ARA Single Gas Detector

Instrument User Manual V1.0R

Unrivaled Gas Detection.

Ionscience.com/usa

Thank you for purchasing your ION Science instrument.
The standard warranty of your instrument is two years.
For instruments with the hibernation option, if the instrument is put into hibernation mode, warranty is increased to 3 years.

EU Declaration of Conformity

The EU Authorised Representative of the manufacturer Ion Science limited has sole responsibility, on the date this product accompanied by this declaration is placed on the market, the product conforms to all technical and regulatory requirements of the listed directives

Authorised Representative:	ISM Deutschland GmbH · Laubach 30 · D-40822 Mettmann, Germany
PRODUCT:	ARA Single Gas Detector Series
MODEL:	ARA100, ARA200, ARA300, ARA400, ARA100H, ARA200H
Description:	Intrinsically safe, wearable single gas detectors.
Directive:	ATEX Directive (2014/34/EU) EMC Directive (2014/30/EU)
Certificate:	CML 20ATEX2016 IECEx CML 20.0007
Notified body:	SGS Fimko 0598
North American: certifying authority	QPS
North American File #:	ML 1621-1
Type of protection	II 1G Ex ia IIC T4 Ga

ATEX TEMPERATURE RANGES	H_2S (ARA100, ARA100H)	-40°C ≤ Ta ≤ 60°C
	CO (ARA200, ARA200H)	-40°C ≤ Ta ≤ 60°C
	O_2 (ARA300)	-30°C ≤ Ta ≤ 60°C
	SO_2 (ARA400)	-40°C ≤ Ta ≤ 60°C

APPLIED TECHNICAL STANDARDS	EN ISO 60079-0-2018 EN ISO 60079-11-2012 EN ISO 61010-1-2010 EN 55032-2015 EN 55035-2017 EN ISO 61000-3-2-2014 EN ISO 61000-3-3-2013
ATEX Notified Body	SGS Fimko 0598

Name: Clemens A. Verley **Position:** Chief Executive Officer

Signature: **Date:** 31st December 2020

Contents

Safety

Legal Notices Regarding the Safe Operation of Equipment

- Whilst every attempt is made to ensure the accuracy of the information contained in this manual, ION Science accepts no liability for errors or omissions in the manual, or any consequences deriving from the use of information contained herein. It is provided "as is" and without any representation, term, condition or warranty of any kind, either expressed or implied.
- To the extent permitted by law, ION Science shall not be liable to any person or entity for any loss or damage which may arise from the use of this manual.
- We reserve the right at any time and without any notice to remove, amend or vary any of the content which appears in this manual.

Symbols

	**WARNING!** **USED TO INDICATE DANGER WARNINGS WHERE THERE IS A RISK OF INJURY OR DEATH.**
	**Caution** **Used to indicate a caution where there is a risk of damage to equipment.**
	**Information** Important information or useful hints about usage.
	**Recycling** Recycle all packaging.
	**WEEE Regulations** Ensure that waste electrical equipment is disposed of correctly.

Warnings, Cautions and Information notifications

The following Cautions apply to the product described in this manual.

	If the 'Activate Before Date' marked on the package is expired, do not activate.
	Do not attempt to replace the internal components. This could impair the intrinsic safety rating and will void the warranty of the product.

	Before daily use: Make sure sensor and audio ports are clear of any obstruction such as debris or blockages. Perform the self-test to ensure the display, alarms and vibrate are operating. Confirm that the self-test is successfully performed by checking the mark on the gas-type on the LCD display. The mark is maintained or blinking on the screen.
	Ensure that the O_2 detector is calibrated at least every 30 days in a clear air environment. See O_2 detector section for information on calibration. The toxic gas sensors (CO, H_2S & SO_2) do not require calibration for the life of the product, however we do recommend bump tests take place. Please see our bump test recommendations below: Perform a bump test at least every 90 days. Please perform a bump test if the detector has been subject to physical impact, liquid immersion, over limit alarm event, change of ownership or anytime the detectors performance is in doubt. Perform a bump test by exposing the detector to a concentration of gas that exceeds the low alarm set points. When selecting suitable bump test concentrations, please consider your local health & safety exposure limits and ensure to take any necessary precautions when handling these gases. If the unit fails the bump test a few times, please contact ION Science.
	The accurate measurement of gas concentration depends upon the target gases and the period. The toxic gas sensors do not need to be calibrated.
	The product is a gas detector, not a measuring device.
	Do not attempt to replace the battery or sensor, the product is designed to be disposable. Changing these components will void the warranty.
	If you suspect any malfunction or have any technical problems, please contact ION Science.

The portable ARA has been designed and certified Intrinsically Safe.

Disposal

- The equipment does not include any toxic materials, but if it has been contaminated by toxic materials, then exercise due care and follow the appropriate regulations when disposing.
- Always adhere to local regulations and procedures when disposing of the equipment.
- ION Science Inc offers a take back service. Please contact us for more information.

RECYCLING

The detector contains a lithium battery that must be disposed in a recycling bin.

WEEE REGULATIONS

Ensure that electrical equipment is disposed of correctly.

The portable ARA has been designed and certified Intrinsically Safe.

Device Overview

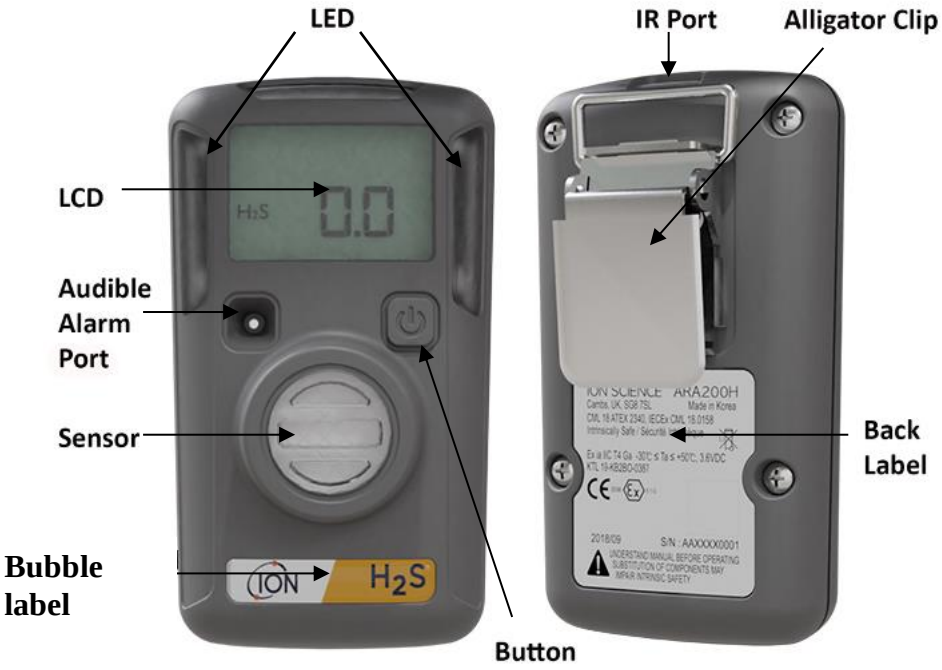
The ARA is a portable, single gas detector. These devices are disposable and will operate for 2 years without any replacement of components, to detect the presence of specific toxic gases. There are 4 single gas detector options:

1. Hydrogen Sulphide (H_2S)
2. Carbon Monoxide (CO)
3. Sulphur Dioxide (SO_2)
4. Oxygen (O_2)

To make it simple, Ara supports only one button. Users should understand the manual before operating ARA.

Hardware overview

Diagram 1 below shows where everything is located on the ARA.



Activating ARA

To activate ARA within the validity period indicated on the packaging, press and hold down button for approximately 5 seconds.

On activation, ARA will sound an audible alarm, flash and vibrate in sequence.

A successful activation will display the life remaining (24 months) or the reading value.

Display (LCD and Symbols)

Ara uses an LCD display to show its status. In the absence of gas, it will display the life remaining. When gas is present, the display will automatically shift to show what the gas concentration is.

NOTE: The display mode can be changed in the IR Link software with the "Life Remaining" and "Sensor Reading" user options.

WARNING: If the display is missing icons or displayed figures can't be read, please contact ION Science promptly.

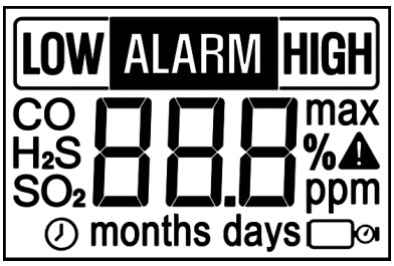


Image above shows all the icons on ARA.

The table below shows the symbols and their meanings.

Mode	Symbol	Description
Alarm	ALARM	HIGH/LOW Alarms
	LOW	LOW Alarms
	HIGH	HIGH Alarms
Sensor	H_2S	H_2S sensor (blinking: Self-Test required)
	CO	CO sensor (blinking: Self-Test required)
	O_2	O_2 sensor (blinking: Self-Test required)
	SO_2	SO_2 sensor (blinking: Self-Test required)
Warning	⚠	Self-Test, Bump-Test, Calibration failed
	max	Exposed to gas above Low alarm set points
		blinking: Bump-Test required
Unit	%	to display unit of O_2 sensor
	ppm	to display unit of H_2S/CO/SO_2
Time		to display Life Remaining
	months	to display time over 1 month
	days	to display time over 24 hours

Self-Test

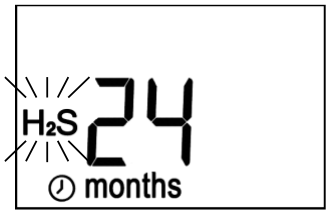
Prior to daily use, users must perform a self-test to ensure ARA is in safe operation. The self-test is done to ensure the audio, visual, and vibrating alarms are activated.

Below is a step by step process for performing the test:

STEP 1

Sensor type icon will blink when a self-test is required. Press the button to perform the test.

NOTE: Self-test can be performed with the IR Link when the sensor icon isn't blinking after 1 hour from self-test.



STEP 2

After pressing the button, the following screen will display, the unit will perform the following sequence:
The right and left side LEDs light up after emitting audible beep and vibration.
All LCD display icons appear.

NOTE: If the self-test is not needed, it will not be displayed.

STEP 3

LOW and HIGH alarm set points will be displayed.

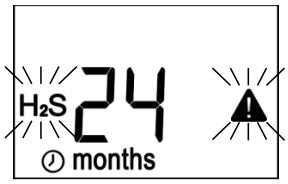
NOTES:

The set points can be changed in the IR Link software.
When LOW and HIGH alarm set points are displayed, the unit will perform STEP 2 if you press the button.

STEP 4

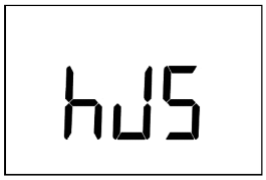
When the self-test is successful, one short audible beep will sound, the unit will then turn to the original screen.
NOTE: The unit will display the self-test reminder after 20 hours. The period of self-test can be changed in the IR-Link software from 8 hours to 7 days.

If the unit fails the self-test, a warning icon ⚠ will appear and the sensor type icon will start to blink. The unit will then wait for the self-test to be done again.



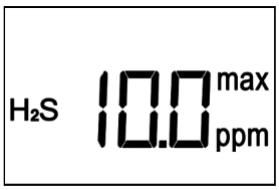
User ID Display

If programmed with a "User ID" via the IR Link, the image below will appear on the screen. The "User ID" consists of up to 6 digits and alphabetic characters. If this has 6 characters, it will show 3 characters across 2 screens.

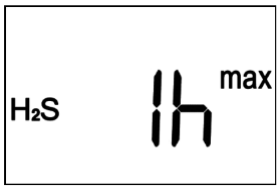


Peak Reading Display

If exposed to a gas concentration that exceeds the HIGH alarm set points, the detector will display the "MAX" icon and the concentration values of the gas.
If the "Max Icon" is displayed, the peak(maximum) value will be displayed as shown below.



The value (hour, day, month) with the amount of time passed since the peak reading will also be displayed.

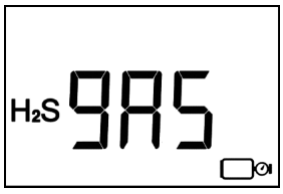


If the user presses the button down while the CLP (clear peak) is displayed, the peak value on the detector will be reset and the "⚠" icon will not be displayed.

Bump Test Display

If the unit has been programmed for an interval bump test (Via IR Link) and if the unit is due for the bump test, the bump test icon (📷) will appear and start to blink.

After pressing the button, the units screen will indicate that its ready for a bump test. For the detailed process of the bump test, please find "Procedure Of BUMP TEST".



User guidelines

Please ensure self-test has been completed before use. This is to confirm the functions of the display, audio alarm and vibrator are all working.

In normal running mode, the unit will automatically detect gas and alarm to the user when the concentration of gas goes above the set threshold.

For safety, wear the detector close to the user's breathing zone.

WARNING: Ignorance or failure to notice the alarm can lead to serious injury or death.

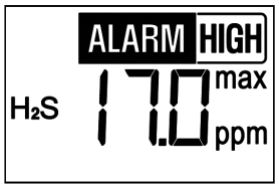
Alarms

LOW Alarms

1) Audible Alarm (2 times/second)
2) LED blinking (2 times/second)
3) Vibrator Alarm (1 time/second)

HIGH Alarms

1) Audible Alarm (3 times/second)
2) LED blinking (3 times/second)
3) Vibrator Alarm (1.5 time/second)



Alarm Set Point

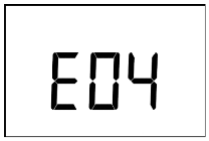
Below is a table to show the default factory set points:

Alarm	H_2S	CO	SO_2	O_2
HIGH	15 ppm	200 ppm	10 ppm	23.5 %
LOW	10 ppm	35 ppm	5 ppm	19.5 %

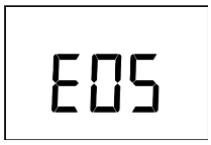
These set points can be changed using the IR-Link. To display the detector alarm set points, press the button on the front of the detector.

SHUT-DOWN Alarm

SHUT-DOWN alarm occurs in the following three cases.



If the unit is displaying "EO4", the battery voltage will be too low or below a certain level when 3 hours passed.



The unit will be displaying "EO5" if the self-test fails three consecutive times.
NOTE: If the self-test fails two consecutive times, the unit will emerge a warning such as a HIGH alarm.

If the unit is displaying **"EOL"**, the life remaining of the unit will be less than 8 hours.

If SHUT-DOWN alarms occur, the detector will generate an alarm, the LED will start to blink and the vibrate will activate in 5-second intervals.
The alarms will be continuous until a user presses the button. If the user presses the button, the detectors alarms will stop but a warning sign will remain on the screen.

Event Log

Ara stores the last 30 alarm events. The log system stores events on a first in first out basis. The events stored in the unit can be confirmed and downloaded using IR Link. The information stored includes:

- The detector serial number
- Life remaining on the detector
- Number of self-tests performed
- Number of warning occurred and its cumulative time
- Data of event log
- time elapsed since the alarm occurred
- duration of the alarm
- alarm level(s) in ppm or %
- type of alarms
- bump test (Yes or no)

Press the button for 3 seconds, the detector will then perform Calibration and the icon will be blinking.
This process is the same as the bump test, show the device gas for 45 seconds.
The detector will display the life remaining or gas concentrations after a successful calibration sequentially operating the buzzer, the vibrator and the LEDs flashing.

Procedure of bump test

Users are able to change the bump-test interval using the IR-Link. The interval can be set anywhere from 1 to 365 days. If the interval is set to zero, the detector will not perform the bump-test.
NOTE: The units factory default has zero interval for the bump-test, this means the units do not perform the bump-test.
NOTE: We encourage bump testing prior to each use for the most reliable response.

If the detector needs bump-testing, the icon ( ) on the bottom of screen will be blinking. The right and left LEDs will also start to flash alternately at intervals of 32 seconds.

If the bump-test icon is present, press the button to go to its inspection screen (display).

Once on the inspection screen, show the instrument the relevant gas for 45 seconds. If the button is pressed and the instrument is not exposed to gas for 45 seconds, the bump test will cease. The detector will then continuously indicate the bump-test status for the user to go through the bump test procedure again.

If the detector displays the gas concentrations on the inspection screen after the detector has been show the gas, the bump test is then complete. The alarm log will be automatically stored in the detector.

Calibration for O_2 Detector

The Ara O_2 detectors factory default setting will remind the user to perform a calibration every 30 days. The user will be prompted by the screen blinking , please see calibration instruction below.

If the detector is due Calibration, the screen will alternately display CAL and ‘Life Remaining’

After a failed calibration, the detector will continuously operate the audio alarm and the LEDs turn on and off. If the calibration fails, please contact ION Science.

Hibernation Mode*

This option is only for a detector with hibernation mode. If a user uses the detector intermittently, they can put the instrument into hibernation mode. This mode is not used for extended period of time. It can be turned off to suspend the 24 months operation life countdown.

ION Science cannot guarantee the product after the warranty of 3 years.

To switch over to the hibernation mode, please follow the instructions below:

1) Connect to IR Link
2) Click on the hibernation button, the detector will then go into hibernation.

To differentiate the different models, the hibernation option models have two coloured lines on the label whereas normal models have one thicker line. (See front cover for standard model image)

NOTES:

The event log will be cleared when the detector is hibernated. It is strongly recommended to save the event log before hibernation.

To activate the detector on hibernation status, please perform the procedure for the detector's activation.

If the detector is hibernated, the screen will be blank, not connect to IR Link and not react anymore in spite of exposure of the gas.

*To use ARA PC you will need an IR Link. The IR Link can be brought separately by visiting www.ionscience.com/usa

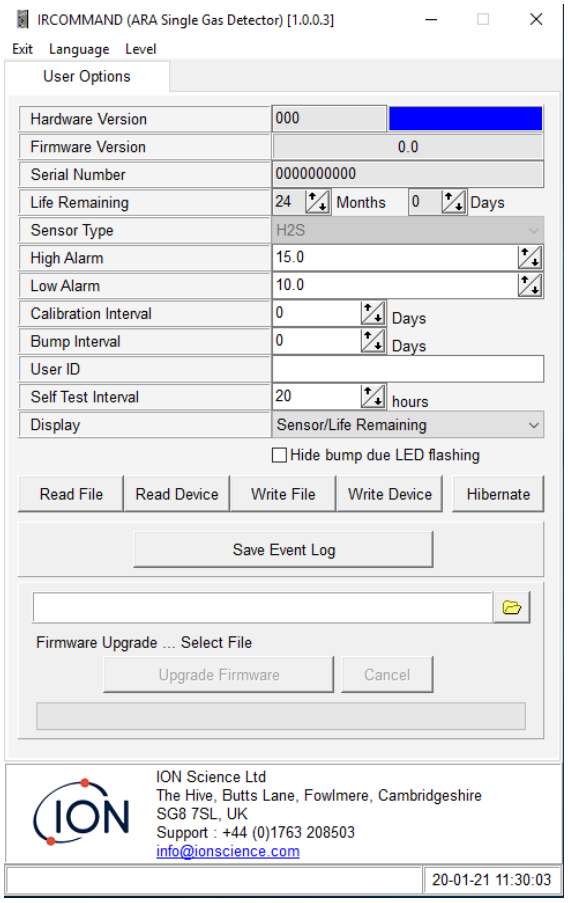
Using ARA PC*

The image below shows the user options. This is where you will be able to connect your instrument to the computer and adjust the following:

- High Alarm
- Low Alarm

- Calibration Interval
- Bump Interval
- User ID
- Self-Test Interval
- Display

NOTE: The white fields are user configurable. The grey fields cannot be changed.



To read the device, place the instrument below the IR Link.
NOTE: Place the instrument close to the IR Link so it can connect.
*To use ARA PC you will need an IR Link. The IR Link can be bought separately by visiting www.ionscience.com/usa

When the instrument is in place, click 'Read Device'.
A green bar should appear at the bottom of the pop up with 'Read Device Information…OK'.
NOTE: If the green bar doesn't appear, the instrument hasn't connected. Move the instrument and place it back close to the IR Link. If you have tried this a few times and haven't had any success, please contact ION Science.
Once the instrument is connected and has successfully been read, the settings can be adjusted.

Saving Event Logs

As stated before, the instrument stores the last 30 events. To save the events, use IR Command. Connect instrument using IR Link, once connected, select 'Save Event Log'.
This will then transfer the last 30 events to a spreadsheet. Here it will state:

- Serial Number
- Firmware Version
- User ID
- Life Remaining
- Number of events
- Duration of events
- Number of self-tests
- Date
- Time
- Bump test
- Duration
- Reading
- Alarm

Failures

⚠ Where the self-test fails, the detector emits an audible alarm and the LEDs will flash 10 times. The detector will also continuously display the self-test icons on the screen.

⚠ Where the self-test fails three consecutive times, the detector will display “EOL” on the screen and SHUT-DOWN alarm will appear. If this warning occurs, please contact ION Science.

⚠ During the detector’s lifetime, the battery will be continuously monitored. If the battery voltage is too low or below a certain level when 3 hours passed, the detector will display EO4 and SHUT-DOWN alarm will appear. If this warning occurs, please contact ION Science.

⚠ If the detector displays EOL, it has reached the end of its operating life. Please discontinue use.

⚠ When the detector restarts shortly after downloading firmware, the detector may display "E01" or "E02". If the warning occurs, please remove the warning by pressing the button. If this warning occurs, please contact ION Science.

⚠ When the detector restarts shortly after downloading Firmware, the detector may display "E03". If this occurs, please re-attempt to download the Firmware. If the "E03" error continuously occurs, please contact ION Science.

⚠ E01 – This is when Ara is experiencing a CRC error (firmware problem or power problem). By pressing the button, the alarm will stop.
To solve this E01, the unit should be reset to the factory setting. Therefore, the unit should be returned to the factory.

⚠ E02 - This is also because of firmware problem or power problem. By pressing the button, the alarm will stop.
To solve this E02, the unit should be reset to the factory setting and calibrated. Therefore, the unit should be returned to the factory.

Cleaning

The detector can be cleaned with a soft damp cloth using an anti-static, neutral cleaner. Do not use solvents, soaps or polishes.

Different Models

Model

Model	Description
ARA100	Hydrogen Sulphide (H_2S) Gas Detector
ARA200	Carbon Monoxide (CO) Gas Detector
ARA300	Oxygen (O_2) Gas Detector
ARA400	Sulphur Dioxide (SO_2) Gas Detector
ARA100H	Hydrogen Sulphide (H_2S) Gas Detector - Hibernation Option
ARA200H	Carbon Monoxide (CO) Gas Detector - Hibernation Option

Technical Specifications

ARA Specifications

Size:	87 x 50 x29 mm (3.4 x 2.0 x 1.1 in)
Weight:	92 g (3.2 oz)
Temperature:	H_2S, CO, SO_2: -40 to +60°C
	O_2: -30 to +60°C
Humidity:	5 – 95% RH
Ingress Protection:	IP67
Alarms:	Audio Alarm: (= 95 dB @ 10 cm)
	Visual Alarm: LED
	Vibrating Alarm: Vibrator (Operates at -10 °C +)
LED:	4 Red LCDS
Display:	Liquid Crystal Display (LCD)
Battery:	ER14335(EVE) or XL-055F(XENO ENERGY)
Battery Characteristics:	3.6Vdc, 1.65Ah, Lithium battery (Primary)
Battery Life:	24 months of operation
	2 minutes of alarm per day
Event Log Storage:	Last 30 events
Shelf Life:	6 months
Sensor Type:	Single plug-in electrochemical cell
Detect Range:	H_2S: 100 ppm, CO: 300 ppm, SO_2: 50 ppm & O_2: 25 %
User Option:	User ID, LOW/HIGH Alarms set up, Bump-Test Interval, Self-Test Interval, Display sensor, life Remaining, Hide Bump Due LED flashing
Approvals	Ratings: Class I, Division 1, Groups A, B, C and D, T4; Class I, Zone 0, AEx ia IIC T4 Ga; Ex ia IIC T4 Ga; -40 °C ≤ Ta ≤ +60 °C: ARA100, ARA200, ARA400, ARA100H, ARA200H -30 °C ≤ Ta ≤ +60 °C: ARA300 Applicable Standards: CAN/ CSA C22.2 No. 60079-0:19 CAN/CSA C22.2 No. 60079- 11:14 ANSI/UL 60079-0 7th ed. ANSI/UL 60079-11 6th ed

Limited Warranty

Where a product within the warranty period has a defect or a quality issue, ION Science provides a buyer with a repair or a replacement for free of charge by ION Science or through an ION Science authorized agency and service centre. This warranty is valid only on the origin buyer making a purchase personally. Also, this warranty is valid only if the detector is activated by the date on package.

This warranty does not include:

1) Fuses, disposable batteries, or routine replacement of parts due to the normal wear and tear of the product arising from use.
2) Any product which in ION Science opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling, or use.
3) Any damage or defects attributable to repair of the product by any person other than an authorized dealer, or the installation of unapproved parts on the product.

The obligations specified this warranty are conditional on:

1) Proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of ION Science;
2) The purchaser promptly notifying ION Science of any defect. No products shall be returned to ION Science until receipt by the purchaser of shipping instructions from ION Science; and
3) The right of ION Science to require that the purchaser provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

In no event shall ION Science be liability hereunder exceed the purchase price actually paid by the buyer for the Product.

The buyer agrees that this warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, express or implied, including but not limited to any implied warranty or merchantability or fitness for a particular purpose. ION Science shall not be liable for any special, indirect, incidental, or consequential damages or losses, including loss of data, whether arising from breach of warranty or based on contract, tort, or reliance on any other theory. Some countries or states do not allow limitation of the term of an applied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. In any event any liability shall not exceed the original value of purchase. If any provision of this warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

Intended Use

This product is classified for use in hazardous atmospheres that are not more than 21% O_2.

Certifications / Approvals:

IEC 60079-0:2017

IEC 60079-11:2011

IECEx : Ex ia IIC T4 Ga CML 18.0158

ATEX : CML 18ATEX2340

KCs : KTL 19-KB2BO-0387

Ratings: Class I, Division 1, Groups A, B, C and D, T4; Class I, Zone 0, AEx ia IIC T4 Ga; Ex ia IIC T4 Ga; -40 °C ≤ Ta ≤ +60 °C: ARA100, ARA200, ARA400, ARA100H, ARA200H -30 °C ≤ Ta ≤ +60 °C: ARA300

Applicable Standards: CAN/CSA C22.2 No. 60079-0:19 CAN/CSA C22.2 No. 60079-11:14 ANSI/UL 60079-0 7th ed. ANSI/UL 60079-11 6th ed

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