DIGIMICRO

Counter
TC-200
User's Manual

Thank you for purchasing the Nikon DIGIMICRO Counter TC-200

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

5th Edition July 2024 en

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 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 indicate the positional displacement, rotation angle, and pulse count on a digital display, when used in combination with Nikon encoder products such as the DIGIMICRO and rotary encoders. 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 AC 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).

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.

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1 System Configuration

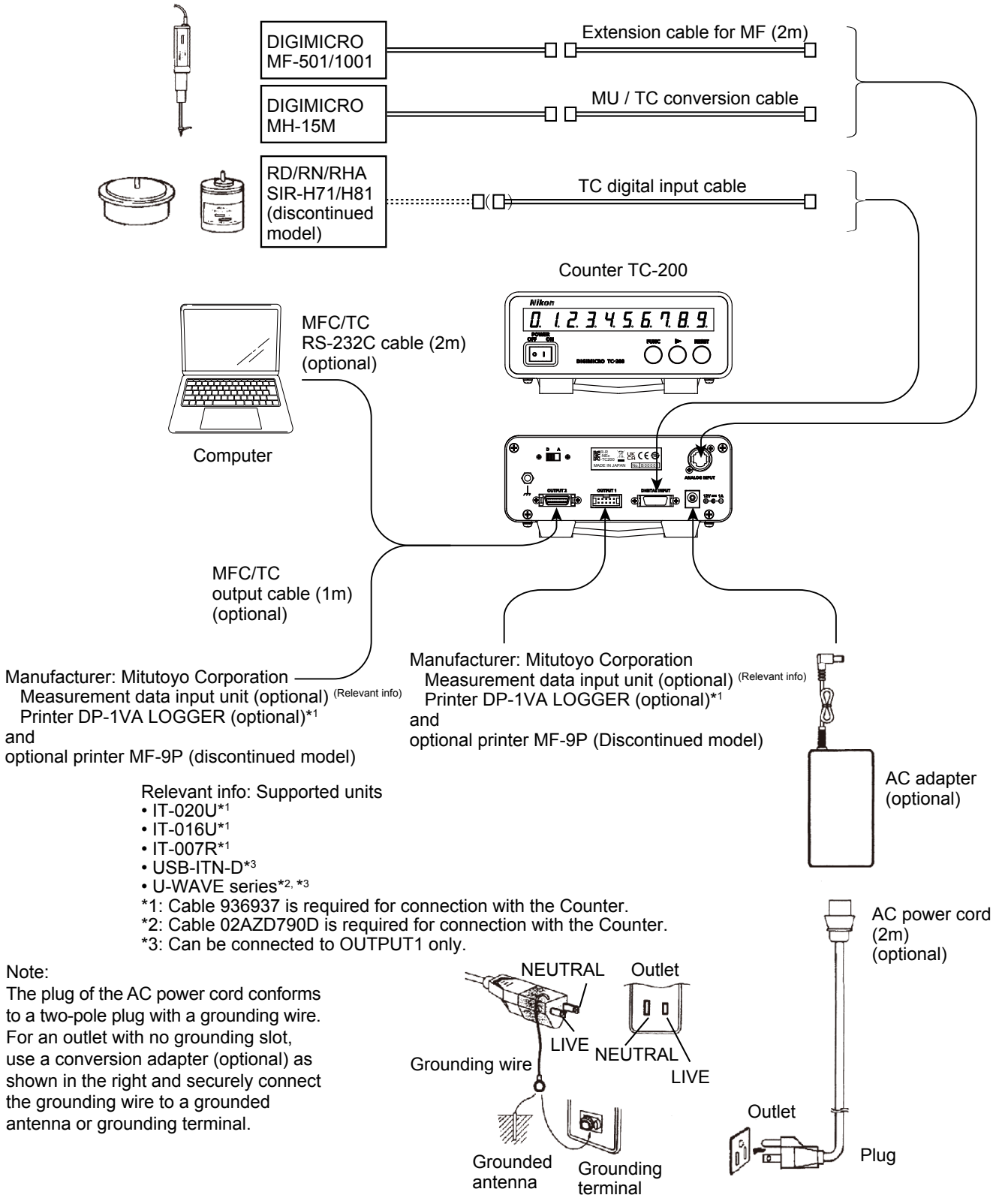


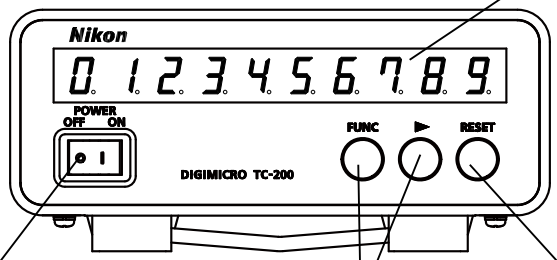
Figure 1

Notes:

- The lead wires at the far end of a TC digital input cable are stranded. If you want to use a cable of that type, please contact your local Nikon representative.
- If you want to connect and use products other than the above, please contact your local Nikon representative as well.

2 Names and Functions of Components

2.1 Front



LED display screen

Green LED indicates a 10-digit number (including a minus sign).

Power switch

Turns on or off the product.

Function switches

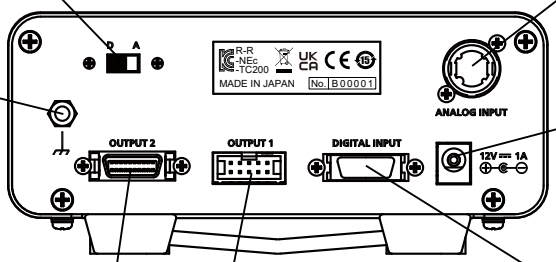
Used to set functions (see “3.2 Setting up functions” on P.5 and P.6).

RESET switch

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

Figure 2

2.2 Rear



EC selector switch

Set to analog input or digital input according to the encoder connected to this product.

Frame terminal

Used to ground the product.
- Only the front nut is removable. Connect the frame terminal by clamping it with the two nuts.

Nominal screw diameter: M4
Tightening torque: 0.75 Nm

Output connector 2

For connection with a computer (RS-232C interface), printer, or measurement data input unit via the specified cable

Analog input connector

For connection with an analog output encoder (e.g. DIGIMICRO)

Input connector

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

Output connector 1

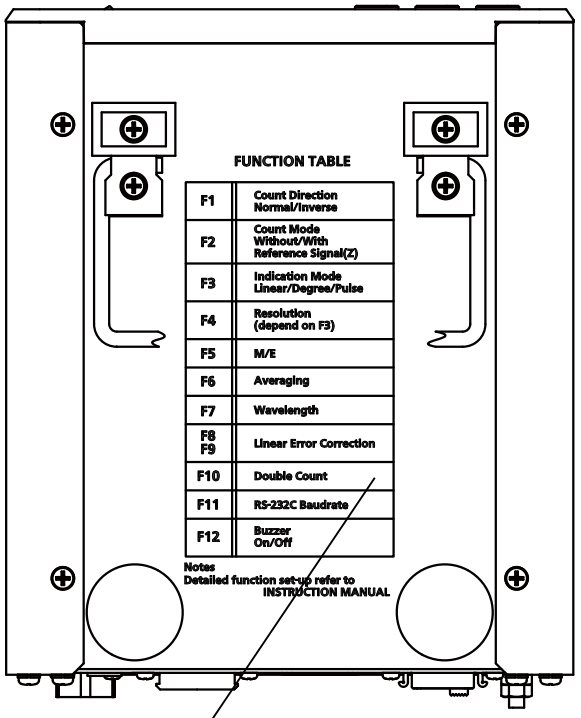
For connection with a printer and measurement data input unit

Digital input connector

For connection with a digital output encoder (e.g. rotary encoder)

Figure 3

2.3 Bottom



Function Setup Table

Function code table used to set up functions with function switches (Figure 2). For details, see Table 6 through Table 8.

Figure 4

3 Operation

3.1 Power-up

⚠ 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.
- To ensure this product operates properly, securely connect the grounding terminal of the AC power cord and the frame terminal to the ground.

(1) Connecting an encoder

Connect the encoders (such as the DIGIMICRO and rotary encoder) to the product by following the system configuration diagram in Figure 1 on page 1.

(2) Setting the EC selector switch (Figure 3 on page 2)

Specify the input mode by setting the switch according to the encoder connected to the product.

There are two input modes in accordance with the types output from the encoder.

- Analog input mode : Set the switch to position "A" (connect the encoder to the analog input connector).
- Digital input mode : Set the switch to position "D" (connect the encoder to the digital input connector).

(3) Connecting peripheral devices

Make sure that the peripheral devices are turned off before connecting them to this product.

For the operation of the peripheral devices, refer to the relevant user's manual.

(4) Connecting the AC adapter

Make sure the power switch of the product is off (position "○") before plugging the AC adapter into the input connector and AC power cord into an appropriate outlet. Be sure to ground the AC power cord. (See Figure 1 on page 1.)

(5) Turning on the power

Set the power switch to position "|" to supply power to the product.

3.2 Setting up functions

The FUNC and ► switches on the front panel are used to set a variety of functions listed in Table 6 on page 16 through Table 8 on page 17. See the following page for an example of operating procedure.

(1) To enter the function setting mode

Press the FUNC switch while holding down the ► switch. The LED display changes from the count display screen to the function setup screen.

(2) To change the function codes

Press the FUNC switch. Each time you press the FUNC switch in the function setting mode, the function codes change in sequence.

(3) To change function parameters

Press the ► switch to set the parameters for the selected function.

(4) To enter the extended setting mode

Press the ► switch when "Enhc." is displayed on the function setup screen.

This allows you to set function codes F6 through F12.

(5) To exit the function setting mode

Press the FUNC switch while you hold down the ► switch with “End” appearing on the LED display to change the function setup screen to the count display screen. The parameters you have so far entered are stored and remain valid after you turn the power off and back on again.

Note: To terminate parameter setting without saving, press the FUNC switch while holding down the ► switch when the LED display shows an alphanumeric code other than “End”. (The parameters you specified will not be stored: those you specified at the last setup session remain valid.)

(6) Initializing parameters

Set the power switch to position "|" to while holding down both the FUNC and ► switches. This initializes the parameters of the functions. The initial state of each function listed in Table 6, Table 7, and Table 8 is circled.

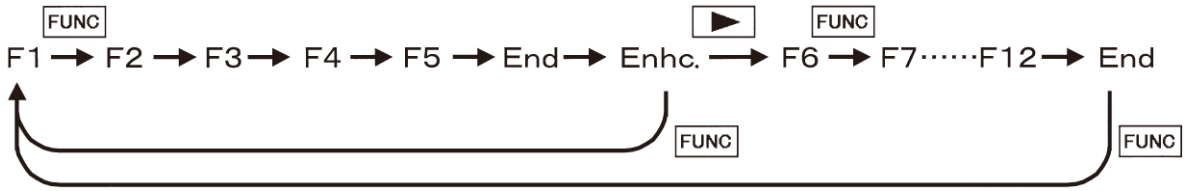


Figure 5 Flow of setup operation

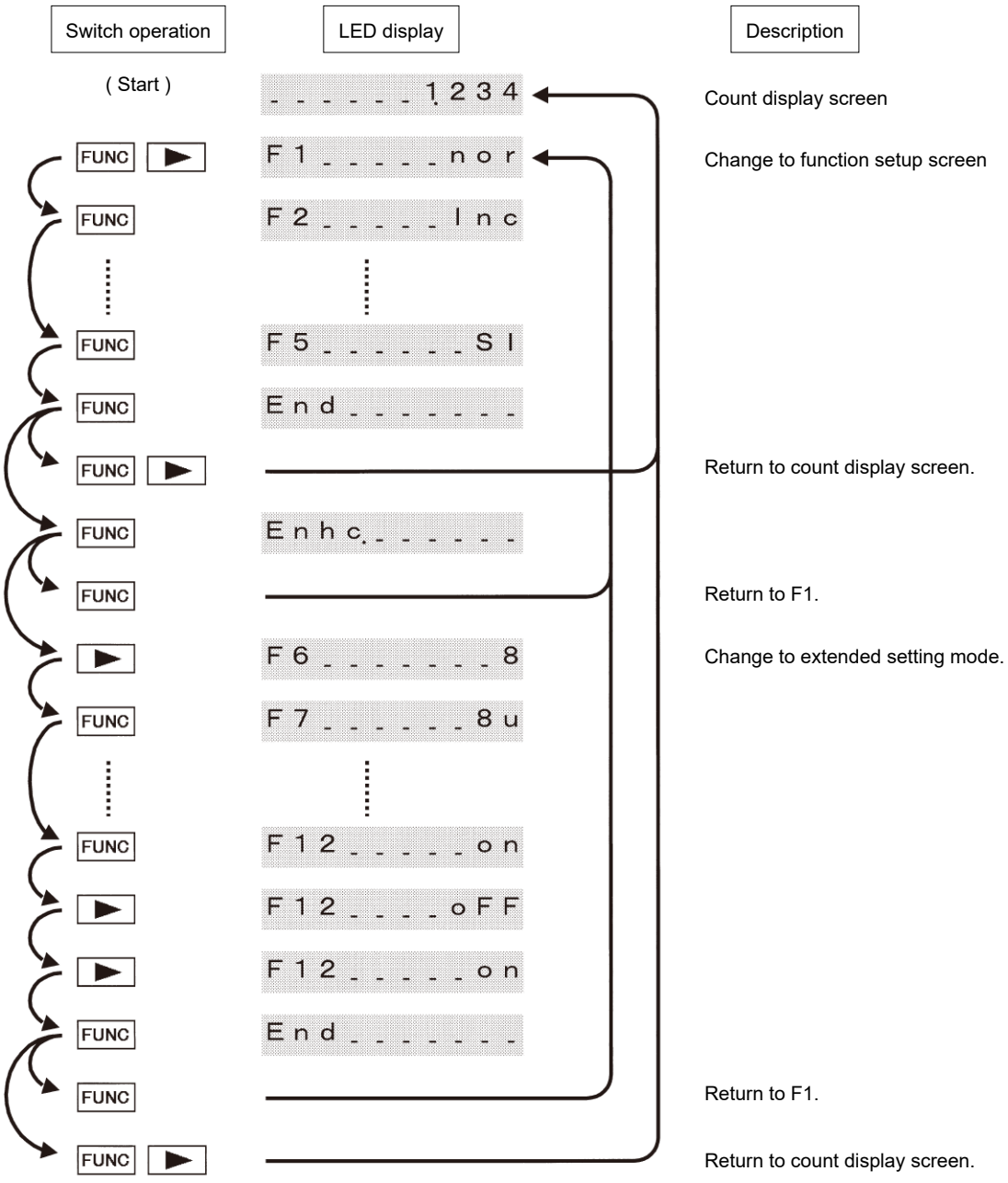


Figure 6 Example of setting up sequence

3.3 Details of features

(1) Resetting

When you press the RESET switch at any position, the display is reset to zero and counting starts from that position.

If the non-volatile memory contains a preset value (value set by the preset function), counting starts from that value.

(2) Presetting

Stores any position in the non-volatile memory as the reference point.

- When you press the RESET switch or turn the power off and back on again, the preset value is enabled.
- A reference point can be set or reset by following the procedures shown below.

Setting : Stop the encoder connected to this product at the position where the reference point is to be set. Press and hold the FUNC switch for about 3 or more seconds. The display then changes to “0000000000” and blinks. Presetting is now completed. The display remains blinking until reset is performed or the power is turned off and back on again.

Resetting : To disable the preset value, press the FUNC switch while holding down the RESET switch for about 3 or more seconds. The display then changes to “0000000000” and blinks. This indicates the resetting is over. The display remains blinking until you carry out resetting or turn the power off and back on again.

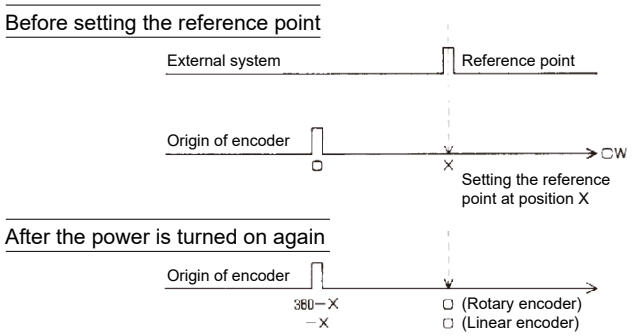


Figure 7 Example of presetting

(3) Pulse checking

A mode that checks the number of encoder pulses. This mode is available when the digital input mode has been selected (when the EC selector switch is set to position "D").

- When you set the power switch to position "|" while holding down the RESET switch, the display changes to “--P”
- When you turn or move the encoder until it passes the zero signal point, the display changes to “0”.
- The display changes to “the number of pulses counted between the moment a zero point signal is detected and the moment the next zero point signal is detected (quad count value)” when you further turn or move the encoder in the same direction until it passes another zero signal point.
- To exit from this mode, press the RESET switch or turn the power off and back on again.

(4) F1, switching of counting direction

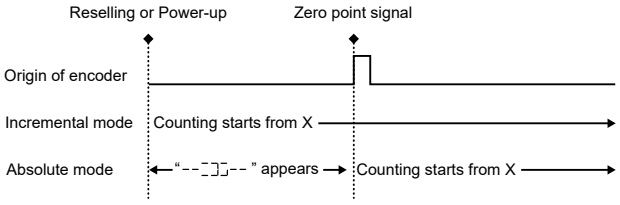
Inverts the direction of counting.

- To use this feature, select F1 on the function setup screen. F1 is enabled when you exit from the function setup screen.

(5) F2, setting of counting mode

Switches the counting mode between incremental and absolute.

- To use this feature, select F2 on the function setup screen. Upon completion of setting, press the RESET switch or turn the power off and back on again.
- In the incremental mode, this product counts in the positive or negative direction with the position enabled at the time of power-up or the one set by pressing the RESET switch used as the reference point regardless of the zero signal output from the encoder.
  Note that if a value has been preset, the counting starts from that value when the power is turned on or the RESET switch is pressed.
- In the absolute mode, the display changes to "--⁻⁻--" when the RESET switch is pressed or the power is turned on. Counting starts when you turn or move the encoder until it passes the zero signal point. The relationship between the encoder position and the displayed count value, therefore, corresponds to 1:1.
  If a value has been preset in this product, however, a value from which the preset value is subtracted is displayed after the encoder passes the zero signal point.



Note: The value of X is 0 or any preset value.

Figure 8 Display in the two counting modes

(6) F3, setting of display format

Selects one of the three display formats - length, angle, and pulse.

- To use this feature, select F3 on the function setup screen. Upon completion of setting, reset operation or turn the power off and back on again is required.
- On the setting screen, select a display format from “L” (length), “P” (pulse), and “d” (angle).

  Length display format : Displays values in millimeters or inches.
  Pulse display format : Displays count values regardless of the unit.
  Angle display format : Displays values in angles (degree, minute, second)
- In the analog input mode (when the EC selector switch is set to position "A"), you can select the length or pulse display formal. In the digital input mode (when the EC selector switch is set to position "D"), you can select the length, pulse, and angle display formats.
- In the absolute mode, the counting operation varies with the display format selected.

  For the length display format : The value is reset to zero when the power is turned on and the encoder passes the first zero signal point.

  For the angle and pulse display formats : The value is reset to zero each time the encoder passes a zero signal point.

(7) F4, setting of display resolution

Switches the display resolution of the count value.

- To use this feature, select F4 on the function setup screen. The setting is enabled when you exit the screen. The resolution can be changed with the encoder being operated because this product keeps the value during the setting as well.
- The F4 parameter changes according to the data you set in F3 and the position of the EC selector switch (analog input mode or digital input mode).

Table 1

F3	Analog input mode	Digital input mode
Length (F3=L)	Sets the minimum unit (e.g. 0.1 μm). (The number of divisions is automatically determined in correlation to F7 setting.)	Sets the display resolution to match the encoder resolution. (For an encoder that outputs 0.1-μm resolution, the F4 parameter must be set to 0.000.1.)
Pulse (F3=P)	Sets the number of divisions for one encoder signal period regardless of the length or angle unit. (When it is set to 800, the display varies from 0 to 799 per signal interval).	Displays the count value of the signal regardless of the encoder resolution. The value is counted in a multiple of 4, 2, or 1. (When it is set to 4x, the display varies from 0 to 3 per signal interval).
Angle (F3=d)	Not available.	Sets the display resolution to match the encoder resolution. (For an encoder that outputs 1-sec resolution, the F4 parameter must be set to 0_00_01.)

(8) F5, switching of display unit (in millimeter or inch)

F5 switches the count value unit (in millimeter or inch).

- To use this feature, select F5 on the function setup screen.
- To switch to the display in millimeters, select SI. To switch to the display in inches, select E.
- The setting of display unit in inches is valid only when the Length (L) is selected in F3.
- The table below shows the correspondence between the two types of display units. The resolution of display in inches is determined by the display resolution in F4 with F3 set to L.

Table 2

Display in millimeters, SI	5 µm	1 µm	0.5 µm	0.1 µm	0.05 µm	0.01 µm	0.001 µm
Display in inches, E	0.0002”	0.00005”	0.00002”	0.000005”	0.000002”	0.0000005”	0.00000005”

(9) F6, setting of averaging

The count value displayed is the value obtained by averaging position data counted n times.

- To use this feature, select F6 on the function setup screen. It is enabled when you exit the screen.
- The options for the averaging count (n) are 1, 8, 16, and 32.
- If the count value does not stabilize and is hard to read (e.g. when the display resolution has been increased), the problem can be improved by changing the averaging count to a larger value. Note that this causes a delay in the count display response.

(10) F7, setting of scale pitch

Selects one signal pitch to the encoder connected.

- The feature is enabled only in the absolute mode with the display format set to “L” (length).
- Select F7 on the function setup screen. Upon completion of setting, you have to press the RESET switch or turn the power off and back on again.
- Options for “encoder's signal pitch” are 8, 10, 16, 20, and 32 µm.

(11) F8 and F9, setting of linear error correction

Linear error correction is provided to digitally correct system errors that occur when the product is connected to a linear encoder (see Figure 9).

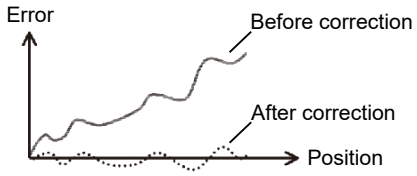


Figure 9 Example of application of linear error correction

- To set the linear error correction, select F8 and F9 on the function setup screen. The settings are enabled when you exit the screen.
- Assume that the display reads D when the encoder is move by L by using an object as a reference of length L or by a range finder used as a reference, such as a laser interferometer. Then, select appropriate F8 and F9 values from the function setting table (Table 8 on page 17) so that the value created with a combination of them is the closest to correction coefficient K calculated from the formula L/D.

How to set the correction coefficient

[Example] When measuring a 100-mm reference gauge, if the display indicates 100.02 (mm) as a result of the operating temperature of the measuring system (including the equipment and linear encoder), the error factor can be corrected by setting the appropriate correction coefficient (F8) and direction of correction (F9). In this case, since correction coefficient K = 100/100.012 = 0.99988, set F8 and F9 as shown below.

F8: Select 122.0E-6 ($\therefore 1 - 0.99988 = 0.000120 \approx 122 \times 10^{-6}$)

F9: Select n. (if the direction of correction is positive (K>1), select P, whereas if it is negative (K<1), select n.)

- When the linear error correction is not used, disable F8 by setting its parameter to “0.0E-6”.

(12) F10, displaying of double-count

Displays a doubled count.

- To set this feature, select F10 on the function setup screen and set the parameter. The setting is enabled when you exit the screen.

(13) F11, setting of RS-232C output

Allows the user to set a baud rate for the RS-232C interface.

- Options for the baud rate are 1200, 2400, 4800, and 9600 bps.
- For other RS-232C interface specifications, see page 12, “RS-232C interface”.
- To set this feature, select F11 on the function setup screen and set the parameter. The setting is enabled when you exit the screen.

(14) F12, setting of alarm

Sets the alarm to on or off.

- An alarm sounds when an error occurs, the power is turned on, the resetting is carried out, and a value is preset.
- To set this feature, select F12 on the function setup screen and set the parameter. The setting is enabled when you exit the screen.

4 Interfacing to External Devices

4.1 RS-232C interface

(1) Communications specification

- Data : Full duplex asynchronous communication
- Data bit length : 8 bits
- Stop bit : 2 bits
- Parity : None
- Delimiter : CR + LF
- Baud rate : 4,800 bps (Can also be set to 1,200, 2,400, or 9,600 bps.)
- Flow control : Hardware flow control required

(2) Transmission data format

- Any data items are transmitted in ASCII characters.
- The transmission data format is fixed to 13 characters.
  (13 data characters + delimiter)

(3) Commands available for RS-232C

Table 3

Command	Name	Description
“RX”	Reset command	Resets the Counter.
“QX”	Request command	Outputs data from the Counter when a command is received.

(4) Sample program

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

4.2 Connecting the measurement data input unit

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

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

Please refer to each User's manual for details.

Notes:

- Do not use the two output connectors at the same time.
- There is no reset command for the measurement data input unit.

4.3 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.

4.4 Correspondence between display modes and output data

Table 4

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)	5 µm	±999999.995	±999999.995	±999.995 M
	1 µm	±999999.999	±999999.999	±999.999 M
	0.5 µm	±99999.999.5	±99999.9995	±99.9995 M
	0.1 µm	±99999.999.9	±99999.9999	±99.9999 M
	0.05 µm	±9999.999.95	±9999.99995	±99.9999 M
	0.01 µm	±9999.999.99	±9999.99999	±99.9999 M
	0.001 µm	±999.999.999	±999.999999	±99.9999 M
Length (inch)	0.0002” (5 µm)	±99999.999.8	±99999.9998	±99.9998 I
	0.00005” (1 µm)	±9999.999.95	±999.999995	±9.99995 I
	0.00002” (0.5 µm)	±9999.999.98	±9999.99998	±9.99998 I
	0.000005” (0.1 µm)	±999.999.995	±999.999995	±9.99999 I
	0.000002” (0.05 µm)	±999.999.998	±999.999998	±9.99999 I
	0.0000005” (0.01 µm)	±99.999.999.5	±99.9999995	±9.99999 I
	0.00000005” (0.001 µm)	±9.999.999.95	±9.99999995	±9.99999 I
Pulse	1 pulse	±999999999	±999999999	±999999 M
Angle	0.1°	±99999999.9	±99999999.9d	(NO DATA)
	0.01°	±9999999.99	±9999999.99d	(NO DATA)
	0.005°	±999999.995	±999999.995d	(NO DATA)
	0.001°	±999999.999	±999999.999d	(NO DATA)
	0.0001°	±99999.9999	±99999.9999d	(NO DATA)
	1’	±999999_59	±999999d59m	(NO DATA)
	30”	±999_59_30	±999d59m30s	(NO DATA)
	1”	±999_59_59	±999d59m59s	(NO DATA)
	0.1”	±999.59.59.9	±999d59m59.9s	(NO DATA)

Notes on printer output:

- If the value is out of the range shown in the table, an asterisk, “ ✻ ”, will be printed.
- In the angle display format, the data cannot be output to a printer (the printer will not respond).
- 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.

5 Range of Counts Displayed

Table 5

Display resolution	Analog Input	Digital input	Count display	Maximum measuring range		
				Incremental mode	Absolute mode	
				Measuring range	Measurement in negative derection	Measurement in positive direction
5 µm	○	○	0.005	±999999.995	–999999.995	999999.995
1 µm	○	○	0.001	±999999.999	–999999.999	999999.999
0.5 µm	○	○	0.000.5	±99999.999.5	–99999.999.5	99999.999.5
0.1 µm	○	○	0.000.1	±99999.999.9	–99999.999.9	99999.999.9
0.05 µm	○	○	0.000.05	±9999.999.95	–9999.999.95	9999.999.95
0.01 µm	○	○	0.000.01	±9999.999.99	–9999.999.99	9999.999.99
0.001 µm	×	○	0.000.001	±999.999.999	–999.999.999	999.999.999
0.0002” (5 µm)	○	○	0.000.2	±99999.999.8	–99999.999.8	99999.999.8
0.00005” (0.1 µm)	○	○	0.000.05	±9999.999.95	–9999.999.95	9999.999.95
0.00002” (5 µm)	○	○	0.000.02	±9999.999.98	–9999.999.98	9999.999.98
0.000005" (0.1 µm)	○	○	0.000.005	±999.999.995	–999.999.995	999.999.995
0.000002” (0.05 µm)	○	○	0.000.002	±999.999.998	–999.999.998	999.999.998
0.0000005” (0.01 µm)	○	○	0.000.000.5	±99.999.999.5	–99.999.999.5	99.999.999.5
0.00000005” (0.001 µm)	×	○	0.000.000.05	±9.999.999.95	–9.999.999.95	9.999.999.95
1 pulse	○	○	1	±999999999	–999999999	999999999
0.1°	×	○	0.1	±99999999.9	0.0	359.9
0.01°	×	○	0.01	±9999999.99	0.00	359.99
0.005°	×	○	0.005	±999999.995	0.000	359.995
0.001°	×	○	0.001	±999999.999	0.000	359.999
0.0001°	×	○	0.0001	±99999.9999	0.0000	359.9999
1’	×	○	0_01	±999999_59	0_00	359_59
30”	×	○	0_00_30	±999_59_30	0_00_00	359_59_30
1”	×	○	0_00_01	±999_59_59	0_00_00	359_59_59
0.1”	×	○	0.00.00.1	±999.59.59.9	0.00.00.0	359.59.59.9

Notes:

- If the counted value is out of measuring range, “Error 2” appears.
- ○: Conforms to display resolution.
  ×: Does not conform to display resolution.

6 Function Setup Table

6.1 Basic setting mode

(1) Analog input mode

Table 6

F1	***nor.***	***Inu.***					
Switching of counting direction	NORMAL	INVERSE					
F2	***Inc.***	***Abs.***					
Counting mode	Incremental	Absolute					
F3	***L***	***P***					
Display format	Length	Pulse					
F4 (F3=L)	***0.001***	***0.000.5***	***0.000.1***	***0.000.05***	***0.000.01***	***0.005***	
Display resolution	1 µm	0.5 µm	0.1 µm	0.05 µm	0.01 µm	5 µm	
F4 (F3=P)	***8***	***16***	***20***	***32***	***40***	***80***	***100***
Number of divisions	8	16	20	32	40	80	100
	160	***200***	***320***	***400***	***800***	***1600***	***3200***
	160	200	320	400	800	1600	3200
F5	***SI***	***E***					
Display unit	mm (millimeter)	E (inch)					
End							
Data stored (End of setting)							
Enhc.							
Enhanced setting							

(2) Digital input mode

Only the functions F3 and F4 differ from those in the analog input mode.

Table 7

F3	***L***	***P***	***d***				
Display format	Length	Pulse	Angle (degree, minute, second)				
F4 (F3=L)	***0.001***	***0.000.5***	***0.000.1***	***0.000.05***	***0.000.01***	***0.000.001***	***0.005***
Display resolution	1 µm	0.5 µm	0.1 µm	0.05 µm	0.01 µm	0.001 µm	5 µm
F4 (F3=P)	***4***	***2***	***1***				
Multiple	4x	2x	1x				
F4 (F3=d)	***0.1***	***0.01***	***0.005***	***0.001***	***0.0001***	***0_01***	***0_00_30***
Display resolution	0.1°	0.01°	0.005°	0.001°	0.0001°	1’	0.5’
	0_00_01	***0.00.00.1***					
	1”	0.1”					

6.2 Enhanced setting mode

Pressing the ▶ switch with *Enhc.* appearing on the display enables the enhanced setting mode.

Table 8

F6	***1***	***8***	***16***	***32***			
Averaging	1 time	8 times	16 times	32 times			
F7	***8u***	***10u***	***16u***	***20u***	***32u***		
Scale pitch	8 µm	10 µm	16 µm	20 µm	32 µm		
F8	***0.0E-6***	***7.6E-6***	***15.3E-6***	***22.9E-6***	***30.5E-6***	***38.1E-6***	***45.8E-6***
Correction coefficient of linear error correction K=D/L	$1±0.0×10^{-6}$	$1±7.6×10^{-6}$	$1±15.3×10^{-6}$	$1±22.9×10^{-6}$	$1±30.5×10^{-6}$	$1±38.1×10^{-6}$	$1±45.8×10^{-6}$
	53.4E-6	***61.0E-6***	***68.7E-6***	***76.3E-6***	***83.9E-6***	***91.6E-6***	***99.2E-6***
	$1±53.4×10^{-6}$	$1±61.0×10^{-6}$	$1±68.7×10^{-6}$	$1±76.3×10^{-6}$	$1±83.9×10^{-6}$	$1±91.6×10^{-6}$	$1±99.2×10^{-6}$
	106.8E-6	***114.5E-6***	***122.0E-6***	***129.7E-6***	***137.3E-6***	***145.0E-6***	***152.6E-6***
	$1±106.8×10^{-6}$	$1±114.5×10^{-6}$	$1±122.0×10^{-6}$	$1±129.7×10^{-6}$	$1±137.3×10^{-6}$	$1±145.0×10^{-6}$	$1±152.6×10^{-6}$
	160.2E-6	***167.9E-6***	***175.5E-6***	***183.1E-6***	***190.7E-6***	***198.4E-6***	***206.0E-6***
	$1±160.2×10^{-6}$	$1±167.9×10^{-6}$	$1±175.5×10^{-6}$	$1±183.1×10^{-6}$	$1±190.7×10^{-6}$	$1±198.4×10^{-6}$	$1±206.0×10^{-6}$
	213.6E-6	***221.3E-6***	***228.9E-6***	***236.5E-6***			
	$1±213.6×10^{-6}$	$1±221.3×10^{-6}$	$1±228.9×10^{-6}$	$1±236.5×10^{-6}$			
F9	***P***	***n***					
Sign of correction coefficient K	+	–					
F10	***1***	***2***					
Double-count display	×1	×2					
F11	***9800***	***4800***	***2400***	***1200***			
RS-232C setting	9600 bps	4800 bps	2400 bps	1200 bps			
F12	***on***	***oFF***					
Alarm	ON	OFF					

Notes:

- Values circled ( ) are initial values.
- F5, F8, F9, and F10 are only available with the length display format selected.
- F7 is only available in analog input mode with the length display format selected.

7 Error Alarming and Error Handling

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

Table 9

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 counting value is out of range (see Table 5 on page 15).	• 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 4-1	Erroneous signal detected (analog input mode) • Signal disturbance caused by a fault (e.g. noise) • Abnormal encoder signal (e.g. disconnection)	• Keep clear of any source generating noise. • Press the RESET switch or turn the power off and back on again.
Error 4-2	Disconnection (digital input mode) • Encoder signal line disconnected. • Error has detected in the encoder.	• Check the signal line for connection. • Turn the power off 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 disturbance caused by a fault (e.g. noise)	• Check the communication conditions before pressing the RESET switch or turn the power off and back on again.

If the error persists, refer to “8 Troubleshooting” on page 19.

8 Troubleshooting

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

Table 10

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.	• Encoder is properly connected. • Encoder rotation and travel speed are appropriate. • There are no sources generating noise in the vicinity of the product. • Equipment is properly grounded. • Input connector and cable have no problem. • EC selector switch is set to a proper position. • The AC power cord of the AC adapter is grounded.
• No counting	• Encoder is properly connected. • EC selector switch is set to proper position. • Input connector and cable have no problem. • The input connector is disconnected.
• Erroneous display	• There are no sources generating noise in the vicinity of the product.
• Poor accuracy	• No mechanical deflection or play is seen. • No irregular temperature rise is seen. • Function settings (including setting of linear error correction, double count, and signal pitch) have no problem. (Try to restore the initial settings.) • 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.
• RS-232C communication error	• Communications conditions (including baud rate and delimiter) are properly set. • The program includes no invalid commands. • A dedicated cable is used.
• 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.)

9 Performance and Specifications

1.	Display	: 7-segment green LED, 10 digits (including minus sign), zero blanking, floating minus sign
2.	Minimum reading	: Varies with encoder connected and function settings (See Table 5 on page 15.)
3.	Functions	: Resetting, presetting, pulse checking, RS-232C interface, error alarming, connection to a measurement data input unit, connection to printer DP-1VA LOGGER
4.	Power supply	: +12 VDC (when an optional AC adapter is used)
5.	Power consumption	: Approx. 6 W
6.	Operating temperature	: 0°C to 40°C
7.	Storage temperature	: -20°C to 60°C
8.	External dimensions (in mm)	: 150.2 (width) x 67.2 (height) x 176 (depth)
9.	Weight	: Approx. 1 kg (AC adapter not included)
10.	Protection class	: Class III
11.	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)

10 Input and Output Connectors

10.1 Analog input connector

- Model: RP17A-13R-12SC(71) (manufacturer: Hirose Electric Co., Ltd.)
  12-pin circular connector (receptacle)
- Matching connector: RP17A-13P-12PC(71) (manufacturer: Hirose Electric Co., Ltd.)

Table 11 Pin assignment and signal names

Pin No.	Signal name	Description	Pin No.	Signal name	Description
1	FG	Frame ground	7	Zin	Analog phase Z input
2	NC	NC open	8	NC	NC open
3	Ain	Analog phase A input	9	L+	Power supply for LED
4	REF	Phase A/B center voltage input	10	0V	Signal ground
5	Bin	Analog phase B input	11	VCC	+12V power supply for EC
6	REF	Phase A/B center voltage input	12	0V	Signal ground

10.2 Digital input connector

- Model: PCS-E20LMD+ (manufacturer: Honda Tsushin Kogyo Co., Ltd.)
  20-pin half-pitch pin contact
- Matching connector: PCS-E20FS+ (plug), PCS-E20LB (plug cover) (manufacturer: Honda Tsushin Kogyo Co., Ltd.)

Table 12 Pin assignment and signal names

Pi No.		Signal name	Description	Pin No.		Signal name	Description
1	(yellow)	DA+	Differential input, phase A (+side)	11	(orange)	5V	+5V power supply for EC
2	(white)	DA–	Differential input, phase A (-side)	12	(brown)	0V	Signal ground
3	(green)	DB+	Differential input, phase B (+side)	13	(white)	DA1	Signal-end input, phase A
4	(white)	DB–	Differential input, phase B (-side)	14	(white)	DB1	Signal-end input, phase B
5	(blue)	DZ+	Differential input, phase Z (+side)	15	(white)	DZ1	Signal-end input, phase Z
6	(white)	DZ–	Differential input, phase Z (-side)	16	(red)	DISEL	Terminal for setting EC*
7		NC	Open	17		5V	+5V power supply for EC
8		NC	Open	18		0V	Signal ground
9	(black)	5V	+5V power supply for EC	19		FG	Frame ground
10	(white)	0V	Signal ground	20		FG	Frame ground

Notes:

- How to set the DISEL terminal:
  To connect a differential output encoder -- Open
  To connect a single end output encoder -- Connect to 0V
- The colors in parentheses indicate those of the lead wires connected to the TC digital input cable.
  (Pins 1 and 2, 3 and 4, 5 and 6, 9 and 10, 11 and 14, 12 and 13, and 15 and 16 are --- twisted pair wires.)

10.3 Output connector 1

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

Table 13 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

10.4 Output connector 2

- Model: DX10GM-20SE(50) (manufacturer: Hirose Electric Co., Ltd.)
  20-pin half pitch pin bellows-type contact
- Matching connector: DX40M-20P (plug), DX30M-20-CV (plug cover) (manufacturer: Hirose Electric Co., Ltd.)

Table 14 Pin assignment and signal names

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	(NC)		Open
14	0V		Signal Ground
5	(NC)		Open
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	(NC)		Open
19	0V		Signal Ground
10	/EXT-R	I	External Reset
20	0V		Signal Ground

11 Accessories

- Safety Precautions x 1
- Product warranty x 1

12 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.

13 Contact information

Table 15 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
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