



User Manual

# **MULTIGAS COLOR ALARM ANALYZER**

Multiple Gas Analyzer  
with  
Humidity, Temperature & Pressure  
Monitoring Capability

Rev. 11.2020



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## **Warning**

**This User Manual contains important safety information and should always be available to those personnel operating this equipment. Read, understand, and retain all instructions before operating this equipment to prevent injury or equipment damage.**

Every effort was made to ensure the accuracy of the information contained within this manual; however, we retain the right to modify its contents without notice. If you have problems or questions after reading the manual, stop and call Nuvair for information.

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## 1.0 Introduction

This manual will assist you in the proper setup, operation and maintenance of the *Nuvair Multigas Color Alarm Analyzer*. Be sure to read the entire manual. Improper operation of this unit can cause serious injury or death.

Throughout this manual we use certain words to call your attention to conditions, practices or techniques that may directly affect your safety. Pay particular attention to information introduced by the following signal words:

### **Danger**

Indicates an imminently hazardous situation which, if not avoided, will result in serious personal injury or death.

### **Warning**

Indicates a potentially hazardous situation, which if not avoided, could result in serious personal injury or death.

### **Caution**

Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

### **Notice**

Notifies people of installation, operation or maintenance information which is important but not hazard-related.

#### Warnings Graphics Defined:



Gas Inhalation



Skin damage

#### Abbreviations commonly used in this manual:

CO	Carbon Monoxide	L/min	Liters per Minute
CO%	Carbon Monoxide Percentage of Gas	LP	Low Pressure
CO <sub>2</sub>	Carbon Dioxide	HP	High Pressure
O <sub>2</sub>	Oxygen		
ppm	Parts per Million		
psi	Pounds per Square Inch		

## 2.0 Discharge of Liability

Before operating and installing please read this manual carefully. This manual is an integral part of the *Nuvair Multigas Color Alarm Analyzer*. The use of this instrument implicates total acceptance of this section.

All warranties relevant to this instrument are void if it is not operated and maintained in accordance with this manual.

NUVAIR disclaims every responsibility for the improper, wrong, or incorrect use of this measurement instrument. Before use, it is necessary to receive proper training on mixed gas and gas mixtures analysis whether human life is involved or not. It is dangerous to breathe mixed gas containing carbon dioxide, carbon monoxide, oil mist, or any other gas different from air. It is dangerous to breathe mixed gas with any percentage of oxygen different from 21% and/or containing helium.

Sport, commercial and mixed gas diving is a potentially hazardous and dangerous activity that may lead to death if practiced incorrectly. Manipulating mixed gas with oxygen is dangerous and requires special training and oxygen dedicated equipment. This instrument does not replace the necessary training for these activities. The data displayed are a mathematical elaboration based on physical laws, but they are not representative of the complexity of human physiology or of the different psycho-physical situation of use by customers. Carbon monoxide poisoning is extremely dangerous and could be only treated with immediate medical cares and could even lead to death.

The operator of this instrument is the only responsible party for any damage or injury resulting from improper use, lack of calibration with certified gas, unauthorized repair, improper maintenance, or damage by anyone other than NUVAIR.

Test/calibrate daily using a known certified test gas to be sure the analyzer is operating properly. If the test accuracy is outside of what is claimed for that gas sensor stop and contact NUVAIR.

Do not use this instrument as a standalone personal safety monitor. Always use in conjunction with another analyzer. Be sure the instruments are calibrated and working properly.

Before operating and installing please read the instrument manual carefully.

NUVAIR is not liable for any damage or injury, including death, which may result from *Multigas Color Alarm Analyzer* utilization.

NUVAIR, whose policy is one of continuous quality improvement, reserves the right to modify the technical characteristics of the instrument and manual without prior notice.

## 3.0 Safety Information - Read First

Do not use the *Multigas Color Alarm Analyzer* as a standalone personal safety monitor. Learn and recognize the effects of O<sub>2</sub>, CO, CO<sub>2</sub>, and any other gas poisoning.

### Carbon Monoxide Limits

0-1 ppm	Normal background levels.
9 ppm	ASHRAE Standard 62-1989 for living areas.
50 ppm	OSHA enclosed space 8-hour average level.*
100 ppm	OSHA exposure limit.*
200 ppm	Mild headache, fatigue, nausea and dizziness.
800 ppm	Dizziness, nausea and convulsions. <b>Death within 2 to 3 hours.</b>

\* U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) Regulation 1917.24: The CO content in any enclosed space shall be maintained at not more than 50 ppm (0.005%). Remove employees from enclosed space if the CO concentration exceeds 100 ppm (0.01%).

- EN 12021 Specification for compressed air limit is 15 ppm.
- OSHA compressed air/compressed oxygen limit is 10 ppm. 1910.34(i)(1)(ii)(C)

### Carbon Dioxide Limits

- CGA COMMODITY SPEC. FOR AIR ANSI/CGA G-7.1-2004
- NATIONAL FIRE PROTECTION ASSOCIATION NFPA 1989, 2008 EDITION BREATHING AIR QUALITY FOR EMERGENCY SERVICE RESPIRATORY PROTECTION (ALSO: TEXAS COMMISSION ON FIRE PROTECTION)
- PROFESSIONAL ASSOCIATION OF DIVING INSTRUCTORS (PADI)
- NAVSEA US NAVY DIVING MANUAL 1999
- ASSOCIATION OF DIVING CONTRACTORS, INC. CHAPTER FOUR 1992 (based on 49CFR 197.340 & 1910.430)

Specification for compressed air limit is 1000 ppm.

- EN 12021, USP MEDICAL AIR PURITY
- OSHA 1910.134(i)(1)(ii)(D)

Specification for compressed air limit is 500 ppm.

- OSHA carbon dioxide limits in working ambient is 0.5% (5000 ppm, 9000 mg/mc TLV-TWA Threshold Limit Value time-weighted average). The same is stated in the Dir. 1991/322/CE. And in D.lgs. 9 aprile 2008, n. 81 TESTO UNICO SULLA SALUTE E SICUREZZA SUL LAVORO, Attuazione dell'articolo 1 della legge 3 agosto 2007, n. 123, in materia di tutela della salute e della sicurezza nei luoghi di lavoro. (Gazzetta Ufficiale n. 101 del 30 aprile 2008 - Suppl. Ordinario n.108)

## 4.0 General Description

The *Multigas Color Alarm Analyzer* is a general-purpose measurement instrument that can be connected to multiple sensors. Its application includes continuous ambient gas monitoring, breathing air and dive gases used with surface supply and scuba, hyperbaric chambers, safety, medical, industrial, air quality, etc.

Standard available configurations include:

- Oxygen
- Helium
- Carbon Dioxide
- Carbon Monoxide
- Humidity
- Gas Temperature
- Pressure

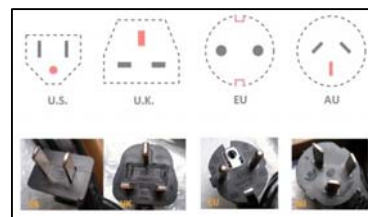


It is possible to connect the instrument to many other sensors and to change the sensors and instrument configuration.

The instrument is installed in an extra heavy-duty waterproof case with an aluminum powder-coated panel. It is possible to install the main instrument and the sensors in an external panel.

### Instrument Power Supply Connection

Connect the external power supply to a 110-230VAC 50-60Hz socket and plug the jack into side of the analyzer. Alternatively, connect the external supply wire to a 8-35 VDC plug. Once powered, the internal battery will start charging. The analyzer can then be used with battery (internal) power instead of external power. The MULTIGAS COLOR can be outfitted with U.S., U.K., EU or AU external power plugs.



### General Specifications

Input voltage requirement:	10-35 VDC
Internal battery	Lithium-ion rechargeable battery. One cell 1400 mAh Li-ion 3.7V
Input:	Up to six (6) sensor inputs
Output:	On board acoustic buzzer alarm
Serial connection:	1 RS232 interface. Baud rate up to 115000 baud, on request RS485 interface
Measure resolution:	24-bit bipolar A/D converter Drift in temperature automatic compensation
Conversion rate:	10 ms
Sampling time:	100 ms (min) for each channel
Signal measurement accuracy:	0.1% Full Scale $\pm 1/2$ LSB
Input device:	Rotary knob with central push
Color display	TFT 320 x 240 dots resolution, backlight led.
Display light intensity	600 nits (cd/m <sup>2</sup> )
Memory	micro SD card writer/reader max 16GB
Microprocessor	Cortex M4

## ⚠ Warning

Do not supply the instrument with voltage higher than 35VDC. This will damage the battery and internal electronics.

### Operating the Unit

To turn on the unit, depress the operating knob, then rotate the knob for navigating to pages and different menus. Press the knob for executing a command or to access subpages. The display in blue indicates the command the knob will execute.

To turn off the unit, depress the operating knob, enter the menu, turn the knob, select power off, and press the knob.

### Acoustic Alarm

There is a buzzer onboard for acoustic warning (i.e. activation of audible alarm). Use the switch on the side of the display for silencing the buzzer.

### Serial Interface

Standard RS232 interface for PC connection. It is possible to remotely read the measurements and to program the instrument. Required software is available on request.

### Nonvolatile Memory

The MULTIGAS COLOR is provided with nonvolatile memory that keeps configuration data and settings for ten (10) years without power supply.

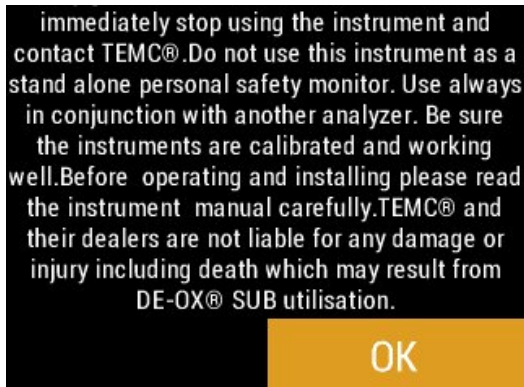


## 5.0 Mechanical Description

The MULTIGAS COLOR is installation in heavy-duty waterproof hard case. Standard case dimensions: 12 × 10.6 × 5.7 in (305 × 270 × 144 mm). Weight: 4.4 lb (2 kg). There are four (4) 3mm holes for setting up the panel. The MULTIGAS COLOR can also be configured as a panel mounted system.

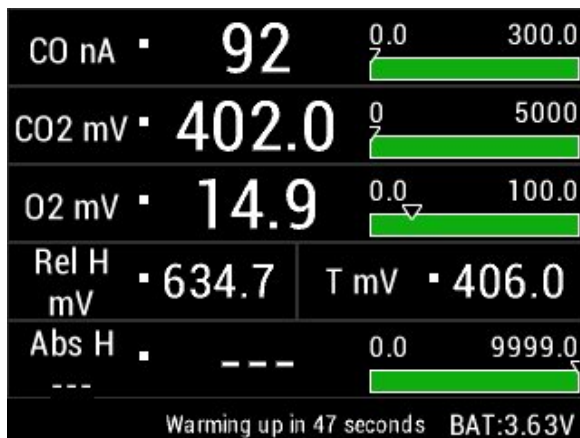
### Display Screens

When the unit is switched on, the unit shows warnings to be read and accepted by the user. To accept, press the knob.



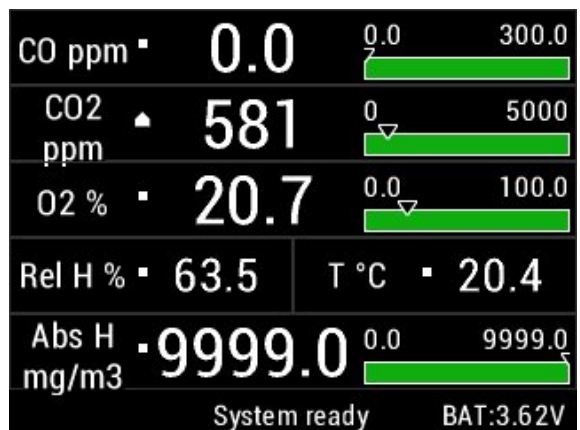
Page 1: When switched on, the unit starts the warmup procedure showing the current electrical values of the sensors and transducers.





Page 2: After 60 seconds, the MULTIGAS COLOR goes to the gas concentration visualization screen. On this page the percentage (or ppm or other scale) of the monitored gases are displayed. Also shown is the alarm set point for any read value. Over the green bar the triangle icon indicates the actual set point or measure.

On the bottom on the screen the battery level and other useful indicators are displayed.



At this time, the instrument is ready to analyze, provided all the gas sensors are well-calibrated. The unit keeps memory of the last calibration performed with sample gas.

Connect the sensors to the gas inlet adapter into the sensor manifold with a gas flow of 0.5–1.0 L/min at the same ambient pressure (typically 1 bar at sea level). The display will continuously show the gas percentage values.

### Warning

**During gas analysis the instrument and the sensors must be undisturbed. Do not move, shake or otherwise jostle the components. The gas pipe must allow free gas flowing.**

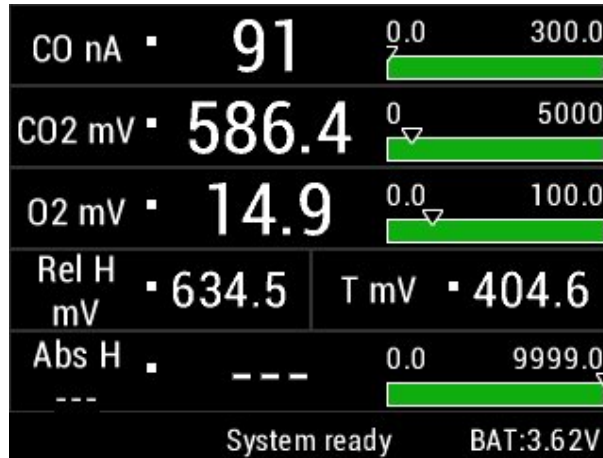
### Warning

**The mixed gas flow must be 0.5–1.0 L/min at the same ambient pressure (1013 mbar at sea level) and ambient temperature 21°C (70°F), or the *Multigas Color Alarm Analyzer* will yield a wrong gas analysis, and the sensors may be damaged.**

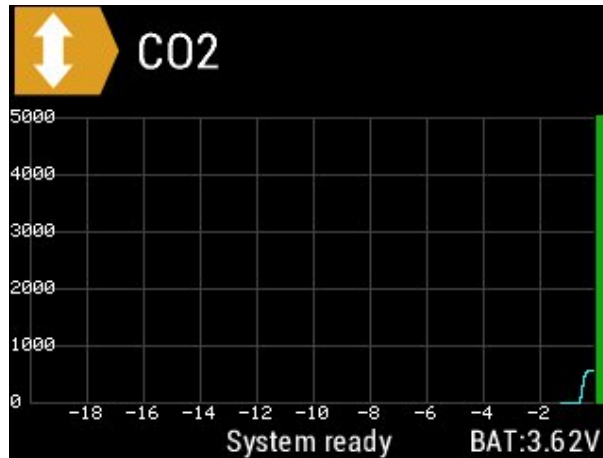
**⚠ Danger**

**Be sure all sensors are properly calibrated and checked against a certified test gas before using. This is the only way to know sensor readings will be accurate. Using the unit without proper sensor calibration or with sensor calibrated to the wrong gas will lead to incorrect analyses that can cause significant injury or death.**

Page 3: Turning the knob the unit shows current and electrical output of the sensors and transducers. On this page it is possible to continuously read sensor values and transducers output (mA and mV) for checking proper sensor operation.



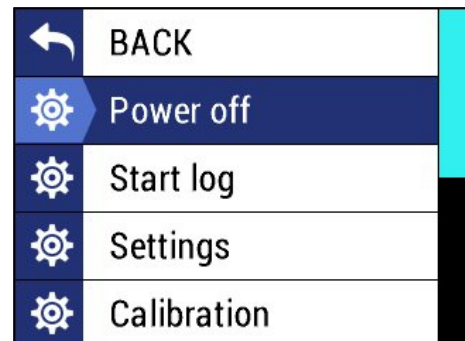
Page 4 and following pages: Graphs of the gas reading are combined with time. Each gas has its own graph page. Press the knob and rotate to go from one graph page to others.



## 6.0 Firmware Description

On any page, keep the knob pressed for accessing the main menu as per the following list:

- Power off
- Start Log
- Settings
  - Brightness
  - Bluetooth
  - References gases
  - Languages
  - Units
  - Configurable alarms



- O<sub>2</sub> and He compensation
- He temperature compensation
- Select VOC type
- Reset VOC counter
- CO sensor gain
- Date and time
- Select skin
- Factory reset
- Calibration
- Alarm
- About

## ⚠ Warning

The list may change following upgrades or/and personal configurations. Ask Nuvair to provide you with the latest firmware description.

### Recording Data on SD Memory Card

1. Insert an SD memory card into the slot. (Maximum 16GB memory size; formatted as FAT32.)
2. Go to the main menu by pressing the knob.
3. Select Start Log.
4. The unit starts recording a .csv file on the SD card adding one line of data every second. On the bottom of the main page is displayed “REC” (record) in red and the file name being recorded.
5. For stopping the writing procedure enter the main menu and select “Stop Log.”

## ⚠ Warning

The unit will not save the file onto the SD card if the unit is switched off during the recording or the unit switches off due to lack of power. Be sure to save data by stopping the logging procedure from the main menu.

The .csv file may be exported and easily printed or used for any data analysis requirement.

### Alarms

The unit provide alarms for any gas, minimum and maximum.

The alarm condition is displayed on the screen; the value in alarm is colored in red and, at the same time, the alarm buzzer will sound.

For setting the alarm, enter Setting Menu, scroll and select Configure Alarms, then choose the gas you want to configure the alarm for and configure the minimum and/or maximum alarm.



## 7.0 Calibration

## ⚠ Warning

Obtain proper training before attempting special calibration procedures. Improper calibration may result in the use of incorrect breathing gas mixtures, which may cause serious injury or death to the person using the gas mixture.

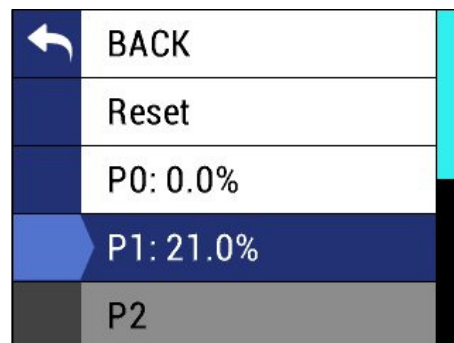
## ⚠ Warning

Calibration should always be performed at the same temperature, humidity conditions, and elevation as the gas being measured. This is not always possible, for example, in a tropical environment where dry breathing gas from a high-pressure scuba cylinder will be measured after analyzer calibration has been

performed in the warm, humid ambient air. Under these conditions a calibration correction value may be required, as detailed in the Appendix, or dry air must be used for calibration.

### Setting the references gases for calibration

1. Go in the menu page by pressing the knob.
2. Turn the knob and select "Settings."
3. Select "Ref. gases."
4. Choose the sensor you want to calibrate. Enter the next page.
5. Set the concentration in the P0, P1 or P2 point.
6. Modifying the expected value.
7. Generally, the first value is set at 0 gas.
8. Then go to "Apply" and accept.
9. Return to main menu.

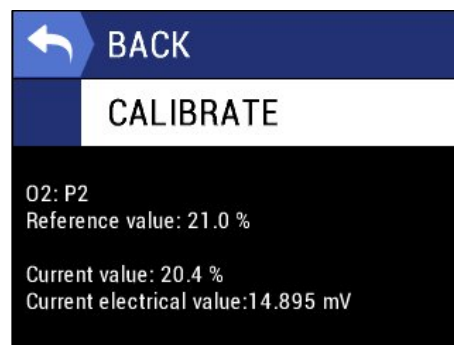


### Gas sensor calibration

Give to the unit the sample gas with known concentrations. Those concentrations must be put into the reference gas before.

Be sure to flow the gas at the same pressure and temperature the unit will be used.

1. Go to main menu and choose Calibration. Select the gas you want to calibrate.
2. Keep flowing the sample gas on the instrument (0.5–2.0 L/min) for at least 1 minute or more until the current value displayed is stable.
3. Choose the calibration point corresponding to the sample gas flowing.
4. Go to "Calibrate," press the knob and wait until the calibration process is done. During the calibration procedure the sensor must receive the sample gas flow.
5. When the calibration is done select "Back" several times and exit from all menus to the main menu.
6. In case of any doubt repeat the calibration procedure until the current gas value is exactly the sample gas value used for calibration.
7. The unit keeps memory of the last calibration even if turned off.
8. For deleting any calibration and return to the original factory calibration, follow the calibration procedure, enter the gas sensor to be reset and instead of choosing the P value of calibration, select the Reset line and accept it. The sensor calibration is now back to the original factory calibration.



## Danger

It is critically important that you calibrate one sensor at a time with the proper gas for that sensor. Using the wrong will lead to an inaccurate setting and can cause serious injury or death.

## Warning

The mixed gas flow must be 0.5–2.0 L/min at the same calibration pressure and temperature, or the Multigas Color Alarm Analyzer will yield a wrong gas analysis.

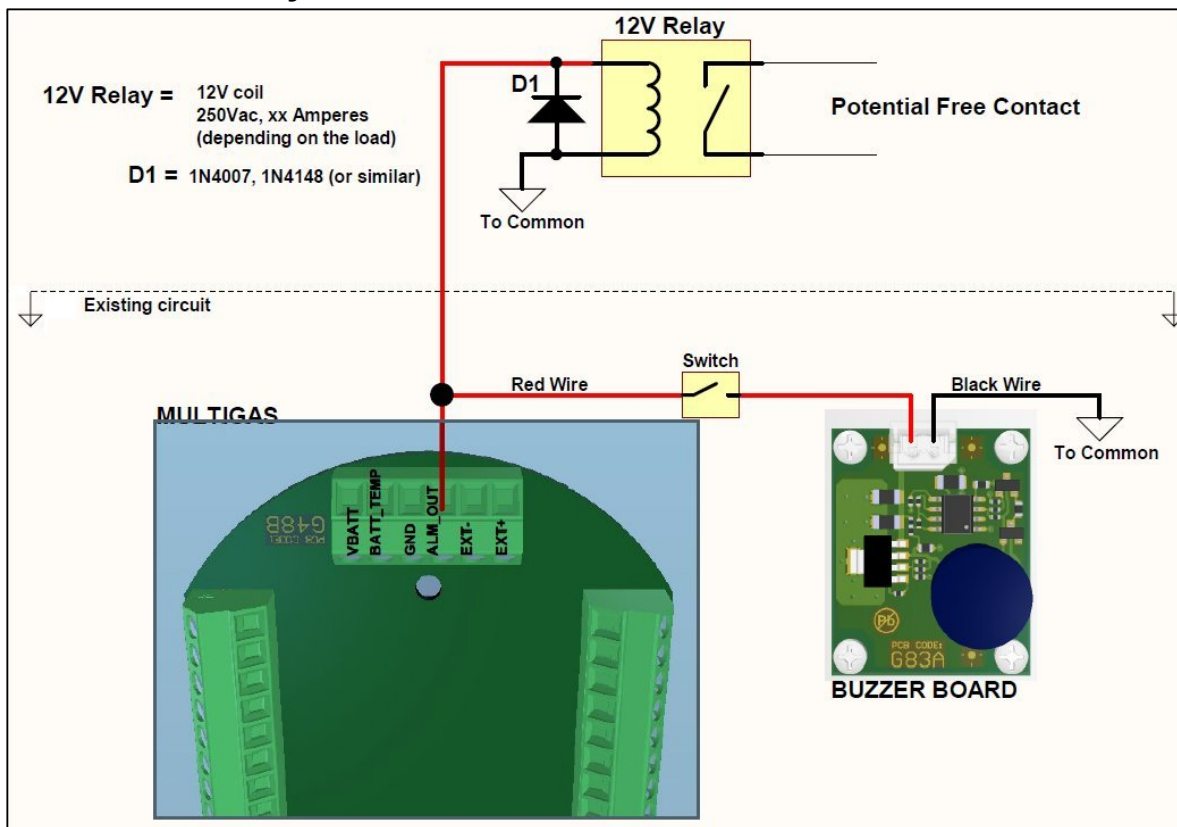
## Warning

The calibration values will be stored in memory and be stored by the instrument until the next calibration, even if the Multigas Color Alarm Analyzer is switched off.

## Warning

Before any use be sure to properly calibrate the sensors. A wrong calibration can result in a wrong analysis that may lead to death.

## 8.0 External Relays Connection



1. The unit is provided with alarms that may be connected to external relays or other devices. Follow the above scheme for the proper connection. Contact NUVAIR for guidance with any other applications before installation.
2. The alarm output is located on connector P4 and is marked as ALM\_OUT.
3. The output signal from ALM\_OUT is a voltage referred to the COMMON signal (there is more than one).
4. In the absence of an alarm, the signal is 0V.
5. In the presence of an alarm, the signal is about 12V.
6. ALM\_OUT is currently sent to the external "0 I" switch (to disable the beeper) and then from the switch to the buzzer board. The negative of the buzzer card is connected to COMMON.
7. If you do not need to keep the external "0 I" switch, you can take as positive the output from ALM\_OUT on the P4 connector and as negative the COMMON signal to which the black wire of the buzzer card is connected.

### Danger

Before the use of any external relay, the system configuration and electrical scheme must be approved in writing by NUVAIR. A wrong connection or installation may lead to wrong analysis that may lead to death.

## 9.0 Main Sensors Characteristics

The Nuvair Multigas Color Alarm Analyzer may be connected to many different sensors, with different ranges, with different calibration, and with different accuracy levels.

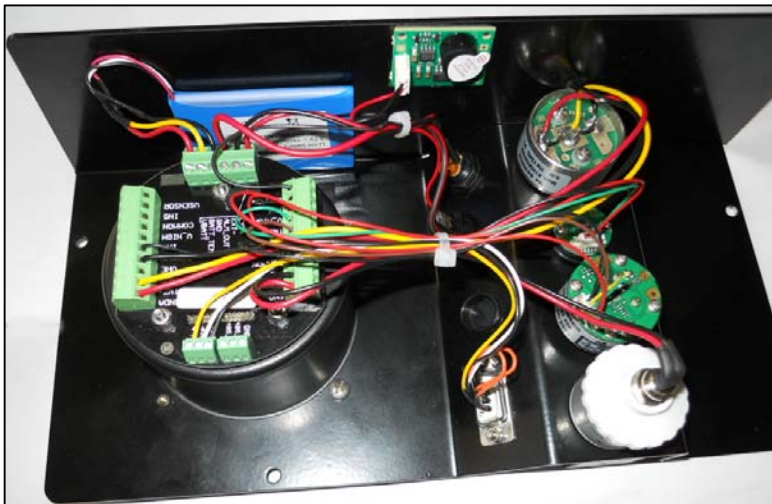
### Danger

The sensors characteristics may change following upgrades or/and personal configurations. Ask

**NUVAIR to provide you with the latest sensor descriptions. Before any use be sure to calibrate the sensors accurately. A wrong calibration means a wrong analysis and that may lead to death.**

### Oxygen Sensor

- Medical galvanic cell type
- Measurements range 0–100% of oxygen
- No effect with gas like CO, CO<sub>2</sub>, NO<sub>x</sub>, N<sub>2</sub>, H<sub>2</sub>, Ar, He.
- Operating humidity from 0 to 95% noncondensing. Prevent condensation on the surface of the sensing surface.
- Operating temperature range from 5°C (41°F) to 40°C (104°F).
- Storage temperature range from -15°C (5°F) to 50°C (122°F).
- Do not expose sensor to a biased voltage or to a short circuit.
- Response Time <15 sec for 90% response (or better, up to <5 sec), <25 sec for 97% response.
- Accuracy ±2% over full scale.
- Linearity within ±2% over full scale.
- Stability <1% drift in 8 hours at constant temperature and pressure.
- Output voltage 11±3 millivolt at 21% oxygen at 23°C (74°F) and 60% rh and at 1 ata.
- Do not disassemble the sensor.
- Sensor life: up to 48 months under normal operating conditions in air. Sensor must be replaced when unable to calibrate or to analyze mixed gas correctly.



### Helium Sensor

Stainless steel, extra long-life sensor based on thermal conductivity technology, with good signal stability with temperature changes.

The helium sensor operates by comparing the thermal conductivity of the measuring gas with air as reference gas. The sensor is calibrated to analyze helium into nitrogen and oxygen gas mix.

All characteristics are based on conditions at 25°C, 50% rh and 1013 hPa.

Specifications:

- Measurements range 0–100% of helium in air or nitrogen or oxygen.
- Resolution: 0.1%.
- Operating humidity from 0 to 95% noncondensing. Prevent condensation on the surface of the sensing surface.
- Operating temperature range from 5°C (41°F) to 40°C (104°F).
- Storage temperature range from -15°C (5°F) to 50°C (122°F).
- Do not expose sensor to a biased voltage or to a short circuit.
- Response Time <10 sec for 90% response at 23°C.
- Accuracy ±2% over full scale.
- Linearity within ±2% over full scale.
- PTFE protection membrane.



Due to the thermal conductivity technology, the accuracy of the sensor is not warranted if the gas mix contains gases like: acetylene, ammonia, argon, carbon dioxide, ethane, ethylene, freon, hydrogen, methane, neon, propane, etc.

When a gas mix with high content of oxygen is analyzed, the helium sensor may detect some amount of helium in the mix, even if there is none. This is due to the oxygen thermal conductivity that is slightly different from air. Nuvair instruments compensate this effect if the oxygen sensor is connected to the same instrument.

## ⚠ Warning

**Do not try to disassemble the sensor. The sealed unit contains a delicate electronic device that may be destroyed. If disassembled or handled, the sensor may not function properly. Do not expose the sensor to moisture.**

### Carbon Monoxide Sensor

- Operating Principle: 2-electrode electrochemical.
- Measurement Ranges: 0–300 ppm or 0–50 ppm.
- Expected Operating Life\*: >2 years in normal use from date of manufacture.
- Temperature Range\* Continuous: -10°C to +50°C. Intermittent: -20°C to +50°C.
- Pressure Range\*: 1 atm +10%.
- Humidity Range\* (noncondensing): Continuous: 15–90%. Intermittent: 0–99%.
- Response Time: (T5 90) <50 seconds over complete temperature range.
- Baseline Offset (clean air): <-2 to 4 ppm equivalent.
- Zero Shift\* (-10°C to +50°C): <+10 ppm.
- Long Term Output Drift: <5% per annum.
- Repeatability: <+5%.
- Linearity: <+5%.
- Orientation: Any.

All measurements were taken at 20°C and 505 rh at 1 atmosphere pressure unless otherwise indicated. The performance data detailed in this document refer to new sensors.

Except for items marked with [\*] the parameters have been verified under the UL component recognition program.



### Cross Sensitivity Sensor Table

Gas	Concentration Used (ppm)	Exposure Time (Minutes)	Reading (ppm CO)
Carbon Monoxide	100	5	100
Hydrogen Sulfide	25	5	0
Sulfur Dioxide	50	600	<0.5
Nitrogen Dioxide	50	900	-1.0
Nitric Oxide	50	5	8
Chlorine	2	5	0
Hydrogen	100	5	20
Carbon Dioxide	5000	5	0
Ammonia	100	5	0
Ethanol	2000	30	5
Iso-Propanol	200	120	0
Acetone	1000	5	0
Acetylene	40	5	80

\*Note: The figures in this table are typical values and should not be used as a basis for cross-calibration. Cross sensitivities may not be linear and should not be scaled. Some cross-interference breakthrough will occur if gas is applied for a longer time period.

### Carbon Dioxide Sensor

High performance, general purpose CO<sub>2</sub> sensor that provides a temperature compensated and linear CO<sub>2</sub> measurement over sensing range. The infrared sensors operate by using the nondispersive infrared (NDIR) principle to monitor the presence of target gas. The proven NDIR technology detects and monitors the presence of carbon dioxide gas.

The sensor contains a long-life tungsten filament infrared light source, an



optical cavity into which gas diffuses, a dual temperature compensated pyroelectric infrared detector, an integral semiconductor temperature sensor, and electronics to process the signals from the pyroelectric detector. The sensor outputs actual CO<sub>2</sub> readings, compensated for temperature, in the range -20°C and +50°C.

- Resolution 0–5000 ppm / 50 ppm resolution from 0–2500 ppm, then 100 ppm up to full scale.
- Temperature and Humidity Working Range:
  - -20°C to 50°C (-4°F to 122°F)
- Temperature Performance:
  - ± 10% of reading up to 50% FSD and ± 15% of reading from 50% to 100% FSD over the range -20°C to +50°C (-4°F to 122°F)
- Storage temperature range:
  - -20°C to +50°C (-4°F to 122°F)
  - 0 to 95% rh, noncondensing
- Warm-Up Time
  - To final zero ± 0.2% of range: 1 minute @ 20°C (68°F) ambient (operational)
  - 10 minutes (for maximum accuracy)
- Accuracy at Ambient Pressure (typical 1013 mbar)
  - Sensor linearity at ambient temperature is ± 2% FSD or ± 10% of the reading whichever is greater.
  - Response Time T90: <30s @ 20°C (68°F) ambient
  - Gas flow rates kept below 600 cc/minute
  - Zero Repeatability: ± 2% of full scale @ 20°C (68°F) ambient
  - Span Repeatability: ± 2% of full scale @ 20°C (68°F) ambient
  - Long term zero drift: ± 1% of full scale / month @ 20°C (68°F) ambient

### Moisture Sensor

Capacitive sensor element with good dynamic performance, high long-term stability, and resistance to dew formation.

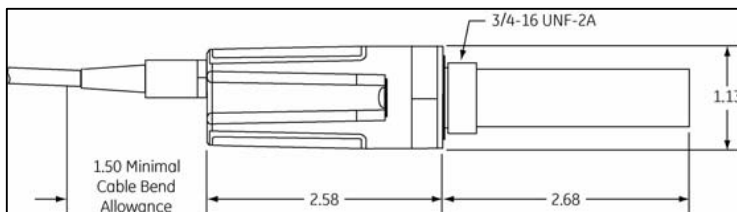
- Relative Humidity
  - Measuring range ..... 0–100 % rh
  - Resolution ..... 0.5 % rh
  - Accuracy ..... ±2 %rh (10...40°C, 10...90%rh) (±97 mg/m3 at 0°C)
  - Additional Error t ..... ±0.1% rh/K for <10°C and >40°C
  - Additional Error rh ..... ±0.25% rh/%rh for < 0% rh and >90% rh
- Temperature
  - Measuring Ranges: -20°C to +80°C
  - Resolution: 0.125°C
  - Accuracy: 0.5 K @ 23°C ±1 digit

### Optional Dew Point External Sensor

If extra accuracy is required, it is possible to connect an external thin-film aluminum oxide moisture sensor probe with the following features:

#### Moisture Ranges

- -110°C to 20°C
- -110°C to -50°C
- -90°C to 10°C
- -80°C to -30°C
- -80°C to 20°C
- -30°C to 20°C
- -130°F to 70°F
- -130°F to -40°F
- -40°F to 70°F
- -50°F to 50°F
- -100°F to 0°F
- 0 to 10 ppmv
- 0 to 100 ppmv
- 0 to 1000 ppmv





- 0 to 10,000 ppmv

Note: ppmv ranges based on constant pressure, provided at time of order placement.

#### **Operating Temperature**

–40° to 60°C (–40° to 140°F)

#### **Storage Temperature**

70°C (158°F) maximum. The probe should be stored with the plastic cover and desiccant packet threaded onto the probe. Store in a cool, dry environment.

#### **Warmup Time**

Meets specified accuracy in 3 minutes

#### **Calibrated Accuracy @ 77°F (25°C)**

- ±3.6°F (±2°C) from –85°F to 50°F (–65°C to 10°C) dew/frost point
- ±5.4°F (±3°C) from –112°F to –86°F (–80°C to –66°C) dew/frost point

#### **Repeatability**

- ±0.9°F (±0.5°C) from –85°F to 50°F (–65°C to 10°C) dew/frost point
- ±1.8°F (±1.0°C) from –112°F to –86°F (–80°C to –66°C) dew/frost point

#### **Response Time**

Less than 5 seconds for 63% of a step change in moisture content in either wet-up or dry-down cycle

#### **Electronics**

##### **Power**

- Supply voltage: 7 to 28 VDC (loop-powered, customer supplied)
- Output: 4 to 20 mA
- Output Resolution: 0.01 mA
- Max. Loop R =  $50 \Omega \times (\text{PSV}-7)$ , where PSV = Power Supply Voltage  
Example: Given a 24 VDC Power Supply, Max. Loop R =  $50 \Omega \times (24-7) = 850 \Omega$
- Cable: 2 m (6 ft) standard (consult factory for custom lengths)

##### **Mechanical**

Sample Connection

- 3/4 in (16 mm) 16 straight male thread with O-ring
- G 1/2 in with optional adapter

##### **Operating Pressure**

5 µHg to 5000 psi (345 bar)

##### **Enclosure**

Type 4X/IP67

##### **European Compliance**

Complies with the following:

- EMC Directive 2004/108/EC and PED 97/23/EC for DN<25
- EN 61326:1998

Class A, Annex A, Continuous Unmonitored Operation

(For EN 61000-4-3 transmitter meets performance criteria A and in a number of frequencies, criteria B per EN 61326)

##### **Dimensions**

- Overall: 6.76 × 1.13 in (17.17 × 2.87 cm)
- Electronics with cable: 4.08 × 1.13 in diameter (10.36 × 2.87 cm)
- Weight: 5 oz (140 g)

##### **Moisture Sensor**

###### **Calibration**

Each sensor is individually computer-calibrated against known moisture concentrations, traceable to NIST

###### **Calibration Interval**

Sensor recalibration with a certified gas is recommended every 6 to 12 months depending on application. More frequent recalibrations may be necessary.

###### **Calibration Data**

Factory-calibrated, stored in FLASH

###### **Flow Rate**

- Gases: Static to 10,000-cm/s linear velocity at a pressure of 1 atm.
- Liquids: Static to 10-cm/s linear velocity at density of 1 g/cc

## VOC Sensor

- VOC analysis into the gas mix in the range of 0.01 to 20 ppm related to isobutylene
- 0.01 ppm (parts per million) resolution.
- Reading of mg/m<sup>3</sup> with the molecular weight [g/mole].
- Setting of any known VOC response factor to isobutylene and molecular weight.
- Operating Life: 5 years (excluding replaceable lamp and electrode stack).
- IS Approval IECEx Ex ia IIC T4; ATEX Ex ia II 1G -40°C < Ta < +55°C (< 10VDC supply).
- Onboard filter to remove liquids and particulates.
- Lamp: User replaceable.
- Electrode Stack: user replaceable.
- Error state signal Lamp out: 35 mV.
- Weight: <8 g.
- Position Sensitivity: None.
- Lamp and electrode stack are user replaceable. Max 10.6eV lamp life: 5,000 lit hours.
- OSHA hydrocarbon (condensed) content limit in compressed air is 5 milligrams per cubic meter of air or less. 1910.134(i)(1)(ii)(B).

## Performance

- Target gases VOCs with ionization potentials <10.6 eV
- Minimum detection level ppb isobutylene 1
- Linear range ppm isobutylene 3% deviation 50
- Overrange ppm isobutylene 50
- Sensitivity linear range mV / ppm Isobutylene >20
- Full stabilization time minutes to 20 ppb 20
- Warmup time seconds time to full operation 5
- Offset voltage mV variable between detectors 46 to 60
- Response time (t90) seconds diffusion mode <3

## Environmental

- Temperature Range: -40°C to +55°C (Intrinsically Safe); -40°C to +65°C (non-IS).
- Temperature Dependence: 0°C to 40°C 90% to 100% of signal at 20°C; -20°C 140% of signal at 20°C.
- Relative Humidity Range: 0 to 95% noncondensing.
- Humidity Sensitivity During Operations: 0% to 75% rh transient near zero.

## Pressure Transducer

The pressure transducer is developed as an adjustable Zero & FS output piezo-resistive pressure transmitter. It uses a high-stability and reliable piezo-resistive pressure sensor as testing element, which is isolated by stainless steel diaphragm, and a high-quality amplifier circuit, which is housed in a stainless-steel housing.

The transmitter is compact in size with good performance. It is widely applied in various fluids pressure measuring and controlling in the industrial applications including petroleum, chemical industry, power station and hydrology, etc.

The transmitter is also available with intrinsically safe version ExiaCT6.

## Specifications

- Pressure range: -0.1...0-0.1...100MPa.
- Overpressure: 1.5 x FS or 110MPa, takes min. value.
- Pressure Type: G = Gauge; A = Absolute; S = Sealed gauge.
- Accuracy (non-lin. +hys. +rep): MPM489 ±0.5%FS MPM480 ±0.25%FS.
- Long Term Stability: MPM489 ±0.15%FS typ MPM480 ±0,1%FS typ.
- Temperature Coefficient: - Zero: MPM489 0.05%FS/°C (±100kPa); 0.03%FS/°C (±100kPa).
- MPM480 0.03 FS/°C (±100kPa); 0,02 FS/°C (±100kPa).
- Full Scale: MPM489 0.05%FS/°C (±100kPa); 0.03%FS/°C (±100kPa) MPM480 0.03 FS/°C (±100kPa); 0.02 FS/°C (±100kPa).
- Compensated Temperature: 0°C-60°C.
- Operating Temperature: -30°C to +80°C intrinsically safe version i: -10°C to +70°C.
- Storage Temperature: -40°C to +120°C.

- Power Supply: 10–30VDC intrinsically safe version supply by safe valve.
- Output Signal: 4-20mA (2-wire), 0/1-5VDC (3-wire), 0-10VDC (3-wire).
- Load Resistance: (U-10)/0.02, (2-wire), \_\_\_\_\_10K (3-wire).
- Intrinsically Safe Version i: ExiaCT6.
- Pressure Connection: ¼G male - ½G male M20X1.5 male – M20X1.5 male flush diap. - ½G male flush diap.
- Electrical Connection: Plug DIN43650 – cable.
- Housing Protection: IP65.

## 10.0 Disposal of Old Electronic Equipment

At the end of product service life, please dispose of electronics (sensors, system and batteries) in accordance with local regulations.

[ continued on next page ]

## 11.0 EU Declaration of Conformity

Manufacturer:	TEMC Via Donna Prassede 5A 20142 Milano ITALY
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Declare under our sole responsibility that the following products:

Product Name: **NUVAIR MULTIGAS COLOR**

Model number: **UX0DEM10TM**

Type of Equipment: **Gas analyzer meter**

Comply conformity with the following standards:

Test	Standard
Conducted emissions Radiated emissions	EN 60945: 2002 ETSI EN 301 489-1 V2.1.1 ETSI EN 301 489-17 V3.1.1
Electrostatic discharge ESD Radiated interferences Radiated RF immunity EFT – Bursts Fast Transients Conducted radiofrequency interferences Conducted RF immunity	EN 60945: 2002 ETSI EN 301 489-1 V2.1.1 ETSI EN 301 489-17 V3.1.1
Radio Requirements	ETSI EN 300 328 V2.1.1 ETSI EN 300 328 V2.2.2 Frequency range: 2400 - 2483 MHz, Maximum power: 10mW
Compass Safe Distance	EN 60945: 2002
EMF	EN 62311: 2008, ICNIRP limit (Council Rec. 1995/591/EC)
Safety	EN 62368-1: 2014

Therefore, the object of the declaration described above is in conformity with the relevant Union harmonization legislation: Directive 2014/53/EU.

Place of issue: Milano Italy

Date of Issue: November 26<sup>th</sup>, 2019



.....  
**Eugenio Mongelli**  
Managing Director

## 12.0 FCC Declaration of Conformity

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.

Changes or modifications not expressly approved by NUVAIR, 1600 Beacon Place, Oxnard CA 93030 USA, could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

## 13.0 Compliance Information Statement

Identification of the Product	Name	P/N
	NUVAIR MULTIGAS COLOR	UX0DEM10TM
Certified Component	Broadcom Bluetooth Module	FCC ID: QDS-BRCM1078
Applicable Compliance Statements	This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: <ol style="list-style-type: none"> <li>1. This device may not cause harmful interference</li> <li>2. This device must accept any interference received, including interference that may cause undesired operation.</li> </ol>	
Responsible party	Name	NUVAIR
	Address	1600 Beacon Place Oxnard CA 93033 USA
	Phone	+1.805.815.4044
	Website	www.nuvair.com

## 14.0 Warranty

**NUVAIR** warrants that its **Multigas Color Alarm Analyzer** will be free from defects on material and workmanship for a period of twelve (12) months from the date of delivery, with the exception of sensors and batteries that is not manufactured in-house and that is warranted for six (6) months, provided that the warranty Registration Card is completed online at [www.nuvair.com](http://www.nuvair.com) at the time of delivery.

Warranty will be void by failure to install, use or maintain the **Multigas Color Alarm Analyzer** according to **NUVAIR** instructions. To avail oneself of the warranty, send the product with postage prepaid to **NUVAIR**.

THESE WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR LEGAL. **NUVAIR** MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Buyer's exclusive remedy shall be the replacement of any **Multigas Color Alarm** oxygen and carbon dioxide analyzer or sensor therefore that fails to comply with the above warranty. Under no circumstances will **NUVAIR** be liable for economic, special, incidental or consequential damages of any kind whatsoever.

This warranty does not cover any damage due to accidental events (ex. impact or falls) or natural events (ex. fires calamities, earthquakes, nuclear disasters etc.).

In the interest of product improvement, **NUVAIR** reserves the right to alter design features and specifications without notice. Check **NUVAIR.com** for the latest sensor and analyzer specifications. Unless otherwise stated, all product specifications are quoted at standard temperature and pressure.

### Warranty Registration

Register Nuvair products online at <https://www.nuvair.com/warranty-registration/>.

### Notes

Date		





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