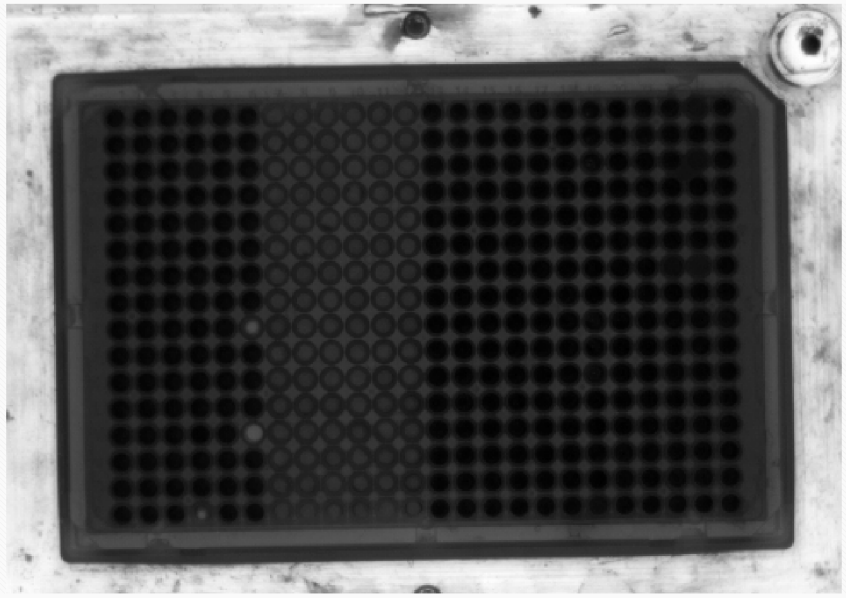
Ice Nucleation Controller – Manual

v. 2022-0.1

Mads Rosenhøj Jeppesen, Sigurd Agerskov Madsen

January 19, 2022



Abstract

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Contents

1 Safety Information

1.1 General safety instructions

DANGER
Danger to life or serious injury can occur when live parts are touched. Do not touch or modify electrical installations without proper training or guidance.

WARNING
Danger to life, serious injury, or equipment damage can occur due to incorrect handling of equipment. Only trained personnel may service and modify system.

CAUTION
Risk of skin irritation or burn when handling gallium. Always handle with care in both solid and liquid form.

CAUTION
Risk of adverse health effects from long-term use and high humidity build-up if not ventilated. Always operate system in properly ventilated room.

NOTICE
Risk of damage to sensitive equipment and/or loss of calibration due to incorrect handling. Always handle equipment marked SENSITIVE with care.

NOTICE
CAMERA lens...

2 Overview

2.1 Components

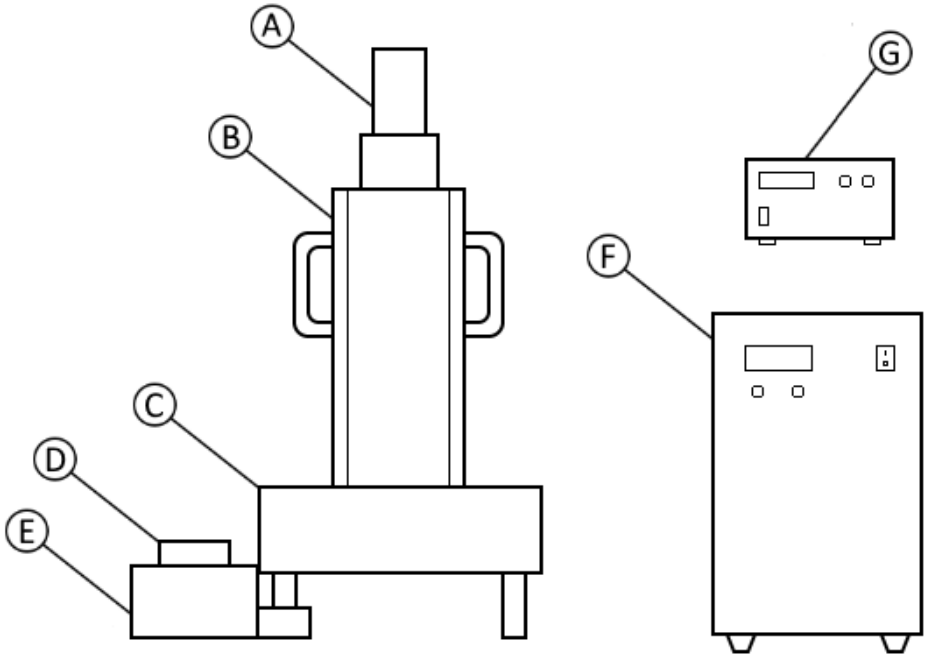


Figure 1: System Components.

2.2 Description

Component	Description	Notes	
A	Thermal Camera	FLIR A655sc (SENTIVE)	[1]
B	Camera Tower	-	
C	Cooling Base	Protruding Sensor Cables (SENTIVE)	
D	cDAQ Module	NI 9219 and cDAQ-9171	[2] [3]
E	Sensor PCB Housing	Protruding Sensor Cables (SENTIVE)	
F	Water Cooler	Alphacool Eiszeit 2000 Chiller	[4]
G	Peltier Power Supply	PeakTech (P1580)	[5]

3 Procedure

3.1 Starting the system

1. Plug in Main Power Cable .

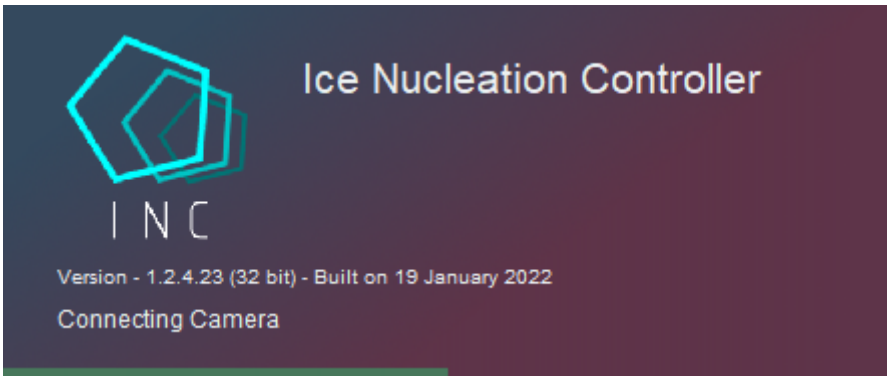
2. Start Water Pump It should beep once, if continuously beeping see X.

3. Start Power Supply It will write a sequence of start messages, once completed it should say either [O P OFF] or a low voltage and current (0 to 3 V).

4. Connect PC to USB-hub Only use USB 3.0 and above.

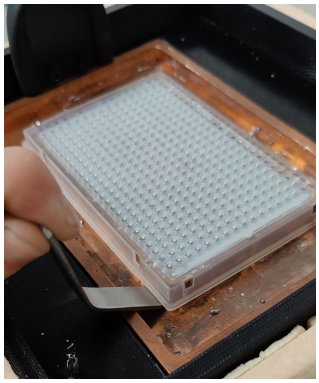
USB_PC_Connect.png

5. Start INC Software If everything is correctly setup no errors should appear.

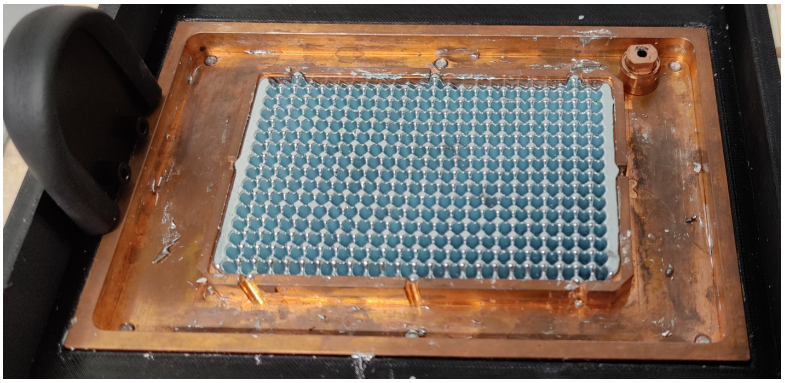


3.2 Preparing Sample

1. Remove Old PCR Plate use crowbar tool to remove previous PCR plate if present.

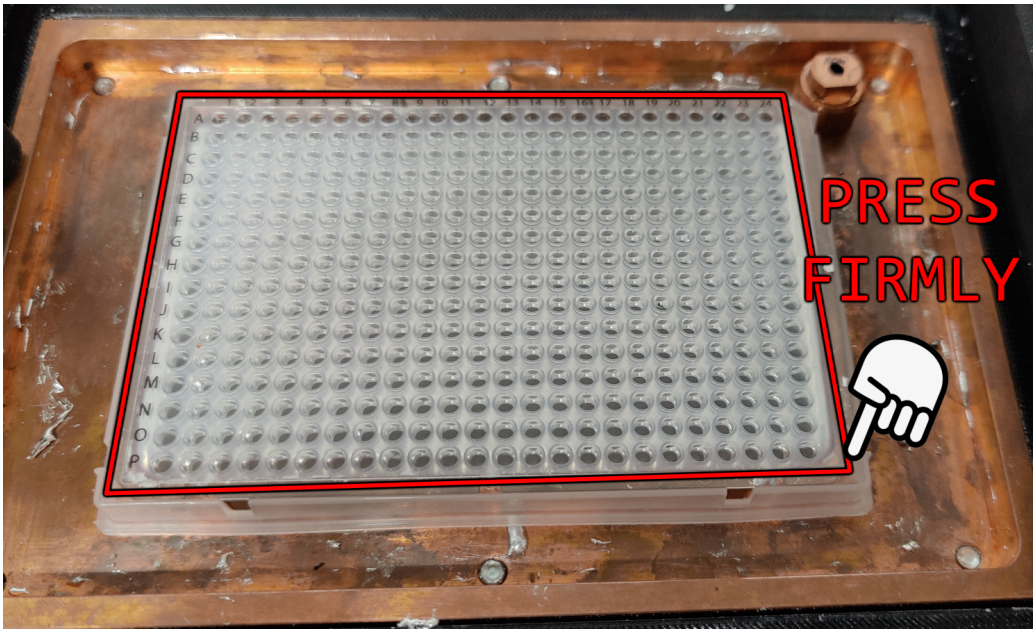


(a) Crowbar Tool

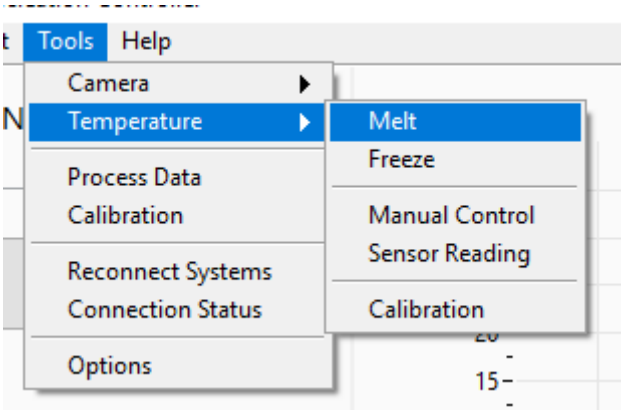


(b) PCR plate removed

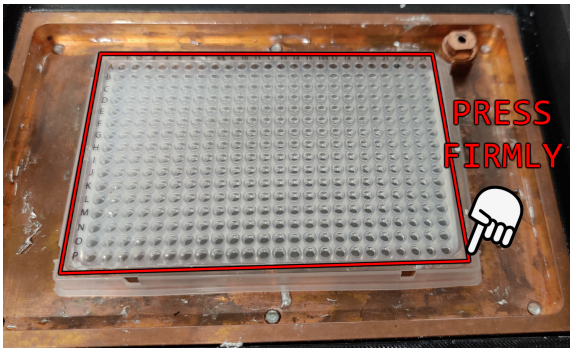
2. Insert New PCR Plate STERILE, make sure to press firmly on every corner and sides.



3. Melt Gallium with new PCR plate inserted Tools › Temperature › Melt. Wait until melting process is complete to continue.



4. When Gallium is melted, firmly press on every corner of PCR plate make sure PCR plate is firmly secured, pressing on each corner and side. Make sure to not press on the center of PCR plate as liquid gallium can spill out. See X in case of gallium spill.

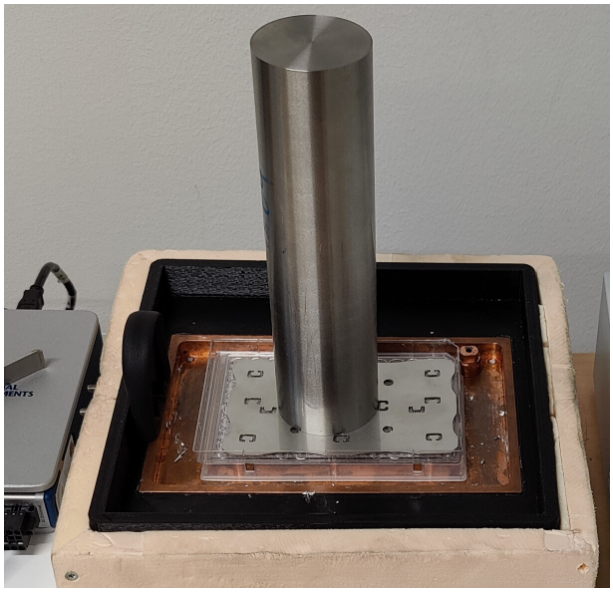


(a) Press along edge

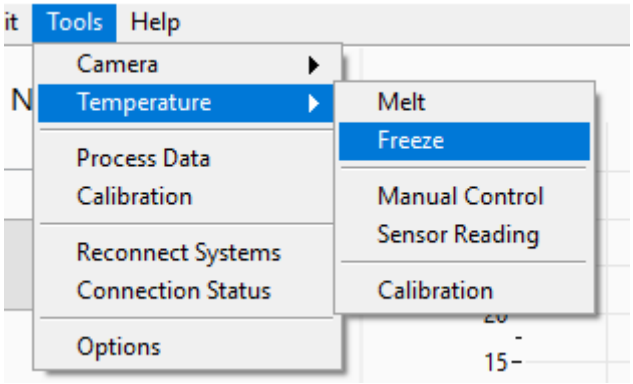
(b) DO NOT PRESS CENTER

DO NOT PRESS CENTER

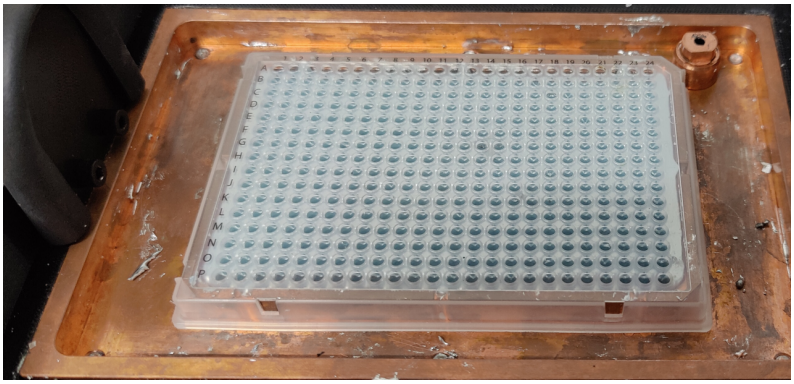
5. Place Lid, Plate and Weight STERILE on top of PCR plate to weigh down PCR plate during cooling process.



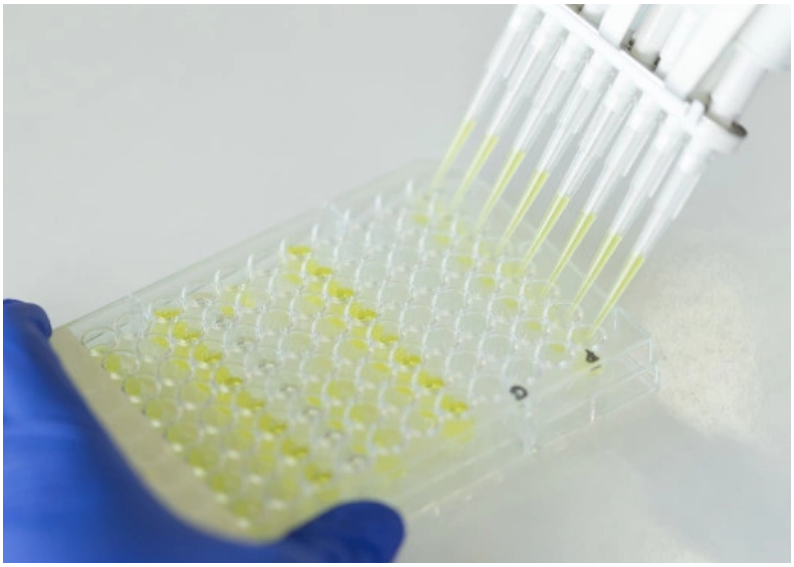
6. Freeze Gallium with Tools > Temperature > Freeze to ensure ideal thermal contact.



7. Remove Lid and Weight once freezing process is complete.



8. Fill PCR wells with desired content ...

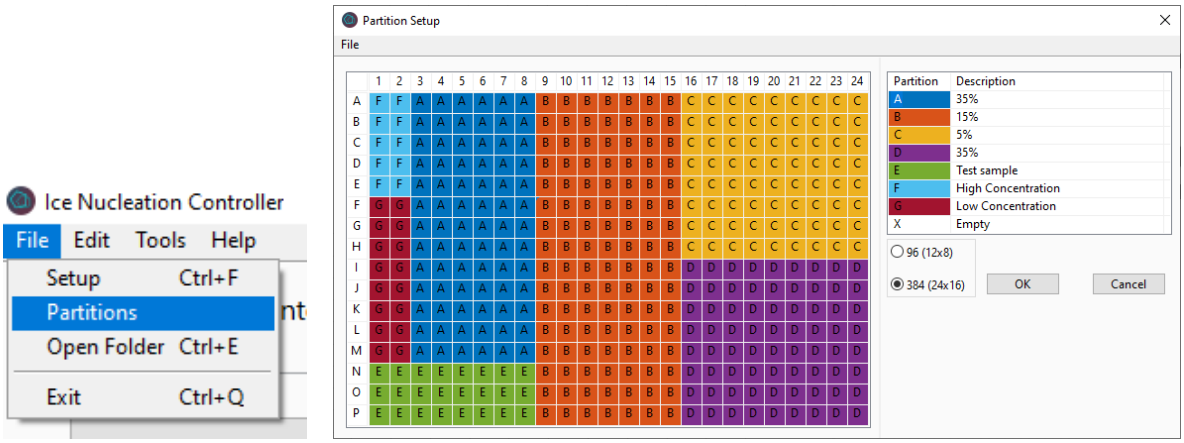


9. Place Camera Tower on Cooling Base make sure tower is firmly secured and pressed to the bottom.

CameraTowerPlaced.png

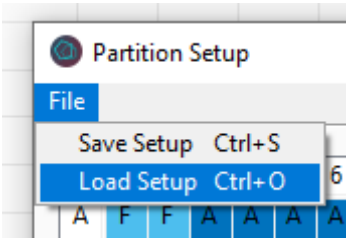
3.3 Configure Partitions

Open partition settings Files > Partitions.



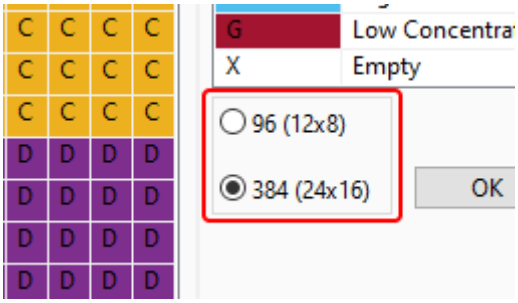
(a) Open Partitions (b) Partition Menu

Load Partition (Optional) Load and edit previously created partition setup. If none are available, create a new Partition Setup.

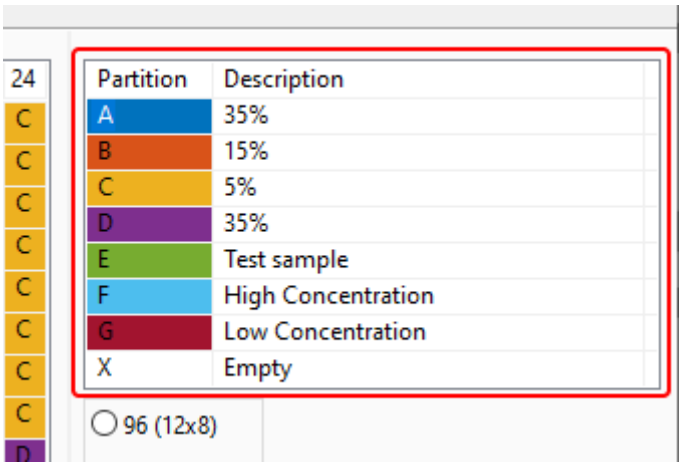


3.3.1 Creating a new Partition Setup

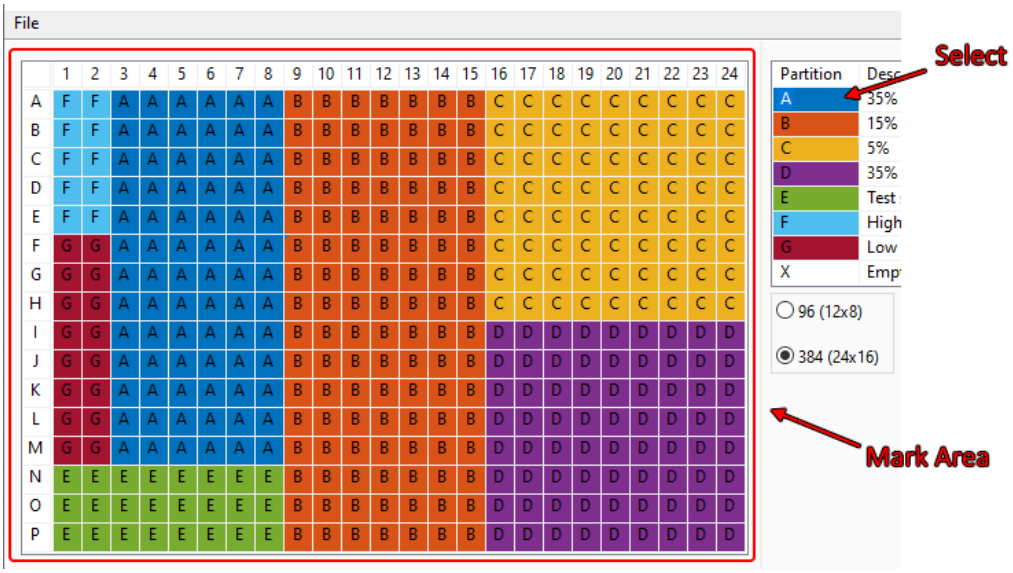
1. Select PCR size Select between 96 and 384.



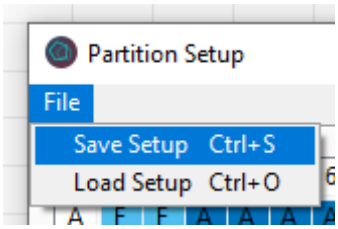
2. Configure Partitions Select partition and left click description to edit contents. Fill out as required.



3. Mark Partitions Select a partition (A, B, C, etc.). Mark an area of the PCR plate containing contents by left click and dragging. Fill out as required.

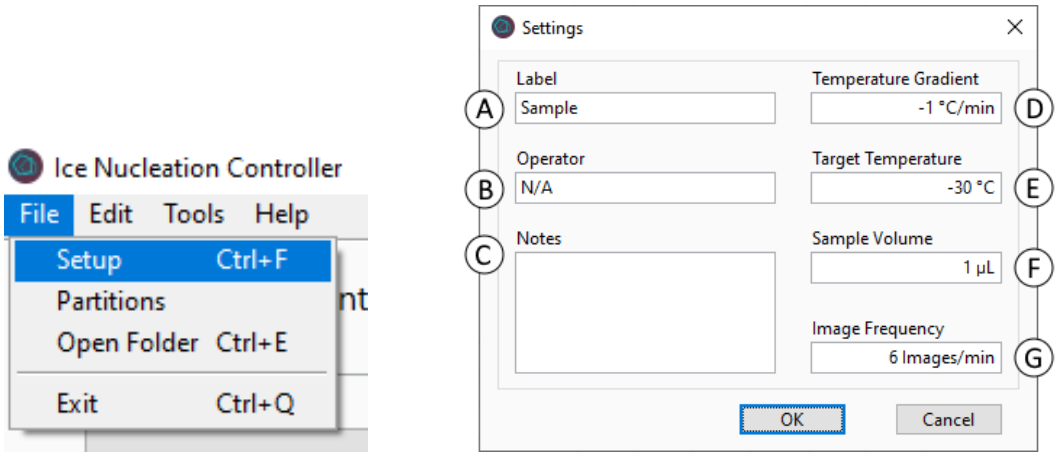


4. Save Partition (optional) Save created partition setup for future uses.



3.4 Configure Setup

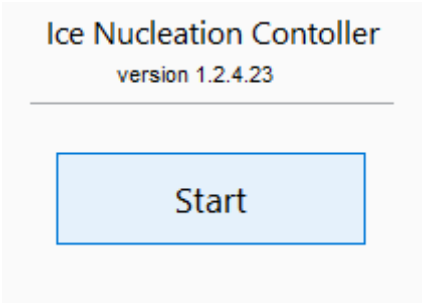
Open Setup settings Files > Setup and fill out.



	Description
A	Title of Experiment
B	Initials of operator
C	Any additional information
D	Target gradient of experiment
E	Ending temperature of experiment
F	Volume present in each PCR well
H	Camera and data output rate

3.5 Start Experiment

Once previous steps are completed press the START-button to start the experiment. Avoid shaking or moving any parts of the setup while experiment is running.



4 Common Errors

4.1 Thermal Camera

4.1.1 Connection Error

Reset, ip adresse, lens

4.2 Cooling Base

4.2.1 Gallium Spill

4.2.2 Water Leak

4.3 NI cDAQ Module

4.3.1 Connection Error

4.3.2 No Temperature Measurement

4.4 Water Pump

4.4.1 continuous Beeping

Disconnected Water, Too low Water Level

4.4.2 Water Temperature Too High

Room Temperature, Too high Gradient

4.4.3 Water Leak

Contact service

4.5 Power Supply Unit

4.5.1 Connection Error

4.5.2 No Output

4.6 Micro Controller Unit

4.6.1 Connection Error

4.6.2 No Output

4.7 Software

References

[1] https://www.flir.eu/products/a655sc/

[2] https://www.ni.com/da-dk/support/model.ni-9219.html

[3] https://www.ni.com/da-dk/support/model.cdaq-9171.html

[4] https://www.alphacool.com/shop/durchlaufkuehler/geraete/21410/alphacool-eiszeit-2000-chiller-black

[5] https://www.elfadistrelec.dk/da/laboratoriestromforsyning\-32v-30a-960w-justerbar-peaktech-p1580/p/11095172

[6] https://www.impactsubsea.co.uk/seaview/

[7] https://www.impactsubsea.co.uk/isd4000/