

# User manual

## G603 Work Chamber



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# 1 General Information & Service

## COPYRIGHT

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Users of K-SYSTEMS Kivex Biotec products should not hesitate to contact us if there are any unclear points or ambiguities in this manual.

K-SYSTEMS  
Kivex Biotec A/S  
Klintehøj vænge 3-5  
3460 Birkerød  
Denmark

Tel.: +45 45 99 56 00  
Fax: + 45 45 99 56 19

E-mail: [info@K-SYSTEMS.dk](mailto:info@K-SYSTEMS.dk)  
Internet: [www.K-SYSTEMS.dk](http://www.K-SYSTEMS.dk)

Service address:  
Please contact your local K-SYSTEMS Kivex Biotec distributor for details.

### 1.1 Instruction of the operating personnel

These operating instructions describe the following unit

- G603 Work Chamber

The G603 Work Chamber has been manufactured in keeping with the latest technologies and developments. It has been tested during assembly and before delivery to ensure correct operation. However, it may present potential hazards to user, if this unit is used in conditions that lies outside of its intentional way of use.

Therefore K-SYSTEMS strongly recommend that:

- Any operation on the cabinet must only be carried out by trained and authorized personnel.
- Any repairs to the device must be carried out, only by trained and authorized service personnel.

**CAUTION:** If the equipment is used in a manner not specified by this manual, the safety of the user may be at risk and the equipment may be damaged. Always use the equipment as outlined in this instruction manual.

## **1.2 Applicability of the instructions**

- Keep these instructions close to the device. This way you ensure having easy access to the safety instructions and important information.
- Please note that the contents of this manual are subject to change without further notice.
- If you encounter problems that are not mentioned in this manual in detailed, please contact your nearest K-SYSTEMS distributor for more information.

## **1.3 Warranty**

K-SYSTEMS warrants the operational safety and correct system operation of the whole unit under the condition that:

- The device is operated as described in the manuals
- The device has not been modified
- All service intervals are kept according to manuals
- Only original spare parts and accessories that have been approved by K-SYSTEMS are used

## 2 Explanation of Symbols Used in Manual



### NOTE

Used to direct attention to a specific item.



### WARNING

Used to warn the user against a specific item.



### DANGER

Used when caution is needed.



### HELP

Used for hints.



### Recycling

Valuable raw materials can be recycled.

### **3 Introduction**

Dear Customer

Thank you for choosing a K-Systems product. We hope you will be happy with your G603 Work Chamber.

At K-Systems we strive to provide the very best products and solutions for human IVF. The G603 Work Chamber is designed to provide optimum conditions for your embryos during handling.

K-SYSTEMS encourage you to register your product on our homepage. This will enable us to inform you about important updates and safety issues directly. Please go to <http://www.k-systems.dk/product-registration.html> for registration

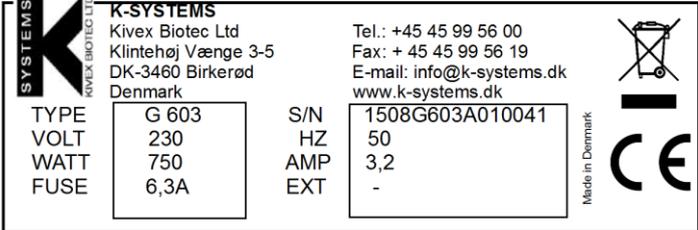
For optimal use of your G603 Work Chamber, please read and follow the instructions in this User Manual.

If you need further assistance, please contact your local K-SYSTEMS supplier or K-SYSTEMS directly.

**Information regarding service and maintenance intervals given in this document should be followed with care.**

## 4 Safety symbols used on the unit

The G603 contains high voltage components that may be hazardous. It is strongly recommended, in order to reduce the risk of electric shock, not to remove the back. This equipment does not contain any user serviceable parts inside. It is recommended to have qualified service personnel performing any service needed on the equipment.

Fuse label.	
The symbol indicates that the unit contains high sensitive electronic components which can be damaged by static electricity.	
Main product label.	
Warranty label – Warning.	
K-SYSTEMS brand logo.	

## 5 Precautions/warnings

- Do not use product if package is damaged.
- Do not use product without proper VOC filter attached.
- Do not use this product at temperatures exceeding 30°C.
- Never use non-K-SYSTEMS filters.
- Use only 100% pure CO<sub>2</sub> and 100% pure N<sub>2</sub> gas.
- Always use HEPA filter for inlet CO<sub>2</sub> and N<sub>2</sub> gas.
- Always keep red cap on unused gas lines.
- Read and understand the user manual completely before use.
- Make sure that CO<sub>2</sub> and N<sub>2</sub> gas supply pressures are kept stable at 1.0 bar (14.5 PSI).
- Always connect power cord to a proper grounded outlet.
- VOC filters must be changed in the interval described in the manuals.
- UV lamp must be changed in the interval described in the manuals.
- O<sub>2</sub> sensor must be changed in the interval described in the manuals.
- Never leave entry port cuffs open when they are not in use.
- Perform temperature and gas calibration in the intervals described in the manuals.
- To reduce the risk of fire or electric shock, this equipment should not be exposed to rain or moistures and objects filled with liquids. This excludes the reservoir for sterile water for use on the table top, but caution must be taken not to spill anything on the unit itself during loading and handling.

## 6 Important Safety Instructions

- Read this safety instruction carefully before using equipment.
- Always keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Do not block any ventilation openings.
- Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat.
- Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third prong is provided for your safety. In the provided plug does not fit into your outlet, consult and electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Use only with the cart, stand specified by the manufacturer or sold with the apparatus. When a stand with wheels is used, use caution when moving the apparatus to avoid injury from tip-over.
- Unplug the apparatus during lightning, storms or when unused for a long period of time.
- Refer all servicing to qualified service personnel.
  - Servicing is required according to service manual or if the apparatus has been damaged in any way, such as if the apparatus have been dropped, exposed to rain or moisture, or does not operate normally.

## 7 General description



**THIS UNIT DOES NOT CONTAIN ANY USER-SERVICEABLE PARTS. PLEASE LEAVE ALL MAINTENANCE WORK TO QUALIFIED PERSONNEL.**

### 7.1 Setup precautions

In order to avoid possible damages' to the system please follow all setup precautions described in this chapter.

#### **Finding a suitable location**

Place this unit on a flat, hard and stable surface.

Never place heat generating equipment under the tabletop.

#### **Space for ventilation**

Place this unit in a location with adequate ventilation to prevent internal heat buildup. Allow at least 2 cm clearance from the rear, 30 cm from the top and 20 cm from left and right to prevent overheating.

#### **Avoid high temperature, moisture, water and dust**

This unit must not be exposed to dripping or splashing.

This unit is intended for indoor purposes only.

### 7.2 Accessories supplied

- VOC filter G603.
- 2 HEPA filter for inlet gas supply.
- 1 USB containing G603 User manual, data logging software and USB converter drivers
- 1 USB A-B cable
- Water reservoir
- Main power cord
- LS12 (light source)
- 2 gas cylinder shelves
- Incorporated microscope (specified by customer)

### 7.3 Copyright notice

The making of any unauthorized copies of copy-protected material, including manuals and software is an infringement of copyrights and constitute a criminal offence.

## **7.4 Use of the device**

The G603 is a laboratory device which is intended to be used and operated in IVF laboratories.

This appliance is designed for continuous use in within the ambient conditions listed in the next chapters.

Prior to the initial operation of the unit, the operator must ensure that the unit is performing with correct temperature and gas levels as described in the validation guide. The cabinet can only be released for operation only if it performs according to specifications given by K-SYSTEMS.

Make sure to repeat the test, in case of any changes of the system setup, or installation conditions has been applied.

The alarm system must never be ignored or muted without a further investigation of the cause of the alarm.

## **7.5 Electro magnetic and other interferences**

Equipment can be affected by electromagnetic interference from other devices, in two major ways. One is direct effects through proximity with other devices; another is electrical interference over the power lines.

Therefore it is strongly recommended to:

- Make sure that all devices emitting electromagnetic radiation are kept a reasonable distance away from G603 in order to avoid any potential electromagnetic or other interferences.
- Have separate power circuits that are intended for use for medical equipment only.

## **7.6 Ambient condition**

In order to maintain operational safety and correct function of the equipment, ensure that this unit is installed at locations that meet the ambient conditions listed below.

- The temperature within the room must be between 10 °C – 25 °C
- The relative humidity must not exceed 75% (non-condensing)
- The location must be equipped with appropriate ventilation system
- Unit must be kept away from heat generating devices (see section 7)
- The flooring of the location must be hard, non flammable and flat
- The power outlet should be out of causal reach to prevent accidental shot off.
- Make sure that the device is correctly attached to ground using grounding-type plug (see section 6)

## 7.7 Moving the unit

The G603 is designed as a stationary unit and it is not supposed to be moved around once it has been installed in the proper way and according to descriptions given in chapters 5, 6 and 7.

To move the device it is strongly recommended that lifting equipment always is used due to weight of the device.

Use the lifting gear to move the unit by lifting in all 4 corners of the tabletop at the same time. It is recommended that beside 1 person who is controlling the lifting gear at least 4 more people are available supporting each side of the unit while unit is being moved around.



**Never try to lift or move the unit alone.**

**Never try to move the unit by lifting the middle part of tabletop.**

**Never use the handles founded on each side of the unit to lift the unit with.**

Always make sure to wear shoes that protect your feet while moving around the unit. During transportation on medium long and long distances it is strongly recommended to use the original casing that was delivered with the unit.

## 7.8 Product description

The G603 is the new generation of Workstations that makes it possible to maintain an optimal environment for the development of oocytes and embryos.

Direct warming of the dishes on the table top gives superior temperature conditions in comparison to comparative semi-closed or closed systems.

The G603 is composed of a large working area that fully encloses one stereo microscope. The environment in this semi-closed working area can be controlled with regards to the temperature in the air, temperature on the table top, CO<sub>2</sub> level, O<sub>2</sub> level and humidity. It is semi-closed because the whole area is under a slight overpressure but sealed so that only minimal amounts of air escapes.

There is a laminar flow down over the work area to prevent contamination, but an upward suction as well near the sides to quickly absorb any air that enters the enclosure near the entry ports on the sides during openings.

In this way there is optimal product protection all the time and an optimal environment.



The re-circulated air is both HEPA filtered, Carbon filtered (VOC removal) and sterilized with UV-light. The UV-light is not penetrating the work area.

For maximum performance the system has got 5 separate temperature controllers, controlling and regulating the temperature in the air and table top.

The G603 needs 100% CO<sub>2</sub> and 100% N<sub>2</sub> in order to be able to control the CO<sub>2</sub> and O<sub>2</sub> concentrations in the work area.

The unit can be connected to a pc running the K-SYSTEMS data logging software for long term data logging and data storage.

Also an external dialler<sup>1</sup> or external alarm system can be connected to the G603 to ensure maximum safety and reliability.

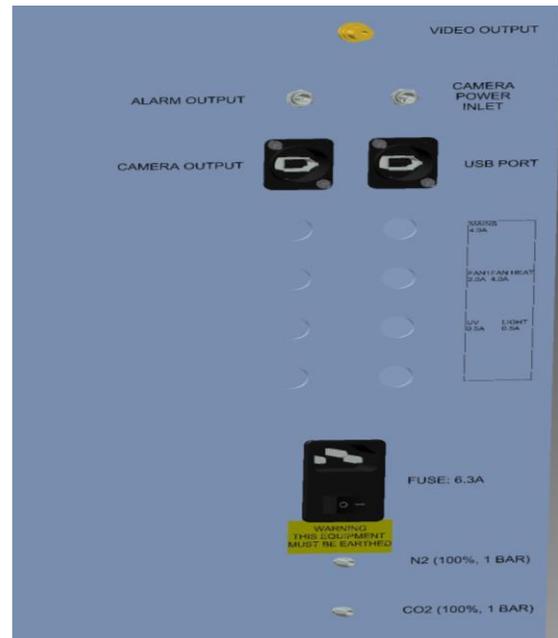
## 8 Connections

The G603 has a series of connectors and switches on its side, back and inside the working area.

### 8.1 Connectors on the left side

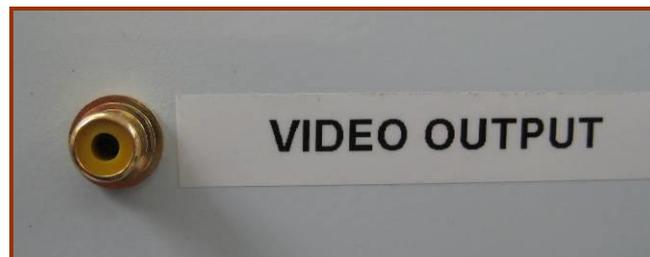
On the left hand side of the G603 there is a composite video output, an USB connector output, 8 circuit fuses, a mains connector and mains switch that also house a mains fuse, and two gas inlets.

In the following chapters, these connectors are explained in more details.



#### 8.1.1 Video socket

The video socket is a RCA type and is intended to be attached to a monitor in order to view images captured by the camera which is mounted inside the working area.



### 8.1.2 USB output

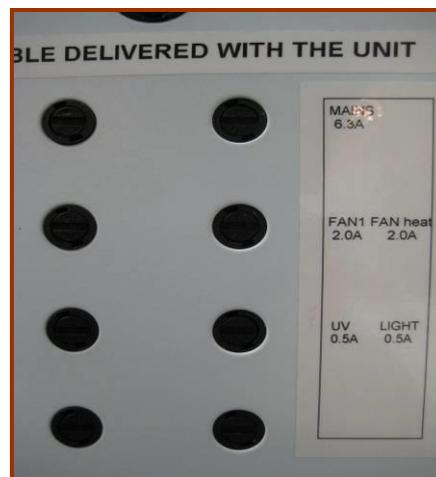
This output is a B-type output and is used to attach the unit to a PC running the K-SYSTEMS data logger monitoring software.



*Before connecting to PC please refer to the Data logger installation instructions manuals delivered with the unit for proper installation process.*

### 8.1.3 Circuit fuses

This equipment is protected by fuses. The fuse ratings are printed on the label attached next to the fuse holders.



*Please note that some of the fuse holders may be empty due to various configuration possibilities. Only replace with same type fuse.*

### 8.1.4 Mains connection

Mains is connected with the cable supplied with the unit. If this is not present or does not fit contact your distributor or K-SYSTEMS. Do not use a non-original cable. This could be dangerous and will void the warranty.

Before connecting the mains check the G603 markings on the side and verify that the yellow mains label reflects the correct voltage.

When marked '220-240 VAC' the G603 can be connected to mains in the range:

- 220 - 240V AC 50Hz or 110-120V AC 60Hz

If the markings correspond with the local mains power the unit can be connected and switched ON.



**CONNECTING THE UNIT TO A WRONG VOLTAGE WILL CAUSE SERIOUS DAMAGES TO THE SYSTEM.**



**Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.**

### 8.1.5 Gas connections

If the G603 is connected to gas bottles be sure to use a high quality regulator that can be adjusted around the required 1.0 bar (14.5 psi).

If the G603 is connected to plumbed gas circuits verify that the pressure is in the correct range.



Remove the red cap for the gas inlet that is needed. Take care not to lose the cap as it will be needed when gas is not connected to the unit.

Connect the gas to the inlet on the G603 with a suitable silicone tube. 2 pcs. are supplied with the unit. Contact your local distributor or K-SYSTEMS if these are missing.

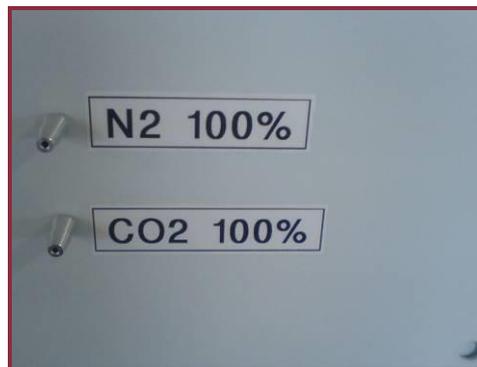
Inlet CO<sub>2</sub> should be connected to 100% pure CO<sub>2</sub>. Only dry CO<sub>2</sub> gas must be used. Inlet N<sub>2</sub> should be connected to 100% pure N<sub>2</sub> (if low oxygen conditions are required). Only dry N<sub>2</sub> gas must be used.



*Gas pressure for both inlets should be 1.0 bar (14.5 PSI) and must be kept stable.*

O<sub>2</sub> control in the work area can be adjusted in the range from 20% - 2% by infusing N<sub>2</sub> gas.

CO<sub>2</sub> control in the work area can be adjusted in the range from 2% - 10%



*Take care not to loose the cap as it will be needed when gas is not connected to the unit.*



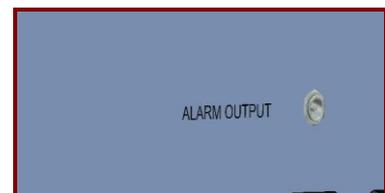
*If no Oxygen control is needed leave the red cap on the N<sub>2</sub> inlet.*



**Never run the unit with an inlet or outlet NOT covered by a red cap.**

### 8.1.6 Alarm switch

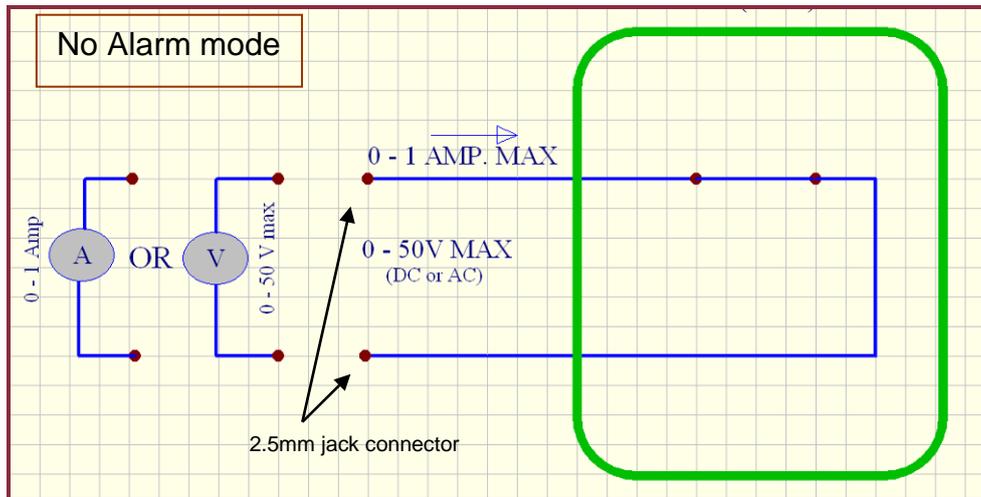
In order to be able to connect the G603 to an external monitoring system, this unit is equipped with an external connector; a 2 pin male connector on the side and can be connected to a monitoring device.



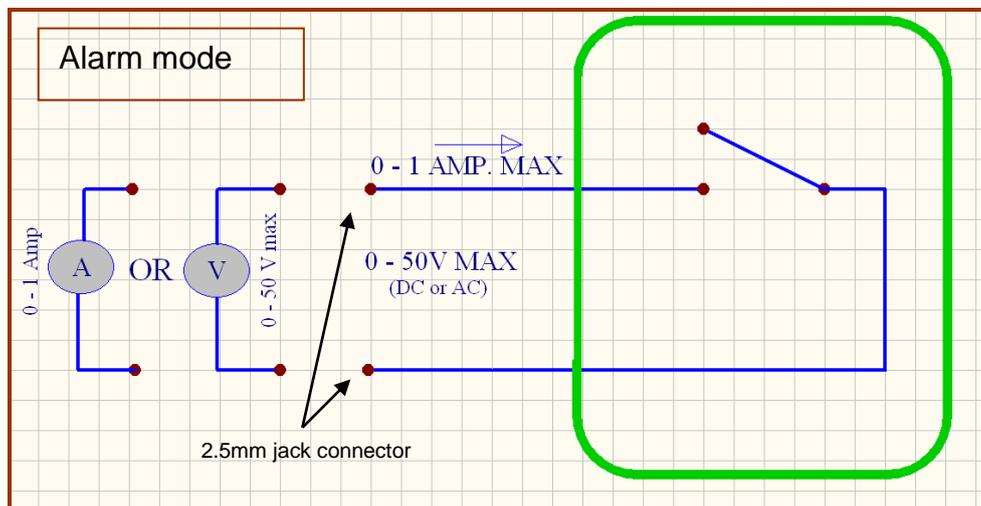
Whenever there is an alarm (that could be temperature alarm, out of set point gas alarms for CO<sub>2</sub> or O<sub>2</sub> levels, low pressure alarms for CO<sub>2</sub> and N<sub>2</sub> gases or no gas alarms) the switch is activated indicating that the unit needs inspection by a user.

The connector can either get connected to a voltage source OR to a current source.

If there is no alarm, the switch within the unit will be in 'ON' position as it is illustrated below.



Whenever the G603 goes into an alarm mode the switch will become an 'open circuit'. This means that no current is able to run through the system anymore.



*Whenever the power cord for workstation is removed from power outlet this switch will automatically indicate an alarm! This is an extra safety feature added to alert the personnel in case of power cut out to the unit.*



**Note that if a current source is attached to the 2.5mm jack connector the maximum current rating is between 0 – 1.0 Amp.**



**If a voltage source is attached, then the limitation is between 0 – 50V AC or DC.**

### 8.1.7 Camera power input

In order to be able to power up the camera mounted inside the working area, this unit is equipped with an external connector, a 2,5mm jack connector in the back that can be connected to the power supply delivered with the camera.



**ONLY USE ORIGINAL POWER SUPPLY DELIVERED TO POWER UP CAMERA. USING A NON-ORIGINAL PSU MAY CAUSE SERIOUS DAMEGES TO THE CAMERA.**

### 8.2 Connector inside the working area

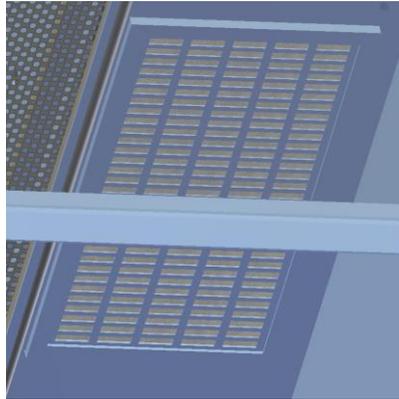
Inside the working area there is a single 4-pins connector which is used to power up the analogue camera mounted on the microscope, and transfer the images to the video output mounted on the left side of the unit.

Besides the analogue interface there is also a digital connector found to connect digital cameras. Signals from the installed digital camera is transferred to an output placed in the side of the workstation.  
Supported digital interfaces are USB, Firewire or HDMI.



## 9 Carbon VOC filter

2 VOC filters exist in the unit - one on either side of the main HEPA filter.



Check that the Carbon VOC filters are correctly installed and covered by the mesh.



*The filter elements should be changed every 3 months. Mark the date when it is put on and make sure to keep this interval. Correct filter performance is crucial for the system performance.*

## 10 Entry ports (sides)

There is a hatch on either side of the G603 for loading equipment and specimens.



Make sure that the hatch is closed after openings. It is not spring loaded. Limit the number of openings to a minimum during procedures as it will affect the CO<sub>2</sub> and O<sub>2</sub> levels.

There should always be a cuff attached to the hatch and the procedures should take place using this to protect the environment inside.



**IF THE CUFFS ARE NOT MOUNTED, THE G603 CANNOT REGULATE THE GAS WITH ANY KIND OF PRECISION.**

Insert the hand into the working area by opening the string on the cuff and gently press the hand through the elastic opening.

When the procedures are finished withdraw the hand and let the cuff follow the hand outside. Hold the cuff and pull the hand out. Remember to close the cuff by pulling the string.



*The Cuffs should be changed every 3 months. Mark the date on the label attached to the Cuff when it is put on and make sure to keep this interval.*

## 11 Entry ports in front (Option)

As an option, a special made front window can be delivered containing 2 pcs. Of extra large doors for easy and convenient access from the front.



## Reservoir for sterile Water

To obtain humidified air a reservoir containing sterile water can be placed in the work area. The degree of humidification can be adjusted by the volume of liquid that is filled in the reservoir or how the reservoir is placed. If the reservoir is placed on the warmed area the humidification level will increase. If kept on the designated non warmed area behind the microscope pole the humidification level will decrease.



In order to protect the microscope, the relative humidity should always be kept under 60% RH. The G603 is equipped with an alarm that will engage if the humidity level becomes too high.

There will be a visual indication in both the RH% display in the inner wall and the keyboard alarm key. This will be accompanied by the acoustic signal that can be muted by pressing the alarm key.



If the alarm sounds either move the reservoir to the non warmed area or remove the reservoir from the working area. If the G603 is not in use vent the working area by opening the side hatches.

The reservoir is made from powder painted aluminium and should be cleaned with a N2H2 solution and a lint free paper towel or a cloth. Rinse with plenty of sterile water afterwards. **The reservoir cannot be autoclaved.**



**FILLED RESERVOIR WHILE THE UNIT IS TURNED OFF WILL RESULT IN A VERY HIGH HUMIDITY LEVEL INSIDE THE UNIT.**

## 12 Keyboard functions for G603

In the next chapters the functions associated with the keyboard and the menu items explained.

The table below shows the main keys and their purposes.

	
<p>(main display) - Shows information about the current status of the unit, also the air and tabletop temperatures are shown on this display.</p>	
<p>Microscope light source control - ON/OFF adjustment of light intensity. (works only with K-SYSTEMS LS-12 light source).</p> <p> Please refer to user manual for LS12 for a complete description of installation and usage of the light source.</p>	
<p>Fan ON/OFF. The fan key also controls air temperature and gas regulation.</p>	
<p>Alarm key. Disable acoustic alarm.</p>	
<p>Interior light ON/OFF.</p>	
<p>Heated surface in tabletop ON/OFF.</p>	
<p>SP/setpoint key.</p>	
<p>Arrow keys – down and up. Press both for 3 seconds to access the user menu.</p>	

### 13 System on standby

Whenever the system is powered the following symbol is shown on the main display to indicate that system is on standby.

Action	Display
System on standby.	

### 14 Keyboard Lock

In order to prevent any change of the settings by mistake, the G603 has a built-in keyboard lock that can be engaged using the keyboard buttons.

Please follow the following instructions to lock and un-lock the keyboard.

Action	Key
Pressing arrow down and SP along with alarm button key at the same time will lock the keyboard.	
When pressing a random key the display will show "lock", while keyboard lock function is engaged.	
To unlock the keyboard press arrow down and SP along with alarm key at the same time.	



**While locking/un-locking the keyboard there is a chance that set temperature might be changed by mistake. Make sure that set temperature is not changed while the keyboard lock function is being activated/de-activated.**



*If the keyboard lock has been engaged and any buttons beside SP is pressed 'Lock' will be shown on the display to indicate that the keyboard is locked.*



*Kindly note that the alarm still can be muted when key lock is engaged.*

## 14.1 Inner wall displays

The inner wall contain 3 separate displays. These displays are used to show the following information:

- CO<sub>2</sub> concentration in %, the status of CO<sub>2</sub> regulator and alarm messages.
- O<sub>2</sub> concentration in %, the status of O<sub>2</sub> regulator and alarm messages
- Relative humidity in %, and alarm messages.



The first display from the top is used to show the status of the CO<sub>2</sub> regulator (ON or OFF) and to show the actual concentration of CO<sub>2</sub>. This display is also used to alert the user in case of any alarm that is related to the CO<sub>2</sub> regulator, wrong CO<sub>2</sub> concentration or wrong incoming gas pressure).



*If there is no gas supply or insufficient pressure the readout of the corresponding gas will show “no Co2”.*

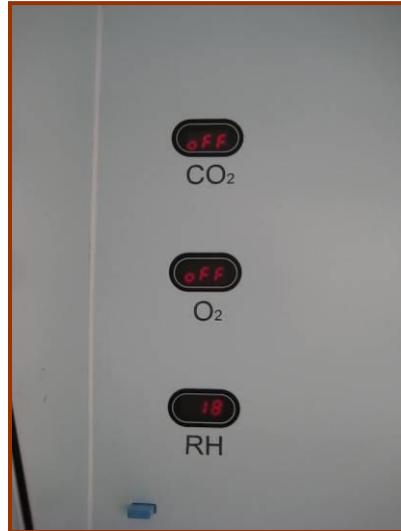
The display in the middle is used to show the status of the O<sub>2</sub> regulator (ON or OFF) and also to show the actual concentration of O<sub>2</sub>. This display is also used to alert the user in case of any alarm that is related to the O<sub>2</sub> regulator (wrong Oxygen concentration or wrong incoming N<sub>2</sub> gas pressure).



*If there is no gas supply or insufficient pressure the readout of the corresponding gas will show “no n2”.*

The third display is used to show the actual humidity level inside the working area. This display is also used to warn the user against too high levels of humidity.

When Fan is OFF the CO<sub>2</sub> and O<sub>2</sub> regulators will also become deactivated. The reason is that this unit will no longer be able to mix the air with the incoming gas and deliver a mix with a uniform concentration. "OFF" will be shown on the displays for CO<sub>2</sub> and O<sub>2</sub> to indicate that the regulators have become inactivated.



When Fan is switched ON the actual gas concentration for CO<sub>2</sub> and O<sub>2</sub> will be displayed only if CO<sub>2</sub> and O<sub>2</sub> regulators have been activated in the menu.



*While menu is entered the 3 displays will be turned OFF.*

## 15 Alarms

Whenever the G603 is in an alarm mode a message will be shown on one of the displays of the unit. The below table contain a list of the alarm messages and an explanation of the alarms.

Alarm	Displayed message	Display
<b>CO<sub>2</sub> pressure alarm.</b>	"No – CO <sub>2</sub> " is shown on the top inner wall display.	
<b>CO<sub>2</sub> gas level alarm.</b>	Blinking top inner wall display when CO <sub>2</sub> gas concentration is wrong.	
<b>N<sub>2</sub> pressure alarm.</b>	"No – N <sub>2</sub> " is shown on the middle inner wall display.	
<b>O<sub>2</sub> level alarm.</b>	Blinking middle inner wall display when O <sub>2</sub> gas concentration is wrong.	
<b>Humidity alarm</b>	Blinking display for too high humidity levels. (above 60% RH)	
<b>Temperature alarm (tabletop)</b>	Tabletop temperature is shown on the main display.	
<b>Temperature alarm (air)</b>	Air temperature is shown on the main display.	

An audible alarm is also activated whenever the G603 is in alarm mode

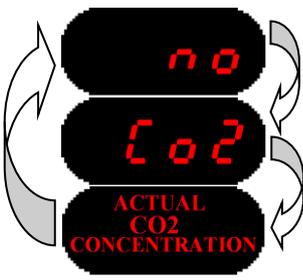


The alarm tone can be muted by pressing the alarm button .

In the following chapters these alarm states are explained in more details.

## 15.1 CO<sub>2</sub> pressure alarm

If the CO<sub>2</sub> gas supply is not attached correctly or wrong CO<sub>2</sub> gas pressure is applied to the system, the G603 will go into CO<sub>2</sub> pressure alarm mode. “no - Co2” will be displayed, indicating wrong incoming gas pressure or no input CO<sub>2</sub> gas.

Cause	Key	Display
CO <sub>2</sub> gas supply failure, wrong gas pressure or no gas attached.	An audible alarm is activated which can be muted by pressing the alarm button  .	



*The message will be shown in the upper display placed in the inner wall which normally is used to show the current CO<sub>2</sub> concentrations.*



*By pressing the alarm button , the alarm sound will be muted, but the red LED light will stay on until correct gas pressure is applied to unit. The above message will still be shown on the display until the system is back to normal mode.*

If no CO<sub>2</sub> control is desired simply switch OFF the regulator within the menu.

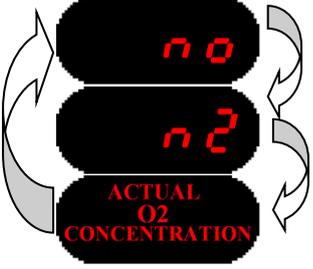
Switching OFF the CO<sub>2</sub> regulator will automatically des-engage the CO<sub>2</sub> pressure alarm.

Please refer to next chapters for more information about the CO<sub>2</sub> regulator.

## 15.2 N<sub>2</sub> pressure alarm

If the N<sub>2</sub> gas supply is not attached correctly or wrong N<sub>2</sub> gas pressure is applied to the unit, the G603 will go into N<sub>2</sub> pressure alarm mode.

“no - n2” will be displayed, indicating wrong incoming gas pressure or no input N<sub>2</sub> gas.

Cause	Key	Display
N <sub>2</sub> gas supply failure, wrong gas pressure or no gas attached.	An audible alarm is activated which can be muted by pressing the alarm button  .	



*The message will be shown in the middle display placed in the inner wall which normally is used to show the current O<sub>2</sub> concentrations.*



*By pressing the alarm button , the alarm sound will be muted, but the red LED light will stay on until correct gas pressure is applied to unit. The above message will still be shown on the display until the system is back to normal mode.*

If no O<sub>2</sub> control is desired simply switch OFF the oxygen regulator within the menu. Switching OFF the O<sub>2</sub> regulator, will automatically des-engage the N<sub>2</sub> pressure alarm.

Please refer to next chapters for more information about the N<sub>2</sub> regulator.

### 15.3 CO<sub>2</sub> level alarm

CO<sub>2</sub> level alarm is activated if the concentration of the CO<sub>2</sub> gas is deviating by more than  $\pm 1\%$  from set value.

Remember when changing the set point more than  $\pm 1\%$  from the current gas level this will result in an CO<sub>2</sub> level alarm. The same goes for all calibration adjustments.

Cause	Key	Display
Gas concentration is deviating by more than one percent from set value will activate an audible alarm and actual CO <sub>2</sub> concentration value will start blinking.		



*When there is an alarm an acoustic signal is also activated which can be muted by pressing the alarm () button.*

### 15.4 O<sub>2</sub> level alarm

O<sub>2</sub> level alarm is activated if the concentration of the O<sub>2</sub> gas is deviating by more than  $\pm 1\%$  from set value.

Remember when changing the set point more than  $\pm 1\%$  from the current gas level this will result in an O<sub>2</sub> level alarm. The same goes for all calibration adjustments.

Cause	Key	Display
<p>O<sub>2</sub> Gas concentration is deviating by more than one percent from set value will activate an audible alarm and actual O<sub>2</sub> concentration value will start blinking.</p>		



*When there is an alarm an acoustic signal is also activated which can be muted by pressing the alarm () button.*

## 15.5 Humidity alarm

In order to prevent any bacteria growth and to protect the unit including microscope and camera against rising humidity levels, this unit is equipped with a humidity alarm which will be engage at humidity levels above 60%.

Cause	Key	Display
Humidity level above 60% will activate an audible alarm and actual humidity level will start blinking.		



*The humidity alarm will also go on even if the unit is switched OFF. This is done to protect the unit against high humidity levels even if the unit is not being used.*



*When there is an alarm an acoustic signal is also activated which can be muted by pressing the alarm () button.*

## 15.6 Temperature alarm (tabletop)

All 3 zones of the tabletop can trigger a temperature alarm if they are more than  $\pm 0.5^{\circ}\text{C}$  from the set value.

Remember when changing the set point more than  $\pm 0.5^{\circ}\text{C}$  from the current temperature this will result in an alarm. The same goes for all calibration adjustments.

The alarm condition is indicated by a red LED light in the alarm key and a pulsating audio signal that can be muted by pressing the alarm key once.

Action	Key	Display
To mute the alarm sound press once. Press once again and the sound will no longer be muted.		



*By pressing the alarm button , the alarm sound will be muted, but the red LED light will stay on until temperature conditions are back to normal.*



*The main display will automatically show the tabletop temperature whenever there is an alarm related to wrong temperatures on the tabletop. Tabletop temperature is indicated by the letter 't' on the left side of the main display.*

## 15.7 Temperature alarm (air)

The sensor controlling the air temperature within the working area will trigger an air temperature alarm if it measures a temperature which is more than  $\pm 1^{\circ}C$  from the set value.

Remember when changing the set point more than  $\pm 1^{\circ}C$  from the current temperature this will result in an alarm. The same goes for all calibration adjustments.

The alarm condition is indicated by a red LED light in the alarm key and a pulsating audio signal that can be muted by pressing the alarm key once.

Action	Key	Display
To mute the alarm sound press once. Press once again and the sound will no longer be muted.		



*By pressing the alarm button , the alarm sound will be muted, but the red LED light will stay on until temperature conditions are back to normal.*



*The main display will automatically show the air temperature whenever there is an alarm related to wrong temperatures in the air. Air temperature is indicated by the letter 'A' on the left side of the main display.*

## 16 Operating the tabletop warmed area

The heaters for the tabletop and air are activated using the heat () button.

Action	Key	Main Display
Press the heat ON/OFF key. Make sure the mains switch on the side of the G603 is also switched to 'ON' position.		
A temperature reading will appear in the main display and the unit will warm up from the ambient temperature to the desired temperature.		
The "t" in front of the temperature reading indicates that it is showing the tabletop temperature.		
The "A" in front of the temperature reading indicates that it is showing the air temperature.		



*The warm up time is around 40 minutes if set temperature is 37.0°C.*

## 17 Operating the laminar air flow

The laminar airflow is activated using the fan () Button.

When the fan is activated the system will automatically start cleaning the air within the working area by pulling the air through 2 VOC filters to remove any VOC's. Then the air is heated to the desired temperature and then lead to a pressure chamber where there is an UV lamp that disinfect the air. Then the pressurized air is lead through the main HEPA filter in order to remove all the particles before it is blown down to the working area.

This ongoing process is keeping the air clean while the unit is in use.

Action	Key	Display
Switch ON the fan. This will automatically activate the air temperature regulator and the gas regulators.		
Toggle the display to show either tabletop temperature (t) or air temperature (A) with the arrow up or down key.		



*Please note that gas control and air temperature control require the heater and the fan to be activated<sup>1</sup>.*



*It is important to note that the gas controls will become deactivated if the fan is switched OFF. This is indicated by the message shown on the display's for the respective gases found on the inner wall.*

<sup>1</sup> Activation of CO<sub>2</sub> and O<sub>2</sub> controls also requires that the CO<sub>2</sub> regulator 'CO2.r' and O<sub>2</sub> regulator 'O2.r' have been activated within the menu.

## 18 Operating the interior light

Action	Key
Press the switch to turn the interior light on, indicated by the yellow light. Press again and the interior light turn off.	

## 19 Operating the light source

The intensity of the microscope light source can be adjusted when using K-SYSTEMS light source (LS-12), by using the light-UP or light-DOWN keys (  ) Prior to operation of the light source this unit must be installed and attached correctly to G603.



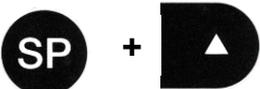
*Please refer to the separately delivered user and installation manual for more information about correct installation and complete description of functions.*

Action	Key
Press the key with this symbol <u>once</u> to switch ON the light source or hold this button to increase light intensity.	
Press and hold this key to decrease light intensity.	
Press both UP and DOWN keys to switch OFF the light.	

## 20 Setting the temperature

The default set temperature is 37.0°C, but it is adjustable in the range from ambient to 49.0°C.

In order to change the setpoint for the temperature, please follow these instructions:

Action	Key	Main Display
Switch the heat ON.		
Press the button with the symbol SP, the current set temperature will be shown on the display.		
To raise the set temperature press and hold SP, then press arrow UP. When the desired Set-point is reached release both keys.		
To lower the Set-point temperature press and hold SP, then press arrow DOWN. When the desired set-point is reached, release both keys.		



*If SP and arrow UP or DOWN are pressed continuously the temperature setting will change quickly. To change the temperature slowly, press one step at a time.*



*The tabletop and the air temperature has the same setpoint and cannot have different set values.*

## 21 Menu Function

The user can access a number of advanced functions via the menu.

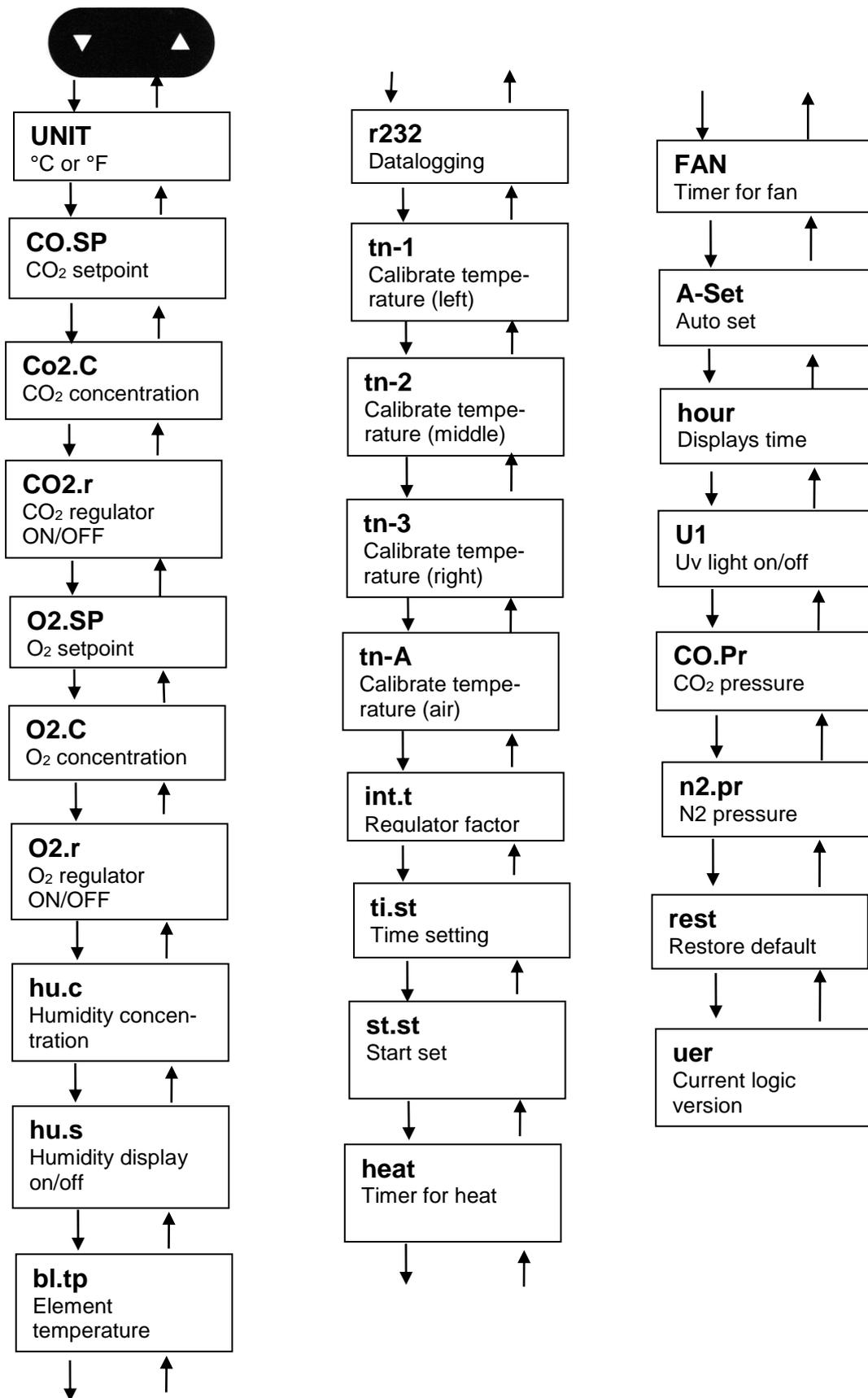
Please follow the below instructions for entering, exiting and navigating within the menu.

Action	Key	Main Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The first option "UNIT" will appear in the display.		
Press UP/DOWN key to navigate within the Menu.		
While holding the SP key in, press either the arrow UP or arrow DOWN key to change values within the options.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*The displays in the inner wall of the work area will switch off when the menu is entered. They will reappear when the menu is exited.*

## 22 Overview of the menu items



## 22.1 Unit

In the UNIT option the **displayed temperature** unit can be set either degrees **Celsius** or **Fahrenheit**.

Follow these steps to navigate in the UNIT option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press and hold SP key. "°C" or "°F" will be shown.		
While holding the SP key in, press either the arrow UP or arrow DOWN key to choose between Celsius (C) or Fahrenheit (F).		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

## 22.2 CO<sub>2</sub> set point

“Co.SP” is the CO<sub>2</sub> set point. This option is used to change the desired CO<sub>2</sub> concentration in the system.

In order to change the CO<sub>2</sub> setpoint, please follow below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “Co.SP” appears in the display.		
Press and hold the SP key to see the current set value for CO <sub>2</sub> concentration.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

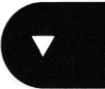


*As default the CO<sub>2</sub> setpoint (CO.SP) is set to 5.0 %.*

## 22.3 CO<sub>2</sub> Concentration / Calibration

Co2.C is the CO<sub>2</sub> calibration or a reading of the actual CO<sub>2</sub> concentration in the system.

Remember that the CO<sub>2</sub> regulator must be activated before the concentration can be viewed or changed. Whenever an adjustment of the CO<sub>2</sub> concentration is needed, it can be done here by following below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "Co2.C" appears in the display.		
Press and hold the SP key to have a reading of the current CO <sub>2</sub> volume.		
Use SP key and arrow UP or DOWN to adjust the reading based on reliable data from an external gas analyzer.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*Please refer to next chapter to for instructions on how to activate CO<sub>2</sub> regulator.*



*Please refer to chapter 23 for more details on gas level validation and calibration procedures.*



*Calibration is done by adjusting the CO<sub>2</sub> level according to a measurement done on the gas sampling outlet using a precision CO<sub>2</sub> measurement device only.*



**Changing the calibration value should only be done based on certain measurement by a trained user or a technician.**

## 22.4 CO<sub>2</sub> regulator

'CO2.r' is used to toggle the CO<sub>2</sub> regulation ON/OFF.

As default the CO<sub>2</sub> regulator is set to 'ON'.

If the CO<sub>2</sub> regulation is not needed, it can be switched off here.

Follow the below instructions to activate/deactivate the CO<sub>2</sub> regulator.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "Co2.r" appears in the display.		
If CO <sub>2</sub> regulation is not needed, it can be switched OFF here. The Default value is ON. CO <sub>2</sub> regulation is switched to OFF by holding the SP key while pressing the arrow DOWN key once.	 + 	
When the CO <sub>2</sub> regulation has been set for OFF there will not be shown any value under the 'CO2.C' menu point. It will display 'OFF' to indicate that the regulator has been deactivated by user.		
Press and hold UP+DOWN key for 3 seconds to exit the menu.		



*Always connect 100 % pure CO<sub>2</sub> source to the CO<sub>2</sub> gas inlet located on the left side of G603 before switching the regulator 'ON'.*



*Switching OFF the fan will automatically deactivate the CO<sub>2</sub> control.*

## 22.5 Oxygen setpoint

“O2.SP” is the O<sub>2</sub> set point. This option is used to change the desired O<sub>2</sub> concentration in the system.

In order to change the O<sub>2</sub> setpoint, please follow below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “o2.SP” appears in the display.		
Press and hold the SP key to see the set value.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*As default the O<sub>2</sub> setpoint (O2.SP) is set to 5.0%.*

## 22.6 Oxygen Concentration / Calibration

The item called 'O2.C' is found in the menu and is used for calibration or just having a readout of the actual O<sub>2</sub> concentration in the system.

Remember that O<sub>2</sub> regulator must be activated before the concentration can be shown/adjusted.

Whenever an adjustment of the O<sub>2</sub> concentration is needed it can be done here by following below instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "o2.C" appears in the display.		
Reading the actual O <sub>2</sub> value is done by pressing and holding the SP key.		
Change by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*Please refer to next chapter to for instructions on how to activate O<sub>2</sub> regulator.*



*Please refer to chapter 23 for more details on gas level validation and calibration procedures.*



*Calibration is done by adjusting the O<sub>2</sub> level according to a measurement done on the gas sampling outlet by a precision O<sub>2</sub> measurement device.*



**Changing the calibration value should only be done based on certain measurement by a trained user or a technician.**

## 22.7 O<sub>2</sub> regulation

'O<sub>2</sub>.r' is used to toggle the O<sub>2</sub> regulation ON/OFF. If O<sub>2</sub> regulation is not needed, the oxygen regulator can be switched OFF here.

If low oxygen conditions are needed the O<sub>2</sub> regulator must be switched to ON.

Follow the below instructions to activate/deactivate the O<sub>2</sub> regulator.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "o2.r" appears on the display.		
When the O <sub>2</sub> regulation has been set for "OFF" there will not be shown any value under the 'o2.C' menu. It will display "OFF", to indicate that the regulator has been deactivated by user.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*Always connect a 100 % pure N<sub>2</sub> source to the N<sub>2</sub> gas inlet located on the left side of G603 before switching O<sub>2</sub> regulator ON.*



*The Default status for the oxygen control is OFF.*



*Switching off the Fan will automatically deactivate O<sub>2</sub> control.*

## 22.8 Humidity calibration

Calibration is done by adjusting the RH% according to a measurement done in the work area with a precision RH% measurement device.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "hu.C" appears in the display.		
Reading the Humidity value is done by pressing and holding the SP key.		
Change by pressing and holding the SP key and arrow UP or arrow DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

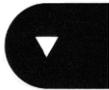


*Changing the calibration value should only be done based on certain measurement by a trained user or technician using proper equipment.*

## 22.9 Humidity display

This function switches the humidity display ON/OFF.

If no humidity showing is desired the display for humidity can be switched off by entering the menu and setting the item called 'hu.s' to 'OFF'.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "hu.S" appears in the main display.		
To see the current status, simply press and hold the SP button.		
If no humidity showing is required, simply switch this OFF by pressing and holding the SP button along with either arrow up or down buttons.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*The humidity alarm will not be deactivated.*



*The humidity showing is set to 'ON' by default.*

## 22.10 Temperature of air heater

“Bl.tp” is the name of the function used to show the temperature of the air heating system. This function is only used for service issues and can be accessed as described in below table.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “bL.tP” appears in the display.		
By pressing the SP key the current temperature value is shown.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

This value should can be as high as 60°C during restart, and lower afterwards.

## 22.11 Data Communication

The next item in the menu is called “r232”. This is the communication protocol with a computer. The communication can be toggled between PC, PDA and OFF.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press down key until the option “r323” appears in the display.		
Press the SP key to see the actual setting.		
Press key UP or DOWN once while holding the SP to turn ON for the communication port. When the required setting is set let go of the SP key.		
Press and hold key UP and DOWN for 3 sec to exit the menu.		

Having the parameter set wrongly will cause data to be corrupt.



*Having the parameter set incorrectly when no PDA or PC is attached will not make any difference. Only switching to “OFF” when the PDA or PC is attached will impact on the datalogger software.*



*Communication protocol is set to ‘PC’ by default.*



*Please refer to the enclosed “Installation instruction for datalogger software” for further instruction on datalogger installation.*



**Never attempt to switch OFF the dataflow when the PDA or PC is logging data. Stop the program first on the PDA or the PC first.**

## 22.12 Temperature calibration – Tune function

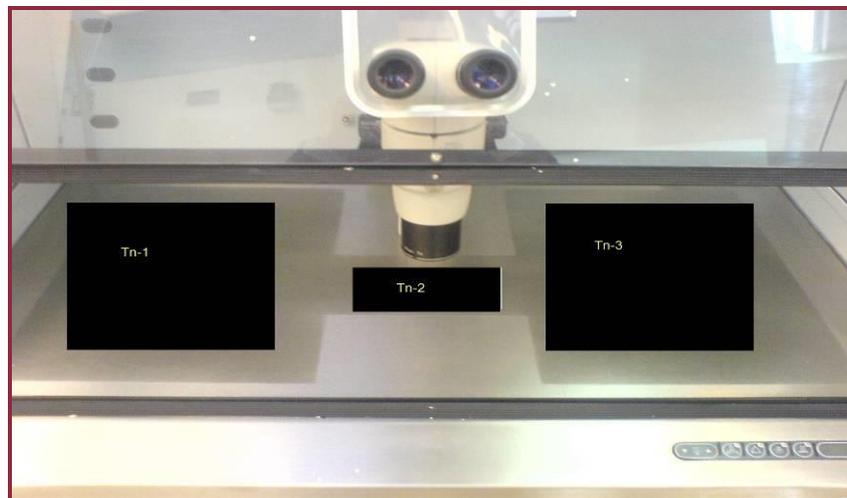
In this section the temperature controls of the G603 is described.

There are 3 separate controls for the temperature on the tabletop of G603, 1 controller for the air temperature, and 1 temperature control for air heating system. The last mentioned temperature control is only for safety purposes and cannot be calibrated.

Each of the other 4 controllers is responsible in controlling the temperature of a separate zone.

Therefore each of the 4 available zones is equipped with its own separate temperature sensor and heater, allowing the user to adjust the temperature within every zone separately and achieve higher precision.

Below is shown an overview of the areas associated with the tune functions for the tabletop.



Calibration is best done by starting out with tn-1 and then move on to tn-2 to tn-3. Then letting the system stabilize and repeating the procedure if necessary.

Adjust according to a high precision measurements done in a dish with media under mineral oil located on the surface area that corresponds to the tune area.

When the whole area of the tabletop is calibrated, then move on and calibrate the air temperature (tn-A) using a proper thermometer designed to be used in measuring air temperatures.

An overview of the zones associated with the tune functions is shown on table below.

Zone name	Position
tn-1	Left section of tabletop
tn-2	Middle section of tabletop
tn-3	Right section of tabletop
tn-4	Air temperature



**Calibration of temperature is done by adjusting the tn-x in the menu (where x is the zone number) according to a measurement done on at least 2 spots within the same zone in order to gain more precision.**



**After temperature adjustment allow at least 15 minutes for the temperature to stabilize, use the thermometer to verify correct temperatures on each zone.**

Be careful when changing the calibration settings to only change the tune value of the place where the measurement is actually done. Give the system time to adjust.



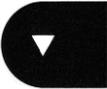
*Remember that if one warmed area is much warmer than the area in its proximity, there will be cross over heating. Calibration is best done by starting out with Tn-1 and then Tn-2 to Tn-3. Then letting the system stabilize and repeating the procedure.*



*Please refer to chapter 22 for a more detailed description of temperature validation. Also refer to chapters 21.12.1 – 21.12.3 for a description on how to get access to the tune functions.*

## 22.12.1 Calibration of Zone 1

The item called “Tn-1” in the menu is used to calibrate the temperature in zone1.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-1” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 1.		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*‘tn-1’ is used to adjust the temperature of left side section of tabletop..*



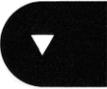
*Adjust according to a high precision measurement done in a dish with media under mineral oil located in compartment 5 and 10.*



*Please refer to chapter 22 for a detailed description of temperature measurement on G603.*

## 22.12.2 Calibration of Zone 2

The item called “Tn-2” in the menu is used to calibrate the temperature in the zone 2 (middle section of tabletop).

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-2” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 2.		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*‘tn-2’ is used to adjust the temperature of middle section of tabletop.*



*Adjust according to a high precision measurement done in a dish with media under mineral oil located on the middle section.*



*Please refer to chapter 22 for a detailed description of temperature measurement on G603.*

### 22.12.3 Calibration of Zone 3

The item called “Tn-3” in the menu is used to calibrate the temperature in the zone 3.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-3” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 3.		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

 *‘tn-3’ is used to adjust the temperature of right side section of tabletop.*

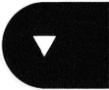
 *Adjust according to a high precision measurement done in a dish with media under mineral oil located in right side section of tabletop.*

 *Please refer to chapter 19 for a detailed description of temperature measurement on G603.*

## 22.12.4 Calibration of Zone 4 (air)

The item called “Tn-A” in the menu is used to calibrate the temperature of the re-circulating air inside the G603.

Adjust according to a high precision measurement made with a suited sensor placed in the work area. Make sure the sensor does not have surface contact with anything within the working area.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “tn-A” appears on the display.		
Pressing and holding the SP key will give a reading of the current temperature of zone 4 (air temperature).		
Change according to a precision thermometer, by pressing and holding the SP key and arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*‘tn-A’ is used to adjust the temperature of the re-circulating air inside the unit.*



*Adjust according to a high precision measurement using sensors placed in the middle of the area.*



*Please refer to chapter 22 for a detailed description of temperature measurement on G603.*



**Be careful when changing the calibration settings to only change the tune value of the place where the measurement is actually done. Give the system time to adjust. Remember that if one warmed area is much warmer than the area in its proximity there will be cross over heating. Calibration is best done by starting out with tn-1 and then tn.2 to tn-3, then letting the system stabilize and repeating the procedure if necessary.**

## 22.13 Regulation factor

The INT.T (Integral Time) option is for changing the base value for the PID controller. This should not be attempted by unauthorised persons. If set at a different level the controlling principle will be affected.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "int.t" appears on the display.		
Pressing and holding the SP key will give a reading of the current setting.		
The value for regulation factor can be change using SP key along with arrow UP or DOWN.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*From the factory this is set to a closely calculated value specific for the model.*

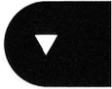
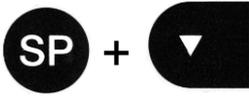


**DO NOT CHANGE THE VALUE HERE UNLESS AUTHORIZATION HAS BEEN GIVEN DIRECTLY BY K-SYSTEMS.**

## 22.14 Timer setting

The “ti.St” refers to the timer functions, which means *time set*.

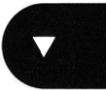
Follow these steps to navigate in the “Ti.St” option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “Ti.St.” appears on the display.		
Press and hold SP key to have a readout of current.		
Change the hours 0-24 by pressing and holding the SP key and then changing the hours with the arrow DOWN key.		
Change the minutes from 00-59 in a similar way but this time using the arrow UP key.		
When the time is set correctly leave menu by letting go of the SP key and pressing the arrow up and down for 3 seconds.		

## 22.15 St.St.

The next menu point is “St.St”. This means *Start Set* and is where timer function is set to switch ON for the G603.

Follow these steps to navigate in the St.St. option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “St.St.” appears in the display.		
Press and hold SP key to see the current time.		
Change the hours 0-24 by pressing and holding the SP key and then pressing arrow DOWN key.		
Change the minutes from 00-59 in a similar way but this time using the arrow UP key.		
When the time is set correctly leave menu by letting go of the SP key and pressing the arrow up and down for 3 seconds.		

St.St is connected with Fan and Heat as both can be turned ON or either one of them alone. It is therefore necessary to indicate in the timer which functions are needed.



*If the function Heat is set, a dot will light up in the right side of display.*



**Always make sure that when the timer function is being used, that the heated area is clear of any objects that might be damaged by the heat or adversely affected by it in any way. CAUTION SHOULD ALWAYS BE EXERCISED WHEN HEATED AREA IS TURNED ON WITHOUT ANY SUPERVISION.**

## 22.16 Heat

When the *start time* has been set the next menu item “heat” must be set to “ON” if the warmed area should warm up automatically.

Follow these steps to navigate in the HEAT option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “hEAt.” appears in the display.		
Press and hold SP key to see current status.		
While holding the SP key in, press the arrow UP to select between “ON” or “OFF”. When the required setting is set, let go of the SP key.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

If the function Heat is set, a dot will light up in the right side of display.



*If the Heat is set to OFF when the timer function is set nothing will be switched on when the timer engages.*



**Always make sure that when the timer function is being used, that the heated area is clear of any objects that might be damaged by the heat or adversely affected by it in any way. CAUTION SHOULD ALWAYS BE EXERCISED WHEN HEATED AREA IS TURNED ON WITHOUT ANY SUPERVISION.**

## 22.17 Fan

The next menu item “fan” can also be chosen to be switched ON or OFF by the timer. In order to have the gas regulation activated by the timer it is necessary to activate the fan as well as the heat.

Follow these steps to navigate within the automatic fan control menu.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “Fan” appears in the display.		
Press and hold ‘SP’ key to have a readout of the current status of “FAN”.		
While holding the SP key in, press the arrow UP to toggle between “ON” or “OFF”. When the required setting is set, let go of the SP and arrow keys.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*If the function ‘Heat’ and ‘Fan’ is set to OFF when the timer function is set, nothing will be switched on when the timer engages.*



*If the heat is set, a dot will light up in the right side of display.*

## 22.18 A-St.

The “A-St” (Automatic Start) option is used to **repeat the timer** (St.St.) function **everyday of the week**.

Penultimate menu point for the timer function is “A-St”. This function will activate the timer all days if toggled to ON and the time + start time has been set accordingly.

Follow these steps to navigate in the A-St option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “A-St.” appears in the display.		
Press and hold SP key to see the current status.		
While holding the SP key in, press the arrow UP to toggle between “ON” or “OFF”. When the required setting is activated, let go of the SP and arrow keys.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*Remember there are no calendar functions in the timer, so all days include Saturday and Sunday.*

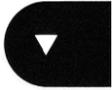


*If this function is set to “ON” the heat function will be repeated every day, but if A-St function is set to “OFF” the heat function will only be activated one time.*

## 22.19 Hour

The HOUR option gives the opportunity to **show the time** on the main display when the **heat is off**.

Follow these steps to navigate in the HOUR option.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press arrow DOWN key until the option "HOUR" appears in the display.		
Press and hold SP key to see the current status.		
While holding the SP key in, press either the arrow UP or arrow DOWN key to select between "ON" or "OFF". When the required setting is activated, let go of the SP key.	 +  OR 	
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

It is also possible to toggle between the temperature display and the clock by pressing SP and heat ()

Action	Key	Display
Press and hold SP key.		
While holding the "SP" key in, press the HEAT key once, then let go of the "SP" key. The display now shows the time.	 + 	



*Remember to press SP first as you otherwise will switch OFF the unit.*

To change back to temperature showing just follow these instructions:

Action	Key	Display
Press and hold SP key.		
Then press the HEAT key once, then let go of both keys. The display now shows the temperature.	 + 	



*The time is shown as a 24 hour clock e.g. 19.30 not 7.30PM.*



*Remember to press SP first as you otherwise will switch OFF the unit.*

## 22.20 UV light

The next item in the menu is called “u1”. This is the toggle ON/OFF of the UV-light inside the circuit. The UV light will make sure that no contamination occurs in the circuit. When correctly set up there is full Carbon filtering of the air so that any harmful by-product from the UV light process is removed at all times.

If the UV light is correctly installed it can manually be switched ON and OFF here. Please follow below instruction on how to switch ON or OFF for the integrated UV light, manually.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “u1” appears in the display.		
Press and hold SP key to see actual status.		
Press and hold SP while pressing arrow DOWN once to change status of UV light.		
If the G603 is not equipped with an UV light the following display will indicate “n.A” for not available, when the ‘SP’ button is pressed.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

The UV light will automatically switch OFF when the unit is turned off.

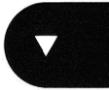


*For optimal air purification reasons it is recommended to have the UV light set to ON when unit is being used. Change UV light in the intervals described in the maintenance manual.*

## 22.21 Pressure of incoming CO<sub>2</sub> gas

The next item in the menu is “Co.Pr” and stands for CO<sub>2</sub> pressure. This function can only be used to monitor the CO<sub>2</sub> gas pressure inside the unit.

In order to check the internal CO<sub>2</sub> gas pressure please follow these instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “Co.Pr” appears in the display.		
Press and hold SP key to monitor internal CO <sub>2</sub> gas pressure.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

The actual CO<sub>2</sub> gas pressure in the circuit is shown (normally between 0.25 – 0.35).



*Remember that the inside pressure is always lower than what is shown on the outside regulator on the gas bottle. This is because there is a built in pressure limiter in the circuit.*

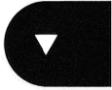


*Make sure that the incoming CO<sub>2</sub> pressure is kept stable at 1.0 bar (14.5 PSI).*

## 22.22 Pressure of incoming N<sub>2</sub> gas

The next item in the menu is “n2.Pr” and stands for N<sub>2</sub> pressure. This function can only be used to monitor the N<sub>2</sub> gas pressure inside the unit.

In order to check the internal N<sub>2</sub> gas pressure please follow these instructions.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press DOWN key until the option “n2.Pr” appears in the display.		
Press and hold SP key to check the actual N <sub>2</sub> gas pressure (normally between 0.35 – 0.65 ).		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		



*Remember that the inside pressure is always lower than what is shown on the outside regulator on the gas bottle. This is because there is a built in pressure limiter in the circuit.*

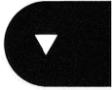


*Make sure that the incoming N<sub>2</sub> pressure is kept stable at 1.0 bar (14.5 PSI).*

## 22.23 Reset

Next item in the menu is the function “REST”. This is the overall back to factory default settings function.

To restore factory settings please follow the instruction below.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option “UNIT” will appear in the display.		
Press arrow DOWN key until the option “REST” appears in the display.		
Press and hold SP key to get ready for a master reset of the system.		
While holding the SP key in, press either the arrow UP or arrow DOWN key. When the display shows “- -” ; * let go of the “SP” key.		
Press and hold UP+DOWN keys for 3 seconds again to exit the menu.		

A complete restore will be done.



**When system is restored the temperature and gas calibration will remain unchanged.**

### 22.24 Logic firmware

The logic installed on your G603 is upgradeable. Whenever an important update is available it will be distributed to our distributors around the world who will make sure that your incubator runs with the newest available logic firmware.

Please follow these steps to check the logic firmware which is currently installed on your unit.

Action	Key	Display
Press and hold UP+DOWN key for 3 seconds to enter the menu. The option "UNIT" will appear in the display.		
Press DOWN key until the option "uEr" appears in the display.		
Press and hold SP key to check the unit's current firmware version.		
Press and hold UP+DOWN key for 3 seconds again to exit the menu.		

## 23 Temperature calibration

There are in total 5 different regulators on board a G603; 3 regulators for controlling the surface temperature of the tabletop, 1 regulator controlling the air temperature in the working area, and 1 safety temperature controller for the air heater system.

In order to be able to perform the temperature test the following items are needed:

- Precision thermometer



- Sensor for precision temperature measurement.



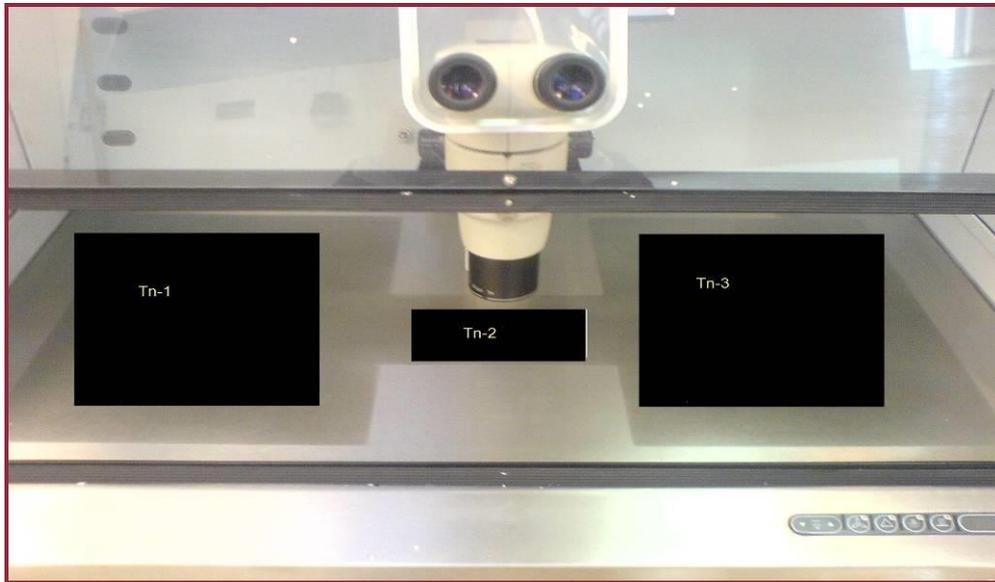
- Special temperature sensor for measuring air temperature with integrated PT-100 sensor.



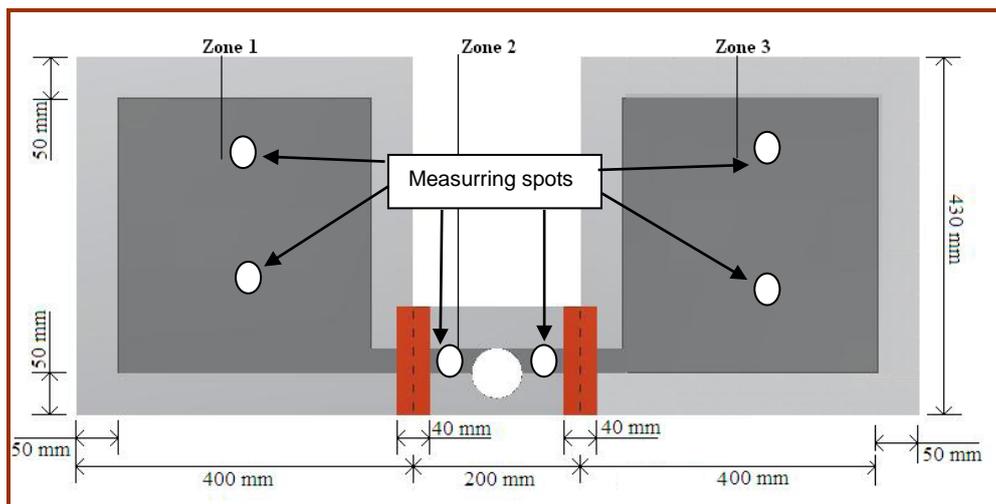
## 23.1 Calibrating temperature on the tabletop

There are 3 regulators integrated into the tabletop. In this chapter the temperature validation of the tabletop is explained in more details.

The 3 areas are marked in picture below.



The figure below shows the type of heating system which usually is integrated into your G603 tabletop.



The safe area is located 50mm from the edge.

In this case there are three different temperature sensors that may need to be calibrated. Each zone must be calibrated separately. To calibrate "zone-1", measure only temperature in "zone-1".



*The red zone on the picture is "cross heat" zone; don't measure the temperature in the cross heat zone.*

An overview of the zones associated with the tune functions is shown on table below.

Zone name	Tune function name	position
Zone 1	tn-1	Left section of tabletop
Zone 2	tn-2	Middle section of tabletop
Zone 3	tn-3	Right section of tabletop
Air temperature	tn-A	Air temperature

In order to be able to make an accurate temperature validation, it is strongly recommended to measure the temperature on 2 spots within every zone on the tabletop. These spots are marked on the previous figure.

E.g. To validate the temperature of tn-1 (the temperature in zone 1 needs to be measured in 2 different spots. Then an average value calculated. The result of the calculated average is then used to adjust the 'tn-1' in the unit menu.



*Always measure the temperature on the whole tabletop before any adjusting is conducted. Refusing to do so will causes heat crossover to other zones and makes it very difficult to adjust the temperature.*

Follow these steps for a detailed instruction of how to validate/calibrate the temperature of the tabletop.

1: Switch on the G603 (🏭) and the fan (🌀). Then wait for at least 40 minutes for the temperature to stabilize at set (e.g. 37.0°C).

2: Place the dish containing oil based liquid and temperature sensor on the tabletop (start with zone 1).



3: Wait for the temperature to get stabilized.

When temperature is stabilized write down the value and move on to the next spot within the same zone.



4: When the temperature of both of spots has been measured, the average value must be calculated using the following formula:

$$Temp_{avr_{m-x}} = \frac{Temp1_{m-x} + Temp2_{m-x}}{2},$$

- where 'x' is the number of zone

5: Go through step 2 and 4 and calculate the average temperature value for all 3 zones on the tabletop.

When all 3 average values are calculated, they should be compared with what is being shown by the system. This is done by entering the menu and checking the values for 'tn-1' to 'tn-3'. Adjust only if the calculated values are different than the ones displayed by the system for each zone.



*Please refer to chapters 21.12.1, 21.12.2, and 21.12.3 for more information regarding the tune functions for the tabletop.*



**Extreme care must be taken here, as any wrong changes or adjustments will have a direct affect on the surface temperature of the tabletop.**

## 23.2 Calibrating temperature of the re-circulating air

As mentioned in previous chapter, the G603 is equipped with a separate temperature control for the air temperature in the working area.



**It is strongly recommended to use a high quality thermometer which is designed to be used for measuring air temperatures for this purpose only.**

An overview of the tune functions controlling the temperature of the air is shown on table below.

Tune function name	Position
tn-A	Air temperature

Follow these steps for a detailed instruction of how to validate/calibrate the temperature of the re-circulating air.

1: Switch on the G603 (🔌) and the fan (🌀). Then wait for at least 40 minutes for the air temperature to stabilize at set (eg. 37.0 degrees).



*Make sure that the temperature of the tabletop is pre-calibrated. Too hot tabletop temperature will affect the air temperature.*

2: Place the thermometer approx. in the middle of the room inside the G603 working area as shown.



*Make sure that all lids are kept closed during the calibration.*

3: Wait for the temperature to get stabilized.

When the temperature of the air is measured, it should be compared with what is being shown by the system. This is done by entering the menu and checking the values for 'tn-A'. Adjust if the shown temperature on the thermometer is different than the one displayed by the system.



*Please refer to chapter 21.12.4 for more information regarding the tune functions for the air temperature control and how to adjust this.*



**Air temperature measurements are generally more time consuming, therefore advice patience while calibrating air temperature.**



**Extreme care must be taken here, as any wrong changes or adjustments will have a direct affect on the air temperature of the Incubator.**

**Too hot air temperature will have a negative affect on the temperature of the tabletop too.**

## 24 Gas level validation

The gas level can be validated through the gas sample hole found on the top front window.



*Make sure that the Incubator is ON and the gas levels are stabilized before any gas measuring.*



*K-SYSTEMS strongly recommend the use of K-SYSTEMS gas analyser as this unit is specially developed to take samples without interfering the internal gas conditions within chamber.*



**Make sure that the gas analyzer is calibrated before use.**



*Prior to any gas measuring make sure that the side Lids have not been opened for at least 5 minutes.*

Please follow these instructions for gas measuring directly from the sample hole:

1: Make sure that the system is ON, and that the gas levels are reached and stabilized.

2: Remove the black Cap from the gas sample hole on the top front window.

3: Inject the tube from gas analyzer through the hole and make a gas measurement.



Compare the CO<sub>2</sub> readout with the value shown under 'CO2.C' in the menu and adjust if necessary.



*Please refer to chapter 21.3 for more instructions.*

Compare the O<sub>2</sub> readout with the value shown under 'O2.C' in the menu and adjust if necessary.



*Please refer to chapter 21.6 for more instructions*



*Remember to put the protective black cap on the outlet afterwards.*

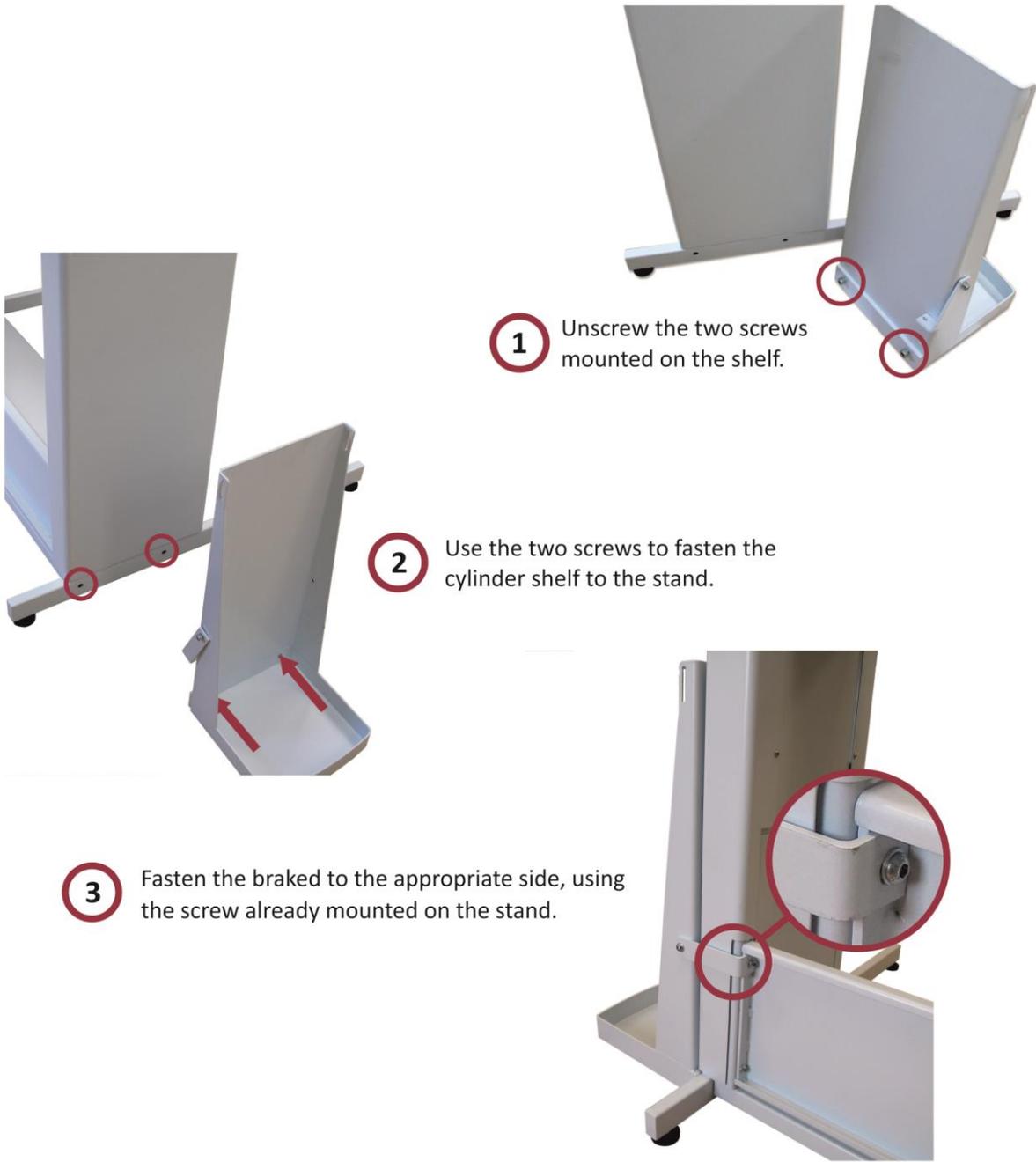


**Taking out large sample volume may affect the gas regulation.**

## 25 Gas Cylinder Shelves.

Two Gas Cylinder Shelves are enclosed with the G603 Work chamber for stable and safe storage of CO2 and N2 gas cylinders.

Assembling instructions:



## 26 Maintenance

Reliable and safe operation of this equipment is based on the following conditions:

- 1: Correct calibration of temperature and gas using high precision equipment in the intervals described in the manuals.
- 2: Replacement of VOC and inline HEPA filters in the correct intervals specified in the manuals.
- 3: Inspection and replacement of UV light according to the intervals defined in the manuals.
- 4: Replacement of Oxygen sensor in the correct intervals defined in the manuals.



**It is strongly recommended to perform the inspection and servicing in the intervals described in the maintenance and service manuals. Refusing to do so can have fatal outcome causing the unit to stop performing as expected and even cause damage to Embryos, Blastocysts etc. that are being stored inside the Incubator.**



**Warranty void if service and maintenance intervals are not followed.**

### 26.1 Cleaning procedures

**Daily:** The G603 can be wiped clean daily through the side hatches, with a sterile cloth moistest in sterile water. It is not recommended to use alcohol solutions for the daily cleaning as alcohol contain VOCs.

As the G603 features a full re-circulated cleaning system it should not be necessary to clean inside other than for spills and general usage.

**Weekly:** Moisten a cloth with 10 mL 0.12% chloride solution, and wipe all internal surfaces of the chamber. Leave it for 15 min. The solution will be active even it will be dried out. There after wipe all cleaned surfaces with a sterile cloth moist with purified or sterile water. Following cleaning, leave the I doors of the unit open to allow sufficient time to ensure that all fumes have dissipated

**Monthly:** Take out the front panel by undoing the 4 finger nuts and gently lifting out the panel chapter. Clean as per the weekly procedure but pay special attention to the microscope, window backsides and edges near the main filter. **Do not wipe the HEPA filter!** Use the same procedure as in the weekly cleaning for degassing the unit again after the cleaning.

**Removal of the front panel:**

Loosen and Remove the 4 nuts holding the front panel in place



Lower panel comes out by gently pulling



Panel removed and clear access for cleaning.



## 27 Technical specifications

Exterior Dimensions		
Width	mm	940
Depth	mm	830
Height	mm	1720
Weight		
Cabinet	kg	112
Stand	kg	33
Load		
Max load on overall working area	kg	10 kg
Interior dimensions		
Table top (Width)	mm	940
Table top (depth)	mm	500

Ambient conditions		
Max. ambient temperature during operation	oC	25
Min. ambient temperature during operation	oC	10
Max. storage temperature	oC	55
Min. storage temperature	oC	5
Humidity		
Max. humidity during operation	% r.H.	75, non-condensing
Max. storage humidity	% r.H.	95, non-condensing

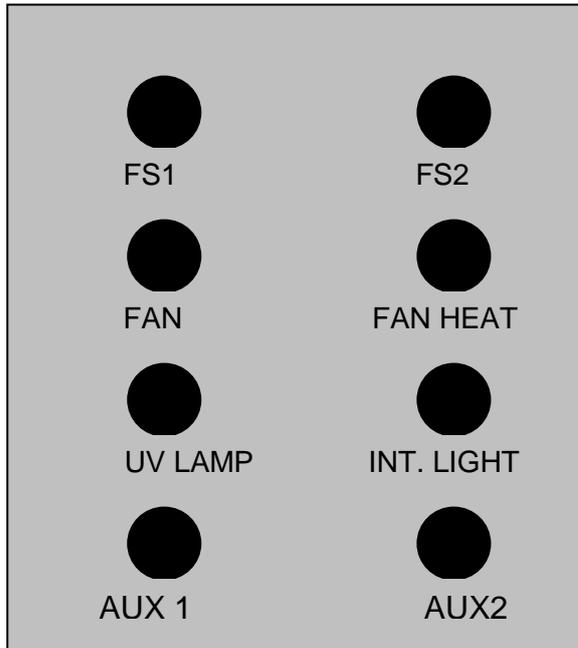
Filters		
Main filter	1 pcs	HEPA (H14 according to DIN EN 1822)
VOC filter	2 pcs	high-efficiency, acid-washed, granular-activated carbon
Gas inline filter	2 pcs	50mm Hepa disc filter for the protection of internal circuits.

Illumination		
G9 LED lamp	2 pcs	3.5W

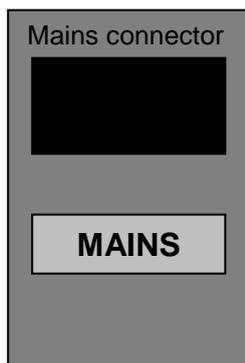
Voltage		
Rated Voltage (system)	V	1/N/PE AC, 240V AC 50Hz or 1/N/PE AC, 110-120V AC 60Hz
Blower voltage	V	100V / AC
Heating element voltage (table top)	V	13,5V / AC
Heating element voltage (air)	V	100V / AC
Current		
Power consumption (max.)	VA	700
Connecting gas		
CO2 inlet	Bar/PSI	1.0 bar / 14.5 PSI
N2 inlet	Bar/PSI	1.0 bar / 14.5 PSI
Connecting Lines		
Mains connection		Cable
Materials		
Cabinet		Powder coated mild steel - painted
Back panels		Aluminium
Table top		Stainless steel
Front windows		Polycarbonate, PU

## 27.1 Fuses

The illustration of the fuses can be seen below.



FUSE NAME	RATED VOLTAGE 220-240V ~
FS1	T 6.3 AH 250V
FS2	T 6.3 AH 250V
FAN	F 4.0 AH 250V
FAN HEAT	F 4.0 AH 250V
UV LAMP	F 1.0 AH 250V
INT. LIGHT	F 1.0 AH 250V
AUX 1	None
AUX 2	None
MAINS	T 6.3 AH 250V



**F 6.3AH (250V)**

## 28 Disposal procedure

Cabinet devices or the whole unit contains re-usable materials. All components (with the exception of the HEPA and VOC filters) can be discarded after having been cleaned and disinfected.

Please note that the filters from this device must be discarded in accordance with the applicable national regulations for special solid waste.



*Below table contains a list of the recyclable components.*

<b>Component</b>	<b>Material</b>
Table plate	Stainless steel
Exterior housing	Steel – painted
Interior housing	Aluminium – painted
Device back panel	Aluminium – painted
Printed circuit board	Enclosed electronic components mounted on a PCB board
Front window(s)	Polycarbonate windows, w. UV protection.
Light source	Aluminium, anodized.



**Contamination Hazard!**  
**Since this device might have been used for processing and treating infectious substances, it might be contaminated.**

**Prior to disposal, the whole device (including light source) must be decontaminated.**

## 29 Troubleshooting

### Heating system

Symptom	Cause	Action
No heating, display is OFF.	The heating switch is OFF.	Press the heating switch to ON.
No heating.	The alarm is on.	The temperature is more than 0.5°C off the set temperature.
	The set point for temperature is wrong.	Check the desired temperature set point.
Heating not even.	System not calibrated.	Calibrate each zone according to the user manual using high precision thermometer.

### CO<sub>2</sub> gas regulator

Symptom	Cause	Action
No CO <sub>2</sub> gas regulation.	System not powered.	Check mains.
	System is on standby or switched OFF.	Switch the system on.
	CO <sub>2</sub> gas regulator is OFF.	Activate CO <sub>2</sub> gas regulator by setting 'CO <sub>2</sub> .r' to ON in menu.
	No CO <sub>2</sub> or wrong gas attached to CO <sub>2</sub> gas input.	Check gas supply, make sure that 1.0 bar of gas pressure is applied.
	Actual gas concentration is higher than set point.	Check CO <sub>2</sub> set point at 'CO.SP' in the menu.
Poor CO <sub>2</sub> gas regulation.	Lid(s) are left open	Close lid(s)
	Insulation missing on lid(s)	Check the black insulation on every lid. Also check and ensure that the Cuffs are mounted properly.
Blinking display.	CO <sub>2</sub> gas concentration more than $\pm 1\%$ from set point.	Allow system to stabilize by closing all lids.
'no – co2' is shown on display.	No/wrong CO <sub>2</sub> gas pressure to system.	Check CO <sub>2</sub> gas supply; make sure that pressure is kept stable at 1.0 bar.

## O<sub>2</sub> gas regulator

Symptom	Cause	Action
No O <sub>2</sub> gas regulation	System not powered.	Check mains.
	System is on standby or switched OFF.	Switch the system ON.
	O <sub>2</sub> gas regulator is OFF	Activate O <sub>2</sub> gas regulator by setting 'O <sub>2</sub> .r' to ON in the menu.
	No N <sub>2</sub> or wrong gas type attached to N <sub>2</sub> gas input.	Check gas supply; make sure that 1.0 bar of N <sub>2</sub> gas is applied.
	Actual gas concentration is higher than set point.	Check O <sub>2</sub> set point at 'O <sub>2</sub> .SP' in the menu.
Poor O <sub>2</sub> gas regulation	Lid(s) are left open	Close lid(s)
	Insulation missing on lid(s)	Check the black insulation on every lid. Also check and ensure that the Cuffs are mounted properly.
Blinking display.	O <sub>2</sub> gas concentration more than $\pm 1\%$ from set point.	Allow system to stabilize by closing all lids.
'no - n <sub>2</sub> ' is shown on display.	No/wrong N <sub>2</sub> gas pressure to system.	Check N <sub>2</sub> gas supply; make sure that pressure is stable at 1.0 bar. If O <sub>2</sub> regulation is not needed set the 'O <sub>2</sub> .r' to OFF in the menu to deactivate oxygen regulation and abort the N <sub>2</sub> alarm.

## Data logger

Symptom	Cause	Action
No data is send to PC	System not powered.	Check mains.
	System is on standby or switched OFF.	Switch the system on.
	The 'rs232' item in menu is set to 'OFF' or 'PDA' mode.	Change to 'PC'.
	Data cable between Incubator and PC not properly attached.	Check connection. Only use the cable supplied along with unit.
	Data logger software/USB driver not properly installed.	Please refer to software installation guide for instructions.

## Display

<b>Symptom</b>	<b>Cause</b>	<b>Action</b>
Missing segment(s) in display.	Failure in the PCB	Replace the PCB. Contact your K-SYSTEMS Distributor for details.

## Keyboard

<b>Symptom</b>	<b>Cause</b>	<b>Action</b>
Absent or erratic function of operation buttons.	Failure in the keyboard.	Replace keyboard. Contact your K-SYSTEMS Distributor for details.

## 30 Technical assistance

For more information, contact the K-SYSTEMS office nearest you. For Denmark, call **+45 45995600**. Outside Denmark, see your K-SYSTEMS catalogue for the phone number of the office nearest you or visit our website at [www.k-systems.dk](http://www.k-systems.dk) for up to date worldwide contact information.

K-SYSTEMS is pleased to provide internet access to product information for its products. To obtain user guides and any other documents that may associate with this product, please go to the K-SYSTEMS website at [www.k-systems.dk](http://www.k-systems.dk)



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K-Systems A/S  
Klintehøj Vaenge 3-5  
DK-3460  
Birkerød  
Denmark

Phone: +45 45995600  
Fax: +45 45995619  
Web: [k-systems.dk](http://k-systems.dk)