

LUMAS NVA — Nozzle Visual Aligner

User Manual

Version 1.1
Release Date: Nov 10, 2025



1. Product Overview

Product Name: LUMAS NVA (Nozzle Visual Aligner)

Purpose: Optical visual alignment tool for laser cutting head nozzle and beam coaxial adjustment.

Application: For laser cutting machine setup, maintenance, and optical path calibration.

Key Features:

1. Real-time coaxial visualization
2. Compatible with multiple laser head brands
3. Portable, lightweight, USB-powered design
4. AI-assisted visual detection (optional in PRO version)

2. Safety Instructions

General Safety

Only trained personnel may operate this device.
Avoid exposure to direct or reflected laser beams.
Use in a clean and static-free environment.

Laser Safety

This device uses a red laser for alignment. Do not activate the main laser power during this process. Complies with IEC 60825-1:2014 safety standards.

Electrical Safety

Use a recommended 14500 battery or a USB powerbank. Do not open or modify the device.

Environmental Caution

Do not expose to humidity, oil mist, or strong vibration.
Follow WEEE directives for disposal and recycling.

3. Explanation of Symbols

Note: Provides additional information or explanations regarding the use of this product.

Caution: Indicates that improper operation may result in reduced calibration accuracy.

Warning: Indicates that improper operation may cause damage to the device.

Danger: Indicates that improper operation may result in severe damage to the product or a safety hazard.

4. Statement

Disassembly of the product without authorization from LUMAS K.K. is strictly prohibited.

Unauthorized disassembly will void the warranty.

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Chapter 1 - Product Description

1.1 NVA Product View

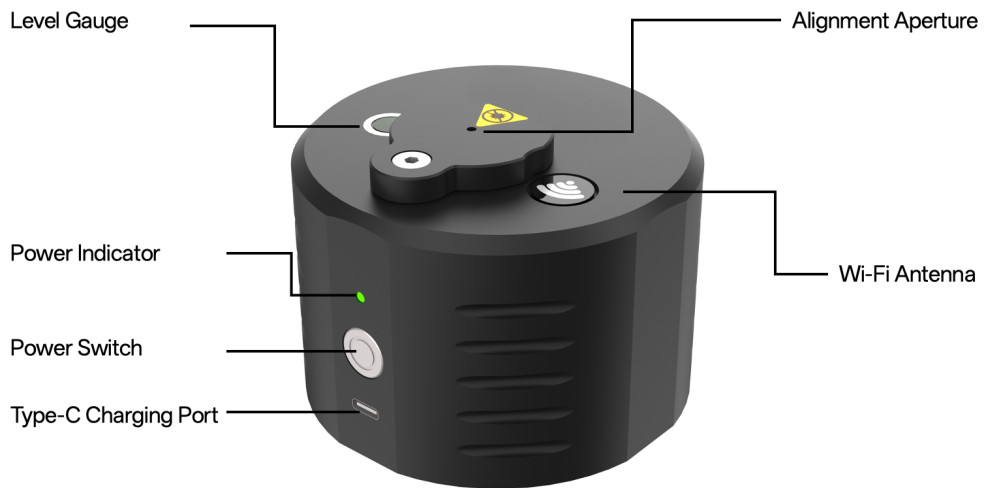


Figure 1-1 NVA Product View

1.2 Operation Interface

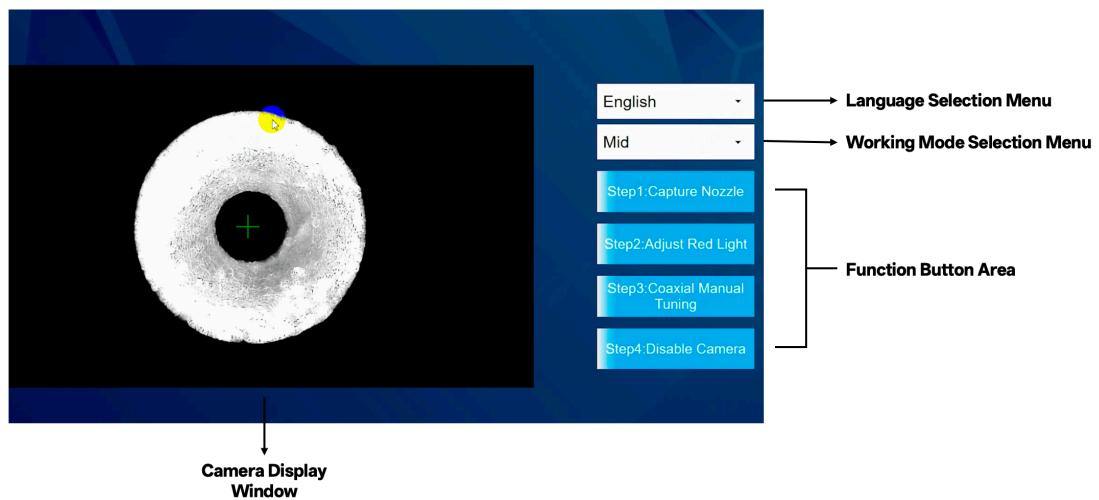


Figure 1-2 NVA Operation Interface

1.3 Technical Specifications

Table 1-1 Technical Specifications

Parameter	Description
Coaxial Deviation	<0.08mm
Connection Method	Wi-Fi
Supported Languages	English, Japanese, French, Spanish, Chinese
Power Supply	External Power: USB-A Port, 5V / 3A Internal Battery: Two 3.7V 14500 Rechargeable Batteries
Power Interface	Type-C Port
Weight	575 g (excluding batteries)
Dimensions	77 mm (H) × 105 mm (D)
Working Environment	Indoor
Operating Modes	Auto Mode / Manual Mode
Operating Temperature	-10°C~60°C
Humidity	≤85%RH
IP Rating	P20
Altitude	≤2500m
Pollution Level	Class 2

1.4 Packing List

Table 1-2 Packing List

No.	Item	Quantity	Unit
1	Nozzle Visual Aligner	1	Set
2	USB-Type C Data Cable	1	Piece
3	Quick User Manual	1	Copy
4	Hex Wrench	1	Piece
5	1.2 mm Copper Single-Layer Nozzle	1	Piece

Chapter 2 - Product Operation

The operation of this product mainly includes six steps: power supply, device centering, interface login, nozzle imaging, red light adjustment, and manual coaxial alignment. Each step must be performed in accordance with the instructions to ensure coaxial precision; improper operation may result in reduced accuracy or calibration failure.

2.1 Power Supply

This product supports two power supply methods: internal battery and external power source. Users may select either option as needed; however, it is recommended to use the internal battery mode for optimal portability.

Table 2-1 Power Supply Methods

No.	Power Supply Type	Description
1	Internal Battery	Powered by two built-in 3.7V rechargeable 14500 batteries. Power on/off is controlled by the main power switch.
2	External Power	Powered by an external power adapter with a USB-A port supporting 5V / 3A output. Power on/off is automatic and does not require the switch.

⚠ Important Note:

The product does not include rechargeable batteries or a power adapter by default. Users must determine the preferred power mode before use and prepare compatible batteries or an adapter that meets the required specifications.

2.1.1 Internal Battery Mode


(1) Battery Specifications

When using the internal battery power mode, you must purchase two 3.7V rechargeable 14500 batteries that meet the specifications listed in Table 2-2.

⚠ Caution:

Do not use batteries that fail to meet the specified requirements. Improper batteries may cause malfunction, damage, or safety hazards.

Table 2-2 Internal Battery Specifications

Parameter	Requirement	Reference Battery
Battery Type	14500 rechargeable lithium or nickel–metal hydride (NiMH) battery, button-top type	
Quantity	2 pcs	
Output Voltage	3.7 V per cell	
Battery Capacity	≥ 1000 mAh per cell (higher capacity provides longer operating time)	
Dimensions	Ø 14 mm × 50 mm (diameter × height)	

(2) Battery Installation

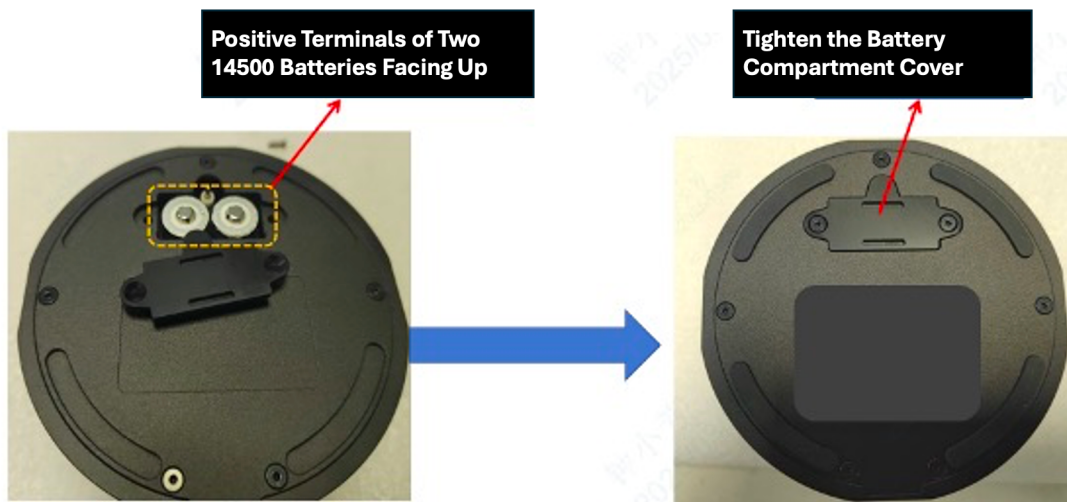


Figure 2-1 Battery Installation Method

The batteries are located inside the bottom battery compartment. Use an M2.5 hex wrench to remove the two countersunk screws and open the battery cover to access the compartment. Insert the batteries with the negative terminals facing the internal spring side and the positive terminals facing the cover. After installation, reposition the battery cover and tighten the screws securely.

⚠ Note:

Ensure correct battery polarity before powering on the device.

Incorrect installation may cause malfunction or damage.

2.1.2 External Power Mode


(1) Power Adapter Specifications

When using the external power supply mode, purchase a USB-A power adapter that meets the requirements listed in Table 2-3, and use the supplied USB-A to Type-C data cable to power the device. The selected power adapter must have a USB-A port and support 5V / 3A output.

⚠ Important:

Do not use dual Type-C cables or multi-purpose “3-in-1” charging cables for power supply. Use only the included USB-A to Type-C cable to ensure stable operation and electrical safety.

Table 2-3 Power Adapter Specifications

External Power Type	Specification Requirements	Remarks / Reference Image
Power Adapter	Input Voltage: DC 100V–240V Interface: USB-A Port Output: 5V / 3A (minimum)	

2.2 Charging Method

When using the internal battery mode, recharge the device using a USB-A power adapter that supports 5V output. Connect the adapter to the device via the USB-A to Type-C cable, then press the power switch to start charging. During charging, the power indicator LED will flash green at 100 ms intervals. When the battery is fully charged, the LED will flash slowly with a pattern of 100 ms on / 10 ms off.

⚠ Important:

Do not use dual Type-C cables or multi-purpose “3-in-1” charging cables to charge the internal batteries. It is strongly recommended to use the original USB-A to Type-C cable supplied with the product to ensure stable charging and avoid potential circuit damage.

2.3 Power Indicator Description

Table 2-4 Power Indicator Status (for Internal Battery Mode)

Operating Stage	LED Status	Description
Discharge Stage	Off	Device is powered off or battery is fully depleted
	Red	Low voltage — recharge required
	Green	Normal working voltage — device operating correctly
Charging Stage	Flashing Green	Device is charging (power switch ON)
	Solid Green	Battery fully charged

⚠ Note:

If the indicator remains red or does not illuminate, recharge the device before use. Do not continue operation when the battery level is critically low, as this may affect calibration accuracy.

2.4 Preparation Before Use

Before using the device, please complete the following steps to ensure safe and accurate operation:

- 1.Power Supply Setup:** Install two 3.7V 14500 rechargeable batteries or connect an external 5V / 3A USB-A power source.
- 2.Power Check:** Ensure the device powers on normally and the power indicator LED shows solid green.
- 3.Device Positioning:** Place the NVA horizontally. Verify that the bubble level is centered within the red circle.
- 4.Nozzle Condition:** Confirm that the nozzle aperture is clean, undamaged, and free of debris.
- 5.System Control:** Make sure the laser head movement and red laser light on/off can be properly controlled via the machine or software interface.

⚠ Note:

Improper setup may lead to alignment deviation or failure of coaxial calibration.

2.5 Operating Steps

The operation of the NVA consists of six main steps:

Device Centering → Interface Login → Nozzle Imaging → Red Light Adjustment → Manual

Coaxial Alignment → Power-Off.

Each step must be performed in the correct order to ensure calibration accuracy.

2.5.1 Device Centering

1. Turn on the red laser of the cutting machine.
2. Place the NVA directly under the nozzle, keeping a distance of approximately 8–10 mm from the sliding cover.
3. Manually adjust the position of the NVA until the red laser spot is fully centered within the alignment aperture.
4. Turn off the red laser after centering is completed.

⚠ Caution:

Move the cutting head slowly when adjusting height.

Avoid collision or pressure contact between the cutting head and the NVA device.

2.5.2 Logging Into the Operation Interface

1.Connect to Wi-Fi:

Open the Wi-Fi settings on your mobile device and connect to the network whose name begins with “NVA” (the number following it matches the Wi-Fi/SN code on the bottom label).

Password: 88888888

2.Access the Interface:

Option 1: Scan the QR code labeled Operator Interface on the NVA sliding cover.

Option 2: Open a browser (set to English input mode) and enter: 192.168.0.1:8088

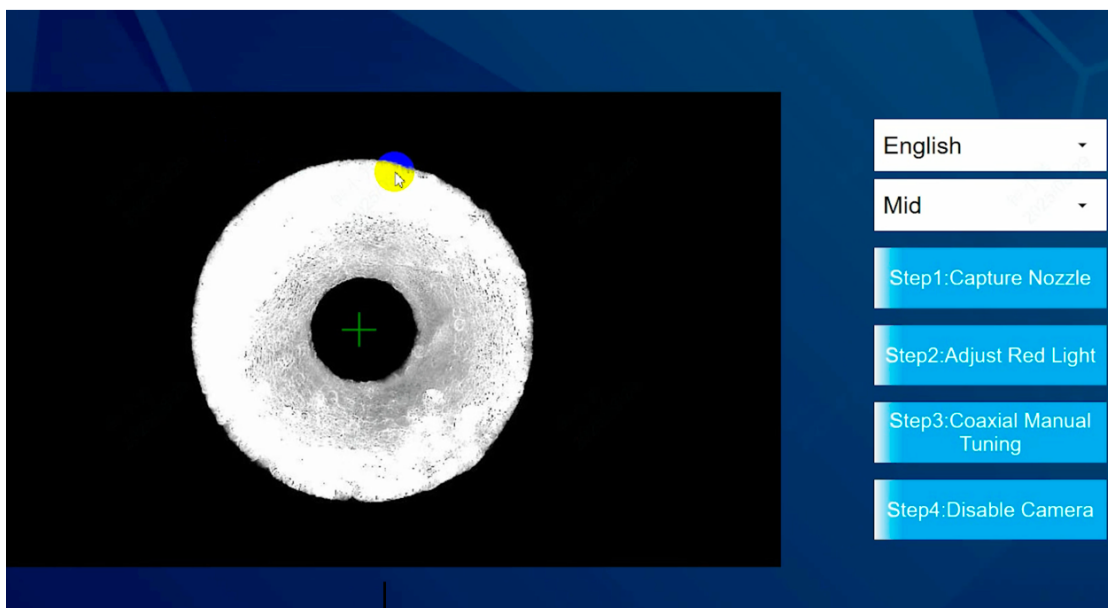


Figure 3-1 Operation Interface

3. Select Language:

In the left-hand drop-down menu, select your preferred display language.

Currently supported languages: Chinese, English, Japanese, French, and Spanish.

4. Select Working Mode:

In the right-hand drop-down list, choose a working mode:

- Auto Mode (AUTO): The interface displays diff_X and diff_Y values to indicate coaxial alignment status.
- Manual Mode (MID): No indicator values are shown; alignment is judged visually by the operator.

 **Note:**

Due to variations in the stability of the red laser, the light spot may flicker or slightly change in size. When this occurs, it is recommended to use Manual Mode for better accuracy.

2.5.3 Capturing the Nozzle

1. Nozzle Focusing

Adjust the cutting head height using the machine's controller until the nozzle aperture is clearly imaged on the display.

2. Capture the Nozzle Image

Click "Step 1: Capture Nozzle (Red Light OFF)" on the operation interface to perform circular fitting of the nozzle aperture.

When the fitting is successful, a yellow inner crosshair circle will appear, as shown in Figure 3-2.

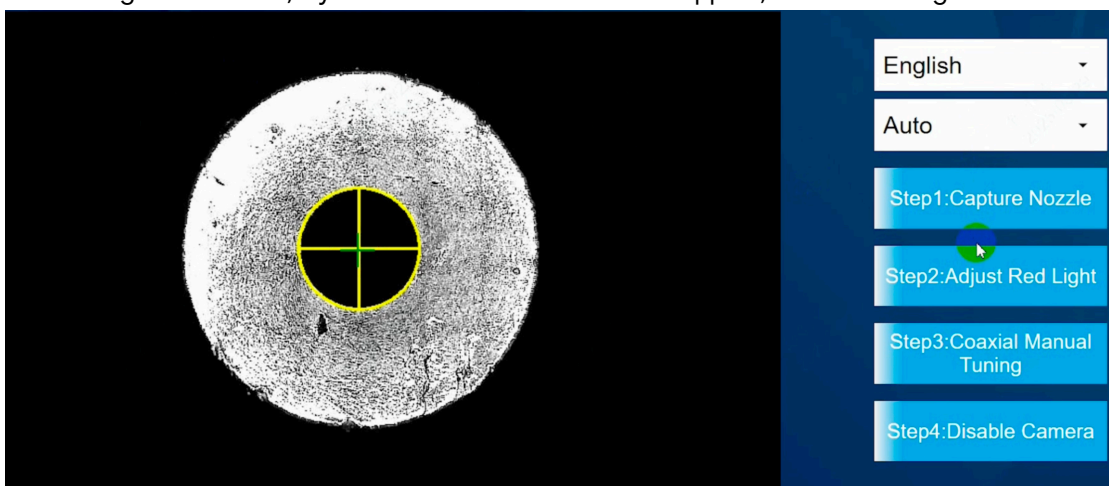


Figure 3-2 Nozzle Aperture Circular Fitting Result

2.5.4 Red Light Adjustment

1. Turn On the Red Laser

Activate the red laser guide light using the cutting machine’s remote controller or software platform.

2. Display the Red-Light Spot

On the operation interface, click “Step 2: Adjust Red Light (Red Light ON)” to enter the display screen and view the laser spot.

3. Adjust the Red-Light Focus

In the laser system software, adjust the red light focus value (recommended: -5 mm, -10 mm, or -15 mm).

Continue adjusting until a stable, concentrated red light spot with a clear outer contour is visible, as shown below:

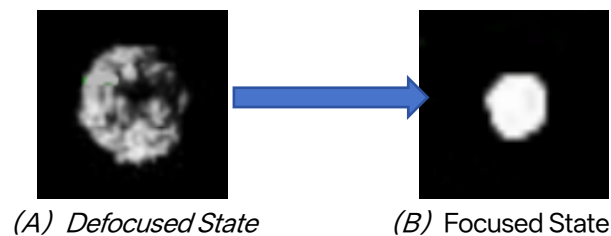


Figure 3-3 Red Light Focusing Process

2.5.5 Manual Coaxial Alignment

1. Enter the Alignment Interface

Click “Step 3: Manual Coaxial Alignment” on the operation interface to enter the real-time coaxial view screen.

2. Adjust the Red Light Position

Use a hex wrench to turn the coaxial adjustment screws on the laser cutting head while observing the live display.

Gradually adjust until the center of the red circle (laser beam) completely overlaps with the yellow circle (nozzle center).

In Auto Mode, this is confirmed when both diff_X and diff_Y values display 0.

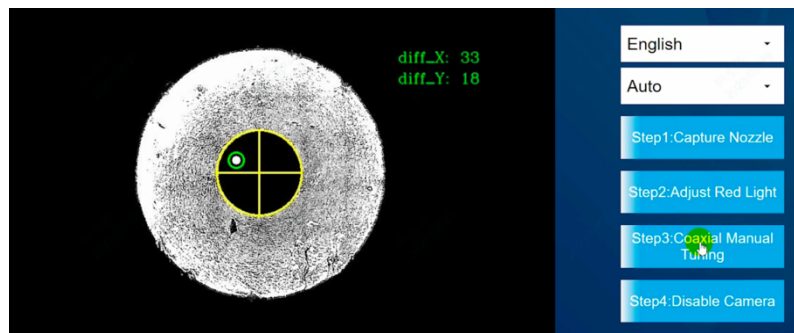


Figure 3-4 Example of Successful Coaxial Alignment

3.Complete the Process

Once alignment is achieved, click “Step 4: Close Camera” to finish the coaxial calibration.

⚠ Caution:

After completing the alignment, turn off the device promptly to conserve battery power.

Chapter 3 - Appendix

3.1 Appendix A — Precautions

- 1.Do not emit the laser beam while the NVA device is in use.
- 2.Do not operate or store the device in environments exceeding 60 °C or in humid conditions.
- 3.Do not use batteries, data cables, or power adapters that fail to meet the specified requirements.
- 4.Do not drop, strike, or apply external pressure to the device.
- 5.Do not disassemble or modify the device without authorization. Unauthorized disassembly will void the warranty.
- 6.After use, power off the device immediately and close the sliding cover to prevent contamination of the protective lens.

3.2 Appendix B — FAQ and Troubleshooting

Special Note

Each problem may have 1 to 3 possible solutions, indicated by the letters a, b, and c.

Always start with solution a. If the issue is not resolved, proceed to b, and then c.

If all listed methods fail, please contact LUMAS Technical Support for assistance. Email: Support@lumas-global.com

Q1: What should I do if the web interface freezes or becomes unresponsive?

A1:

- a. Refresh the operation interface.

Q2: The device does not power on after installing the batteries.

A2:

- a. Check that the batteries are 14500 rechargeable button-top 3.7V cells.
- b. Ensure the positive terminals of both batteries face the battery cover.

c. Confirm that the batteries are charged.

Q3: How do I clean the outer protective lens?

A3:

a. Use professional optical lens cleaner and tools (such as cotton swabs or lint-free cloth) to wipe gently.

Q4: The nozzle aperture cannot achieve a perfect circular fit.

A4:

- a. Improve the nozzle image clarity by refocusing.
 - b. Keep the nozzle centered in the display frame.
 - c. Replace the nozzle with a clean, undamaged one.
-

Q5: Wi-Fi does not appear after powering on the device.

A5:

- a. Refresh the Wi-Fi connection list on your phone.
 - b. Check the power indicator LED — if red, the battery is low and requires charging.
 - c. Verify the power adapter supports 5V / 3A output and use the original supplied cable. If not, replace it according to Section 2.5 and use a compliant adapter and data cable.
-

Q6: The interface is unresponsive, or Wi-Fi repeatedly disconnects and reconnects.

A6:

- a. If the indicator LED is red, it means low battery — please recharge before use.
 - b. Ensure the power adapter's USB-A port supports 5V / 3A output. Replace the adapter if it does not meet the requirement, and use a single USB-Type C cable (not a multi-purpose "3-in-1" cable).
-

Q7: The camera display shows noticeable delay.

A7:

- a. Keep your mobile device within 1.5 meters of the NVA unit.
- b. Refresh the operation interface and retry.

—

Q8: Wi-Fi is connected but the operation interface cannot be accessed.

A8:

- a. Verify that the IP address and port number are entered correctly (192.168.0.1:8088) in English input mode.
- b. After connecting to the NVA Wi-Fi, change its MAC address if necessary and set the IP configuration to Static.
- c. Try a different browser — Chrome or Microsoft Edge is recommended for best compatibility.



Warranty & Service Policy

This product is covered by the LUMAS Limited Warranty, valid only when operated and maintained according to the instructions provided in this manual.

Unauthorized modification or disassembly will void the warranty.

For detailed terms, please refer to your authorized distributor.

Disclaimer

All information, technical specifications, and images contained in this document are subject to change without notice.

LUMAS K.K. strives for accuracy but assumes no liability for typographical or technical errors.

The manufacturer reserves the right to modify the product for improvement without obligation to notify prior purchasers.

Compliance Statement

This product complies with the following international standards and directives:

- CE (European Conformity)
- FCC Part 15 (U.S. Federal Communications Commission)
- RoHS (Restriction of Hazardous Substances)
- WEEE (Waste Electrical and Electronic Equipment Directive)

Tested and verified by TÜV Rheinland for compliance and safety.

Technical Support

LUMAS K.K. Technical Service Center

Email: support@lumas-global.com

Website: www.lumas-global.com/NVA

LUMAS K.K. – Tokyo

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