

HY-ALERTA

HYDROGEN SPECIFIC LEAK DETECTION

HY-ALERTA™ 500 Handheld Hydrogen Leak Detector



OPERATING MANUAL



Hydrogen is the future, we can sense it!™

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MISSION STATEMENT

Our Mission

Deliver unsurpassed value and optimize green initiatives with our one of a kind continuous hydrogen-specific sensing technology worldwide.

Our Value Propositions

Enable end-user customers to efficiently and effectively optimize:

- Electric utility power transformer fleet and other oil-filled assets (Grid)
 - Petroleum refinery and other industrial process control
 - Facility and equipment safety to minimize downtime
- ...at a much lower total costs of ownership than the competition.

Our Strategic Objectives

H2scan's technology accepted as the new gold standard in hydrogen sensors. H2scan's business recognized for innovation and ingenuity, high quality products and systems, application -specific solutions, and exceptional customer service and satisfaction.

H2scan's success results from teamwork, strategic partnerships and market leadership leading to sales growth and improved profitability.

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IMPORTANT NOTICES



Read and understand this operating manual before installing or using the unit.
Only use cables, battery pack, battery charger, and AC/DC power supply from H2scan with this unit.
If this equipment is used in a manner not specified by H2scan, the protection provided by this equipment may be impaired.



Hydrogen is flammable at 4% in air. Take indications seriously and be prepared to take action. In the event of detection of 4% or higher of a hydrogen gas concentration there is a high probability of a hazard to safety. Inform local emergency response personnel immediately.



Any exposure to condensation will damage the sensor. The sensor die is made of a Palladium Nickel film and is sensitive to any form of condensation (organic and aqueous). Keep the sensor die dry.

Limitation of Liability: SELLER SHALL UNDER NO CIRCUMSTANCES BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, PUNITIVE, OR OTHER DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF BUSINESS OR PROFIT, PROMOTIONAL OR MANUFACTURING EXPENSES, INJURY TO REPUTATION, OR LOSS OF CUSTOMER, BASED ON ANY ALLEGED NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, BREACH OF CONTRACT, OR ANY OTHER LEGAL THEORY ARISING OUT OF THE USE, MISUSE, PURCHASE, SALE OR POSSESSION OF ITS GOODS OR ITS PERFORMANCE OF THIS CONTRACT TO THE EXTENT THAT SUCH LIABILITY EXTENDS SELLER'S OBLIGATIONS BEYOND THE PRICE PAID BY BUYER TO SELLER FOR THE ITEM ON WHICH SUCH CLAIM IS BASED. SELLER ADVISES BUYER TO PERFORM ACCEPTABLE TESTS ON ALL HARDWARE PRIOR TO DEPLOYMENT AND TO PERFORM MAINTENANCE AS DESCRIBED IN THE SELLER'S INSTRUCTION GUIDE. UNDER NO CIRCUMSTANCES SHALL THE EQUIPMENT PROVIDED HEREUNDER BE USED IN A MANNER WHERE IT IS THE SOLE PROTECTIVE SYSTEM FOR FACILITIES, EQUIPMENT AND PERSONNEL SAFETY; THE EQUIPMENT IS INTENDED FOR USE IN CONJUNCTION WITH OTHER APPROPRIATE PROTECTIVE SYSTEMS.

LIMITED WARRANTY

H2scan Limited Warranty: Each hydrogen instrument ("Product") will conform, as to all substantial operational features, to the Product specifications set forth in this Manual and will be free of defects which substantially affect such Product's performance for twelve (12) months from the ship date for such Product.

Must Provide Notice of Defect: If you believe a Product that you believe is defective, you must notify H2scan in writing, within ten (10) days of receipt of such Product, of your claim regarding any such defect.

Return Product to H2scan for Repair, Replacement or Credit: If the Product is found defective by H2scan, H2scan's sole obligation under this warranty is to either (i) repair the Product, (ii) replace the Product, or (iii) issue a credit for the purchase price for such Product, the particular remedy to be determined [by H2scan] on a case-by-case basis.

Voided Warranty: H2scan's 12 Month Limited Warranty is void for any of the following:

The unit is opened and the manufacturing seal is broken

Unauthorized repair work performed at the customer's location or carried out by anyone other than H2scan's factory trained technicians

Equipment or parts that have been tampered with, misused, neglected, mishandled, improperly adjusted, or modified in any way without the written consent of H2scan.

Equipment or parts that have been damaged due to shipping, misuse, accidents, mishandling, neglect, or problems with electrical power sources.

Repair work performed during the warranty period does not prolong the warranty period past the original period.

System operation in incorrect or inappropriate environments.

Usage that is not in accordance with system guidelines or an operator's failure to follow manual instructions.

LIMITATION OF WARRANTY: THE ABOVE IS A LIMITED WARRANTY AS IT IS THE ONLY WARRANTY MADE BY H2SCAN. H2SCAN MAKES NO OTHER WARRANTY EXPRESS OR IMPLIED AND EXPRESSLY EXCLUDES ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. YOUR SOLE REMEDY HEREUNDER IS REPAIR OR REPLACEMENT OF THE PRODUCT OR A CREDIT FOR THE PURCHASE PRICE FOR SUCH PRODUCT, THE PARTICULAR REMEDY TO BE DETERMINED BY H2SCAN ON A CASE-BY-CASE BASIS. H2SCAN SHALL HAVE NO LIABILITY WITH RESPECT TO ITS OBLIGATIONS UNDER THIS AGREEMENT FOR CONSEQUENTIAL, EXEMPLARY, OR INCIDENTAL DAMAGES EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE STATED EXPRESS WARRANTY IS IN LIEU OF ALL LIABILITIES OR OBLIGATIONS OF H2SCAN FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE DELIVERY, USE OR PERFORMANCE OF THE PRODUCTS.

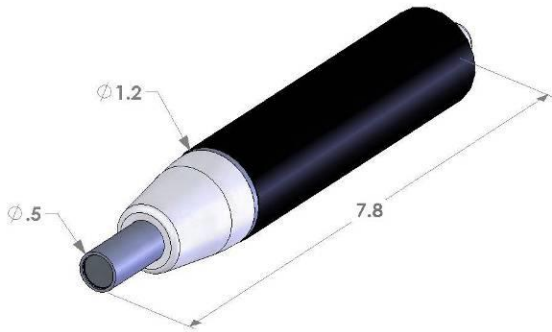
1 DESCRIPTION

H2scan believes that protecting lives means being able to locate and find hydrogen leak as quickly as possible. With two sensing elements on the same semiconductor die, the HY-ALERTA™ 500 can detect hydrogen leaks as low as 15 ppm and will not saturate or be destroyed when detecting concentrations of hydrogen up to 100%. The flexible cable allows the sensor probe access to virtually all potential leak sources.

2 SPECIFICATIONS

Sensitivity Range:	0.0015% (15 ppm) to 100% hydrogen by volume in air.
Response Time:	Indication of hydrogen within seconds. Stabilization to final value depends on concentration.
Ambient Temperatures:	Operating: 0°C to +40 °C Storage: -20°C to +45 °C
Relative Humidity:	0-95% non-condensing
Power:	Internal rechargeable Lithium Ion battery yields over 10 hours of operation and is recharged in 4 hours with included charger. Battery charger input: 100-240VAC, 50-60Hz, 0.6A.
Environmental:	Indoor/Outdoor Use Altitude up to 2000 meters Pollution degree 2 environment
Ingress Protection:	IP64 capable
Calibration Period:	Recommended factory calibration on a 12 month basis.
Weight:	975 g (2.15 lb.) unit and carrying pouch 2.2 kg (5 lb.) shipping weight (unit with accessories)
Product Life Expectancy:	10 years
Certifications:	CE c UL US LISTED

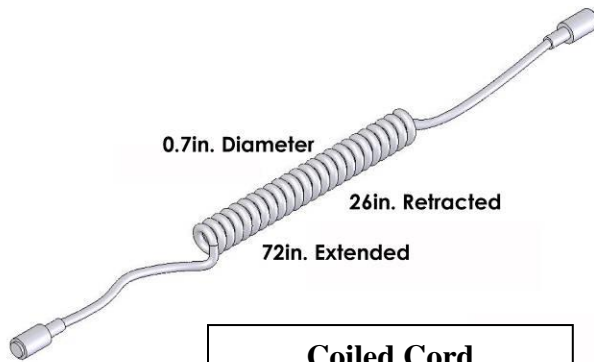




Sensor Probe



Controller



Coiled Cord



Controller Carry Pouch



Battery Charger with Regional Plugs

3 OPERATION

3.1 STARTUP

To power-up the HY-ALERTA™ 500, press and hold the **ON/OFF** button until the Controller LCD display indicates an operational message.

Warning: Only power-up the instrument in a hydrogen-free environment.

After power is on, the instrument takes about ten minutes to warm-up. During this time the LCD displays a countdown to completion and the Probe Tip LED is amber. The following operations occur:

The Wide Range Sensor® reaches operating temperature.

A system self-test is run.

Upon successful completion of the above tasks the instrument zeroes itself and automatically switches to normal operation. If an error is detected the instrument will display an error code (see *Section 10*).

3.2 SHUTDOWN

To power-down the HY-ALERTA™ 500, press and hold the ON/OFF button for approximately two seconds until the Controller LCD display turns off.

4 BATTERY LEVEL

After power-on the **BATTERY LED** indicates the current battery level (times are approximate, and may vary as the battery ages.)

Color	Meaning
Green	more than 60 minutes of operation remaining
Amber	approximately 15 to 60 minutes of operation remaining
Red	less than approximately 15 minutes of operation remaining

A fully charged battery should last 10 to 15 hours, depending on use.

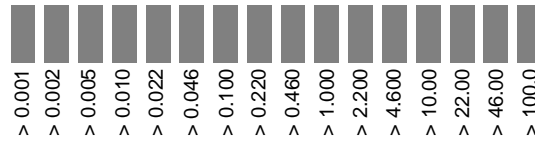
There is a small load on the battery when the unit is powered off. This load will discharge the battery of the unit in its powered off state in about 6 months. Customers that do not use the device frequently should charge the battery and perform a bump test with hydrogen gas every one to three months to keep the battery charged and ready for use.

4.1 NORMAL OPERATION

During normal operation the instrument is detecting and reporting the hydrogen concentration near the probe tip sensor. Hydrogen readings are displayed on the controller LCD and the probe tip LED bar graph array. Note that due to the extreme sensitivity of the sensor, it may take several minutes to return to a near zero (less than 0.001%) reading after exposure to hydrogen. If the instrument does not return to an indication of less than 0.001% after 5 minutes in a hydrogen-free environment, then invoke the Reset operation (See *Section 4.3*).

The upper line of the Controller LCD indicates a numerical value or range for the percent hydrogen concentration or peak hydrogen value. The lower line is used to display the hydrogen meter, a logarithmic bar graph ranging from 0.001% (10 ppm) to 100% hydrogen by volume. An open box on the bar indicates the last peak value obtained and filled boxes indicate the current value. The following figure describes how to interpret the hydrogen meter:

Hydrogen = 4.67%



The Probe Tip LED Indicator shows an increase or decrease in hydrogen concentration. Leak detection is accomplished by watching the Probe Tip LED and the bar graph array and moving the sensor around a potential hydrogen leak.

Probe Tip Colors	
	<p>Solid Green - Unit ready</p> <p>Pulsing Green - < 15 ppm hydrogen - Decreasing H2 level</p>
	<p>Solid Amber - System startup - Steady H2 level</p>
	<p>Pulsing Red - Increasing H2 level</p> <p>Alternating Red, Green - Fluctuating H2 level</p>

The number of yellow LEDs lit in the Probe LED bar graph array indicates detected hydrogen concentrations in four ranges as noted below:

LED Bar Graph Array			
	<p>1 Yellow LED: > 0.01% hydrogen > 100 ppm</p>		<p>3 Yellow LEDs: > 1% hydrogen > 10,000 ppm</p>
	<p>2 Yellow LEDs: > 0.1% hydrogen > 1,000 ppm</p>		<p>4 Yellow LEDs: > 10% hydrogen > 100,000 ppm</p>

4.2 HYDROGEN-FREE AREAS

For the purposes of this document a hydrogen-free area is one with less than 5ppm of hydrogen in the air.

It may be difficult to find a hydrogen-free area in a facility where hydrogen is used. Nearby rooms, or even the entire building, may not be hydrogen free.

To check these areas reset or zero the sensor outside, away from any hydrogen tanks, pipes, or other potential sources. Walk through the facility, watching the sensor. It is surprising how far low levels of hydrogen can spread.

If the sensor is zeroed or reset in hydrogen, there will be a negative offset in the readings that could compromise the sensor's ability to find small leaks.

4.3 RESET OPERATION

The Reset operation is used to speed recovery from hydrogen exposure.

It can be invoked from the keypad while in the top menu level (measuring hydrogen) by pressing and holding ◀▶ (left and right arrow buttons simultaneously) or from the Reset Menu. Reset takes about 75 seconds to complete.

WARNING:

THE INSTRUMENT MUST BE IN A HYDROGEN FREE ENVIRONMENT WITH THE LCD INDICATING LESS THAN 0.1% HYDROGEN BEFORE INVOKING THE RESET OPERATION.

4.4 ZERO OPERATION

The Zero Operation is used to zero the hydrogen reading if the instrument is reporting low levels (0.001% to 0.01%) of hydrogen when no hydrogen is present.

It can be invoked from the keypad while in the top menu level (measuring hydrogen) by pressing and holding ◀ (left arrow button) or from the Zero Menu. Zero takes about 10 seconds to complete.

WARNING:

THE INSTRUMENT MUST BE IN A HYDROGEN FREE ENVIRONMENT WITH THE LCD INDICATING LESS THAN 0.1% HYDROGEN BEFORE INVOKING THE ZERO OPERATION.

5 KEYPAD

5.1 NUMERICAL CHANGES

In the following sections when queried to change a numeric value the ▲ (up arrow) and ▼ (down arrow) keys are used to increment/decrement the value based on the selected digit. If the ones digit is selected the value will increment/decrement by one (1 increments to 2, 2 decrements to 1). The ◀ (left arrow) and ▶ (right arrow) keys are used to select another digit. To change a value of 0 to 100 first select the hundreds digit then press the ▲ up arrow. Pressing ◀▶ (the left and right arrows simultaneously) will clear any changes made and restore the previous value. Once the correct value is displayed press the **ENTER** key to save it.

5.2 TOP LEVEL KEYPAD FUNCTIONS

While in the hydrogen measurement screen, the keypad has these functions:

Key	Function
ENTER	Go to the Information Display menu.
▲	Display the peak hydrogen reading.
▼	No change
▶	Clear the peak hydrogen value.
◀	Zero the sensor.
◀▶	Reset the sensor.

5.3 GENERAL KEYPAD FUNCTIONS

Key	Navigation	Query Answer
ENTER	Enter submenu	Yes
▲	Previous Menu	No
▼	Next Menu	No
▶	Enter Submenu	No
◀	Exit Submenu (Back)	No
◀▶	Exit Configuration	No

5.4 INFORMATION DISPLAY

The Information Display menu allows the user to view useful information about the instrument including firmware revisions, serial number, and calibration date. Enter it by pressing and holding the **ENTER** button.

5.5 FIRMWARE REVISION

This displays the sensor pod and controller firmware. The left most number preceded by an 'S' is the sensor probe firmware revision. The right most number preceded by a 'C' is the Controller firmware revision.

For example: *S1.23 C2.34* for sensor probe firmware version 1.23 and Controller firmware version 2.34.

5.6 SERIAL NUMBER

This displays the product serial number.

For example: *50123*

5.7 FACTORY CALIBRATION DATE

This displays the date of last factory calibration, MM/DD/YY.

For example: *5/8/06* for 8 May 2006.

5.8 RESET SENSOR

The Reset Sensor menu is used to invoke the Reset Operation.

5.9 ZERO SENSOR

The Zero Sensor menu is used to invoke the Zero Operation.

6 HYDROGEN SENSING CONSIDERATIONS

From any given source, hydrogen gas disperses rapidly and generally upward due to its very low density compared to air. Understanding this behavior allows a more effective search for hydrogen leaks.

The hydrogen plume from a leak generally spreads in a roughly conical shape that is easily disturbed by environmental conditions. Certain conditions such as pressure, temperature, and leak size may act together to change the shape of the hydrogen plume from a cone to a laser-like beam. This makes finding a leak more difficult.

If the sensor element is near (and above) the leak, the concentration will likely be higher but the leak may be difficult to locate. As hydrogen dissipates the concentration decreases. Generally, greater distances will increase the chance of intercepting the leak stream, but if the sensor is too far away, the response may be too weak to detect.

When drafts or air currents are present, hydrogen will tend to be dispersed. Testing for hydrogen leaks downwind of the leak area may increase the chance of detecting the leak.

If hydrogen is rising in an enclosed building the hot air near the ceiling may slow the hydrogen's rise. Thus, sensing hydrogen near ceiling areas with high temperatures present may not be as effective as at a lower level.

Low temperatures can also affect the behavior of hydrogen. Hydrogen stored in a liquid state is at an extremely low temperature. The density of any escaping hydrogen will be higher than normal and may initially move downward. As the hydrogen warms, it will begin to rise upward. When checking for a leak in areas where liquid hydrogen is stored, check both above and below the area of concern.

7 BUMP TEST

A bump test is recommended every three months. The purpose of a bump test is to verify that the sensor is active, detecting hydrogen and verifying that the sensor is within the pre-set factory tolerance for accuracy.

To perform a bump test perform the following:

In a hydrogen free environment, power on the instrument. Once the instrument has gone through its standard warm-up, use the calibration cup that accompanies the HY-ALERTA™ Model 500, and apply 2% hydrogen to the probe sensor. Let the 2% hydrogen flow for 3-5 minutes. After 3-5 minutes the LED bar graph should have three LED's lit. If the three LED's are not lit, the instrument should go through a factory calibration at H2scan.

8 BATTERY CHARGING

Ensure the unit is powered OFF.

Disconnect the coiled cord from the controller.

Connect the battery charger to the controller.

Using the appropriate A/C plug adapter for the region of use, plug the battery charger into the A/C supply.

The battery charger indicator light will illuminate according to charge status as follows:

Off	No Battery
Flashing Green	Fast charging
Steady Green	Fully charged
Steady Amber	Standby
Flashing Red	Error

NOTE: Complete charging may take up to 4 hours for a fully discharged battery.

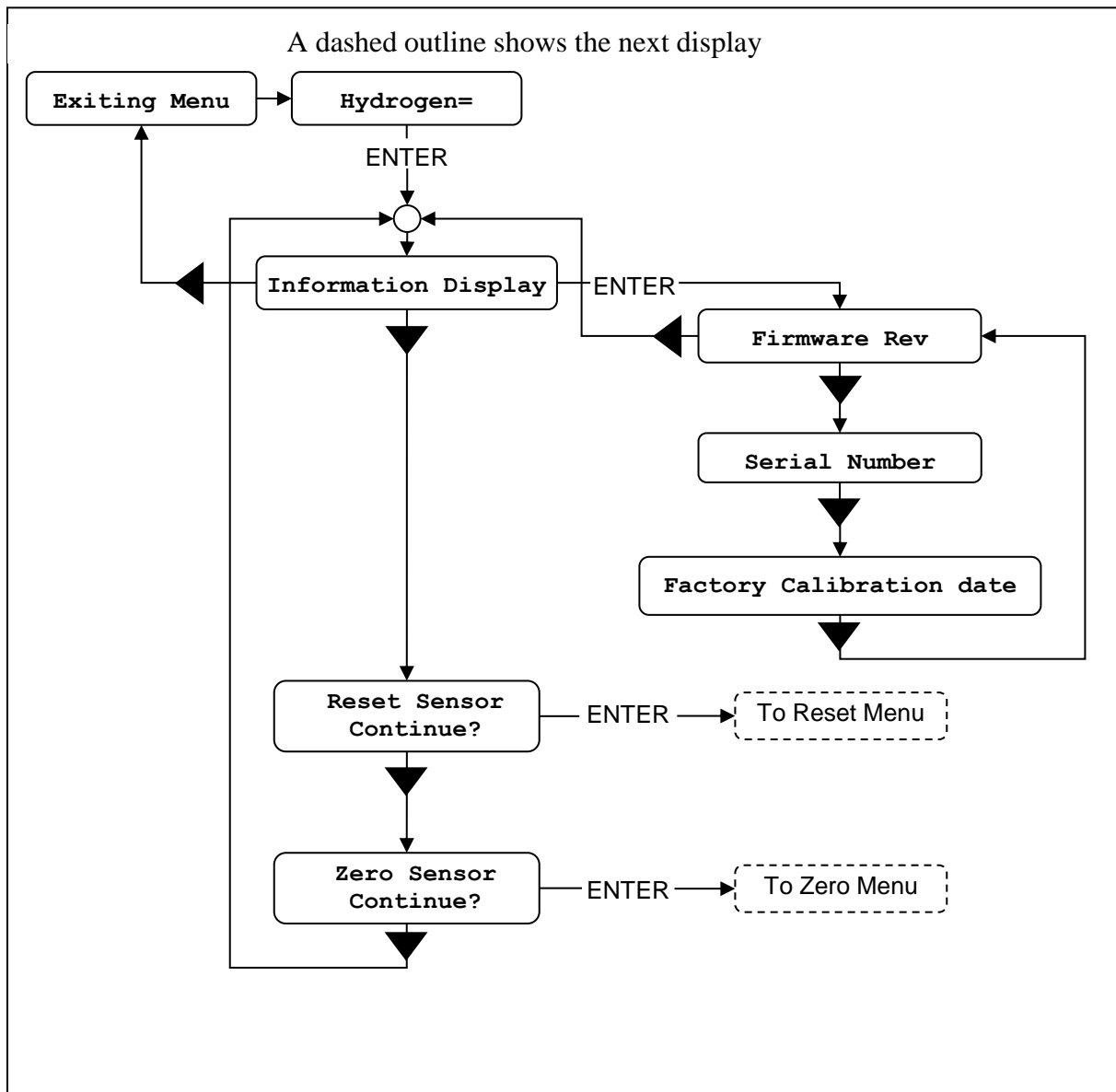
9 CLEANING

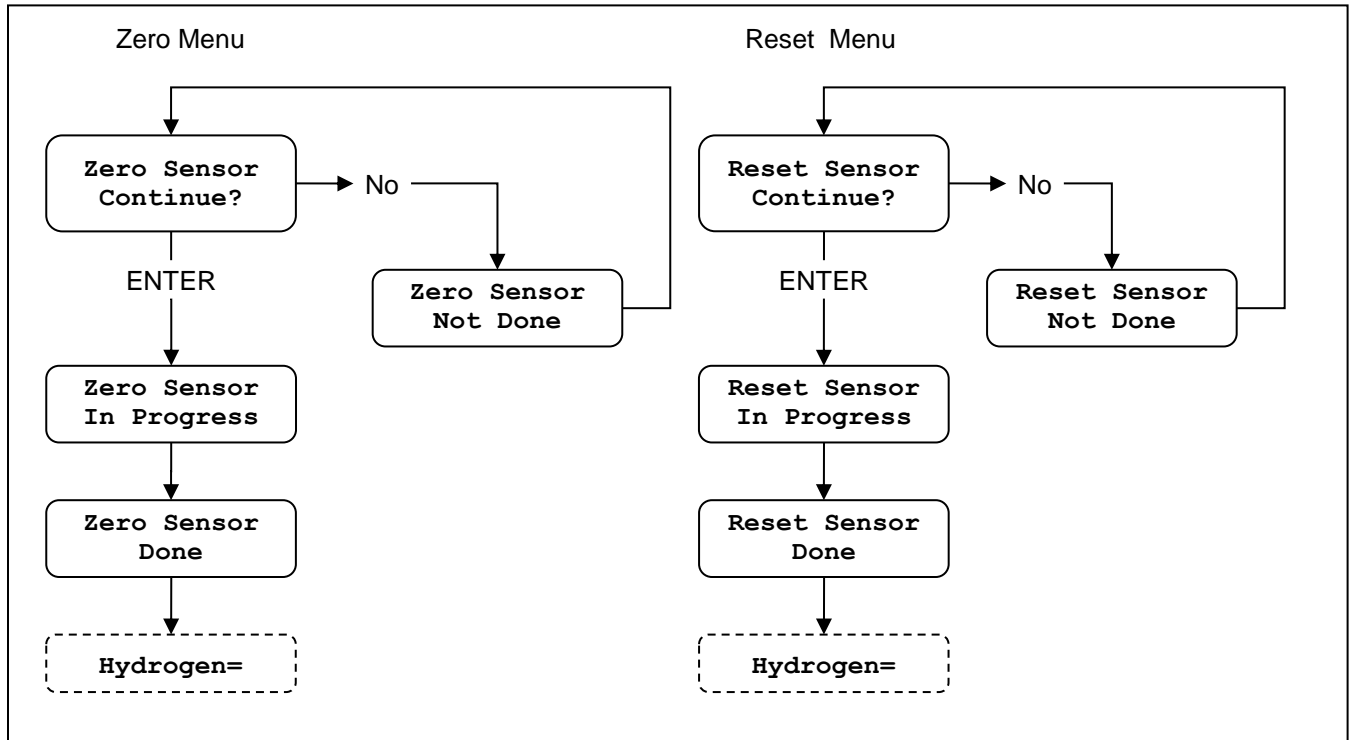
If the unit becomes soiled, clean the unit with a lint-free cloth. Use special care when cleaning the handheld probe assembly. Small debris or other material may collect over the sensor tip. Clean the tip with a gentle wiping with a clean, damp, lint-free cloth or paper. Do not use chemicals or soap.

10 TROUBLESHOOTING

Symptom	Possible Cause	Action
Sensor Error	The probe is disconnected from the controller.	Turn off the instrument and verify that the probe is properly connected to the controller.
Error 88	Faulty capacitor	Cycle of power
Error 40	The sensor PCB temperature is too high.	Turn off the instrument. Let it cool.
Error 20	The sensor temperature is incorrect.	Cycle of power
Unit won't turn on	The battery is dead.	Charge the battery completely.
If the recommended action does not solve the problem, the HY-ALERTA 500 should be returned to the factory for repair.		

11 MENU STRUCTURE





12 EUROPEAN DECLARATION OF CONFORMITY



European Declaration of Conformity

Directives Applied: EMC Directive 2004/108/EC

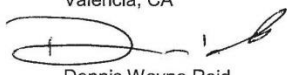
Standards to which Conformity is Declared: EN61326:1998
EN55011 Class B Group 1
EN61000-4-2 Electro-Static Discharge (4KV CD / 8KV AD)
EN61000-4-3 Radiated Immunity 10V/M (80-1000MHz) 3V/M (1.4-2GHz) 1V/M (2-2.7GHz)

Standards comply with Requirements of the European Directives.

Manufacturer's Name: H2Scan Corporation
Manufacturer's Address: 27215 Turnberry Lane, Suite A Valencia, CA 91355 (661)775-9575
Equipment Type: Handheld Leak Detector
Equipment Class: Laboratory, Measurement, & Process Control Equipment: Portable Environment
Model Numbers: 5XX, where XX can be 00 to 99

I hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s)

Date of Issue: March 10, 2015
Place of Issue: Valencia, CA

Signature: 
Full Name: Dennis Wayne Reid
Position: Chief Executive Officer

Tests carried out by DNB Engineering, and/or accredited testing laboratories.