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INSTALLATION NOTES

OPLD 4000

CONTENTS

SAFETY

Ensure that you have read and understand these instructions before operating the equipment. Please pay particular attention to the safety warnings.

1. Ensure to install according to AS/NZS 3000:2007: standards

2. Ensure that operators and installation engineers are aware of your plant room emergency procedures prior to installation

Important notices
PIL can take no responsibility for installation if this is not done in accordance with the appropriate manual.

The final and long term effectiveness of any gas detector depends heavily upon the user who must be responsible for its installation and functional testing.

Let us know
PIL has made every effort to ensure the accuracy of this document. If however you notice something you believe to be erroneous please notify us by email info@photonicinnovations.com

OPLD 4000 IS NOT AN EX RATED PRODUCT.

SYSTEM DESCRIPTION

THE OPLD 4000 uses an invisible “open path” laser to determine the average ammonia concentration across a room. The laser exits the main OPLD unit, traverses the room until it hits the retroreflector and reflects back to the main unit. This measures the average concentration of ammonia present in the distance between the main unit and the retroreflector.

Laser classification

There are two lasers used in the OPLD 4000; a Class 3R infrared laser (1512nm) which is used to perform the ammonia measurement and a Class 2 red (650nm) laser which is used for alignment. Because the laser exits the enclosure, care must be taken to avoid direct eye exposure from the laser. In particular, never look into the laser exit port of the OPLD. Note that the Class 3R laser is invisible so it may not be obvious to people nearby that hazardous laser radiation is present. Therefore we recommend that the OPLD be installed well above eye level, and that personnel working near the OPLD unit are made aware of the potential dangers.

THE LID OF THE ENCLOSURE MUST NOT BE REMOVED BY ANY UNAUTHORISED INDIVIDUAL

CERTIFICATIONS & COMPLIANCE

Electrical
AS/NZS CISPER 11:2011
IEC/ CISPR 11 Ed 5.1: 2010
EN 55011: 2010
Complies with Refrigeration System Safety Guidelines AS/NZS 5149.3
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GAS DETECTION METHOD

PIL has developed a laser spectroscopy based gas detection system that uses laser diodes set at a particular wavelength to detect industrial process gases. The laser diode's output wavelengths are precisely controlled by intelligent electronics, which prevent wavelength changes that may occur due to temperature fluctuations. This ensures reliable detection. An absence of electrochemical sensing elements means that there is no corrosion of the sensing element, no need for regular calibration or bump testing, nor any need for sensor replacement.

The interaction of the gas cloud with the laser beam is important to get a high signal to noise ratio. The OPLD 4000 employs an open path laser arrangement to measure the average ammonia level across a room.

OPLD Back Panel

Retroreflector

Laser Alignment Plug

RECOMMENDED PLACEMENT OF THE DETECTOR

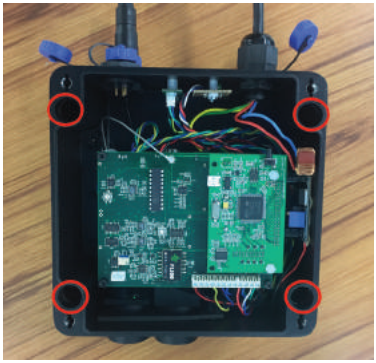
We advise placement at a height that is well above head height either above or near the pumps or above or near the compressor units. (REFER AS/NZ 5149.3)
Placing the OPLD below head height can expose personnel to laser radiation hazards as well as preventing the OPLD unit from functioning correctly if the laser beam is blocked unknowingly.

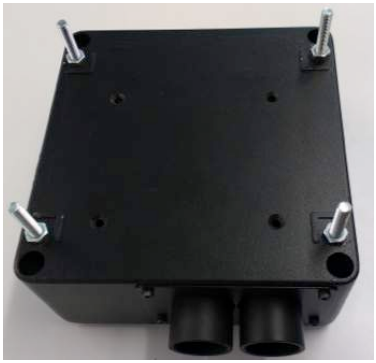
PHYSICAL INSTALLATION

1. Before screwing the OPLD to a shelf/platform it's critical that it's aligned correctly with the retro reflector. To achieve this you will need to go through the device startup procedure outlined on page 6.

2. After the device startup procedure has occurred make sure you mark where the OPLD will need to sit on the shelf or platform.

3. To screw the OPLD onto a horizontal shelf/platform 4x 6mm bolts must dropped into the 4 hold fast holes that can be seen when the lid is taken off (see image below).





4. Note that, due to variability in thickness of shelfs/platforms bolts are not included. We recommend measuring the thickness of the platform the OPLD will be bolted into and sourcing bolts that will satisfy the thickness requirement

5. If you need to sit the OPLD on a thin truss or beam we recommend screwing a steel base plate, approx 220mm x 220mm with holes to accommodate the hold fast bolts. This will ensure the OPLD 4000 is on a wide and stable enough platform.

6. Once aligned and the start up procedure has been implemented the OPLD can be screwed to shelf/platform

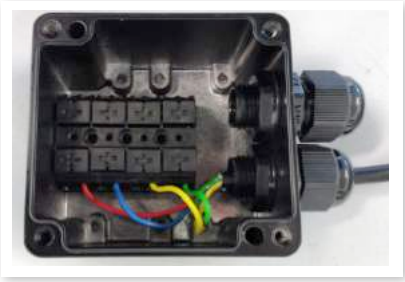
ELECTRICAL INSTALLATION

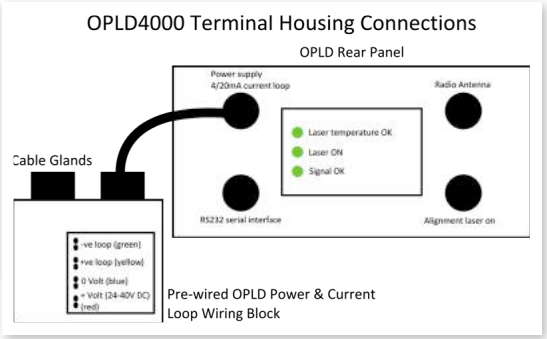
Electrical installation should be conducted by a licensed electrician in accordance with your local codes of practice/guidelines.

Caution: before electrical installation **ISOLATE** or switch **OFF** all associated power supplies and ensure that they remain **ISOLATED** or **OFF** during the electrical installation process.

FOLLOW THE STEPS TO COMPLETE ELECTRICAL INSTALLATION

- Remove the cover of the terminal block.
- Feed the necessary cables (power supply, 4/20mA) through the spare M16 cable gland.
- Pushing down with a large screwdriver to open the terminal blocks connect up the wiring appropriately.
  - Red: + Volt (24 - 40 V DC).
  - Blue: 0 Volt.
  - Yellow: positive 4/20mA loop.
  - Green: negative 4/20mA loop.
- Close cable glands.
- Replace the terminal block cover and reinsert fixing screws.

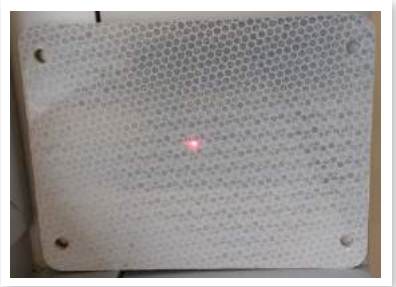




DEVICE STARTUP

1. After completion of the electrical installation procedures, proceed to power on the device. The OPL D 4000 does NOT have power on/off switches. The power to the device is controlled by the power line to the terminal block.

2. Once the power is switched on the Laser ON LED should switch on.
3. Within 30 seconds the Laser temperature OK LED should switch on.



4. Plug in alignment plug to switch on the red alignment laser.

5. Aim the red laser at centre of retroreflecting target.

Within 5 minutes the Signal OK LED should switch on indicating that the received laser power is within an acceptable range. Fix the OPLD main unit into position ensuring the red laser stays in the centre of the retroreflector.

6. Finally, remove the alignment plug to switch off the red alignment laser. All 3 LEDs should now be switched on indicating that the OPLD unit is fully operational.

If the OPLD open path distance has not been preset at the factory a PIL technician will set this now.

ERROR CODES

1. The Signal OK LED does not switch on:

The OPLD 4000 only functions correctly if enough laser light is received at the main unit after reflecting off the retroreflector. If the signal received is too low the Signal OK LED will switch off indicating that it cannot detect ammonia accurately.

- Realign the OPLD main unit by aiming the red alignment laser at the centre of the retroreflector.
- Check that the retroreflector is clean. If not, gently clean with a microfibre cloth.
- If the problem persists contact PIL or an authorised representative immediately.

2. The Laser temperature OK LED does not switch on:

The laser diode is maintained on the ammonia absorption line via a temperature control circuit. If the temperature control circuit is broken by any unknown reason, the device will not initialize and the Laser temperature OK will be switched off. Contact PIL or an authorised representative immediately.

The device should be inspected annually for the following:

1. Inspect the OPLD 4000 unit and cabling for signs of physical damage. If cabling is damaged, repair the damage or replace the affected cabling with new cable or connectors.

2. If the OPLD 4000 unit has suffered mechanical damage that appears to have compromised the unit return the unit to Photonic Innovations for factory examination and repair.

TECHNICAL SPECIFICATIONS

GENERAL PROPERTIES	
Lower Detection Limit	5ppm*
Accuracy	½ of the detection limit
Response time (t_{10})	0.5 - 4 sec
Saturation Time (T_{90})	$6t_{10}$

* With an open path length of 15m.
** The final measurement is subjected to a user defined rolling average

ENCLOSURE CONSTRUCTION	
Material	Powder coated diecast aluminum
Cable Entry	Single M16
Dimensions	160mm x 160mm x 100mm
Weight	2kg

ELECTRICAL	
Power Supply	24 - 40 VDC 2 Watts maximum
4-20mA	External supply V_{min} - 40 V.***
Communication	RS232, IoT enabled STRATUS Dashboard
4-20mA Output	0mA - open circuit 2mA - fault 3mA - system initializing 4mA - minimum gas level, nominally 5ppm 20mA - full scale, nominally 500ppm 22mA - over-range gas level
Alarms	Alarms should be configured on the SCADA backend based on 4/20mA output. Can be integrated into Central Monitoring System

*** Vmin depends on the external loop impedance at 22mA e.g. Vmin = 12v5 @ 250 Ω loop.

ENVIRONMENTAL	
IP Rating	IP54
Operating Temperature	Typically +5 to +40 (For Engine Rooms)
Operating Humidity	0-95% (non condensing)
Storage Conditions	-10C to +50C < 80% humidity

COMPLIANCE

Electrical Safety
AS/NZS CISPR 11: 2011
EN 55011: 2010
IEC/ CISPR 11 Ed 5.1: 2010

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Complies with Refrigeration System Safety Guidelines AS/NZS 5149.3

FAQs

1. What certifications does the equipment have?
The equipment has passed the AS/NZS CISPR 11: 2011 standard for electrical safety.
The system is built to ensure compliance with AS/NZ 5149.3:2016.
The system complies to SIL 2 safety standards.

2. How can I be sure that the equipment won't move out of calibration?
The OPLD's laser diodes are positioned on the ammonia absorption line via a temperature controlling circuit and laser's internal injection current. Both these parameters are factory set and tightly controlled via feedback loops. Any kind of drift will result in an error signal/notification from the device. The OPLDs are factory calibrated to gas concentrations and as long as the laser is positioned on the target gas absorption line, you can be sure that the device will not give incorrect gas readings.

3. Will dust, moisture and other particulates interfere with the laser and trigger a false alarm?
No, the system is calibrated to recognise a distinct absorption pattern that can only be generated by the target molecule.

Note, that if dust, moisture or other particulates reach a critical level the system will trigger a fault condition which will notify the user that a fault in the system has occurred.

4. Can the units detect lower explosive limits (LEL)?
NO, The OPLD 4000 is specifically built to detect minute levels of ammonia to ascertain toxicity levels only. We recommend FLD 4001 (Ex-rated) for LEL levels.

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ANY ADDITIONAL QUESTIONS/QUERIES CAN BE DIRECTED TO:

info@photonicinnovations.com
Contact form on www.photonicinnovations.com