance (e.g. noise) • Instantaneous failure of power supply line	• Turn power off and back on again. • Keep clear of a noise source.
Error 4	Erroneous signal detected • Signal distribution caused by a fault (e.g. noise). • Digimicro signal failure (e.g. disconnection)	• Keep clear of a noise source. Press the RESET switch or turn off power and back on again.
Error 5	RS-232C communication error • An undefined command received. • Overrun error has been detected. • Framing error has been detected. • Signal distribution caused by a fault (e.g. noise).	Check to see if the communications conditions are properly set before pressing the RESET switch or turn off power and back on again.

6. Interfacing to External Devices

1) RS-232C interface

(1) Communications specification

- Data transmission technique : Asynchronous full-duplex transmission
- Data bit length : 8 bits
- Stop bit : 2 bits
- Parity : None
- Delimiter : CR + LF
- Baud rate : 4,800 bps (SW6 = Off), 9,600 bps (SW6 = On)

(2) Transmission data format

- Any data items are transmitted in ASCII characters.
- The transmission data format is fixed to 10 characters (10 data characters + delimiter)

(3) Commands available for RS-232C

TABLE 4

Command	Name	Description
"RX"	Reset	Reset the counter.
"QX"	Request	Output data from the counter when a command is received.

(4) Sample program

```
10 CLS                                  Clear display
20 0PEN"COM:N83NN" AS #1                Open standard line
30 '                                    (8 data bits, 2 stop bits)
40 GOSUB *TIMER                         Timer processing
50 PRINT #1,"RX"                        Send Reset command
60 '
70 FOR LOOP=1 TO 100                    Repeating of communication
80 GOSUB *TIMER                         Timer processing
90 PRINT #1,"QX"                        Send Request command
100 LINE INPUT #1,IBUF$                 Read data sent from MFC-101A
110 PRINT "N=";LOOP,"MFC=";IBUF$        Display data
120 NEXT LOOP                           Repeating of communication
130 '
140 CLOSE #1                            Close standard line
150 END                                 End of communication
160 '
170 *TIMER                              Timer routine
180 FOR I=1 TO 1000:NEXT I
190 RETURN
```

2) Connecting printer

It is possible to output the counting data to a printer by connecting the MF-9PW printer. If you require it, please ask your local Nikon dealer.

3) Correspondence between display modes and output data

TABLE 5

Display format	Display resolution	Display format (data displayed on the counter)	RS-232C format (data displayed on a personal 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

Printer format:

- If the value is out of range shown in the table, an asterisk, "*", is output to a printer.

7. Troubleshooting

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

TABLE 6

Trouble	Check
Power is not supplied to the equipment	• Power input connector securely connected • AC adapter properly connected to a receptacle?
"Error xxx " appears repeatedly. Improper counting	• Function switches properly set? • Connection appropriate? • Digimicro travel speed appropriate? • Heavy noise source nearby? • Input connector and cable OK? • Attempt to ground the frame terminal (CASE).
No counting	• Input connector and cable OK? • Input cable engaged OK?
Erroneous display	• Function switches properly set? • Heavy noise source nearby? • Supply voltage appropriate? • Attempt to ground the frame terminal (CASE).
Poor accuracy	• Free from mechanical deflection, play etc.? • Free from irregular temperature rise?
RS-232C communication error	• Communications conditions (including baud rate and delimiter) properly specified? • Proper cable connected?
Printer error	• Connected by proper cable? (For the operation and handling of printer, refer to its instruction manual.)

8. Specifications

1. Display	:	7-segment green LED, 8 digits (including minus sign), zero blanking, floating minus sign
2. Minimum readout	:	0.1 μ m (selected to 0.5 μ m or 1 μ m by the use of function switches)
3. Response speed	:	500 mm/sec (when MF-501 (MF-1001) is connected)
4. Functions		Resetting, alarm, RS-232C interface, connection to printer (MF-9PW), alarm
5. Power supply	:	+12 Vdc (AC adapter used)
6. Power consumption	:	Approx. 4 W
7. Operating temperature	:	0℃ to +40 ℃
8. Storage temperature	:	-20℃ to +60℃
9. External dimensions (in mm):		80 (width) x 60 (height) x 32.2 (depth) (connector included)
10. Weight	:	Approx. 95g
11. Protection class	:	Class Ⅲ
12. Conforming standards	:	EU Low Voltage Directive satisfied "The Digimicro Counter model MFC-101A is approved with the AC adapter model SPU 24-105 or SPU 25A-105 according to EN standard. EU EMC Directive satisfied FCC 15B class A satisfied

9. Input and Output Connectors

1) Input connector

- Model : RP17A-13RA-12SD (manufacturer: Hirose Electric), round-type 12-pin receptacle
- Matching plug : RP17A-13P-12PC (manufacturer: Hirose Electric)

- **Pin assignment**

TABLE 7

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

2) Output connector

- Model : DX20M-20S (Manufacturer: Hirose Electric), 20-pin receptacle
- Matching plug : DX40M-20P (plug),
  DX30M-20-CV (plug cover) (Manufacturer: Hirose Electric)

- **Pin assignment**

TABLE 8

Pin No.	Signal Name	I/O	Description
1	FG		Frame Ground
11	FG		Frame Ground
2	/TXD	O	Send Data
12	/RXD	I	Receive Data
3	RTS	O	Request to Send
13	CTS	I	Clear to Send
4	DSR	I	Open
14	0V		Signal Ground
5	CD	I	Not used
15	DTR	O	Fixed to High
6	SEL1	I	For switching interface
16	SEL2	I	For switching interface
7	0V		Signal Ground
17	DATA	O	Send Data
8	CK	O	Clock to Send
18	/REQ	I	Request
9	N.C.		Open
19	0V		Signal Ground
10	/EXT−R	I	External Reset
20	0V		Signal Ground

10. Accessories

- Clamp screws for Digimicro x 2
- Instruction manual x 1

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