



Nikon

LV-NCNT2

Motorized Nosepiece Controller 2

Instructions

Thank you for purchasing a Nikon product.



This instruction manual is written for users of the Nikon LV-NCNT2 motorized nosepiece controller 2.

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

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

Warning and Caution Symbols Used in This Manual

Although this product is designed and manufactured to be completely safe during use, incorrect usage or failure to follow the safety instructions provided may cause personal injury or property damage. To ensure correct usage, read this manual carefully before using the product. Do not discard this manual and keep it handy for easy reference. Safety instructions in this manual are marked with the following symbols to highlight their importance. For your safety, always follow the instructions marked with these symbols.

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



WARNING

1. Application of this product.

This is a device to drive a motorized nosepiece of a microscope. Do not use it for other than intended use.

2. Do not dismantle the product.

Dismantling the product could cause an electric shock and a mechanical failure. Never dismantle the parts other than described in the manual. If abnormal conditions are encountered, please contact your nearest Nikon representative.

3. Use the specified AC adapter.

This is an AC-powered device. Please use the device with a specified AC adapter which serves the purpose noted below.

Use of other AC adapters is extremely dangerous and may result in breakdowns, abnormal heating or a fire hazard.

For the specified AC adapter, see “VI. Specifications.”

- To protect against breakdowns and fire, install the device and the AC adapter in a location with good ventilation. If you cover it with something or put something on it, it could cause abnormal heating because it obstructs the heat liberation.
- To prevent breakdowns and malfunctions, turn off the power switch at the back of the device (press the power switch to side labeled “O”) before connecting the AC adapter.

4. Precaution for the power cable of the AC adapter

Be sure to use the specified power cable.

Use of other power cable may result in breakdowns or a fire hazard.

This is an electric shock protection class I product, so be sure to connect a protective earth terminal.

For the specified power cable, see “VI. Specifications.”

To prevent an electric shock, turn off the power switch at the back of the device (press the power switch to side labeled “O”) before connecting the power cable.

5. External light source

When an external light source is attached to the microscope, be sure to use the C-HGFIE (manufactured by Nikon) or the X-Cite 120PC (manufactured by EXFO Electro-Optical Engineering Inc.) And those external light sources must be connected with the LV-NCNT2 through the RS-232C cable to prevent an unexpected flash. Additionally, when using the C-HGFIE or the X-Cite 120PC, set the switch inside this product correctly. For the settings, refer to “3. Switch Specifications” in Chapter IV, External Communications Control.



CAUTION

1. Handling

- Do not drop, bump or subject the product to a strong shock. Handle it with great care.
- Do not forcefully bend, pull or twist the power cord and the cables.
- Do not dismantle any part. It could cause an electric shock and a mechanical failure.
- Do not drop metal pieces such as clips and staples through any clearance into the device inside. It could cause a failure of the device or a fire.
- Do not spill any liquid such as coffee. It could cause a failure of the device or a fire.

2. Location for installation

If this device is used or stored under unsuitable conditions, it may get damaged or lose accuracy. When selecting the installation location, note the following:

- Avoid a location exposed to direct sunlight.
- Choose a location that is free from dust or dirt.
- Choose a flat surface with little vibration.
- Choose a sturdy desk or table that is able to bear the weight of the instrument.
- Do not install this device in a hot or humid location.
- Choose a circumstance where you can unplug the power cord from the DC power connector with a simple operation in an emergency.
- For details about the operating environment and storage environment, see “VI. Specifications.”

3. Slight electromagnetic waves

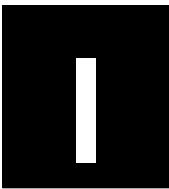
This device generates slight electromagnetic waves. Please keep it away from precise electronic equipment because its electromagnetic waves could damage the accuracy. If there is any effect on radio and television receiving, please set the radio or television away from the device.

4. Cleaning

- Wipe stains of the device with a piece of soft cloth. To clean tough stains, wipe off with a piece of tightly squeezed cloth after dampening it with a neutral detergent.
- Do not use such organic solvents as alcohol, ether or thinner. Use of such substance may result in deformation or discoloration of the product.

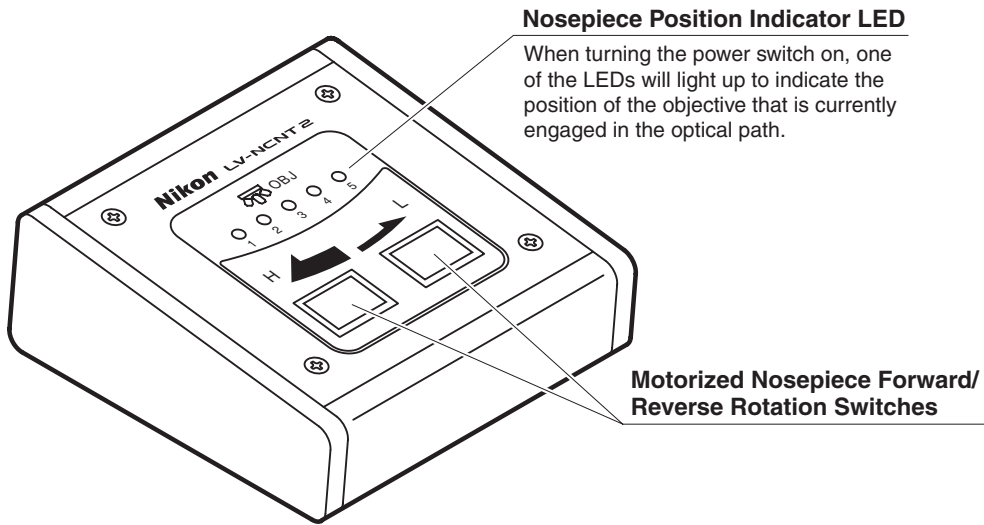
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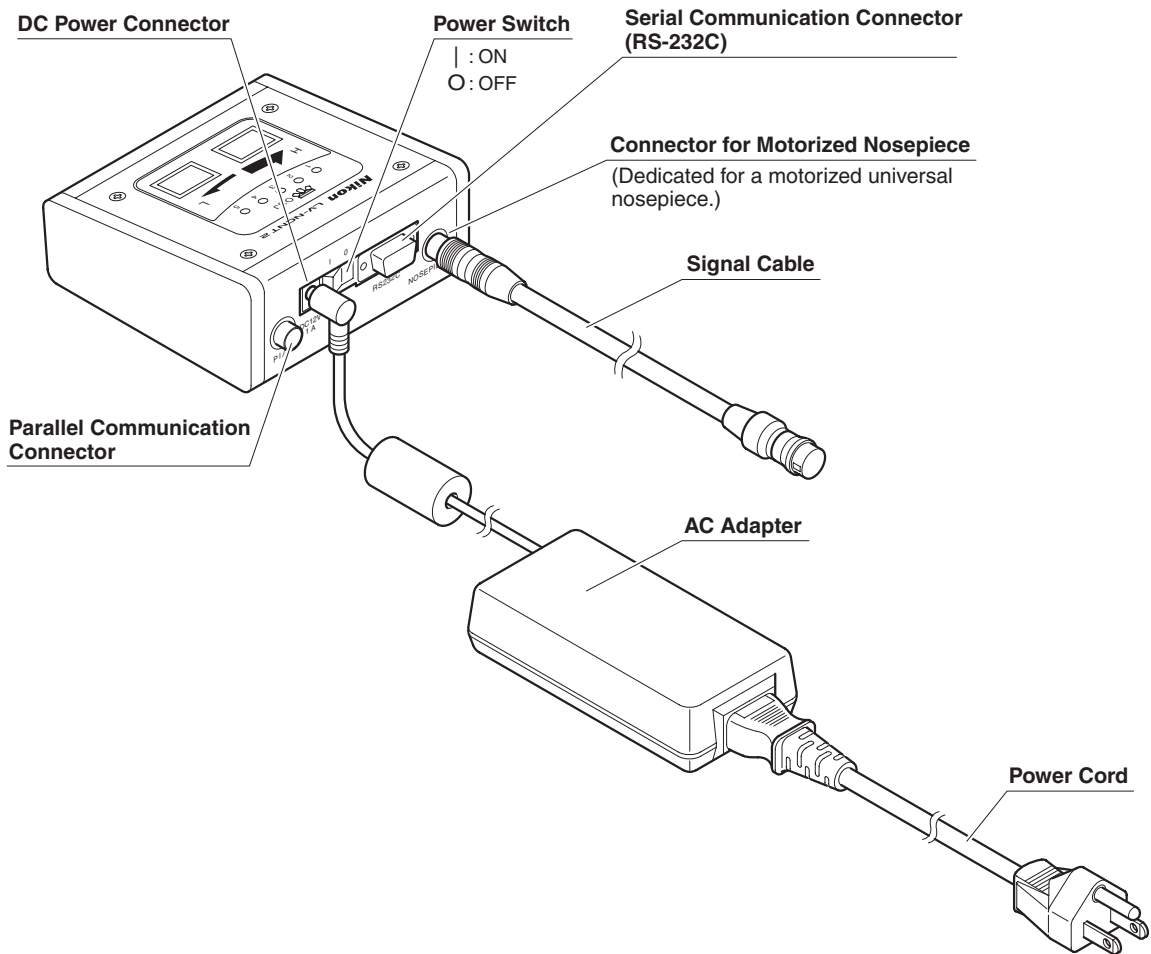


Name and Function of Each Part

► Front Panel



► Rear Panel



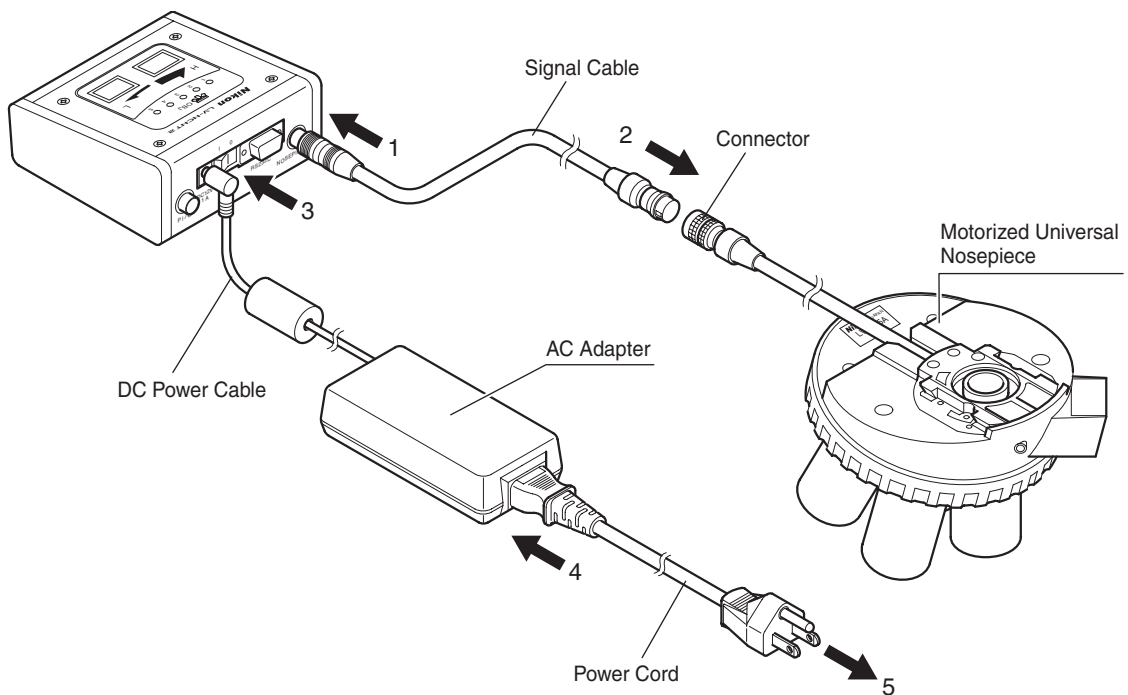


Method of Connection

This unit connects with a motorized universal nosepiece, LV-NU5A (option), and controls its rotational movements.

Please refer to the information below for connection of the unit.

- 1 Connect the signal cable supplied with the unit to the connector for the motorized nosepiece labeled “NOSEPIECE” in the rear panel of the unit.
- 2 Connect the other end of the signal cable to the connector of the cable that extends out of the motorized universal nosepiece.
- 3 Connect the DC power cable that extends out of the AC adapter to the DC power connector in the rear panel of the unit.
- 4 Connect the AC power cord supplied with the unit to the AC adapter.
- 5 Connect the other end of the AC power cord to an AC power outlet.

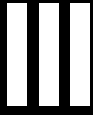


* A signal cable of 10 m length is available as an option.

▶ Connecting the external light source

To use the external light source, C-HGFIE manufactured by Nikon or X-Cite 120PC manufactured by EXFO, perform the settings and connection described below. The shutter of the light source can be opened/closed in synchronization with the nosepiece rotation.

- 1 For setting of the switches on the control board in this device, set the switch S4-1 to DF, S4-2 to EXT, and S4-4 to 9.6k. And then set the switch S4-3 to NIKON when the external light source is the Nikon C-HGFIE, or set the switch S4-3 to EXFO when it is the EXFO X-Cite 120PC.
- 2 For the Nikon C-HGFIE, use the RS-232C cross cable to connect this device and the RS232C connector on the C-HGFIE. For the EXFO X-Cite 120PC, use the RS232C cable provided with this light source.



Method of Operation

- 1** Press the power switch on the rear panel of the unit to the side labeled “|” to turn on the power.
One of the nosepiece position indicator LEDs located on the unit’s front panel will light up to indicate the position of the objective that is currently engaged in the optical path. The number of each nosepiece position indicator LED corresponds to a hole number in the nosepiece. However, if the nosepiece is not in one of the prescribed positions, the position indicator LEDs will not light up.
- 2** Use the motorized nosepiece forward/reverse rotation switches to control the rotations of the motorized nosepiece.
When using the reverse rotation switch to rotate in the reverse direction, rotating from the hole number “1” to the hole number “5” in the nosepiece is prohibited to protect the sample under observation. Please press the forward rotation switch while holding down the reverse rotation switch to rotate from the hole number “1” to the hole number “5”.

This unit can be controlled externally via serial (RS-232C) or parallel communication.

1 Serial Communication

The serial communication enables commands for rotating of the nosepiece, reading the nosepiece position, setting the status, and reading the status.

1. Communication Method

Asynchronous (start-stop synchronized) serial communication
RS-232C (EIA standard compliant)

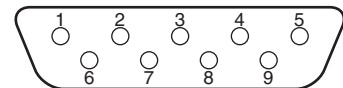
2. Connector Specifications

(1) Connector Type Name

D-sub 9-Pin Male

(2) Pin Assignment

Pin number	Signal name	In/out
1	–	–
2	RxD	Input
3	TxD	Output
4	DTR	–
5	SG	GND
6	DSR	–
7	–	–
8	–	–
9	–	–

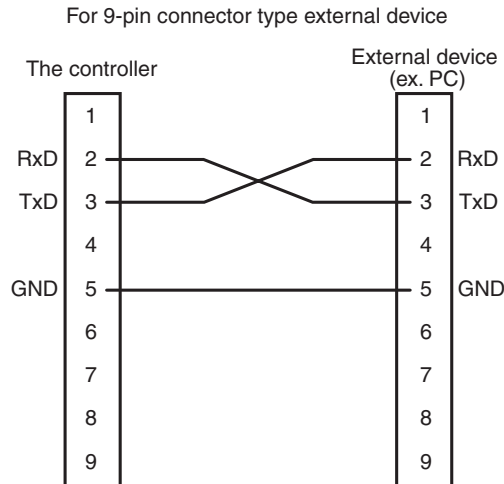


–: Not used

NOTE: The control lines DTR and DSR are not used in communication with this unit.

3. Cable Specifications

The following diagram shows signal connections necessary for a cable to work with the factory default.



4. Communication Parameters

- Baud Rate The switch S4-4 located on the PCB in the unit can be used to set the baud rate.
 S4-4 setting OFF: 9600 bps (factory default)
 ON: 19200 bps
- Data Length 8 bits
- Start Bit 1 bit
- Stop Bit 1 bit
- Parity Bit None

5. Communication Formats

The format of data received by this unit from an external device shall be defined as the “receiving format”, and the format of data sent by this unit to an external device as the “sending format”. Note that in the following text “[”, “]”, “<”, and “>” are used as delimiters only for the purpose of description and that they are not part of the characters to be included in data sent or received.

(1) Receiving Format: [Identification Code] [Command] [Data] [<CR>]

[Identification Code]: 1 lower-case alphabetic character (ASCII code, 1 byte)

Code	Specifications
c	Operation command, control command, or data set command
r	Settings condition read, or data read

[Command]: 3 upper-case alphabetic characters (ASCII code, 3 bytes)

[Data]: ASCII code

[<CR>]: Transmission control character (Carriage Return: 0x0D)

(2) Sending Format: [Identification Code] [Command] [Data] [<CR>]

[Identification Code]: 1 lower-case alphabetic character (ASCII code, 1 byte)

Identification code	Specifications
o	Acknowledging response against a “c” code
n	Negative acknowledging response against a “c” or “r” code
a	Acknowledging response against an “r” code
s	Sending a status

[Command]: 3 upper-case alphabetic characters (ASCII code, 3 bytes), [?] (ASCII code, 0x3F)
[?] is added when the [command] portion of a message received by this unit is short of 3 bytes.

[Data]: ASCII code

In case the identification code is an [n], the lower-case alphabetic character (ASCII code, 1 byte) set to [data] will be an error code whose meanings are defined in the table below.

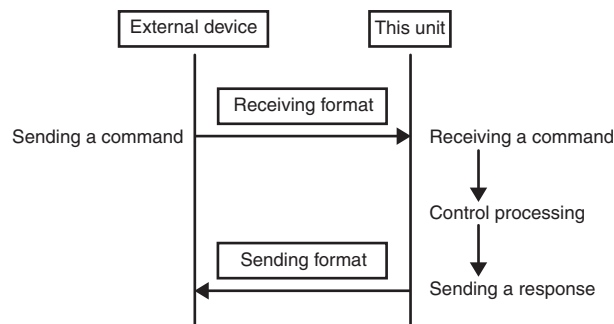
Error code	Name	Specifications
a	Command error	Indicates an unregistered command is received
b	Data Error	Indicates that data is invalid
d	Control Timeout Error	Indicates a timeout error occurred during control
f	Control Forbidden Error	Indicates a control command is received while control is forbidden
4	Receive buffer overflow	The received data exceeded the limit.
5	Hardware error	Hardware breakdown

[<CR>]: Transmission control character (Carriage Return: 0x0D)

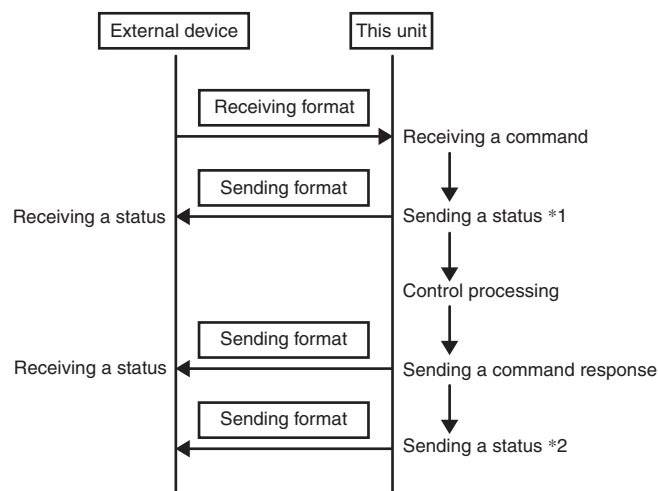
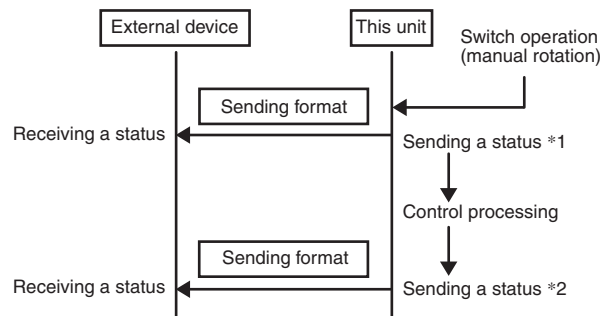
6. Communication Sequence

The factory default is the state of (1) described below. You can set the status of (2) and (3) by using a communication command. Also, you can set the status of (3) by using a switch on the control board. For detailed about the switch settings, refer to 3. Switch Specifications.

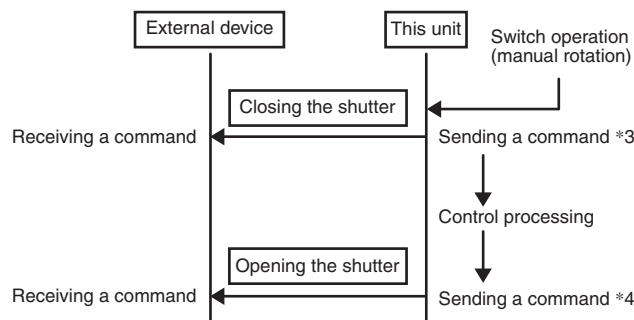
(1) When the status output of this unit is disabled;



(2) When the status output of this unit is enabled;



(3) When an external light source is attached and the control for the external light source shutter is enabled;



- *1: The unit status will be sent when the nosepiece is rotated by using the forward/reverse rotation switch, when the nosepiece is rotated by using the communication command, or when the objective goes out of the optical path.
- *2: The unit status will be sent when the the rotation driven by the motor ends or when the objective comes into the optical path.
- *3: The shutter close command will be sent when the nosepiece is rotated by using the forward/reverse rotation switch, when the nosepiece is rotated by using the communication command, or when the objective goes out of the optical path.
- *4: The shutter close command will be sent when the the rotation driven by the motor ends or when the objective comes into the optical path.

7. List of Control Commands

Identification code	Command	Data	Specifications
c	RCW	-	Rotates the nosepiece in forward direction to the next address.
c	RCR	-	Rotates the nosepiece in reverse direction to the next address. (However, rotation from nosepiece address 1 to 5 is prohibited.)
c	RCC	-	Rotates the nosepiece in reverse direction to the next address.
c	RDC	p	Rotates the nosepiece to the specified address (p: 1 to 5).
r	RAR	-	Reads the nosepiece address.
r	VER	-	Reads the program version.
r	PNM	-	Reads the program name.
c	SAS	-	Sets the status output setting.
r	SAR	-	Reads the status output setting.
s	SAE	-	Outputs the status.
c	DEF	-	Initializes the control data (factory default).

8. Response to Control Commands

[c] [RCW] [<CR>]

Rotates nosepiece in forward direction to the next address.

→ When properly finished [o] [RCW] [<CR>]

→ When control error occurred [n] [RCW] [error code] [<CR>]

[c] [RCR] [<CR>]

Rotates nosepiece in reverse direction to the next address. (Rotation from address 1 to address 5 is prohibited.)

→ When properly finished [o] [RCR] [<CR>]

→ When control error occurred [n] [RCR] [error code] [<CR>]

[c] [RCC] [<CR>]

Rotates nosepiece in reverse direction to the next address.

→ When properly finished [o] [RCC] [<CR>]

→ When control error occurred [n] [RCC] [error code] [<CR>]

[c] [RDC] [p] [<CR>]

Rotates nosepiece to the specified address (p: 1 to 5).

→ When properly finished [o] [RDC] [<CR>]

→ When control error occurred [n] [RDC] [error code] [<CR>]

[r] [RAR] [<CR>]

Reads nosepiece address.

→ When properly finished [a] [RAR] [p] [<CR>]

→ When control error occurred [n] [RAR] [error code] [<CR>]

[p]: Nosepiece address 0, 1, 2, 3, 4, or 5 ("0" when address unidentified.)

[r] [VER] [<CR>]

Reads the program version number.

→ When properly finished [a][VER][data][<CR>]

→ When control error occurred [n][VER][error code][<CR>]

[data]: V*.* (* denotes numeral. Example: V1.00)

[r] [PNM] [<CR>]

Reads the program name. You can identify devices connected on the communication line from an external device.

→ When properly finished [a][PNM][data][<CR>]

→ When control error occurred [n][PNM][error code][<CR>]

[data]: LV-NCNT2

[c] [SAS] [data] [<CR>]

Sets the status output setting for rotation of the nosepiece.

→ When properly finished [o][SAS][<CR>]

→ When control error occurred [n][SAS][error code][<CR>]

[data]: 0 (status output disabled), 1 (status output enabled), 2 (EXFO external light source shutter control enabled), or 3 (Nikon external light Source shutter control enabled)

[r] [SAR] [<CR>]

Reads the status output setting (the value set with cSAS command).

→ When properly finished [a][SAR][data][<CR>]

→ When control error occurred [n][SAR][error code][<CR>]

[data]: 0 (status output disabled), 1 (status output enabled), 2 (EXFO external light source shutter control enabled), or 3 (Nikon external light Source shutter control enabled)

[s] [SAE] [data] [<CR>]

Outputs the status with the rotation of the nosepiece when the status output is enabled. No response is required from the external device to this unit.

→ Status output is [s][SAE][data][<CR>]

[data]: 0 (at the start of nosepiece rotation), or 1 to 5 (address) (at the end of the nosepiece rotation)

[c] [DEF] [<CR>]

Initializes the control data to the factory default.

→ When properly finished [o][DEF][<CR>]

→ When an error occurred [n][DEF][error code][<CR>]

NOTE: Please refer to “5. Communication Formats” for description of [error code].

2 Parallel Communication

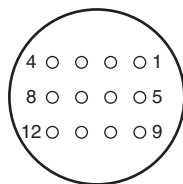
The parallel communication enables commands for rotating the nosepiece, reading the nosepiece position, and reading the status.

1. Connector Specifications

(1) Connector Type Name

HR25-9R-12P Manufactured by Hirose Electric Ltd.

(2) Pin Assignment



Pin number	Signal name / Specification	Input / Output																														
1, 2, 3	<p>Nosepiece position signal ($\overline{\text{OBJ1}}$, $\overline{\text{OBJ2}}$, $\overline{\text{OBJ3}}$) 1: $\overline{\text{OBJ1}}$, 2: $\overline{\text{OBJ2}}$, 3: $\overline{\text{OBJ3}}$</p> <table border="1"> <thead> <tr> <th>Nosepiece Position Indication (=Nosepiece Hole Number)</th> <th>$\overline{\text{OBJ1}}$</th> <th>$\overline{\text{OBJ2}}$</th> <th>$\overline{\text{OBJ3}}$</th> <th>H: Open</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>L</td> <td>H</td> <td>H</td> <td></td> </tr> <tr> <td>2</td> <td>H</td> <td>L</td> <td>H</td> <td></td> </tr> <tr> <td>3</td> <td>L</td> <td>L</td> <td>H</td> <td></td> </tr> <tr> <td>4</td> <td>H</td> <td>H</td> <td>L</td> <td></td> </tr> <tr> <td>5</td> <td>L</td> <td>H</td> <td>L</td> <td></td> </tr> </tbody> </table>	Nosepiece Position Indication (=Nosepiece Hole Number)	$\overline{\text{OBJ1}}$	$\overline{\text{OBJ2}}$	$\overline{\text{OBJ3}}$	H: Open	1	L	H	H		2	H	L	H		3	L	L	H		4	H	H	L		5	L	H	L		<p>Output* (Transistor Open Collector Output)</p>
Nosepiece Position Indication (=Nosepiece Hole Number)	$\overline{\text{OBJ1}}$	$\overline{\text{OBJ2}}$	$\overline{\text{OBJ3}}$	H: Open																												
1	L	H	H																													
2	H	L	H																													
3	L	L	H																													
4	H	H	L																													
5	L	H	L																													
4	<p>Nosepiece set-in-position signal ($\overline{\text{STOP}}$) It is set to "L" when the nosepiece is in one of the normal positions (click stop positions).</p>	<p>Output* (Transistor Open Collector Output)</p>																														
5	<p>Nosepiece rotational condition indicator signal ($\overline{\text{ACT}}$) "H" = Rotating, "L" = Not rotating</p>	<p>Output* (Transistor Open Collector Output)</p>																														
6	<p>Nosepiece rotational condition indicator signal ($\overline{\overline{\text{ACT}}}$) (The invert state of pin 5 output.) Use of this signal changes according to the settings of switch S5 on PCB in the unit:</p> <table border="1"> <thead> <tr> <th>S5</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>COF</td> <td>Always "H" (= not rotating)</td> </tr> <tr> <td>CNT</td> <td>"L" = rotating "H" = not rotating</td> </tr> </tbody> </table> <p>S3 is set to "CNT" as the factory default.</p>	S5	Specification	COF	Always "H" (= not rotating)	CNT	"L" = rotating "H" = not rotating	<p>Output* (Transistor Open Collector Output)</p>																								
S5	Specification																															
COF	Always "H" (= not rotating)																															
CNT	"L" = rotating "H" = not rotating																															
7, 8	0V (=GND)	GND																														
9	+5V (50 mA output maximum)	Output																														

Pin number	Signal name / Specification	Input / Output															
10, 11	<p>Nosepiece rotation command signal (\overline{CCW}, \overline{CW})</p> <p>Negative logic Minimum pulse width = 50 ms</p> <table border="1"> <thead> <tr> <th>\overline{CW} (Pin 11)</th> <th>\overline{CCW} (Pin 10)</th> <th>Nosepiece Action</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>H</td> <td>Stop</td> </tr> <tr> <td>L</td> <td>H</td> <td>In ascending direction of nosepiece address</td> </tr> <tr> <td>H</td> <td>L</td> <td>In descending direction of nosepiece address</td> </tr> <tr> <td>L</td> <td>L</td> <td>Reverse rotation when at address 1</td> </tr> </tbody> </table> <p>[Input]</p>	\overline{CW} (Pin 11)	\overline{CCW} (Pin 10)	Nosepiece Action	H	H	Stop	L	H	In ascending direction of nosepiece address	H	L	In descending direction of nosepiece address	L	L	Reverse rotation when at address 1	<p>Input (CMOS input level CR low-pass filter included)</p> <p>H: 3.2V to 5.0V L: 0 to 1.0V</p>
\overline{CW} (Pin 11)	\overline{CCW} (Pin 10)	Nosepiece Action															
H	H	Stop															
L	H	In ascending direction of nosepiece address															
H	L	In descending direction of nosepiece address															
L	L	Reverse rotation when at address 1															
12	Not used	Not used															

NOTE: The maximum output ratings of the output transistor is:

Maximum applied voltage for output VCE: 30V

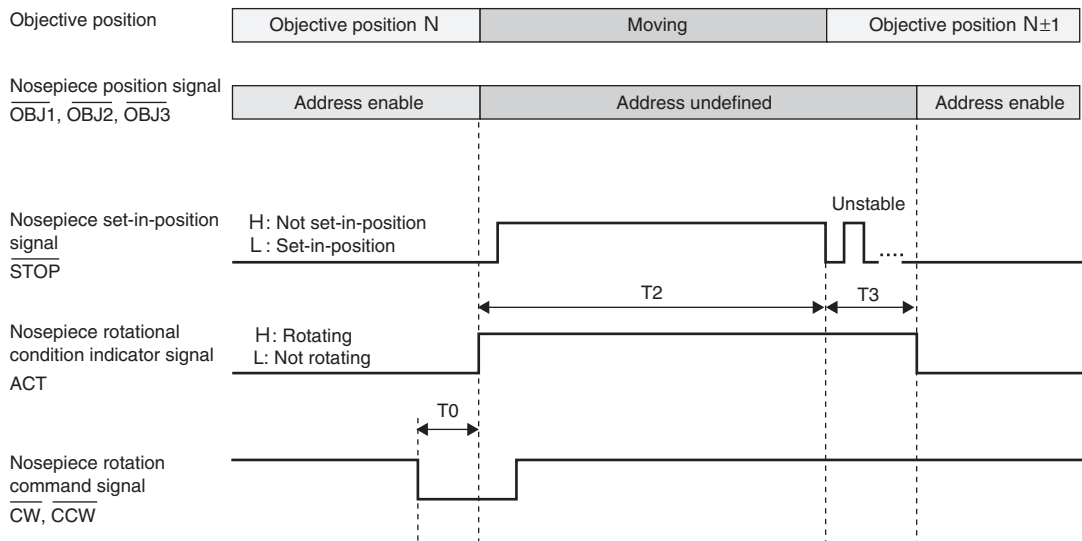
Maximum output current IC: 30 mA (for each output)

Output saturation voltage VCE (sat): 0.9 V

The transistor type is TD62083AF manufactured by TOSHIBA Corporation. For details, see the data sheet for the transistor.

2. Timing Charts for the Parallel Communication

(1) Rotation to the next address (PCB switch S4-1: factory default)

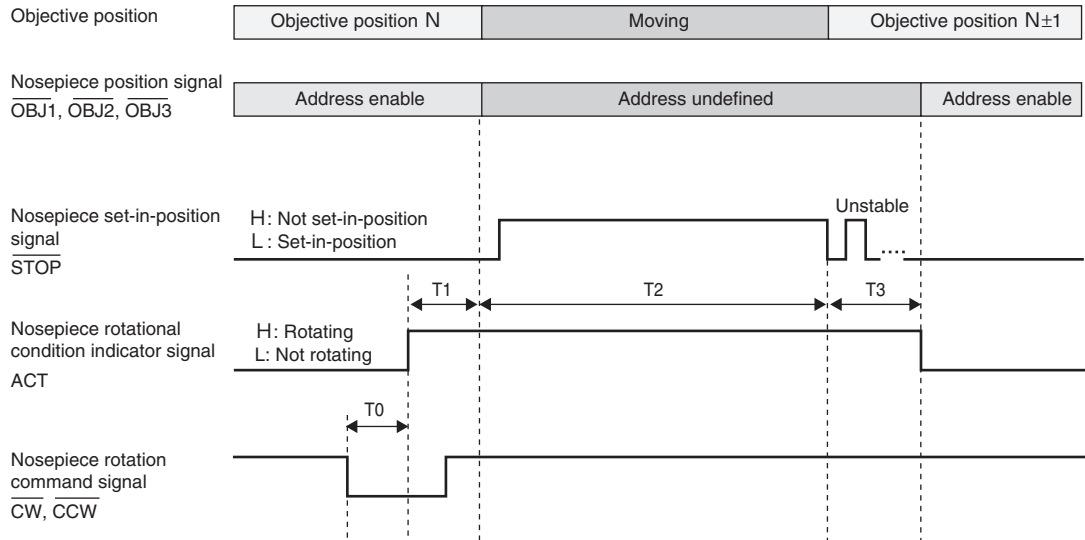


T0: When it remains "L" for 50 ms or more, the rotation command signal is enabled.

T2: The nosepiece is moving to the next address in this period. About 500 ms or less.

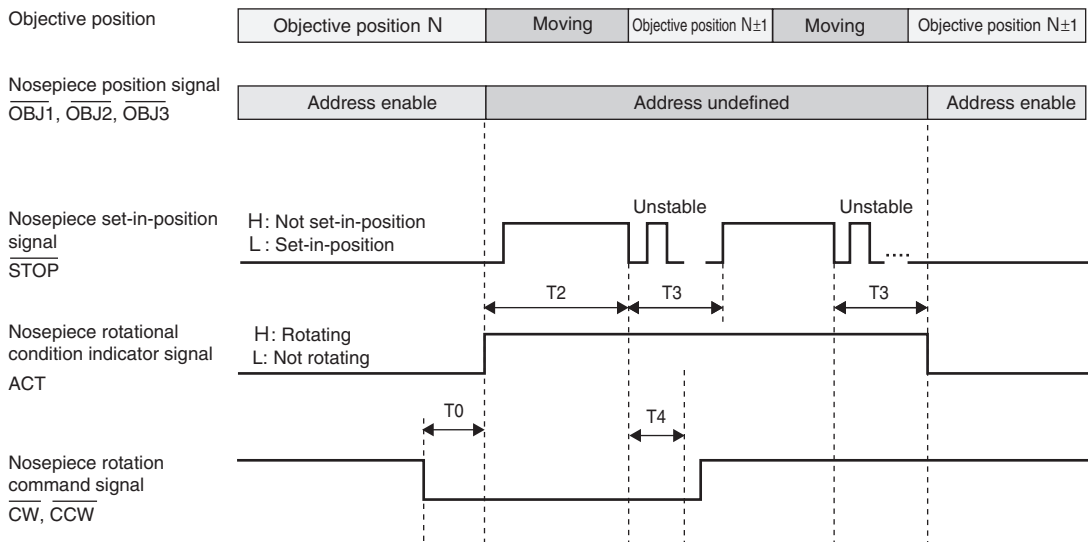
T3: Settling time for nosepiece positioning. About 50 ms.

(2) Rotation to the next address (PCB switch S4-1 = DF)



T0: When it remains "L" for 50 ms or more, the rotation command signal is enabled.
T1: The nosepiece control starts after 300 ms of the rotation command signal receipt. (S8=DF)
T2: The nosepiece is moving to the next address in this period. About 500 ms or less.
T3: Settling time for nosepiece positioning. About 50 ms.

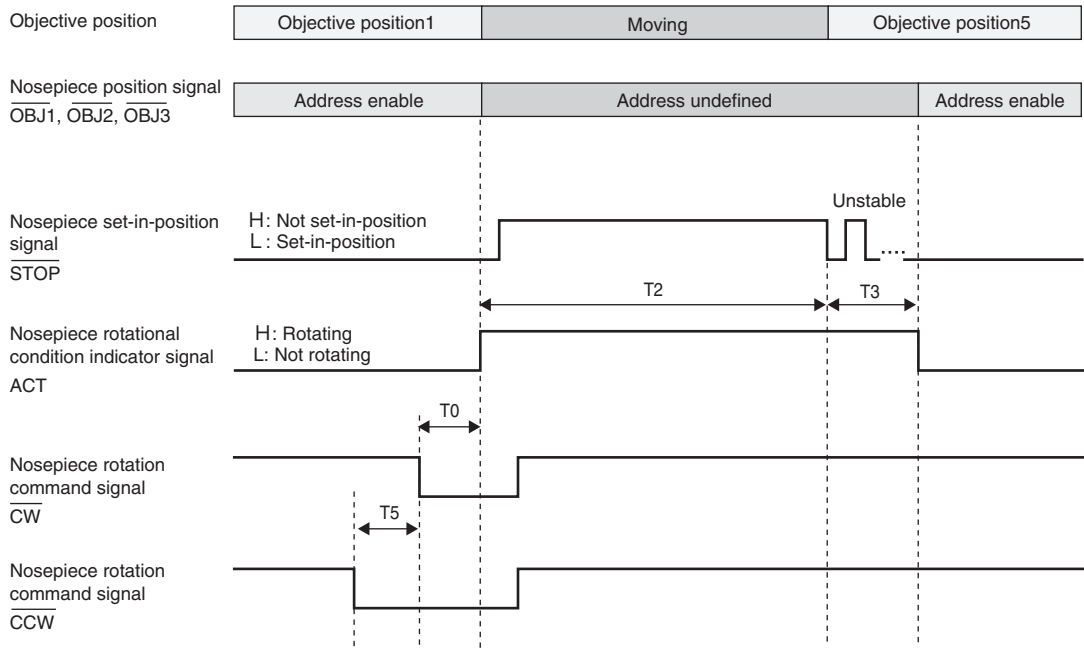
(3) Successive rotation (PCB switch S4-1 = BF: factory default)



T0: When it remains "L" for 50 ms or more, the rotation command signal is enabled.
T2: The nosepiece is moving to the next address in this period. About 500 ms or less.
T3: Settling time for nosepiece positioning. About 50 ms.
T4: CPU recognizes the successive rotation in this period. 50 ms or more.

(4) Rotation from No.1 to No. 5 (PCB switch S4-1 = BF: factory default)

To protect the specimen, the rotation from objective position 1 to 5 is prohibited in the counter clockwise direction. But, when the CCW and CW signals are set as the timing charts below, you can rotate the objective from 1 to 5 in the counter clockwise direction.



T0: When it remains "L" for 50 ms or more, the rotation command signal is enabled.
 T2: The nosepiece is moving to the next address in this period. About 500 ms or less.
 T3: Settling time for nosepiece positioning. About 50 ms.
 T5: 50 ms or more.

3 Switch Specifications

Specifications of the switches on the control board inside this device are shown in the table below.

Switch number		Specifications	Factory default setting
S4	1	BF (OFF): when a rotation switch is set to “L” or the rotation command input signal is set to “L”, the nosepiece rotates without delay. DF (ON): when a rotation switch is set to “L” or the rotation command input signal is set to “L”, the nosepiece rotates after a 0.3 second delay.	BF (OFF)
	2	NONE (OFF): no external light source is attached. EXT (ON): an external light source is attached. (Set the S4-1 to “DF.”)	NONE (OFF)
	3	For setting external light source NIKON (OFF): Nikon C-HGFIE EXFO (ON): EXFO X-Cite 120PC	NIKON (OFF)
	4	For setting baud rate for serial communication 9.6k (OFF): 9600 bps 1.92k (ON): 19200 bps	9.6k (OFF)
S5		For controlling indication of the nosepiece rotational condition	CNT (OFF)

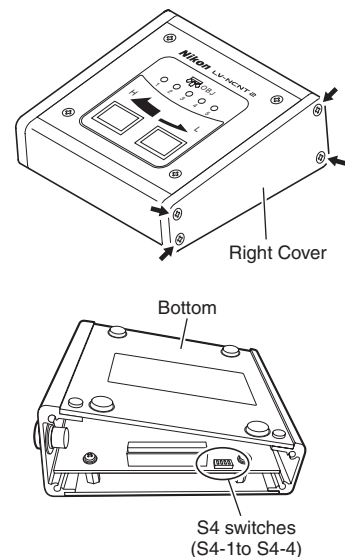
When the external light source is the Nikon C-HGFIE or the EXFO X-Cite 120PC, set the switch S4-1 to “DF”, S4-2 to “EXT”, and S4-4 to “9.6k”. Additionally, set S4-3 to “NIKON” when the Nikon C-HGFIE is used, or to “EXFO” when the EXFO X-Cite 120PC is used.

Under this settings, the shutter close command will be issued for the external light source when the nosepiece rotates and the shutter open command will be issued after the nosepiece stops.

For the shutter control above, connect the LV-NCNT2 and the light source using the RS232C cable.

▶ Changing the settings of the S4 switches

- 1 Press down the power switch to the “O” side to turn off the LV-NCNT2.
- 2 Remove four M3 screws and detach the cover from the right surface of the nosepiece controller. A control board is installed on the backside of the control panel. Check the location of the S4 switches.
- 3 Set the S4 switches.
When the LV-NCNT2 is placed with its bottom facing upward (as shown in the right figure), the switches S4-1 to S4-4 are placed starting from the left. Pull the switches to turn off (default positions) and press inward to turn on.
- 4 After setting the switches, reattach the cover to the original position.



V

Troubleshooting

Problem	Cause	Countermeasure
One or more of the nosepiece position indicator LEDs do not light up.	The objective is not located in the normal optical path position.	Press either the nosepiece forward switch or the nosepiece reverse switch to rotate the nosepiece to the correct position.
	The signal cable is not properly connected. The AC adapter is not properly connected.	Ensure to connect the cable properly and firmly.
The motorized nosepiece does not rotate.	The signal cable is not properly connected. The AC adapter is not properly connected.	Ensure to connect the cable properly and firmly.
The shutter of the external light source does not close when the external light source, Nikon C-HGFIE or EXFO X-Cite 120PC, is used and the nosepiece is rotated.	The RS-232C cable is not connected correctly.	Connect the RS-232C cable.
	The switches on the control board are not set correctly.	Set the switches correctly.

Model name	LV-NCNT2 Motorized Nosepiece Controller 2
Input voltage	12 VDC (supplied from the AC adapter)
Power source	AC adapter
Specified AC adapter	<p>Model name: F1650K / AD-1260B / EA1050E-120</p> <p>Manufacturer: Electricity Power Source (EPS) Inc. (F1650K) / Medi-Power Electronics Inc. (Made by Powertron Technology Co., Ltd) (AD-1260B) / EDAC POWER Electronics Co., Ltd. (EA1050E-120)</p> <p>Input ratings: 100 to 240 VAC, 50/60 Hz, 1.2 A max. (F1650K, AD-1260B) 100 to 240 VAC, 50/60 Hz, 1.8 A max. (EA1050E-120)</p> <p>Output ratings: 12 VDC \pm5% 3.5 A max. (F1650K, EA1050E-120) 12 VDC \pm5% 5.0 A max. (AD-1260B)</p> <p>Dimensions: 121(L) x 60(W) x 35(H) mm (F1650K) 121(L) x 62(W) x 36(H) mm (AD-1260B) 120(L) x 60(W) x 35(H) mm (EA1050E-120)</p> <p>Weight: 350 g(F1650K) / 270 g(AD-1260B) / 253 g(EA1050E-120)</p> <p>Safety standards compliance: GS, CE, UL, PSE</p>
Power cable for the AC adapter	<p>When used in 100 - 120V region, outside Japan: UL listed detachable power cord set, 3 conductor grounding (3 conductor grounding Type SVT, No.18 AWG, 3 m long maximum, rated at 125 VAC minimum)</p> <p>When used in 220 - 240V region: Detachables power cord set approved according to EU/EN standard, 3 conductor grounding (3 conductor grounding Type H05VV-F, 3 m long maximum, rated at 250 VAC minimum)</p> <p>When used inside Japan: PSE approved detachable power cord set, 3 conductor grounding (3 conductor grounding Type VCTF 3x0.75mm², 3 m long maximum, rated at 125 VAC minimum)</p>
Operating environment	<p>Temperature: 0°C to +40°C</p> <p>Relative humidity: 85% RH max. (no condensation)</p> <p>Altitude: 2000 m max.</p> <p>Pollution degree: Degree 2</p> <p>Installation category: Category II</p> <p>Electric shock protection class: Class I (AC adapter)</p> <p>Indoor use only</p>
Transport and storage environment	<p>Temperature: -20°C to +60°C</p> <p>Relative humidity: 90% RH max. (no condensation)</p>
Weight	Approx. 0.5 kg

Safety standards

- This product meets FCC Part 15B Class A requirements.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- The product meets Canadian EMI.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe A est conforme à la norme NMB-003 du Canada.

CE marking

- This product meets EU Low Voltage Directive requirements.
- This product meets EU EMC Directive (EN61326) requirements.

