



A DIVISION OF
THE BAKER COMPANY



UM-002

Gas Mixer Q User Instruction – Software V1.70

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SAFETY INSTRUCTIONS

For your safety, safety of others using GMQ and those around you;

- Only the POWER LEAD supplied with GMQ should be used to connect GMQ to the mains supply.
- The power cord set must be an appropriately rated and approved cord-set in accordance with the regulations in the country it is used in.
- The top and side covers must not be opened by anyone other than a qualified service engineer. There are no end user serviceable parts behind these covers.
- Gas regulators must be used for each gas supply. A 2 STAGE REGULATOR should be used for each bottled gas supply. The maximum supply pressure permissible is 4 BAR GAUGE.
- For anoxic operation, Hydrogen gas in Nitrogen is required. The maximum permissible concentration is 10% HYDROGEN IN NITROGEN.
- Only the gasses specified in this manual may be used.
- Only Ruskinn Technology Limited replacement parts should be used.
- The mains supply voltage fluctuations must not exceed +/- 10% of the nominal mains voltage.
- If an Uninterruptable Power Supply (UPS) system is used, BOTH GMQ and the workstation must be connected to the Uninterruptable Power Supply (UPS) system.
- GMQ must NOT be switched on if the workstation is switched off.
- GMQ must NOT be switched on if it is not connected to a workstation.
- The cooling fan inlet and exhaust vent must NOT be covered or blocked.
- GMQ must NOT be used without the umbilical cable connected to both GMQ and the workstation.
- GMQ should be used in a well ventilated area.

FAILURE TO ADHERE TO THESE SAFETY INSTRUCTIONS COULD CAUSE SERIOUS INJURY AND WILL INVALIDATE THE WARRANTY. RUSKINN TECHNOLOGY LIMITED ACCEPTS NO RESPONSIBILITY FOR ANY ACCIDENT, INJURY OR LOSS CAUSED BY UNSAFE OPERATION OF GMQ.

Regulatory compliance



This product complies with the essential EEA requirements for Electromagnetic Compatibility as set out in the EMC Directive 2004/108/EC. It has been tested and found to comply in full with the requirements of:

EN 61326-1:2006

EN 61000-3-2:2006

EN 61000-3-3:2008

It meets Class A, Group 1 Limits as described in EN 61326-1 (and CISPR 11/EN 55011:2009). Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Warning, in a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.






It also complies with the essential EEA requirements for Electrical Safety as set out in the Low Voltage Directive 2006/95/EC. It has been tested and found to comply in full with the requirements of:





EN 61010:2010

Symbols

Before using GMQ, please ensure that you are familiar with the symbols on GMQ. Fig.1 explains the symbols found on GMQ;

Fig.1 GMQ symbols

| Symbol | Meaning |
|---|--|
|  | Refer to user manual. |
|  | Alternating current |
|  | Off power |
|  | On power |
|  | This product complies with the essential EEA requirements for Electrical Safety and Electromagnetic compatibility as set out in the EMC directive 2004/108/EC and the Low Voltage Directive 2006/95/EC |

| Symbol | Meaning |
|---|--|
|  | <p>Caution, do not remove covers. No end user serviceable parts behind covers.</p> |
|  | <p>Warning, this equipment contains high voltage circuitry</p> |
|  | <p>GMQ contains hazardous components and must not be disposed of at a household waste site. Instead it should be taken to the appropriate collection point for the recycling of electrical and electronic equipment.</p> |
|  | <p>Date of manufacture in format YYYY MM</p> |

Unit Gas Connection

Connect the unit to the mains outlet, a correct type moulded plug is supplied with each work station and is specific to the region of purchase. It is recommended the work station is located no further from one meter away from the plug socket. The plug socket should not be obstructed by the GMQ Gas Mixer workstation. The workstation must be connected to a protective earth.

All GMQ gas mixers are supplied with four gas hoses.

- A 3m length of black hose with a push fit connector and 2 hose clips.
- A 3m length of red hose with a push fit connector and 2 hose clips.
- A 3m length of clear hose with a push fit connector and 2 hose clips.
- A 3m length of blue hose with a push fit connector and a “T” fitting located towards one end.

At each end of each of the hose should situate a small hose clip. Check to see if these are in place.

Extreme caution must be exercised when dealing with highly pressurised gases as misuse can lead to damage to the work station and injury to the user.

- Make sure the gas bottles are turned to the off position.
- Uncoil the hoses separating red, clear, black and blue.
- Locate the blank end of each of the red, clear and black hoses making sure each one has a hose clip attached.
- On the rear of the gas mixing unit you will note four quick release connection points. These correspond to the writing on the graphic above. (see the diagram below)
- The smaller connection is marked as H2 / N2, push the blank end of the red coloured hose into this until you hear a “click”.
- Repeat this procedure using the clear hose into the connection labelled as “Air”.
- Repeat this procedure using the black hose into the connection labelled as “CO2”.
- Take the blue hose with the “T” piece. You will notice at this point all the three lengths of tubing are different, the smallest approx 15cm, should be a quick release connection with a gas hose clip. Push this end over the remaining point marked as N2 on the rear of the gas mixer. The Second longer piece with the quick release connector should be inserted in to the correct point on the work chamber.
- Using the bottle containing Nitrogen (N2), slide the other blank end of the blue hose over the two stage regulator hose tail. Tighten the hose to the hose tail using the clip making sure to get the tightest possible seal.
- Repeat the previous step using the red coloured hose on the anaerobic gas mixture bottle (ANO2). **Note! Anaerobic gas is only required for Microaerophilic Work stations and for Anaerobic use of the Invivo work station.**
- Repeat again using the clear hose on the Air gas bottle and the black hose on the carbon dioxide bottle (CO2).
- Once you are sure the hoses are connected as tight as possible turn the gas bottles one at a time to the on position. The gauge on the two stage regulator will rise to indicate the amount of pressure remaining in the gas bottle.
- Slowly turn the knob on the two stage regulator until the output pressure dial starts to rise. Stop when the output pressure reaches approx 50psi. **3,4 bar**
- Test around the connection between the gas hose and the regulator tail for leaks. This can be done with either a **gas leak detector**. If leakage is found **re-tighten the hose clips** until a gas tight seal is achieved.

- Now test for leaks in the same way as above around the connections between the hose barbs on the back of the gas mixer and the supply hoses.

Three lengths of 6mm clear tubing are supplied with the gas mixer, these must connect between the gas mixer and the work chamber as follows

- Take the first length of tubing push it firmly into the port on the rear of the gas mixer marked as “Gas Sample In”. Then Into the rear/side of the work chamber push firmly into the port marked as “Gas Sample Out”.
- Take the second length tubing push it firmly into the port on the rear of the gas mixer marked as “Gas Sample Out”. Then Into the rear/side of the work chamber push firmly into the port marked as “Gas Sample Return”.
- Take the second length tubing push it firmly into the port on the rear of the gas mixer marked as “Mixed Gas Out”. Then Into the rear/side of the work chamber push firmly into the port marked as “Mixed Gas Inlet”.

Unit Electrical Connection

The GMQ unit is compatible with a mains supply between 100V and 240V, with a frequency ranging from 50 Hz – 60 Hz. Power consumption is less than 100W. The switch for the power supply is located at the back of the unit.

Oxygen Sensor Location

Earlier Gas Mixer Q versions had the oxygen sensor mounted to the rear of the gas mixer where an air grille is now mounted (please see “label designation on rear of unit”). To change the oxygen sensor in this version, set the touch screen to the main menu, remove the sensor lead and unscrew the oxygen sensor anti-clockwise. Fit the new sensor, re-connect the lead and then run the auto-calibration sequence from the main menu.



For oxygen sensors located internally within the gas mixer, they should be changed by suitably qualified person(s). Further details are included within this document under the section “O2 calibration”

Label Designation on rear of unit

- Switched and Fused Power Supply Inlet
- N2 Input – Connect Nitrogen supply here (Blue Hose)
- CO2 Input – Connect CO2 supply here (Black Hose)
- Air Input – Connect Air supply here (clear hose)
- H2N2 Input – Connect Hydrogen / Nitrogen supply (Red Hose)
- Mixed Gas out – Gas injection line to main chamber
- Gas Sample In – gas sample line from chamber
- Gas Sample Out – gas sample return line to chamber
- Com Cable – Silver communication lead to communicate to main chamber
- Condensate drain (circled) – connect length of 6mm tube and run to suitable water collection tray (automatically drains condensate from system)

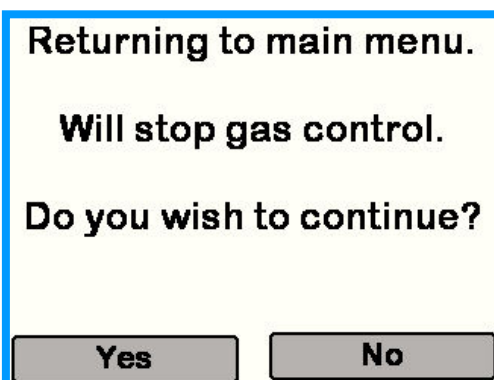


Unit Start Up / Main Menu



Connect the power lead, gas supply lines, gas sample lines, comms lead, condensate drain lead and sensor lead as previously explained and then turn on the mains connection switch at the rear of the unit. The main user menu screen will be displayed as below. There are 4 menu options and these are discussed in further detail within this user manual. Each menu can be selected via the touch screen. Please be advised that the unit will NOT operate in this mode as no operating cycle has been selected.

- Hypoxic – Select to enter Hypoxic control
- Hypoxic Cycle – Select to enter Hypoxic Cycle control
- Anoxic – Select to enter Anoxic control
- O2 calibration – Select to enter O2 auto Calibration mode
- Set Date and Time



When exiting gas control options a user prompt warning screen will be displayed advising the user that gas control will not be maintained at the main user menu. Please be aware of this for future reference.

Please note – for reference purposes the software revision level is displayed in the upper right hand corner of the main screen.

Changing the Date/Time

The main menu screen displays the Ruskinn logo and version information (Rev 1.5 /1.5) at the top. Below the logo are five rectangular buttons stacked vertically: "Hypoxic", "Hypoxic Cycle", "Anoxic", "O2 Calibration", and "Set Date and Time".

The "Date/Time last updated on" screen features several input fields and buttons. At the top, it says "Date/Time last updated on". Below this are four input fields for "Day Number", "Day", "Month", and "Year". The "Day" field contains the value "06". Below these are two input fields for "Hour" and "Minute". To the right of these is a "Serial No" field containing the value "795585". At the bottom of the screen are two buttons: "Set Time" and "Back".

To set the time and date select the set Date and Time option from the main menu and then enter the values in the areas provided. The set day is done by number and the chart below indicates the value depending on the day of the week.

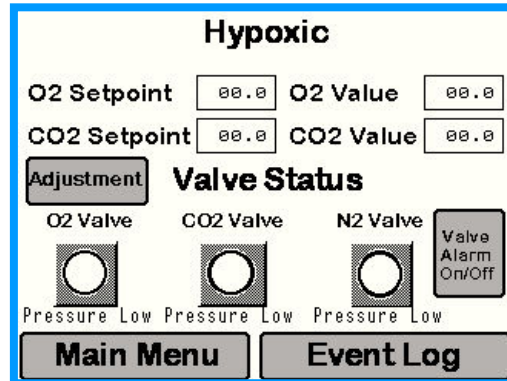
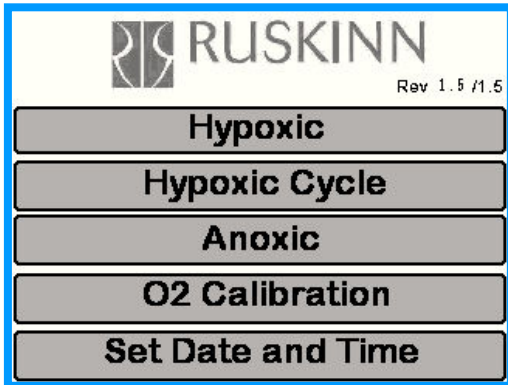
1. Sunday
2. Monday
3. Tuesday
4. Wednesday
5. Thursday
6. Friday
7. Saturday

Enter day (as the calendar day number), month (as a number) and year in numerical values. The hour to be entered is in 24 hour format and minute as a value between 1 and 60 (minute clock). Once all the info has been entered select the "back" button to return to the main menu. **You must now turn off the gas mixer and turn back on in order for this information to be processed to the plc.**

Please note the Serial number is entered by Ruskinn and cannot be altered by the end user.

Hypoxic Screen

Enter the **hypoxic menu** by touching the Hypoxic box on the Main Menu screen to access the hypoxic screen.

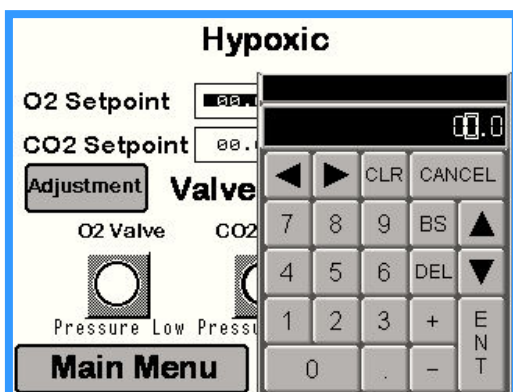


Hypoxic Screen Layout

- O2 Set point – displays the user O2 set value
- O2 Value – displays the O2 value within the sample plenum
- CO2 Set point – displays the user CO2 set value
- CO2 Value – displays the CO2 value within the sample plenum
- Adjustment – allows the O2 and CO2 values to be trimmed to independent meters
- Valve Status – displays information about incoming gas pressure. Each icon will alter when gas is being injected into the main chamber
- Valve Alarm On / Off - turn off low gas pressure audible alarm
- Main Menu – takes the user to the main menu.
- Event Log - takes the user to the event log screen (note - If the unit is powered down for any reason the event logs will be lost to the point of power being restored)

Entering the Set point for O2

To enter the set-point for O2, touch the screen to the right of the “O2 Set point” header. The following screen will now appear.

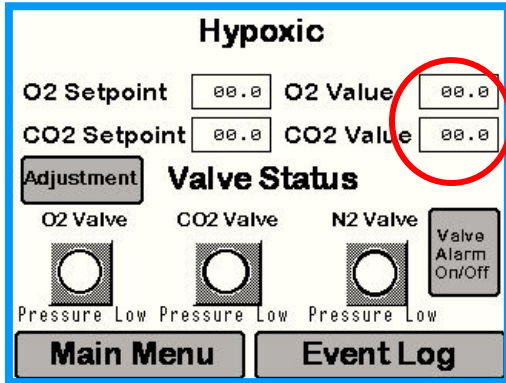


This menu allows the user to enter the required value. Please note, the O2 sensor range is 20.9 (%) and is the maximum value that can be entered. The lowest value that can be entered is 0.1 (%). Once the required values have been entered press “ENT” to return to the previous screen. The selected value will then appear in the “O2 set point” value box. Once the value has been set, the gas mixer Q control software and sensors will react to achieve the required O2 level within the main chamber.

Entering the Set point for CO2

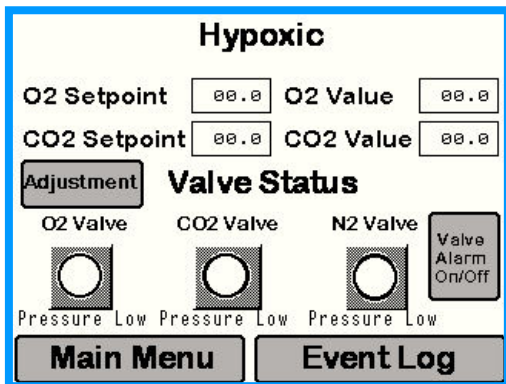
Repeat the same exercise for setting CO2 by touching the screen to the right of the “CO2 Set point” header. Please note, the CO2 sensor range is 30(%) and is the maximum value that can be entered.

Hypoxic Screen O2 and CO2 displays.

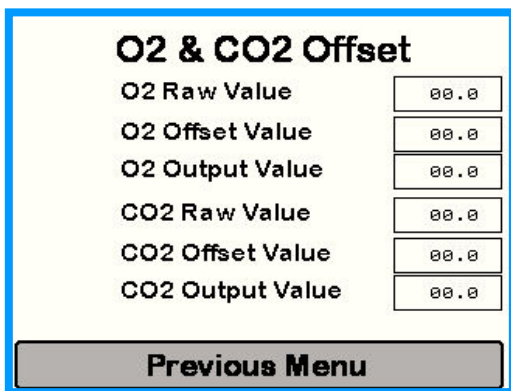


The actual O2 and CO2 values are displayed on the hypoxic screen and allow the user to make reference to the current values against the set point values. These values update according to a pre-programmed update time to provide a constant stream of information to the user.

Adjustment Function.



All gas mixer Q units are calibrated to independent gas sensor meters prior to despatch. As independent meters vary, Ruskinn has provided an adjustment feature to allow values to be trimmed to match end user monitoring equipment. Both the O2 and CO2 values can be trimmed as required by the end user



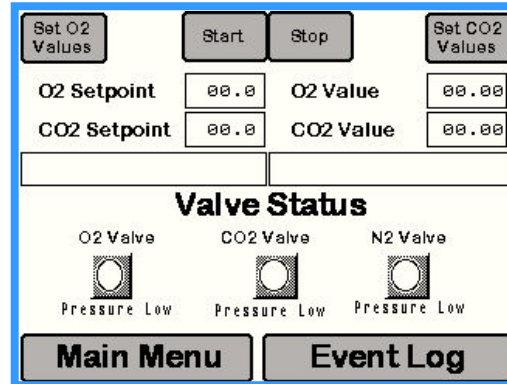
Select the Adjustment button on the Hypoxic Screen. The O2 and CO2 Raw Values are those being sensed by the equipment calibrated by Ruskinn. To offset any value merely press the space box next to either the "O2 Offset Value" or "CO2 Offset Value". Enter the trim value from the pop up menu (for trimming down always enter a minus (-) keystroke before the value). The resultant offset will then be displayed in the O2 Raw Value / CO2 Raw Value box and is the value to which the gas mixer will control to. Select "Previous Menu" to return to the previous user screen

Example: O2 Setpoint 1% O2 Value 1%. Independent meter 1.2%. Match the O2 Setpoint to the independent meter (in this case 1.2%). Select the Adjustment button and then enter +0.2 in the O2 offset value screen (The O2 Output Value will now display 1.2%).

If any problems are experienced when using this function either contact your local service / distributor partner for assistance or alternatively contact Ruskinn directly.

Hypoxic Cycle

Enter the hypoxic cycle menu by touching the hypoxic cycle box on the Main Menu touch screen.

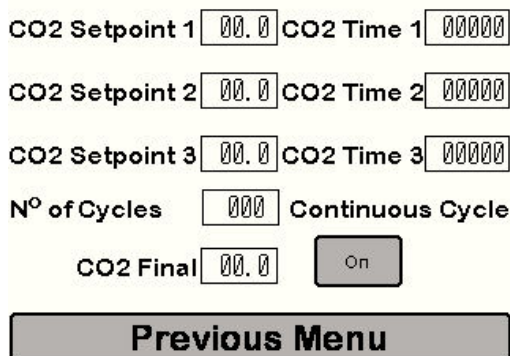


Hypoxic Cycle Screen Layout

The hypoxic cycle allows a timed sequence of 3 different gas concentrations to be entered via the “set CO2 Values” and set “O2 Values” touch boxes. All time entered is in minutes e.g. 60 = 60 minutes, 10 = 10 minutes etc.

- Set O2 Values – Touch screen here to enter O2 Values
- Start – touch screen here to start Hypoxic Cycle
- Stop – Touch screen here to stop Hypoxic cycle (always stop the cycle when exiting)
- Set CO2 Values – Touch screen here to enter CO2 Values
- O2 Set point – displays the set point for the relevant cycle
- O2 Value – displays the O2 level in the sample plenum
- CO2 Set point – displays the set point for the relevant cycle
- CO2 Value – displays the CO2 level in the sample plenum
- Blank Area Beneath CO2 Set point – Displays status of what O2 cycle is running
- Blank Area Beneath CO2 Value – Displays status of what CO2 cycle is running
- Valve Status – displays information about incoming gas pressure.
- Main Menu – takes the user to the main menu.
- Event Log – takes the user to the event log screen.

Hypoxic menu – how to input cycle values



Touch the touch box adjacent to the “O2 Set Point 1” header. A pop up menu will now appear. Enter the required value and touch “ENT” to return to the above screen. Repeat the above procedure to set “O2 Set points 2 and 3” and “O2 Final”. No of cycles is the number of repeat cycles. The same exercise should be repeated for co2. The maximum time permissible for each cycle is 99,999 minutes (approx 69 days). When the continuous cycle button is pressed the No of cycle and Final options are no longer shown.

Example of a Hypoxic Cycle

O2 cycle:

5% for 120 Minutes is entered in "O2 Set point 1"

8% for 300 Minutes is entered in "O2 Set point 2"

3% for 300 Minutes is entered in "O2 Set point 3"

Co2 cycle:

3% for 60 Minutes is entered in "co2 Set point 1"

2% for 120 Minutes is entered in "co2 Set point 2"

5% for 300 Minutes is entered in "co2 Set point 3"

No of cycles: - Set to zero, the gas mixer will complete 1 full cycle. Example - Setpoint1, 2, 3 and final

No Of cycles: - Set to 1, the gas mixer will complete the following cycle. Setpoint 1, 2, 3,1,2,3 and final

The "O2 Final" and "CO2 Final" value is the value to which the gas mixer will run on to indefinitely until the cycle is stopped. .

Continuous cycle: - When pressed the gas mixer will continue to run the Setpoint 1, 2, 3 cycle options until the stop button is pressed.

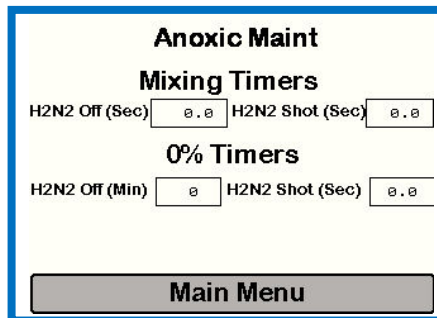
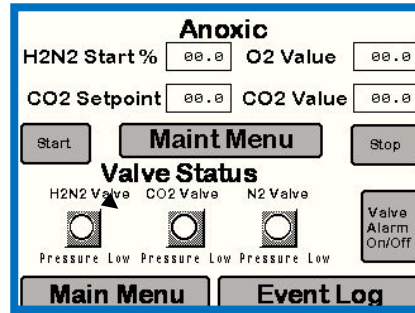
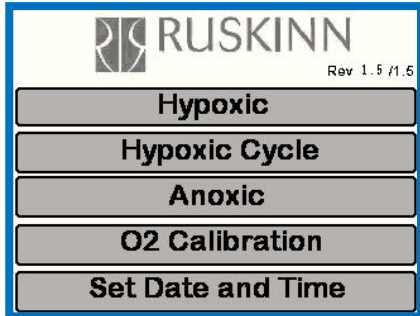
Please note the software only starts counting the "TIME" once the selected value is within the tolerance of the required value. Therefore the time to reach 5% from 8% after the set time of 120 minutes is reached (in the above example of a Hypoxic Cycle) is not included in the cycle time. The control software will also control the oxygen level before CO2 to ensure efficient use of gas.

Anoxic Cycle

The Anoxic cycle allows the chamber to be run in Anoxic conditions but MUST be used with a catalyst sachet installed in the main chamber:

| Ruskinn Part Number | Description |
|---------------------|----------------|
| 260-679 | Large Catalyst |
| 260-680 | Small Catalyst |

Enter the Anoxic cycle menu by touching the Anoxic box on the Main Menu touch screen.



Anoxic Cycle Screen Layout

- O2 Value – Displays the Oxygen level in the chamber
- H2N2 Start % - Enter the value to switch from Nitrogen control to Anaerobic gas
- Start – touch screen here to start Anoxic Cycle
- Stop – touch screen here to stop Anoxic Cycle
- H2N2/CO2/N2 Valves – shows when the each of the gases are being injected to the chamber
- Valve Alarm On/Off – turn off low gas pressure audible alarm
- Main Menu – takes the user to the main menu.
- Event Log – takes the user to the event log screen.
- Maint menu – takes you to the Anoxic Maint screen.

Mixing Timers

- H2N2 off (Sec) – enter a value in seconds for the off time during the pull down to 0% O2.
- H2N2 Shot (Sec) – enter a value in seconds for the shot time during the pull down to 0% O2.

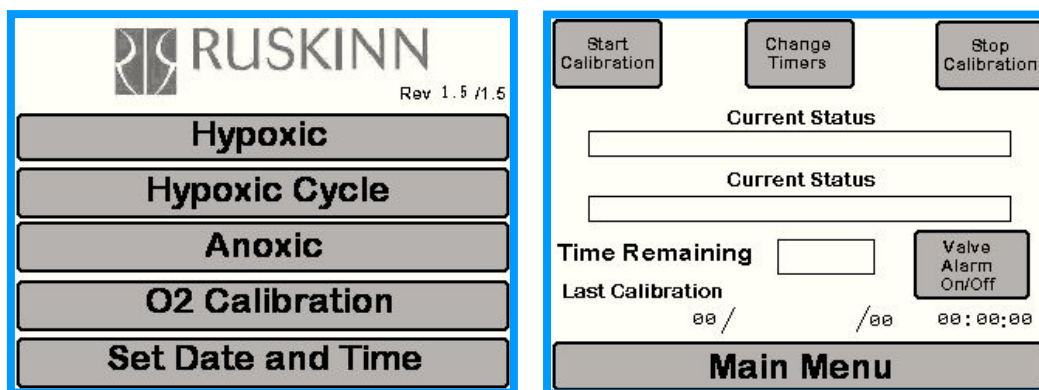
O2Timers

- H2N2 off (Min) – enter a value in minutes for Anaerobic gas OFF *
- H2N2 Shot (Sec) – enter a value in seconds for Anaerobic gas shot top up *

*These features allow a user maintenance regime for precise control of anoxic conditions within the workstation chamber

O2 Calibration

Select the O2 calibration from the main menu



The auto calibration allows the oxygen sensor to be calibrated without its removal and thereby eliminates the gas atmosphere in the main chamber being de-stabilised. During the calibration cycle a number of messages will be displayed under the “current status” header to inform the user of the calibration status.

If the sensor fails the user will be informed by an on screen message. Ruskinn recommends monthly re-calibration to ensure oxygen sensor accuracy.

O2 Calibration Cycle Screen Layout

- Start Calibration – Press to start calibration cycle
- Change Timers – Factory set and requires a user password
- Stop Calibration – Press to stop calibration cycle
- Current Status – displays first line status of calibration cycle
- Current Status – displays second line status of calibration cycle
- Time Remaining – displays the time left (seconds) to finish the cycle)
- Valve Alarm On / Off – turn off low gas pressure audible alarm.
- Last Calibration – displays date of LAST calibration
- Main Menu - Takes the user to the main menu.

If the auto calibration displays “sensor failed” then the sensor should be replaced.

- Select Main Menu and Isolate the power
- Remove the gas mixer lid and then disconnect the lead from the oxygen sensor
- Unscrew the sensor anti-clockwise
- Insert new sensor and tighten clockwise – ensure sensor is tightly fastened
- Re-connect the lead to the oxygen sensor.
- Re-fit the lid and turn on the mains power
- Select O2 calibration from main menu
- Press “Start Calibration”

Please note the co2 sensor should be calibrated annually by a Ruskinn approved service engineer. Details for calibrating the sensor are contained in the Gas Mixer Q service manual.

Event Log

The on-screen event log can be accessed without effecting the operation of the gas mixer system. The menus that have access to the event log are displayed previously in this manual. (hypoxic screen example is shown below)



Event Log Screen Layout

- Date – displays date of log
- Time – displays the time of the event log (1 minute intervals)
- O2 – Displays the o2 value at the given date and time
- CO2 – Displays the co2 value at the given date and time

The event log stores a maximum of 60 logs “on screen” (1 hour of logs) and these can be scrolled through using the “up” and “down” menu buttons. Once the event log has 60 logs stored it will add 1 log every minute and delete the first log on the list.

Note – if the event log is being used for Anoxic results the O2 and CO2 Set points should be set to zero on the Hypoxic screen as these will then return zero values to the CSV file.

Down Loading Event Logs To A USB Memory Stick

Software V1.71 / 1.71 stores a rolling log of data at 1 minute intervals to a maximum of 5 days. After 5 days one log entry will be added and 1 log entry will be deleted. The USB can be safely removed at any time and the data downloaded to any pc for analysis. The file format is “CSV” and can be opened using Microsoft excel.

Log files are an important diagnosis tool. They will provide information on how efficient your work station is operating. The following information is a guide in how to assess the data from the log files. First of all the initial column gives the date.

Ruskinn Technology Limited

| Date | Time | O2 | CO2 | O2 S.P | CO2 S.P | PS | SN |
|------------|----------|------|------|--------|---------|-----|-------|
| 13/01/1930 | 15:50:04 | 1.15 | 4.92 | 1 | 5 | 234 | 40802 |
| 13/01/1930 | 15:51:04 | 1.17 | 3.18 | 1 | 5 | 235 | 40802 |
| 13/01/1930 | 15:52:04 | 1.2 | 4.79 | 1 | 5 | 236 | 40802 |
| 13/01/1930 | 15:53:04 | 1.24 | 4.92 | 1 | 5 | 237 | 40802 |
| 13/01/1930 | 15:54:04 | 1.29 | 4.94 | 1 | 5 | 238 | 40802 |
| 13/01/1930 | 15:55:04 | 1.33 | 4.94 | 1 | 5 | 239 | 40802 |
| 13/01/1930 | 15:56:04 | 1.38 | 4.96 | 1 | 5 | 240 | 40802 |
| 13/01/1930 | 15:57:04 | 1.42 | 4.94 | 1 | 5 | 241 | 40802 |
| 13/01/1930 | 15:58:04 | 1.46 | 4.96 | 1 | 5 | 242 | 40802 |
| 13/01/1930 | 15:59:04 | 1.31 | 4.92 | 1 | 5 | 243 | 40802 |

The above format of the Log File can be confusing; In the first column we have the date. The way this is set out reads as follows, 13/01/1930 but actually means 30/01/2013. This is a deficiency of the Excel when it imports data produced by the mixer software. There is an automated script that can change this format. It can be found on at RWI 016 on the Ruskinn Resource Centre web site.

The next column is a time register, giving minute by minute updates of the gas readings, ie.15:50:04, 15:51:04. 15:52:04, and so on.

The third column shows the value that O2 sensor is reporting, in this case 1.15% in the first reading. The O2 set point (S.P.) is located in the fifth column.

The fourth column shows the value that the CO2 sensor is reporting, in this case 4.92% in the first reading. The CO2 set point (S.P.) is located in the sixth column.

With columns two through six described above, therein operates what is called a deadband area. This means that if the O2 value is set at 1.0% , it can increase or decrease by pre determined percentage above and below the 1.0% to form a deadband. If the value is out of deadband, the gas controller will inject Nitrogen or compressed air until the sensor reading is within deadband. This is also true of CO2. Gas use can be excessive if the gas controller is not able to achieve deadband for one or both of these parameters.

Column 7 (PS or “pressure switch”) is a minute by minute record that the workstation is pressurised. The workstation operates at a slight positive pressure, ie slightly higher than ambient. This is employed to keep atmospheric gas from entering the workstation and increasing the O2 or affecting the CO2.

The numbers displayed are not a reflection on the pressure within the workstation, but an indication that pressure is maintained on a timed basis. This value counts up for each minute that the workstation remains at an appropriate pressure above atmospheric. There is some normal leakage within the workstation; this is seen when the counter in the PS column resets itself. A workstation is considered to be operating normally if the PS does not reset itself within 20 minutes.

If the PS column shows values that are continuously zero or counting up below 20 before resetting, there is a leak in the workstation. This is likely to be a seal that is not seated correctly. The procedure below should be employed to try to resolve the problem.

If the O2 or CO2 point is not within the deadband of the target set point for a long period of time, the gas controller will inject either Nitrogen or CO2 to compensate. This may pressurise a workstation

even if it has a slow leak. In this case the PS will still count up but either the CO2 or the N2 will not be at target.

The final column on the log files is the identification number of the unit.

Gas Leak Procedure

What can be determined from the pressure switch column showing zero or showing low counts: If zero is displayed for a short time period of a few minutes, it is possible that the workstation lost pressure through the eezee sleeves, whilst an operative was carrying out daily work procedures. Once the work is completed then the workstation will resume its pressure and the log will start to register again.

Using deadband as an indicator of a leak, if the pressure switch is recording but the gas control settings are out of the parameters preset, then this could indicate a leak. The GMQ is injecting gas in to the workstation to try to achieve the target O2 and CO2 levels but without success. This, however, could inject enough gas to maintain pressure inside the workstation.

If the log file is continuing to register zero or only low counts, then we must assume that the workstation is leaking, there are some steps we can take to try and establish where the leak is.

- (1) Check the eezee sleeves for any damage or that the O rings are fitted correctly, if these are distorted or damaged they can allow leaks to occur.



- (2) Check that the access glove ports are sealed correctly again to ensure there are no leaks.
- (3) Check the N₂ and CO₂ bottles are not empty; if a bottle is empty it cannot recharge the workstation. If the log file appears normal but excess gas is being used, there may be a leak in the supply to the workstation. Power down the workstation. Then shut the supply regulator off to see how quickly the regulator drops. If it drops quickly (i.e. to empty within minutes) there may be a leak in the supply line.
- (4) Check for any obvious leaks around the pipe work or fittings, leading to the pressure chamber doors, or to and from gas mixer and workstation.
- (5) Check there are no obstacles between the pressure chamber sliding window and the mating surface that would prevent the complete sealing of the window.
- (6) Ensure that the Single Port Entry System (SPES) is closed correctly (if equipped on your workstation).



- (7) Check the water tank is full, as this is a secondary pressure relief. In the rare event of a mechanical pressure relief valve failure, the water tank will bubble over if the workstation pressure has increased excessively. The bubbling will be very visible.

The water tank will also release workstation pressure (causing excess gas consumption) if the water level is not sufficiently high. This can be either visually confirmed by comparing the water level with the label on the side of the workstation or in the case of Sci-tive by looking at the indicator LEDs on the control panel. If the water level is critical, the RED led will illuminate, once the water has been replenished, the GREEN led light will illuminate. Use only DE-ONISED water to top up,



If all the above have been checked and there continues to be a problem then please contact your local Distributor. Please ensure that your Log File is checked regularly as it is a very important assistant to the everyday running of your workstation.

Warranty information

Ruskinn Technology Limited warrants for the applicable time period that GMQ will substantially perform in accordance with the user documentation. The terms of this Agreement do not affect or prejudice the statutory rights of a consumer acquiring the Ruskinn Technology Limited GMQ otherwise than in the normal course of a business.

THIS WARRANTY DOES NOT APPLY IN THE FOLLOWING CIRCUMSTANCES:

(A) IF THE Ruskinn Technology Limited GMQ HAS BEEN REPAIRED BY PERSONS NOT AUTHORIZED BY Ruskinn Technology Limited; OR

(B) THE Ruskinn Technology Limited GMQ and associated accessories/peripherals HAVE BEEN ALTERED, MODIFIED, OR MISUSED; OR

(C) THE Ruskinn Technology Limited GMQ IS USED WITH NON- Ruskinn Technology Limited COMPONENTS; OR

(D) THE Ruskinn Technology Limited GMQ OR A COMPONENT IS USED FOR OTHER USES (FOR EXAMPLE USE WITH OTHER CIRCUIT BOARDS OR SOFTWARE) OR

(E) THE Ruskinn Technology Limited GMQ HAS NOT BEEN MAINTAINED OR USED IN ACCORDANCE WITH THE INSTALLATION AND USER GUIDE.

UNLESS PROHIBITED BY LAW, THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE. Ruskinn Technology Limited DOES NOT WARRANT THAT THE Ruskinn Technology Limited GMQ WILL FUNCTION ERROR FREE.

If within the Warranty Period, the Ruskinn Technology Limited GMQ does not conform to the express warranty set forth above, Ruskinn Technology Limited's sole obligation and User's sole remedy shall be, at Ruskinn Technology Limited's option: 1. to repair or replace the non-conforming component; or, 2. refund the purchase price.

LIMITATION OF LIABILITY.

UNLESS PROHIBITED BY LAW, Ruskinn Technology Limited WILL NOT BE LIABLE TO USER OR OTHERS FOR ANY OTHER DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES INCLUDING, FOR EXAMPLE, LOST PROFITS, BUSINESS, INVESTMENTS, OR OPPORTUNITIES EVEN IF Ruskinn Technology Limited HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

The parties agree that Ruskinn Technology Limited total cumulative liability to User for direct damages for all causes under this Agreement shall not exceed £5,000,000 (FIVE MILLION UK STERLING POUNDS), or the price paid for the Ruskinn Technology Limited GMQ, whichever is higher. Some states or countries may have laws which require liability rights different from those stated above. In such states or countries, the minimum required liability terms shall apply.

Disposal information

GMQ contains hazardous components and must not be disposed of at a household waste site. Instead it should be taken to the appropriate collection point for the recycling of electrical and electronic equipment. Alternatively please contact your local distributor for disposal instructions.

GMQ contains recyclable parts. Please contact your local distributor for more advice.

Contact details

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