



photonic  
innovations

# INSTALLATION NOTES



FLD 4000

# **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](mailto:info@photonicinnovations.com)

**FLD 4000 IS NOT AN EX RATED PRODUCT.**

# SYSTEM DESCRIPTION

THE FLD 4000 uses an internally mounted “closed path” laser to determine ammonia concentration. Closed path simply refers to the laser existing within an enclosed environment. The advantage of this is that it takes up less space. The laser path is also more protected from atmospheric particulates.

## Laser classification

As discussed above the laser for the FLD 4000 is transmitted within the detection enclosure. As such the laser should not ever emit outside the enclosure.

The laser used in the FLD 4000 is a Class 3R laser which are considered safe when handled carefully. There is only a small hazard potential for accidental exposure. The laser beam always stays inside the enclosure and hence the potential to any harmful exposure is very limited.



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

# CERTIFICATIONS & COMPLIANCE

## Electrical

AS/NZS CISPER 11:2011, Pass

IEC/ CISPR 11 Ed 5.1: 2010

EN 55011: 2010

Complies with Refrigeration System Safety Guidelines  
AS/NZS 5149.3

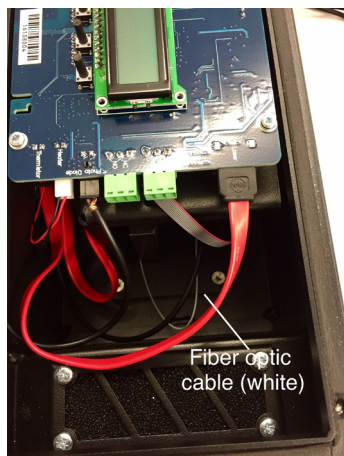
FLD 4000 IS NOT AN EX RATED PRODUCT.

## 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 FLD 4000 employs a patented multi pass cell arrangement i.e a combination of two curved mirrors. The laser beam bounces back and forth between the mirrors and amplifies the signal to noise ratio by orders of magnitude. The mirrors are protected from dust by filters provided on the enclosure. The multipass cell system employs delicate fiber optic cables.

**PLEASE DO NOT TOUCH THE FIBER OPTIC CABLES AT ANY TIME. THIS CAN LEAD TO STRESS AND STRAIN/BREAKAGE IN THE FIBER AND RENDER THE DEVICE NON FUNCTIONAL.**

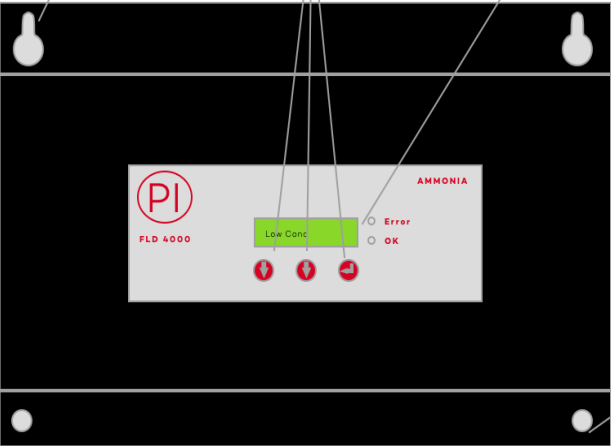


# DEVICE LABELS

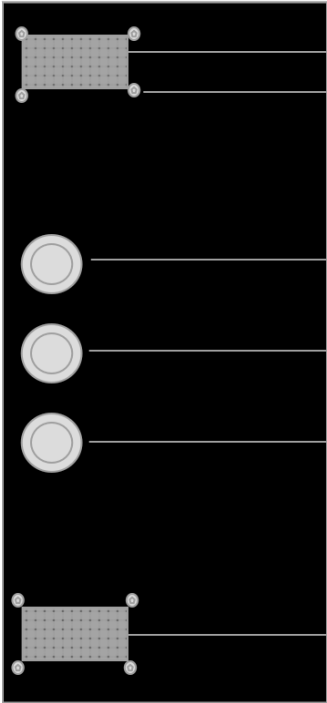
Keyhole 7.8mm

Navigation menu

LCD display, will either show  
Low Conc - for low concentrations of ammonia  
or PPM - for parts per million of ammonia



Guide hole 7.7mm



Pressurised in vent

Allen screw

M20x 1.5 Plastic threaded Gland

Out vent

## RECOMMENDED PLACEMENT OF THE DETECTOR

We advise placement at a height that is close to eye level either above or near the pumps or above or near the compressor units. (REFER AS/NZ 5149.3)

## PHYSICAL INSTALLATION

The FLD 4000 can be screwed onto a vertical surface (wall) or platform. Simply mark and drill the pilot hole points and screw into the wall. We recommend screw threads no wider than 7.5mm.

For stability we recommend drilling all four corners of the unit.



# ELECTRICAL INSTALLATION

Perform the electrical installation in accordance with the applicable Codes of Practice or Guidelines for the installation of electrical equipment in industrial areas/zones.

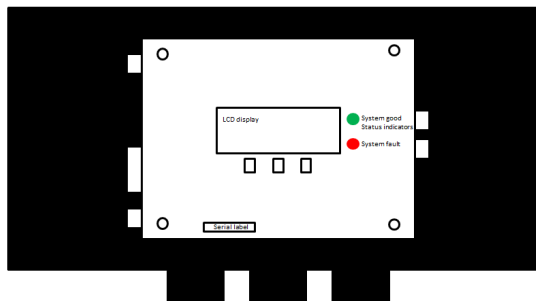
## CAUTION SYMBOL IMAGE

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.

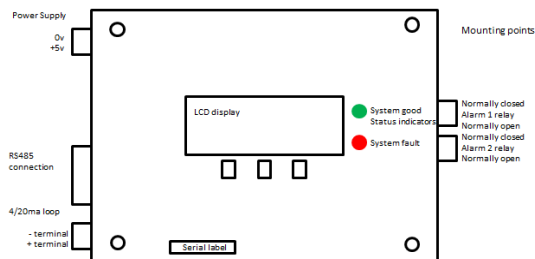
## FOLLOW THE STEPS TO COMPLETE ELECTRICAL INSTALLATION

- Removal of unit front cover to expose terminal entry points
- Note: appropriate terminal entries should be unplugged from the electronic module to expose the terminal screws
- Remove the appropriate cable gland covers for the particular installation
- Removal of cable gland inserts
- Feed necessary cables (power supply, 4/20ma, relays) through appropriate cable entry points and into the terminal entry locations
- Connect wiring to the appropriate terminal blocks
- Reinsert terminal blocks into electronic module seating locations
- Close cable glands and ensure cables are clamped
- Reposition unit front cover and reinsert fixing screws

View of unit with lid removed



View of electronic module with unit lid removed



The FLD 4000 has two relays that can be connected to standalone alarms/strobe etc.

The relays are present to alarm at 200 ppm as per AS/NZS 5149.3 guidelines.



## DEVICE STARTUP SCREEN

After completion of the physical and electrical installation procedures, proceed to power on the device. The FLD 4000 does NOT have power on/off switches. The power to the device is controlled by the power line to the 24V socket. As the device powers up and initializes an 'Init..' screen is displayed.



The initialization screen stays on for 1 - 4 minutes and then 'low conc' is displayed. Low conc means the ammonia concentration measured by the device is <20ppm. The green LED is switched on at all times.



# ERROR CODES

The screen freezes in 'Init..':

1. The laser diode is maintained on the ammonia absorption line via a temperature control circuit. When the device is powered on the screen remains in initialization mode ('Init..') for approximately 1 min and then 'Low Conc' is displayed. If the temperature control circuit is broken by any unknown reason, the device will not initialize and the screen will freeze in 'Init...' mode. Contact PIL or an authorised representative immediately.

Display shows 'Low Signal'

2. The FLD 4000 uses a multipass cell with an optical fiber assembly for producing high signal to noise ratio. Any damage to the fiber or the multipass cell will cause the screen to display low signal. If the device is operated outside the temperature range as specified in the specification sheet it can cause distortions in the multipass assembly leading to 'Low signal'.

- Check that the system has not been physically damaged
- Check that the system is being operated in the correct temperature range
- If the problem persists contact PIL or an authorised representative immediately.

# FUNCTIONAL TESTING PROCEDURE

Although the system is set up with a daily internal calibration audit we RECOMMEND periodic external functional testing on an annual basis. This ensures that the system is responding appropriately to an external source of ammonia. The test simply involves holding a small amount of ammonia solution (a cap full) to the in-vent and watching the LCD display for a response.

It's important to note that you are not testing for PPM accuracy. You are testing to ensure functionality upon exposure to an external source of ammonia. If the device is functional, the daily internal calibration audit will ensure it's accuracy.

The functional testing should be completed by AN AUTHORISED INDIVIDUAL.

In addition to functional testing the device should be inspected annually for the following

1. Inspect the FLD 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 FLD 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	20ppm
Accuracy	+/- 2.5% (min 1ppm)
Resolution	1ppm
Response Time	<1 sec
T90	<20 sec

## ENCLOSURE CONSTRUCTION

Material	Powder Coated Steel
Cable Entry	3x M20 (one blanking plug included for unused entry)
Dimensions	320mmx150mmx130mm
Weight	6.0kg
Display type	LCD Dot Matrix Display; concentration and messages

## ELECTRICAL

Supply	7-40 Vdc 2 watts max
4-20mA	Output, 2 wire connector
Relays	2x2 A @250 VAC, NO and NC contacts
Communication	RS485
4-20mA Output	0mA open circuit 2mA fault 4mA zero gas level 20mA full scale, nominally 500ppm 22mA over-range gas level
Voltage output	0-5V 10bit; on request
Alarms	Alarms should be configured on the SCADA backend based on 4/20ma output. Each relay can be configured for independent alarms, nominally set, alarm 1 @ 50ppm, alarm 2 @ 100ppm. Can be integrated into Central Monitoring System

## ENVIRONMENTAL

IP Rating	IP44
Operating Temperature	Typically +5 to +40 (For Engine Rooms)
Operating Humidity	0-95% (non condensing)
Operating Pressure	90-110 kPa
Storage Conditions	-20C to +40C < 80% humidity

## COMPLIANCE

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

### **FLD 4000 IS NOT AN EX RATED PRODUCT.**

**Complies with Refrigeration System Safety Guidelines AS/NZS 5149.3**

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## 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 FLD'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 FLDs 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 (see error codes) which will notify the user that a fault in the system has occurred.***

### **4. Can the units detect lower explosive limits (LEL)?**

NO, The FLD 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:**

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