Nikon

Supplement

Connecting Optional Equipment to the Inner Counter of V-12BDC and V-12BSC

Instructions

Introduction

The RS-232C connector at the back of the Profile projector allows the connection of optional equipment such as a printer or a data processing device to print out or calculate the count data.

This instruction manual describes how to connect optional equipment to the counter of the projector, and what to take care about when connecting them. Please read this manual carefully before use in order to handle the instrument correctly and to make full use of its capabilities. Keep this manual in a safe place for future reference.

CONTENS

Connecting DP-302

Connecting the Data Processor DP-302 (optional) to the projector's counter permits you to make various calculations based on the count data. A set of counter extension cables (optional) is necessary for the connection. When the photoelectric micrometer is attached to your stage (optional), use "photoelectric micrometer extension cables" as the counter extension cable. When the linear encoder is attached to your stage (optional), use "linear encoder extension cables".

Caution

(1) Values displayed on the projector's counter and DP-302 may differ by one count due to quantization error. One count is equivalent to 0.5μm or 1μm (0.00005 in. or 0.00002 in.) depending on the DIP switch setting on the projector.
All data printed out from the DP-302 are based on the display of the DP-302.

(2) The projector's counter displays the count values based on the machine coordinate system. If count values based on the work coordinate system or the polar coordinate system is needed, see the display on DP-302.

(3) Displays on the projector's counter and the DP-302 can be reset independently.
a) The RESET switch on the projector's counter resets its own display. (Display on DP-302 is retained.)
b) The RESET switch on the DP-302 resets the DP-302's display when the DP-302's display is based on the machine coodinate system. (Display on the projector's counter is retained.)
c) The RESET switch on the DP-302 resets neither the display of the projector's counter nor the display of the DP-302 when the DP-302's display is based on the work coodinate system or the polar coodinate system.

(4) To transfer count data to DP-302, press the LOAD switch on the DP-302. No count data will be sent to DP-302 when SEND switch on the projector's counter is pressed.

(5) Read the instruction manual provided with the DP-302 for details on the DP-302.

Connection

- As shown in the figure below, connect the rear of the projector and the DP-302 with the counter extension cables (optional).
- When using Screen sensor SS-1 (optional) or the Foot switch (optional), connect their cables to the DP-302. (No count data will be sent to DP-302 when the SS-1 or the Foot switch is connected to the rear of the projector.)

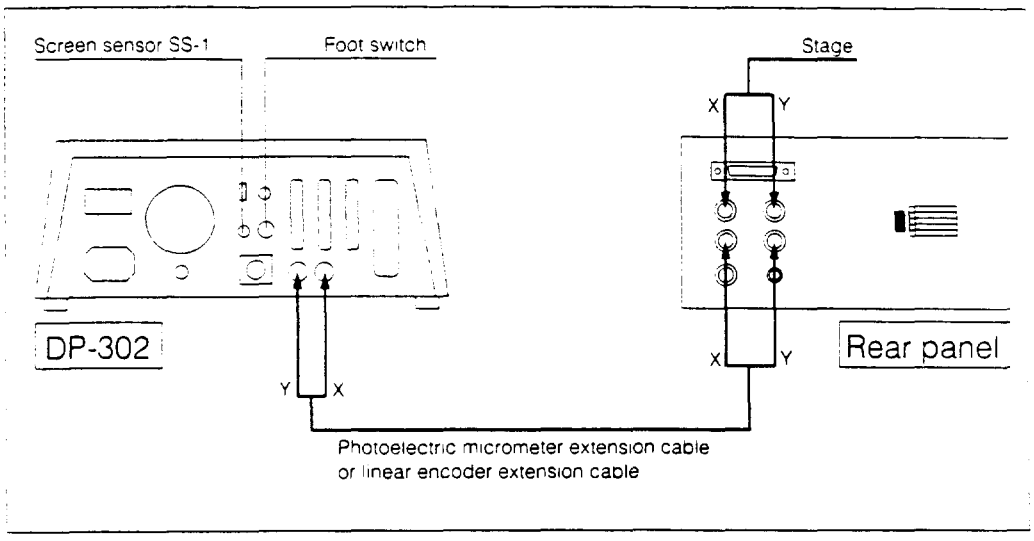

Fig. 1

2 Connecting DP-202 or personal computer

Connecting the Data Processor DP-202 (optional) or a personal computer to the projector's counter allows you to make various calculations based on the count data. An RS-232C cable (cross cable) (optional) is necessary for the connection. Refer to "V. Specifications" for more information on the RS-232C connector and communication specifications.

Caution

Equipment should be turned ON or OFF in the following order. If the order is reversed, error message E-3 may be displayed on the projector's counter. Press the SEND switch on the counter to reset the error.

ON: DP-202 or personal computer → Projector
OFF: Projector –> DP-202 or personal computer

Connection

- As shown in the figure below, connect the rear of the projector and the DP-202 or a personal computer with an RS-232C cable (cross cable) (optional).
- Set the DIP switch No. 5 on the rear of the projector to ON ("DP" side).
- When using Screen sensor SS-1 (optional) or the Foot switch (optional), connect them to the projector.

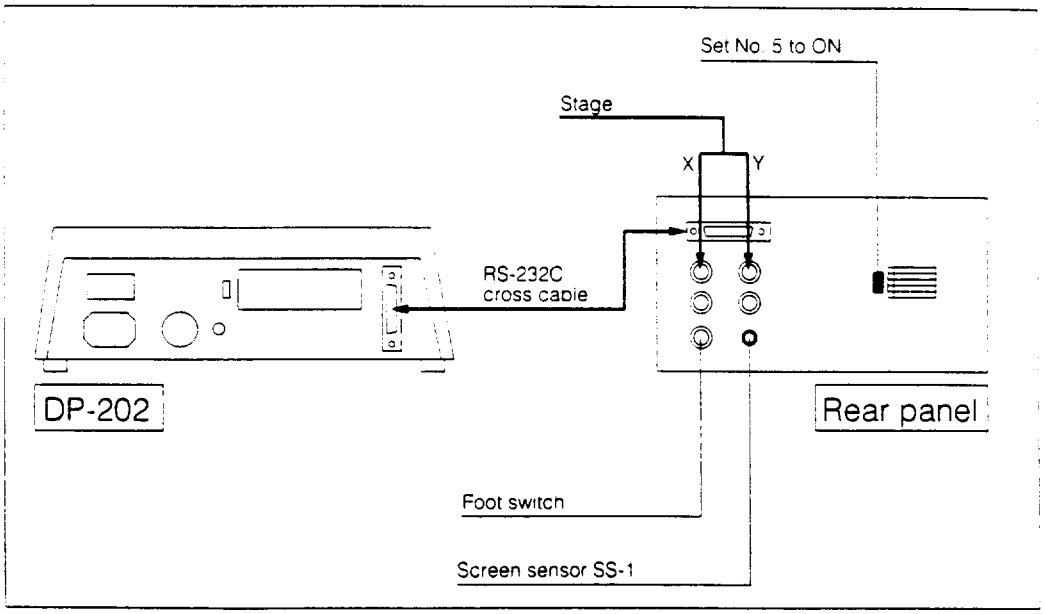

Fig. 2

Operation

- If the data request LED on the projector's counter is lit, count data can be transferred to the DP-202 or a personal computer.
- To transfer the count data, press the SEND switch or the Foot switch. When Screen sensor SS-1 is used, count data is automatically transferred when the edge of a specimen passes through the sensor unit of the SS-1.
- The data request LED goes out while the data is being transferred.
- Refer to the instruction manual provided with DP-202 or a personal computer for the details on each equipment.
- Refer to appendix "4 Communication with external equipment" for commands and responses using a personal computer.

Connecting a printer

Connecting a printer to the projector's counter allows you to print out the count data. An RS-232C straight through cable (modem cable) (optional) is necessary for the connection. Refer to "V. Specifications" for more information on connector and communication specifications.
The use of Nikon's digital printer SC-7P is recommended.

Caution

Be sure to turn off the printer when turning the projector ON or OFF. If the printer is left ON while turning the projector ON or OFF, undefined characters or graphics may be printed out.

Connection

- As shown in the figure below, connect the rear of the projector and the printer with an RS-232C straight-through cable (modem cable) (optional).
- Set DIP switch No. 5 on the rear of the projector to OFF ("PR" side).
- When using Screen sensor SS-1 (optional) or the Foot switch (optional), connect them to the projector. When using digital printer SC-7P, set the DIP switch on the SC-7P as shown in Fig. 4.

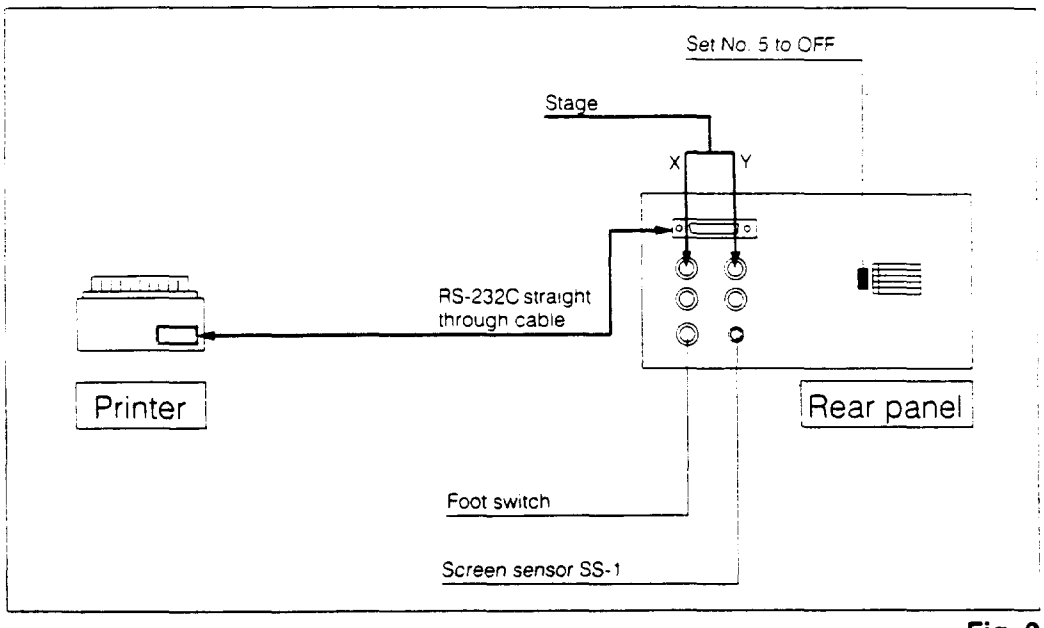

Fig. 3

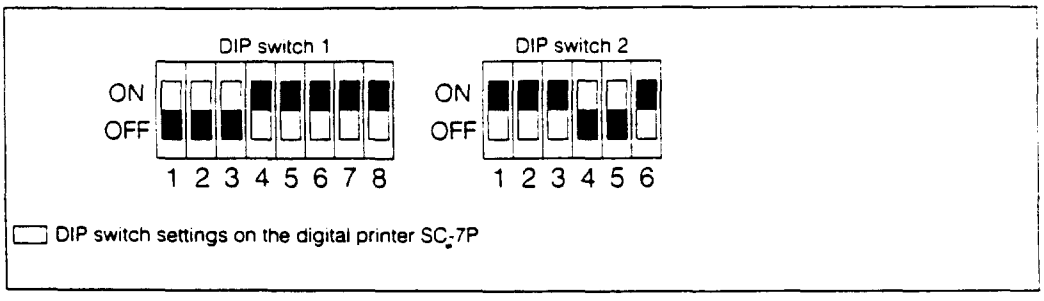

Fig. 4

Operation

- If the data request LED on the projector's counter is lit, count data can be transferred to the printer to be printed out.
- To transfer the data, press the SEND switch or the Foot switch. When Screen sensor SS-1 is used, data is automatically transferred when the edge of a specimen passes through the sensor unit of the SS-1.
- The data request LED goes out while the data is being transferred.
- Refer to the instruction manual provided with the printer for details on the printer.

Example of the output:

```
NO. 1   X=   25.418   Y=-   17.830
NO. 2   X=   25.418   Y=-   17.830
NO. 3   X=   25.418   Y=-   17.830
NO. 4   X=   25.418   Y=-   17.830
NO. 5   X=   25.427   Y=-   17.794
NO. 6   X=   25.444   Y=-   17.769
NO. 7   X=   25.399   Y=-   17.783
NO. 8   X=   25.399   Y=-   17.783
NO. 9   X=   25.399   Y=-   17.783
```

Fig. 5

Communication with external equipment

Count data can be transferred to external equipment through the RS-232C connector at the rear of the projector. Sending and receiving of the data is performed in ASCII characters. Delimiter is CR+LF (0DH+0AH).

Communication format

External equipment → Projector:
[Command] [CR] [LF] (Command in ASCII characters.)

Projector → External equipment:
[Data] [CR] [LF] (Data in ASCII characters, formatted.)

Format of the data sent out from the projector to the external equipment is as follows:

- Fixed to 10 characters for each axis (X, Y-axis)
- Location of negative sign is next to the uppermost digit of the count value.

Unit	Resolution	Sending data (X axis)										Sending data (Y axis)										
mm	[illegible]	Sign	10^{5}	10^{4}	10^{3}	10^{2}	10^{1}	.	10^{0}	10^{-1}	10^{-2}	.	Sign	10^{5}	10^{4}	10^{3}	10^{2}	.....	10^{-2}
mm	[illegible]	Sign	10^{4}	10^{3}	10^{2}	10^{1}	.	10^{0}	10^{-1}	10^{-2}	10^{-3}	.	Sign	10^{4}					

Example: When the count data of X axis is [-15.2385mm], and Y axis is [3.1850mm], response to external equipment will be as follows. ("_" indicates blank.)

_ _15.2385, _ _ _ _3.1850 [CR] [LF]

Caution

- When a communication error (framing error, overrun error, etc.) occurs, error messages will always be displayed on the counter.
- The projector can respond only to the commands listed in the Command List. When other commands are sent to the projector, error messages will be displayed on the counter.
- When communication errors occur after a command requesting the projector's response is sent to the projector, that command is invalidated.
- When a command requesting the projector's response is sent to the projector (such as "SX", "SY", "SXY"), do not send other commands (except "CS") until a cue for the response (depression of SEND switch, foot switch, etc.) is given to the projector.
- Press the SEND switch on the counter to reset the errors. Count value is retained during the error.

Error message	Description
E-----1	Undefined command received.
E-----2	Overrun error
E-----3	Framing error

Command List

(1) Stage, X axis count data, request command (SX)

External equipment → Projector: [S] [X] [Delimiter]
Projector → External equipment: [X axis] [Delimiter]

Counter's data request LED lights up when the projector receives the command. According to a cue*1, X axis count value is sent out to the external equipment and the data request LED goes out.

(2) Stage, Y axis count data, request command (SY)

External equipment → Projector: [S] [Y] [Delimiter]
Projector → External equipment: [Y axis] [Delimiter]

Counter's data request LED lights up when the projector receives the command. According to a cue*1, Y axis count value is sent out to the external equipment and the data request LED goes out.

(3) Stage, X and Y axis count data, request command (SXY)

External equipment → Projector: [S] [X] [Y] [Delimiter]
Projector → External equipment: [X axis] [" , "] [Y axis] [Delimiter]

Counter's data request LED lights up when the projector receives the command. According to a cue*1, X and Y axis count values are sent out to the external equipment and the data request LED goes out.

(4) Stage, X axis count data, immediate request command (QX)

External equipment → Projector: [Q] [X] [Delimiter]
Projector → External equipment: [X axis] [Delimiter]

X axis count value is sent out to the external equipment at the moment the projector receives the command.

(5) Stage, Y axis count data, immediate request command (QY)

External equipment → Projector: [Q] [Y] [Delimiter]
Projector → External equipment: [Y axis] [Delimiter]

Y axis count value is sent out to the external equipment at the moment the projector receives the command.

(6) Stage, X/Y axis count data, immediate request command (QXY)

External equipment → Projector: [Q] [X] [Y] [Delimiter]
Projector → External equipment: [X axis] [" , "] [Y axis] [Delimiter]

X and Y axis count values are sent out to the external equipment at the moment the projector receives the command.

(7) Counter, X axis count value display, reset command (RX)

External equipment → Projector: [R] [X] [Delimiter]
Projector → External equipment: No response.

Counter's X axis count value display is reset.

(8) Counter, Y axis count value display, reset command (RY)

External equipment → Projector: [R] [Y] [Delimiter]
Projector → External equipment: No response.

Counter's Y axis count value display is reset.

(9) Counter, X/Y axis count value displays, reset command (RXY)

External equipment → Projector: [R] [X] [Y] [Delimiter]
Projector → External equipment: No response.

Counter's X and Y axis count value displays are reset.

(10) Stage, count data, request cancel command (CS)

External equipment → Projector: [C] [S] [Delimiter]
Projector → External equipment: No response.

Cancels the previously sent stage count data request command ("SX", "SY", "SXY"). Valid only before a cue*1 for the response is given to the projector. The data request LED goes out.

(11) Counter, specification, request command (WU)

External equipment → Projector: [W] [U] [Delimiter]
Projector → External equipment: [2] [" , "] [U] [" , "] [R] [Delimiter]

2: 2 axes
U: [M] = mm
E: [E] = inch
R: [1.0] = 1.0 µm or 0.00005 in.
[0.5] = 0.5 µm or 0.00002 in.

Counter's specifications are sent out to the external equipment. (Number of axis, U: Unit system, R: Resolution)

Note1 (*1):
Depression of the SEND switch or the Foot switch, or the passage of the edge of a specimen above the sensor unit of SS-1 will be a cue for a response.
Note2: Delimiter is CR+LF (0DH+0AH)
Note3: [X axis] and [Y axis] represents formatted data.

Sample program when a personal computer is connected to the projector through RS-232C interface.

The program varies depending on the type of personal computer and the programming language used. The following is a sample program to transfer X and Y axis count data to a personal computer using BASIC interpreter. Refer to the instruction manual provided with the personal computer and the programming language when actually writing the program.

10 OPEN "COM1:4800,N,8,2, LF" AS #1	(Open RS-232C #1 line.) Baud rate 4800 bps Parity check None Data bits 8 Stop bits 2 Line feed LF
20 PRINT #1,"QXY"+CHR$(&H0D)	(Sends X and Y axis data transfer request.) "command" + [CR]
30 INPUT #1,X$,Y$	(Recieves X,Y data.)
40 PRINT TAB(5);X$,Y$	(Displays X,Y data on CRT.)
50 CLOSE	(Closes the line.)
60 END	(END)

Nikon reserves the right to make such alterations in design as may be considered necessary in the light of experience. For this reason, particulars and illustrations in this handbook may not conform in every detail to models in current production.