

aeroQUAL

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Foreword

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Aeroqual operates a policy of continuous development. Aeroqual reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Under no circumstances shall Aeroqual be responsible for any loss of data or income or any special, incidental, consequential or indirect damages howsoever caused.

The contents of this document are provided “as is”. Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this document.

Aeroqual reserves the right to revise this document or withdraw it at any time without prior notice. The availability of particular products may vary by region. Please check with the Aeroqual dealer nearest to you.

Statement of Compliance

The Aeroqual Series 100 Ozone Controller complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



Warranty

Thank you for purchasing this Aeroqual product. To get maximum use of the features of your new product we recommend that you follow a few simple steps:

- Read the guidelines for safe and efficient use.
- Read all the terms and conditions of your Aeroqual Warranty.
- Save your original receipt. You will need it for warranty repair claims. Should your Aeroqual product need warranty service, you should return it to the dealer from whom it was purchased or contact Aeroqual.

Our Warranty

Aeroqual warrants this product to be free from defects in material and workmanship at the time of its original purchase by a consumer, and for a subsequent period as stated in the following table:

Products	Warranty Period
Series 100 Controller	One year from the date of purchase
High Ozone Concentration Head	Six months from the date of purchase
Low Ozone Concentration Head	Six months from the date of purchase

All accessories for the product are covered by a warranty for a period as follows:

Accessories	Warranty Period
Other Accessories	One year from the date of purchase

This warranty is expressly limited to the original owner who purchases the equipment directly from Aeroqual or from an authorized Aeroqual dealer.

What we will do

If, during the warranty period, this product fails to operate under normal use and service, due to improper materials or workmanship, Aeroqual subsidiaries, authorized distributors or authorized service partners will, at their option, either repair or replace the product in accordance with the terms and conditions stipulated herein.

Conditions

1. The warranty is valid only if the original receipt issued to the original purchaser by the dealer, specifying the date of purchase, is presented with the product to be repaired or replaced. Aeroqual reserves the right to refuse warranty service if this information has been removed or changed after the original purchase of the product from the dealer.
2. If Aeroqual repairs or replaces the product, the repaired or replaced product shall be warranted for the remaining time of the original warranty period or for ninety (90) days from the date of repair, whichever is longer. Repair or replacement may be via functionally equivalent reconditioned units. Replaced faulty parts or components will become the property of Aeroqual.
3. This warranty does not cover any failure of the product due to normal wear and tear, damage, misuse, including but not limited to use in any other than the normal and customary manner, in accordance with Aeroqual's user guide for use, faulty installation, calibration and maintenance of the product, accident, modification or adjustment, events beyond human control, improper ventilation and damage resulting from liquid or corrosion.
4. This warranty does not cover product failures due to repairs, modifications or improper service performed by a non-Aeroqual authorized service workshop or opening of the product by non-Aeroqual authorized persons.
5. The warranty does not cover product failures which have been caused by use of non-Aeroqual original accessories.
6. This warranty becomes void if a non-Aeroqual approved AC/DC adaptor or battery is used.
7. Tampering with any part of the product will void the warranty.
8. Damage to the sensors can occur through exposure to certain sensor poisons such as silicones, tetraethyl lead, paints and adhesives. Use of Aeroqual sensors in these environments containing these materials may (at the discretion of Aeroqual) void the warranty on the sensor head. Exposure to levels of ozone outside of the design range of a specific Aeroqual sensor head can adversely affect the calibration of that sensor head and will also void this warranty as it applies to the replacement of sensor heads.
9. Aeroqual makes no other express warranties, whether written or oral, other than contained within this printed limited warranty. To the fullest extent allowable by law all warranties implied by law, including without limitation the implied warranties of merchantability and fitness for a particular purpose, are expressly excluded, and in no event shall Aeroqual be liable for incidental or consequential damages of any nature whatsoever, however they arise, from the purchase or use of the product, and including but not limited to lost profits or business loss.

Some countries restrict or do not allow the exclusion or limitation of incidental or consequential damage, or limitation of the duration of implied warranties, so the preceding limitations or exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which may vary from country to country.

For Your Safety

Read these simple guidelines. Ignoring these guidelines may be hazardous.

- **USE SENSIBLY**
Use only as per this user guide.
- **USE AEROQUAL APPROVED SERVICE**
Only approved service personnel must work on this product.
- **ACCESSORIES**
Use only approved accessories. Do not connect incompatible products.
- **CONNECTING TO OTHER DEVICES**
When connecting to any other device, read the appropriate user guide for detailed safety instructions. Do not connect incompatible products.
- **HAZARDOUS ENVIRONMENTS**
Do not use the Ozone Controller in or near volatile fuel or chemicals.
- **DO NOT EXPOSE SENSORS TO HIGH LEVELS OF OZONE**
This can adversely affect the calibration of Aeroqual sensor heads
- **HEALTH AND SAFETY IN THE WORKPLACE**
The Aeroqual 100 Series Controllers are used to monitor Ozone concentration. Aeroqual does not guarantee user safety. In hazardous environments, an appropriate Health and Safety plan should be in place.
- **Prior to switching the controller on please read the User Guide.**

Care and Maintenance

Your Ozone Controller is a product of superior design and quality and should be treated with care. When using your Ozone Controller:

- Keep it and all its parts and accessories out of the reach of small children.
- Keep it dry. Avoid water and/or condensation as humidity and liquids containing minerals may corrode electronic circuits.
- Do not use or store in dusty, dirty areas.
- Do not expose sensor heads to high levels of ozone.
- Do not store or turn off the controller in temperatures below 10°C.
- This unit is designed for use at temperatures between -5°C and +50°C (23°F and 120°F). Sudden changes in temperature will cause condensation that may damage the electronic componentry.
- Do not attempt to open. Non-expert handling of the device may cause damage.
- Do not drop, knock or shake as this could lead to internal damage.
- Do not use harsh chemicals, cleaning solvents or strong detergents for cleaning. Wipe with a soft cloth slightly dampened with a mild soap-and-water solution.

Disposal / Recycling

Please note that this is an electronic product and disposal should be in line with your local or country legislation. The plastic casing of the product is made from a Polycarbonate / ABS blended material (PC + ABS) and is marked accordingly.

Guidelines on How to Measure Ozone

The following information is presented to help users operate their **Aeroqual Ozone Controller** in the most effective and efficient manner.

General

- Ozone is heavier than air and tends to sink. Thus detection of leaks from ozone generating equipment should be performed at the most appropriate position.
- Ozone will react and decompose on surfaces such as walls, furniture etc.
- Smell is not a reliable test for the presence or concentration of ozone as the odour threshold varies widely between people and is affected by local ambient conditions.

Permanent Controller Placement

- The **Aeroqual Ozone Controller** has been designed to measure the ambient concentration of ozone. The controller must not be placed directly in an ozone stream.
- For indoor local area monitoring attach the controller to an inert fixture such as a metal post or rack with the inlet facing generally towards the centre of the room.
- For leak detection mount the unit near the ozone equipment.
- Ensure that the controller is protected from water splashes, dust, vibration, excessive heat or cold, high concentrations of ozone and excessive swings in humidity.

Spot Ozone Measurements

- Since ozone concentrations can change rapidly, it is wise to take a time averaged measurement. Place the controller on a flat surface with the inlet towards the centre of the room.

False Readings

- The Aeroqual Ozone Controller has been designed to respond selectively to ozone, however other oxidizing gases such as chlorine and nitrogen dioxide can generate false readings if they are at high concentrations. High concentrations of hydrocarbon gases such as vapours of alcohol, oils and solvents can reduce and mask the concentration of ozone.
- Ozone will react with and decompose on organic substances. *The presence of human beings may reduce the local ozone concentration.*

Calibration

- The sensor head is calibrated prior to delivery.
- The Aeroqual Ozone Controller has been designed so that it does not normally require re-calibration for the life of the sensor head.
- The Aeroqual Ozone Controller comes with built in diagnostics which will alert the user if the sensor is not operating correctly.
- Environmental conditions such as dust, high humidity, vibration, chemicals and heat or cold as well as high concentrations of ozone may degrade the sensor performance and shorten the sensor life. Please ask your local dealer or contact Aeroqual at **technical@aeroqual.com** about your application if you are in doubt.
- In applications where the ozone concentration needs to be controlled very closely and the operating environment is particularly harsh, it is recommended that the sensor head be replaced more frequently. Please contact Aeroqual or your local representative if in doubt.

About Your Controller

The Aeroqual **Series 100 Ozone Controller** is designed to measure and control ozone concentrations by activating an external relay controlled circuit. The unit can be used either as a control device (to maintain the ambient ozone concentration between user defined levels) or as a simple switching device (switching equipment on and off).

The unit has been specifically designed to incorporate Aeroqual's in-depth-knowledge of accurate ambient ozone measurement. Specific sensor head and controller unit combinations are used depending upon whether high or low ozone concentrations are to be measured.

The following information details the operation and features of the controller:

1. The ozone controllers are modular in design and are comprised of **two main components**, a Series 100 controller, and a high or low concentration ozone sensor head. This affords the user the ability to replace faulty sensor heads without having to replace the controller.
2. The **High Concentration Ozone Sensor Head** is designed to measure ozone concentrations from 0.00 to 5.00 ppm and is accurate to within 10% between 0.50 ppm and 5.00 ppm.. The T90 response time (i.e. the time to reach 90% of the actual ozone concentration) of the high concentration sensor head is 30 seconds. ***Exposure of this sensor head to ozone concentrations higher than 5.00 ppm may affect the calibration.***
3. The **Low Concentration Ozone Sensor Head** is designed to measure ozone concentrations from 0.000 to 0.500 ppm with an accuracy of +/-0.010 ppm from 0 to 0.100 ppm and 10% from 0.100 to 0.500 ppm and has a resolution of 0.001 ppm. The T90 response time (i.e. the time to reach 90% of the actual ozone concentration) of the low concentration sensor head is 80 seconds. ***Exposure of this sensor head to ozone concentrations higher than 0.500 ppm may affect the calibration.***
4. The sensor head is calibrated prior to delivery and does not normally need to be re-calibrated during its life.
5. The Aeroqual **Series 100 Controller** comes with in-built diagnostics, which will inform the user if the sensor is not operating correctly.

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Warm up

Prior to operation the controller must be warmed up to burn off contaminants on the sensor. When the controller is first switched on it will warm up for 30 minutes prior to measuring Ozone.

Further to the above warm up time it is recommended that the controller is run for 24 hours prior to use if it has been switched off for more than 7 days.

Reset Routine **High ozone head only*

For optimal accuracy with the high concentration head, the unit should be periodically aligned with its operating environment (frequency is dependant upon the application conditions). This has to be carried out by fitting the sensor head onto a Series 300 or Series 500 monitor (see Series 300/500 User Guide). This procedure must be carried out in a low ozone environment (0.00ppm to 0.01ppm) after which the unit can be returned to the S100 base.

Ozone Controller Components

Series 100 Ozone Controller

The following components are supplied with the Series 100 Ozone Controller:

- Series 100 controller base
- Ozone sensor head
- User guide
- 3 rubber pads
- 4 Velcro dots

Please check that all these components have been supplied and contact your dealer or Aeroqual on email at:

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Setting up the Ozone Controller

Assembly

The following needs to be completed before the Ozone Controller is ready for use: -

- Insert the sensor head into the top of the controller. The sensor head is keyed to ensure the head is inserted correctly.
- Insert one end of the Cat 5 cable (user supplied) into the RJ45 connector.
- Wire up the other end of the Cat 5 cable as per the “Power Requirements” and “External Control Wiring” sections below.

Power Requirements

The Series 100 controller is designed to be powered by a 12VDC, 400mA power supply. The permissible voltage range is:
Max Voltage: 15 VDC
Min Voltage: 11 VDC

Ensure that the power supply to the unit is sized to account for the voltage drop across the Cat 5 cable so that it delivers 12VDC to the unit in line with the above voltage range. Typical resistance of Cat 5 cable is 9.38Ohms per 100m at 20°C.

The unit does not have an On/Off switch and is activated when power is supplied to the unit. Before powering up the unit, ensure that all the necessary wiring connections are in place.

NOTE: Do not insert or remove the sensor head while power is being supplied to the unit.

External Control Wiring

The pin numbers for the RJ45 connector, viewed from the front are numbered from 1 to 8 with pin number 1 being on the right.



The pin designations are as follows:

1. GND
2. Relay switching signal
3. +12V
4. Not used
5. Not used
6. GND
7. Signal showing power connected to the S100
8. +12V

Operating Instructions

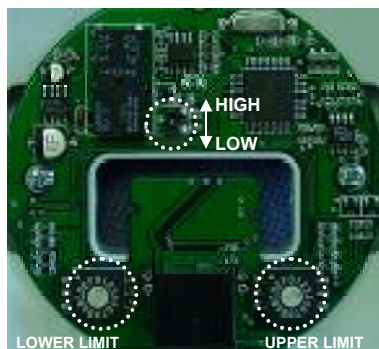
Operating in Low or High Ozone Environments

The controller can operate either low or high ozone concentration sensor heads by setting the dip-switch on the controller printed circuit board for the appropriate ozone sensor head.

Operating as a Controller

The low and high control set points ('dead band') are set by adjusting the two rotary switches as shown in the diagram on the following page. Both control set points must be operating (i.e. set to a switch position between 1 and F) for the unit to operate as a controller.

If either control set point is set in switch position 0, the controller will operate as a switch (see section "Operating as a Switch" on page 15).



The ozone concentration set points for each switch position are detailed in the following table.

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Switch position	Low conc. head - low rotary	Low conc. head - high rotary	High conc. head - low rotary	High conc. head - high rotary
0	OFF	OFF	OFF	OFF
1	0.030	0.050	0.20	0.30
2	0.040	0.060	0.30	0.40
3	0.050	0.070	0.40	0.60
4	0.060	0.080	0.60	0.80
5	0.070	0.090	0.80	1.00
6	0.080	0.100	1.00	1.20
7	0.100	0.125	1.20	1.40
8	0.125	0.150	1.40	1.60
9	0.150	0.200	1.60	1.80
A	0.200	0.250	1.80	2.00
B	0.250	0.300	2.00	2.50
C	0.300	0.350	2.50	3.00
D	0.350	0.400	3.00	3.50
E	0.400	0.450	3.50	4.00
F	0.450	0.500	4.50	5.00

The control is achieved by turning the external trigger signal on when the measured value is below the low set point (orange LED) and turning the external trigger signal off when the measured value is above the high set point (red LED).

While the ozone concentration is rising from below the low set point to the upper set point, the external trigger signal remains on. While the ozone concentration is falling from above the upper set point to the lower set point, the external trigger signal remains off. The LED glows green when the ozone concentration is between the upper and lower set points.

Setting the Control Set Points

Remove the back cover to expose the rotary control switches which are located on the controller PCB as shown in the diagram on the previous page. Using the above table, set the switches to the desired concentrations.

NOTE: If the high set point is set lower than the low set point, the LED on the unit will flash orange.

Operating as a Switch

WARNING

PERSONAL INJURY

- DO NOT USE this product as a safety or emergency stop device, or in other applications where failure of the product could result in personal injury.
- In hazardous environments, an approved Health and Safety plan should be in place.

Failure to comply with these instructions could result in death or serious injury.

The S100 controller can be operated as a switch by turning one of the rotary switches to the 0 position.

Low Switch

If the high rotary switch is set at the 0 position, the unit activates the external trigger when the measured value is **below** the low set point. Adjusting the low concentration rotary switch position sets the low set point (see table on page 14).

High Switch

If the low rotary switch is set at the 0 position, the unit activates the external trigger when the measured value is **above** the high set point. Adjusting the high concentration rotary switch position sets the high set point (see table on page 14).

Status	LED Indicator
No power, No connection, controller failure	Off – relay open
Control Operation	
< Low Set Point	Orange (constant) – relay closed
Within Control Band	Green (constant)
> High Set Point	Red (constant) – relay open
Control Status	
Warm Up (30 minutes)	Green (Slow Flash -2 sec period) - relay open
Wrong Switch Setting (eg. low rotary > high rotary)	Orange (Fast Flash -0.5 sec period) – relay open
Sensor Failure	Red (Fast Flash 0.5 sec period) – relay open
Switch Operation	
Normal operation	Green (constant)
Low Switch	Yellow (constant)
High Switch	Red (constant)

Sensor Head Failure

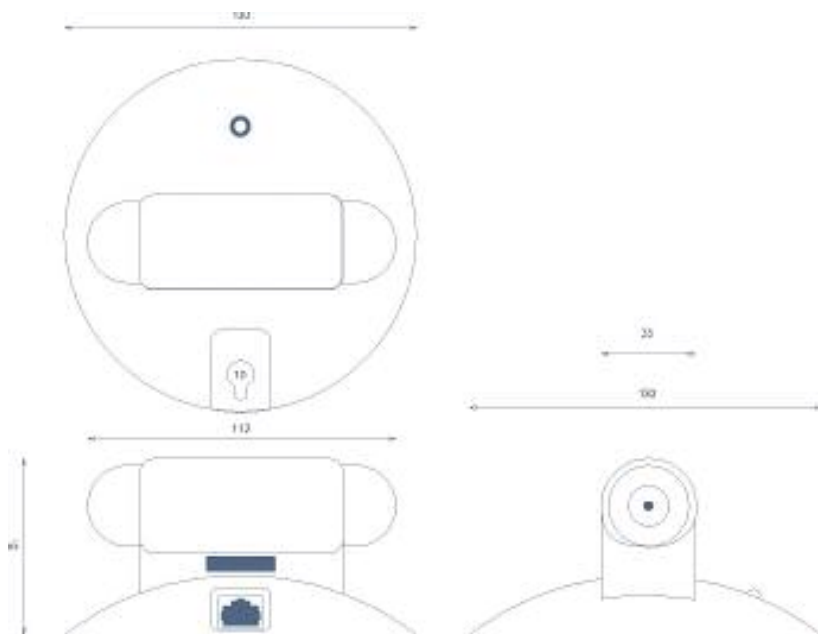
The sensor failure LED signal (red fast flash) will activate due to:

- **Sensor Life Exceeded** –*this indicates that the sensor has operated beyond its design life and should be replaced.*
- **Sensor Failure-** *the sensor head is no longer operating within the on-board diagnostic settings and should be replaced.*

Specifications – Series 100

Sensor type (GSS)	Gas Sensitive Semiconductor
Measurement range	
Low concentration Ozone Head	0.000 to 0.500 ppm
High concentration Ozone Head	0.00 to 5.00 ppm
Accuracy	
Low concentration Ozone Head	± 0.010 ppm (0 to 0.100 ppm)
	± 10% (0.100 to 0.500 ppm)
High concentration Ozone Head	± 10% (0.50 to 5.00 ppm)
T90 response rate (standard)	
Low concentration Ozone Head	80 seconds
High concentration Ozone Head	30 seconds
Operating temperature range	-5°C to 50°C
Relative humidity range	5% to 95%
Removable / replaceable sensor heads	Yes
High/ low control or set points	16 position rotary switch
External signal for control & switching	12 VDC, 150 mA
Power Requirements (User supplied):	12 VDC, 400 mA
	(11VDC - min : 15VDC –max)
Unit Interface (power, control signal)	RJ45 connector
Height (with sensor head):	64 mm
Diameter of base	130 mm

Drawings



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