

VIA Freeze system User Manual

1. Revision History

Revision	Details	Date	Author
1	Initial issue	07/10/14	John Sendall
2	Graphics added	15/10/14	Matt Bateman
3	Restructure of document	20/10/14	Chris Creasey
4	Addition of images	25/10/14	Matt Bateman
5	Additions to text	26/10/14	Chris Creasey
6	Proof Reading and corrections	28/10/14	Stuart Milne
7	Proof Reading and corrections	30/10/14	Chris Creasey
A	Released	30/10/14	Stuart Milne
B	Images updated to reflect software	27/8/15	Chris Creasey
C	Images and menu structure updated	10/12/15	Ellis farmery
D	Moved menu structure to appendix	14/12/15	Chris Creasey
E	Removed section on shipping bung	29/04/16	Chris Creasey
F	Peter Dunkley Comments	16/10/2016	Stuart Milne
G	Edit	09/01/2017	Emma Creasey

Table of Contents

1. Revision History	2
2. Introduction.....	6
3. Safety	7
3.1 Mains electricity	7
3.1.1 Instruction regarding positioning to avoid difficulty in operating the disconnecting device.....	7
3.2 Lifting and carrying	7
3.3 Operating environment and conditions.....	8
3.4 Cold surfaces.....	8
3.5 Disposal	8
4. Getting started.....	9
4.1 Before switching on	9
4.2 Switching on and logging in.....	9
4.3 Notes on the touchscreen.....	13
4.4 Notes on the Main Menu.....	14
4.4.1 The navigation bar	14
4.4.2 The status column	15
5. System Overview / Orientation.....	16
5.1 Overview of a Cryopreservation Run.....	16
5.1 Loading and unloading vials.....	17
5.2 Hardware overview	20
5.2.1 VIA Freeze™ Research.....	20
5.2.2 VIA Freeze™ Duo	23

5.2.3	VIA Freeze™ Quad.....	26
5.3	Software Menu Structure.....	29
6.	Detailed use	29
6.1	The back and forward buttons.....	29
6.2	Menu icons	30
6.2.1	Home screen.....	30
6.2.2	Settings screen.....	31
6.2.3	System Manager screen.....	32
6.2.4	Service screens.....	33
6.2.5	Log Out and Shut Down screen.....	34
6.2.6	System mode icons.....	34
6.3	Performing a run	35
6.3.1	Protocols.....	36
6.3.2	Record details.....	38
6.3.3	Running.....	38
6.4	Heating	40
6.5	Exporting Run Data	41
7.	Routine Maintenance	42
7.1	Cleaning	42
7.1.1	Cleaning products	42
7.1.2	Cleaning protocol	42
7.2	Heat transfer pad replacement.....	43
7.3	Servicing and Calibration.....	44
8.	Plate loading/unloading	44
8.1	Sample placement/removal inside freezer.....	44

8.1	SBS plate loading outside the freezer	54
9.	Advanced operation	55
9.1	Records	55
9.2	Changing password, email and FTP	58
9.3	Creating a new protocol (admin only).....	58
9.4	Editing an existing protocol (admin only).....	62
9.5	User management (admin only)	65
9.6	Creating a new user.....	67
9.7	Service screens (admin only).....	67
9.8	Systems administration.....	68
9.8.1	Hardware	68
9.8.2	Operating system, Boot process and Sys Admin access.....	68
9.8.3	Network and Security	69
9.8.4	Software maintenance	69
9.8.5	Setting the time zone (do this before setting the time).....	69
9.8.6	Setting the time and date.....	70
9.9	Events	71
9.9.1	Export event log.....	72
9.10	Alarms	72
9.11	Remote access.....	75
10.	Menu structure detail	78
11.	Specifications and dimensions	81
11.1	VIA Freeze Research	81
11.2	VIA Freeze Duo	83
11.3	VIA Freeze Quad	85

2. Introduction

Thank you very much for purchasing an Asymptote VIA Freeze™ product.

This manual describes the operation of the VIA Freeze™ range of controlled rate freezers.

The freezers use free piston Stirling coolers to freeze samples and there are three freezer models available, full details can be found in the Technical specifications section 10 of this document,

Figure 1 The three VIA Freeze™ models



3. Safety

To ensure safe operation of this equipment please follow these instructions.

If the via Freeze is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3.1 Mains electricity

All VIA Freeze™ freezers operate using mains voltage of between 100 and 240V with a standard IEC C14 power socket on its rear as shown in section 5.2.

The standard inlet fuse rating is T5A H250V.

Ensure that suitable Portable Appliance Testing (PAT) procedures are undertaken regularly throughout the life of the freezer. This will also ensure that plugs and leads are correctly earthed, should they have been changed or damaged.

Only connect to earthed (grounded) mains outlet.

3.1.1 Instruction regarding positioning to avoid difficulty in operating the disconnecting device

Disconnection from the mains supply should be performed by either switching mains power at the wall, or by the power switch located at the rear of the unit where the IEC cable enters the product. Ensure that the operator will have physical access to one or both of these connections points when the unit is positioned for operation.

3.2 Lifting and carrying

Take care when lifting and carrying all VIA Freeze™ freezers. Ensure that all precautions are taken to lift in a safe manner and follow your company's lifting and handling procedures.

The VIA Freeze™ Research is relatively light so can be lifted and carried by a single user with the front and rear handles.

The VIA Freeze™ Duo and VIA Freeze™ Quad are heavy pieces of equipment and are not suitable to be lifted and carried by a single person. Make sure that when moving these freezers that one person grips each of the large blue handles at the sides.

3.3 Operating environment and conditions

The system is designed to operate in normal laboratory environments.

The system is designed to operate in ambient air temperature from 0-30 degrees Celsius and from 0-90% humidity.

The VIA Freeze Research is designed for benchtop mounting, and both the VIA Freeze DUO and QUAD can be benchtop or floor mounted.

3.4 Cold surfaces



The potential danger symbol is positioned near the working surfaces of the freezer which get very cold during operation.

Temperatures of the working surface can reach as low as -110°C. At this temperature, contact with skin can lead to cold burns. Please ensure that suitable gloves are worn at all times when handling frozen samples and the working area.

3.5 Disposal

At the end of the life of a VIA Freeze™ freezer, please contact Asymptote or your distributor to arrange disposal and recycling.

The Stirling engine(s) contain(s) a small amount of pressurised helium and metals that can be recycled and should not be disposed of in general waste.

4. Getting started

4.1 Before switching on

1. Site the freezer on a suitable table or work-surface with reference to the weight indicated in Table 1.

System	VIA Freeze Research	VIA Freeze Duo	VIA Freeze Quad
Weight	14kg (31lb)	40kg (88lb)	64kg (141lb)

Table 1 VIA Freeze System weights

2. To allow sufficient air circulation, place the back of the freezer at least 10cm (4") from any wall or obstruction. The outlet vents from the engine are on the bottom so ensure that the work-surface is firm and free from debris. Do not run the system on a soft surface such as a carpet.
3. Plug the supplied power cable into the IEC power socket at the back of the freezer (see section 5.2) and into the mains supply. In the unlikely event that something unforeseen has happened during shipping we recommend performing a portable appliance test for electrical safety before plugging the unit into the electrical supply outlet.
4. If networking or remote access is required, then plug an Ethernet cable (not supplied) from the local area network into the RJ45 socket at the back of the freezer.
5. If purchased please refer to and complete the IQOQ document. This QA document ensures and records that Asymptote QA installation and operational requirements are met.

4.2 Switching on and logging in

Switch on the power socket at the wall and switch on at the back of the unit as shown in Figure 2



Figure 2 Switching on a VIA Freeze

Wait for the system to boot up (this can take a minute or so especially if no network is connected) and you should be presented with the login screen as shown in Figure 3. This indicates that the system has correctly booted up and the temperature sensor on the top right hand side of the screen is reading approximately room temperature or the temperature that the unit has been stored at.

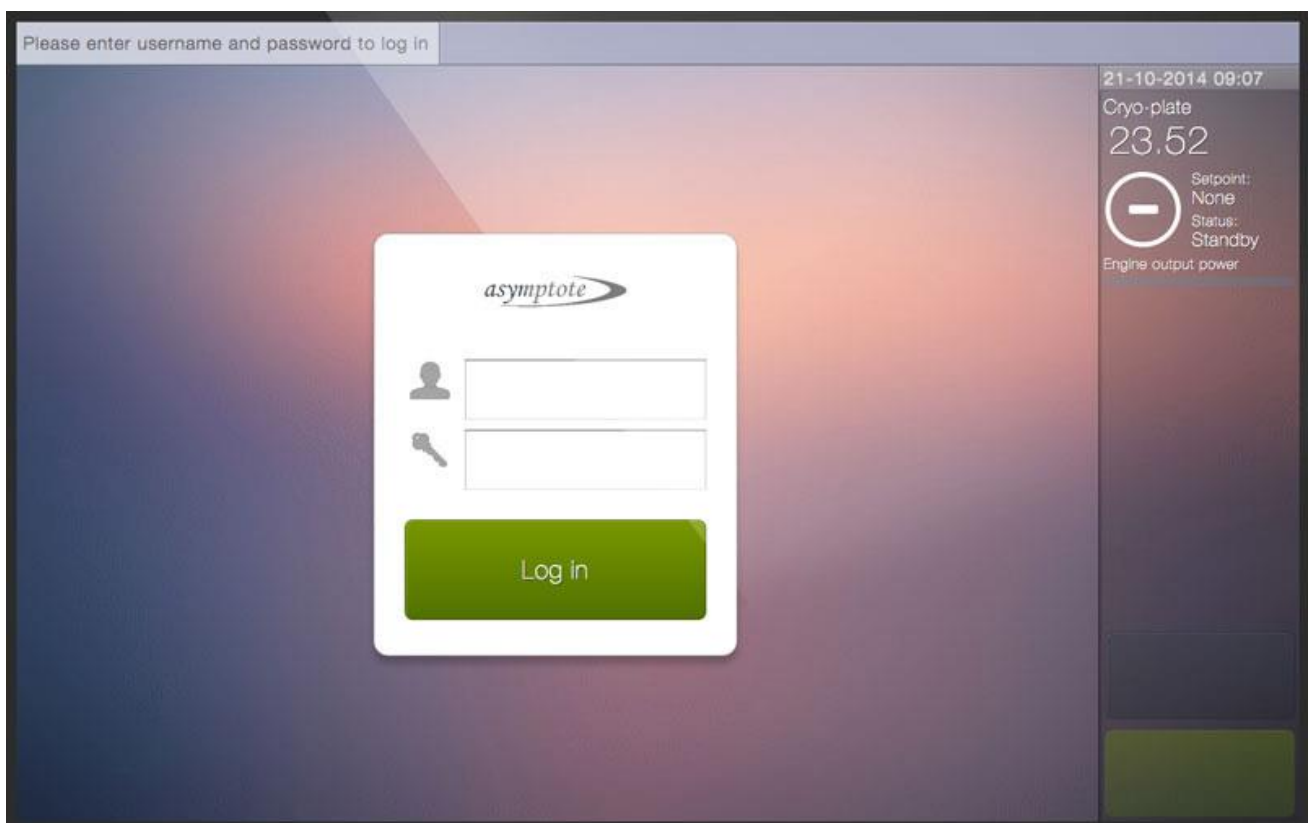


Figure 3 The Login Screen

Two types of user accounts exist, 'user' and 'admin', and you can log in as either from the login screen. If you log in as an Admin, you will have access to certain system settings, which a normal User account is not able to view, for example being able to create extra

user accounts. For the purposes of this document, it does not matter which user type you log in as although some menus are only available as an admin user.

If this is the first time that the freezer has been used, the default login is as an administrator as follows:



: admin



:

The password has no characters by default so there is no need to type anything into this field. We recommend that these login details are changed and user accounts created for system security and traceability as follows:



: username – a unique identifier for every user.



: password – a string of characters and / or numbers unique to each user for authentication.

When a text input field is touched on the touch screen, an on-screen keyboard will appear, as shown in Figure 4. To log in, use this keyboard to enter your username and password in the relevant fields, click 'Accept' on the keyboard, then press the 'Log in' button on the login dialog box.

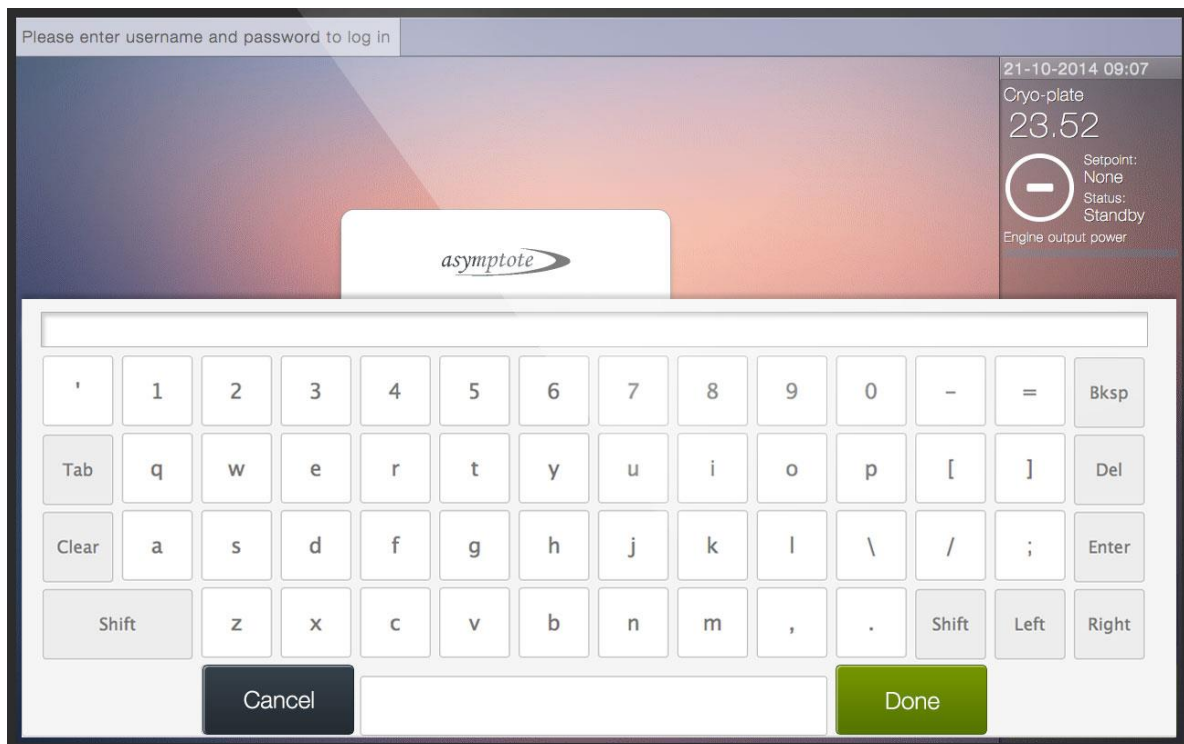


Figure 4 An onscreen keyboard appears when entering text

If the login attempt failed, e.g. because the wrong password was entered, an error message will be shown and the display will remain on the login menu. Otherwise, the main menu will appear on the display, see Figure 5.

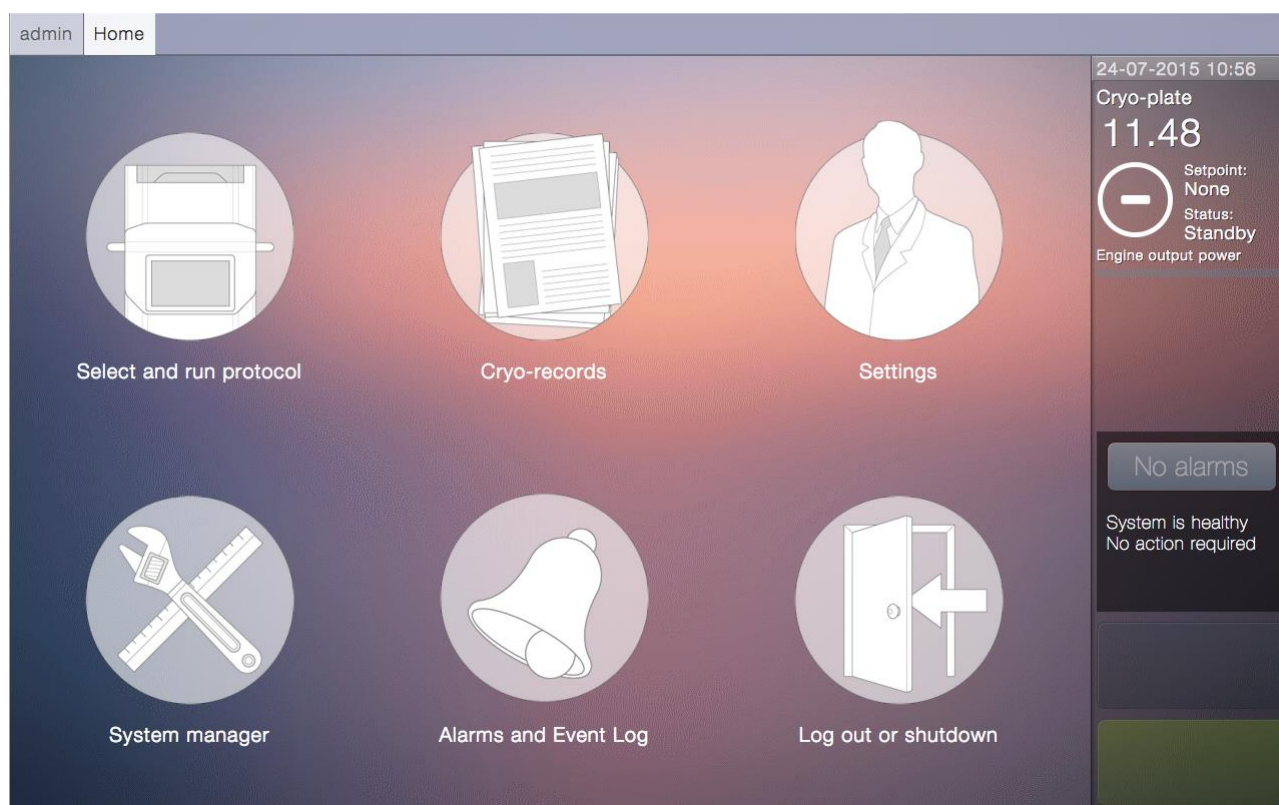


Figure 5 The main menu, as it appears when logged in as admin user. 'Settings' will not appear if logged in with a User rather than Admin account.

The login is managed on a session-by-session basis. If this session expires, you will be redirected back to the login menu, and you will have to log in again. A session expires if left inactive for 15 minutes.

4.3 Notes on the touchscreen

The operation and user interface is identical for all VIA Freeze™ freezers. The only difference is the capacity or number of samples of each freezer.

All freezer models have a 25.6cm (10.1") touchscreen display mounted on the front of the system. This allows the user to control all aspects of the freezer through a touch based menu system.

If the user does not wish to use the touch interface, then a standard USB mouse and keyboard (not supplied) can be used instead by plugging them into the USB sockets at the back of the system. Contact Asymptote or your distributor if you have any problems with this or other accessibility issues.

4.4 Notes on the Main Menu

The main menu, as shown below in Figure 6, has three main areas. The menu window is the main point of interaction and changes according to what menu is currently selected. When changing menus, the navigation bar will update to show the current menu location.

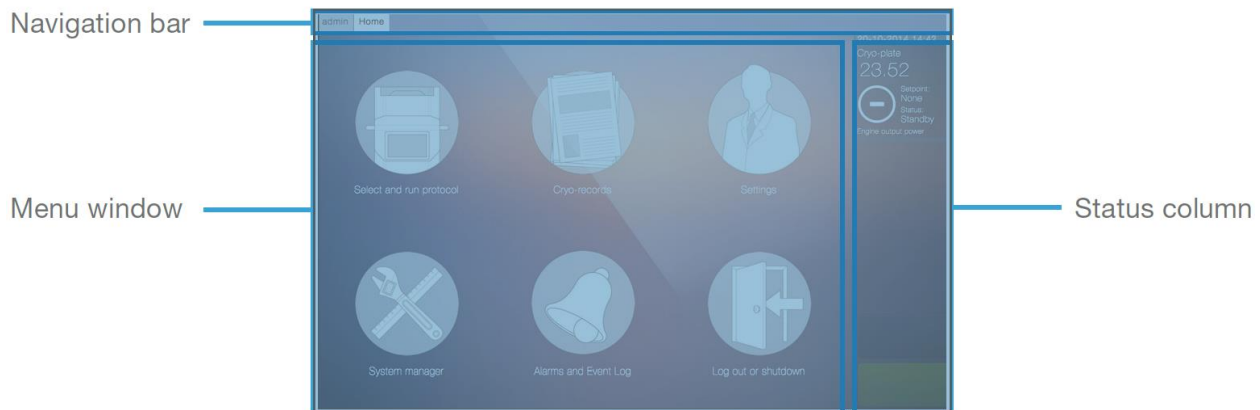


Figure 6 Main menu areas

4.4.1 The navigation bar

The navigation bar at the top of the screen shows the user which menus and windows are currently active. It also allows users access to any currently active operations or menus. These are listed along the bar and can be selected as required by tapping them.

The button furthest on the left on the navigation bar contains the username of the current user. Pressing this button reloads the user interface in the unlikely event of a system crash.

4.4.2 The status column



The status column on the right hand side of the screen displays live data from the Stirling engine. If using a VIA Freeze™ Quad, then data from two Stirling engines will be displayed. For each engine, the following information is displayed:

1. Cryo-plate: This is the temperature of the cryo-plate in °C (**please note** that samples placed on this plate will be a few degrees warmer due to the thermal gradient in the system which must be accounted for).
2. Setpoint: This is the temperature that the cryo-plate is programmed to reach and is set by the protocol, which is currently running.
3. Status: This is the current status of the cryo-plate and can be one of the following:
 - Standby: The default mode, engines and heaters not powered.
 - Running: A freeze protocol is running and the engine is active.
 - Holding: The freezer is holding at a set temperature and is using the engine

to maintain this temperature.

- Heating: Heaters are on to warm and dry the system. This occurs after the run has been finished and the samples have been removed.

4. Engine output power: This power bar fills up as the engine requires more power to operate. This indicates how much cooling capacity the engine has left.

5. System Overview / Orientation

This section is intended to give the user a high-level overview of the workflow, software and hardware of the systems before more detailed descriptions in subsequent chapters.

5.1 Overview of a Cryopreservation Run

Figure 7 shows an example cryopreservation run with 4°C sample loading. This shows the intended workflow for a typical protocol. This can be changed to suit the specific process and cell lines used. For a more thorough guide to cryopreservation please refer to 'ASY_0009_D_1_Asymptote guide to cryopreservation'.

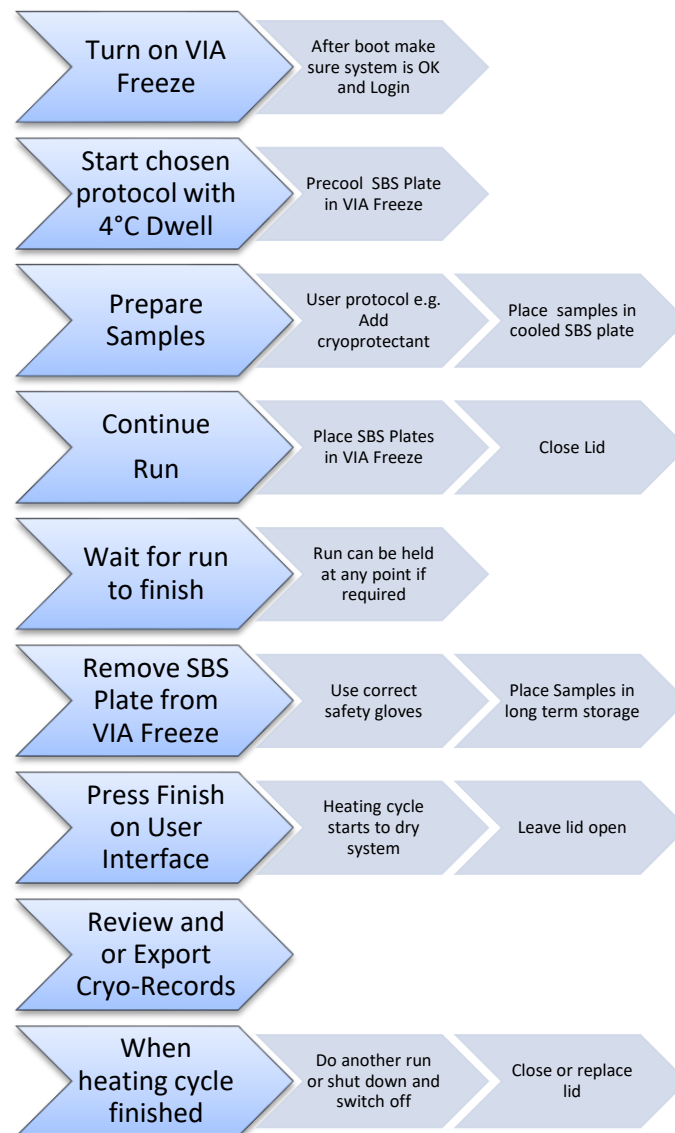


Figure 7 Example Cryopreservation Run

5.1 Loading and unloading vials

When using the system, vials can either be loaded into the supplied SBS adapting plate which is then loaded into the VIA Freeze or the SBS plate in the VIA Freeze. The SBS plate and the dwell temperature of the VIA Freeze protocol should be the same to avoid the cells or samples being unnecessarily heated or cooled. This is shown in Figure 8.

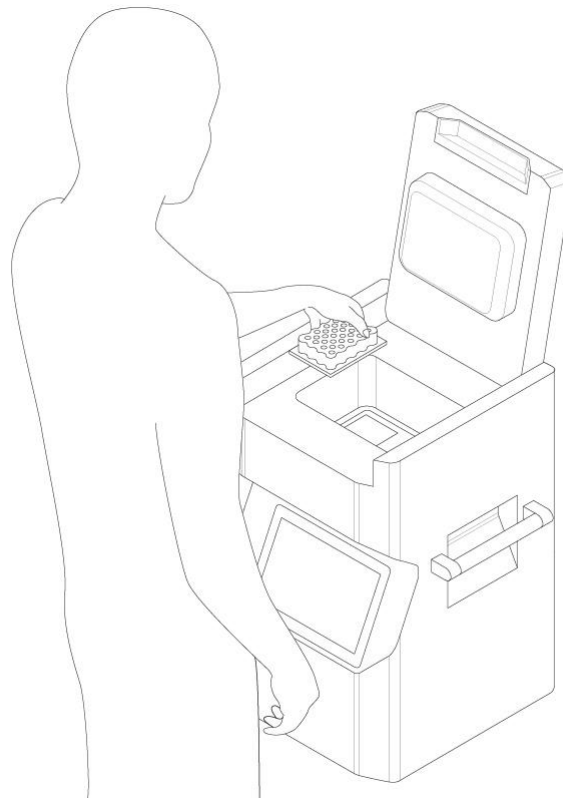


Figure 8 Loading an SBS plate into a VIA Freeze

Alternatively, the vials can be loaded individually into a SBS plate in the system that has been precooled to the correct temperature using a dwell and hold in the protocol. This is shown in Figure 9.

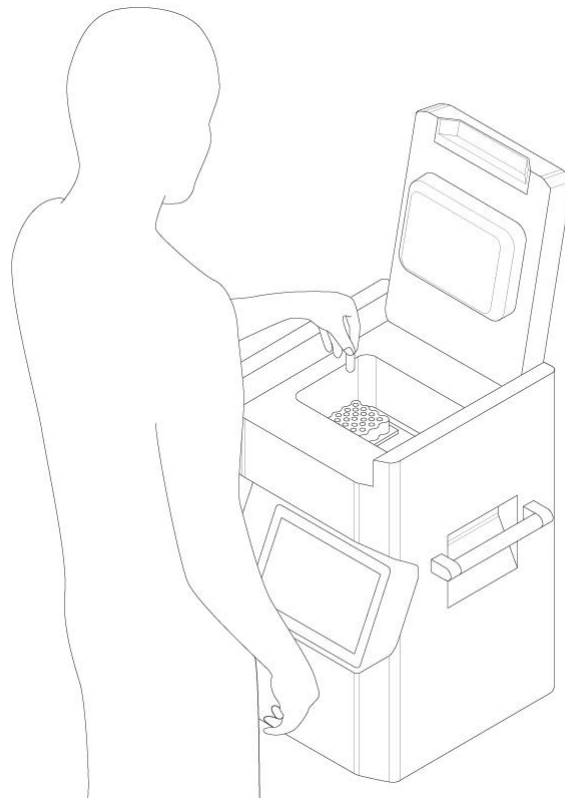
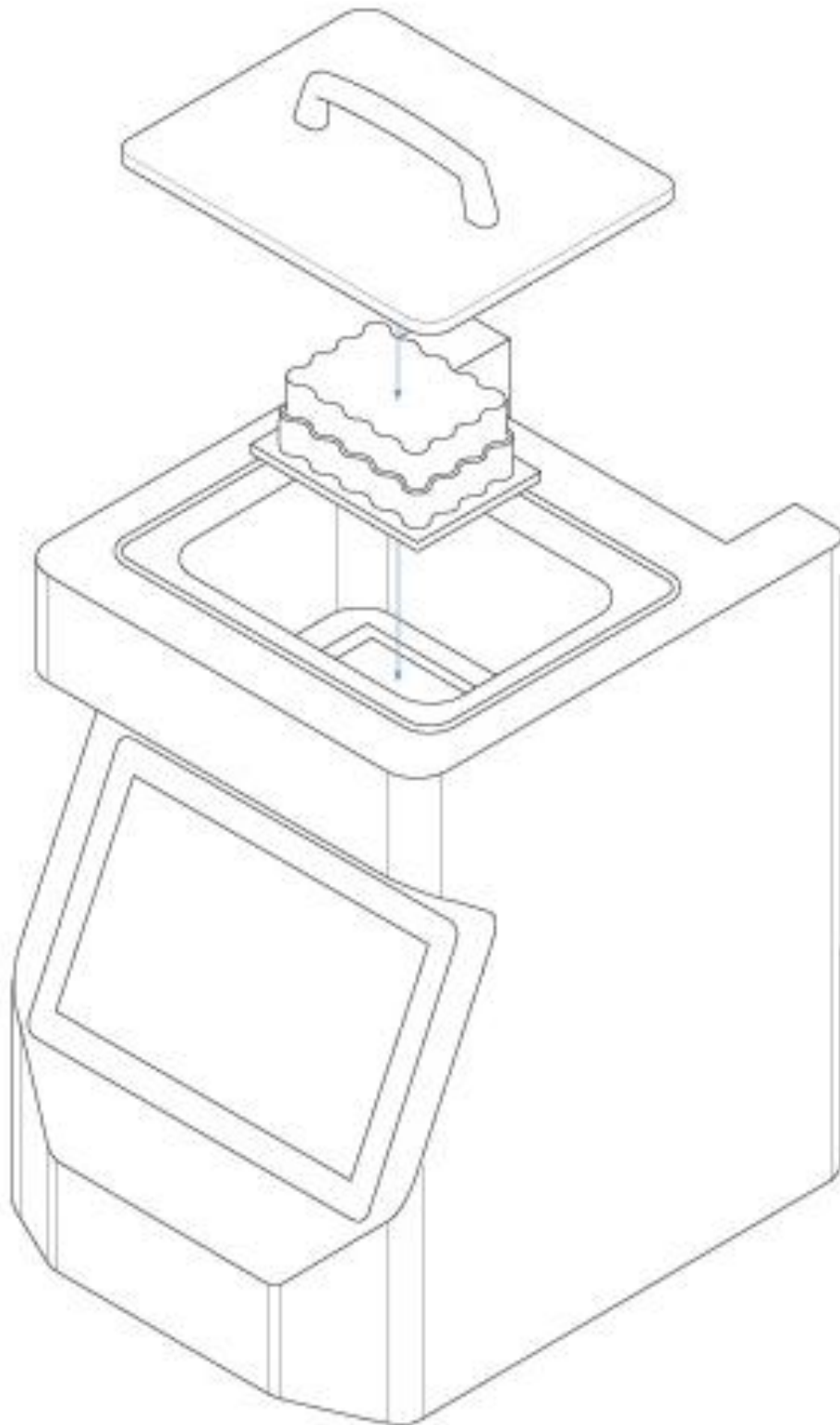
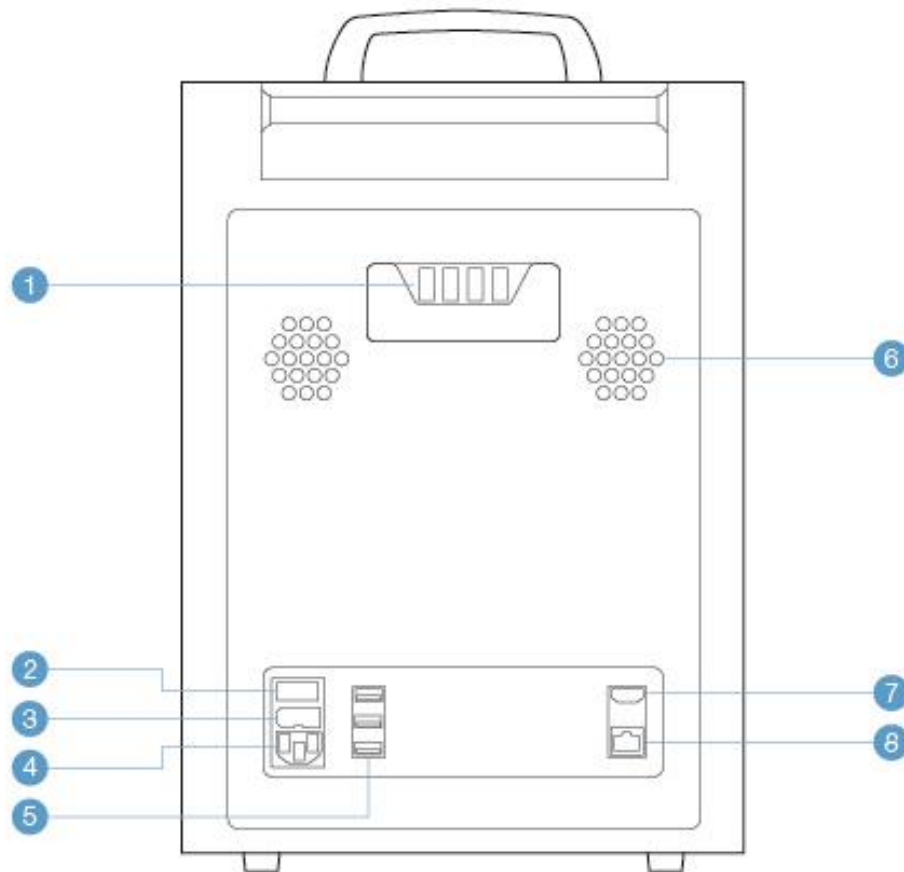


Figure 9 Loading vials individually into an SBS plate

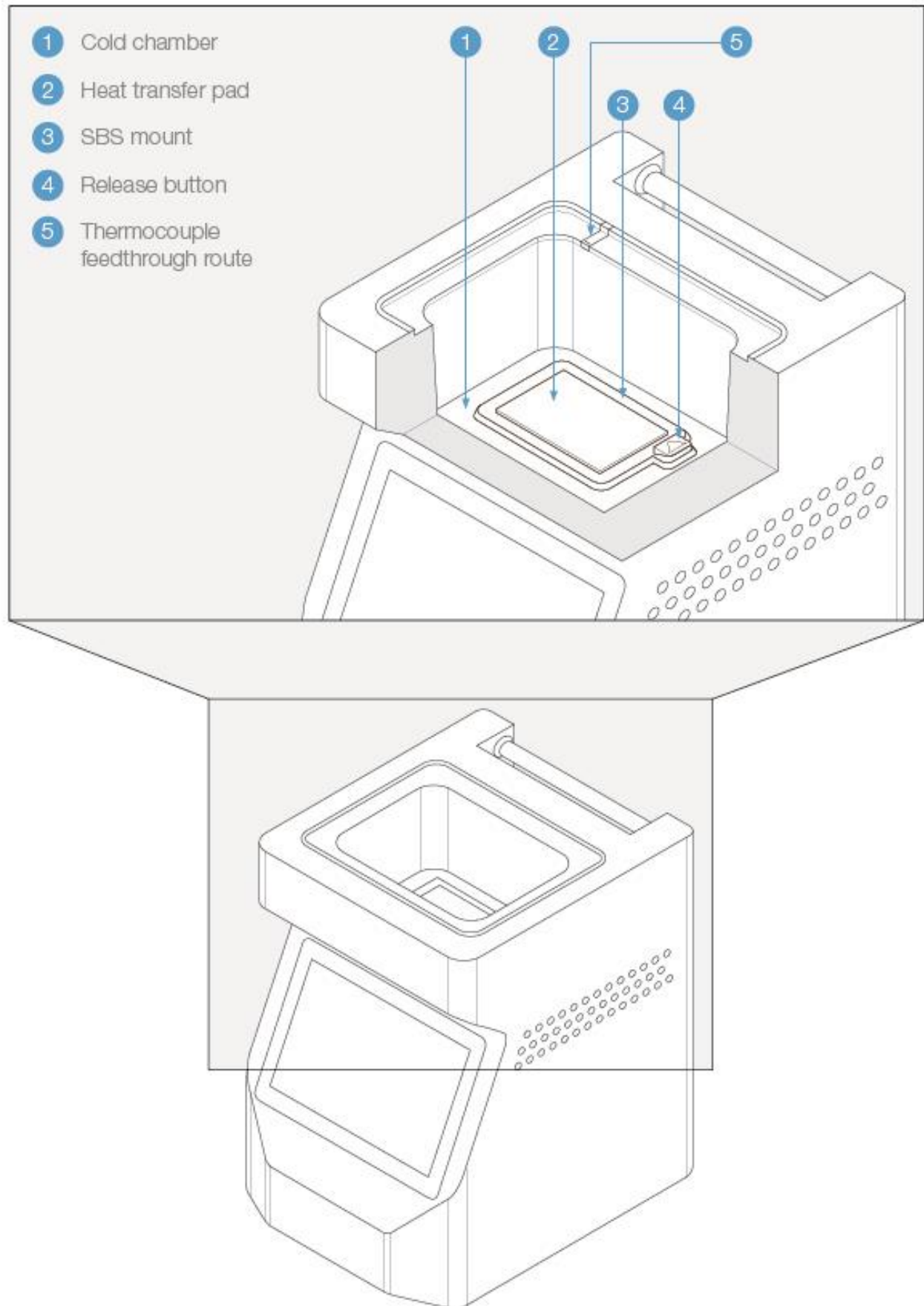
5.2 Hardware overview

5.2.1 VIA Freeze™ Research

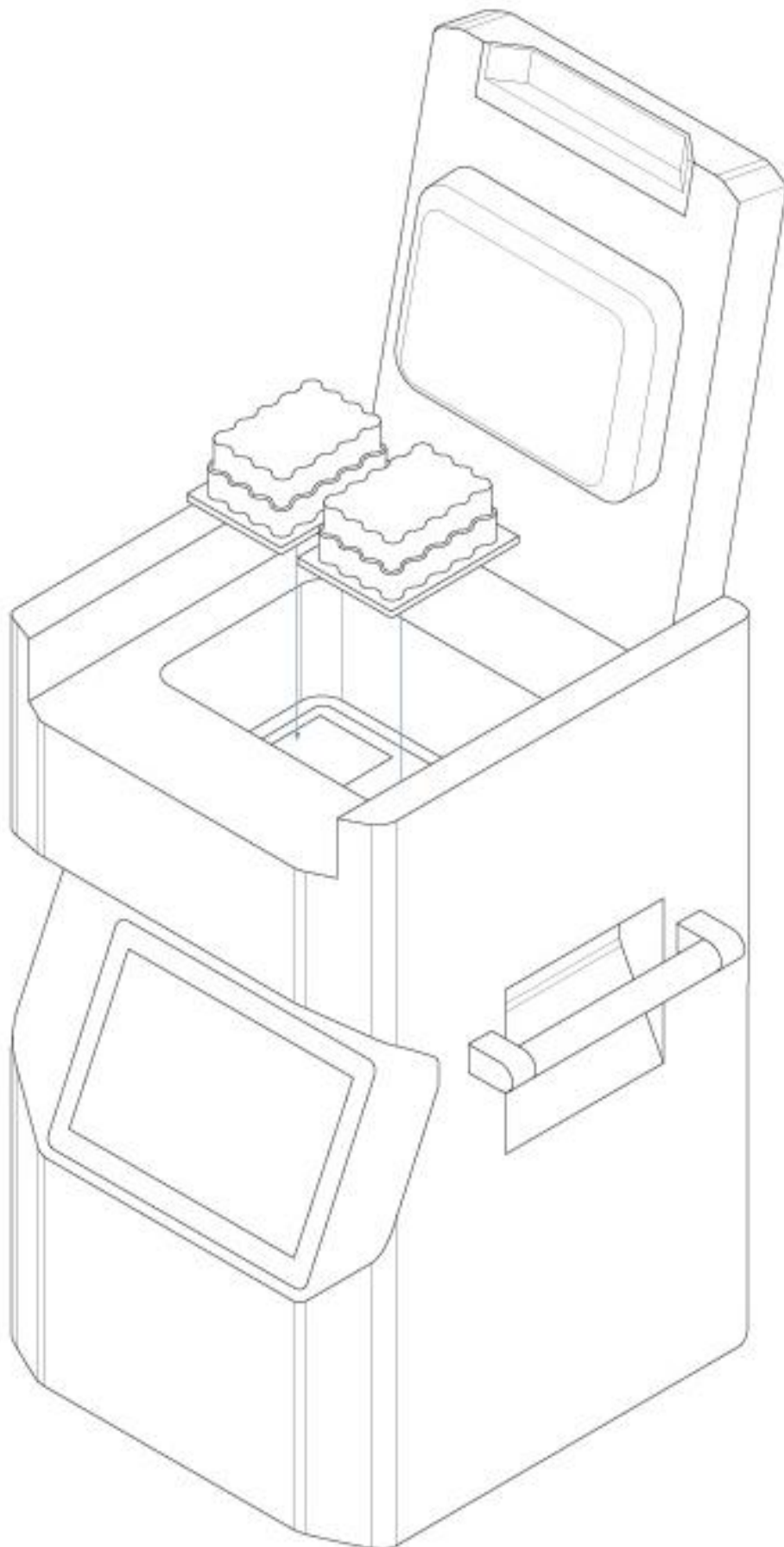


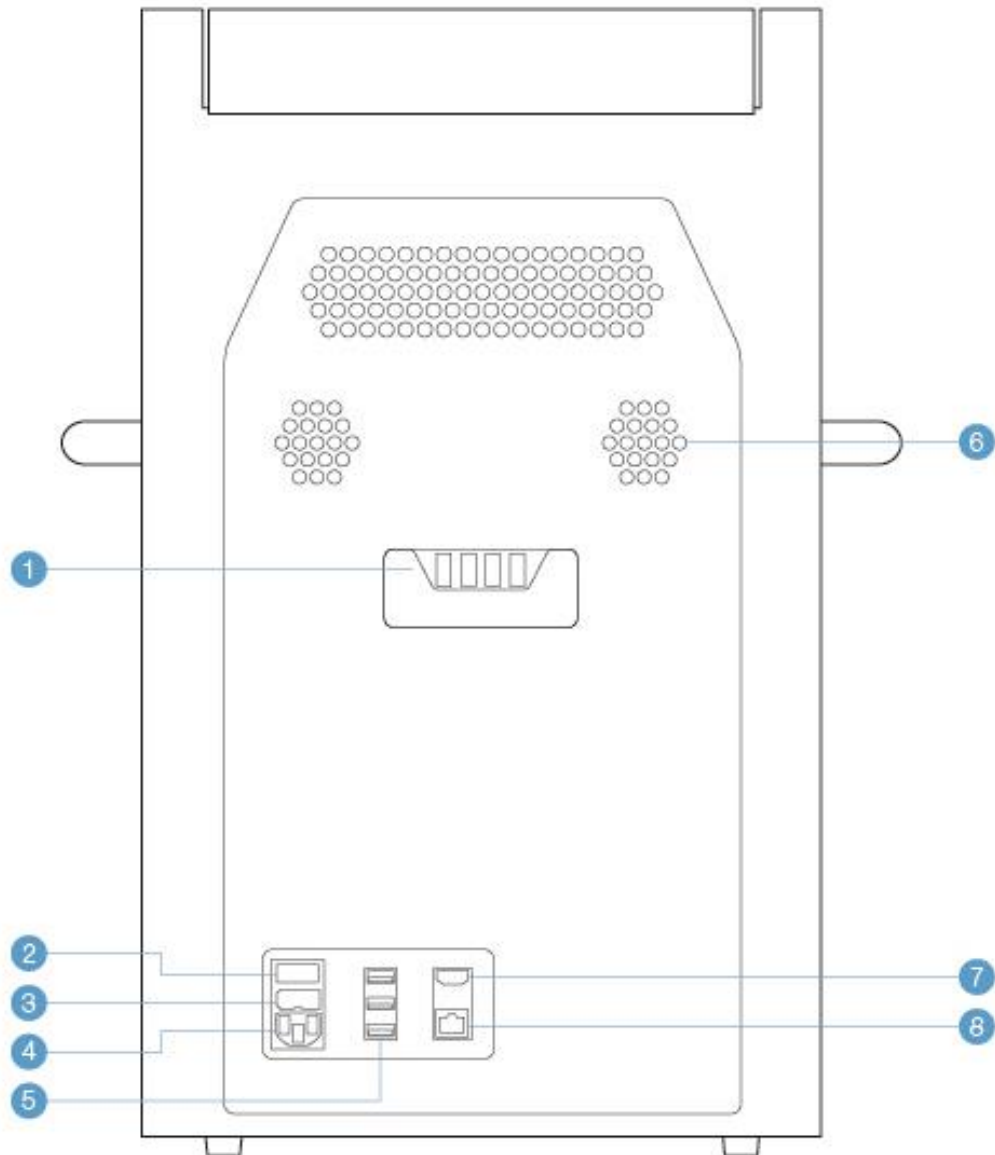


- | | |
|----------------------|-----------------|
| 1 Thermocouple ports | 5 USB ports |
| 2 Power switch | 6 Air vents |
| 3 Fuse | 7 HDMI port |
| 4 IEC power socket | 8 Ethernet port |

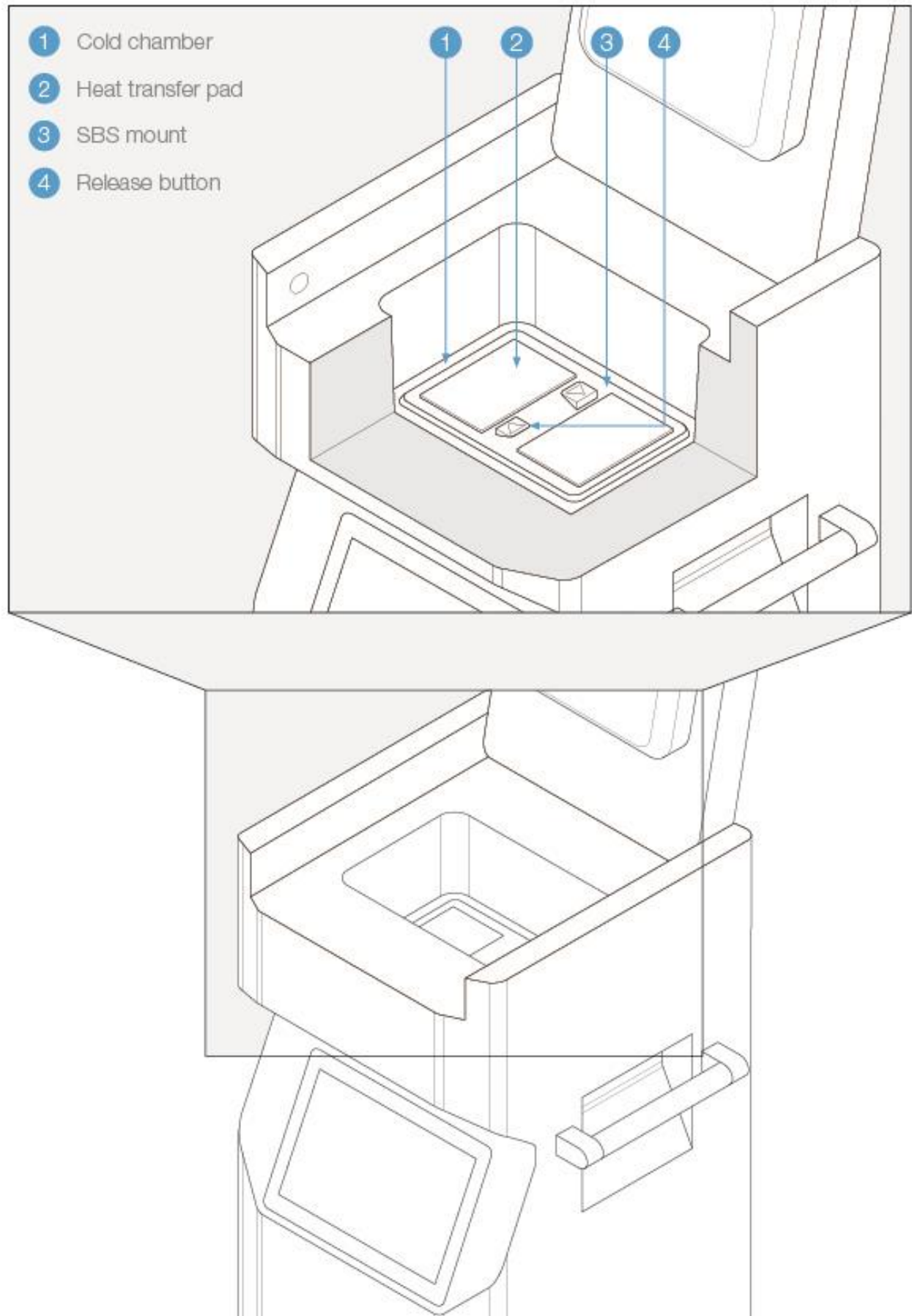


5.2.2 VIA Freeze™ Duo

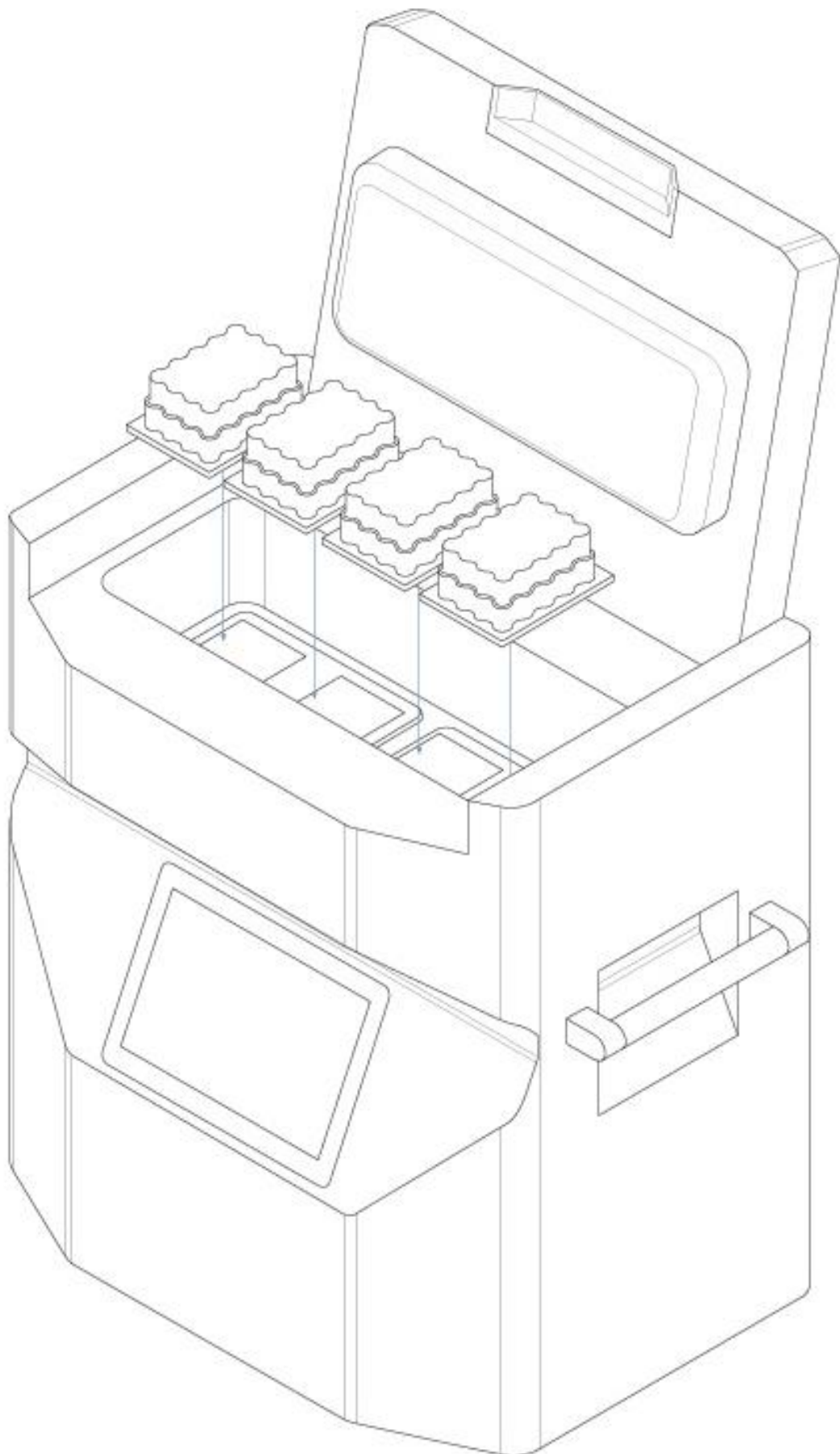


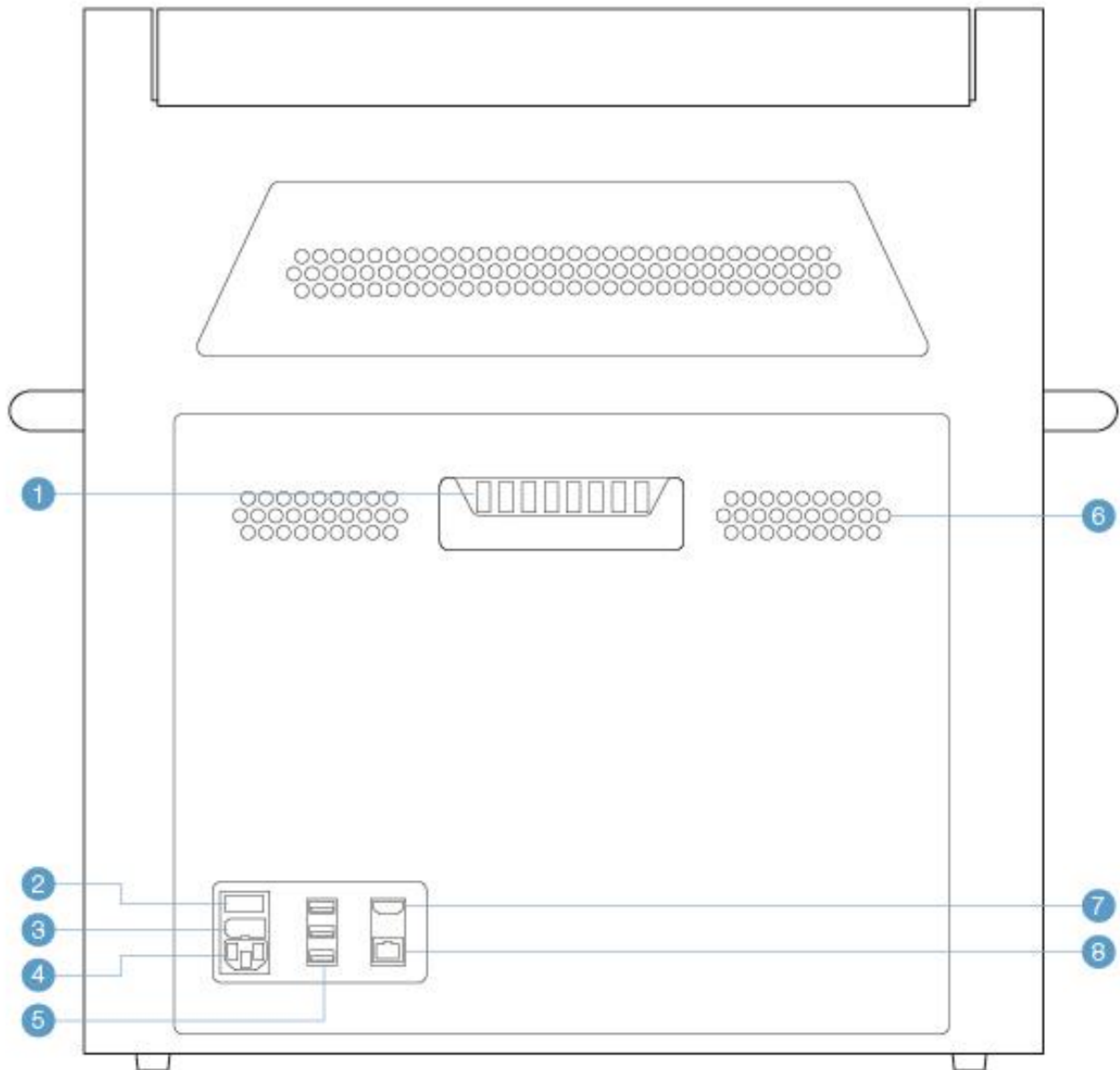


- | | |
|-----------------------------|------------------------|
| 1 Thermocouple ports | 5 USB ports |
| 2 Power switch | 6 Air vents |
| 3 Fuse | 7 HDMI port |
| 4 IEC power socket | 8 Ethernet port |

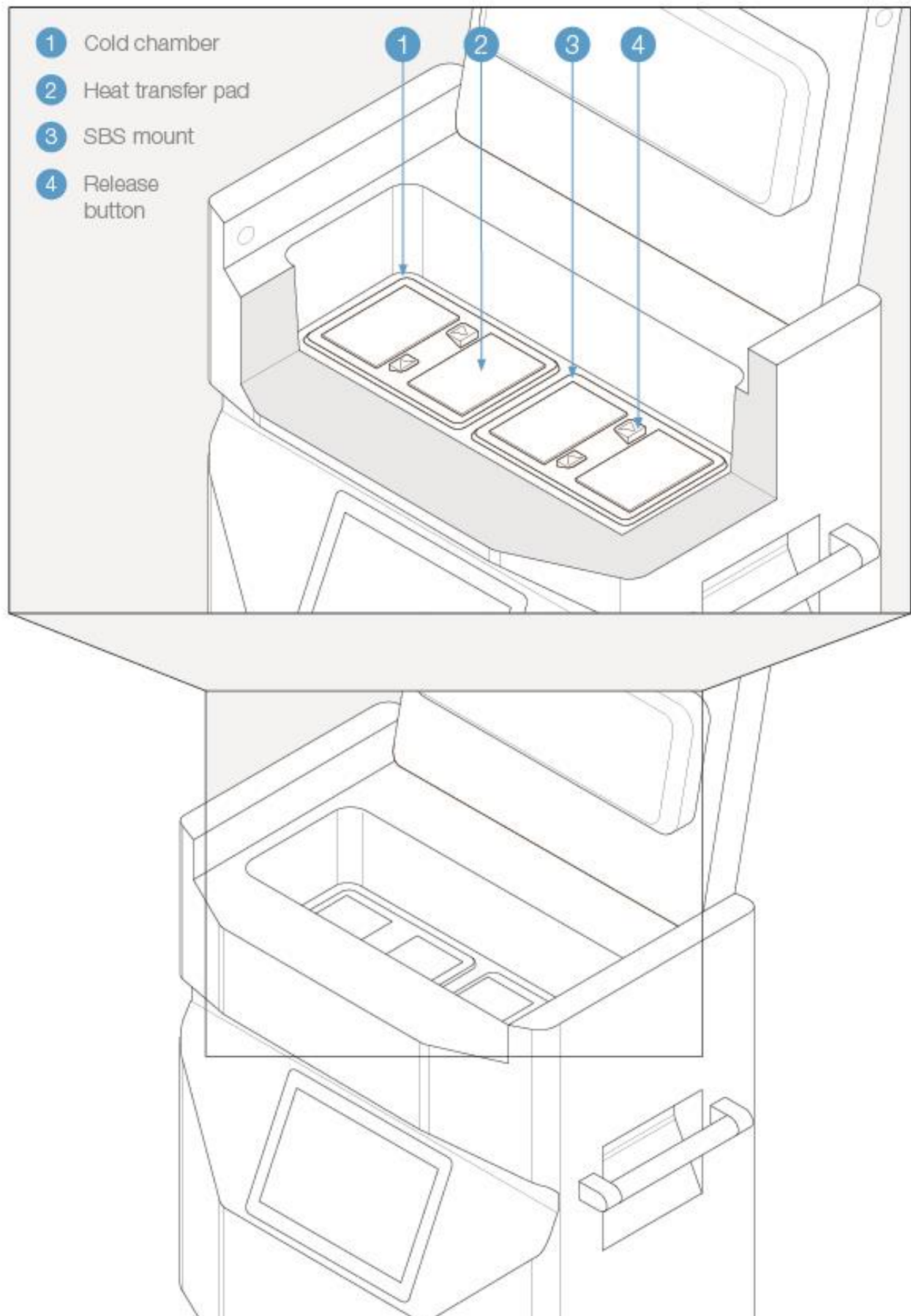


5.2.3 VIA Freeze™ Quad





- | | |
|----------------------|-----------------|
| 1 Thermocouple ports | 5 USB ports |
| 2 Power button | 6 Air vents |
| 3 Fuse | 7 HDMI port |
| 4 Power socket | 8 Ethernet port |



5.3 Software Menu Structure

An overview of the menu structure of the VIA Freeze units is shown in this section. The home screen as shown in Figure 5 corresponds to the top level menu structure as shown in Figure 10. A more detailed description of the use of each screen is given in the following sections and the menu structure detail is shown in section 10.

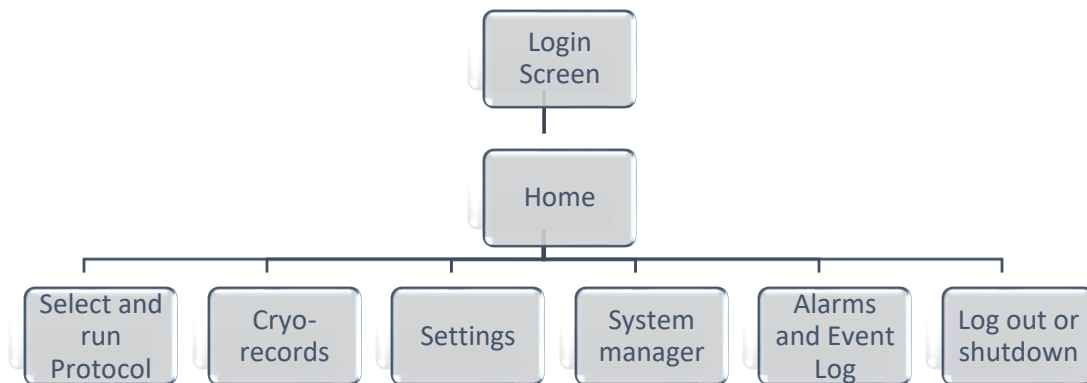


Figure 10 Menu tree corresponding to the home screen

6. Detailed use

6.1 The back and forward buttons

These buttons are the main method for cycling through the screens and performing important operations. Each button has several different functions depending on what is displayed in the main window.



1. The 'back' button at the top normally returns to the previous screen.
2. The 'forward' button at the bottom confirms an operation and moves to the next screen.

6.2 Menu icons

These icons are intended to guide the user through the menu structure in an intuitive way similar to the use of a touch screen phone or tablet. The overall menu structure is shown in section 5.1.

6.2.1 Home screen

On logging in, you will be presented with the home screen. The following icons will present themselves in the main window for navigation through the user interface.



Select and Run Protocol

Provides access to the Select Protocol Type menu via which a run may be started and controlled.



Cryo-records

Lists all previous cryo-records to review and export.



Settings

Access to Settings of logged in user such as password control and email control.



System manager

Access to the System Manager sub menu which provides the protocol editor, user management controls and service screens menu.



Alarms and events log

Lists all previous alarms and events to review and export.



Log out and shut down

Log out or shut down the system.

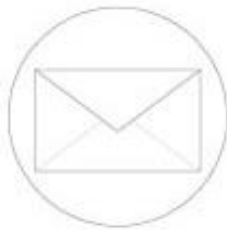
6.2.2 Settings screen

Selecting the Settings icon on the home menu will take you to the Settings screen. The following options will present themselves.



Change password

Change the password of the logged in user.



Change email address

Change the email address of the logged in user.

6.2.3 System Manager screen

Selecting System Manager on the home screen will take you to the System Manager screen, showing the following options.



Create new protocol

Enter Protocol Editor to create a new protocol.



Edit existing protocol

Lists all existing protocols via which the Protocol Editor can be entered.



User management

Manage users currently registered on the system.



Start heating cycle

Turns on the heaters to warm the cold chamber back to room temperature and dry the chamber.

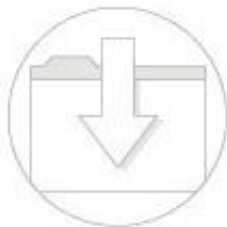


Service screens

Access to Backup manager, Update manager and Engineering Display.

6.2.4 Service screens

Selecting Service Screens on the System Manager screen will take you to the Service Screens with the following options.



Backup manager

Back up data on the system via USB.



Engineering and display

Shows detailed system information for advanced users.



Update manager

Check for software updates.

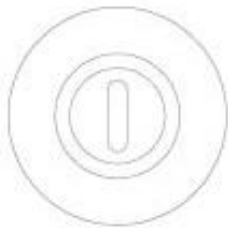
6.2.5 Log Out and Shut Down screen

Selecting Log Out and Shut Down on the Home screen will present the following options.



Log out

Logs the current user out and ends session.



Shut down

Shuts the system down ready to safely power off.

6.2.6 System mode icons

The system mode icons are displayed the status column on the right hand side of the screen and display the systems current operation mode.



Running

The system is currently running.

Holding

The user has selected to hold the run. To continue please select Run.

Finished

The system has successfully finished the run. Please follow on screen instructions to proceed.

Standby

The system is currently on standby mode.

Aborting

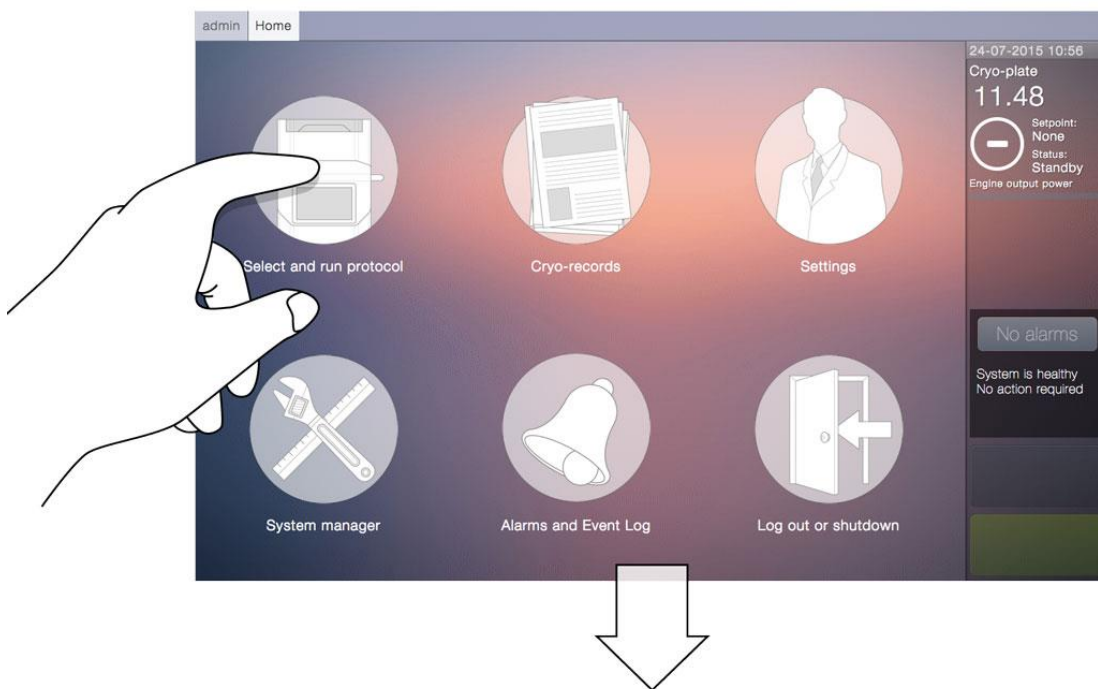
The user has selected to abort the run. Please follow on screen instructions to proceed.

Error

The system has detected an error which must be resolved immediately.

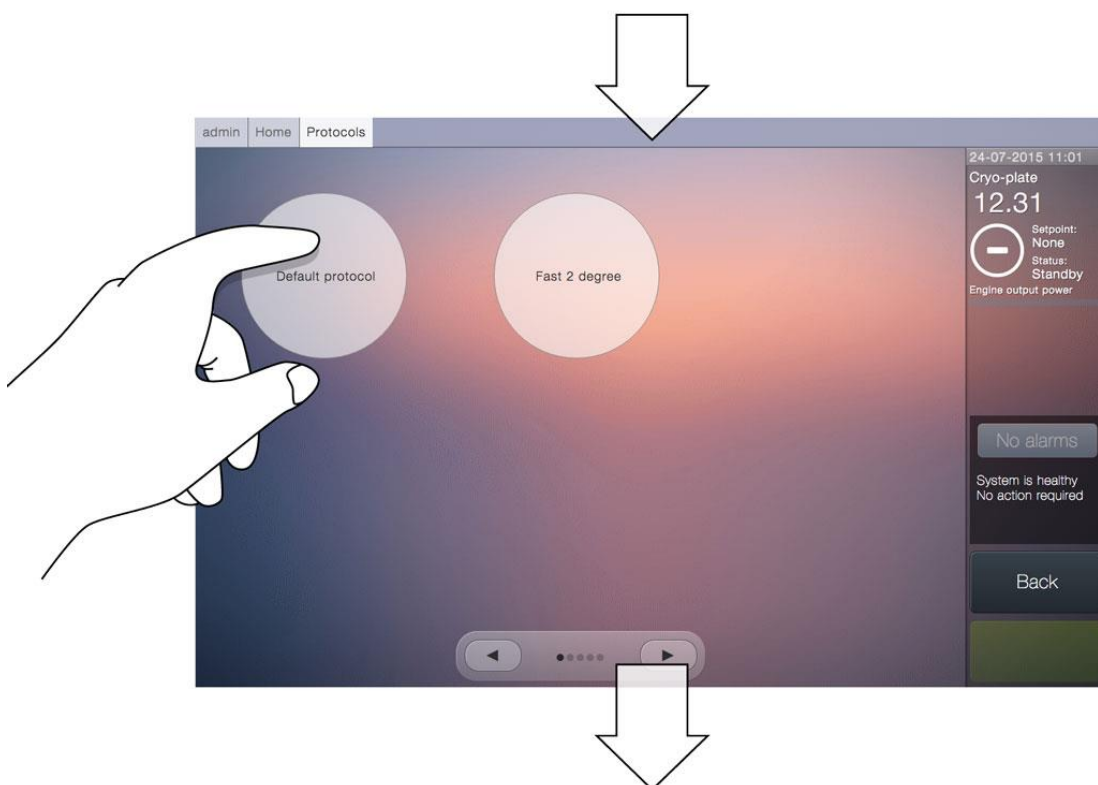
6.3 Performing a run

To perform a run on the freezer, press the 'Select and Run Protocol' button on the 'Home screen', this enters the protocol screen.



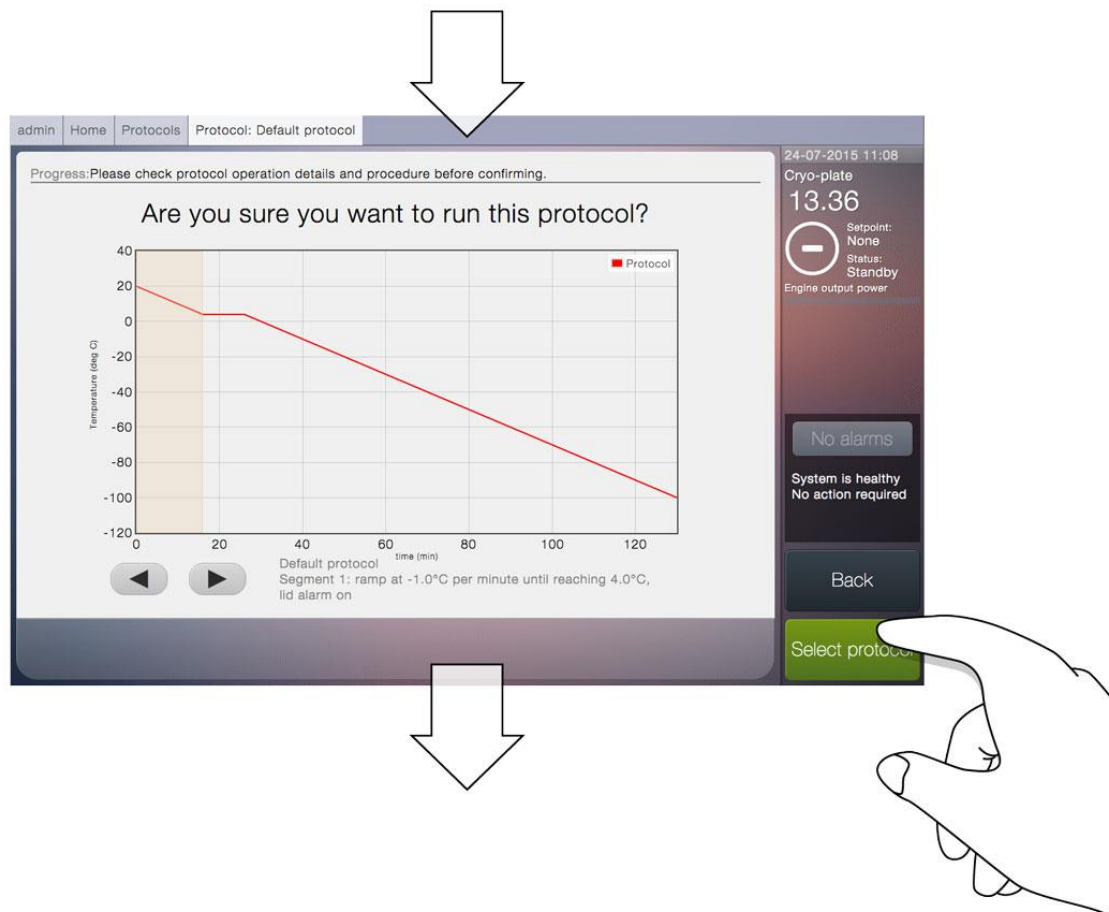
6.3.1 Protocols

The protocol screen allows the user to select their required protocol from those available on the system. Up to six protocols can be displayed on each screen. The left and right arrows at the bottom of the screen allow multiple pages of protocols to be viewed.



In its factory default state, only one 'Default protocol' is available for selection on the freezer.

When the required protocol is selected, its profile is displayed in the main window. The left and right arrows at the bottom left of the screen now allow the parts of the protocol to be inspected.



Protocols are the cooling temperature profiles that the freezer will follow. They are made up of 'ramps' where cooling happens at a set rate, 'holds' where the temperature holds until a command is pressed and 'dwells' where the temperature holds for a set amount of time.

For advanced instructions about creating and editing protocols, see sections 9.3 and 9.4.

When the protocol has been inspected, press either the 'Back' button to select a different protocol or the 'Select protocol' to confirm that this is the required protocol.

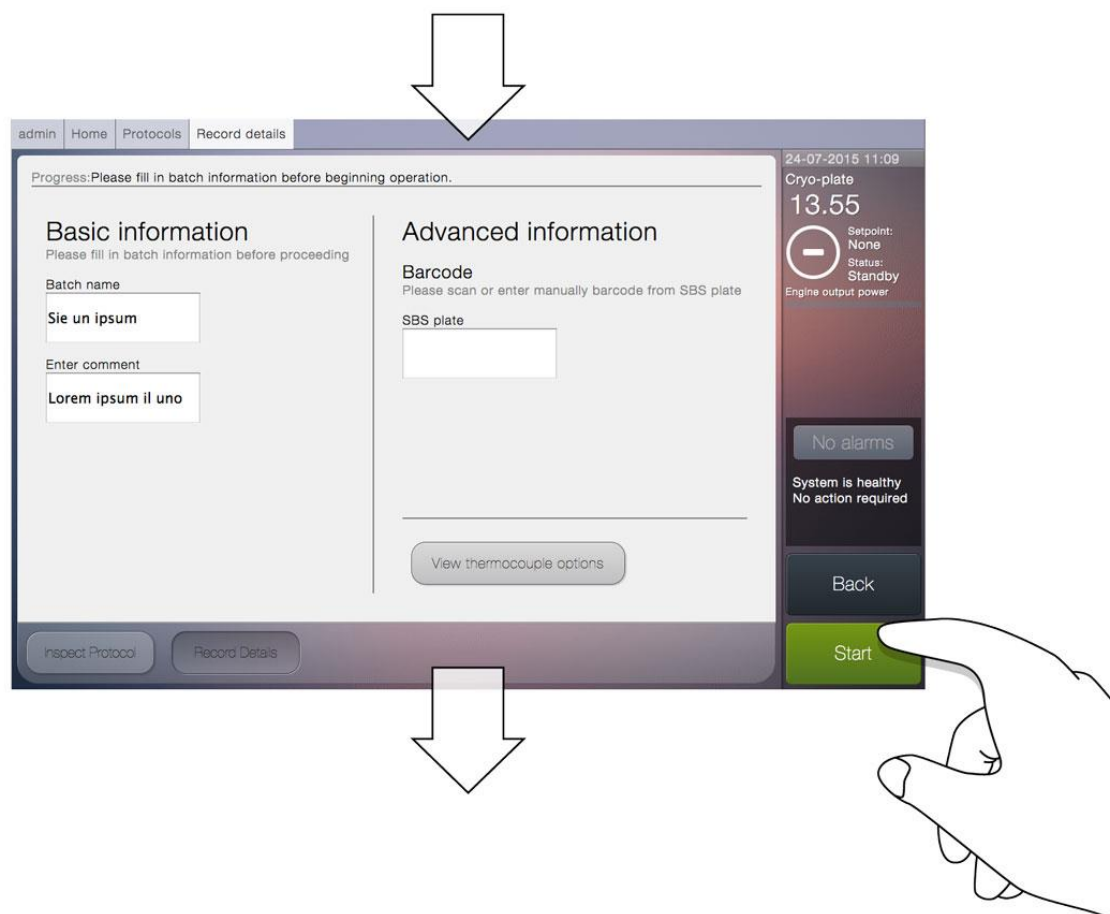
6.3.2 Record details

With a protocol selected, the main window shows the 'Record details' screen. This allows the user to enter the following information:

Batch name: This is the name which this run is referenced by.

Enter comment: Any required details of the run.

The run can be started by pressing the 'Start' button.

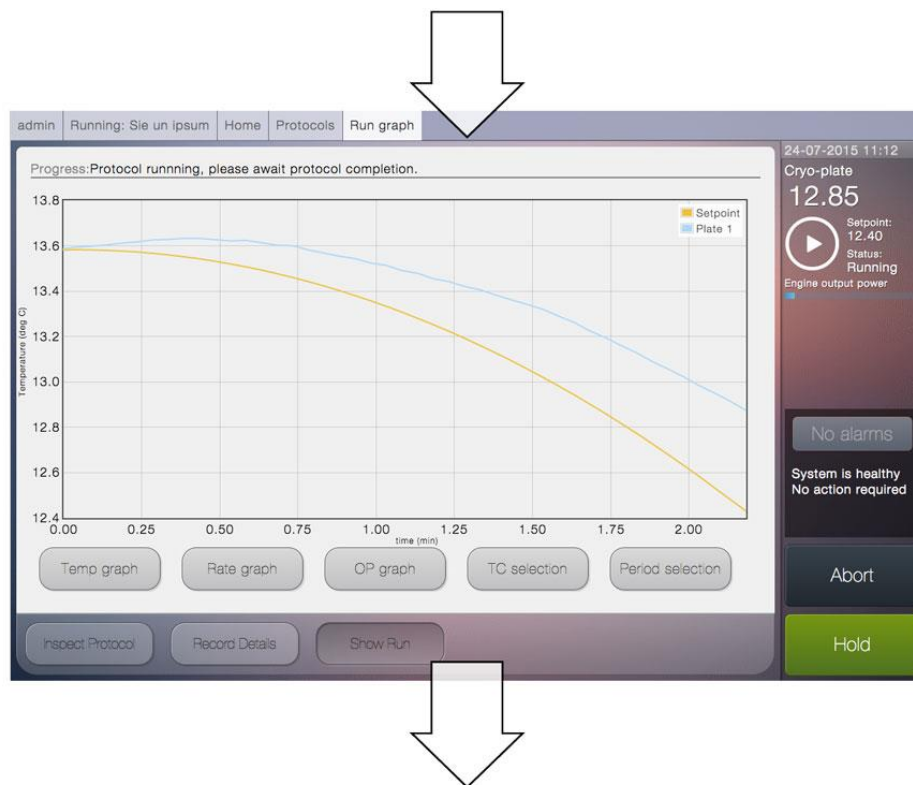


6.3.3 Running

When a run has been started, the main window displays a live graph showing temperature (vertical axis) against time (horizontal axis). There are two plots displayed on the graph and these are referenced in the key at the top right:

'Cryo-plate' – blue line – this is the current recorded temperature of the plate.

'Setpoint' – yellow line – this is the current target temperature of the plate.

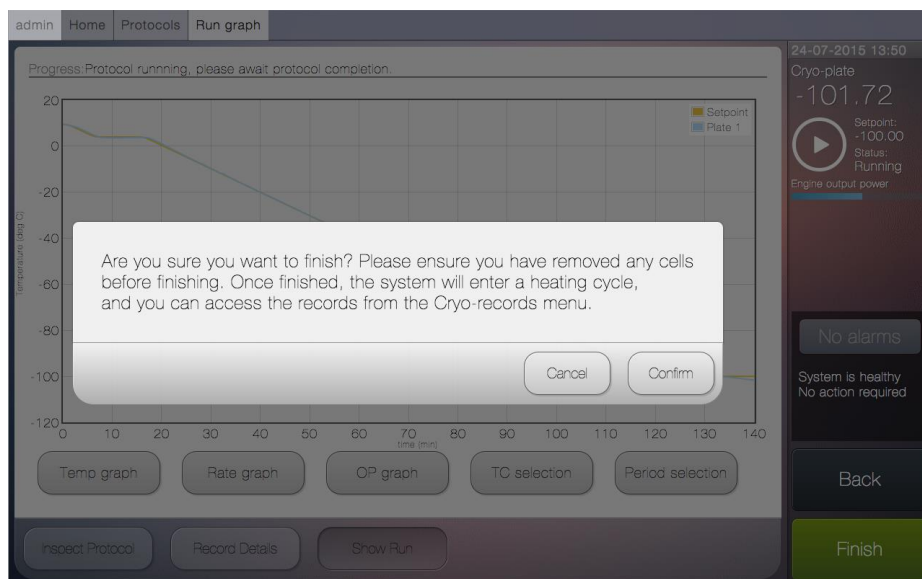
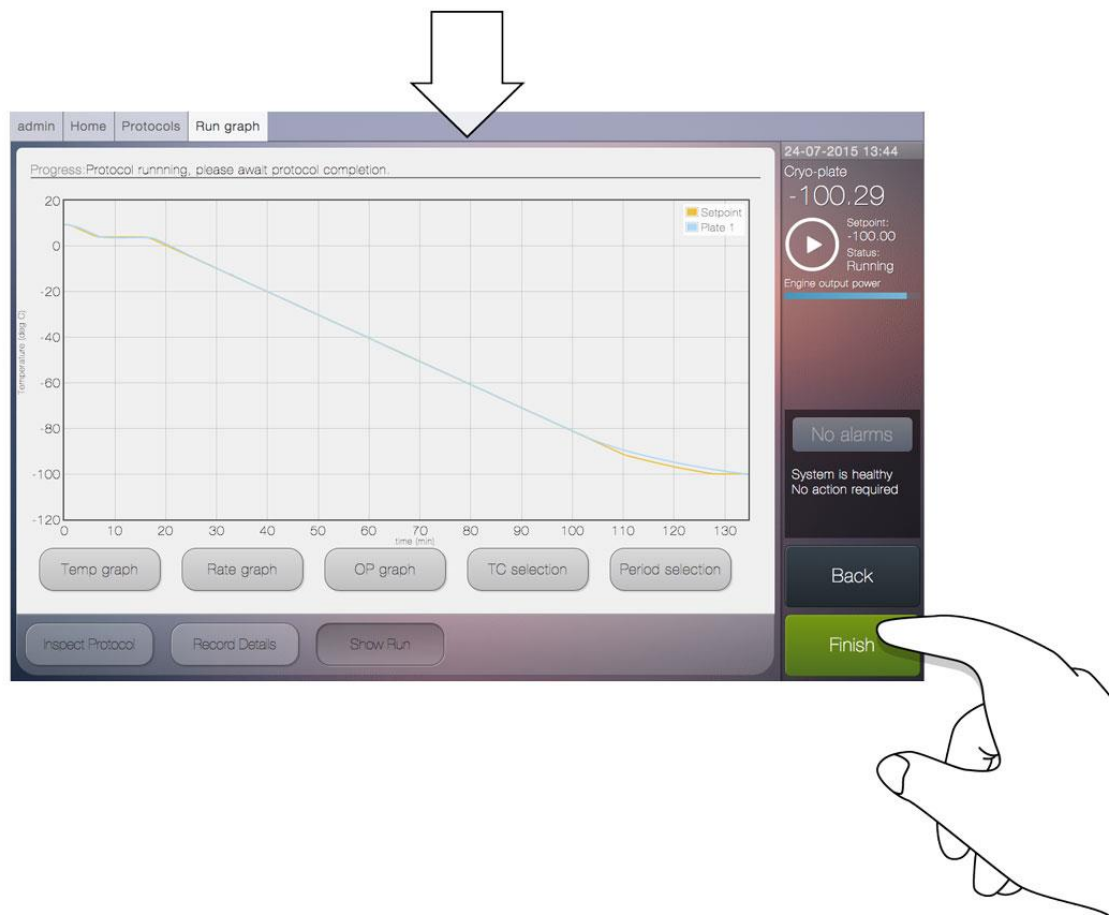


At any point during the run it can be held at the current 'setpoint' temperature by pressing the 'Hold' button. The run is continued by pressing 'Resume'.

At any point during the run it can be stopped by pressing the 'Abort' button.

Information about when to load and unload samples or plates can be in section 7.

When a run is complete, press the 'Finish' button and confirm.



6.4 Heating

After a run has been completed and the 'Finish' or 'Abort' button has been pressed and confirmed, the freezer will enter a heating cycle. The 'Status' will now change to 'Heating'.

The heating cycle heats the plate of the freezer to bring it to an elevated temperature. This is to remove unwanted moisture from the system before a new protocol can be started. Moisture in the system if refrozen in a subsequent run can make the SBS plates hard to remove (although this is made easier by pressing the release button to lever the SBS plate from the cryo-plate) and negatively affect the performance and longevity of the system. To allow the moisture to evaporate the **lid should be removed or opened during heating.**

The heating cycle will automatically finish when it has reached an elevated temperature for a period of time (approximately 45 minutes from -100°C).

A new run cannot and should not be performed until this cycle has finished due to the potential build-up of ice.

If the heating cycle needs to be stopped before it is complete then press the 'Abort Heating Cycle' button. This is found on the 'Home' screen for users and on the 'System' screen for admins. The 'Abort Heating Cycle' command needs to be confirmed before it switches off.

6.5 Exporting Run Data

When a run has been completed, all the data from that run is permanently stored as a record on the freezer. This data can be exported as a 'pdf' and a 'csv' file via either a USB flash drive, email or transfer to a FTP server.

To export via USB, a flash drive must be plugged into any one of the three USB sockets on the back of the freezer.

To export via email, an email server must be set up in System Manager > Email Server then an email address entered in Settings > Change Email.

To export to an FTP server, the server address, username and password must be set in Settings > Change FTP.

More details about records can be found in section 9.1.

7. Routine Maintenance

7.1 Cleaning

Regular cleaning of your VIA Freeze™ freezer will help to reduce the chance of sample contamination within the cold chamber and maintain its performance.

7.1.1 Cleaning products

The VIA Freeze range can be cleaned using any of a range of fluids including the following:

- Mild detergents
- Isopropanol (IPA)
- Ethanol
- Mild bleach
- Warm water

Specialist clean room products from STERIS™ have also been tested and approved for use cleaning VIA Freeze™ products. These are:

- Environ™ Vesphene™ st - diluted 1:128
- Environ™ LpH™ st - diluted 1:125
- Spor-Klenz™ RTU

Do not use acetone to clean the system since this can damage the paintwork.

Some stronger cleaners may also damage the paint and other surfaces of the freezer. If a product is not on the above lists then contact your supplier to see if it is safe to use.

7.1.2 Cleaning protocol

- 1 Before cleaning, ensure that a heating cycle has been completed and then switch off the freezer.
- 2 Unplug the power lead and any other cables or wires from the back of the freezer.

- 3 Spray or dampen a cleaning cloth with the desired cleaning fluid. To avoid the cleaner entering the VIA Freeze through the air vents or joins in the surfaces (e.g. around the back panel and screen) do not spray the cleaner directly onto the VIA Freeze or use a cloth which is overly wet or saturated.
- 4 Wipe any surfaces requiring cleaning with the cloth.
- 5 Allow to dry.
- 6 Inspect the air vents for dust and debris, any build ups can be carefully removed using a conventional vacuum cleaner. Take care to not fully cover vent holes on the electronics enclosure with the vacuum head, as damage to internal fans may occur. Only apply vacuum to $\frac{1}{4}$ of the aperture at any one time.
- 7 After cleaning has been completed and before the next use, switch the freezer on and run a full heating cycle.

7.2 Heat transfer pad replacement

All VIA Freeze™ freezers are supplied with spare heat transfer pads.

It is recommended that you replace the heat transfer pad when it gets dirty or damaged as this will optimise the performance of the freezer.

1. Before heat transfer pad replacement, ensure that a heating cycle has been completed and then switch off the freezer.
2. Peel the old pad from the SBS mount.
3. If required, clean any remnants of the old pad from the SBS mount using one of the above cleaning products.
4. Wipe clean the SBS mount and allow it to dry.
5. Remove the new heat transfer pad from its packaging.
6. Peel the backing from the pad half way.
7. Align the short edge of the pad with the recess in the SBS mount and press on firmly.
8. Gradually roll the length of the pad onto the SBS mount peeling the backing off as required.
9. When fully placed, ensure all four corners and edges are pressed down firmly and are flush with the top of the SBS mount.
10. Inspect the surface of the pad for any air bubbles and carefully push out to the

edges.

11. With the heat transfer pad in place, the freezer can be switched on and operated.

Replacement pads can be purchased by contacting Asymptote or your supplier.

7.3 Servicing and Calibration

We recommend that the VIA Freeze™ systems are serviced and calibrated every year. Please contact Asymptote or your supplier to arrange this.

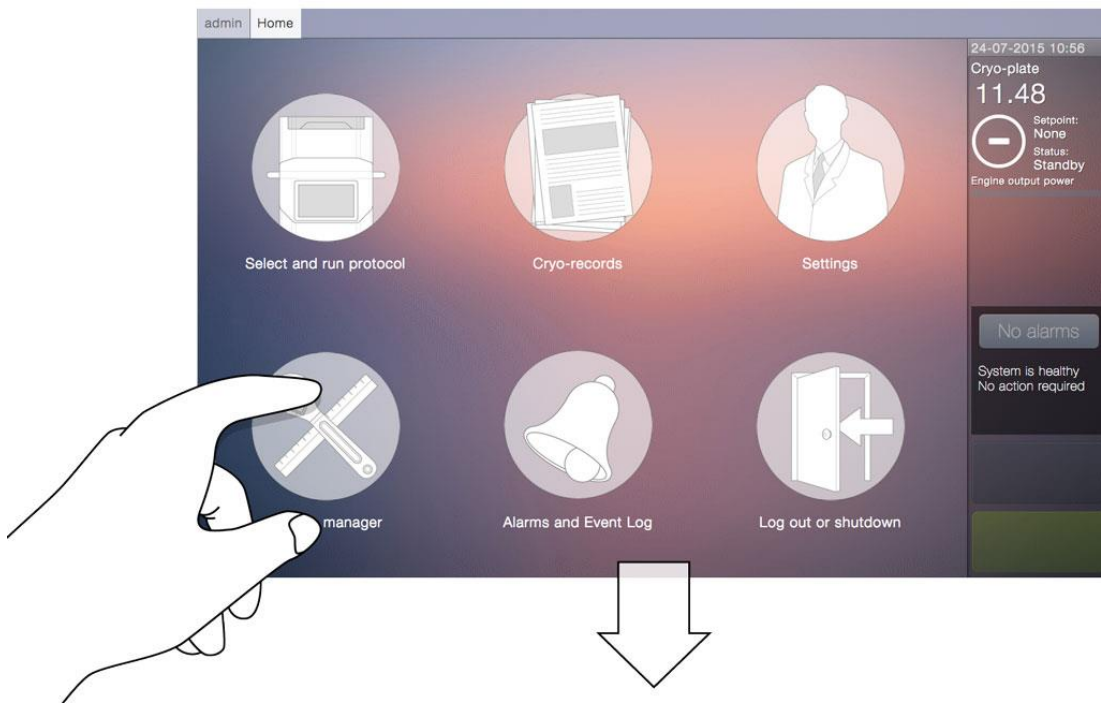
8. Plate loading/unloading

Due to the large number of sample formats that are available for use with VIA Freeze™ freezers, instructions for the use of specialist sample holders are supplied with them and not included in this manual. We recommend that you contact either Asymptote or your supplier to discuss your specific application and requirements.

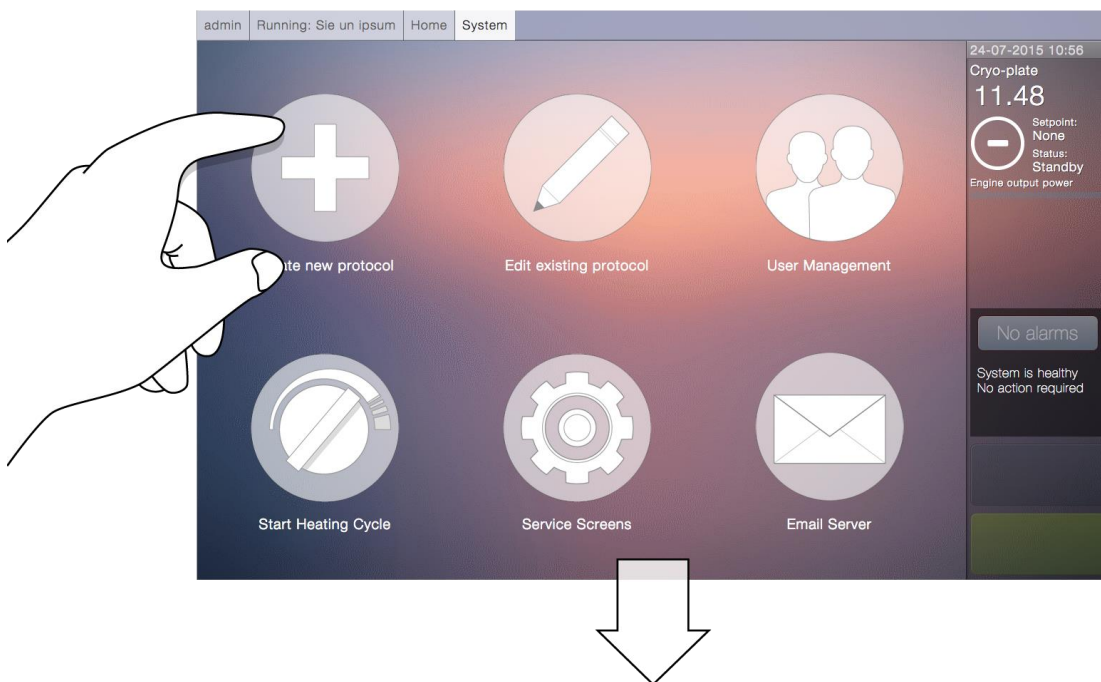
For standard 2ml cryo-vials and the Asymptote supplied sample holder (ASY_10146) there are 2 methods for placing and removing samples from the freezer:

8.1 Sample placement/removal inside freezer

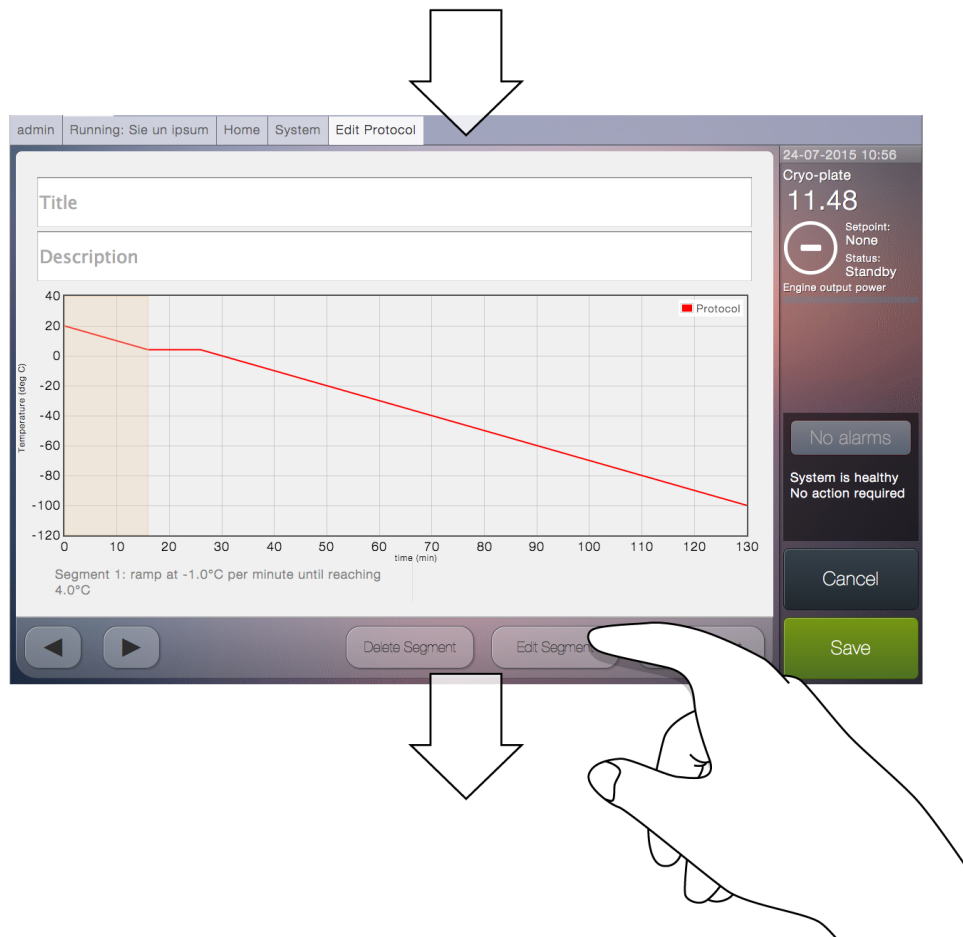
In this mode of operation the sample holder(s) should be placed into the VIA Freeze™ and a protocol created that has a dwell segment ending with a hold with the temperature at which the samples are intended to be loaded. By way of an example the following screens will be followed:



System manager is selected leading to:



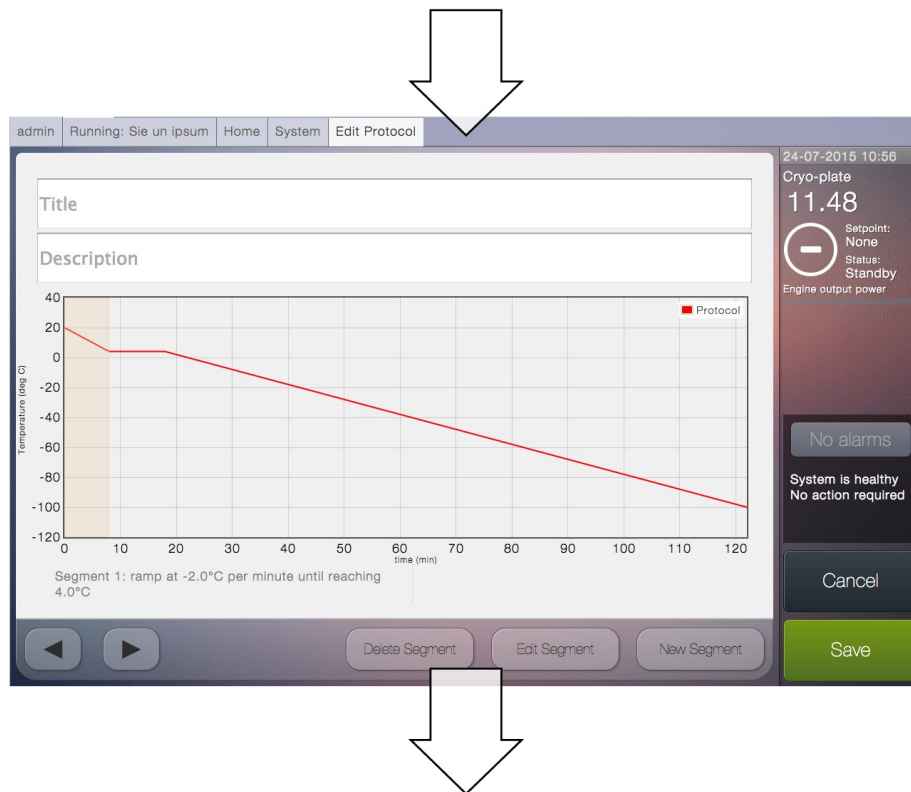
Create new protocol is then selected leading to:



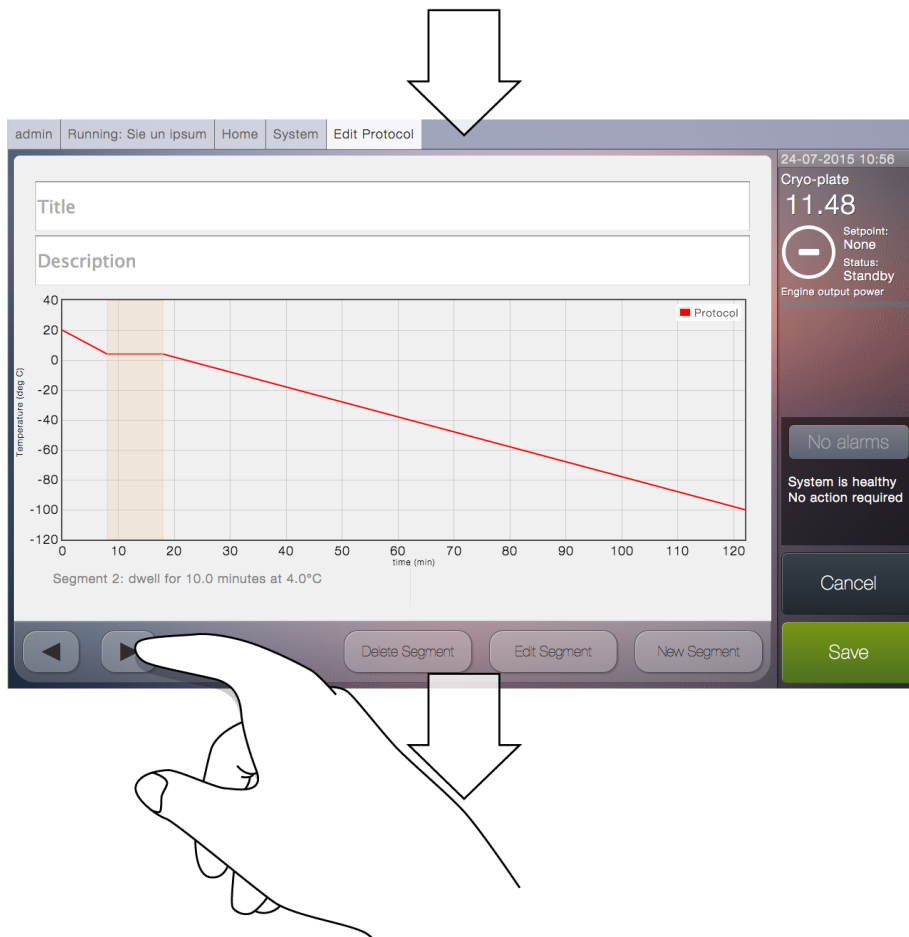
Which is the default starting profile for an edit. The first segment is highlighted and if this is edited the following dialog is displayed:



Any of the numbers can be highlighted by touching on them and the number that is highlighted can then be changed using the up and down arrows. In this example the rate has been changed to -2 degrees per minute to give the following protocol:



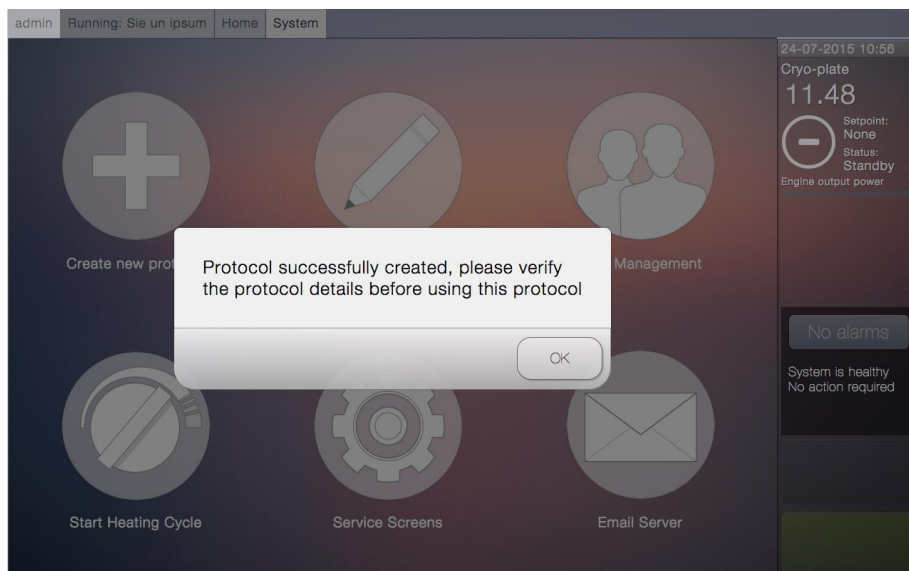
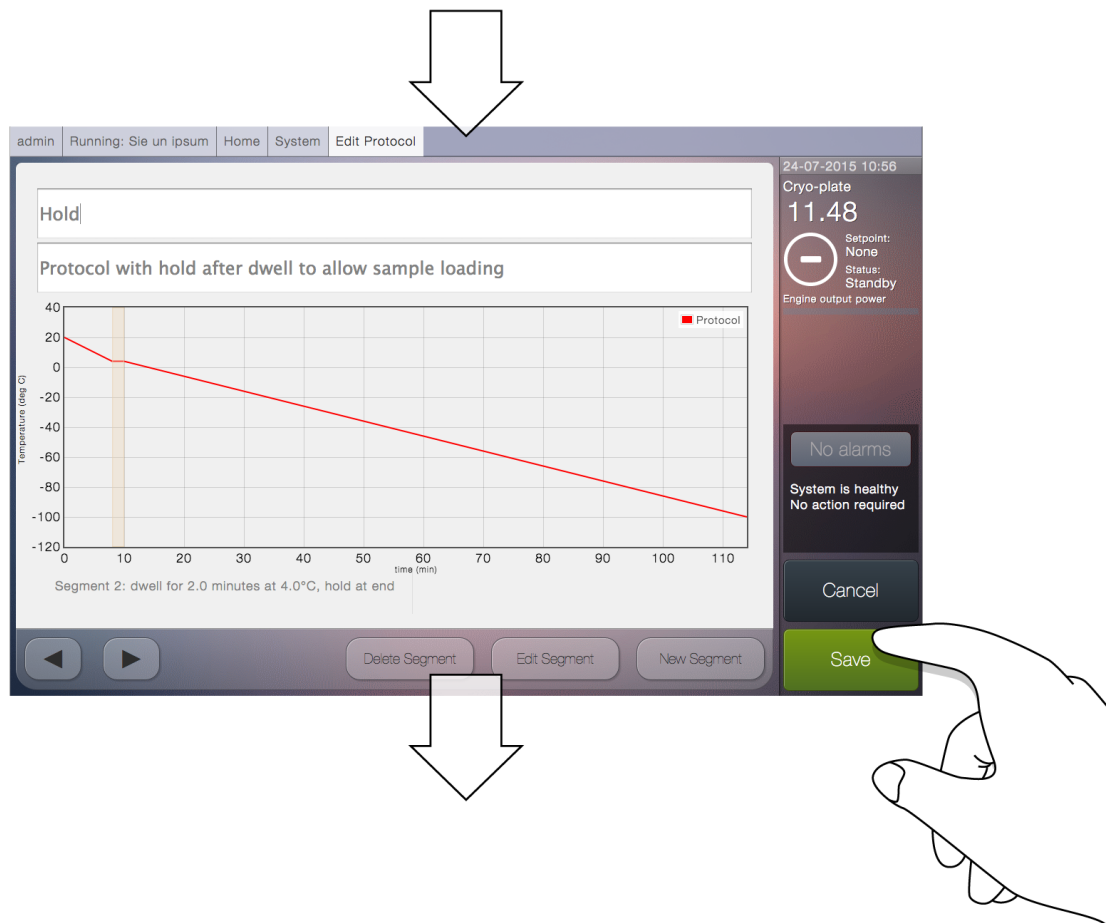
The next segment can now be edited by pressing the right button at the bottom left of the screen:



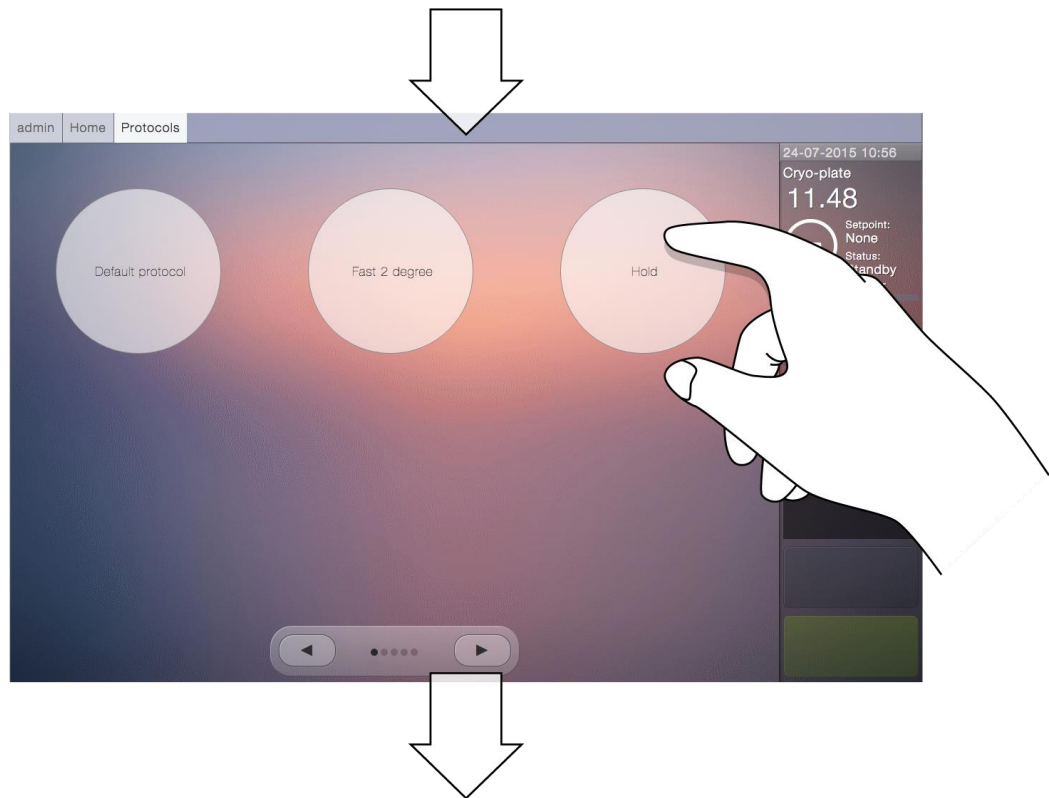
The second segment can now be edited and the hold at end of this segment should be checked to allow for sample loading:



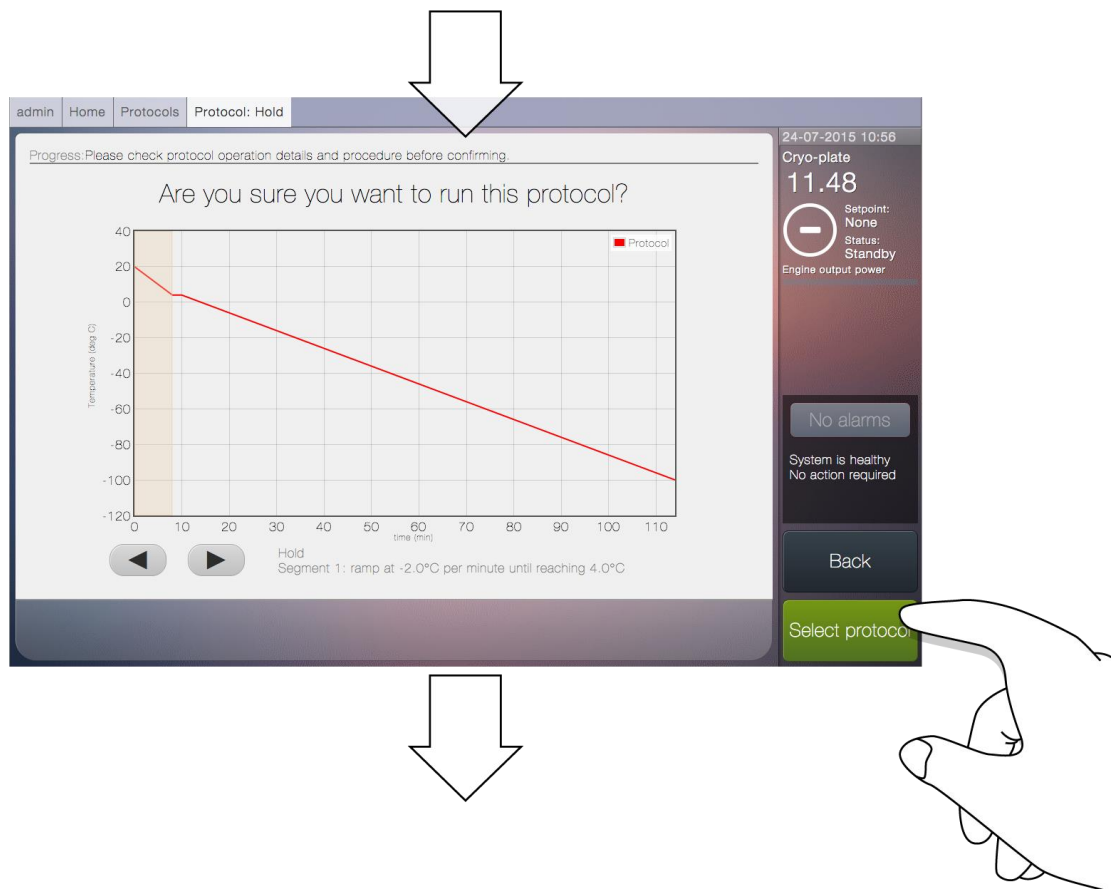
The new segment is shown above with a hold at the end and this should now be given a title and description and saved:



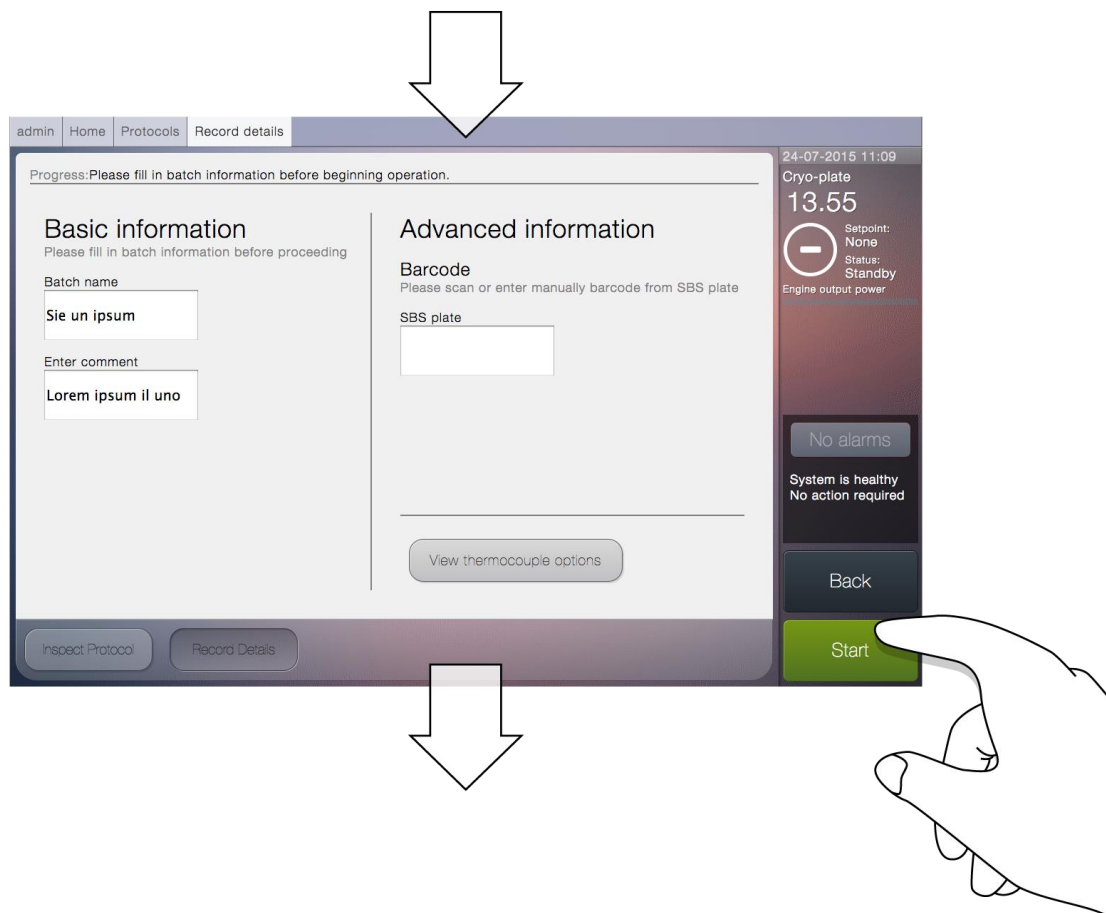
The protocol should then be run by going back to the select and run protocol screen



Selecting the protocol after checking the segments are correct:



And entering the record details and press start:



As the VIA Freeze is cooling the run can be held or aborted



Once the second segment has been reached the system will maintain the cryo-chamber at the preset loading temperature. Samples can now be loaded by simply removing the lid, loading the samples and closing the lid once again. The run is resumed by hitting the green 'Resume' button in the bottom right hand side of the screen.

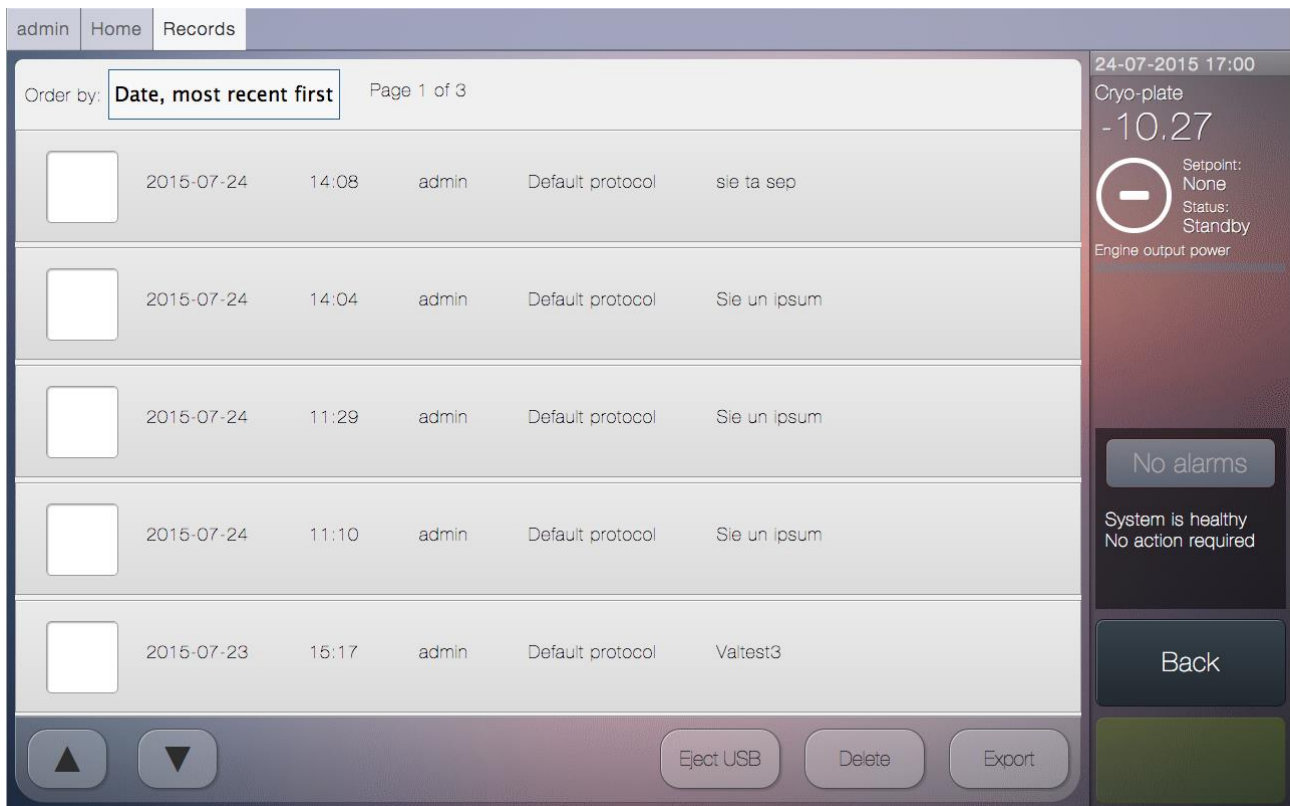
8.1 SBS plate loading outside the freezer

It is also possible to remove the SBS plate from the system to fill vials outside the freezer. This will enable use cases such as automated-vial filling in a SBS tray, or use of the SBS tray to minimise thermal excursions during cryoprotectant addition.

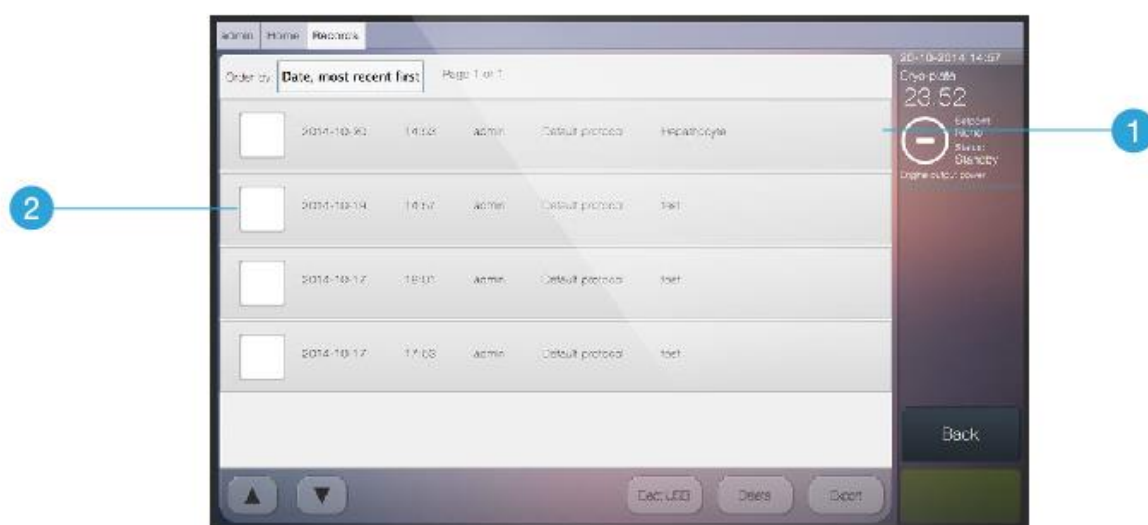
When designing SOPs that use the SBS trays outside of the cryo-chamber we recommend you discuss your proposed workflow with Asymptote who can advise as to best-practice. It is imperative that condensation build up is minimised during this use-case, various methodologies and SOP's can be adopted to ensure correct operation.

9. Advanced operation

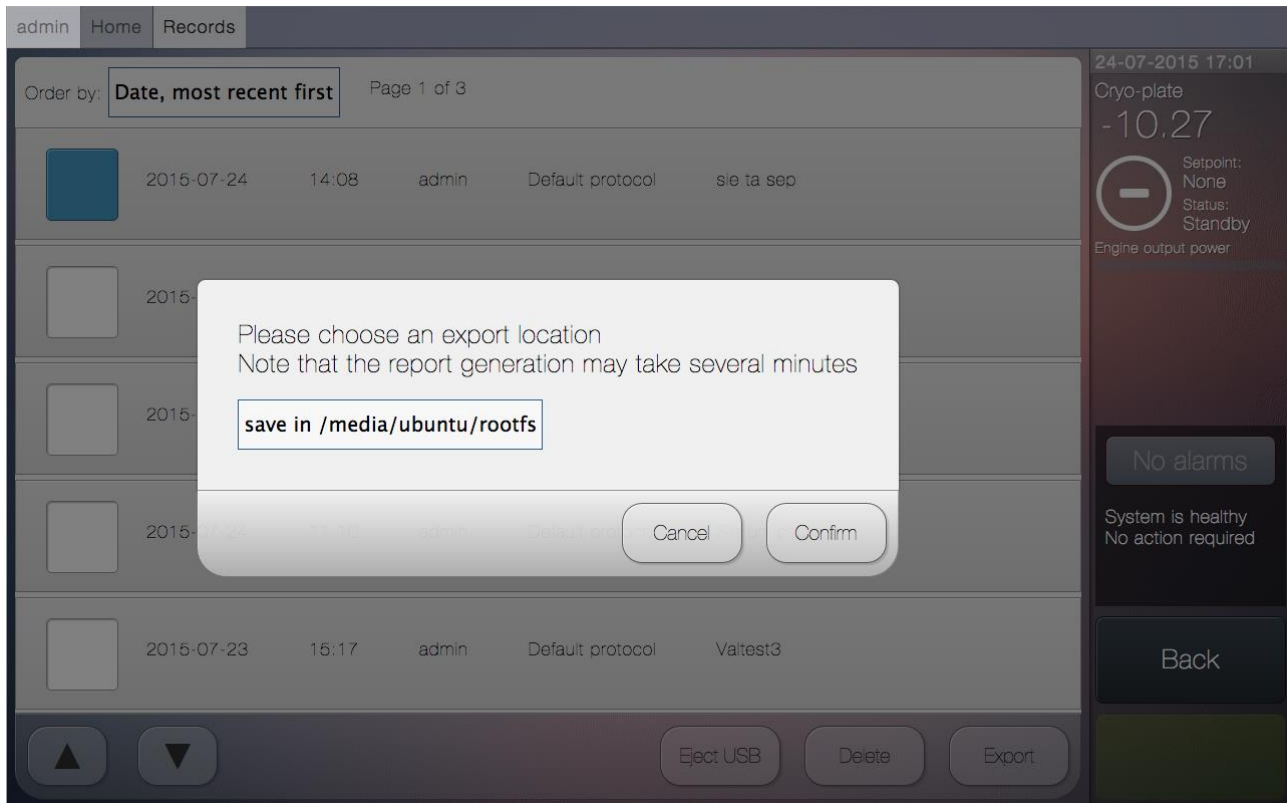
9.1 Records



The Records screen allows users to access a log of previously run protocols; the protocol information bar will display the time, date, user, protocol type and comments of each run.

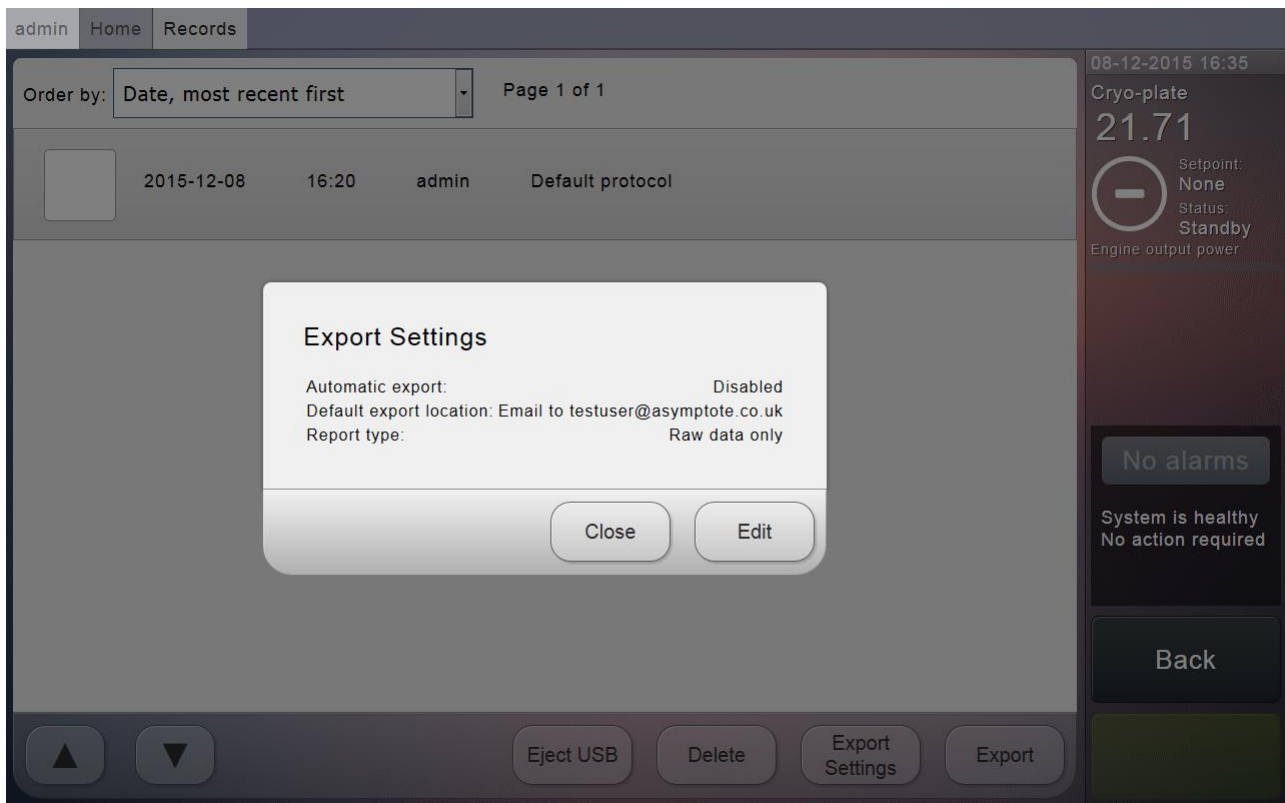


- 1) Selecting the protocol information bar will take the user to the protocol summary screen, where further information, such as the graph, can be examined.
- 2) Checking the checkbox and selecting the Export button will display pop up window with the export options. Select confirm to export a report.

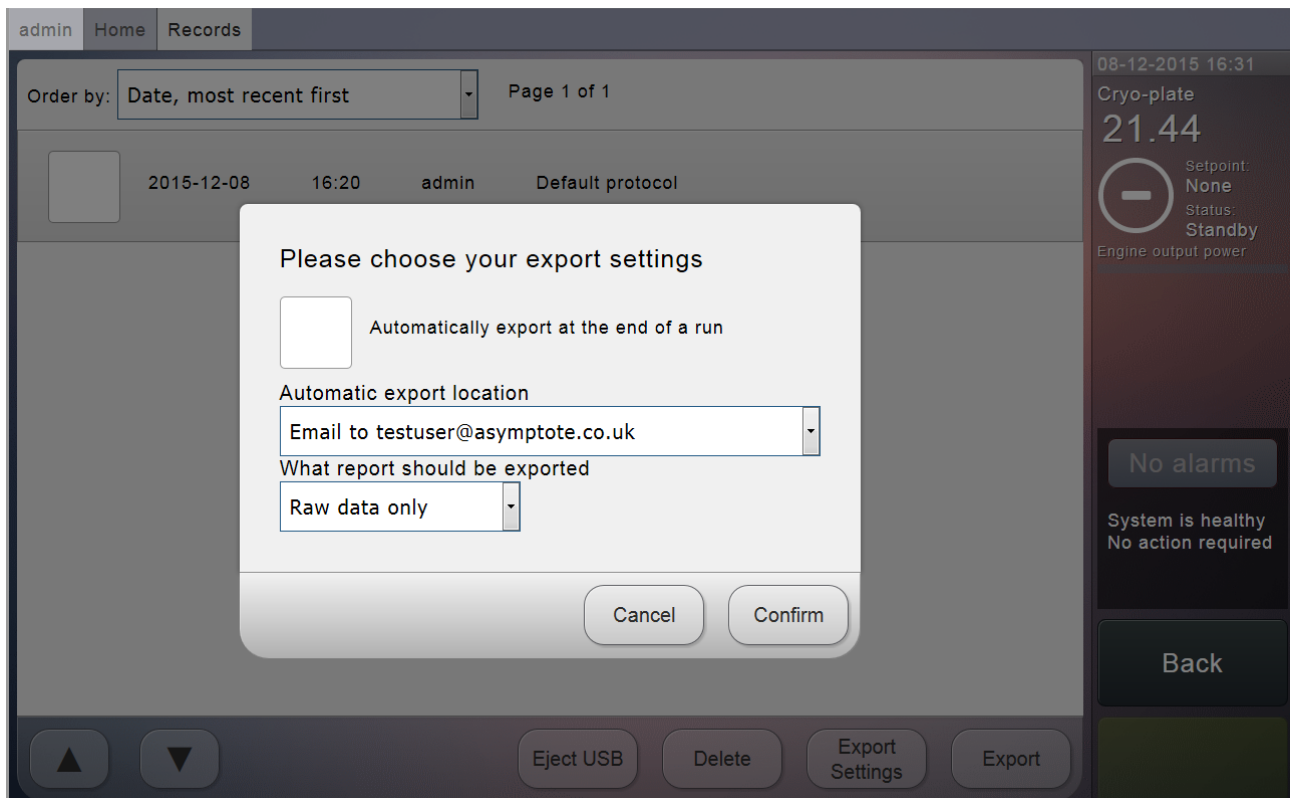


NOTE: please make sure a USB memory stick has been plugged into the USB ports on the back of the system prior to selecting Export. Once exported, select Eject USB before safely removing the memory stick.

- 3) Selecting the Export Settings button will display a dialog box that will allow you to view and edit settings for exporting.

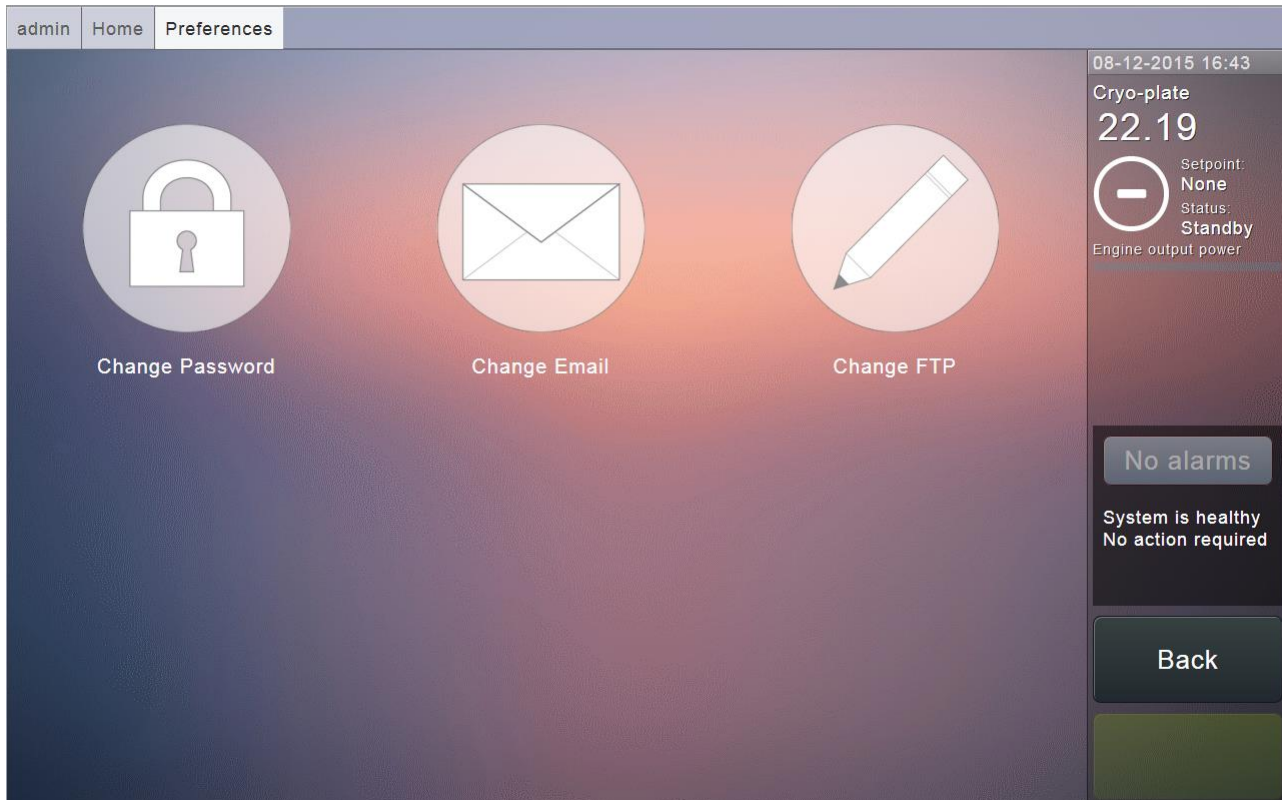


- 4) Clicking edit here opens a new menu to change these settings. Automatic export means that after each run a report will automatically be exported to your default export location. Report type specifies whether you want just the csv (Raw data only) or both pdf and csv (Full report).



The edit export settings menu, the checkbox toggles automatic exporting and the drop down menus let you change the location and the type of report.

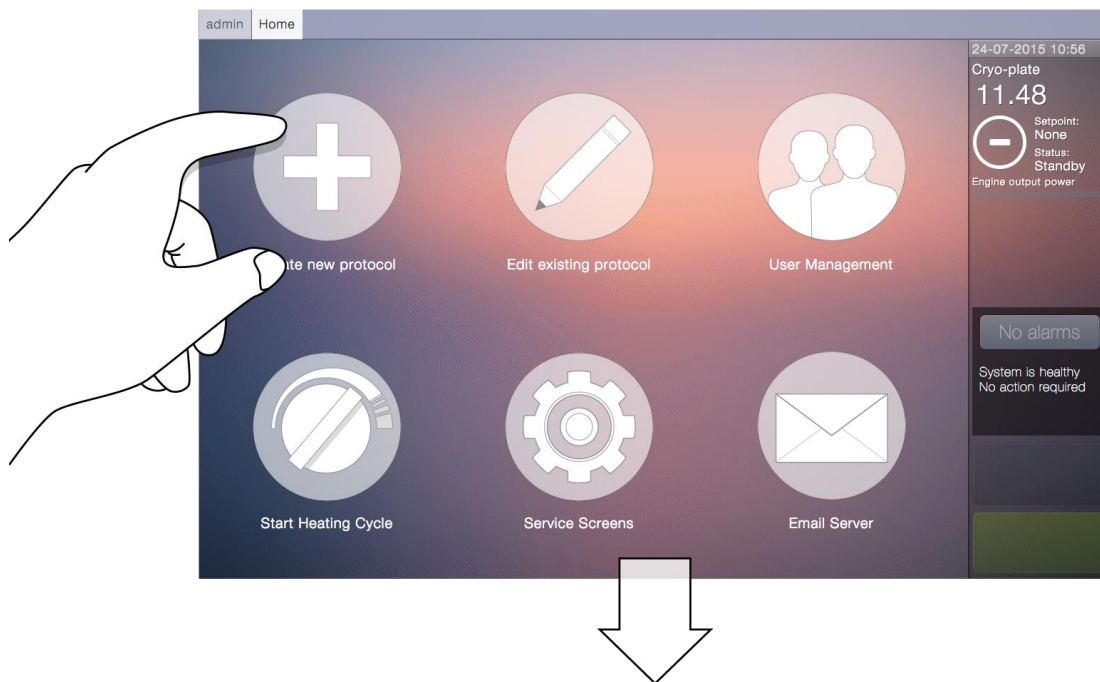
9.2 Changing password, email and FTP



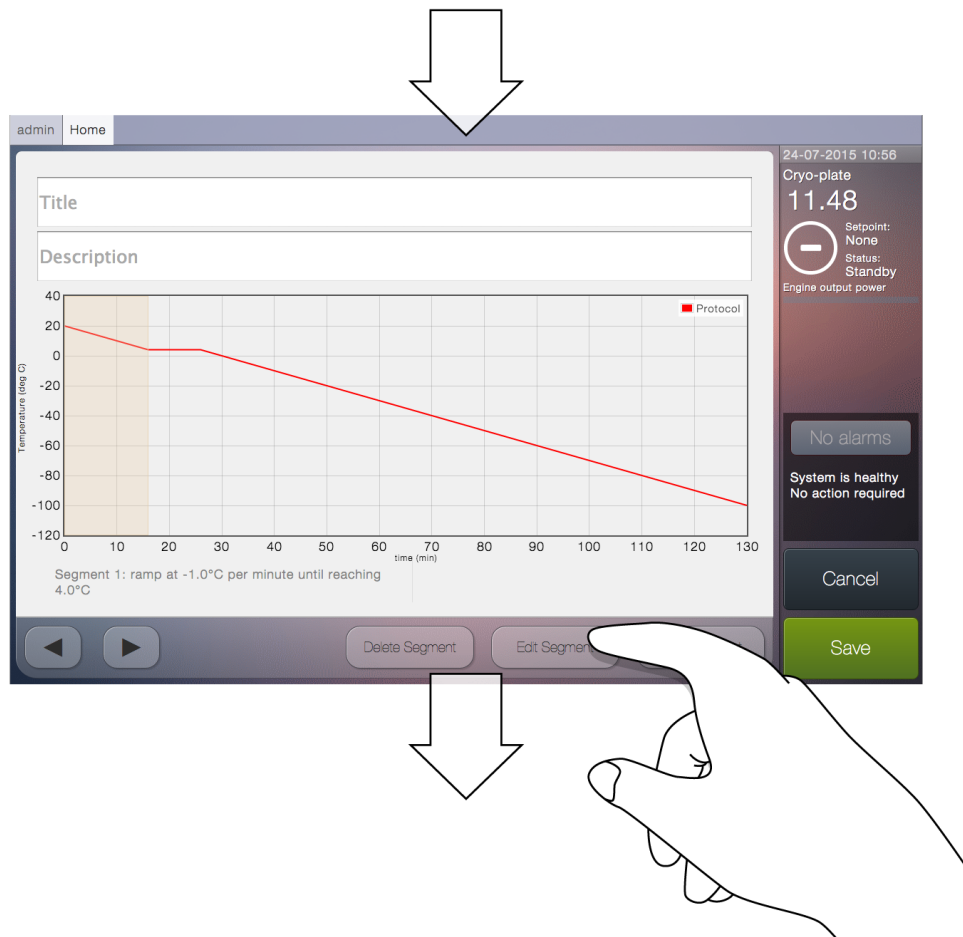
The user has the option to change their password, email and FTP information via the Settings menu. Simply select either the relevant icon and follow the on screen instructions on the subsequent screen.

9.3 Creating a new protocol (admin only)

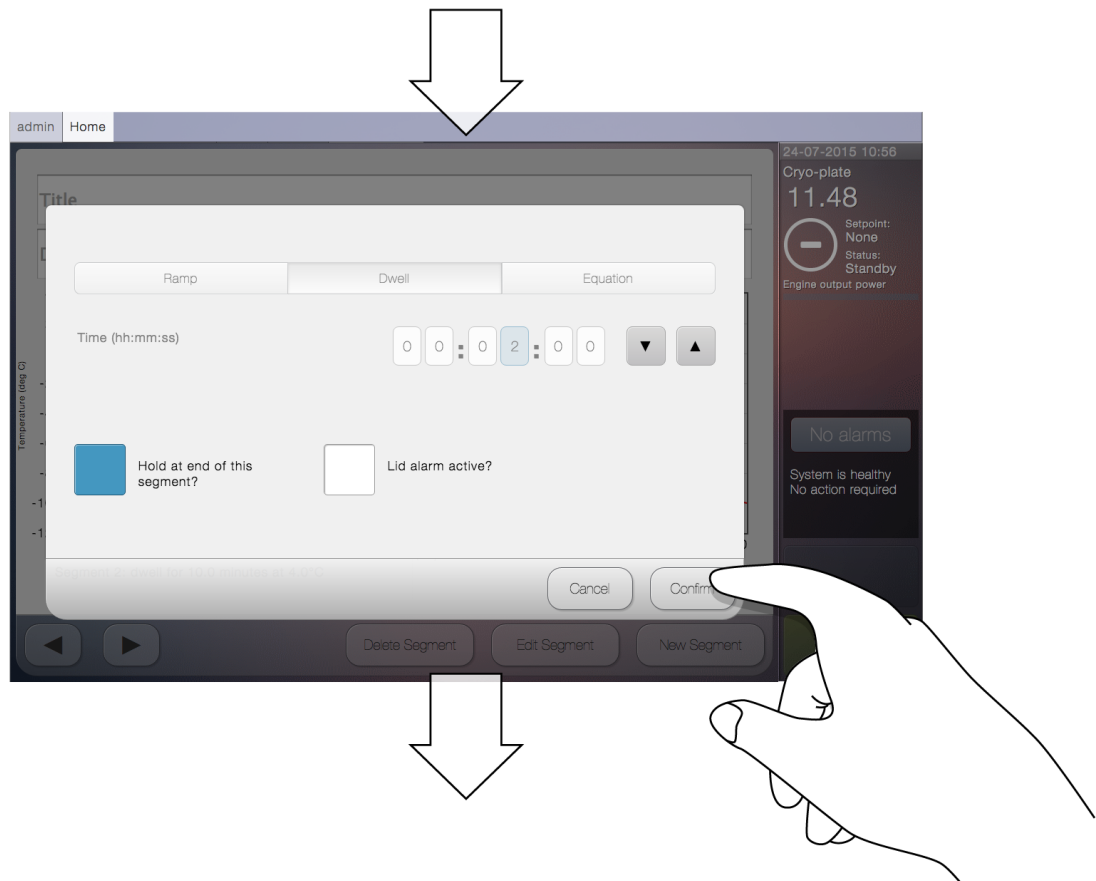
Via the System Manager menu an admin user can access the protocol editor to either create new protocols or edit existing ones. To create a new protocol, simply select Create New Protocol.



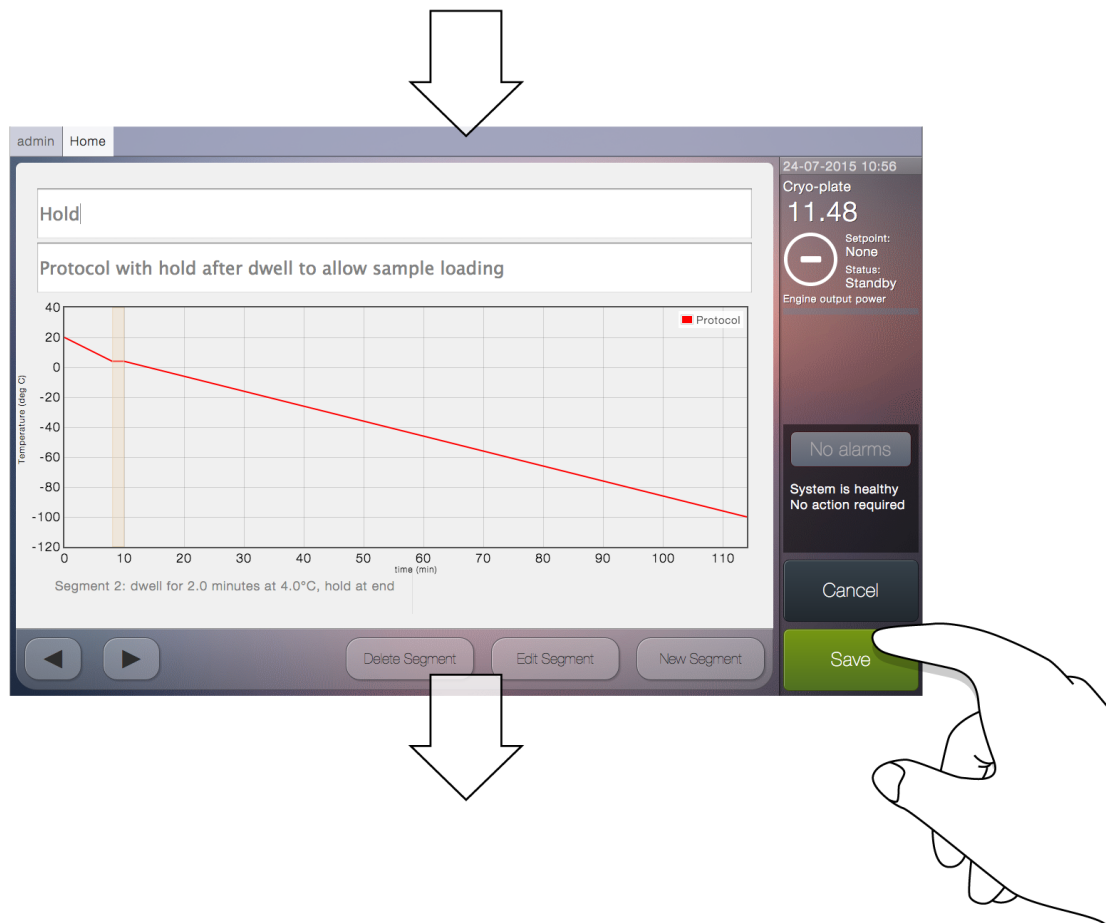
Here a protocol title and description should be filled in; to do so simply select the input box and fill in the on screen keyboard, which will appear. Control the currently selected segment of the protocol with the controls in the bottom left of the main window.



Once on the desired segment, the user can select to delete the segment, edit the segment or create a new segment to follow, using the controls in the bottom right of the screen. Selecting Edit Segment will access a pop up window whereby users can choose a desired state for the segment.

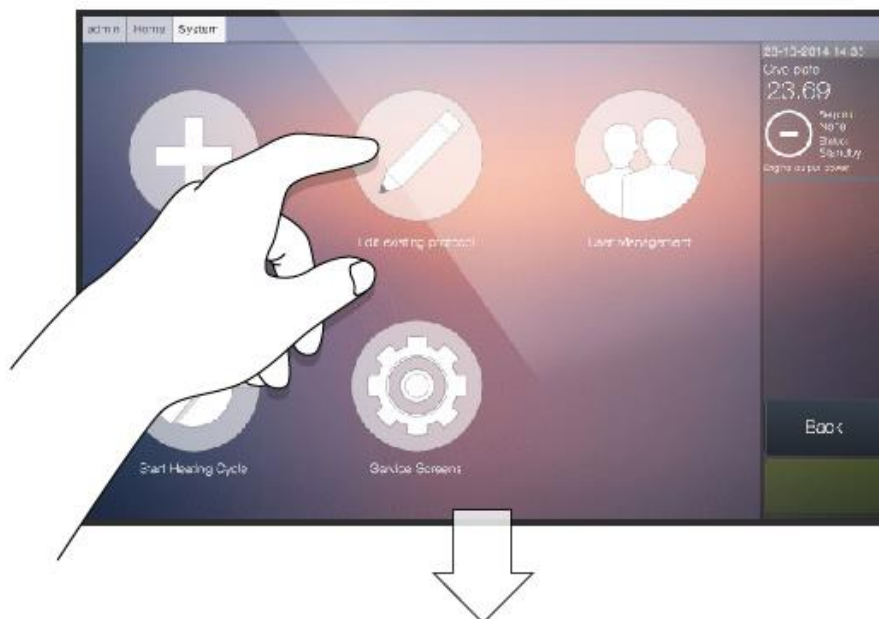


Once the protocol cooling rate has been completed and all information correctly added to the input boxes, simply select Save in the bottom of the status column. The new protocol has been created and can be accessed via the Select and Run Protocols option on the home screen.

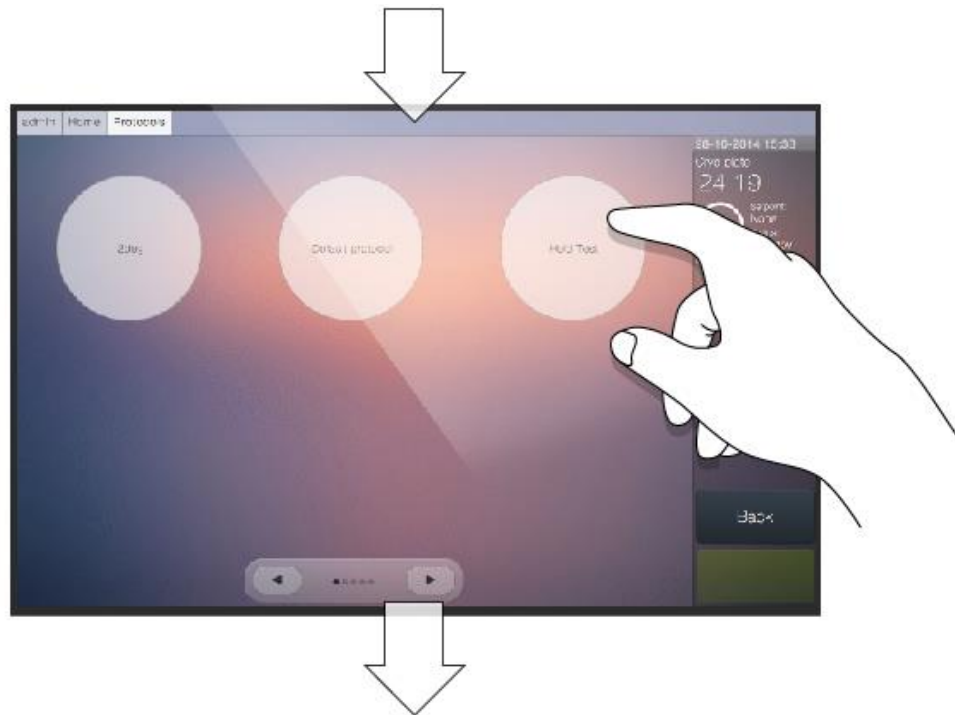


9.4 Editing an existing protocol (admin only)

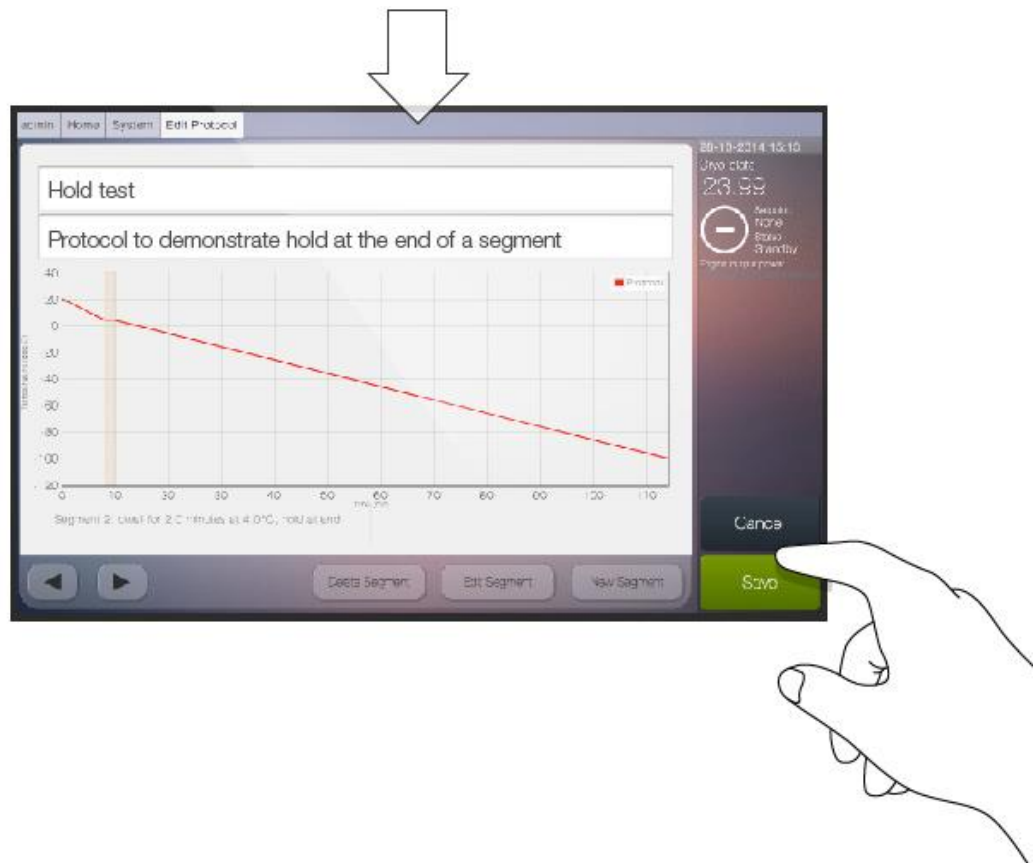
As in section 8.5 the protocol editor can be accessed via the System Manager menu and existing protocols can be edited.



To do so select Edit Existing Protocol on this screen to view the protocols currently installed on the system. Selecting a protocol will bring up a fully populated protocol editor screen.

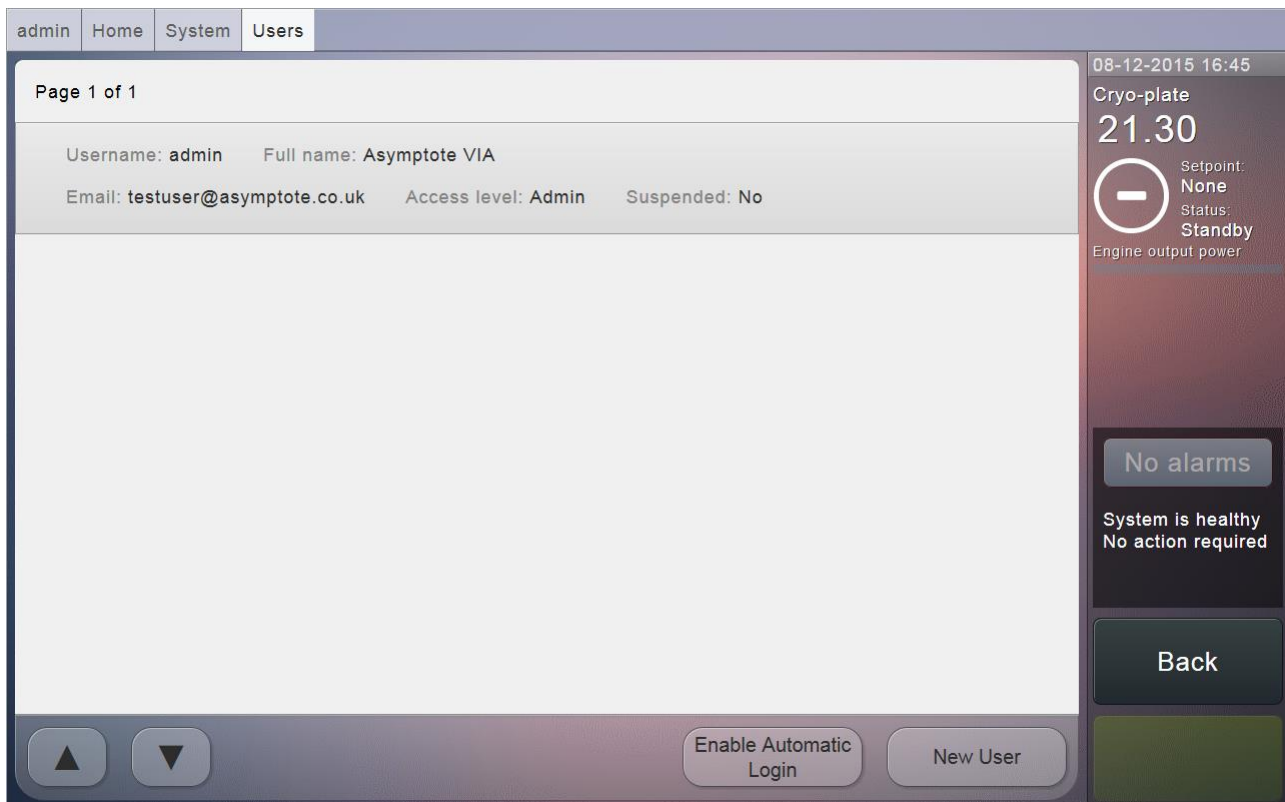


Navigate through the graph segments using the controls on the bottom left of the main window, edit or delete the selected segment with those on the bottom right of the main window, or create new segments. Edit the title and description by selecting the input boxes.

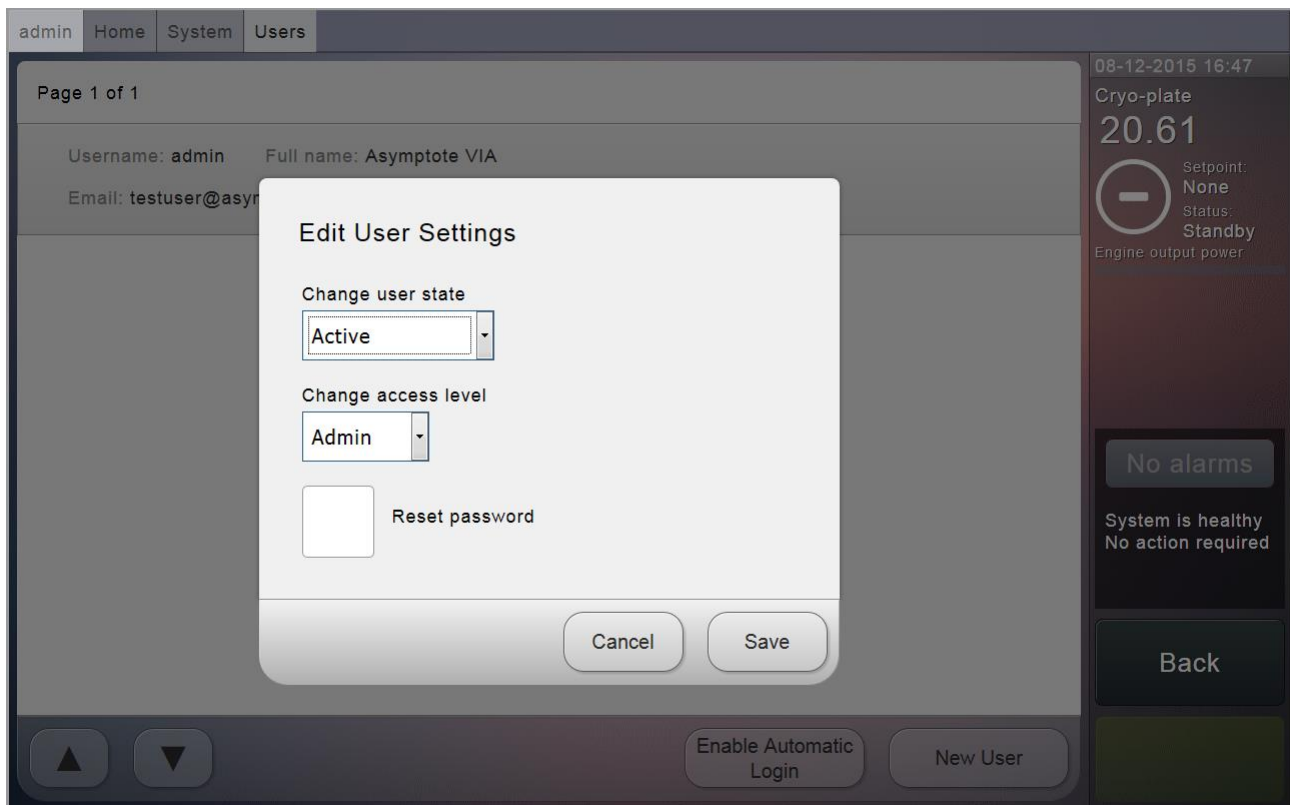


Finally select Save in the bottom of the status column. To view the newly edited protocol, go back to the Home screen and choose Select and Run Protocol.

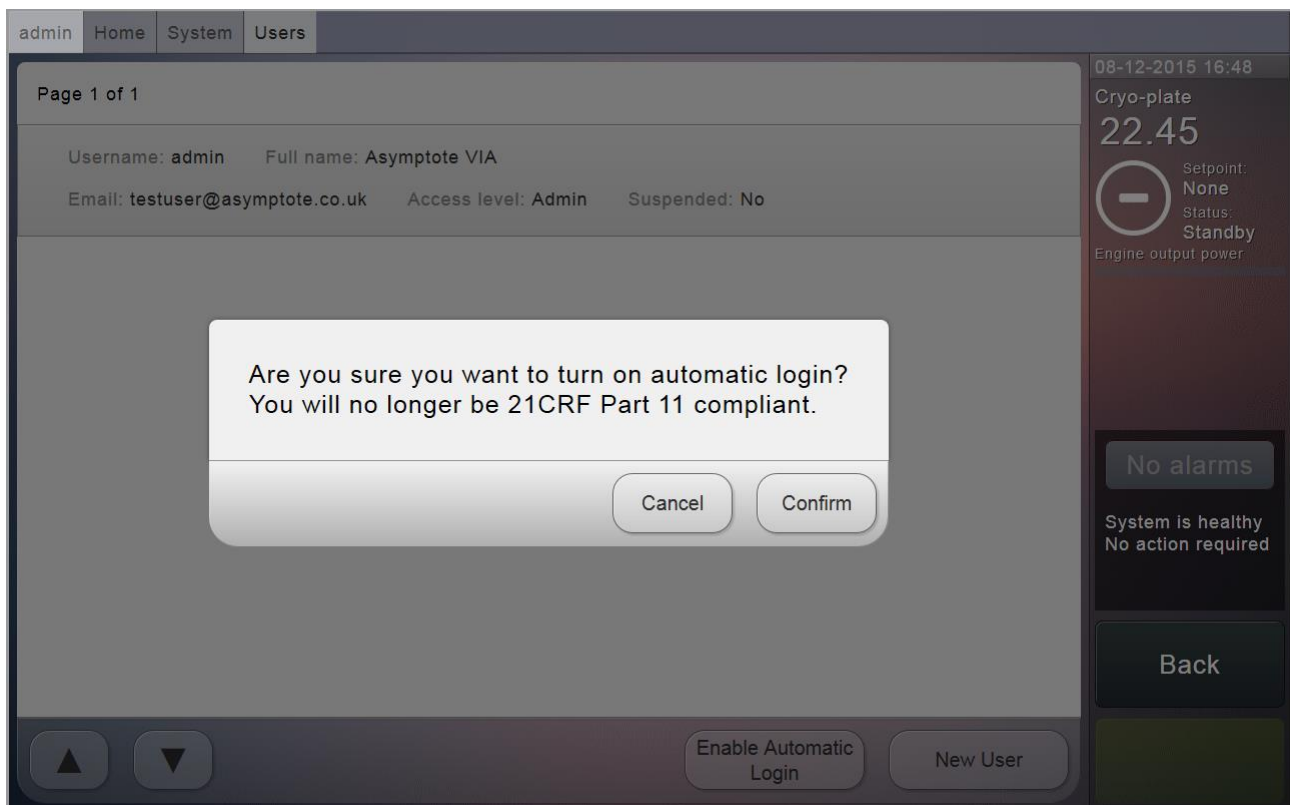
9.5 User management (admin only)



An admin user can access the User Management screen via the System Manager menu. Selecting the user information bar accesses a pop up window where the user can control the status of the selected user account.



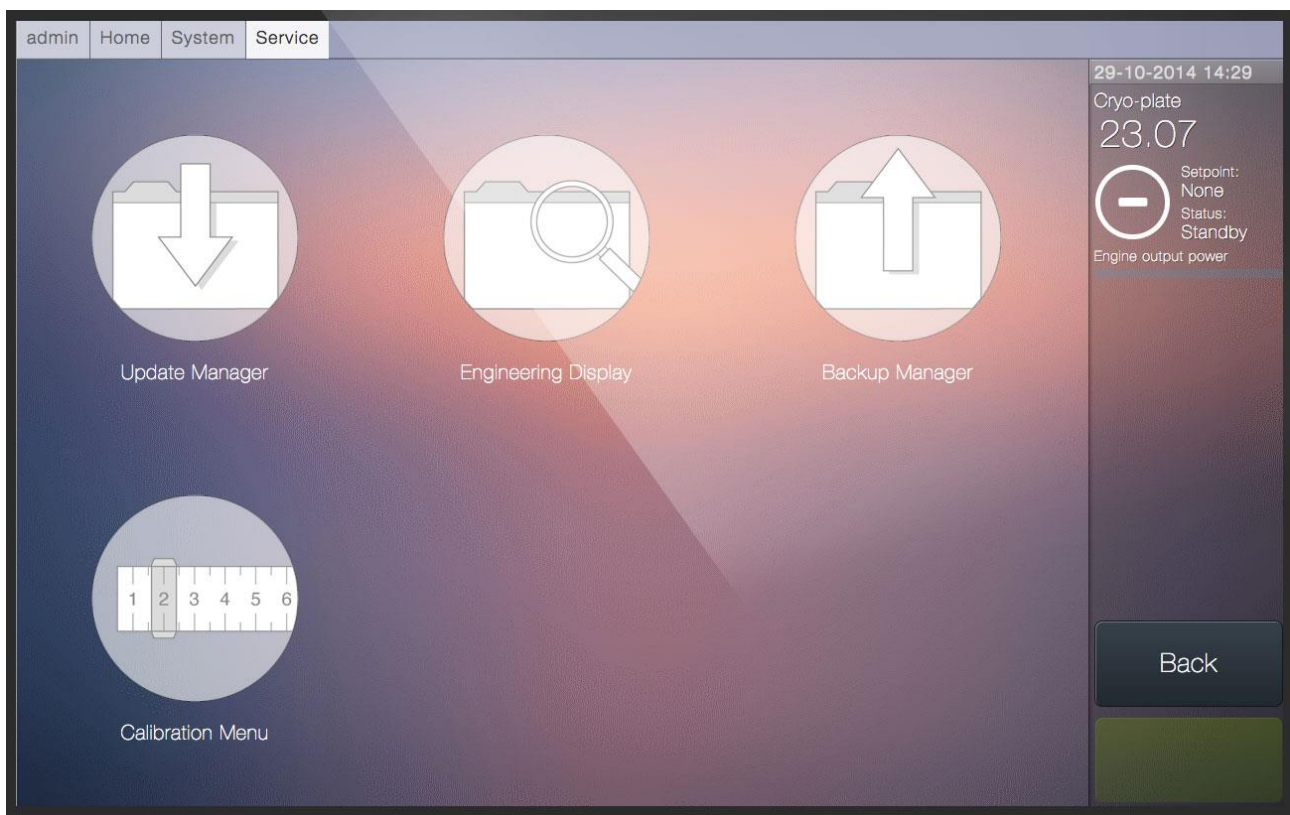
Selecting the Enable Automatic Login option brings up a confirmation box which when confirmed removes the need to log in to the system each time. The system stays logged in as the current admin user.



9.6 Creating a new user

A new user can be created by clicking on the System Manager -> User Management menu and then the New User button. Once the username, and type has been entered a new user can be created. The First name, last name and e-mail are optional. The password for the new user is set to asymptote by default and this can be changed from the My preferences or settings menu (depending on user type) on the home screen.

9.7 Service screens (admin only)



Technical information and servicing tools, such as updating and backups, can be accessed on the Service Screens menu. Each of these options will take the user out of the familiar user interface structure, which can be returned to from each of the screens. Instructions to each new menu can be found on the individual screen once accessed.

If calibration is required, please contact Asymptote for calibration servicing.

9.8 Systems administration

9.8.1 Hardware

The VIA Freeze™ unit is powered by an iMX6 ARM microcontroller running an Embedded Linux operating system. The system has an integrated SATA hard drive that is used to boot the OS and store all system information.

9.8.2 Operating system, Boot process and Sys Admin access

The operating system is Ubuntu 14.04 Long Term Support. The desktop environment is LXDE.

The software of the system can be separated into 3 distinct areas;

1. Ubuntu OS
2. Asymptote Software dependencies
3. Asymptote Proprietary Software

The boot process goes through the following distinct steps to present the UI to the user;

4. uBoot
5. Linux Kernel loading and booting
6. Standard LXDE boot process
7. Upstart processes to load Asymptote Backend processes
8. Upstart process to load Asymptote Frontend UI

The Frontend UI is displayed in a Firefox Web browser run in full screen Kiosk as an upstart process.

The easiest way to gain access to the Linux environment, is to either SSH into the system via the IP address (reported in the Engineering Page), with user: Ubuntu, Pass: Asymptote, or to open a terminal on the local VIA Freeze™ system by CTL-ALT-T on a USB keyboard. On the local system;

```
$sudo service stop firefox
```

Which will terminate the kiosk mode Firefox UI giving the admin access to the Linux desktop.

9.8.3 Network and Security

For maximum security, Asymptote recommends that you connect the system to your intranet only, not exposing it to the Internet. This minimises the small risk that the Linux OS could present a security vulnerability to your network. If the system is connected with direct access to the Internet, regular maintenance of the OS software packages will ensure that any vulnerabilities discovered by the Linux community are patched.

9.8.4 Software maintenance

If connected with direct access to the internet, we recommend that the Linux OS is kept up to date monthly with the:

```
$sudo apt-get update
```

```
$sudo apt-get upgrade
```

standard package manager commands to maintain security of the system.

The VIA Freeze™ software is maintained by Asymptote. As new VIA Freeze™ software is released, Asymptote will contact you by email to make you aware of the new software. The update process requires a user to load the patch onto a USB device, connect it to the system, and to log in as an admin user and access the software update page.

9.8.5 Setting the time zone (do this before setting the time)

Before setting the system time it is necessary to set the time zone in which the system is operated. We endeavour to ship the systems with the correct configuration, but this is not always possible.

To see the currently set time zone of the system, the command:

```
$timedatectl
```

Will show you the current system time and Time zone information. To change time zone type;

```
$sudo dpkg-reconfigure tzdata
```

And select the correct time zone. Restart the system with:

```
$sudo shutdown -r now
```

and the time zone change will take effect.

9.8.6 Setting the time and date

For installations where users allow direct access to the internet, the system will interface with the Ubuntu Network Time Protocol server to keep synchronised to live atomic clocks. More information can be found here:

<https://help.ubuntu.com/10.04/serverguide/NTP.html>

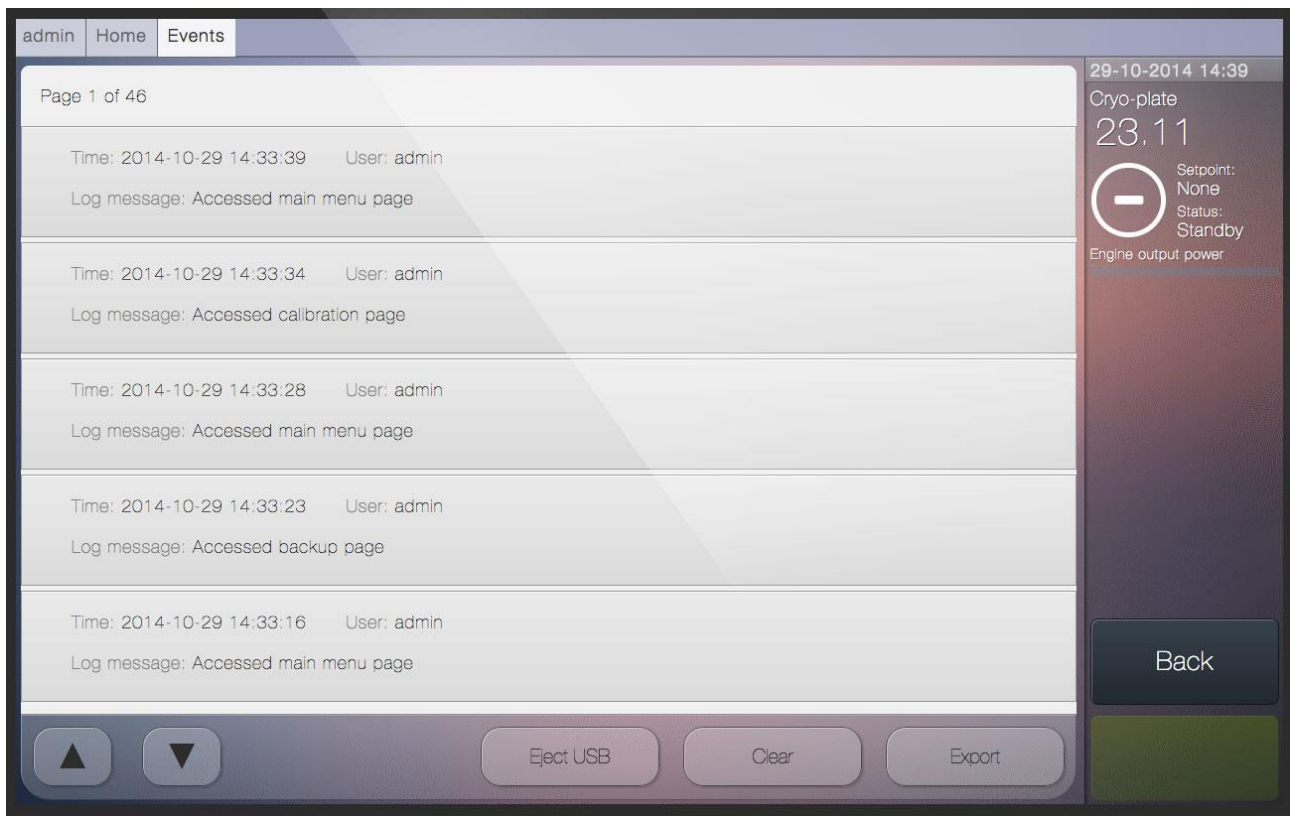
If not connected to the internet, it is possible to a timeserver on your intranet or to manually set the time and date of the system.

To manually set the date and time of the system use the command

```
$ sudo timedatectl set-time "Mon 2014-10-27 18:00:00"
```

With correct values substituted in.

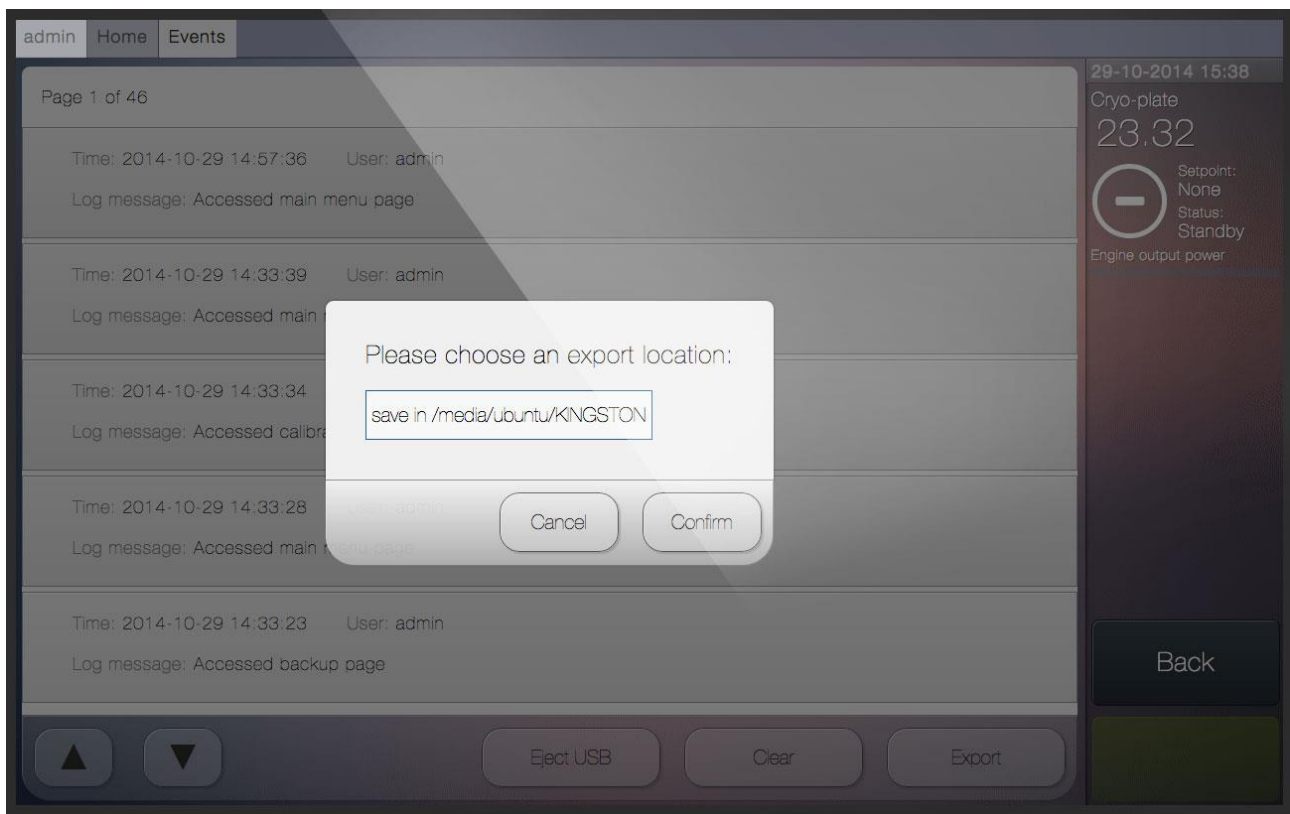
9.9 Events



The Alarms and Event Log, accessible via the Home screen, displays a list of all errors and events in chronological order. Each information bar will show the time, date and user and give a brief message detailing the event or alarm type.

To scroll through the pages of the list use the controls at the bottom left of the main window and use those in the bottom right to export or clear the log or to eject the USB safely from the system.

9.9.1 Export event log

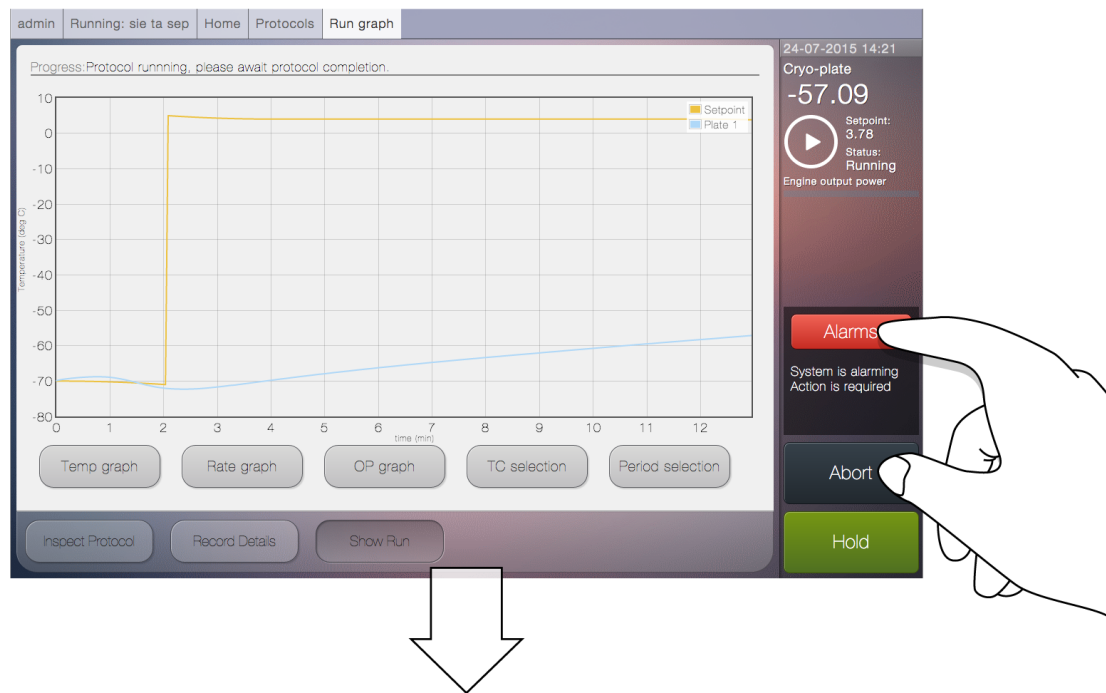


To export the alarms and events log, first plug a USB memory stick into the USB ports at the back of the system. Next select Export at the bottom right of the main window to access the export pop up menu and select confirm.

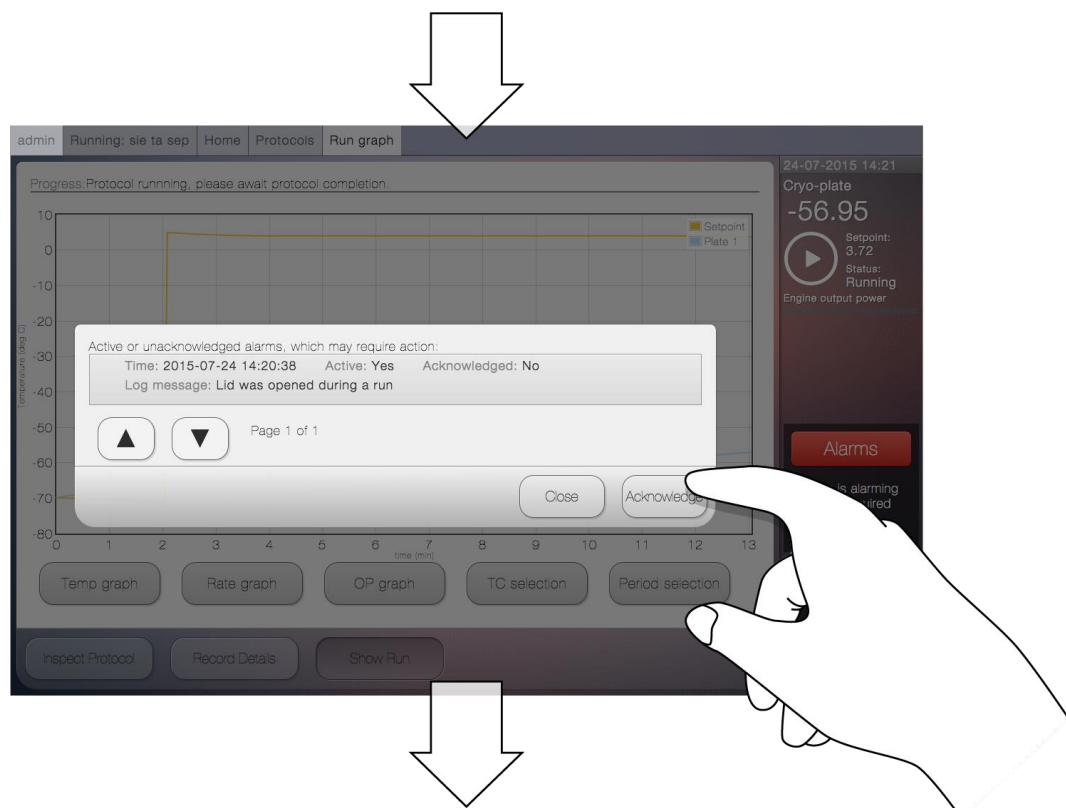
Before removing the memory stick first select Eject USB before safely removing from the USB port.

9.10 Alarms

The Alarms panel is displayed in the Status Column. When no alarms are active, the panel will state "System is healthy. No action required".

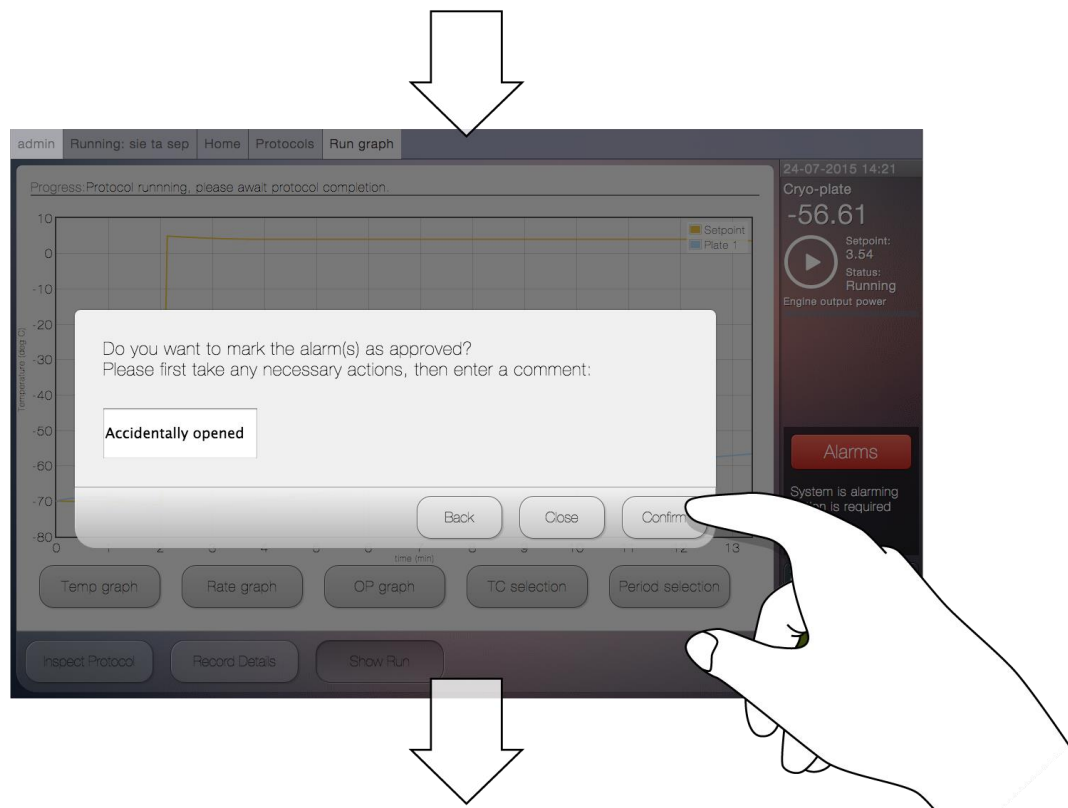


If an alarm sounds, the 'Alarms' button will become active and the panel will read "System is alarming. Action is required". Press the 'Alarms' button to view the alarm type.

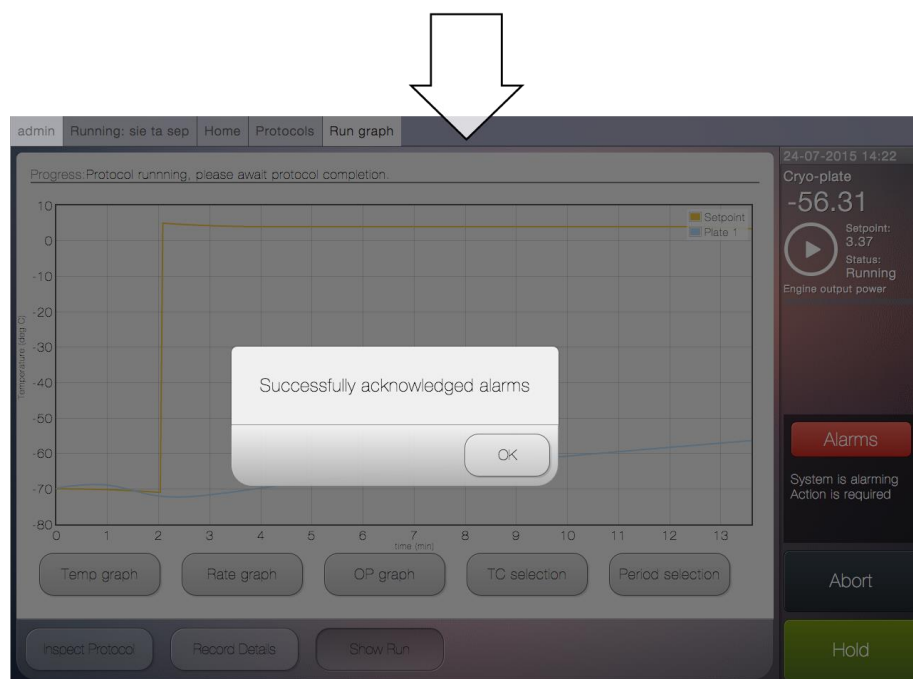


A pop up will appear stating the type of alarm, a timestamp of when it occurred, its status (active: Yes or No) and whether or not it has been acknowledged. Select the

'Acknowledge' button to proceed.

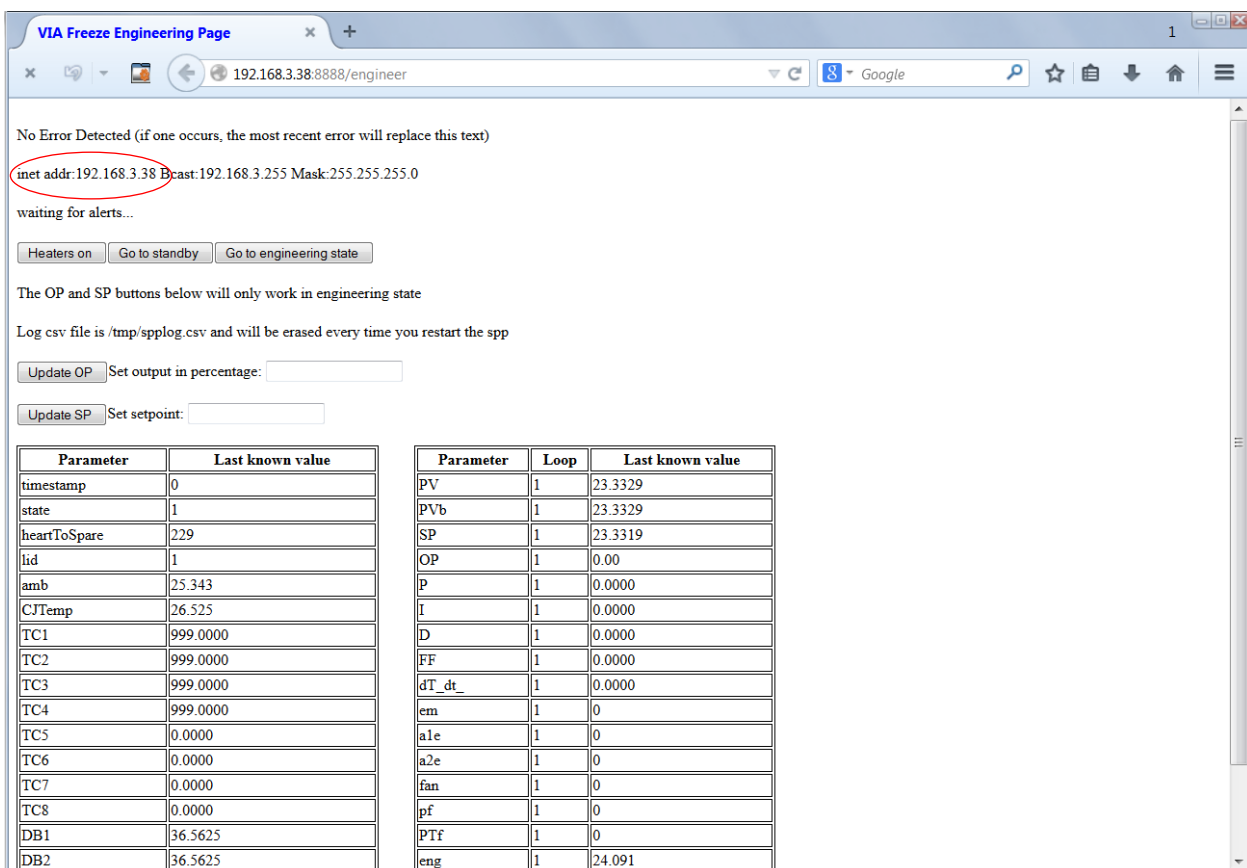


To confirm acknowledgment, enter a comment into the input box to explain the nature of the alarm and how it was resolved. All details of alarms and their comments will appear in the alarms log.



9.11 Remote access

To remotely access the VIA Freeze from another computer it has to be connected to a network via the Ethernet port as shown in section 5.1. Once this is done the unit should be dynamically given an IP address (this can depend on your intranet settings) which can be found in the engineering screen. This is accessed through the System Manager → Service Screens → Engineering Display menus. The IP address is shown as inet addr: in the second line of the engineering screen as shown below in Figure 11:



192.168.3.38:8888/engineer

No Error Detected (if one occurs, the most recent error will replace this text)

inet addr:192.168.3.38 Bcast:192.168.3.255 Mask:255.255.255.0

waiting for alerts...

Heaters on Go to standby Go to engineering state

The OP and SP buttons below will only work in engineering state

Log csv file is /tmp/spplog.csv and will be erased every time you restart the spp

Update OP Set output in percentage:

Update SP Set setpoint:

Parameter	Last known value
timestamp	0
state	1
heartToSpare	229
lid	1
amb	25.343
CJTemp	26.525
TC1	999.0000
TC2	999.0000
TC3	999.0000
TC4	999.0000
TC5	0.0000
TC6	0.0000
TC7	0.0000
TC8	0.0000
DB1	36.5625
DB2	36.5625

Parameter	Loop	Last known value
PV	1	23.3329
PVb	1	23.3329
SP	1	23.3319
OP	1	0.00
P	1	0.0000
I	1	0.0000
D	1	0.0000
FF	1	0.0000
dT_dt	1	0.0000
em	1	0
a1e	1	0
a2e	1	0
fan	1	0
pf	1	0
PTf	1	0
eng	1	24.091

Figure 11 Engineering screen with IP address highlighted

Note this number down from the VIA Freeze and then go to another computer on your intranet (with access to the subnet that the VIA Freeze is connected to) and run a web browser (we recommend Firefox). In the address bar type in the IP address and append :8888/login. In this example the address to type into the web browser will be

192.168.3.38:8888/login. You will then be presented with the login screen. Once logged in the user interface will appear in the web browser as shown in Figure 12.

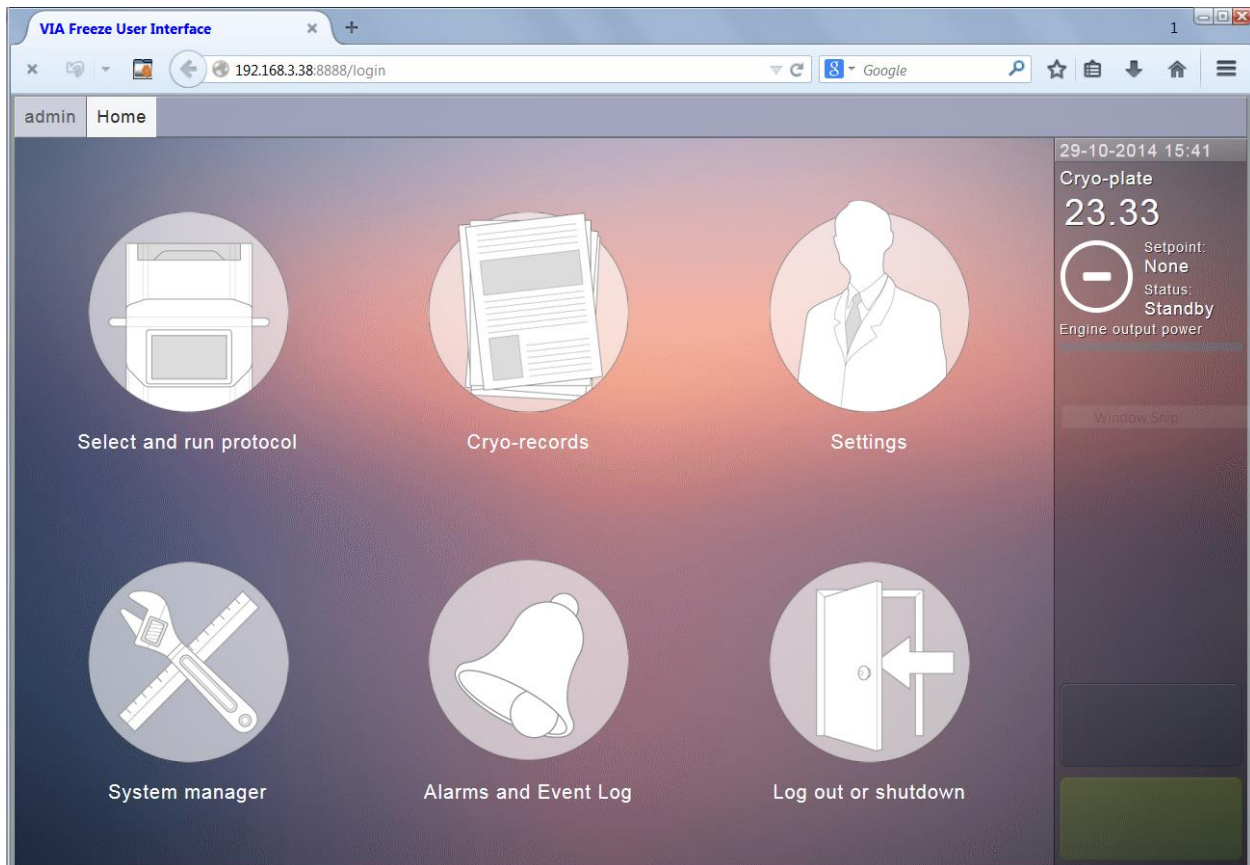
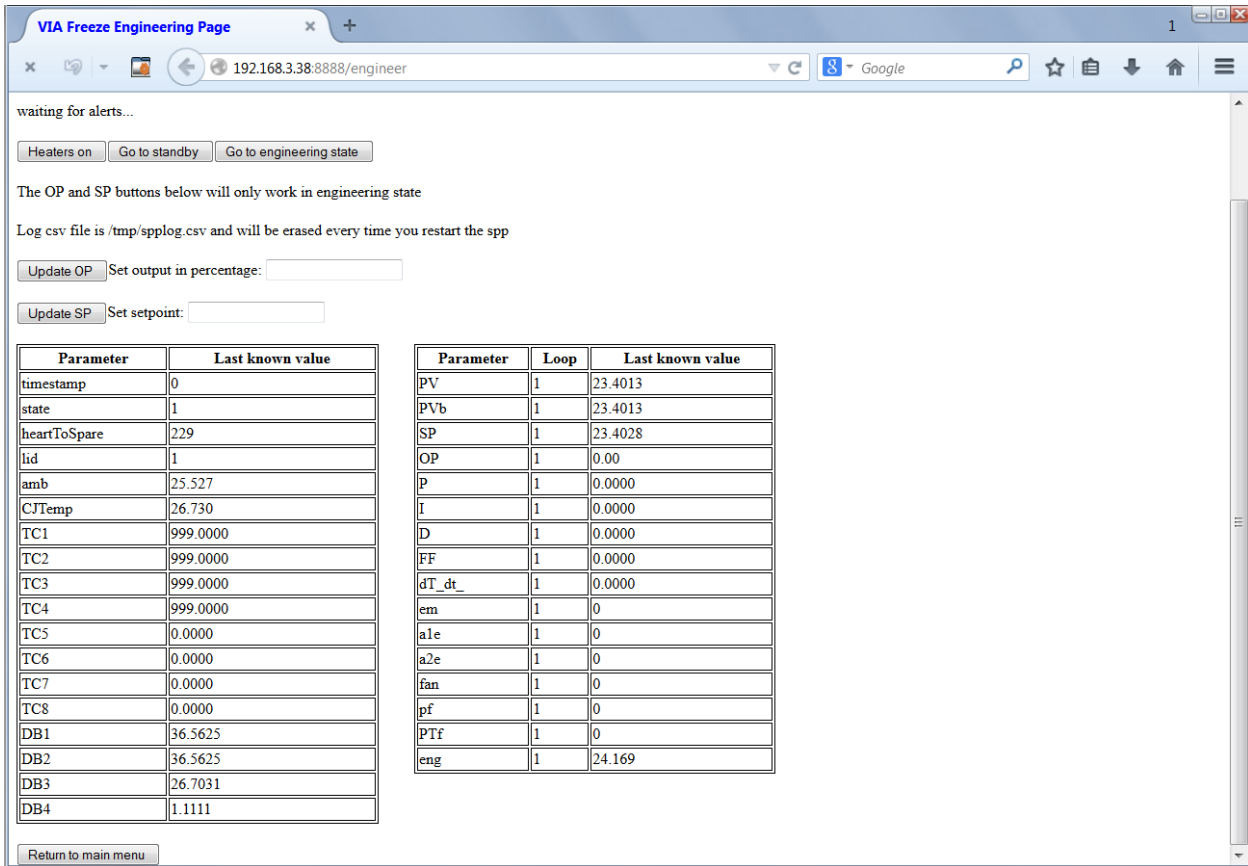


Figure 12 VIA Freeze user interface in a Firefox web browser

Once connected to the VIA Freeze user interface the functionality is exactly the same as if you were using the system in the lab but from the comfort of your desk. This is especially useful for monitoring runs. Multiple users can login to the system and if remote access to your intranet is available via VPN (Virtual Private Network) then the system can be accessed from the internet.

Should you have any problem connecting to the system we recommend you contact your system administrator since intranet settings may vary.

Note on the VIA Freeze™ to exit the Engineering page scroll down to the bottom and press the Return to main menu button as shown in Figure 13



waiting for alerts...

Heaters on Go to standby Go to engineering state

The OP and SP buttons below will only work in engineering state

Log csv file is /tmp/spplog.csv and will be erased every time you restart the spp

Update OP Set output in percentage:

Update SP Set setpoint:

Parameter	Last known value
timestamp	0
state	1
heartToSpare	229
lid	1
amb	25.527
CJTemp	26.730
TC1	999.0000
TC2	999.0000
TC3	999.0000
TC4	999.0000
TC5	0.0000
TC6	0.0000
TC7	0.0000
TC8	0.0000
DB1	36.5625
DB2	36.5625
DB3	26.7031
DB4	1.1111

Parameter	Loop	Last known value
PV	1	23.4013
PVb	1	23.4013
SP	1	23.4028
OP	1	0.00
P	1	0.0000
I	1	0.0000
D	1	0.0000
FF	1	0.0000
dT_dt_	1	0.0000
em	1	0
a1e	1	0
a2e	1	0
fan	1	0
pf	1	0
PTf	1	0
eng	1	24.169

Return to main menu

Figure 13 Exiting the Engineering Page

10. Menu structure detail

This section **Error! Reference source not found.** gives an overview of the complete menu structure, as shown below, which is then split out in the subsequent figures.

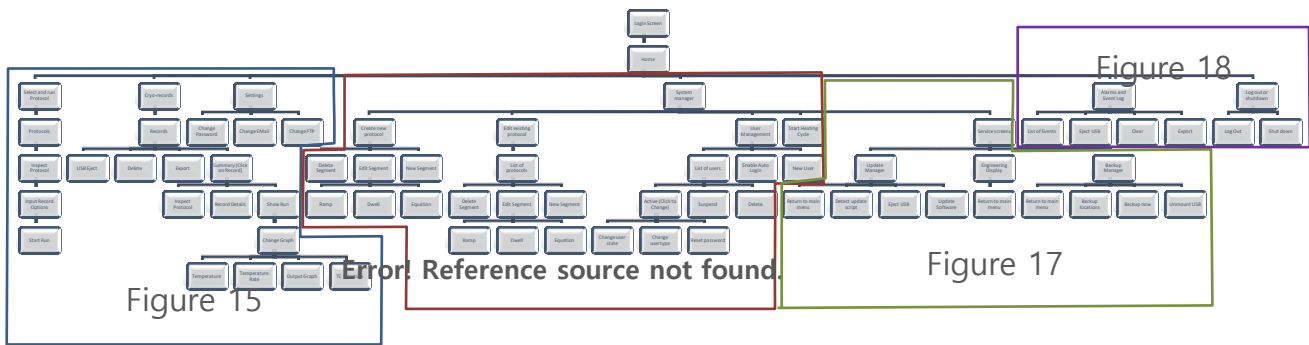


Figure 14 Complete menu structure

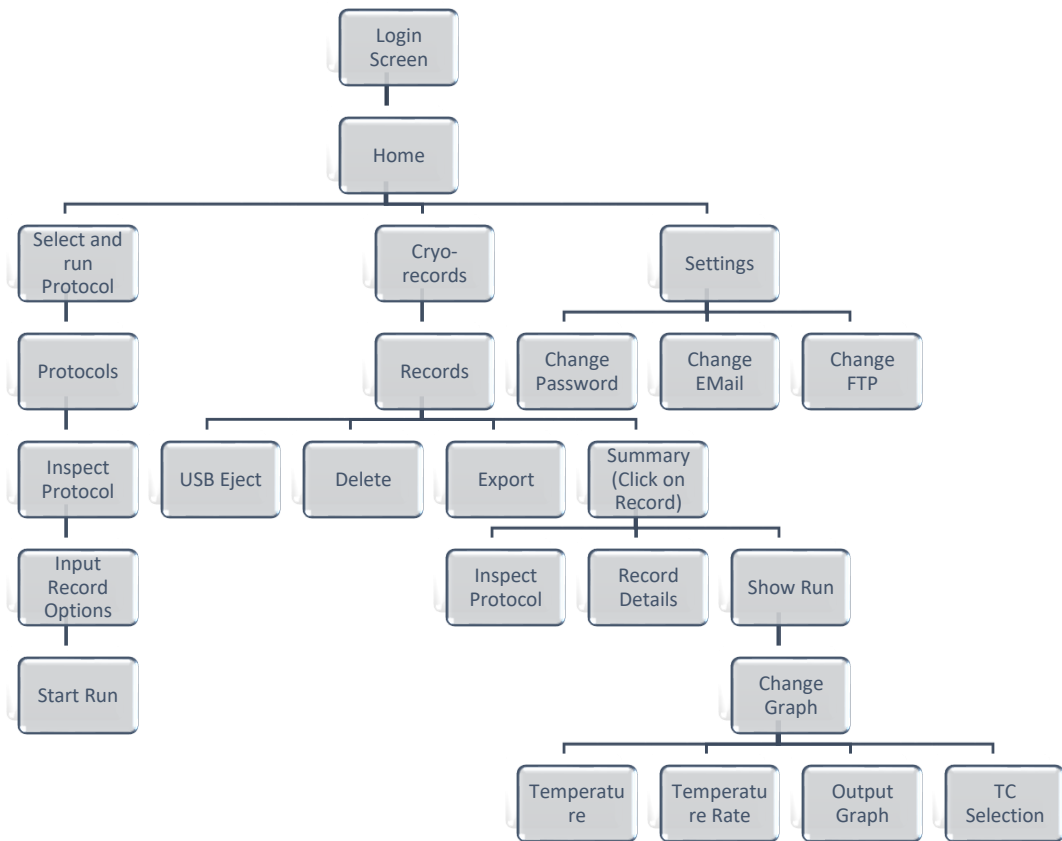


Figure 15 Home Menu tree A

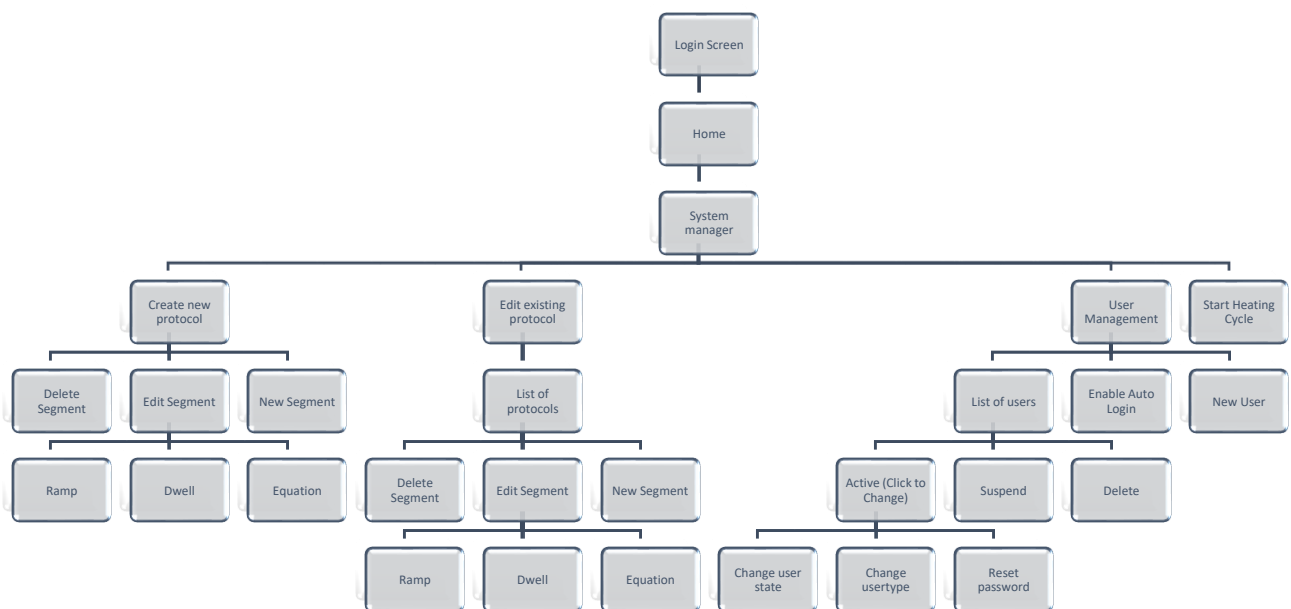


Figure 16 System Manager menu A

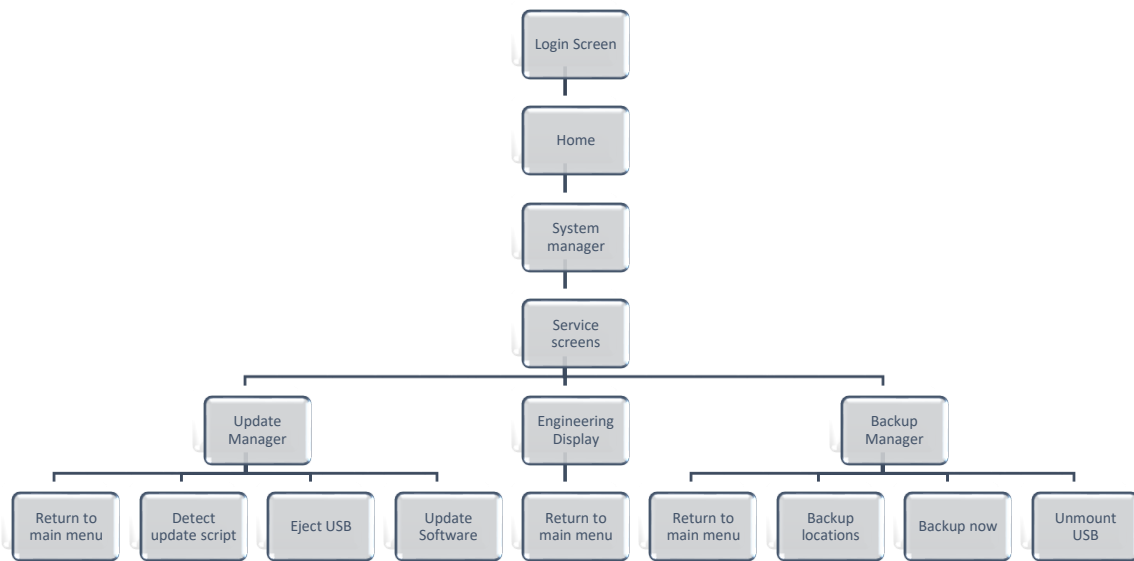


Figure 17 System Manager menu tree B

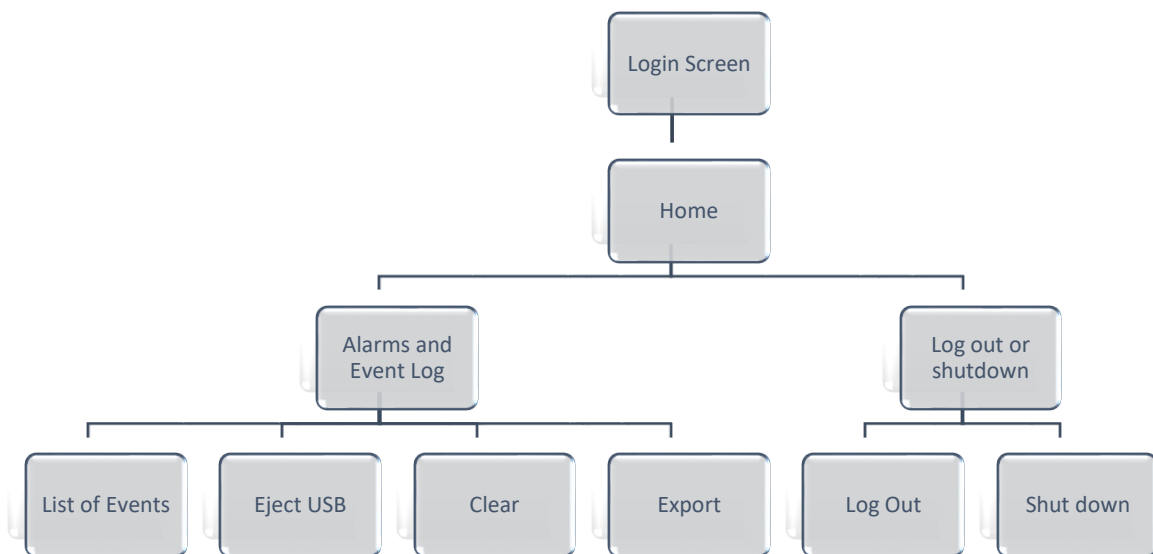
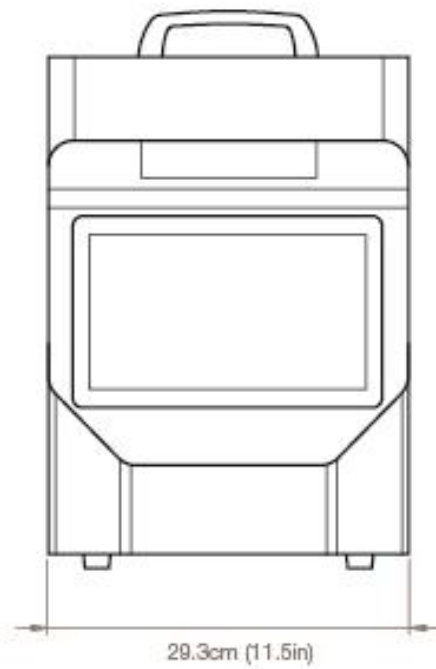
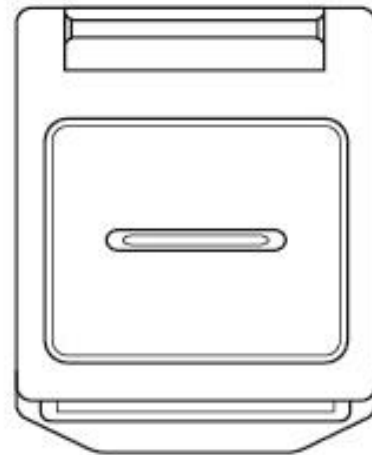
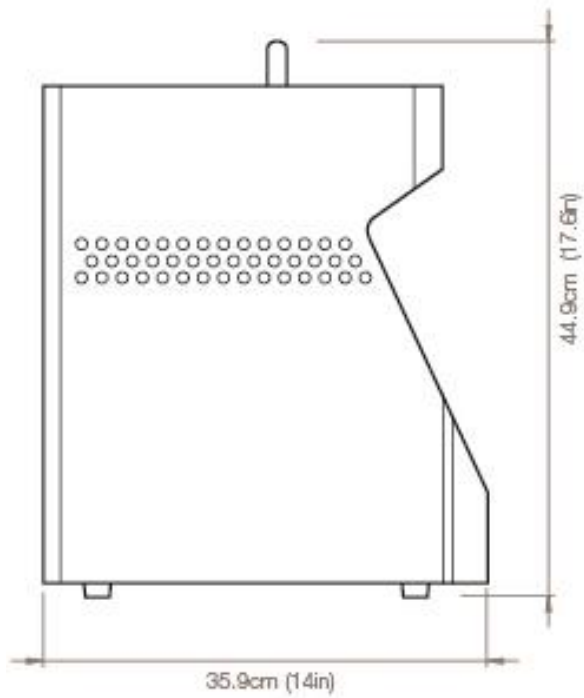


Figure 18 Home menu tree B

11. Specifications and dimensions

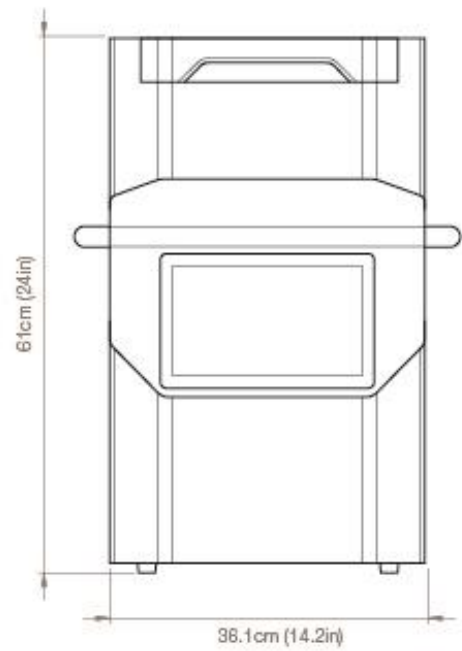
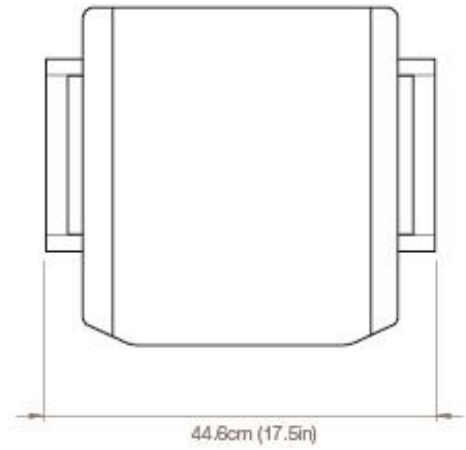
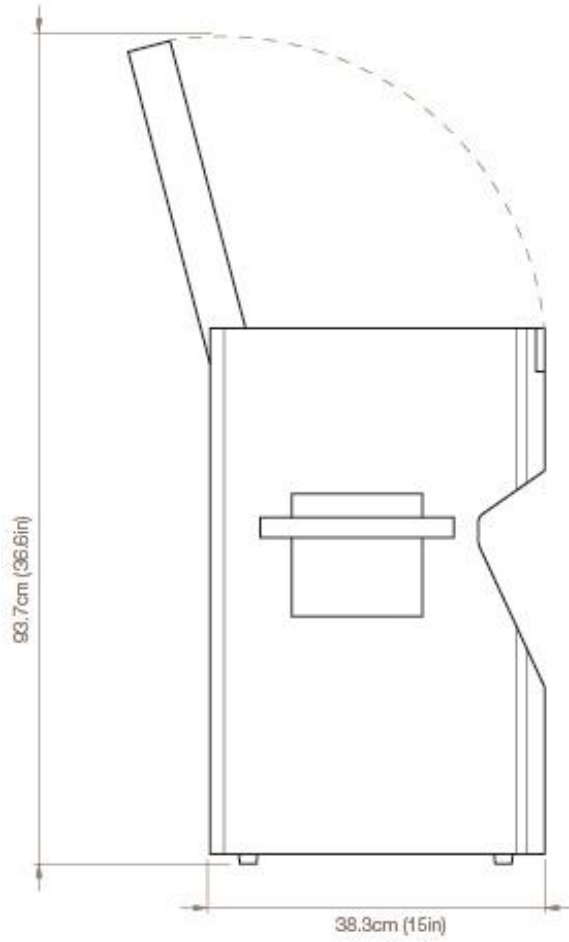
11.1 VIA Freeze Research

Model Number	VFP_30001
Cooling capacity	48 x 2.0ml standard cryo-vials on 1 custom SBS plate
Ambient operating temperature	+5°C to +30°C
Cooling temperature limit	-100°C @ 18°C ambient
Cooling rate	-1°C/minute down to -70°C @ 18°C ambient
Cooling temperature control range	±1°C
Operating voltage	100V to 240V
Fuse	T5A H250V
Maximum input power	250VA
Software	Embedded Linux
Ports	3 x USB RJ45 Ethernet 4 x T type thermocouples
External dimensions (W x D x H)	29.3cm x 35.9cm x 44.9cm (11.5" x 14.1" x 17.7")
Net weight	14kg (31lb)



11.2 VIA Freeze Duo

Model Number	VF1_30006
Cooling capacity	96 x 2.0ml standard cryo-vials on 2 custom SBS plates 125ml baxter bag
Ambient operating temperature	+5°C to +30°C
Cooling temperature limit	-100°C @ 18°C ambient
Cooling rate	-1°C/minute down to -70°C @ 18°C ambient
Cooling temperature control range	±1°C
Operating voltage	100V to 240V
Fuse	T5A H250V
Maximum input power	350VA
Software	Embedded Linux
Ports	3 x USB RJ45 Ethernet 4 x T type thermocouples
External dimensions (W x D x H)	44.6cm x 38.3cm x 61cm (93.7cm open) (17.6" x 15.1" x 24" (36.9" open))
Net weight	40kg (88lb)



11.3 VIA Freeze Quad

Model Number	VF2_30010
Cooling capacity	192 x 2.0ml standard cryo-vials on 4 custom SBS plates 250ml baxter bag
Ambient operating temperature	+5°C to +30°C
Cooling temperature limit	-100°C @ 18°C ambient
Cooling rate	-1°C/minute down to -70°C @ 18°C ambient
Cooling temperature control range	±1°C
Operating voltage	100V to 240V
Fuse	T5A H250V
Maximum input power	650VA
Software	Embedded Linux
Ports	3 x USB RJ45 Ethernet 8 x T type thermocouples
External dimensions (W x D x H)	63.8cm x 38.3cm x 61cm (93.7cm open) (25.1" x 15.1" x 24" (36.9" open))
Net weight	64kg (141lb)

