



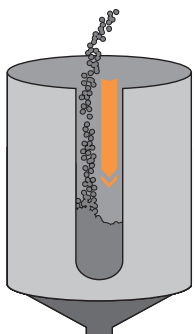
The NL-02 InoxLaser uses time-of-flight laser technology for continuous non-contact distance or level measurement.

Able to measure to any solid surface, at any angle, the NL-02 an ideal sensor for level, positioning and detection applications.

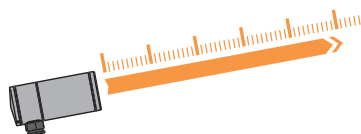
Features

- *Non-contact measurement with laser technology*
- *Level, distance & position measurement of solids*
- *303 Stainless steel housing*
- *Measurement range up to 100 m (328')*
- *Continuous measurement, 10 mm (0.39") resolution*
- *NAMUR compliant 4 ... 20 mA output*
- *2 Normally open relay outputs*
- *Easy configuration via USB*
- *220 / 110 V ac or 24 V dc power supply*
- *Visible aiming pointer*

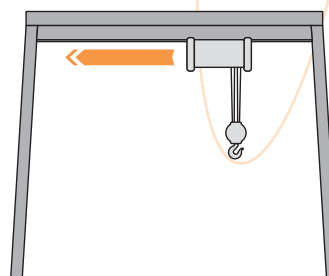
Applications



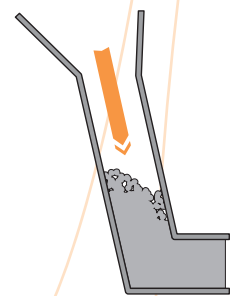
Level control



Distance measurement



Positioning



Blockage detection

Table of contents

| | |
|---------------------------------------|---|
| 1. Quick start guide | 3 |
| 2. Connections..... | 4 |
| 3. Instructions for safe use | 5 |
| Appendix A :: Specifications | 6 |
| Appendix B :: Dimension drawings..... | 6 |
| Revision history | 7 |

Table of figures

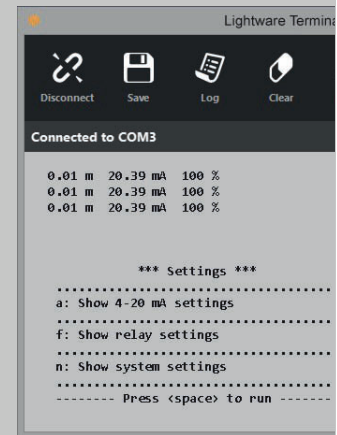
| | |
|---|---|
| Figure 1 :: Connection diagram | 4 |
| Figure 2 :: Labelling on the NL-02 | 5 |
| Figure 3 :: Dimension drawings of the NL-02 | 6 |

Disclaimer

Information found in this document is used entirely at the reader's own risk and whilst every effort has been made to ensure its validity neither LightWare Optoelectronics (Pty) Ltd nor its representatives make any warranties with respect the accuracy of the information contained herein.

1. Quick start guide

1. CAUTION - The NL-02 InoxLaser Sensor contains a laser and should never be aimed at a person or an animal. Do not look at the beam directly with optical instruments.
2. Download LightWare Terminal software from www.lightware.co.za > Info > Software onto your PC.
3. Open the LightWare Terminal package and follow the installation instructions. Everything needed for communicating with the NL-02 will automatically be installed.
4. Plug a USB cable into the USB A connector in the terminal compartment of the NL-02.
5. Plug the other end of the USB cable into a PC and the NL-02's LED indicators will light up.
6. Open Terminal software on the PC, a connection with the NL-02 will automatically be established using baud rate of 115200,8,n,1.
7. Click the "Connect" icon to open a communications port and the distance measured in meters, the milliamp output and the signal strength as a percentage. will begin to scroll in the Terminal window.
8. If an automatic connection is not created, click the "Laser" icon and select the appropriate USB port and 115200 baud rate.
9. To access the configuration settings menu of the NL-02, press the <SPACE> key on the keyboard:



| Menu | Selection | Default | Description |
|--------------------------------|----------------------------|-------------------------------|--|
| <A> 4 ... 20 mA settings | 4 mA | 25.00 m | Enter the distance corresponding to the 4 mA output value. |
| | <C> 20 mA | 0.60 m | Enter the distance corresponding to the 20 mA output value. |
| | <D> Fail safe current | > 21.0 mA | Enter the failsafe condition of the 4...20 mA range for alarm indications. |
| | <E> Test | 21.50 mA | Output test of the 4 ... 20 mA. |
| <F> Relay settings | <G> Relay A switch point 1 | 1.00 m | First distance at which Relay A activates. |
| | <H> Relay A switch point 2 | 2.00 m | Second distance at which Relay A activates. |
| | <I> Relay A mode | near => closed far => open | Select polarity of the relay |
| | <J> Relay B switch point 1 | 1.00 m | First distance at which Relay B activates. |
| | <K> Relay B switch point 2 | 2.00 m | Second distance at which Relay B activates. |
| | <L> Relay B mode | near => closed far => open | Select polarity of the relay |
| | <M> Relay test | A:closed B:closed | Tests relay functionality. |
| <N> System settings | <O> Measuring units | meters | Enter the required measuring units, either meters or feet. |
| | <P> Zero distance offset | 0.00 m | Enter the distance corresponding to the zero datum trim. |
| | <Q> Lost signal timeout | 4.0 sec | Enter the lost signal hold time delay in seconds. |
| | <R> Smoothing filter | ON | Turns the smoothing filter OFF (raw) or ON (filtered). |
| | <S> Filling rate filter | OFF | Turns the filling rate filter OFF (fast filling) or ON (slow filing). |
| | <U> Moving obstacle filter | ON | Turns the moving obstacle filter OFF (raw) or ON (reject obstacles). |
| | <V> Obstacle filter size | 16 results | If the "Moving obstacle filter" is ON, this buffer allows for selection of the number of results used to reject obstacles. |
| | <W> Visible aimer | OFF | Turns the visible aiming laser OFF or ON. |

10. Press the appropriate keyboard key to select a menu item, e.g. type <A> for "a: Hide 4-20 mA settings" to show or hide the 4-20 mA settings menu.
11. To restart measurements, press the <SPACE> keyboard key.
12. To save a copy of the current screen data, click the "Save" icon.
13. If you wish to start recording data, click the "Log" icon.
14. To clear the screen of measurement data, click the "Clear" icon.
15. Once you have configured the NL-02, click the "Disconnect" icon and disconnect the USB cable from the unit.
16. Connect the 220 / 100 V ac or 24 V power supply, the 4 ... 20 mA output, and the relays, as necessary for your application.

2. Connections

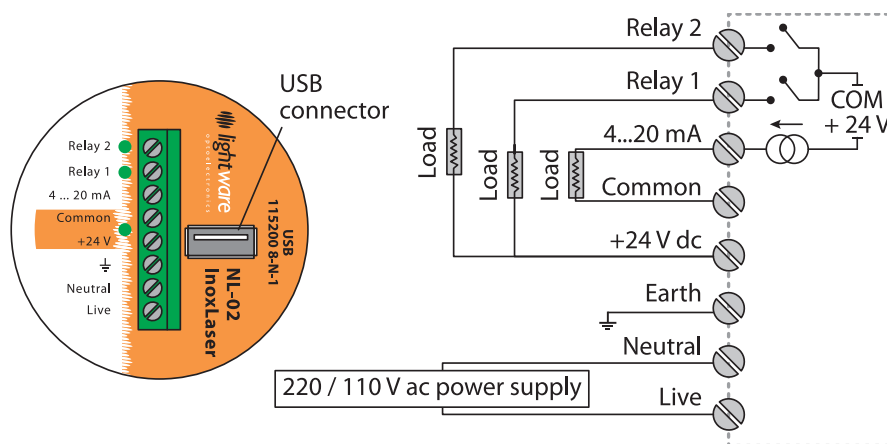


Figure 1 :: Connection diagram

3. Instructions for safe use

The NL-02 is a laser rangefinder that emits ionizing laser radiation from its measuring laser. The level of the laser emission from the measuring laser is Class 1M which indicates that the laser beam is safe to look at with the unaided eye but must not be viewed using binoculars or other optical devices at a distance of less than 15 meters. Notwithstanding the safety rating, avoid looking into the beam and switch the unit off when working in the area.

CAUTION -- The use of optical instruments with this product will increase eye hazard.

The NL-02 also contains an aiming laser that emits visible laser radiation when switched ON. The level of the laser emission from the aiming laser is Class 2 which indicates that the laser beam must not be stared at with the unaided eye.

CAUTION – DO NOT STARE INTO THE BEAM

The NL-02 should not be disassembled or modified in any way. The laser eye safety rating depends on the mechanical integrity of the optics and electronics so if these are damaged do not continue using the NL-02. There are no user serviceable parts and maintenance or repair must only be carried out by the manufacturer or a qualified service agent.

No regular maintenance is required for the NL-02 but if the lenses start to collect dust then they may be wiped with suitable lens cleaning materials. Make sure that the NL-02 is switched OFF before looking into the lenses.

The NL-02 should be mounted using the four holes provided in the circuit board. Do not hold or clamp the lens tubes as this may cause damage and adversely affect the laser safety rating.

Laser radiation information and labels

| Specification | Measuring laser's value / AEL | Aiming laser's value / AEL | Notes |
|--------------------------|-------------------------------|----------------------------|--|
| Laser wavelength | 905 nm, pulsed | 670 nm, CW | |
| Pulse width | < 20 ns | | |
| Pulse frequency | < 36 kHz | | |
| Peak power | < 10 W | 0.0008 W | 50 millimeter aperture at 2 meters |
| Average power | < 0.6 mW | | 7 millimeter aperture |
| Average energy per pulse | < 300 nJ | | |
| NOHD | 15 m | | Distance beyond which binoculars with may be used safely |

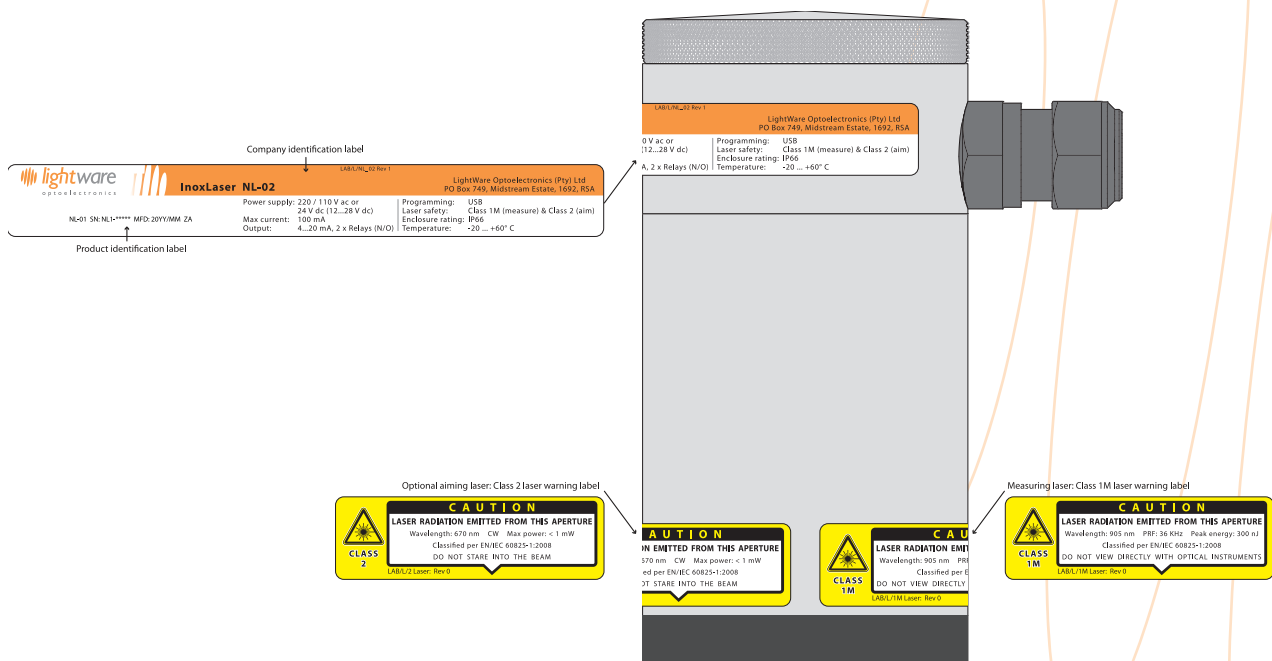


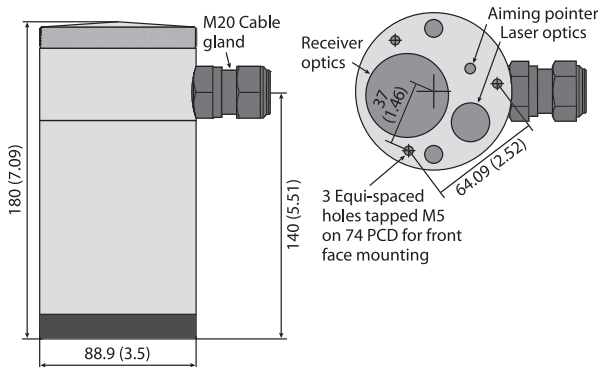
Figure 2 :: Labelling on the NL-02

Appendix A :: Specifications

| Performance data | | |
|-----------------------------|--|---|
| Sensing range | 0.3 ... 100 m (0.98' ... 328') | |
| Resolution | 10 mm (0.39") | |
| Accuracy | <0.1% of full range at 20°C | |
| Update rate | 5 readings per second | |
| Technical data | | |
| Power supply | 220 / 100 V ac or 24 V dc nominal (12 ... 28 V dc) | |
| Current consumption | 100 mA nominal | |
| Output | | |
| Analog | 4 ... 20 mA NAMUR compliant self-powered & non-isolated. 2 x Relays (N/O), 60 V dc at 3.5 A. | |
| Communication | USB at 115200 baud 8-N-1 | |
| Mechanical data | | |
| Diameter | NL-02: 88.9 mm (3.5") | NL-02/DT: 140 mm (5.51") |
| Length | NL-02: 180 mm (7.09") | NL-02/DT: 110 mm (4.33") |
| Weight | NL-02: 2.7 kg (5.59 lb) | NL-02/DT: 0.7 kg (1.54 lb) |
| Connection | Flange accessory (NL-02/DT) with 4 Ø 8.5 mm holes on 120 PCD | |
| Housing material | 303 Stainless steel | Powder coated stainless steel |
| Optical data | | |
| Laser power | Measuring laser: 15 W (peak) | Visible aiming laser: < 5 mW red |
| Optical aperture | 75 mm (2.95") | |
| Beam divergence | < 1° to half power points | |
| Lens material | Impact resistant acrylic | |
| Laser safety classification | Measuring laser: Class 1M CAUTION: Do not view laser directly with optical instruments. | Visible aiming laser: Class 2 CAUTION: Do not stare into the beam. |
| Environmental data | | |
| Operating temperature | -20°C ... +60°C | |
| Pressure | Atmospheric | |
| Enclosure rating | IP66 | |

Appendix B :: Dimension drawings

NL-02



NL-02/DT

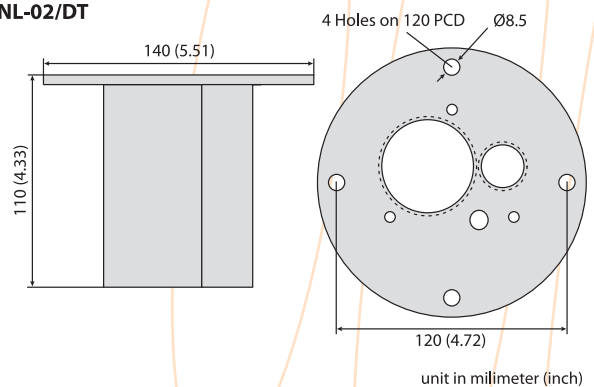


Figure 3 :: Dimension drawings of the NL-02

Revision history

| Version | Date | Authors | Comments |
|---------|------------|---------|--|
| Rev 1 | 2016/06/29 | TLP | Update “1. Quick start guide” to reflect updated software menu structure (page 3). Update the “Appendix A :: Specifications” Relay output to “60 V DC at 3.5 A” (page 6). |
| Rev 0 | 2016/04/18 | TLP | First edition |