



User Manual

ART Workstation



Esco MEDICAL

Version 1.4

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Service address: Please contact your local distributor for details.

Users of Esco Medical products should not hesitate to contact us if there are any unclear points or ambiguities in this manual.

CAUTION: If the equipment is used in a manner not specified in 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.

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Caution: Federal law restricts this device to sale by or on the order of a licensed healthcare practitioner.

Unpacking and Inspection

Follow standard receiving practices upon receipt of the instrument. Check the shipping carton for damage. If damage is found, stop unpacking the instrument. Notify the freight carrier and ask for an agent to be present while the instrument is unpacked. There are no special unpacking instructions, but be careful not to damage the instrument when unpacking it. Inspect the instrument for physical damage such as bent or broken parts, dents, or scratches.

Claims

Our routine method of shipment is via common carrier. Upon delivery, if physical damage is found, retain all packing materials in their original condition and contact the carrier immediately to file a claim.

If the instrument is delivered in good physical condition but does not operate within specifications, or if there are any other problems not caused by shipping damage, please contact your local sales representative or Esco Medical immediately.

Standard Terms and Conditions

Refunds &Credits

Please note only serialized products (products labelled with a distinct serial number) and accessories are eligible for partial refund and/or credit. Non-serialized parts and accessory items (cables, carrying cases, auxiliary modules, etc.) are not eligible for return or refund. In order to receive a partial refund/credit, the product must not have been damaged, and must be returned complete (meaning all manuals, cables, accessories, etc.) within 30 days of original purchase and in “as new” and resalable condition. The Return Procedure must be followed.

Return Procedure

Every product returned for refund/credit must be accompanied by a Return Material Authorization (RMA) number, obtained from EscoMedical Customer Service. All items being returned must be sent prepaid (freight, duty, brokerage and taxes) to our factory location.

Restocking Charges

Products returned within 30 days of original purchase are subject to a minimum restocking fee of 20% of the list price. Additional charges for damage and/or missing parts and accessories will be applied to all returns. Products which are not in “as new” and resalable condition, are not eligible for credit return and will be returned to the customer at their expense.

Certification

This instrument was thoroughly tested and inspected and found to meet EscoMedical’s manufacturing specifications when it was shipped from the factory. Calibration measurements and testing are traceable and done according to EscoMedicals ISO certification.

Warranty and Product Support

Esco Medical warrants this instrument to be free from defects in materials and workmanship under normal use and service for two (2) years from the date of original purchase, providing the instrument is calibrated and maintained in accordance with this manual. During the warranty period EscoMedical will, at our option, either repair or replace a product at no charge that proves to be defective; provided you return the product (shipping, duty, brokerage and taxes prepaid) to EscoMedical. Any and all transportation charges incurred are the responsibility of the purchaser and are not included within this warranty. This warranty extends only to the original purchaser and does not cover damage from abuse, neglect, accident or misuse or

as the result of service or modification by other than EscoMedical.

IN NO EVENT SHALL EscoMedical Ltd. BE LIABLE FOR CONSEQUENTIAL DAMAGES.

No warranty shall apply when damage is caused by any of the following:

- ! Power failure, surges, or spikes,
- ! Damage in transit or when moving the instrument,
- ! Improper power supply such as low voltage, incorrect voltage, defective wiring or inadequate fuses,
- ! Accident, alteration, abuse or misuse of the instrument,
- ! Fire, water damage, theft, war, riot, hostility, acts of God, such as hurricanes, floods, etc.

Only serialized products (those items bearing a distinct serial number tag) and their accessory items are covered under this warranty.

PHYSICAL DAMAGE CAUSED BY MISUSE OR PHYSICAL ABUSE IS NOT COVERED

UNDER THE WARRANTY. Items such as cables and non-serialized modules are not covered under this warranty.

This warranty gives you specific legal rights and you may have other rights, which vary from province to province, state to state, or country to country. This warranty is limited to repairing the instrument to Esco Medical's specifications.

When you return an instrument to EscoMedical for service, repair or calibration, we recommend shipment using the original shipping foam and container. If the original packing materials are not available, we recommend the following guide for repackaging:

- ! Use a double-walled carton of sufficient strength for the weight being shipped.
- ! Use heavy paper or cardboard to protect all instrument surfaces. Use non-abrasive material around all projecting parts.
- ! Use at least four inches of tightly packed, industrial-approved, shock-absorbent material all around the instrument.

Esco Medical will not be responsible for lost shipments or instruments received in damaged condition due to improper packaging or handling. All warranty claim shipments must be made on a prepaid basis (freight, duty, brokerage, and taxes). No returns will be accepted without a Return Materials Authorization ("RMA") number. Please contact EscoMedical to obtain an RMA number and receive help with shipping/customs documentation.

Re-calibration of instruments, which have a recommended annual calibration frequency, is not covered under the warranty.

Warranty Disclaimer

Should you elect to have your instrument serviced and/or calibrated by someone other than EscoMedical Ltd. and their representatives, please be advised that the original warranty covering your product becomes void when the tamper-resistant Quality Seal is removed, or broken without proper factory authorization.

In all cases, breaking the tamper-resistant Quality Seal should be avoided at all cost, as this seal is the key to your original instrument warranty. In the event that the seal must be broken to gain internal access to the instrument you must first contact EscoMedical Ltd.

You will be required to provide us with the serial number for your instrument as well as a valid reason for breaking the Quality Seal. You should break this seal only after you have received factory authorization. Do not break the Quality Seal before you have contacted us! Following these steps will help ensure that you will retain the original warranty on your instrument without interruption.

WARNING

Unauthorized user modifications or application beyond the published specifications may result in electrical shock hazards or improper operation. Esco Medical will not be responsible for any injuries sustained due to

unauthorized equipment modifications.

Esco Medical Ltd. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PURPOSE OR APPLICATION. THIS PRODUCT CONTAINS NO USER-SERVICEABLE COMPONENTS. UNAUTHORIZED REMOVAL OF THE INSTRUMENT COVER SHALL VOID THIS AND ALL OTHER EXPRESSED OR IMPLIED WARRANTIES.

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1 Welcome

Congratulation with the acquisition of your ART Workstation. Esco MEDICAL is proud that you have chosen our product to serve your needs. We hope to hear from you with feedback on this product that can benefit future product developments.

We will strive to serve you well.

Thank you.

2 Reading instructions for the manual.

Individual sections can be read and the information about the subject can stand alone. This means, that if the manual is read from start to finish, there will be some overlap. A recommended way to read the manual is to familiarize oneself with the safety instructions first. Then progress to the basic user functions, that are needed on a day to day basis. Then the alarm functions. The menu function of the user interface details information that is needed for the more advanced level of users only.

3 Explanation of Symbols Used in Manual



NOTE

Used to direct attention to a specific item.



DANGER

Used when caution is needed.

4 About the product

The Esco MEDICAL ART Workstation is a new generation of Vertical laminar airflow workstations with a heated table top and provisions for a built-in microscope. The product is mainly developed for the use in the Artificial reproduction techniques area – but can be used for any purpose where the combination of an aseptic working area with a heated work surface and a stereo microscope is utilized.

The 12-zone heating system (8 x table plate and 4 x compartments) gives superior temperature conditions in comparison to conventional layouts.

For maximum performance, the system has 12 separate temperature controllers, controlling and regulating the temperature in each zone.

The workstation has been primarily developed and optimized for tissue culturing with an overlay of either Paraffin or Mineral oil.

If open culture is used the user can utilize the humidified gas system that built into the table top. The dish is placed under the gas hood where the pH conditions in a buffered media without oil overlay can be maintained.

👉 Open culture may lead to evaporation and a change in pH. If the correct conditions are not maintained.

An integral part of the ART Workstation is the All-in-one PC that is running the Esco MEDICAL workstation logger software. The software functions as a constant surveillance system that will give the user early warnings if any parameter drifts beyond safe limits. The monitor can be used for a microscope camera image, as

any warning will still be brought to the attention of the user and an easy possibility to toggle the modes presented. The software includes data logging, data storage and report functions for ISO quality management compliance.

The device is manufactured under a full EU certified ISO quality management system.

This product fulfils the requirements of EN60601-1 3rd edition standards as a Class I type B equivalent device suited for continuous operation. It also conforms to the requirements of the EU Council directive 93/42/EEC concerning medical devices and is classified as a Class IIa device under rule II.

5 Accessories supplied

- 1 HEPA filter for input gas supply.
- 1 USB key containing Esco MEDICAL data logging software and the manuals as PDF files
- 1 Gas hood
- 1 CarryTray
- 1 Humidification flask
- 1 Medical grade Mains cord (for the table top)

6 Manuals supplied

The ART Workstation comes with 3 manuals as standard.

1. The User Manual (this manual)
2. The Validation Manual
3. The Maintenance Manual

Each manual has a specific purpose.

6.1 The user manual

Is intended to provide the user with the information that is necessary for using the device.

 **The user manual cannot stand alone or replace user training.**

6.2 The validation manual

Is intended to provide the trained technical personnel that is performing the installation, the procedures and specifications, for making sure the device is safe, so that it can be taken into clinical use. The manual can also be used as a guide for the validation tests that should be performed regularly.

6.3 The Maintenance manual

Is intended to provide the schedules and the methods for the trained technical personnel that ensures that the device is running optimally and safely during its entire lifespan.

☛ The maintenance specified in the maintenance manual cannot replace the regular maintenance/validation that user must perform.

7 Safety symbols

There are several labels to guide the user on the ART Workstation.

A complete list of labels is shown below.

<p>Warning on the type label indicates that an earth connection is needed, mains info and "ON/OFF" push-push button.</p> <p>'Bolt of lightning' indicates the potential risk of electrical shock.</p> <p>Never remove any covers.</p>	
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<p>Protection against electric shock. Type B.</p>	
<p>Not protected against ingress of water.</p>	
<p>Caution when discarded. Observe WEEE.</p>	
<p>The symbol indicates that the unit contains high sensitive electronic components which can be damaged by static electricity.</p>	
<p>Internal label placed next to the earth wires.</p>	
<p>PT1000 sensor input. 5 x connectors for a PT1000 signal.</p>	
<p>Gas output. From the external bottle to the humidification system.</p>	
<p>Gas outlet in the table top</p>	



8 Important Safety Instructions and warnings

8.1 Pre-installation

- Do not use product if package is damaged.
- Read the user manual completely before use.
- Always keep these instructions at hand near the device.
- The ART workstation is heavy and can present a life-threatening danger if it tips over or drops during installation.
- Use ample personal for any manual lift.
- If a forklift is used only lift on the custom-built pallet. The table top itself cannot withstand any lifting in the middle. Permanent damage will occur. Warranty void if this happens.
- Electronics box under the table top is not flush with the rest of the underside. Any blows can result in permanent damage. Warranty void if this happens.

8.2 During installation

- Never place this unit on top of other equipment that might heat it up
- Place this unit on a flat, hard and stable surface.
- Never place the unit on a carpet or similar surfaces.
- 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.
- Always connect power cord to a proper grounded outlet and only use the cord that came with the device.
- Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus that produce heat.
- Do not use this device near water.
- Always use external HEPA filter for input CO₂ gas.
- Do not use this product at temperatures exceeding 30°C.
- Place this unit in a location with adequate ventilation to prevent internal heat build-up. Allow at least 10 cm clearance from the rear, 30 cm from the top and 20 cm from left and right to prevent overheating
- This unit is intended for indoor purposes only.

8.3 Post installation

- 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. The ART

Workstation contains high voltage components that may be hazardous.

- Unplug this apparatus during lightning, storms or when unused for a long period.
- Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from apparatus.
- Perform temperature calibrations in the intervals described in the manuals.
- NEVER block the gas supply hole in table top.
- Make sure that CO₂ gas supply pressures are kept stable at 0.6 bar.

9 Getting started

 **The ART Workstation must be installed by authorized and trained personnel only.**

1. Follow the guidelines in the safety instructions and warnings section
2. Connect the mains cable to the top of the Workstation for the fan unit to work.
3. Connect the mains cable to the underside of the table top for the PC and table top heating system to work.
4. Connect the gas line for the CO₂ 5 or 6 % premixed gas.
5. Set the gas pressure on the external gas regulator at 0.6 Bar.
6. Switch on the ART Workstation on with the on/off switch under the table top (next to the mains cable).
7. Power up the PC by pressing the button in the middle of the inner wall work area.
8. Observe for normal functionality.

9. Let the unit warm up and stabilize for 20 min.
10. Follow the guidelines in the Validation Guide.
11. Complete user training and instructions.
12. After a burn in phase of 24 hours the unit is ready for use IF the testing is successful.

👉 Clean the device before use. It is not delivered sterile or in clinically acceptable cleanliness state. Consult the cleaning instructions section in this manual for the manufactures recommended guidelines.

10 Mains connection

The ART Workstation comes with a detachable mains power cord. The power cord is prepared for the country in which the unit is intended to be used.

⚠️ 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.

The power requirement is: 230V 50 Hz OR 115V 60Hz.

The built-in power supply is of a switch mode type that automatically adjust to the correct mains power between 100V-250V AC 50-60 Hz.



11 Gas connection and the humidification system

Under the table top one single gas input (black and blue) is located.



☛ **Gas pressure for on the external source should be 0.6 bar and must be kept stable.**

Always use a high-quality pressure regulator for the gas that can be set with the required precision.



Connect the CO₂ gas to the CO₂ inlet with a suitable tube. Make sure the tube is

fastened with a clip, so that it does not accidentally loosen itself during a sudden pressure fluctuation.

Use the supplied 0.2 μ HEPA filter on the gas line just before the inlet on the ART Workstation. Notice the flow direction marked on the filter.



The CO₂ inlet should be connected to a 5 or 6% pre-mixed CO₂.

The gas flow can be controlled digitally with the keys on the table top.

The gas will pass through the humidification system.



Humidification flask

Connect the tube between the port marked "Outlet" and the connector in the lid of the flask with the long silicone tube on the inside. The connector without the long tube must be connected to the port under the port marked "Outlet".



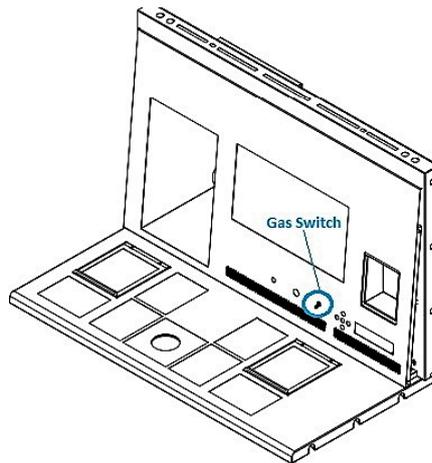
Tubes connected to the flask

☛ If no humidification is required/wanted a U-looped silicone tube must be put from the port marked "Outlet" to the port below.

Fill the flask to the bottle mark with sterile water.

11.1 Gas from table plate

Choose the Gas from the nozzle in the table plate by the gas switch in the inner wall



The gas will flow through the nozzle in the table top work area.



Gas

nozzle in table top

A gas hood must be placed over the outlet. The constant flow will flush the environment so that a correct CO₂ concentration can be kept and thus no pH drift will occur.



Gas hood

placed over gas nozzle

Keep the lids on the dishes when they are placed under the gas hood. The dishes can be placed directly on the warmed surface but a CarryTray heating optimization plate can also be used. With the CarryTray, several dishes

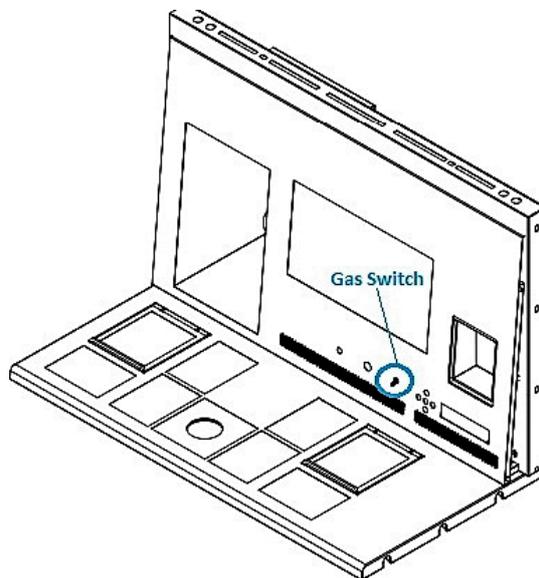
can be conveniently being transported between an CO₂ incubator and the Workstation.



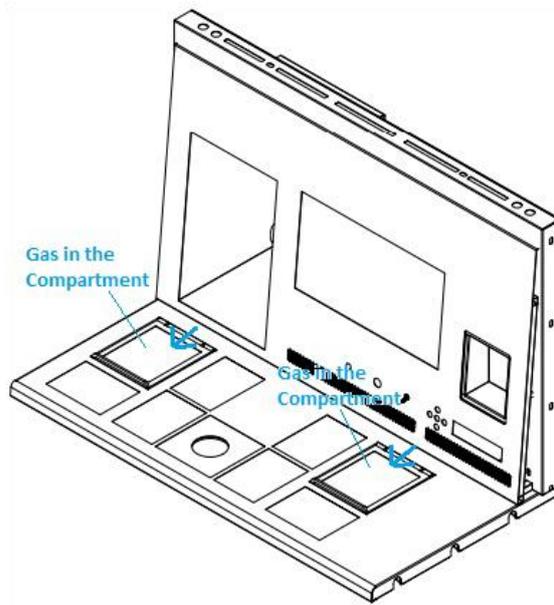
Carry Tray

11.2 Gas in the Compartments

Choose the gas for compartment with the gas switch in the inner wall



The gas will flow through and circuit in both compartments by the internal pump. The pump will automatically start when the flow is set.



Gas in compartments

12 User Interface

The table below shows the main keys and their purpose.

		
<p>On/off</p> <p>Under the table top.</p>		
<p>(Alarm key)</p> <p>is used to mute an audible alarm and indicates visually the alarm condition by a flashing red circle of light. The audio alarm will automatically come back on after 5 min. It can be muted again.</p>		
<p>(Display panel)</p> <p>- Shows information about the status of the unit. The display consists of 7 x high brightness 16 segments LEDs. The first one is red to indicate a user warning. The 6 others are blue and used for display of normal running conditions.</p>		

<p>(Set point) - Is used to select items in the menu to change their status. It is also used to change temperatures and gas flow.</p>	
<p>(Arrow keys up, down & right) - Are used to navigate through the menu and changing values for temperatures and gas flow.</p>	
<p>Gas Switch, choose gas between table plate or compartments.</p>	

12.1 Activating the heat and gas flow controls

The heat and gas controls are activated using the on/off switch under the table top.

Soon after system activation the main display will show the actual temperature.



Change the display reading to gas flow, press key right

12.1.1 Temperature Set point

The temperature set point can be adjusted in the range from ambient to 40.0°C.

The default temperature set point is 37.0°C

Changing the set point for the temperature, follow these instructions:

When the display show the current temperature:



Press and hold the SP key.

Now the set point can be adjusted up or down with the arrow up or arrow down key.

One key press corresponds to a 0.1°C change.

If the display does not show the current temperature reading press the arrow right key.

12.1.2 Gas flow Set point

The gas flow Set point can be adjusted in the range from 0 l/h to 40 l/h.

Changing the set point for the gas flow, follow these instructions:

When the display show the gas flow:



Press and hold the SP key.

Now the set point can be adjusted up or down with the arrow up or arrow down key.

One key press corresponds to a 1 l/h change.

If the display does not show the current gas flow reading the arrow right key will toggle between the temperature and gas flow readings.

12.1.3 Heated Mode

Table plate has four heated mode. It possible to heated area.

To adjust Heated mode, press right key until the mode function is shown on the display.

Changing the Heat mode, follow these instructions:

When the display show the gas flow:

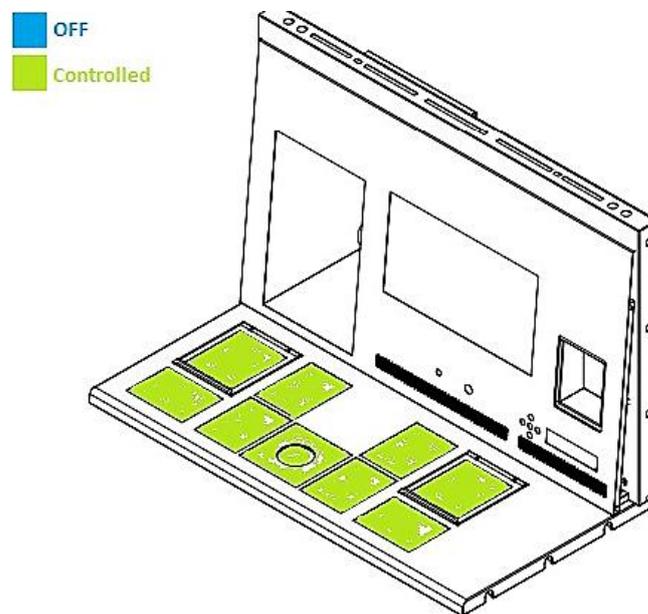


Press and hold the SP key.

Now the Mode can be adjusted up or down with the arrow up or arrow down key.

Mode 1:

all zones are on and controlled, all zones are Heated up to the set point.

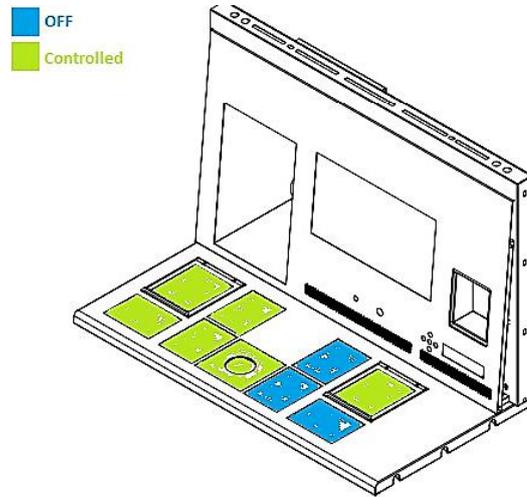


Mode 2:

Both compartment is on and controlled.

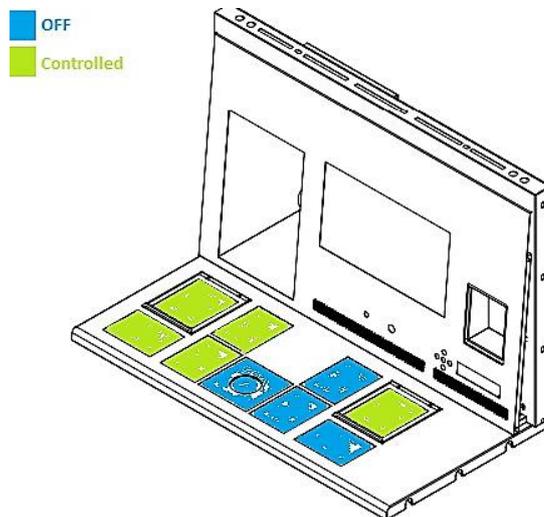
Right side and the middle zone is on and controlled

Left side of the area is off, as shown, all other zones are heated up to set point.



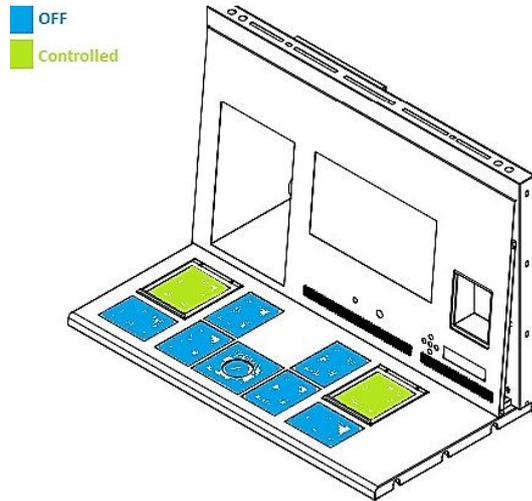
Mode 3:

Both compartment and the right side of the table plate are on and controlled. The middle zone and left side area are off, as shown. All other zones are heated up to set point.



Mode 4:

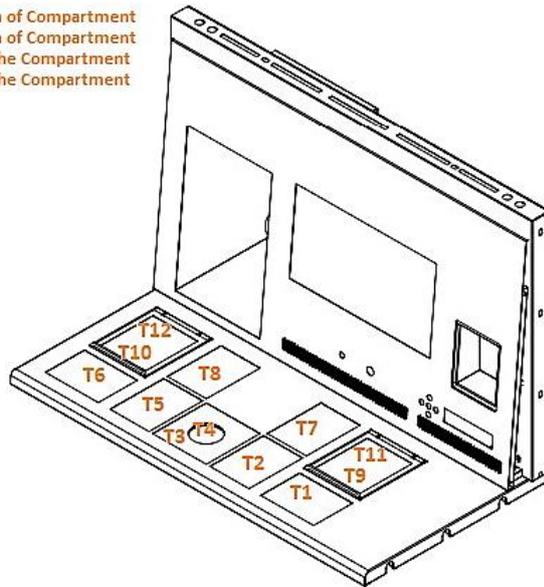
Both compartment is on and controlled, rest of the table plate is off as shown.



12.2 Surface Temperatures

There are 12 separate PID controls for the temperature on the table plate. Each controller is responsible for controlling the temperature of a separate zone.

T9 : Bottom of Compartment
 T10 : Bottom of Compartment
 T11 : Lid of the Compartment
 T12 : Lid of the Compartment



Each of the 12 available zones is equipped with its own separate temperature sensor and heater, allowing the user to adjust the temperature within every zone separately and achieving higher precision.

Each zone can be calibrated separately using the item that corresponds to the respective zone in the menu.

These items are placed in the menu and they are named: T1, T2, T3, T4, T5, T6, T7, T8, T9 and T10,11,12.

To adjust/calibrate the temperature of the zone please find the item called 'tx' (where x is the zone number) and adjust it based on a measurement taken using a high precision thermometer.

Esco MEDICAL recommends ONLY the YSI 4610 equipped with a 4611 probe.

To achieve precision, the measurement device must be both fast in response and accurate.

- ☛ **Calibration of temperature is done by adjusting the tx according to a measurement done on a spot.**
- ☛ **After temperature adjustment allow at least 15minutes for the temperature to stabilize, use the thermometer to verify correct temperatures on each zone.**
- ☛ **Tape the 4611 sensorsto the middle of the zone. It may be necessary to do iterations before the zone is completely calibrated**

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

- ☛ **There are virtually no cross over heating between the 12 zones when they are adjusted to temperatures within 0.5 degree °C. At larger temperature differences the hotter zone will affect the colder zone.**

Example: How to calibrate the temperature

Note: (the procedure is the same for T1 – T12)

After measuring with a quality thermometer, it has been noted that T1 is 37.4 Degrees C. Locate T1 in the sub menu:



Press and hold the SP key. This display will show:



Adjust the temperature by pressing the arrow up key 4 times while still holding the SP key down.

The display will show the steps from 37.1, 37.2, 37.3 and 37.4. Let go of the SP key and the value is now stored and calibration value for the T1 area temperature has been modified.

Press the arrow up to exit back into the menu.

12.3 Menu Options

Press and hold arrow up and down - 3 seconds – to access menu:

Navigate in menu using:

- Arrow right (in)
- Up and down (previous – next)
- SP/Enter (change – accept)
- Pressing and holding arrow up and down for 3 seconds will exit from any stage in the menu.

12.4.1 Main Menu



Arrow up – leave menu

Arrow right – enter menu



Arrow down scroll further down in menu, arrow up on stage back and right arrow chose the Temp category:



Arrow up on stage back and right arrow chose the Service category:

12.4.2 Sub menus

All Sub menus are described in the next passage

12.4.2.1 Temperature sub menu

Choose arrow right under temp to enter the temperature sub menu:



Calibrate holding down the SP key and using up and down arrow to adjust:

Move to the next sub menu item with arrow down or one step up with arrow up.

A rectangular digital display with a white background and a thin black border. It shows the text 'T2 CAL' in a blue, seven-segment LED font. The 'T' is solid, while the '2' and 'CAL' are hollow.

Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.

A rectangular digital display with a white background and a thin black border. It shows the text 'T3 CAL' in a blue, seven-segment LED font. The 'T' is solid, while the '3' and 'CAL' are hollow.

Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.

A rectangular digital display with a white background and a thin black border. It shows the text 'T4 CAL' in a blue, seven-segment LED font. The 'T' is solid, while the '4' and 'CAL' are hollow.

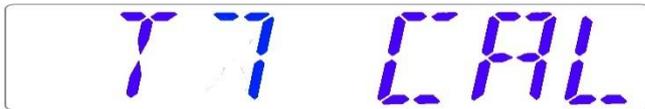
Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.

A rectangular digital display with a white background and a thin black border. It shows the text 'T5 CAL' in a blue, seven-segment LED font. The 'T' is solid, while the '5' and 'CAL' are hollow.

Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.

A rectangular digital display with a white background and a thin black border. It shows the text 'T6 CAL' in a blue, seven-segment LED font. The 'T' is solid, while the '6' and 'CAL' are hollow.

Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.



Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.



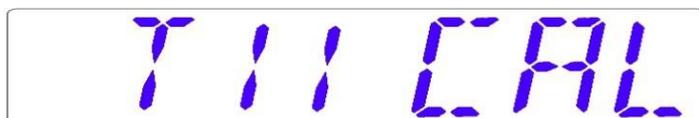
Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.



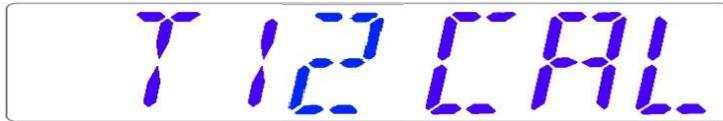
Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrow up.



Calibrate holding down the SP key and using up and down arrow to adjust:
Move one step up with arrow up.



Calibrate holding down the SP key and using up and down arrow to adjust:
Move to the next sub menu item with arrow down or one step up with arrowup.



Calibrate holding down the SP key and using up and down arrow to adjust: Move one step up with arrow up.

12.4.2.2 Service sub menu

Choose arrow right under Serv to enter the Service sub menu:

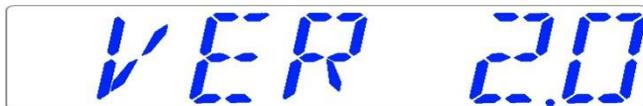


The service sub menu is locked as default:

The display will show:



Press SP to read the currently installed firmware version:



Press the arrow up to exit back into the main menu.

13 Alarms

On single fault condition the display will show a red "A" along with the status message of the affected parameter. There will be an audio signal that can be

muted (toggled on/off for a period of 5 minutes) by pressing the alarm key once. There will also be an arrow indicating if the alarm is due to too high a value or too low.

Furthermore, the audio on/off key will pulse red:



The audio pattern is 3 short beeps and a 3 seconds' pause. All alarms have the same audio pattern.

13.1 Temperature alarms

All 10 zones can trigger a temperature alarm if they are more than ± 0.5 -degree C from the set point.

👉 Remember when changing the set point more than ± 0.5 degrees from the current temperature this will result in an alarm. The same goes for all calibration adjustments.



Temperature is too high in zone 3. The display will force lock on the alarm condition and will stop alternating between the normal status messages. If the mute key is pressed. The display will shift to normal status and show the parameters for 5 minutes until the audio alarm comes back on again. The alarm mute key will still show the alarm condition by pulsing red when the alarm is

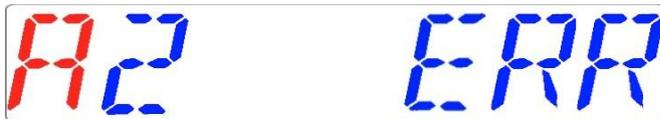
muted.

The zone with the alarm will be indicated by the number after the "A" The zone layout and sensor placement are described in section 17.



Temperature is too low in zone 4.

If there should occur a malfunction with the sensors in the temperature system, it will be indicated by the below warning:



This describes that the sensor in zone 2 has failed. As a safety precaution that zones heating will be shut down.

13.2 Gas pressure alarms

If the CO₂ gas supply is not attached correctly or a wrong CO₂ gas pressure is applied to the system, the ART workstation will go into CO₂ pressure alarm mode. "CO2 P" will be displayed, indicating wrong incoming gas pressure.

The alarm level is < 0.2 bar and > 0.8 bar.



☛ 'P' stands for pressure.

An audible alarm is also activated which can be muted by pressing the alarm key. If the mute key is pressed. The display will shift to normal status and show the parameters for 5 minutes until the audio alarm comes back on again. The alarm mute key will still show the alarm condition by pulsing red when the alarm is muted.

13.3 Multiple alarms

When there are concurrent alarms the display will indicate this by showing first "A MULTI" and then the alarm conditions:



The flow will be forced according to the alarms. The temperature alarms have 1st priority. Gas pressure alarms 2nd.

13.4 Loss of power alarm

If the power is disconnected the incubator will give an audio alarm for approximately 4 seconds and the LED in the alarm mute key will flash.



4 Pressure of the CO₂ gas

The CO₂ pressure rate can only be seen in the workstation logger view on the PC. The value is in bar. **External pressure must be 0.6 bar always.** It cannot be adjusted on the ART Workstation, only on the external gas regulator.

☛ **Remember there is a pressure alarm on the pressure limits if the fall below 0.2 bar or rise above 0.8 bar.**

☛ **The internal pressure sensor cannot be calibrated by the user. Under normal circumstances it will remain without drift for the lifetime of the device.**

15 Firmware

The firmware installed on your ART Workstation 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. This can be done by a service technician during the scheduled yearly service.

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

In the menu locate the Service sub menu "Serv".

Choose arrow right under "Serv" to enter the Service sub menu:



The service sub menu is locked as default:

The display will alternate between:



And the currently installed firmware version:



Press the arrow up to exit back into the menu

16 Cleaning instructions

16.1 Considerations about a sterile device

The ART workstation is not a sterile device. It is not delivered sterile and it is not assumed to be possible to keep it sterile in use.

However great care has been taken in the design to make it easy for the user to keep the device sufficiently clean during use and to sterilize key components.

These cleaning instructions are for a general-purpose use and have not been validated for sufficiency to cover all possible aspects of usage and all imaginable use scenarios.

The design features intended to provide cleanliness are:

An ULPA filtered laminar air flow

A flush stainless steel work surface.

Use of parts that withstand cleaning well.

16.2 The manufacturers recommended cleaning procedure



Always validate the cleaning procedures locally or consult the manufacturer or the distributor for more guidance.

Clean the unit externally with a 70% of alcohol solution on a lint-free cloth.

Switch off the device and remove the mains lead.

Remove all loose items from the work area.

Wipe the inside with a lint free cloth soaked in a 70% alcohol solution.

Wipe the sides in the same way.

Clean with sterile water and wipe again.

Attach the power again and switch on flow of the workstation.

Let the unit run empty for at least 20 minutes before inserting a sample or starting to work.



A list with approved cleaning liquids can be supplied on request.

17 Heat optimization plate.

The Carry Tray heat optimization plate will ensure full contact with the dish. This generally means much more stable temperature conditions for the cells. The plate fits the area under the gas hood. The plate can be taken out for cleaning and serves as a convenient way to carry several dishes between the CO₂ incubator and the ART Workstation.

 **Do not autoclave at the Carry Tray. This will damage it, as the high temperature will make it bend out of shape.**

Place the dish where it fits the pattern. There is a Carry Trays for Nunc® and for Falcon® dishes.

 **Only use the correct type for your dishes.**



CarryTray

18 Humidification

If the ART workstation is used for open culture conditions the use of the humidification system and gas hood is recommended.

If the ART workstation is used for culture with a mineral overlay it is not necessary to use the humidification system.

19 Temperature validation

The ART workstation is equipped with 5 PT-1000 Class B sensors

Each zone has an extra sensor for validation (zone 1,2,3,5,6), these sensors are not connected to any of the electronics on the unit.

The PT-1000 Class B sensors are located with one in each of the central positions of the bottom zones and are connected to a connector in the side of the table plate as shown:



A connector and wire can be supplied by Esco MEDICAL or your distributor.

Through the connectors the temperature conditions in the zones can be logged continually externally without compromising any performance of the unit. Any logging system that uses standard PT-1000 sensors can be used.

Esco MEDICAL can supply an external logging system for the sensors.

20 All in one PC.

The ART workstation is equipped with a powerful touch enabled AIO PC.

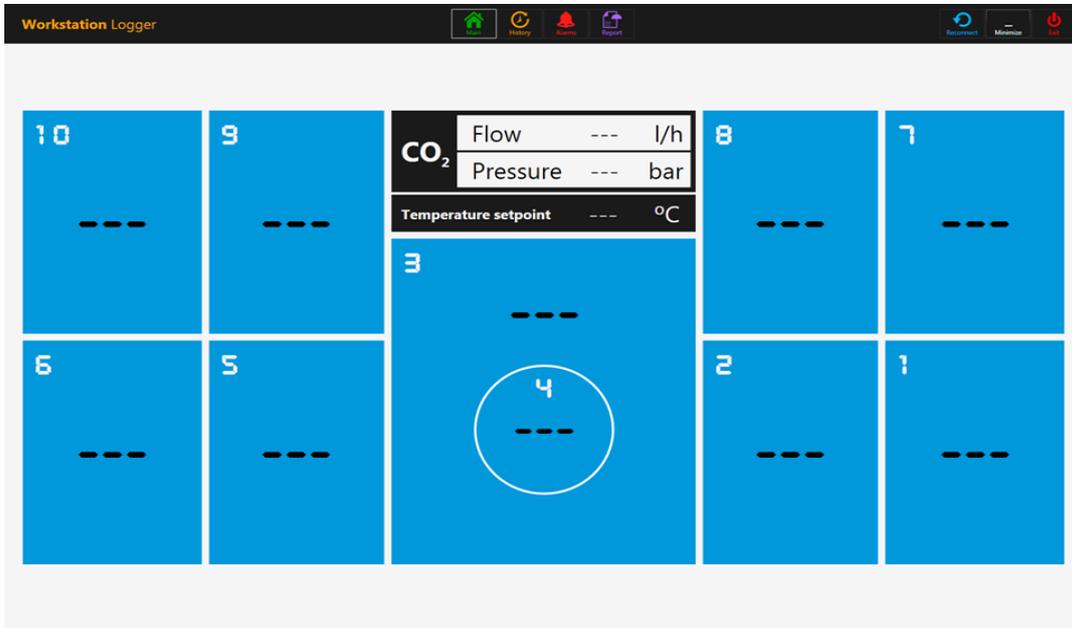
Switch on the PC by pressing the button below the screen.



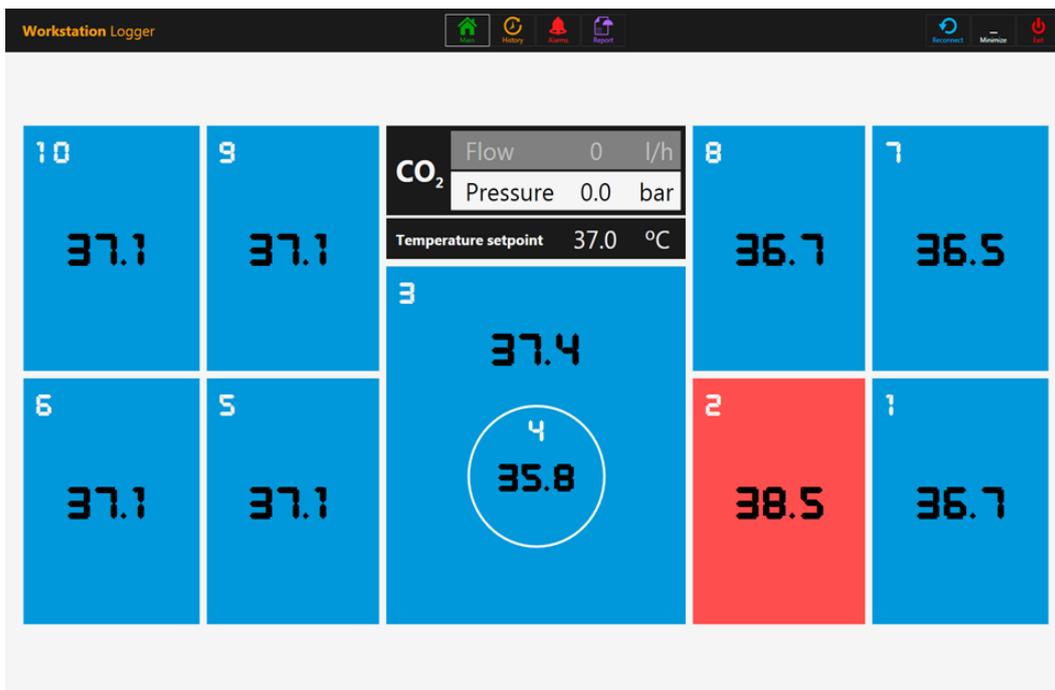
AIO PC with on/off button under the screen

The PC will start and load the Windows operating system first. After that the

workstation logger surveillance software will load automatically and the parameters and warnings will be shown on the screen.



The main view shows the 10 zones (numbered). When there are no signal 3 lines are displayed instead of the value. When the sensor signal is received, this will shift to a numeric value.



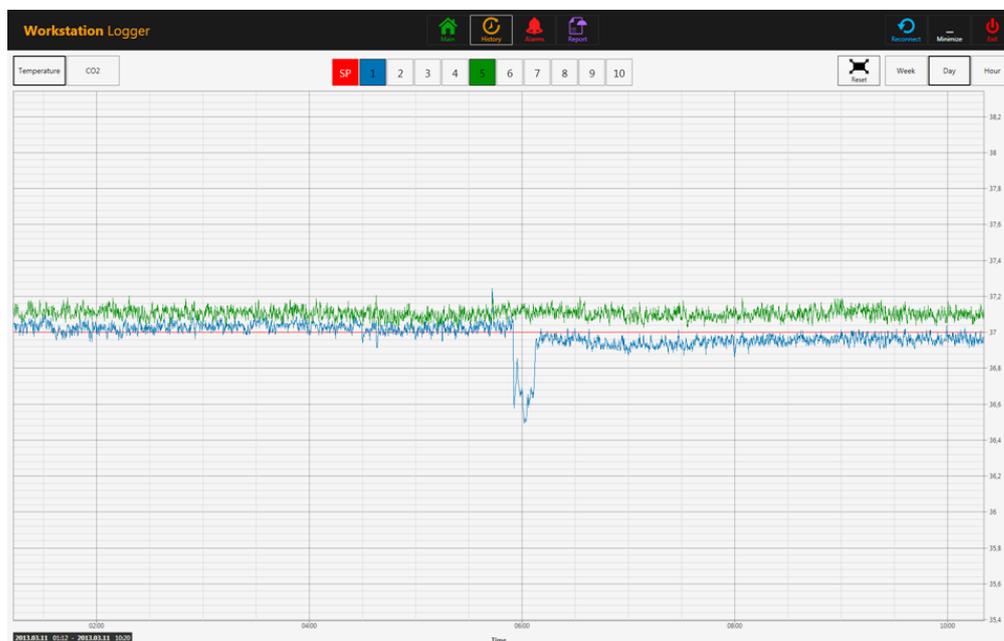
The blue colour signifies that the zone is in normal operation mode. If there is an alarm the colour will shift to red on the relevant zone.

In this way, the operator will always have a clear visual indication of the normal operation and an easy way to identify and respond to a malfunction.

☛ This is unique safety feature of the ART workstation which cannot be found on any comparable system.

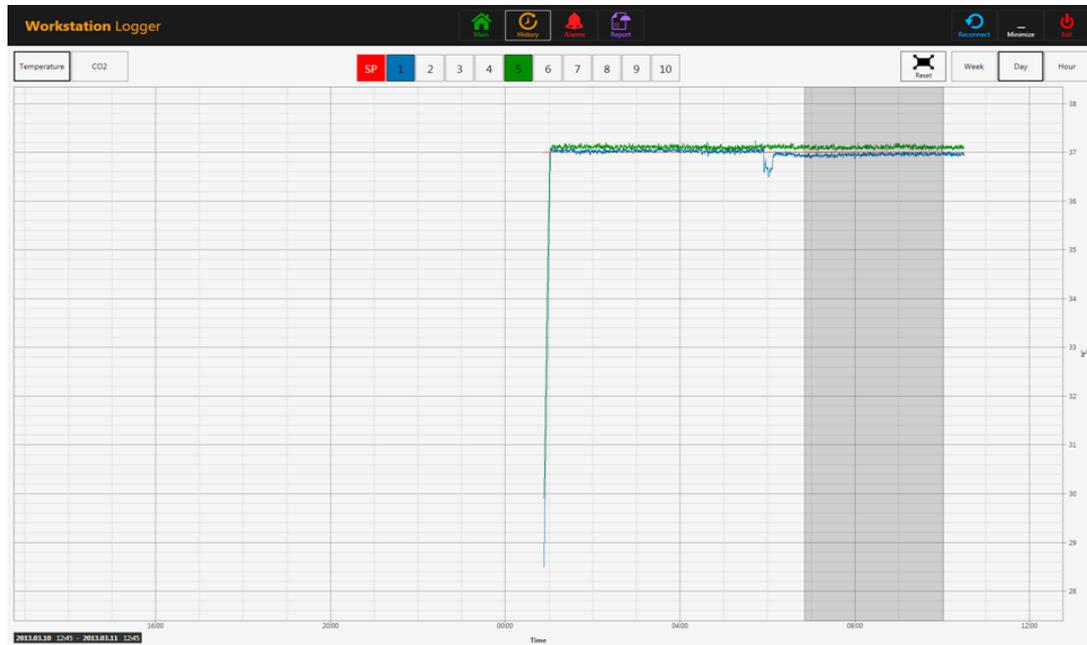
In the top of the screen 4 navigation buttons are placed in the middle and 3 actions buttons in the right-hand corner.

The greenhouse "Main" brings up the main view (as shown in the pictures above). The orange button "History" toggles the graph view, where graphs can be shown for all the parameters. This is useful for documentation of the systems stability and to identify errant behaviour.



Several extra buttons appear in the graph view. The user can see the temperatures

and toggle on/off the graph for each zone in the view by pressing the button with the number for the zone.

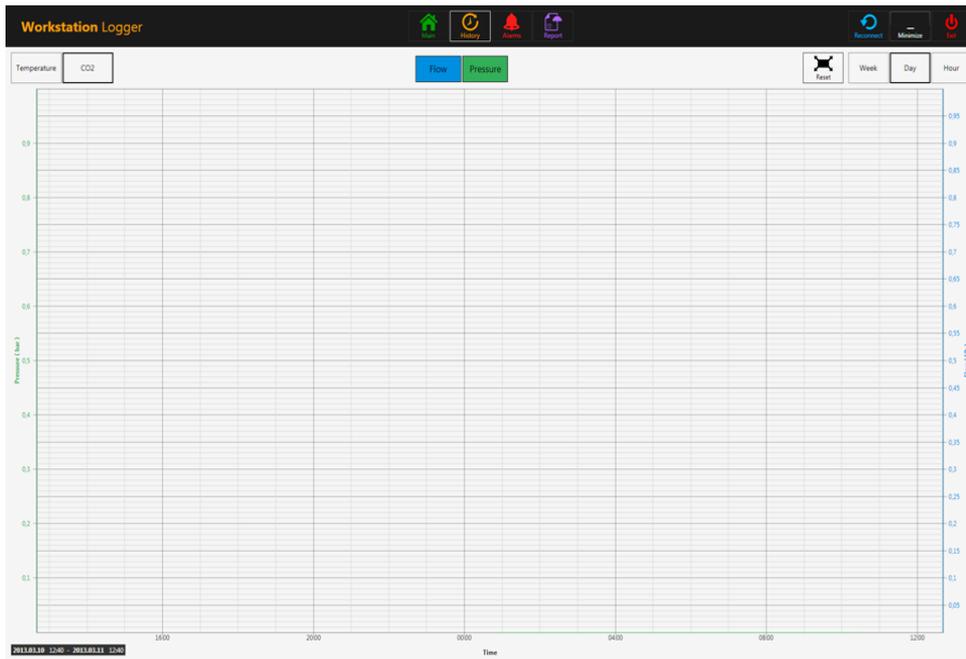


A zoom function is available by touching the screen and swiping the finger left over the area that should be zoomed.

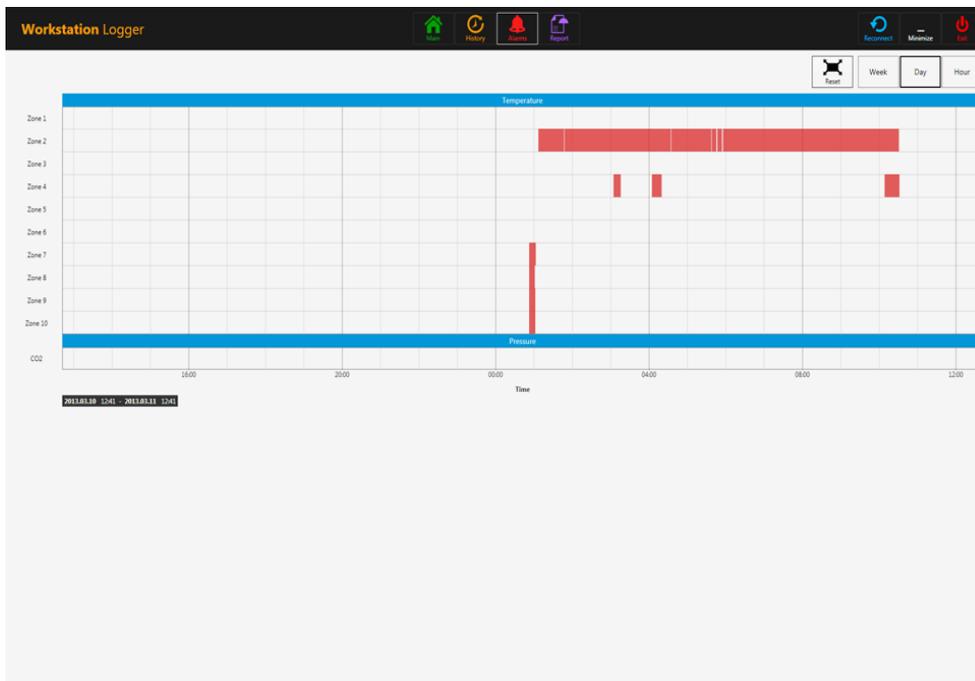
Pressing the reset button will jump back to full view.

If there are data accumulated it is possible to shift between a "week", "day" or "hour" view.

Pressing the CO2 button will shift from the temperature view to the CO2 gas view. Here the user can see the historical data for the flow and pressure.

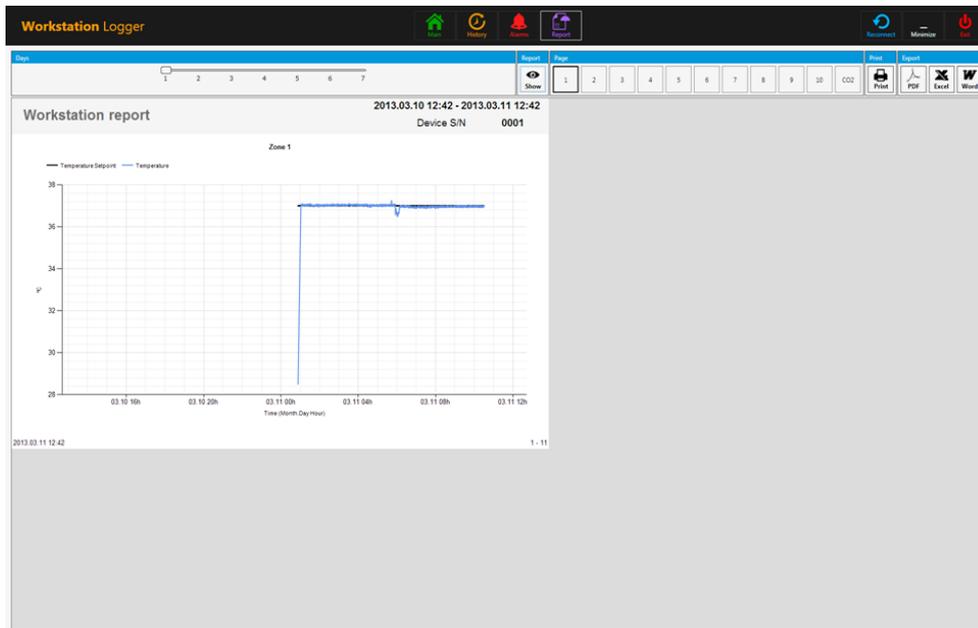


Pressing the red "Alarm" button in the top will bring up the graphical alarm view. Alarm conditions for the parameters are shown as red on the time line, thus making easy identification possible.



Pressing the magenta "report" button will bring up the report mode.

This is for convenient ISO quality management compliance as all the running parameters of the ART workstation can easily be documented and printed as a report or exported in either PDF, Excel or Word.



The 3 action buttons in the right-hand side. The button “reconnect” allows the system to reconnect with the sensors (in case of data loss due to USB connection issues).

The button “minimize” - toggles the full screen format off for the workstation logger.

The button “exit” - shuts down the workstation logger software.



No data will be stored and all safety surveillance functions will be operative if the data logger is shut down.

The AIO PC can easily be used to display an image from any USB type microscope camera.



A standard USB socket is located under the humidification system. This can be used to load the microscope camera drivers or other software onto the AIO PC. When the software is set up the microscope camera can be connected to the USB socket and the image shown on the screen.

👉 A force function is built into the workstation logger, so even though the full screen on the AIO PC is being use by the microscope camera image, the system will visually alert the user to any alarm conditions and make a rapid shift to the full view of the workstation logger possible.

21 Maintenance

The ART Workstation is designed to be easy in use but reliable and safe operation of this equipment is based on the following conditions:

1: Correct calibration of temperature and using high precision equipment's in the intervals prescribed by clinical practise at the laboratory where the Workstation is in use. Longer than 14 days between validation is not recommended by the manufacturer.

2: Replacement of in-line HEPA filters in the correct intervals. Once at every changeover of gas bottles.

In case of plumbed in gas lines the in-line HEPA filters can be changed yearly only.

3. Suitable cleaning according to the intervals prescribed by the clinical practise in the laboratory where the Workstation is in use. Longer than 14 days between cleaning is not recommended by the manufacturer.



It is essential to perform the inspection and servicing in the intervals described in the MAINTENANCE manual.

Refusing to do so can have fatal outcome causing the unit to stop performing as expected and cause damage to samples, patients or users. Warrantyvoid if service and maintenance are not followed.



Warrantyvoid if service and maintenance is not done by trained and authorized personnel.

22 Emergency Procedures

Total loss of power to or on the unit.

Remove all the samples and place them in an alternative or backup device that is not affected by the problem.

The Workstation will lose its temperature below a safe level in around 5 minutes.

In case of a single temperature alarm on the unit.

Remove the samples from the affected zone. They can be relocated to either of the 9 other zones. Each zone is separate so the 9 others will stay safe.

In case of a multiple temperature alarm on the unit.

Remove the samples from the affected zones. They can be relocated to either of the other zones. Each zone is separate so the others will stay safe.

In case of a CO₂ pressure alarm on the unit.

Inspect the external gas supply and the gas supply lines. If the problem is external and not readily amendable it normally will not be necessary to perform any emergency procedures other than stop using the humidification system.

23 User Troubleshooting

Heating system

Symptom	Cause	Action
No heating, display is off.	The unit is switched off at the back or not connected to power.	Switch on at the back, or connect power.
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.

CO₂ gas

Symptom	Cause	Action
'CO ₂ P' is shown on display.	No/wrong CO ₂ gas pressure to system.	Check CO ₂ gas supply; make sure that pressure is kept stable at 0.6 bar.

Data logger

Symptom	Cause	Action
No data is sent to PC	System not powered	Check mains.
	System is on standby or switched off.	Switch the system on.
	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

Symptom	Cause	Action
Missing segment(s) in display.	Failure in the PCB	Replace the PCB. Contact your Esco MEDICAL Distributor for details.

Keyboard

Symptom	Cause	Action
Absent or erratic function of keys.	Failure in the keys.	Replace the keys. Contact your Esco MEDICAL Distributor for details.

4 Specifications

General Specifications			
SPECIFICATION	MAW-4D_	MAW-6D_	MAW-6D_-DUAL
Work area dimensions (depth x width)	487mm x 1259mm	487mm x 1869mm	
External dimensions without support stand (width x depth x height)	1340mm x 640mm x 1300mm	1950mm x 640mm x 1300mm	
External Dimensions with "B" type support stand (width x depth x height)	1340mm x 640mm x 2160mm	1950mm x 640mm x 2160mm	
Laminar air velocity	Average of 0.36 m/s or 70 fpm (+/-10%)		
Filter efficiency	Minimum: 99.9991% at 0.3 μ m / 99.9985% at 0.12 μ m / 99.9982% at MPPS Typical: 99.9998% at 0.3 μ m / 99.998% at 0.12 μ m / 99.9987% at MPPS		
Pre-filter	Disposable and non-washable polyester fibers with 85% arrestance / EU3 rated		
Heating system	Smart power injection electrical heating, 9+1 zones	Smart power injection electrical heating 2 x (9 + 1) zones	
Temperature accuracy	$\pm 0.2^{\circ}\text{C}$		
Temperature uniformity	$\pm 0.2^{\circ}\text{C}$		
Included advanced features	Integrated humidification system HS-1 Surveillance system with data logger AIO PC Heated glass stage Transmitted light source SC-1 (with bulb) 5 x PT1000 validation ports	Integrated humidification system HS-1 Surveillance system with data logger AIO PC 2 x Heated glass stage 2 x Transmitted light source SC-1 (with bulb) 10 x PT1000 validation ports	
Included accessories	1 x water bottle for HS-1, including tubing 1 x sample carry tray 1 x humidified gas plastic cover	2 x water bottle for HS-1, including tubing 2 x sample carry tray 2 x humidified gas plastic cover	
Microscope provision	Included for 1 microscope	Included for 2 microscopes	
Microscope	Required, Not included (see Microscope ordering information)		
Support stand	Required, Not included (see Microscope ordering information)		

25 Electromagnetic Compatibility

Guidance and manufacturer's declaration – electromagnetic emissions		
The ART Workstation is intended for use in the electromagnetic environment specified below. The customer or the user of ART Workstation should assure that it is used in such an environment.		
Emission test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR11	Group 1	The ART Workstation does not use RF energy. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class A	The ART Workstation is suitable for use in a hospital environment. It is not for domestic establishments.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions	Class A	

Guidance and manufacturer's declaration – electromagnetic immunity			
The ART Workstation is intended for use in the electromagnetic environment specified below. The customer or the user of the ART Workstation should assure that it is used in such an environment.			
Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines		
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode		

<p>Voltage dips, short interruptions and voltage variations on power supply input lines</p> <p>IEC 61000-4-11</p>	<p><5 % 100V (>95% dip in 100V) for 0,5 cycle 40% 100V(60% dip in 100V) for 5 cycles 70% 100V(30% dip in 100V) for 25 cycles) dip in 100V) for 5 sec</p>		
<p>Power frequency (50/60Hz) magnetic field</p> <p>IEC 61000-4-8</p>	<p>3 A/m</p>	<p>Performance A</p>	<p>Powerfrequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</p>

Guidance and manufacturer's declaration – electromagnetic immunity			
The ART Workstation is intended for use in the electromagnetic environment specified below. The customer or the user of the ART Workstation should assure that it is used in such an environment.			
Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment- guidance
<p>Conducted RF IEC 61000-4-6</p> <p>Radiated RF IEC 61000-4-3</p>	<p>10Vrms 150kHz to 80MHz in ISM bands</p> <p>3V/m 80MHz to 2,5 GHz</p>	<p>3V/m from 80MHz to 2.5 GHz</p>	<p>Portable and mobile RF communications equipments should be used no closer to any part of the ART Workstation including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> <p>$d = 0.35 \sqrt{P}$</p> <p>$d = 0.35 \sqrt{P}$ 80MHz to 800MHz</p> <p>$d = 0.7 \sqrt{P}$ 800MHz to 2.5GHz</p> <p>Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range.</p> <p>Interference may occur near equipment marked with the following symbol:</p>

Recommended separation distances between portable and mobile RF communication equipment and the ART Workstation			
The ART Workstation is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ART Workstation can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ART Workstation as recommended below, according to the maximum output power of the communication equipment.			
Rated maximum output power of transmitter	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
W			
0.01	0.1m	0.1m	0.2m
0.1	0.4m	0.4m	0.7m
1	1.2m	1.2m	2.3m
10	3.7m	3.7m	7.4m
100	11.7m	11.7m	23.3m
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.			
NOTE 1 At 80 MHz and 800 MHz, these separation distances for the higher frequency range applies.			
NOTE 2 These guidelines may not apply in all situations.			

26 Technical assistance

For more information, contact the Esco Medical – representative in your Country.

All goods and services are sold subject to the terms and conditions of sale of the company within Esco Medical which supplies them.

Contact your local Esco Medical representative for the most current information.

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