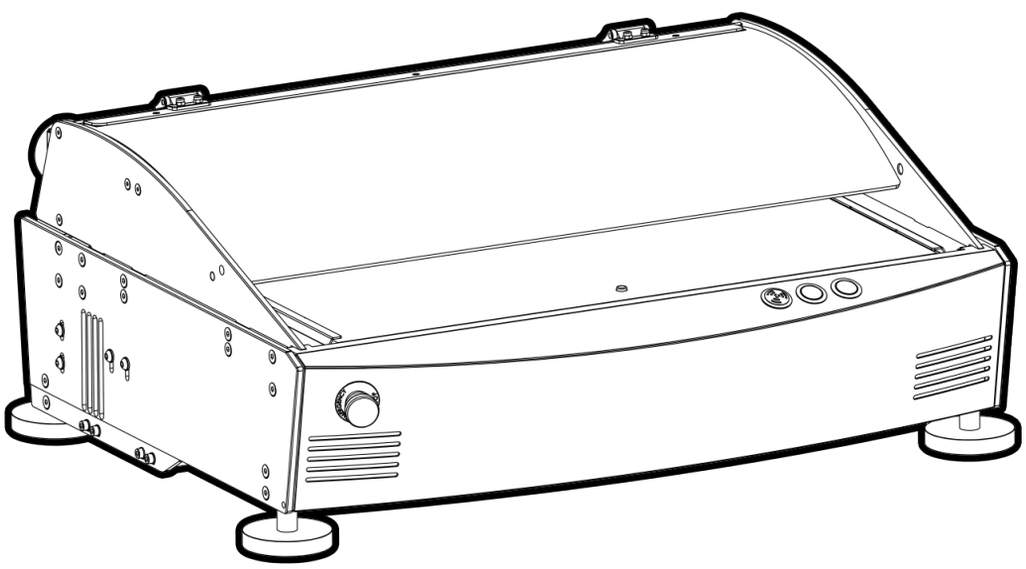


TQC CureView Gradient Oven
AB8000 (REV02)

Gradient oven with GOC and
Ideal Finish control

Operating Instructions (V1.1 0817)

IMPORTANT! Before taking this instrument in use we strongly advise you to read this manual carefully.

INDEX

1 GENERAL

This TQC CureView Manual is created in multiple parts. This to give the operator the best experience with the TQC CureView. It is essential that the full manual is read and understood prior to commencing operation of the TQC CureView.

1.1 Importance of operating manual
This manual is written in order to become familiar with all the functions and possible applications of the instrument. It contains important instructions about how to use the instrument safely and economically; according to the purpose designated. Following these instructions is not only essential to avoid risks. It also reduces repair costs and down-time and increases the products reliability and service-life.

Anyone who works with the instrument shall follow the instructions in this manual, particularly the safety related instructions. Additionally local rules and regulations relating to environmental safety and accident prevention should be observed. It is mandatory that users have read and understand this manual prior to first operation of the TQC CureView.

1.2 User-responsibility
The user should

a) Only allow persons to work with the instrument who are familiar with the general instructions on how to work safely and to prevent accidents. The use of the instrument should have been instructed duly. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.

b) Regularly check the safety-awareness of personnel at work.

c) Only allow user maintenance on the instrument such as lamp replacement and thermal board replacement / exchange only to be performed by TQC qualified or appointed personnel. Maintenance by unqualified personnel can result in serious damage to the instrument and will not be accepted as claimable warranty.

1.3 Responsibility of personnel
Before commencing work anyone appointed to work with the instrument should pay attention to the general regulations relating to working safety and accident prevention. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature, as can be placed in the Operator qualification list Annex A.

1.4 Dangers
This instrument has been designed and constructed in accordance with state-of-the-art technology and the acknowledged safety regulations. Nevertheless, working with the instrument may cause danger to the life and health of the operator or to others, or damage to the instrument or other property. Therefore the instrument should only be used for its designated purpose, and in a perfect technical condition. Any defect that could have a negative effect on safety should be repaired and recorded in the maintenance list Annex B immediately.

1.5 Designated purpose

The TQC CureView Gradient oven is exclusively designed to perform thermal testing to within its thermal design envelope of painted and coated test panels as described within the specifications. Other applications constitute improper use. TQC will not be held liable for damage resulting from improper use.

Designated purpose also includes properly observing all instructions in the operation manual, and adherence to inspection and maintenance schedules. TQC is entitled to request these form when warranty claims are made and during inspections to ensure safe operation and evaluate correct usage.

1.6 Copyright

1.7 Manufacturer's/Supplier's address
TQC – Molenbaan 19
2908 LL Capelle aan den IJssel
The Netherlands
T +31(0)10 7900 100
F +31 (0)10 7900 129

2 SAFETY INSTRUCTIONS

2.1 Meaning of Symbols

The following symbols for dangers are used in this instruction manual.

Possible immediate danger to the life or health of personnel.	If this guideline is not noted it can lead to severe danger to health, up to fatal injury.
A dangerous situation could be caused.	Non observance of this guideline can lead to injury or to damage to equipment.
Special tips and particular information.	Guidelines to make optimal use of the instrument.

2.2 Availability of Safety Information

The instruction manual should be kept in proximity to where the instrument operates and should be visible and accessible at any time of operation.

In addition to the information contained in the instruction manual, general and local regulations for accident prevention and environmental protection shall be kept available and observed. Always ensure all guidelines in respect of safety and dangers on the instrument are in readable condition.

In case of danger the instrument has to be switched off by means of the emergency-button on the front of the instrument, then the danger should be eliminated.

2.3 Training of Personnel

- Anyone who operates the instrument should be trained properly.
- It has to be clear who has which responsibility regarding commissioning, set-up of maintenance and repairs, installation, and operation.
- Anyone who hasn't finished training should be supervised by an experienced person while working with the instrument.

2.4 Dangers from Electrical Energy

- Work on the electrical supply may only be done by a qualified electrician.
- The electrical equipment of the instrument must be checked regularly. Loose connections and cable damaged by heat must be corrected immediately.
- If any work is to be done on parts connected to a voltage supply, a second person must be present to switch off the main switch if necessary.

2.5 Points of Special Danger

There is one special point of danger in the moving zone of the tool carrier:

Always be aware that the machine, components and test panel can be hot and cause physical injuries by burning. Keep your hands away from the heated area after the instrument has started!

2.6 Care, Maintenance, Repairs

- Always make sure the instrument is connected to an earthed socket.
- Maintenance and inspection should be carried out at the correct intervals
- Operating personnel should be informed before starting with maintenance or repair work
- Always make sure the instruments power is turned off and the instrument is not connected to a socket while adjusting any electrical component whenever maintenance, inspection or repair work is done.
- Do not open the instrument. In case of malfunction always consult the manufacturer.

2.7 Modifications to the Equipment

- Any modifications or additions or alterations to the instrument may solely be made with permission from the manufacturer.
- All measures involving modifications require written confirmation of approval from TQC
- Instruments which are not in fault-free condition must immediately be switched off
- Only use replacement parts from the original supplier. Parts used from other sources aren't guaranteed to take the loading and meet the safety requirements.

2.8 Cleaning of the Instrument and Disposal of Materials

- When in use it is not always possible to avoid some spill of paint on the work surface.
- Try to keep the instrument as clean as possible to prevent distortions of functions.
- To clean the instrument properly use a suitable solvent to dispose remains of paint or ink.
- Wear gloves during cleaning; Don't spill an overdose of solvent during cleaning.
- Cleaning materials must always be used and disposed of correctly.

3 TRANSPORT AND STORAGE

3.1 Packing

- Please take note of pictorial symbols on the packing.
- Check for transport damages. If the packaging is damaged only accept it with a written approval of the transporter that the package was damaged.

3.2 User: Check on Receipt

- Check packing for damage
- After unpacking check complete supply.

3.3 Reporting Transport Damage and Documentation

- Any damage should be documented as accurately as possible (possibly photographed) and reported to the relevant insurers or, in the case of sales "delivered to customers works", to the supplier.

3.4 Storage and Protective Measures when not in use

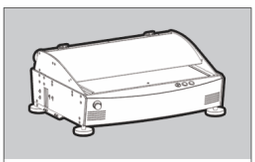
- The instrument must be stored in a dry place at a temperature between 10 - 40˚C / 50 - 104˚F.
- The storage period should not be longer than 3 months. When stored longer than 3 months please contact the manufacturer for instructions on recommissioning.
- Store instrument in the original packing if possible.

4 INSTRUMENT DATA

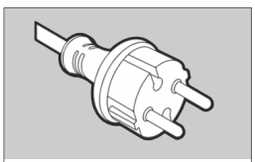
4.1 Name / Article

TQC CureView – Computer controlled thermal test center.

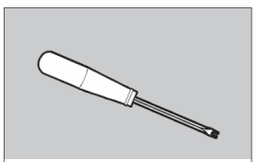
4.2 Scope of Supply



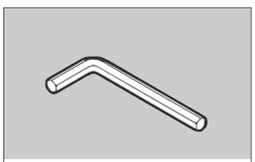
TQC CureView



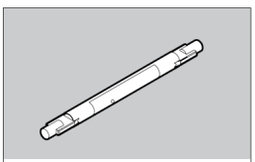
Power Cord



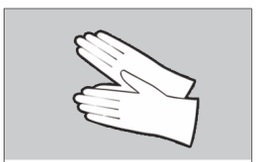
Lamp Replacement Tool
(Art. nr. AB8012)



Allen Key 2.5 mm
Allen Key 3 mm
Allen Key 4 mm



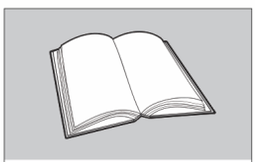
3x Spare Lamps



Lamp Replacement
Gloves

Pre-installed Laptop
+ Laptop Power Cord
+ Laptop Installation
and documentation set

TQC GOC and
TQC Ideal Finish
Software



TQC CureView Manual

4.3 Technical Data

Temperature range:	Ambient +5˚C to 350˚C
Maximum temperature difference:	50˚C / 122˚F (between 2 elements) (Thermal properties of test panel not included)
Number of heating elements:	32 elements, individually controlled.
Max. panel width:	98 mm / 3.86 inch
Max. panel length:	Max 570 mm / 22.44 inch
Max. panel thickness:	max. 1.0 mm / 0.03 inch
Effective test are:	500 x 74 mm / 19.69 x 2.91 inch

4.4 Dimensions and Weight

Depth:	595 mm / 23.43 inch
Width:	760 mm / 29.92 inch
Height:	296 mm / 11.65 inch
Net weight:	approx. 31 kg / 68.34 inch

4.5 Basic Unit

Power Supply:	220 - 240 V, 50 - 60 Hz (single phase / split phase)
Power consumption:	max. 3000 Watt
Display:	None, status indication by 2 LED indicator buttons.
Safety:	Emergency Button,
Function:	2 LED lit buttons, and computer control

4.6 Accuracy

Controller accuracy:	0.1˚C
Time control:	0.1 s/h
Heated accuracy:	3 ˚C

4.7 Noise Level

The continuous noise level from the instrument does not exceed 70 dB.

4.8 Accessories and Spares

	Accessories
AB8025	CureView Gradient Oven Test Panels, set of 50 pcs
AB8026	CureView ISO 2812-5 Panel Adapter, suitable for Holding Panels size 500 mm x 100 mm

	Spare parts
AB8016	Halogen Gold Reflector Infrared Heating Lamp (set of 10 pcs)
AB8020	Lamp Replacement Tool
AB8030	Nextrema Glass Test Surface
CM1105	USB Cable
AB8103	Power Supply Cable for CureView

5 INSTALLATION AND ASSEMBLY

5.1 Installation and Operation

The instrument has to be installed in a suitable place, preferably on a sturdy table or work area, with normal ambient temperature. Special fixings are not required. Exhaust for non-forced expel of fumes should be present. Carefully unpack the apparatus and the accessories and check complete supply. Place, if necessary, a spirit level on the work surface and adjust the height of the feet. See also chapter 9.

5.2 Preparation of Energy Connections

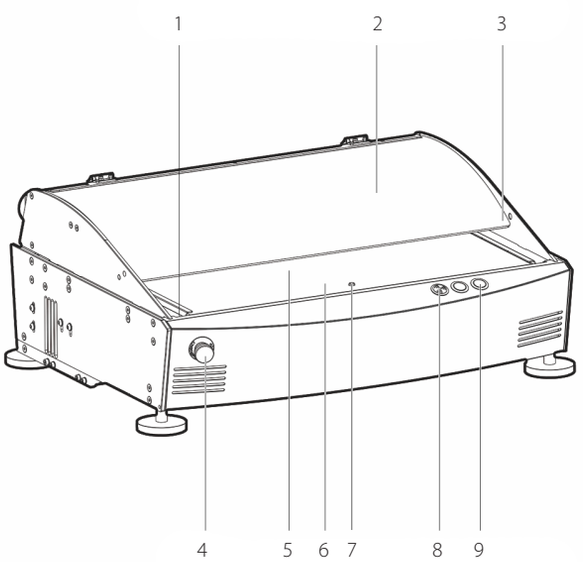
The instrument is equipped with a safety tested mains supply cable and may only be connected to plug sockets with earth connection complying with the safety regulations.

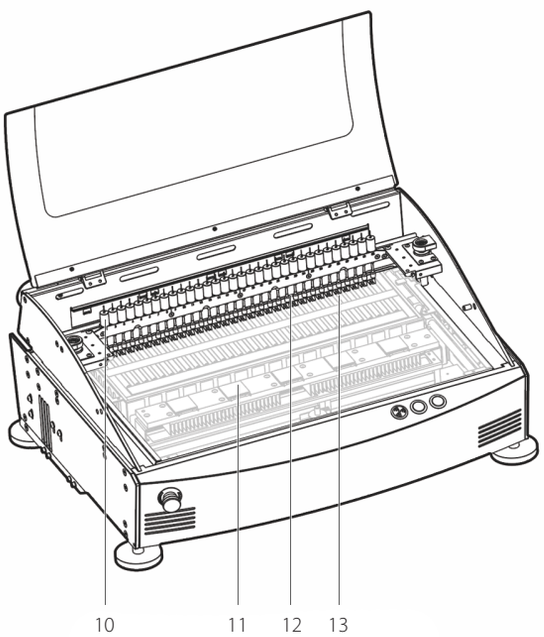
Before connecting the instrument, check whether the supply voltage corresponds to the local supply voltage. If it does not, the instrument must not be connected under any circumstances.

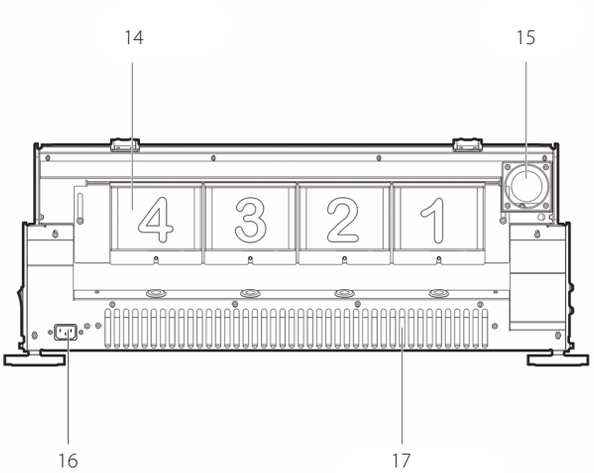
5.3 Mains Connection

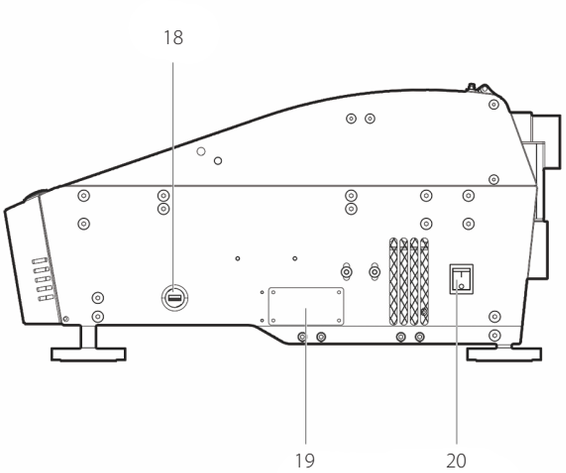
The mains connection is located at the rear of the instrument. Plug in the female plug in the socket on the rear of the housing. The ON/OFF Switch is located at the right hand side near the end of the instrument.

6 INSTRUMENT CONTROLS AND FUNCTIONS









1 Panel Displacer
2 Protective Glass/Ceramic Cover
3 Canopy Safety Release
4 Emergency Stop
5 Test Surface
6 Loading Zone
7 Panel Lifter
8 Audio Alarm
9 Control Buttons
10 Thermal Sensors
11 Cooling Zone
12 Panel Clamp
13 Heating Zone
14 Controller Units
15 Fumex Exhaust
16 Power Supply Connection
17 Cooling Exhaust Machine
18 USB Connector
19 Identification Panel
20 Power Switch

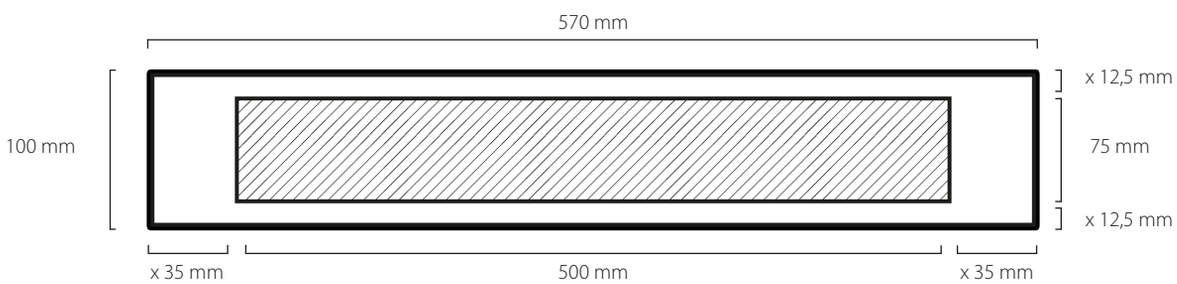
7 INSTRUMENT PREPARATIONS

7.1 Start-up sequence

- Start the control computer or laptop.
- Once windows is launched start the TQC CureView.
- After 3 beeps the initiation of the TQC CureView in completed.
- Start the GOC software.

7.2 Test Panels

Prepare the panel as required by the test to performed. Make sure that no wet/uncured paint or any other chemicals are applied at the area's used by the probes or pins. Only below depicted area can be used.



7.3 Calibration interval

The TQC CureView is supplied with 4 controllers each measuring and controlling 8 channels. TQC advises to have an annual calibration interval. Contact TQC or a local representative for information on how to calibrate the TQC CureView.

7.4 Lamp maintenance

The carefully selected TQC Infra red heaters have a life expectancy of at least 5000 burn hours. In end this depends on the use of the lamps.

The replacement of the lamps should be performed as mentioned in the chapter: "Replacing the Heater lamps" and should only be done by authorized personnel.

7.5 Software

The TQC CureView operates in conjuction with Gradient Oven Control and Ideal Finish software.

8 OPERATION

8.1 Preparatory Work

• Turn the machine on as described earlier.

8.2 Sample preparation

Prepare a sample suitable for conducting the tests as required, and suitable for the TQC CureView.

8.3 Start the instrument

Start the instrument following the steps listed in Section 12.

9 CARE

- Always clean the instrument after use.
- Clean the instrument using a soft dry cloth. Never clean the instrument by any mechanical means such as a wire brush or abrasive paper. This may cause, just like the use of aggressive cleaning agents, permanent damage.
- Do not use compressed air to clean the instrument.

Make sure that no paint or other liquids are spilled on the electronics or left in the holes.

9.1 Disposal of Materials

Disposal of materials used in the operation of the instrument or for auxiliary functions and exchanged items should be dealt with safety and in a manner that will not harm the environment. Follow the local regulations.

9.2 Customer Service

Customer service is provided on request by
TQC – Molenbaan 19 , 2908LL Capelle aan den IJssel - The Netherlands,
T +31(0)10 7900100, F +31 (0)10 7900129 or by local representatives.

10 INSTALLATION CRITERIA

The TQC CureView is designed to operate in general lab conditions on a sturdy worktable. In order to create the safest work environment possible below requirements should met.

10.1 Climate

It is recommended to operate the TQC CureView in a temperature stable environment. Due to the general tests performed with the TQC CureView a climate controlled environment is advised having 20-25˚C / 68-77˚F and 40 – 60 %rH. Other ranges of temperature and humidity can limit the minimal programmable temperature of the machine. For example if the ambient temperature is 35˚C / 95˚F the minimal programmable temperature is approximately 10˚C / 50˚F higher.

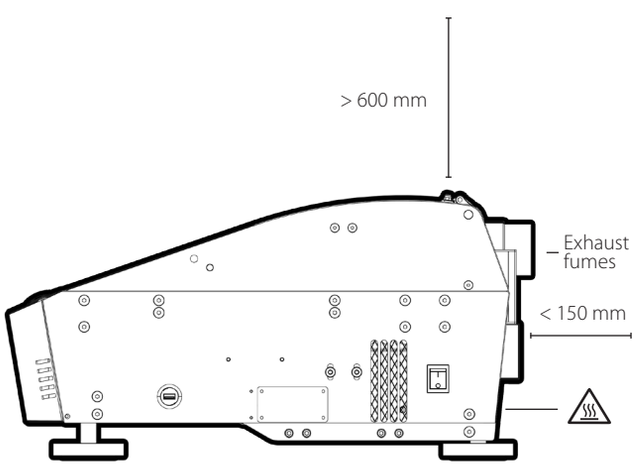
10.2 Power Supply

The TQC CureView is designed to operate at 220 - 240V / 50/60Hz power supply, this due to the power consumption of 3500W. For the 230V /60Hz equipped countries the 3500W is together with the laptop the maximum power that can be drawn from a fuse. The CureView should be run on a dedicated fuse. The TQC CureView cannot be connected to 110V power supply. When the TQC CureView is intended for use in 110V countries the CureView needs to be connected to Split phase power supply. Please consort a suitable trained technician to verify the power supply.

There should be a second power plug available to connect the laptop.

10.3 Worktable

A suitable and sturdy table needs to be selected with sufficient depth and clearance above the table to operate the TQC CureView. No power supplies, sockets or such may be placed behind the CureView that could block or be affected by the heat exhaust in the rear of the CureView. The worktable should be able to support 40 kg / 88.18 lbs of load and allow for placement of the CureView with following clearances. The height of the table should be selected such that ergonomic and safe operation is the machine is possible. Please consult local guidelines and regulations.



10.4 Exhaust system

The CureView has a self-powered fume exhaust system mounted on the rear. This system is created to allow fumes emanating from the test panel to be expelled safely. The CureView may be connected to an already existing ventilation system when this is a system without forced convection. If the ventilation system has forced convention care should be taken not to disturb the flow of air in the CureView.

10.5 Installation procedure

Verify that above criteria are met. If above criteria are met proceed as followed:

1. Remove all packaging material from the CureView and store it for possible later use.
2. Lift the CureView onto the the worktable by lifting it with 2 persons. Each grabing the machine from the side.
3. Connect the exhaust.
4. Connect the power supply.
5. Place the USB cable.
6. Install the supplied laptop.
7. Connect the USB cable to the laptop
8. Power up the TQC CureView.
9. Power up the laptop.
10. Verify that 2 beeps are sounded from the gradient oven.
11. Start the Gradient Oven Control software.
12. No error message should be shown.

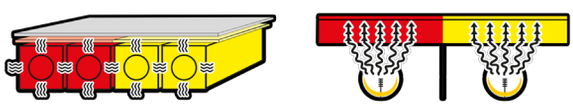
11 THERMAL DYNAMICS

11.1 General

Even though the CureView is designed to the highest specifications possible the CureView has limitations. We simply are not able to go beyond the laws of physics. In order to explain some of the limitations of the TQC CureView the following chapter will include some of the intricacies of thermal dynamics involved with using the CureView.

11.2 Basics of Gradient Ovens:

The TQC CureView is a new generation of Gradient-ovens that allows for significantly more advanced tests and doesn't require preheating. The implementation of the latest heating techniques in the TQC CureView provide a different heat transfer compared to that of older systems with conventional heating. The direct IR-irradiation by the TQC CureView allows for a significantly more efficient heating than traditional gradient oven systems. Due to this new heating system multiple components and procedures had to be changed in the machine. Below is a simplified image highlighting the difference in build of conventional systems and the new TQC CureView.



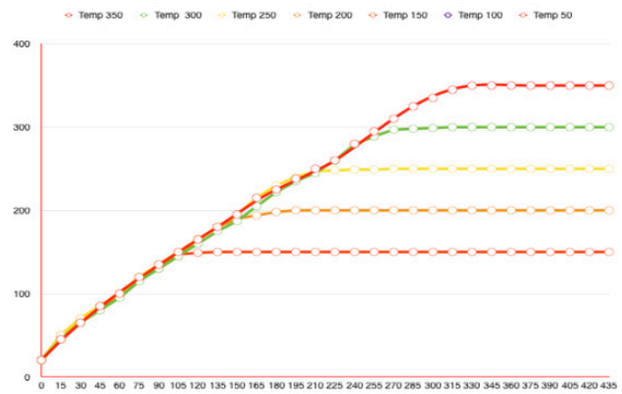
Conventional heating IR-heating

Due to the difference in construction the heat transfer is significantly different. Where the older systems work based on conduction of heat the TQC CureView is based on transmittance of energy by IR-radiation. Older Gradient ovens often suffer from loss in efficiency by improper contact between the heating element, glass-bed and/or test panel. Because older models have the thermocouple installed directly at the heater, they have been compensated for the offset that occurs due to the different contacts required to transfer the heat. Any small misalignment or other problem will result in a loss of efficiency. This will cause significant differences in the temperature of the test-panel. The TQC CureView is created such that it regulates the heaters based on the temperature probe that is positioned on top of the panel, thus at the actual spot where the temperature is relevant. When comparing old and new systems side by side there might be a temperature offset that has to be accounted for. This off-set is due to deviation from older machines. Where test were set to be performed at 180˚C / 356˚F they could actually have been performed at 150˚C / 302˚F. This off-set varies depending on the condition of the old machines. To determine this off-set it is recommended to measure the actual temperature obtained on the surface of the test panel.

Due to the new and improved heating systems no preheating is required. This eliminates an irregular heating of the panel and allows for a repeatable ramping of the temperature on the panel. The ramping is controlled and will follow the same slope for all temperatures. The ramping for the heating can be programmed in the Gradient oven. Below graph shows a default slope being equal for all set point temperatures.

All following examples of ramping and heating graphs are generalized and not correlated to a specific substrate or ramp speed unless otherwise stated.

In the following graph the vertical axis shows the temperature in ˚C and the horizontal axis displays the time (s). All set temperatures follow the same ramp. Adjusting the ramp value can control the ramp slope.



11.3 Substrate material

The main influence for differences between tests is the substrate that tests are performed on. Different substrates react differently to heat. Some substrate function as an isolator and others as an excellent conductor of heat. This ability or it's lack to conduct heat determine the maximal temperature difference between 2 heaters. On a well conducting material the difference between 2 elements is lower than on a less conducting substrate. The property of metals to conduct heat is a temperature dependent function. If a gradient from 25˚C to 125˚C / 77˚F to 257˚F is obtainable this doesn't mean that 125°C to 225°C / 257˚F to 437˚F is possible as well or vice versa. In order to test for the suitability of a program and/or substrate it is advised to run a test-run on uncoated substrate prior to performing the real test.

Full thermal properties of a substrate can be calculated. Full calculations and factors can be found in the " Handbook of Chemistry and physics." Calculating the thermal response of panels is however tricky due to the large number of variables.

11.4 Surrounding / environmental conditions.

The TQC CureView has been designed such that it will keep draft away from the panel but still allow the panel to be visible. Though the Cureview is designed to eliminate as many influences as possible. Small fluctuations in the heating behavior can be caused by changes in temperature and humidity of the surrounding air. These parameters not only influence the heating capabilities of the CureView but in more significant manner the evaporation of samples as tested according the ISO 2812-5 or curing of powder coatings. Stable laboratory conditions are required to create reproducible results. Please consult internal guidelines or international standards for the required climatic conditions required for the performed test.

11.5 Ramping

The TQC CureView can be set for custom ramping speeds. A Ramping indicates the speed in degree per second the CureView will heat a panel. The selected ramping will influence the amount of heat generated by the lamps. The generated heat needs to flow from the bottom of the panel to the top prior to being detected by the probes. This process depends on the thermal properties of the test panel. Thickness, material type, surface finishing and set end temperature all influence the thermal response. If the ramping is set to high there might be an overshoot of the set temperature.

12 CONTROL SOFTWARE MANUAL

12.1 Introduction

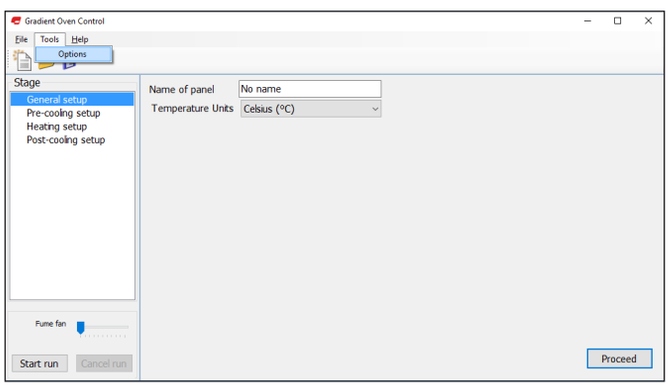
This document describes the TQC Gradient Oven Control Software (GOC) version 1.11, which allows you to setup and run elevated temperature tests in the Gradient Oven. The GOC is driving the instruments actuators, heaters and sensors. The GOC works in conjunction with the TQC Ideal Finish analysis software (IFA), which receives and displays the temperature profile data from the GOC.

12.2 Prerequisite

In order to view and analyze temperature profiles the TQC Ideal Finish Analysis Software version 6.0 or higher has to be present on the same computer.

12. 3 Program configuration

Before starting a test it is good practice to configure two settings of the GOC located in the tools menu.



Tools -> Option

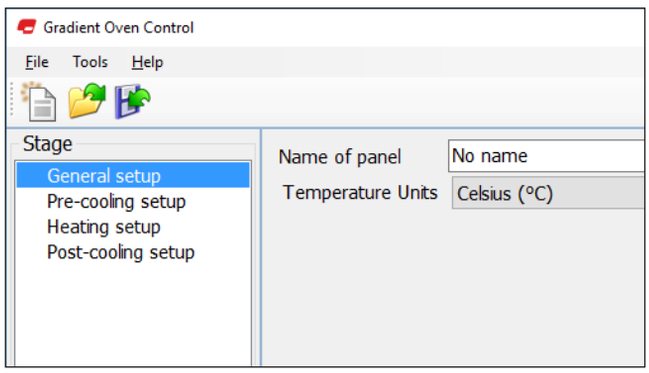
GOC File Locations:
Specify where the GOC configuration files shall be saved to a storage device, file extension *.goc.
The configuration file describes various test parameters that are used during a test, for example panel name, duration and temperature parameters of the test. All these parameters are configured in the software setup mode.

Default temperature Units:
Specify in which temperature units the GOC shall display its values by default.

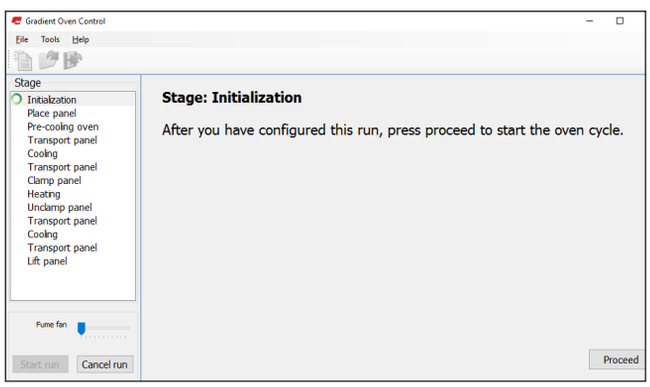
12.4 Modes and stages

The Gradient Oven Control software has two modes a setup mode and a run mode. The program starts up in the setup mode showing the setup stage enumerator, which guides the user through the setup in four steps. Once setup is completed and the run is started the program will switch to run mode, showing the run stage enumerator with the thirteen stages from begin to the end of the test.

Setup mode

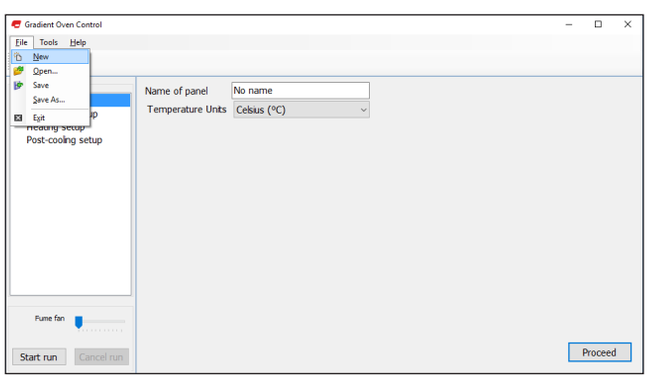


Run mode



12.5 Configure a test in setup mode

The setup stage enumerator shows the four stages that are configured manually and which can be saved to a storage device for future use. The basic commands New, Open and Save to handle configuration files are grouped together in the menu bar and in the tool bar.



New:
Create a new test configuration.

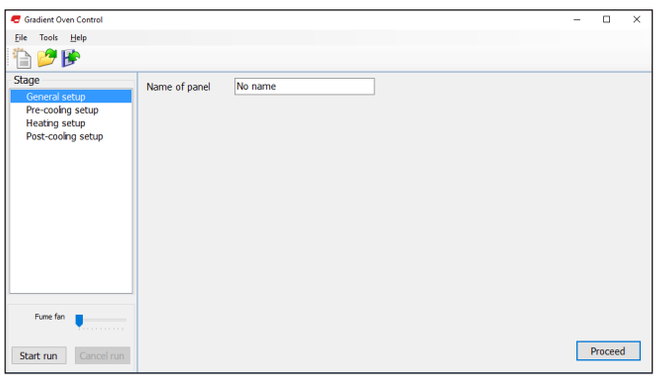
Open:
Open a saved test configuration file.

Save:
Save a test configuration to file on a storage device.

Save As…:
Save a test configuration to file with another name on a storage device.

12.5.1 General setup

Use the general setup page to specify a name for the panel under test. In IFA the name of panel will be used as identification for the temperature profile. Use Temperature units to override the default setting in this configuration only.



Start run:

Command to switch the program in run mode and skip any remaining steps from the setup mode stage enumerator. Use this command to switch to run mode instantly for example after opening a configuration file.

Cancel run:

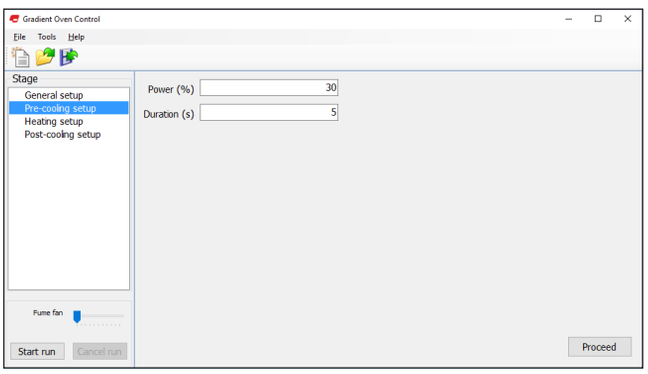
Command to cancel the current run and switch to program to setup mode. Use the red button on the front of the gradient oven to obtain the same result.

Proceed:

Command to step to the next stage in the setup mode stage enumerator, obtain the same result as selecting a stage by mouse. The command will switch the program into run mode if the Pre-cooling stage was previously selected. Use the green button on the front of the gradient oven to obtain the same result.

12.5.2 Pre-cooling setup

The gradient oven cooling zone consists of five Peltier cooling elements that can cool down the panel under test. The cooling zone is not temperature controlled and only driven by a predefined power and duration. Use the pre-cooling setup to configure the cooling power and duration in the cooling zone that shall be applied to the panel under test prior to the heating stage.



Power (%):

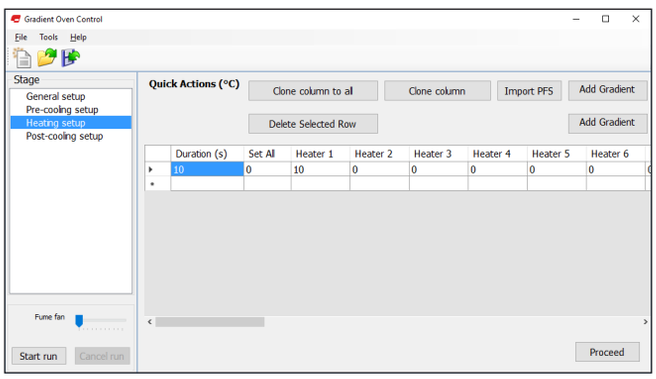
Defines the amount of cooling in percentage of the gradient oven cooling system.

Duration (s):

Defines the amount of time in seconds that the cooling shall be applied.

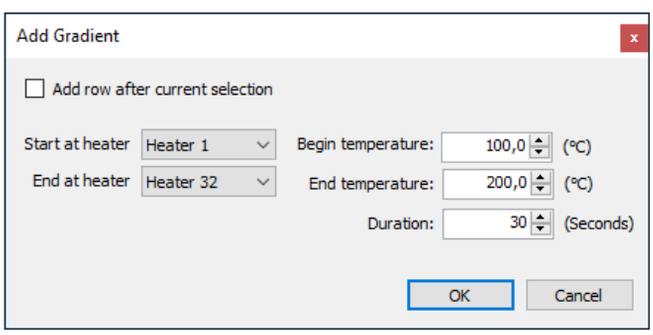
12.5.3 Heating setup

The gradient oven heating zone consists of thirty two heating elements, which are displayed in one record in the program. Each heating element has its own temperature set point. The duration is set for all thirty two heating elements at once. The individual heating settings allow applying a temperature gradient over the length of the panel, whereas multiple records allow applying a temperature gradient in time.



Use the column Set All to add an identical value to all heaters at once.

Add gradient:
Command to configure a temperature gradient from and to a specie temperature, the control will automatically calculate all values between the lowest and highest temperature setting.



Add row after current selection:
By default a row is inserted before the selected row, check this option to insert a row after the current selection.

Start at heater:
Specify the heater from which the gradient shall begin.

Begin temperature:
Specify the start temperature at the heater specified at Start at heater.

End at heater:
Specify the heater at which the gradient shall end.

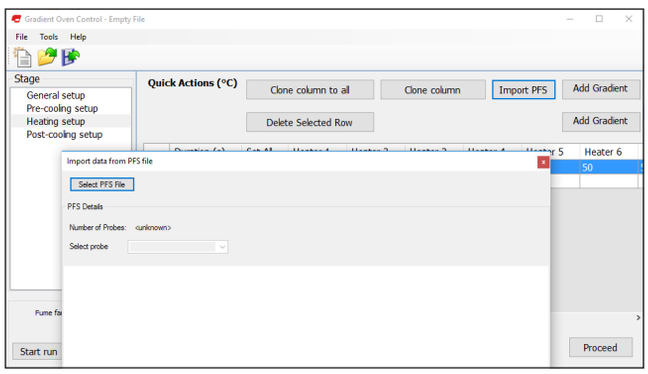
End temperature:
Specify the stop temperature at the heater specified at End at heater.

Duration:
Specify the duration of this gradient heating cycle.

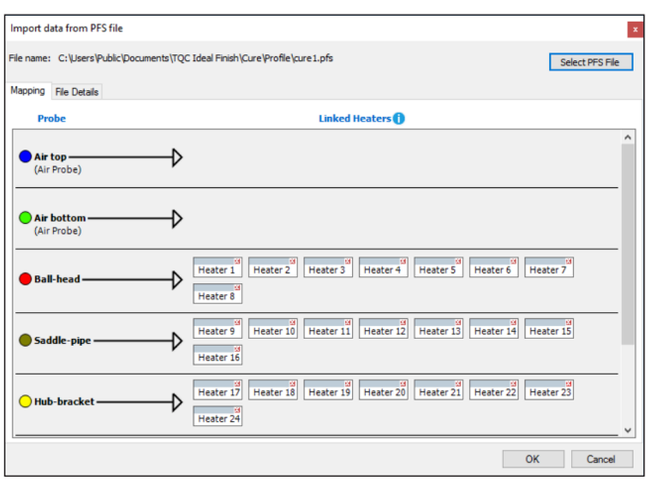
Clone column to right:
Command to copy one heater to all other heaters to the right of the selected heater.

Delete row:
Command to delete the selected row.

Import PFS:
Command to import IFA profiles, generated from GOC or from CurveX measured temperature data.



Select PFS File:
Command to select the IFA temperature profile for import. After import the Mapping tab shows the imported temperature profile for each probe on the left and the gradient oven heaters to which these probes will link on the right.



The link between probes and heaters can be changed by drag and drop a heater onto the desired probe.

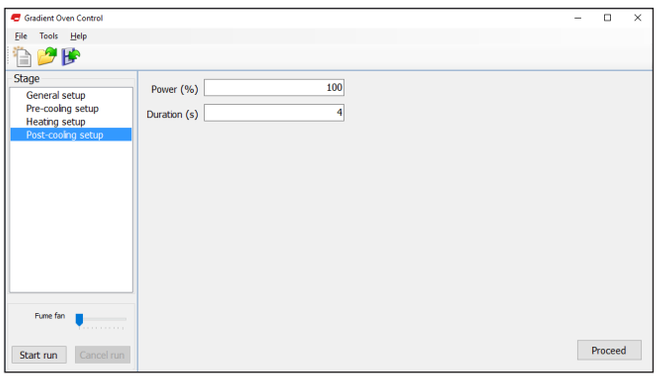
Use the white/red close window command to remove a heater from the assigned probe, the heater will move to the Not allocated to a probe section at the bottom of the window.

Click the Heater windows to rotate the heater order.

File Details:
Use the file tab to view the imported temperature probes in a graph.

12.6 Execute a test in run mode

In the Post-cooling setup the two commands start run and proceed will act the same way and switch the program into run mode.



Start run:

Command to instantly switch the program into run mode and begin execution of the configured panel test. Once in run mode this command is disabled and the cancel run command is enabled, which allows cancel of the test in any run mode enumerator stage.

Proceed:

Command to begin execute the configured panel test.

Fume fan:

Command to control the exhaust fume fan. Use this control to flow off fume that may originate from the running test.

Cancel run:

Command to cancel the current run and switch to program to setup mode. Use the red button on the front of the gradient oven to obtain the same result.

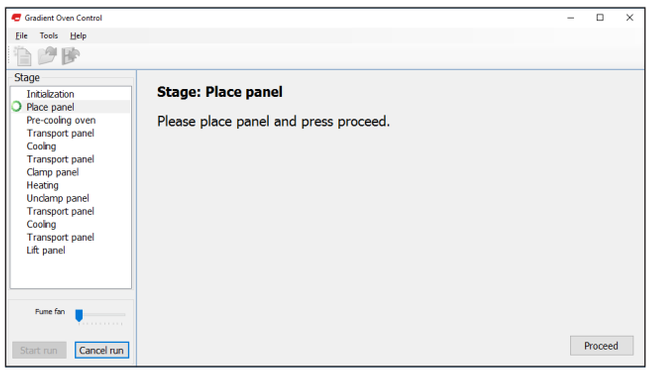
12.7 Initialization

In this stage the gradient oven will get ready for run mode. The run stage enumerator shows the thirteen stages that a panel test follows. The stages include loading the panel into the oven loading area, where after the panel is transported to the cooling area followed by a transport to the heating area.

After the test the process is reverted and the panel returns to the loading area.

12.8 Place panel

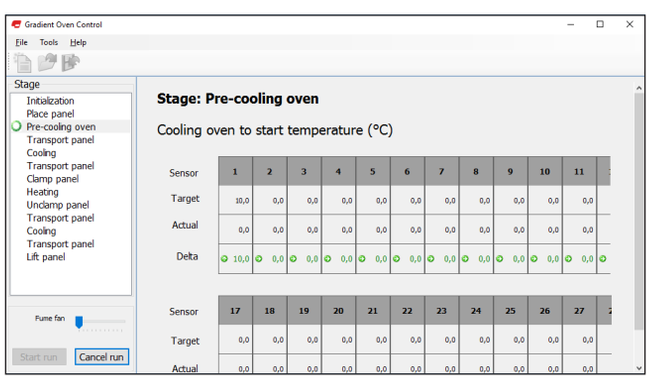
The gradient oven carrier is waiting in the loading area allowing placement of the panel into the carrier.



Once this stage is completed press Proceed.

12.9 Pre-cooling oven

In this stage the gradient oven clamp is lowered onto the heaters to verify that the heating zone is cooler than the configured oven test panel temperature. Each probe must measure an actual temperature that is lower than the target temperature before the gradient oven transports the panel any further. In case the system temperature is higher the gradient oven internal fan will switch on at 100% until all probes are measuring a temperature lower than the configured temperature.



Configure a target temperature that is at least higher than ambient temperature in order to avoid the oven to wait for a condition that can't be met.

Transport panel

The panel is transported from loading to cooling area.

Cooling

The panel is cooled down according to the configured Pre-cooling setup.

Transport panel

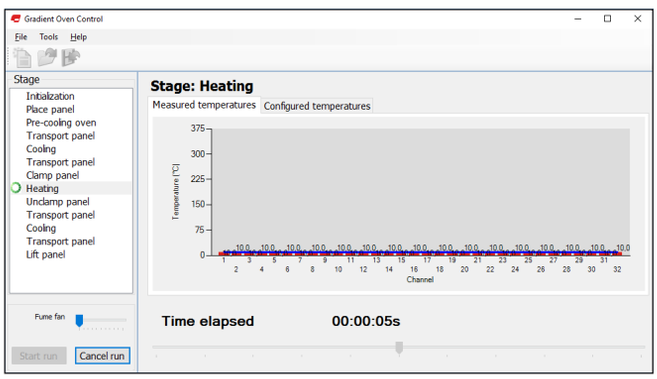
The panel is transported from cooling to heating area.

Clamp panel

The panel is clamped onto the glass bed by the weight of the probes.

12.10 Heating

In this stage the gradient oven starts the heating cycle according to the configured heating setup.



Measured temperatures:

The graph displays the measured temperature (blue) vs the configured set temperatures.

Configured temperatures:

The graph display the set temperatures.

Unclamp panel

The heating stage is ended, the clamp is lifted and the probes are moved upwards in order to free the panel for transport.

Transport panel

The panel is transported from heating to cooling area.

Cooling

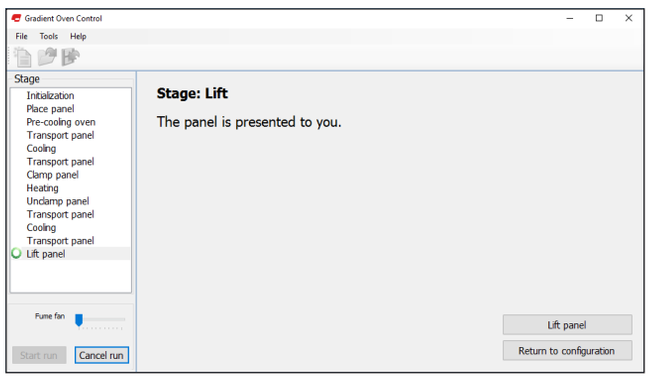
The panel is cooled down according to the configured Post-cooling setup.

Transport panel

The panel is transported from cooling to loading area.

12.11 Lift Panel

The panel is ready and presented to the user for analysis.



Lift panel:

Command to lift or lower the panel in the loading area.

Return to configuration:

Command to switch from Run mode to Setup mode where the next run is configured.

13 MAINTENANCE

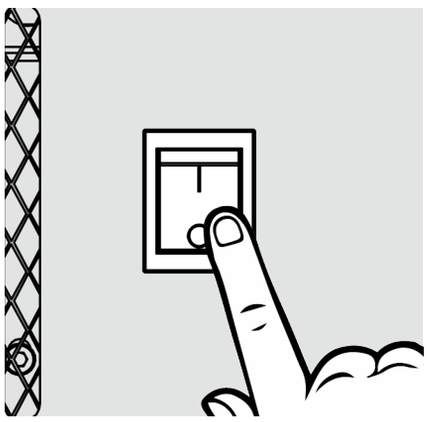
The TQC CureView is created such that a minimum of maintenance is required on an annual basis. Due to the temperature resistant materials used for the production only a hand full of components need to be checked and maintained. Maintenance of the TQC CureView should only be performed by competent personnel.

13.1 HEATER REPLACEMENT

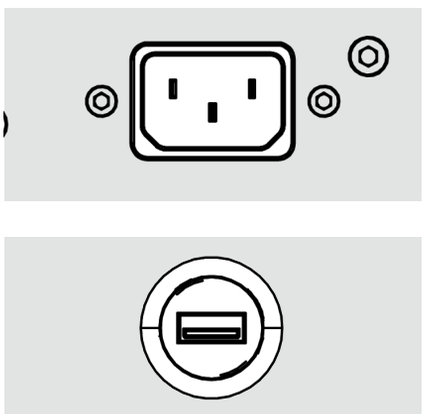
The TQC CureView uses IR heaters to heat the panel. These heaters have a limited life expectancy of 5000 burn hours. It is advised to replace the heaters on an annual basis. Older heaters can influence the performance of the TQC CureView and limit the ramping capabilities of the TQC CureView, or cause a significant loss in efficiency. Following procedure should be followed for replacing the heaters.

Frequency:
Annual replacement (adviced) or individual lamp replacement

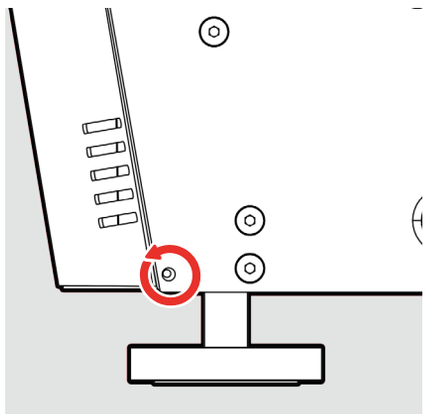
By:
Supervisor / TQC representative



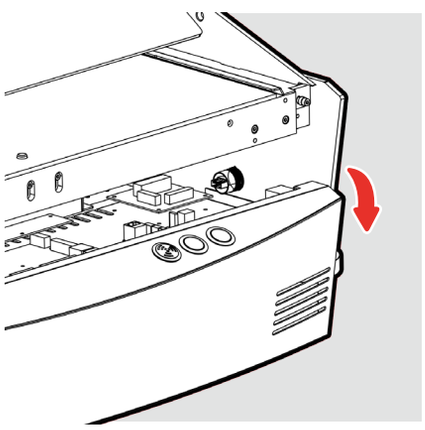
1 Turn machine off by using the switch button on the right side of the instrument.



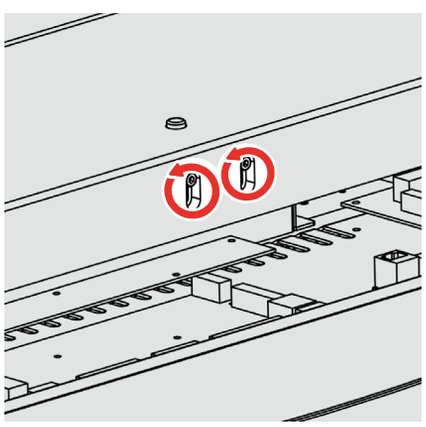
2 Disconnect power supply and USB cable.



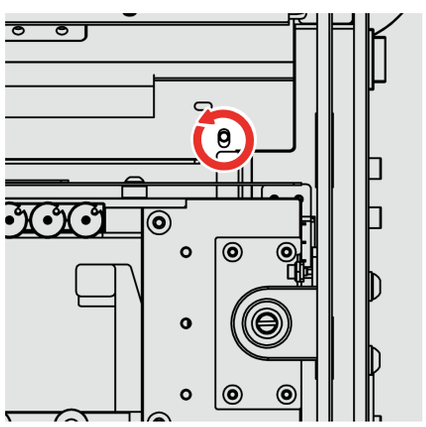
3 Unscrew frontpanel allen keys (2.5 mm) located one on each side to release front cover.



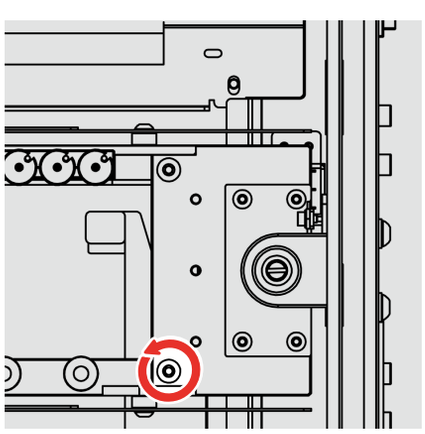
4 Slide front cover down and tilt to front.



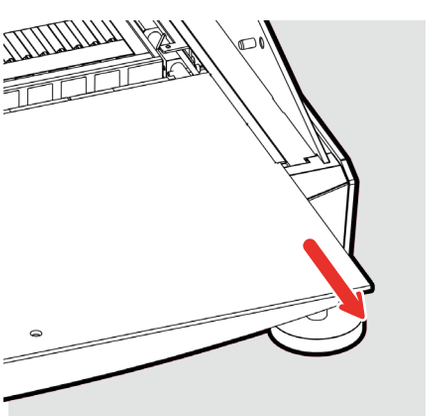
5 Loosen the 2 allen keys (3mm) that hold the panel lifter in place, and lower the panel lifter until it is below the glass bed.



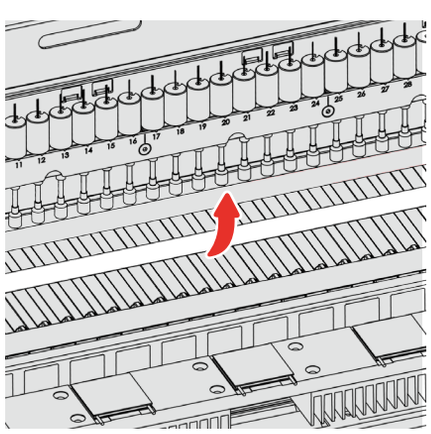
6 Open the glass top cover and loosen the 2 allen keys positioned on the rear corners of the glass bed.



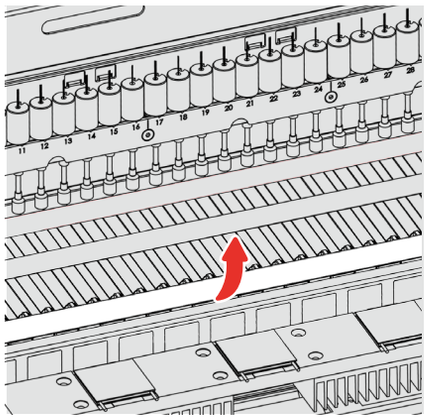
7 Remove the front pressure pin bar. By unscrewing the allen key (3mm) on each side and sliding it forward.



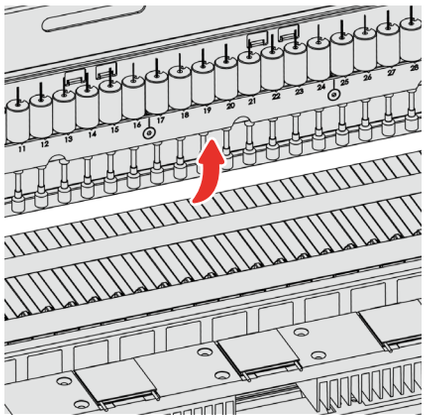
8 Slide the glass bed forward. This might take a little effort because the plate is still clapped at some placed.



9 Gently lift the middle deflector and store it.

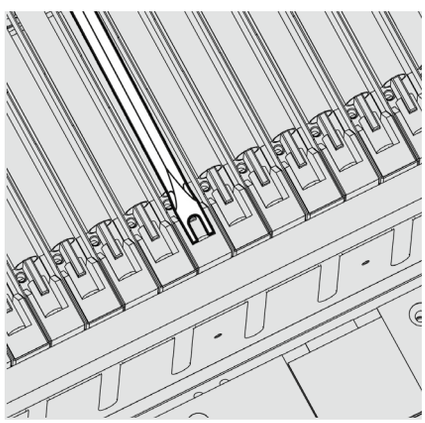


(10) Gently remove the front deflector by sliding it out upwards from between the lamps.

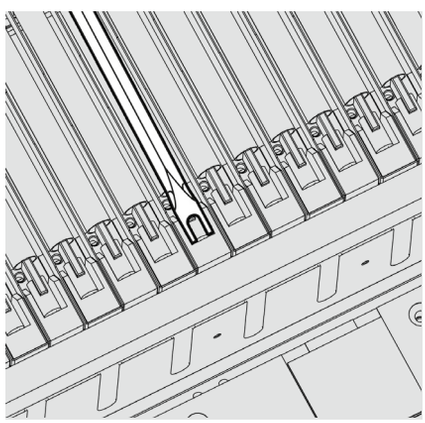


(11) Gently remove the back deflector by sliding it out upwards from between the lamps.

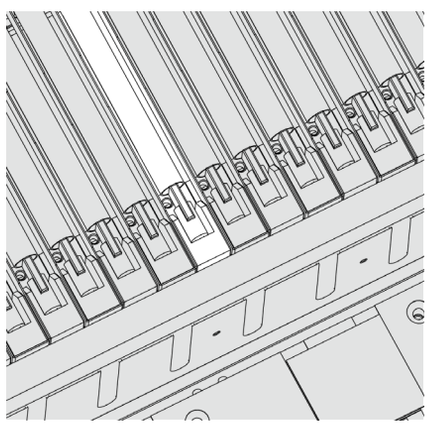
Before proceeding always wear the supplied cotton gloves to prevent contamination from the hands to be transferred to the lamps. Contamination on the heaters will significantly reduce the lifetime expectancy.



(12) Place the special heater tool between the heater and the socket, and lift the lamp out of its socket. Lift the front side of the heater with two hands. Pull it slightly to the front to release it from the rear socket and lower it out from under the rear deflector.

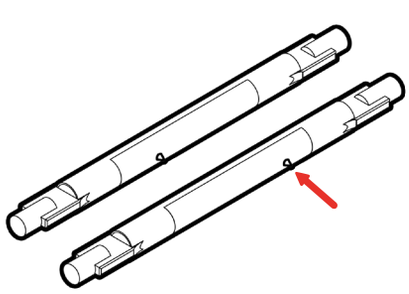


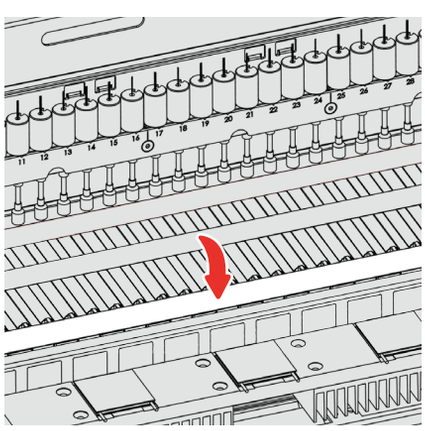
(13) Take the new heater from its protective package and place it in the same way as the original heater was positioned using the heater placement tool.



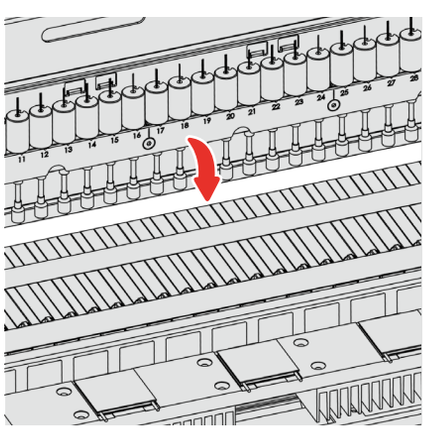
(14) Align the placed heater such that it is pointing upward. Assure all other lamps are correctly aligned as well.

The pin on the bottom of the heater must be positioned correctly. For a more uniform heat distribution these are mounted alternating. On the uneven positions on the back side and at the even to the front.

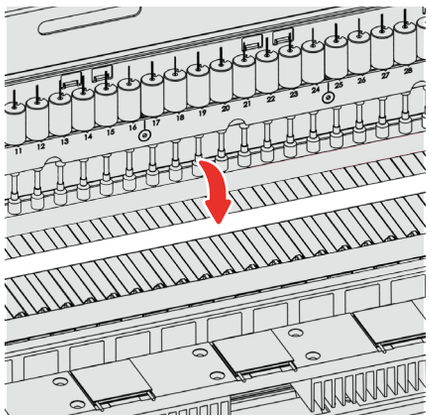




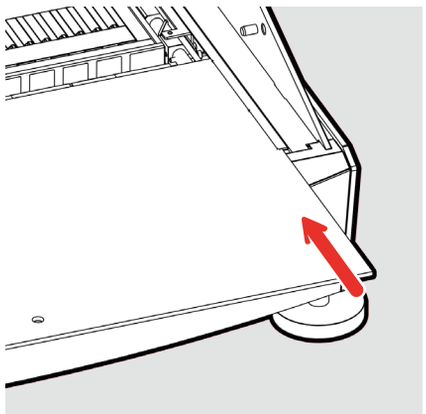
(15) Place the front deflector.



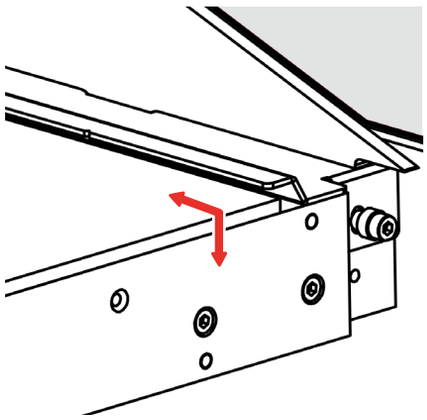
(16) Place the back deflector.



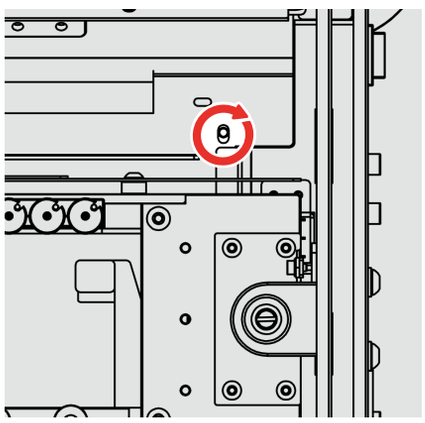
(17) Place the middle deflector.



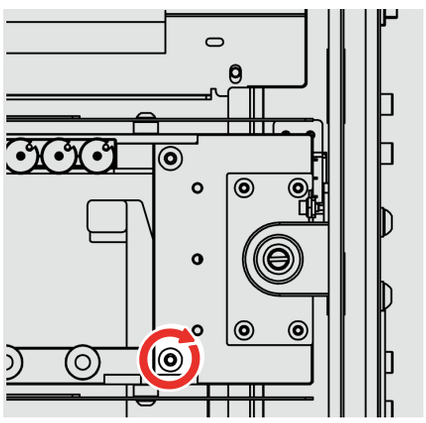
(18) Slide the glass bed gently back in place. Make sure it properly aligns to slide it in the last 1-2 cm.



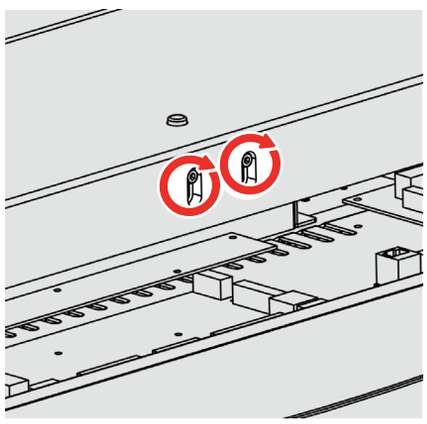
(19) Make sure the front of the glass bed in inline with the aluminum housing.



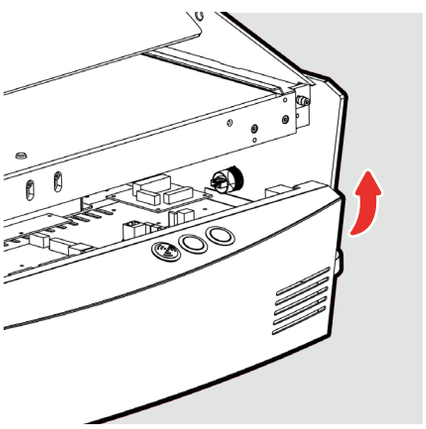
(20) Gently tighten the 2 rear allen keys that hold the glass bed in place.



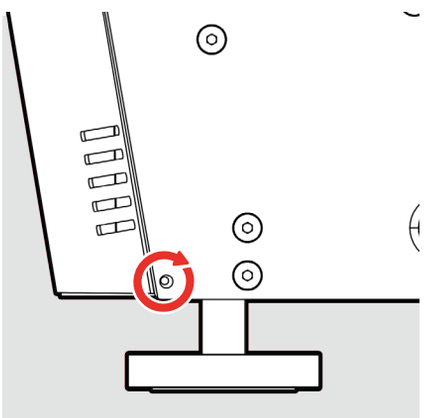
(21) Replace the front pressure pin bar, and fix the 2 allen keys.



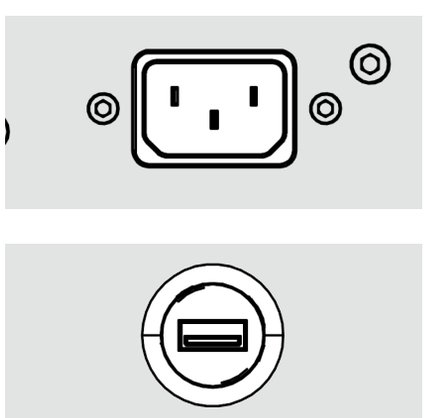
(22) Move the panel lifter back up. Make sure it sits.



(23) Replace the front cover and slide it upwards to fix it in place.



(24) Fix frontpanel allen keys (2.5 mm) located one on each side to release front cover.



(25) Connect power supply and USB cable. Verify with a test run that all lamps are functioning again.

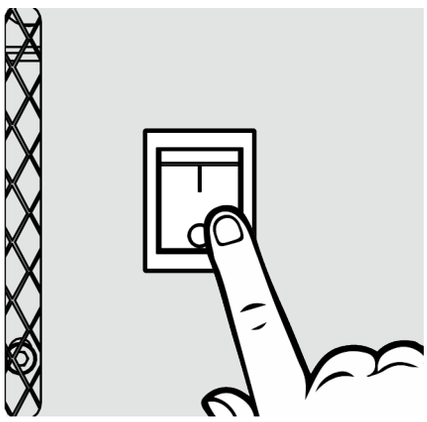
13.2 CONTROLLER REPLACEMENT

The TQC CureView is equipped with 4 temperature control units. These units allow for simple repairs and or placement of newly calibrated units. The calibration of these units is transferrable to the Gradient oven the controller will be placed on. Though appearing universal the controllers need to be placed at a specific location on the CureView. The locations are marked on the rear of the units. The units control the following heaters:

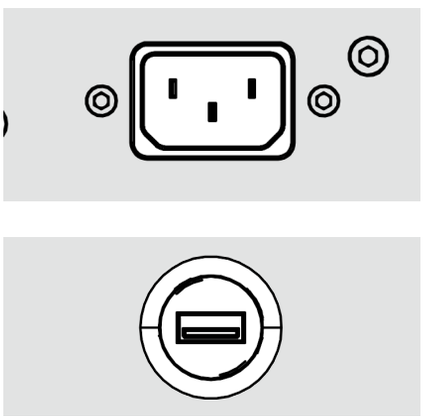
Unit 1	Heaters / probes 1- 8	**Unit 3**	Heaters / probes 17 - 24
Unit 2	Heaters / probes 9 - 16	**Unit 4**	Heaters / probes 25 - 32

Frequency:
Annual if required for calibration or individual for defect probe replacement.

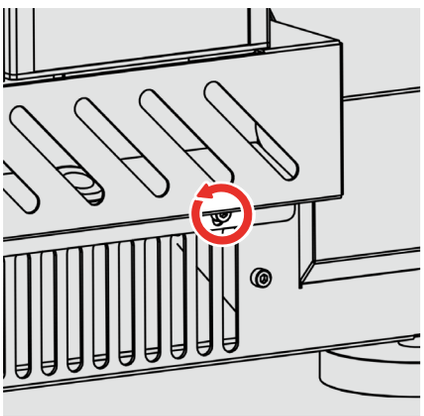
By:
Supervisor / TQC representative



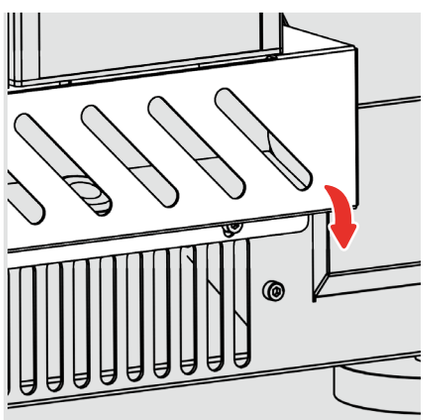
1 Turn machine off.



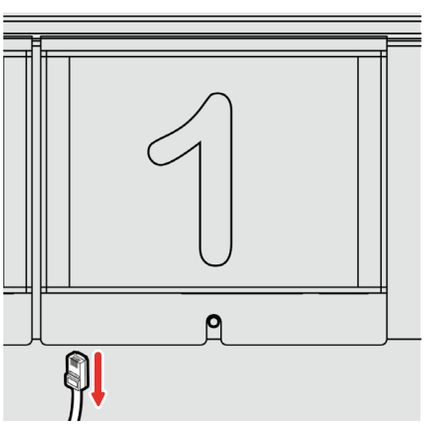
2 Disconnect power supply and USB cable.



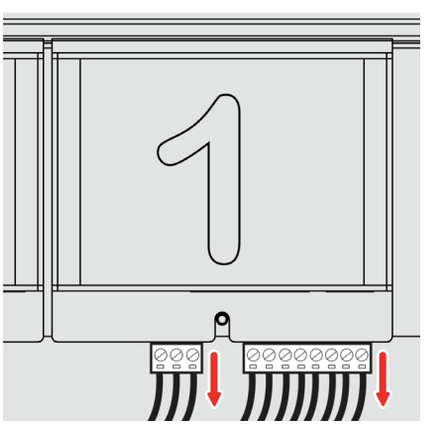
3 Unscrew the 2 allen keys (3mm) holding the rear cable cover in place.



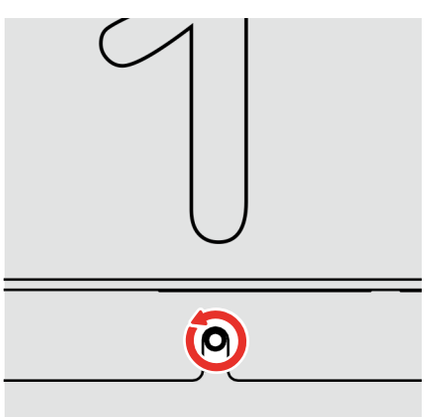
4 Slide the cover downward and tilt it out.



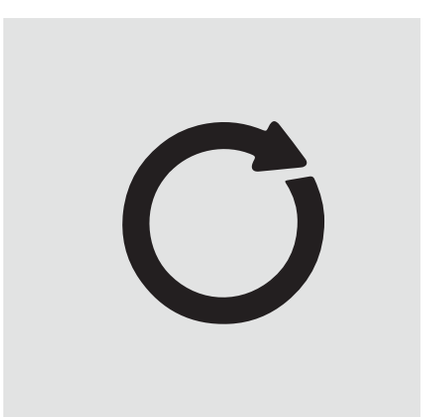
5 Disconnect the BUS-connector cable from the controller.



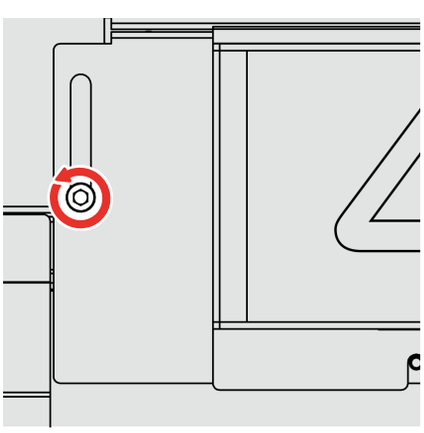
6 Disconnect the power and heater lead cables from the controller.



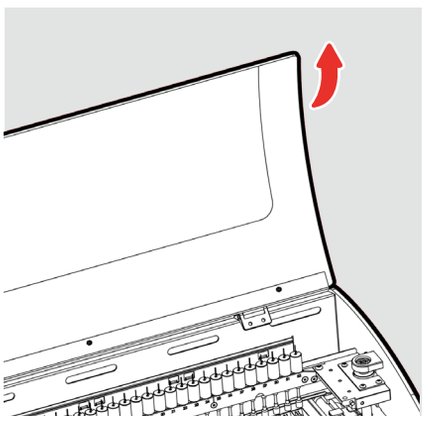
7 Unscrew the nut (7mm) below the controller.



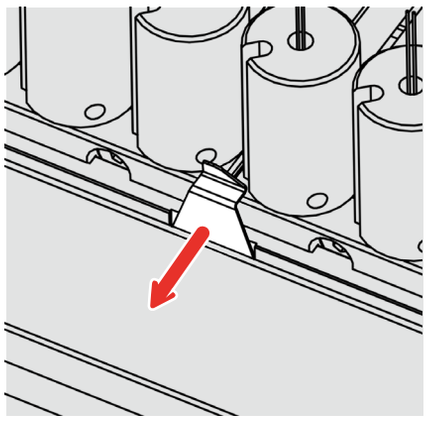
8 Repeat steps 5, 6 and 7 for all controllers that need to be disconnected.



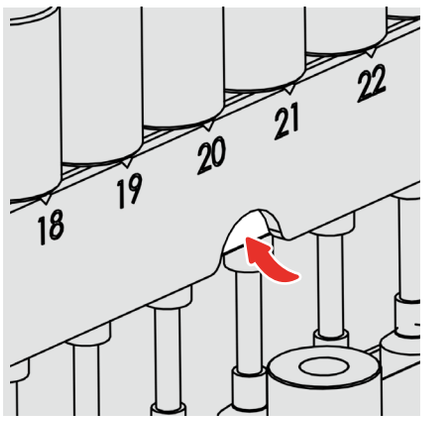
9 Loosen the 2 allen keys (3mm) on each side of the controller holder plate. Allowing the plate with the controllers to slide down.



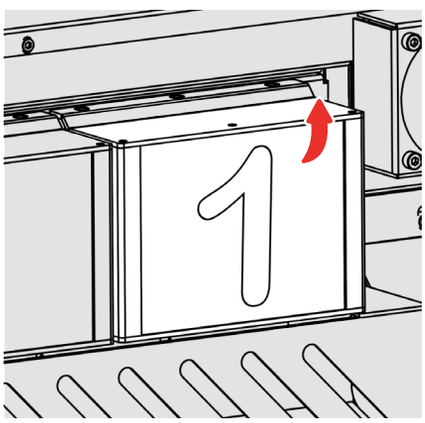
(10) Open the cover of the CureView.



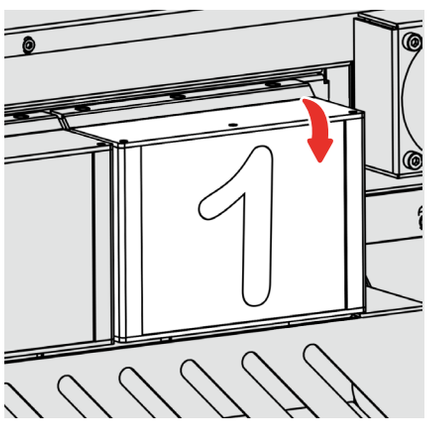
(11) Push the spring behind the probe block backward.



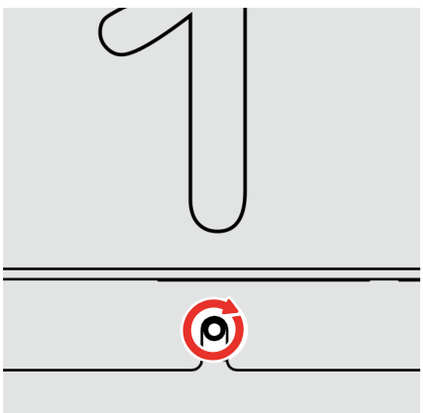
(12) Push back the base of the probe block at the notch and lift the probe block out.



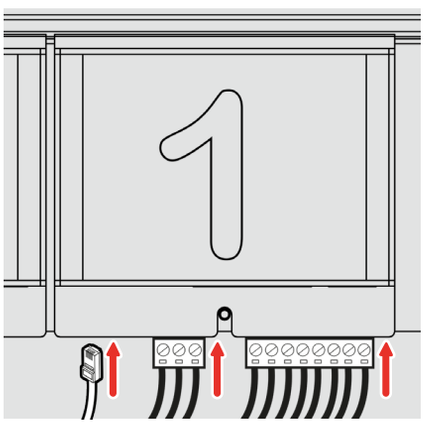
(13) Lift the controller and guide the probe block out through the back of the CureView.



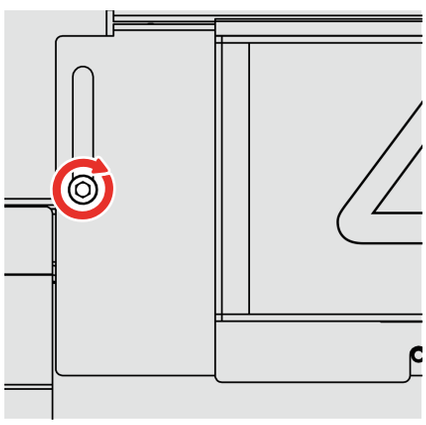
(14) Replace the controller with a new one. Take care not to switch the controllers or place them at the wrong locations. Do not exert force on the cables connecting the probe to the controller.



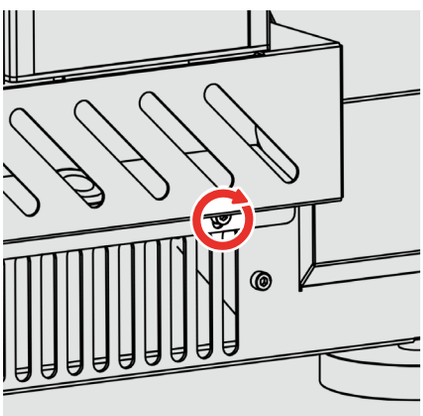
(15) Fix the nut below the controller.



(16) Reconnect the connectors. Take care the TQC-BUS connector(s) is/are placed correctly.



(17) Raise the controller holder plate and tighten the allen keys (3mm) on each side.



(18) Tilt and slide in the rear cable cover back in place. Fix the 2 allen keys to hold it in place.

If the cables prevent a smooth positioning. Use the allen key to gently push the cables down. To allow to slide the cable cover back in place.

14 DISCLAIMER

The right of technical modifications is reserved.

The information given in this manual is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this manual without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Whilst we endeavor to ensure that all advice we give about the product (whether in this manual or otherwise) is correct we have no control over either the quality or condition of the product or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this manual is liable to modification from time to time in the light of experience and our policy of continuous product development.

ANNEX A | OPERATOR QUALIFICATION LIST

Supervisor list (allowed to perform lamp replacement and such).

Date	Name	Signature	Instructed by	Signature

Operator list.

Date	Name	Signature	Instructed by	Signature

ANNEX B | MAINTENANCE LIST

Date	Action	Name	Signature
	Installed at test location.		
	First run performed.		

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