

## SAFETY



### DANGER

The NuQ laser should not be supplied with external DC power unless all laser safety precautions are followed. These safety precautions include and are not limited to the following:

- Wearing appropriate safety glasses by all personnel in the vicinity of the laser who could be exposed to direct or indirect radiation within the full range of optical parameters described above.
- Installing appropriate warning signs and using safety curtains or enclosures.
- Implementing safety interlocks to avoid accidental exposure to laser radiation.
- Taking appropriate precautions when using NuQ with other optical instruments as they may increase eye hazard.
- Containing the beam to eliminate or minimize the possibility of exposure to the beam.
- Use of the NuQ laser other than as specified herein may result in hazardous radiation exposure.
- If you are not familiar with this model laser, please stop and read the entire manual before proceeding.

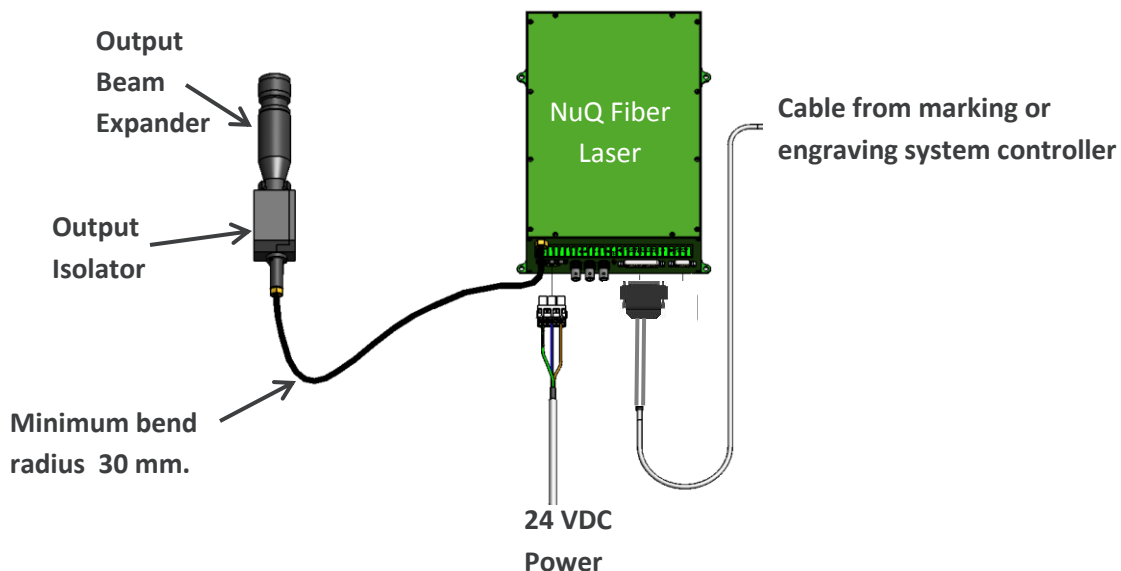
## HELPLINE

Our ongoing commitment to research and investigation with our customers promises a bright future with our fiber laser technology. If you need assistance with the operation of your laser, please contact us 8 AM to 5 PM EST.

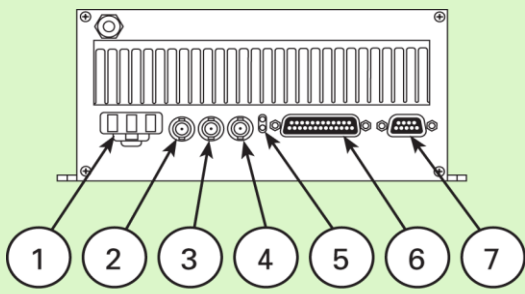
Within U.S. Call Toll-free: (888) NU-HELPS (684-3577)  
 From outside the U.S. Call: 1-860-408-5000  
 Email: [info@nufern.com](mailto:info@nufern.com)

Applications Engineer  
 Phone: 860-408-5043

## COMPONENTS



## FRONT PANEL CONNECTION CABLES



1. 24 V in
2. PRR Out
3. Gate
4. PRR in
5. Status LED
6. 25 Pin Interface Connector
7. RS-232

1. 24 Volt DC Input: As supplied, the 16-gauge, 3-conductor cable is nominally 0.8 meters in length. Please refer to the label on the cable for the connections.
2. PRR Output: This connector provides an output signal indicating when RF power is supplied to the Q-switch in the Master Oscillator (MO). This signal will mimic the pulse repetition rate (PRR) of the MO. This can be used as a diagnostic and also to synchronize other electronics in a laser processing system.
3. Gate Signal: The gate signal is provided for customers wishing to use a combination of TTL and RS-232 commands to control the laser.
4. PRR Input: The PRR input signal is provided for customers wishing to use a BNC cable to provide the PRR signal to the laser. This input is connected internally to Pin 20 of the DB25 connector.
5. Status LEDs (Red/Green): The LED bank consists of two stacked multicolor LEDs. **LED STATUS INDICATION** summarizes the information conveyed by these two LEDs.
6. DB25 Interface Connector: The 25-pin connector is used to control and to monitor the laser via the parallel interface. This interface primarily requires or provides TTL signals at the individual pins.
7. RS-232 Communications: The 9-pin connector is used to control and monitor the laser via the RS-232 interface.

## 25-PIN INTERFACE COMMUNICATIONS

Pin(s)	Description	Specification
1- 8	Bit 0 to Bit 7 of Power Setting (Input), respectively	0: Minimum power, 255: Maximum power.
9	Latches power on low to high transition (Input)	The minimum period between two latch signals is 1 msec; 1 $\mu$ sec. hold time required.
10-15	System Ground	Ground
16	Alarm 0 Output	TTL output. Refer to <b>STATUS MONITORS</b> .
17	Auxiliary 5V Input (Optional)	5 $\pm$ 0.2 V; 700 mA typical current consumption, 1400 mA max.
18	Master Oscillator Enable 1 = On, 0 = Off (Input)	TTL input. This pin has to be set to TTL high 200 $\mu$ s prior to Pin 19 being set to TTL high.
19	Amplifier Enable 1 = On, 0 =Off (Input)	TTL input. Rising edge triggered. Amplifier can not be enabled when visible pointer is enabled.
20	Pulse Repetition Rate (Input)	TTL (20 kHz to 100 kHz) $\pm$ 2%, Minimum 20 kHz, for NUQA-1064-NA-0020-YZ TTL (30 kHz to 100 kHz) $\pm$ 2%, Minimum 30 kHz, for NUQA-1064-NA-0030-YZ TTL (50 kHz to 200 kHz) $\pm$ 2%, Minimum 50 kHz, for NUQA-1064-NA-0050-YZ
21	Alarm 1 Output	TTL output. Refer to <b>STATUS MONITORS</b>
22	Visible Pointer Enable 1=On, 0=Off (Input)	TTL input. Visible pointer can not be enabled when amplifier is enabled. See Pin 19 description.
23	Interlock 1=Normal Operation, 0=Laser Disable (Input)	TTL input.
24	GND	
25	Not connected	

Note 1.  $V_{INL}$  is 1.35V typ.  
 $V_{INH}$  is 3.85V typ.  
 $V_{OL}$  is 0.4V typ.  
 $V_{OH}$  is 4.6V typ.

## LED STATUS INDICATION

LED Status	Laser Status	Indication
Green LED On • Red LED Off	DB25 interface detected, status OK	All Good.
Green LED Blinking • Red LED Off	RS-232 interface, status OK	All Good.
Green LED On or Blinking • Red LED on	Error detected	Check the laser status using the alarm pins on the DB25 interface. After correcting the source of the error, clear the error by turning on and off the 24VDC power.
Green LED On or Blinking • Red LED Blinking	Internal error detected	Turn on and off the 24 VDC power supply to clear the error.

## STATUS MONITORS

Condition	Alarm 0 State (Pin 16)	Alarm 1 State (Pin 21)
Laser Not Ready (Over Temperature, E-Stop, 24V Supply Off)	LOW	LOW
Normal Operation	LOW	HIGH
High Back-Reflection Error	HIGH	LOW
MO Error (Transient or Persistent)	HIGH	HIGH

## POWER REQUIREMENTS

Parameter	Specification
Input Voltage	23-25 Volt DC
Noise and Ripple	1% Peak-to-Peak
Recommended Current Capacity	6 A for NUQA-1064-NA-0010-YZ 8 A for NUQA-1064-NA-0020-YZ 10 A for NUQA-1064-NA-0030-YZ 15 A for NUQA-1064-NA-0050-YZ

## RUNNING LASER USING DB-25 PARALLEL INTERFACE

1.	Apply a TTL low signal to all signal inputs, pin #s 1–8, 9, 18–19, 22.
2.	Apply the appropriate voltages to the power cable, as described in POWER REQUIREMENTS
3.	Apply a TTL high to Pin 23.
4.	Apply the Pulse Repetition Rate (PRR) Signal to Pin #20. This should be a TTL signal with the duty cycle between 20% and 80% For NUQA-1064-NA-0010-YZ, the PRR has to be between 20 kHz and 100 kHz. For NUQA-1064-NA-0020-YZ, the PRR has to be between 20 kHz and 100 kHz. For NUQA-1064-NA-0030-YZ, the PRR has to be between 30 kHz and 100 kHz. For NUQA-1064-NA-0050-YZ, the PRR has to be between 50 kHz and 200 kHz.
5.	Set the desired power of the laser using pins 1–8. The default is 0 W (Only MO is on).
6.	Latch the power setting by toggling Pin 9.
7.	Apply TTL high on Pin 18 to enable the MO.
8.	Wait for 200µs or longer, apply a TTL high signal to Pin 19 to turn on the amplifier.
9.	Turn the amplifier on and off by applying TTL high or low on Pin 19.

## TURNON/OFF VISIBLE POINTER – ONLY VALID FOR UNITS WITH THE VISABLE POINTER OPTION

1.	Apply 24V to the unit or apply the optional auxiliary 5 V to Pin 17.
2.	Apply TTL high or low to pin 22 to turn on or off the visible pointer.
3.	Visible pointer can not be enabled when laser amplifier is enabled. See pin 19 description.