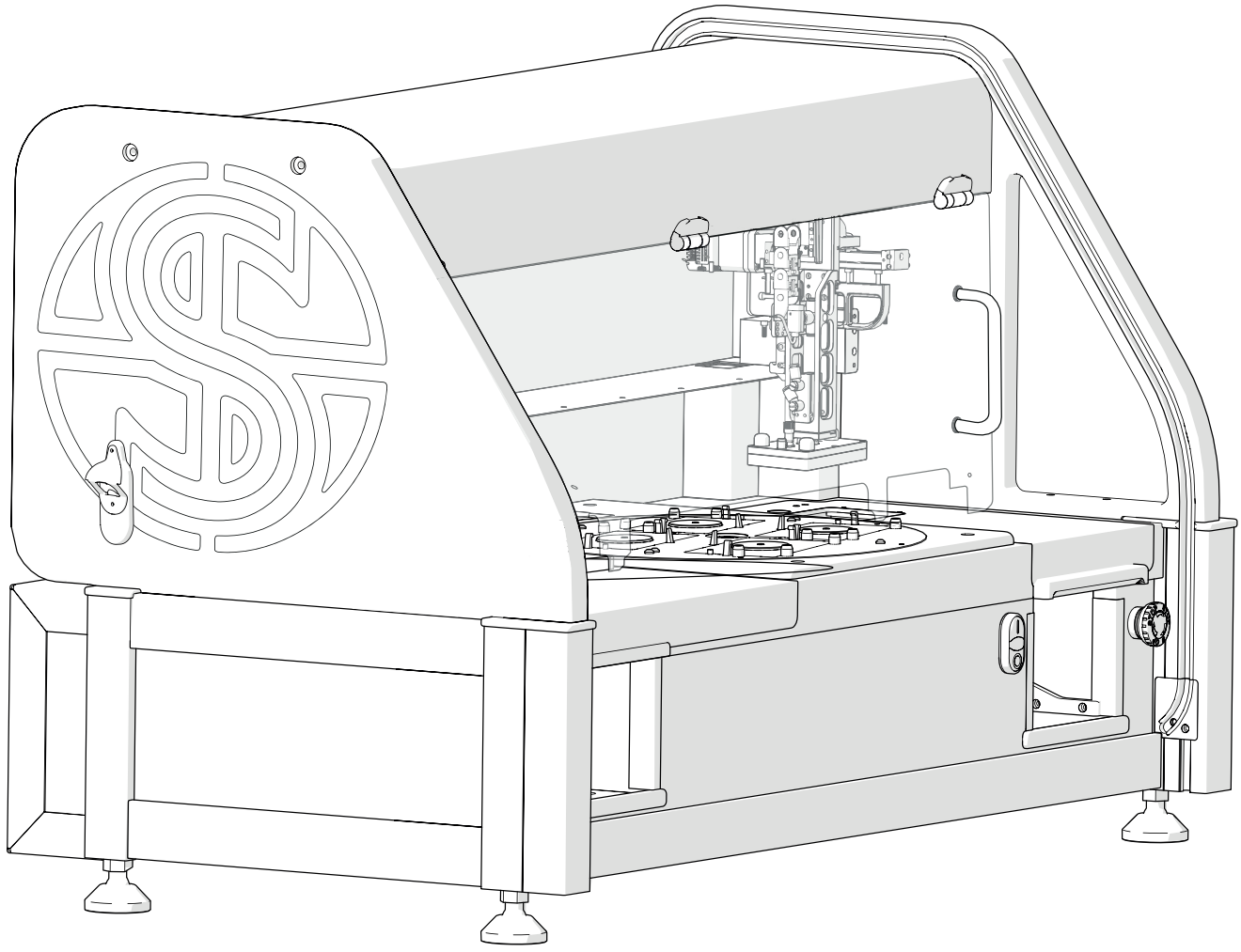
USER GUIDE v1.2

ROTOR™ HDA



BEFORE YOU START!

- All on-screen instructions MUST be followed. Straying from the on-screen instructions could cause damage to the machine and the user.

- Ensure to keep transit hardware in a safe place. These will be required should the ROTOR HDA require moving.

- During Pad Head removal, always ensure the push cylinder is cleared before moving away from the carriage. The push cylinder runs from the carriage arm into The Stinger/Pad Head. If either are not pulled down far enough during removal, the cylinder will catch and damage the ROTOR HDA.

- Always ensure the power is OFF before changing heads. Leaving the power on can cause a hardware crash.

ROTOR HDA™

INTRODUCTION

The Singer ROTOR HDA™ is a compact benchtop robot for easy, ultra-fast manipulation of high-density arrays of yeast, other fungi and bacteria. Reagent sets such as deletion mutant collections and the complete set of cloned yeast genes can be utilised for high-throughput screens; large-scale 2-hybrid, synthetic genetic array, phenotypic and chemical-genetic analysis. The ROTOR HDA uses plastic replica plating pads and supports liquid pinning to and from 96 and 384-well microtitre plates and agar pinning at densities of 96, 192, 384, 768, 1536 and 6144.

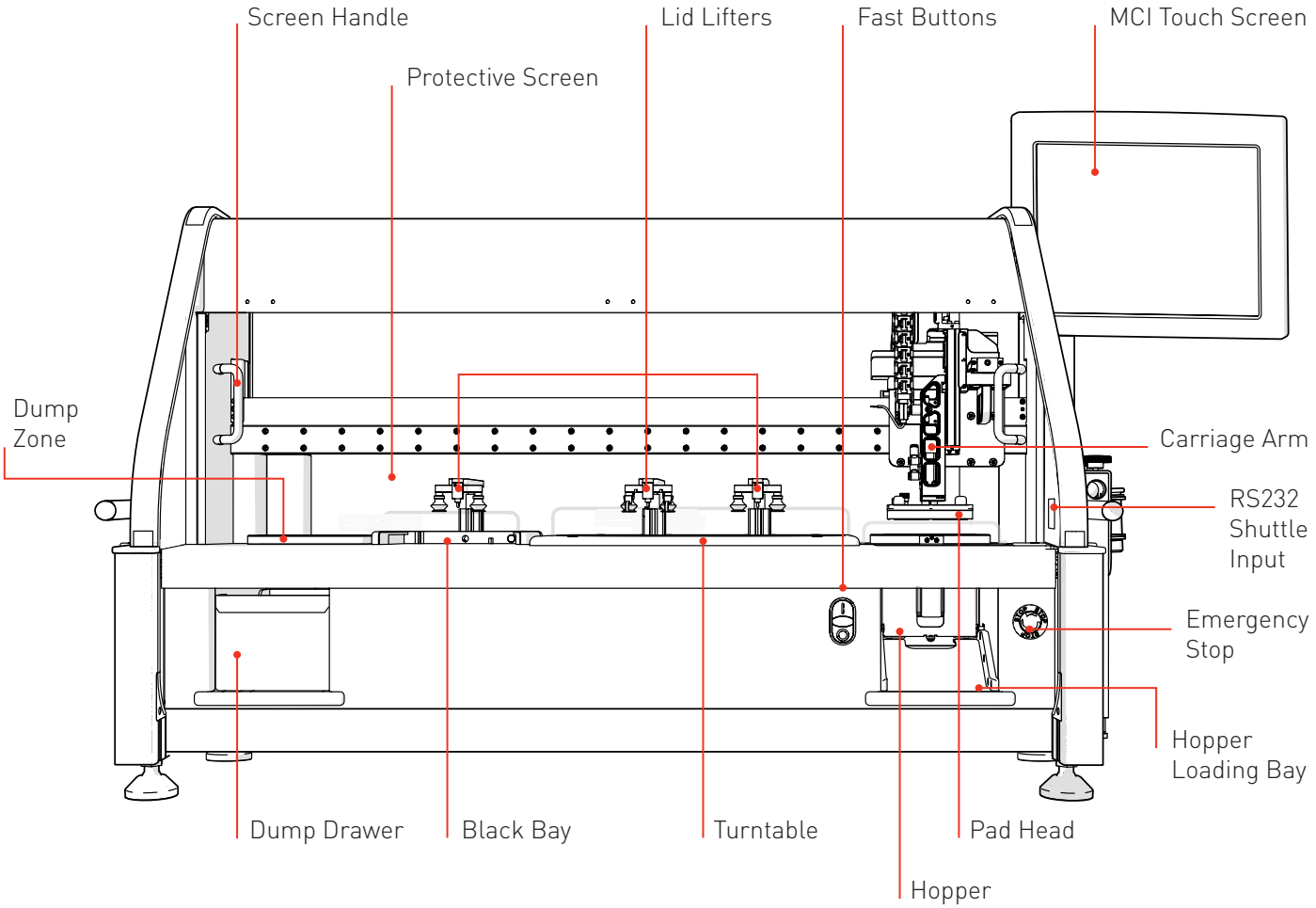
USER GUIDE

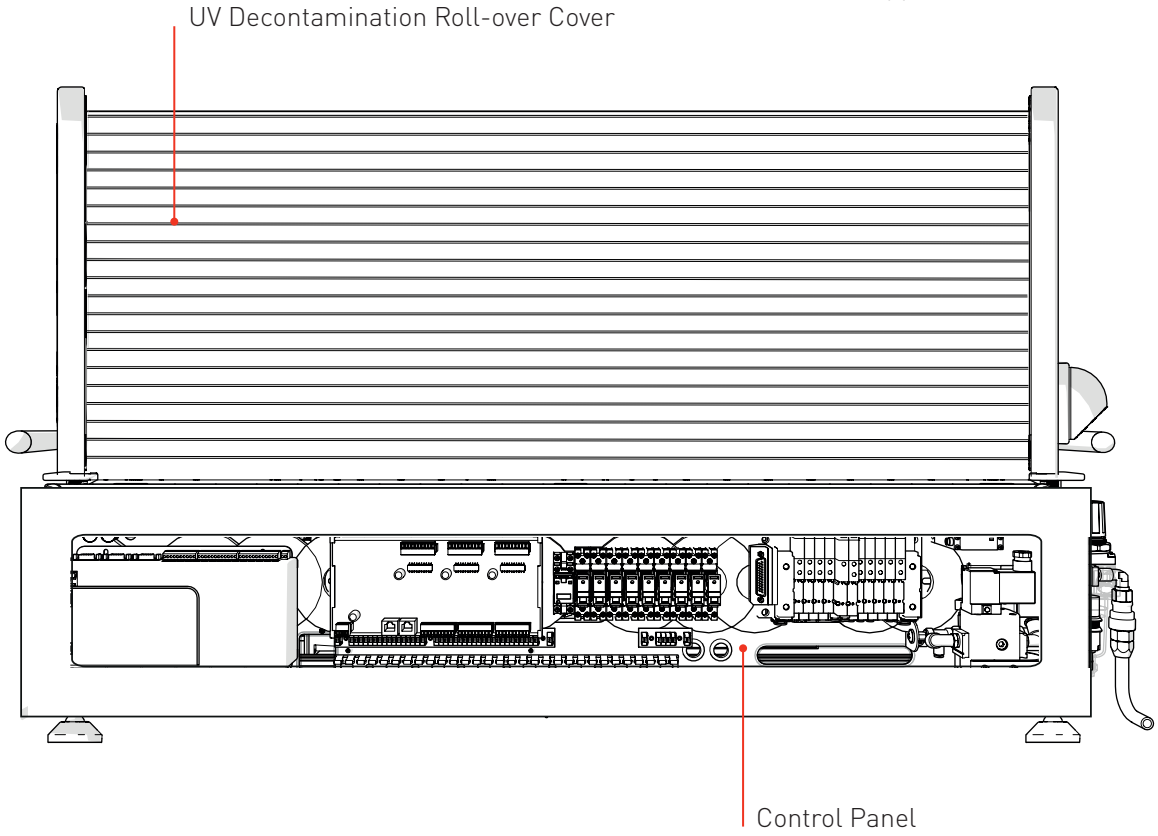
Follow these instructions alongside the on-screen instructions to get the most out of the ROTOR HDA, High Throughput Screening Robot. This guide outlines basic operation of the ROTOR HDA as well useful maintenance advice. Read through this guide and you'll be ready for the exciting world of high throughput screening!

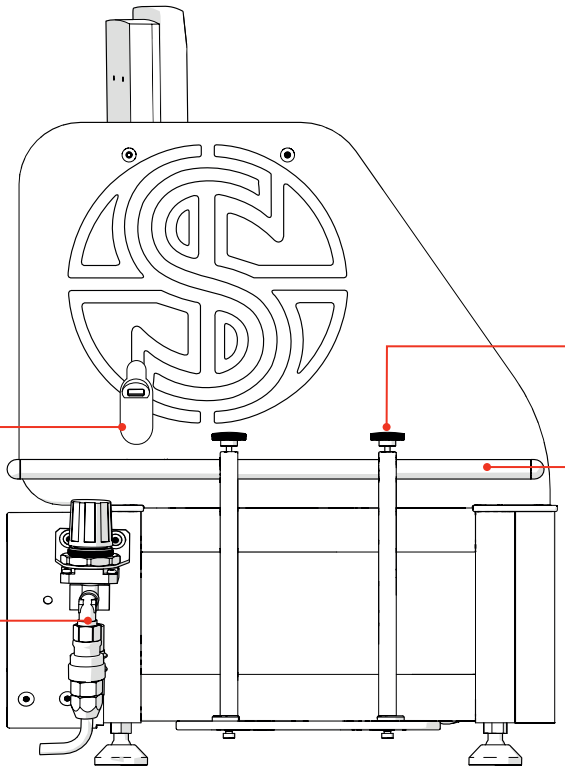
DISCLAIMER

At Singer Instruments, we are constantly seeking to improve our products and adapt them to the requirements of modern research techniques and testing methods. This involves modification to the mechanical structure and optical design of our instruments. Therefore, all descriptions and illustrations in this user guide, including all specifications are subject to change without notice.

ANATOMY & FEATURES







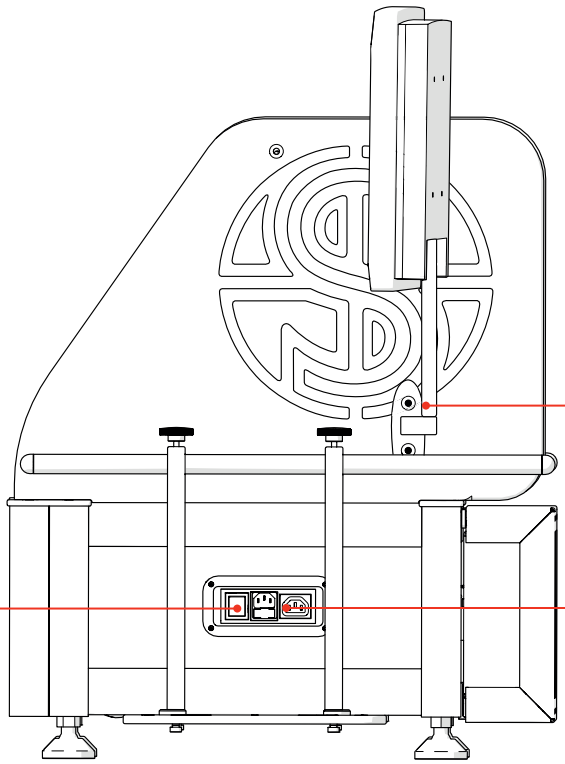
Beer Bottle Opener

Air Line Connection

Removable Transit Clamps

Removable Transit Bar

NOTE: Ensure to keep transit hardware in a safe place should the ROTOR HDA require moving.



Power Switch

MCI Mounting Bracket

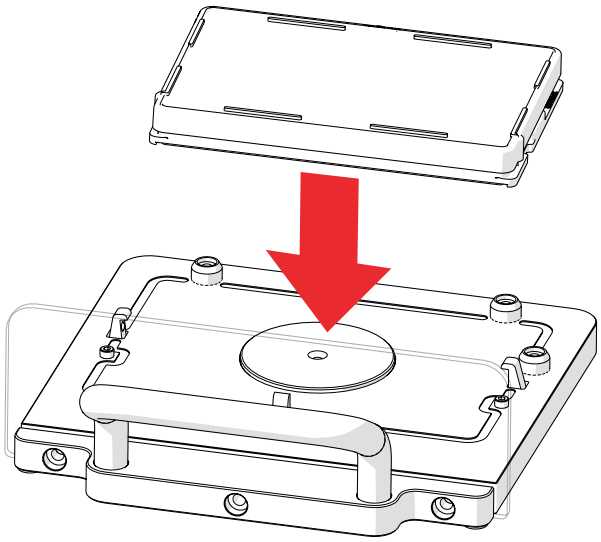
Power In

1

BLACK BAY

- The Black Bay is a loading bay for source and target plates. You will need to remove the Black Bay to load plates.

- If you own The Stinger single colony picker then you will need to remove the Black Bay in order to change between the Pad Head and The Stinger.



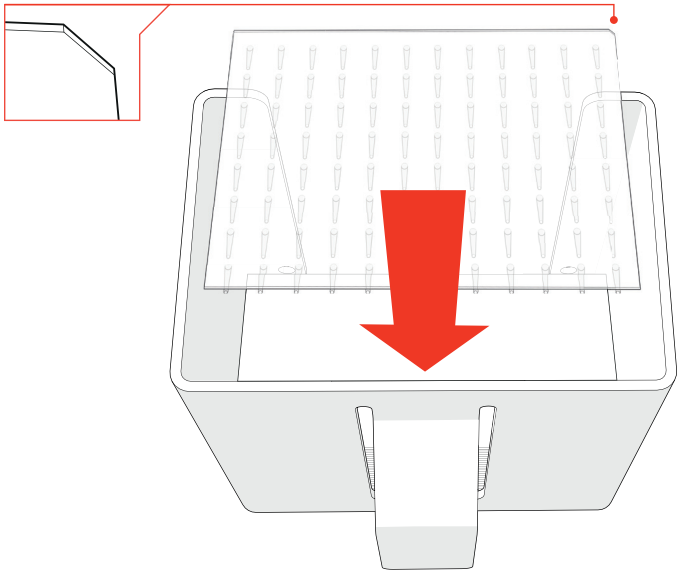
2

PAD HOPPER

- The Pad Hopper is where the fresh RePads™ are loaded.

- Load a stack of RePads™ (pins facing down) into the Hopper as shown, ensuring the chamfered corner is to the top right.

- The Pad Hopper is fully autoclavable to ensure RePads™ stay sterile. However, a pack of RePads™ includes a protective card that means the RePads™ stay sterile without autoclaving the Pad Hopper.



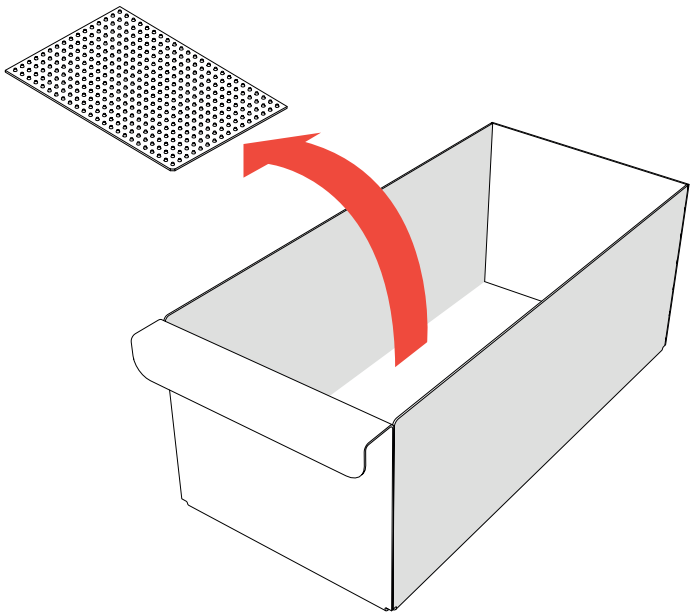
3

DUMP DRAWER

- The Dump Drawer is where used RePads™ are deposited.

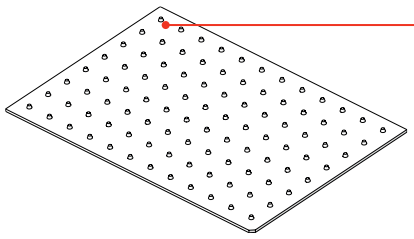
- When a program is finished, the Dump Drawer can be removed to dispose of the used RePads™.

- The Dump Drawer is fully autoclavable.



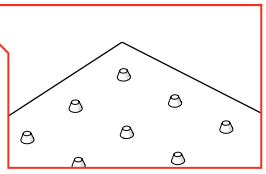
REPADS™

96 SHORT

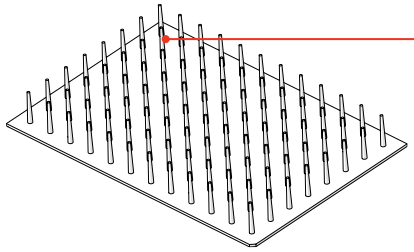


COMPATIBLE MEDIA
- Solid agar

COMPATIBLE DENSITIES
- 96
- 192
- 384
- 1536

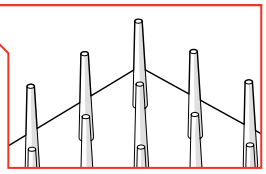


96 LONG

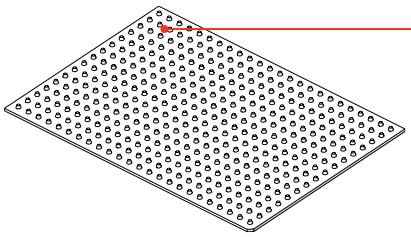


COMPATIBLE PLATES
- Liquid
- Solid agar

COMPATIBLE DENSITIES
- 96
- 192
- 384
- 1536

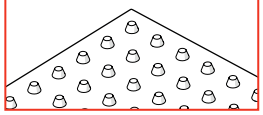


384 SHORT

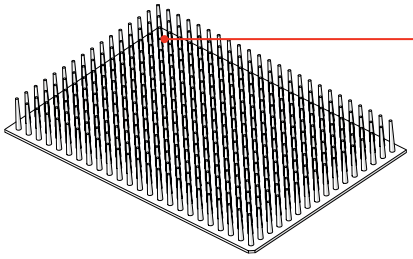


COMPATIBLE PLATES
- Solid agar

COMPATIBLE DENSITIES
- 384
- 768
- 1536
- 6144

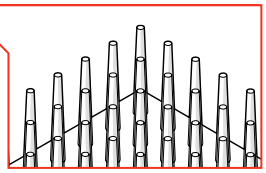


384 LONG

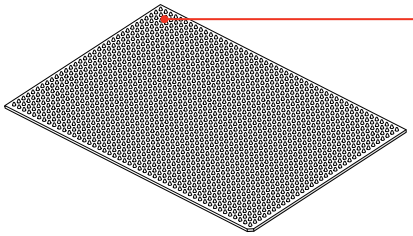


COMPATIBLE PLATES
- Liquid
- Solid agar

COMPATIBLE DENSITIES
- 384
- 768
- 1536
- 6144

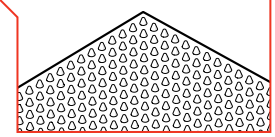


1536 SHORT

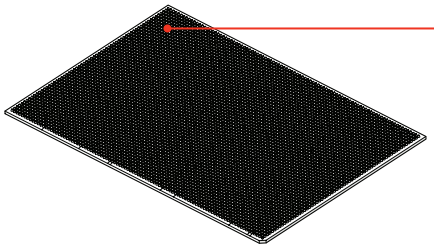


COMPATIBLE PLATES
- Solid agar

COMPATIBLE DENSITIES
- 1536
- 3072
- 6144
- 24576

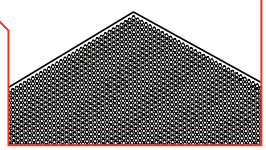


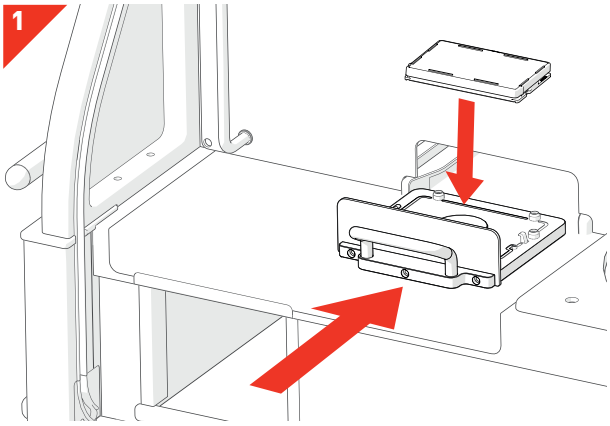
6144 SHORT



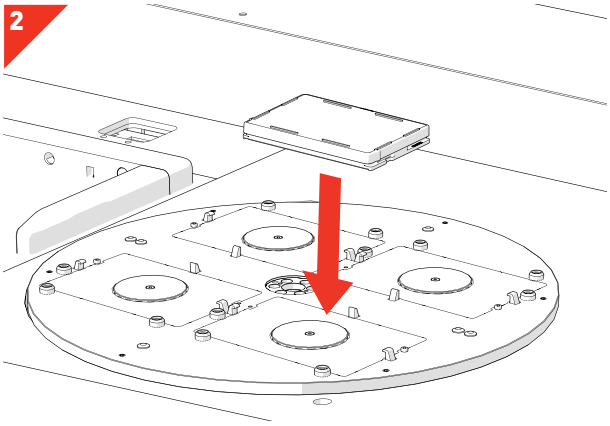
COMPATIBLE PLATES
- Solid agar

COMPATIBLE DENSITIES
- 6144
- 12288
- 24576

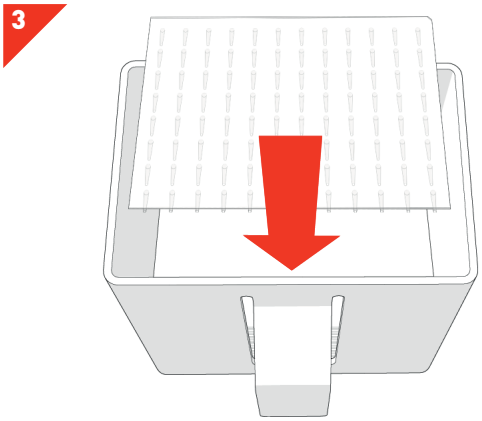




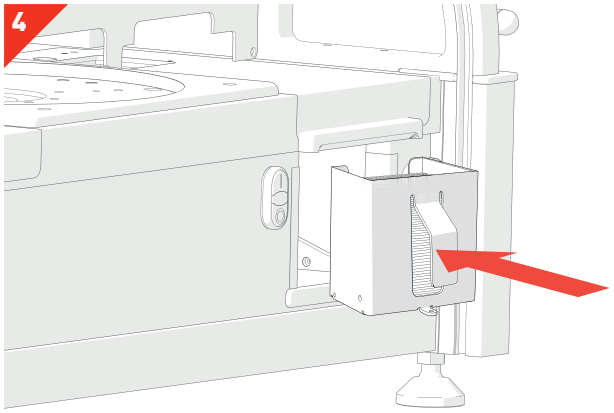
· *Source Plates* or *Target Plates* are loaded into the *Black Bay*. Source plates are the plates that already have the desired strains on. Target plates are the plates that you want your desired strains to grow on.



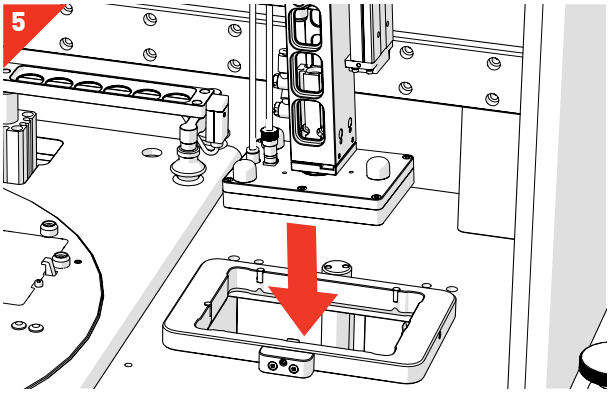
· *Target Plates* or *Source Plates* are loaded into the *Turntable*.
· If loading four plates, the front two plates are loaded first. The turntable will then rotate to allow you to load the second two.



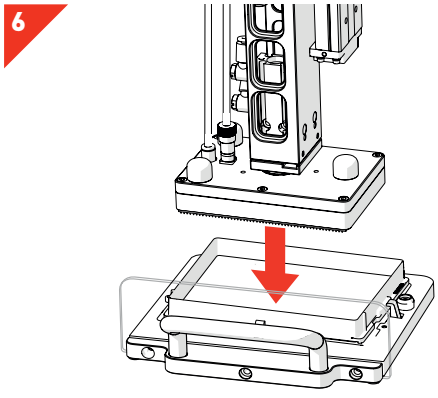
· *RePads™* are loaded (pins facing down) into the *Pad Hopper*. RePads™ come in a variety of densities and are used to transfer strains from *Source Plates* to *Target Plates*.



· The *Pad Hopper* is loaded into the *Hopper Loading Bay*.

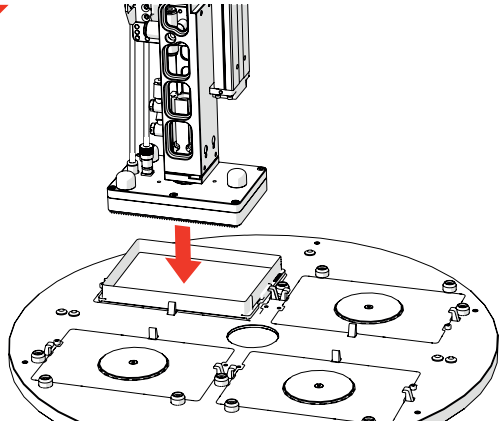


· The *Pad Head* lowers and picks up a *RePad™*.



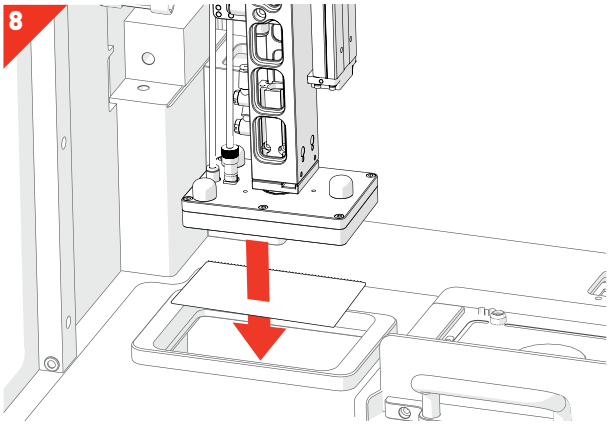
· The *Pad Head* moves to the *Source Plate*, lowers and collects a sample of cells.

7



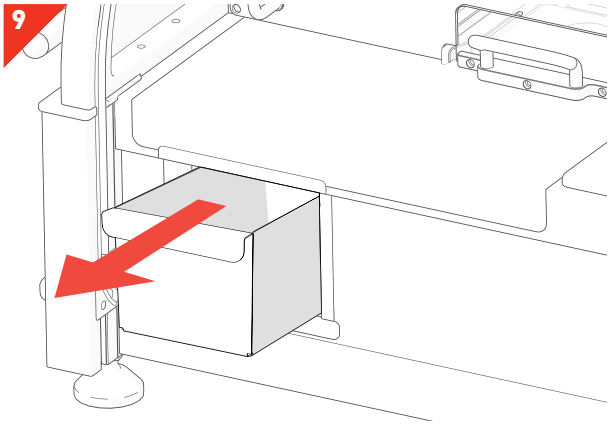
· The *Pad Head* moves to a *Target Plate* and deposits the sample of cells.

8



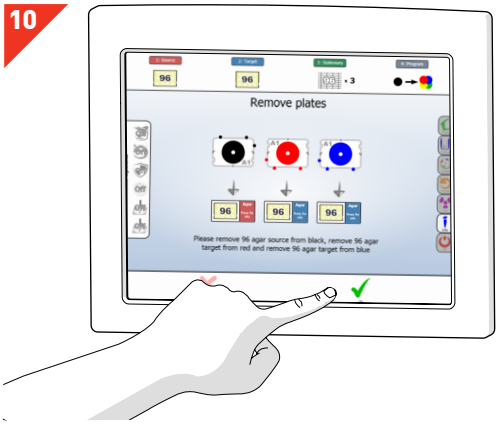
· The *Pad Head* moves to the *Dump Zone* and drops the used *RePad™*.

9



· Used *RePads™* are collected in the *Dump Drawer* ready to be disposed of.
· These steps will be repeated until your chosen protocol is finished.

10

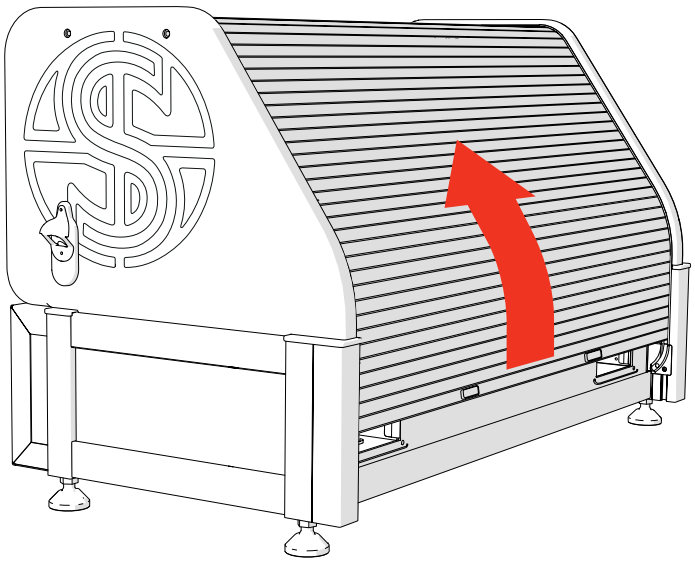


· Follow the simple step-by-step instructions for loading/unloading of plates and consumables. See *page 14.*

INITIALISATION ROUTINE

1

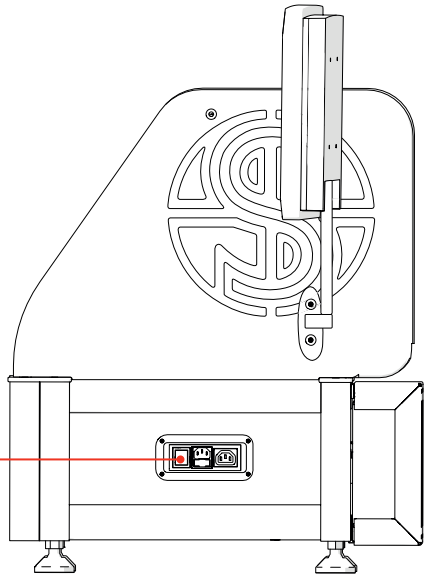
· Open the *Roll-over Cover*.



2

· Insert the *Power Cables* into the *ROTOR HDA* and switch on the mains power.

· Turn on the *ROTOR HDA Power Switch*.

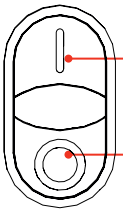


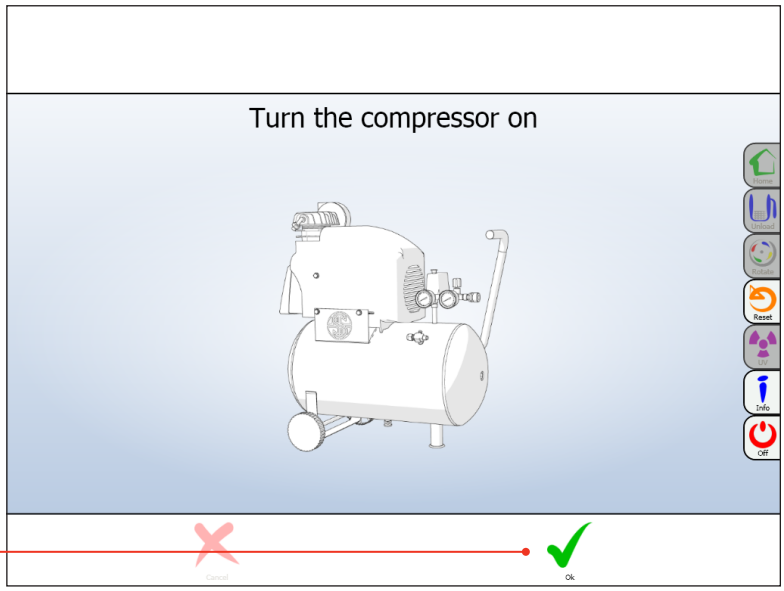
3

· Follow the simple on-screen instructions to work through the *ROTOR HDA* initialisation procedure.

· Turn on the *Compressor*.

· Select *OK* on the *Touch Screen* or use the *Fast Buttons*.



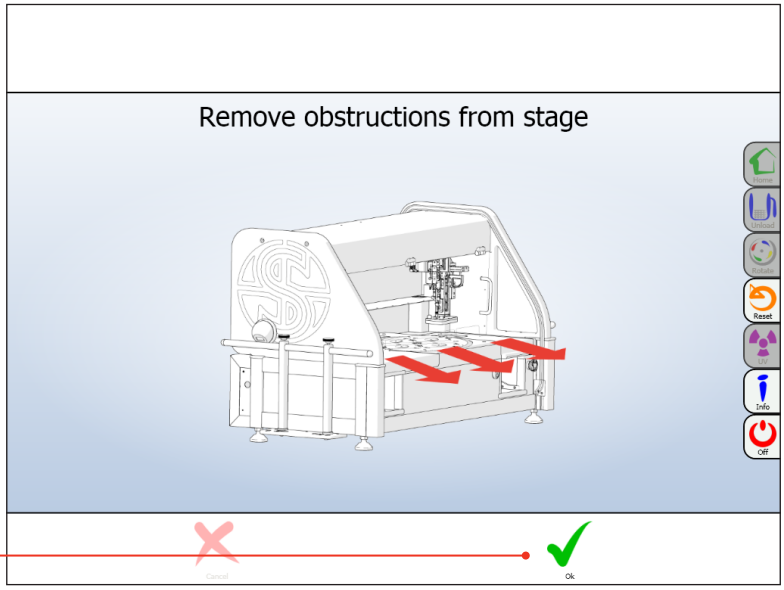


INITIALISATION ROUTINE

4

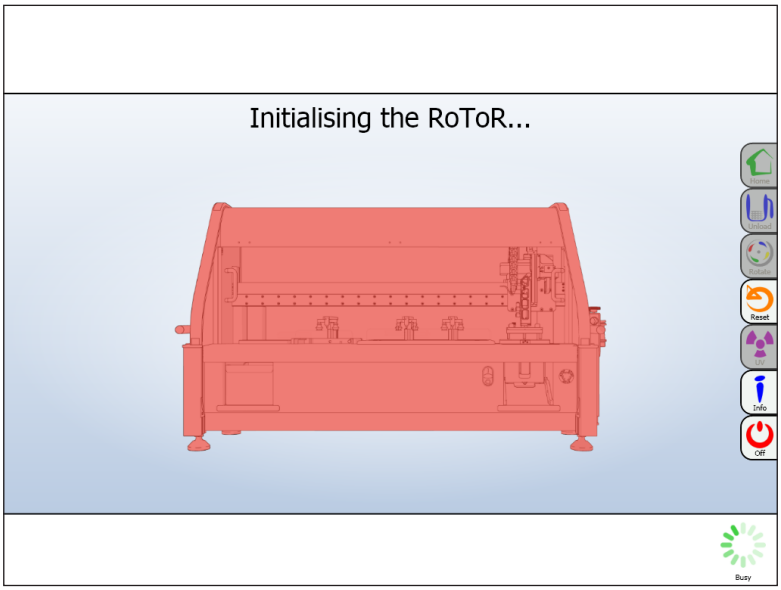
· Clear all objects from the *ROTOR Stage*, so nothing will obstruct the initialisation routine.

· Select *OK On-screen* or use the *Fast Buttons.*



5

· The *ROTOR HDA* will perform a start-up routine.



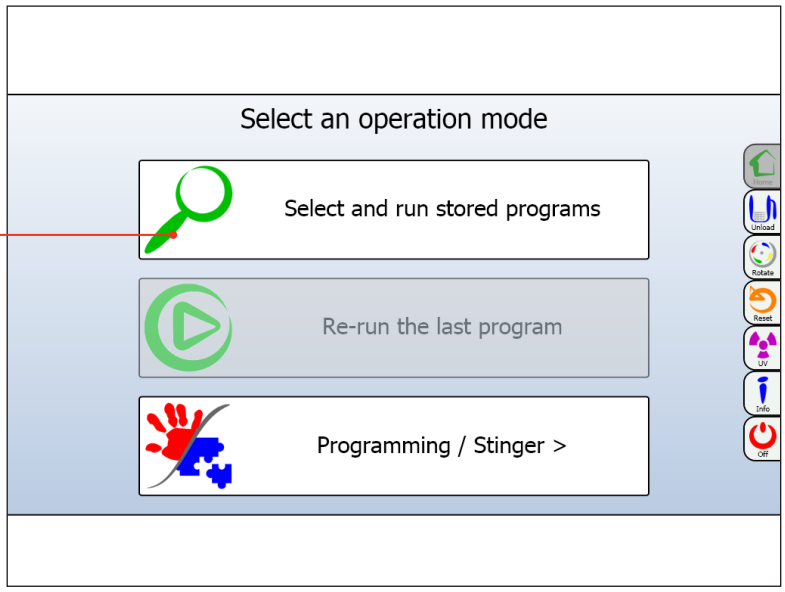
1

· This is the *ROTOR Home Menu.* From here you can choose to run pre-existing programs or create your own programs. In this example, we click *Select And Run Stored Programs.*

· NOTE: Follow the same 4 steps to select for an existing program:

1. Choose the type of Source Plates.
2. Choose the type of Target Plates.
3. Choose the type of Pin Pads.
4. Select required Program.

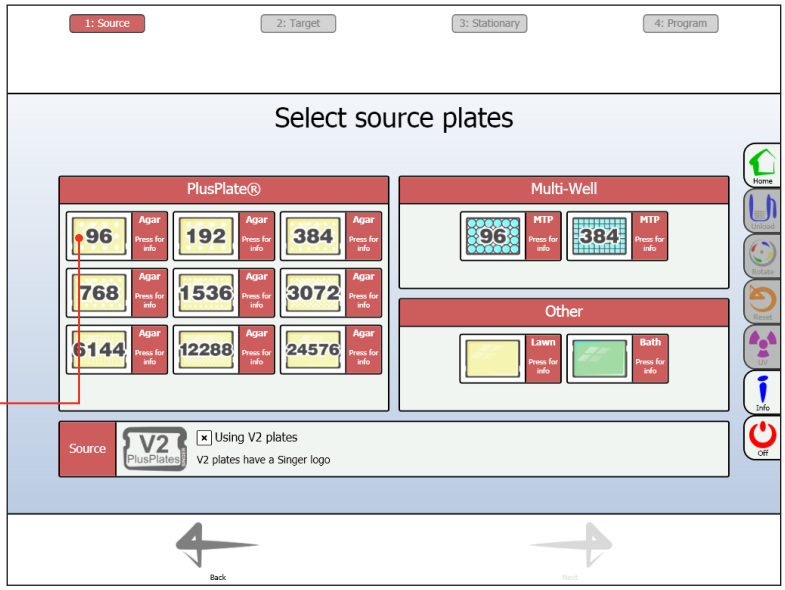
These four steps are demonstrated below.



2

· Select your *Source Plates*. They are the plates that already have the desired strains on. The source could be colonies grown on solid agar, or cultures grown in liquid media. In solid agar, the ROTOR HDA currently supports colony density up to 24576. In liquid media, the ROTOR HDA supports multi-well plates at 96 and 384-density.

· In this example we select *96 Agar.*

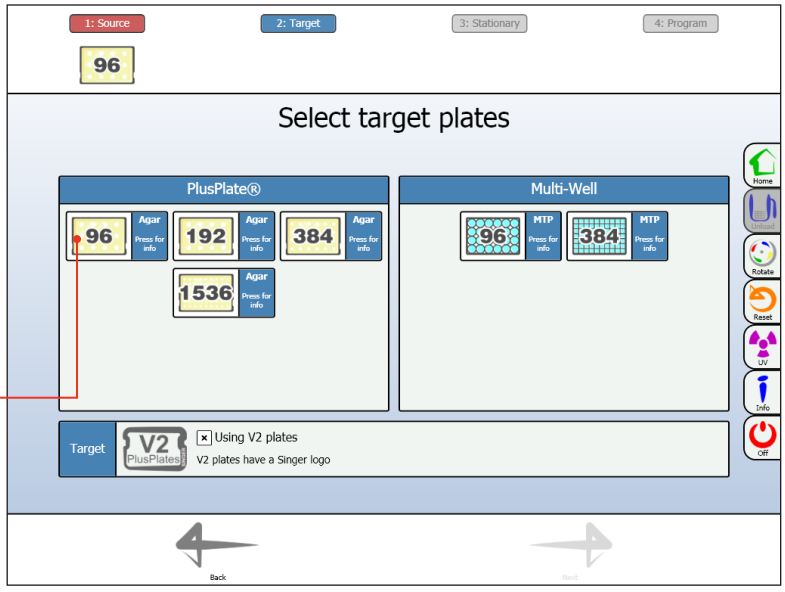


3

· Select your *Target Plates*. They are the plates that you want your desired strains to grow on. The types of target plates available are only those compatible with your previous selection. Since we've selected our source plate as 96 Agar, we won't be able to choose the target plate density beyond 1536.

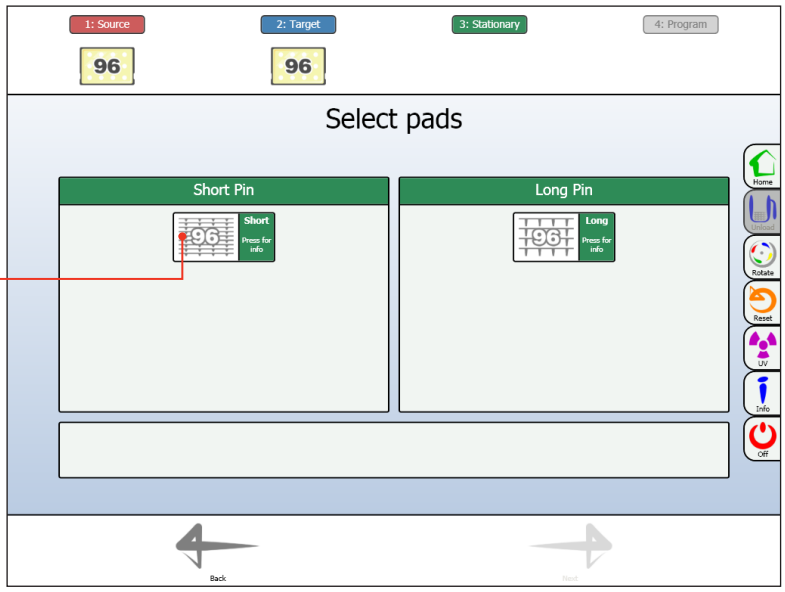
· In this example we select *96 Agar.*

· NOTE: The ROTOR software will not allow you to make a mistake during plate and RePad™ selection.



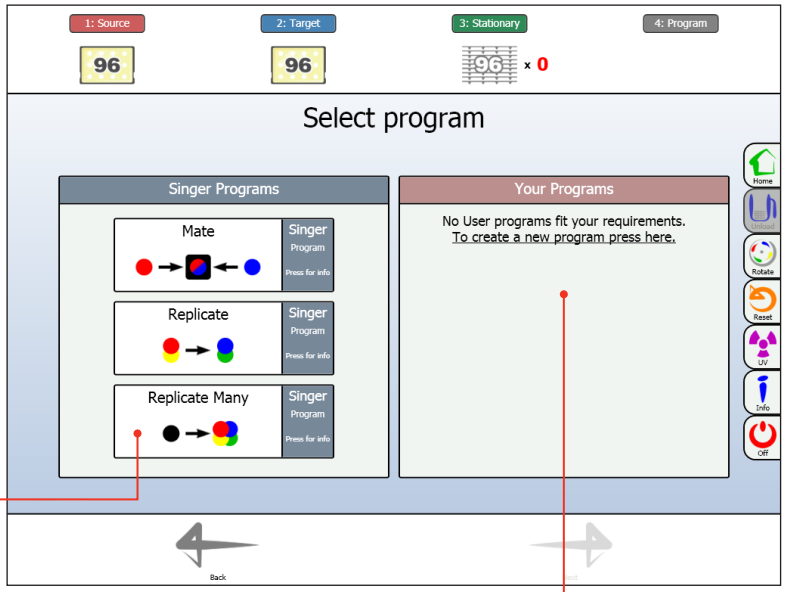
4

- Select your *RePad™*. The types of RePads™ available are only those compatible with your previous selection.
- In this example we select *Short Pin Pad 96-Density.*
- NOTE: Short pin pads are used to pin colonies from solid agar to solid agar. Long pin pads are used to pin liquid media or solid agar to solid agar or liquid media.



5

- The final step is to select the program that you want to perform. The programs available are only those compatible with your previous selection. In this example, there are three available programs:
- *Mate* - pinning two haploid cells onto one plate.
- *Replicate* – pinning one source plate onto one target plate.
- *Replicate Many* – pining one source plate onto multiple target plates.
- In this example, we select *Replicate Many*.
- The right-hand panel will display your custom programs. You also have the option to create new custom programs.

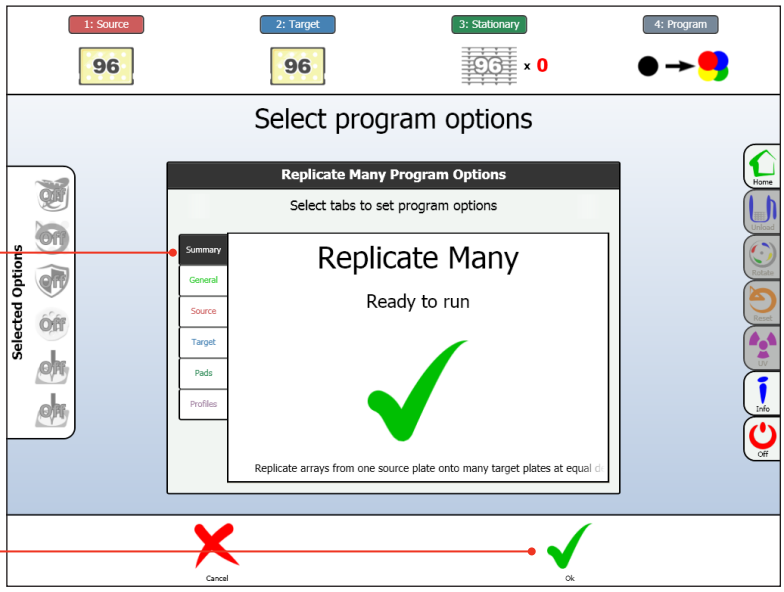


NOTE: Running a program is easy. Just follow the on-screen instructions!

1

· This is the *Program Preparation Page*. Here you can fine-tune the program using the options on the left. A detailed overview of these options can be found on *pages 18-21*.

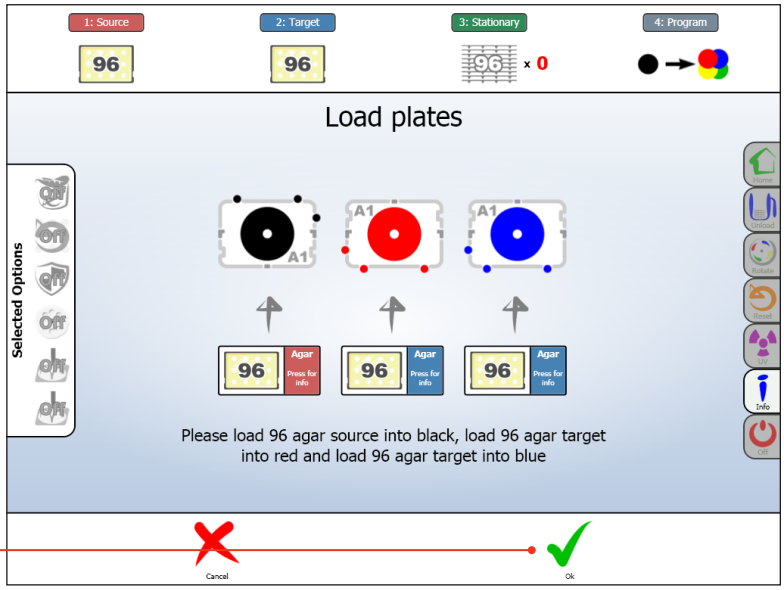
· Select *OK On-screen* or use the *Fast Buttons* to continue.



2

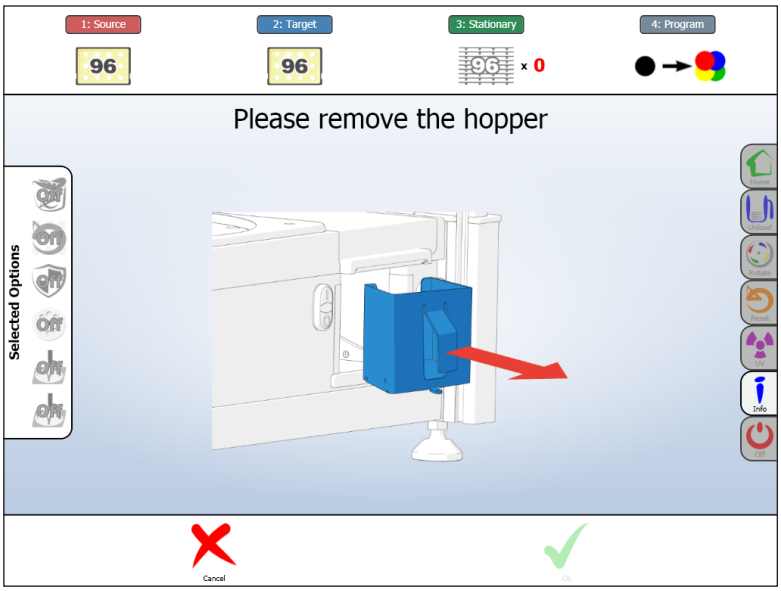
· Simple, step-by-step instructions will guide you through the program. Each plate position is colour coded. Red, blue, yellow and green go into the *ROTOR Turntable*, while black goes into the *ROTOR Black Bay.*

· Select *OK On-screen* or use the *Fast Buttons* when you are done.



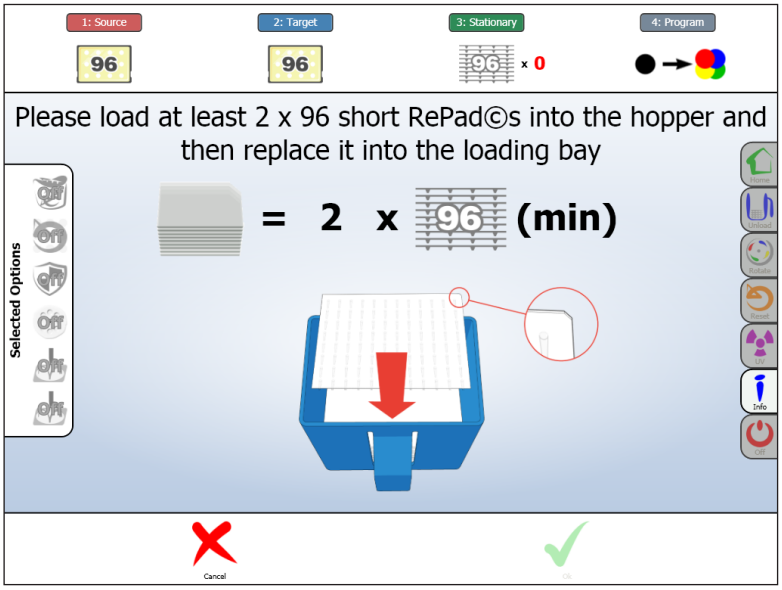
3

· When prompted, remove the *Pad Hopper* to load the *RePads™*.



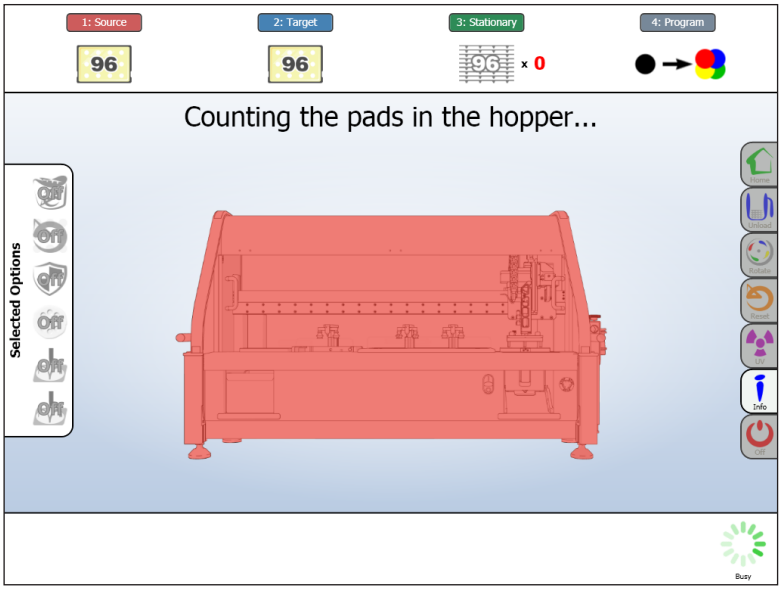
4

- Follow the instructions and load the appropriate *RePads™* into the *Pad Hopper*.



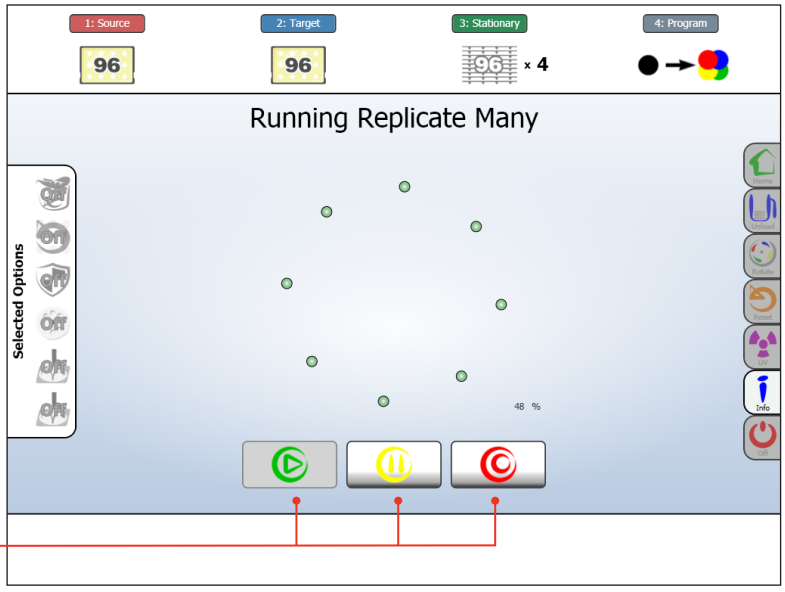
5

- The *ROTOR HDA* will now count the number of *Pin Pads* loaded to ensure there are enough to complete the program.



6

- The *ROTOR HDA* will now start pinning the colonies for replication.
- Live program information will be updated throughout the operation.
- Quick button operation: Pause and Resume.
- On-screen operation: Resume, pause, stop / abort.

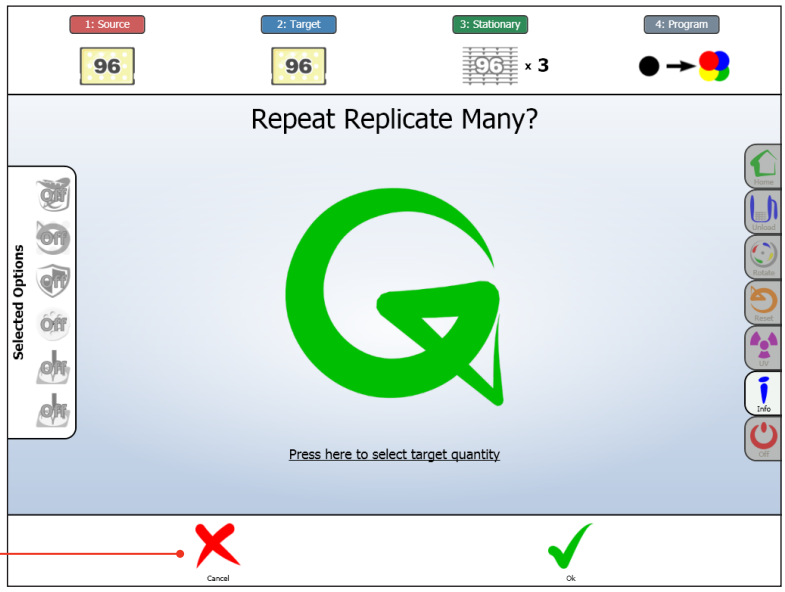


PROGRAM COMPLETION

1

· If you wish to generate more than 4 replicates of a target plate, you can repeat the program with one click.

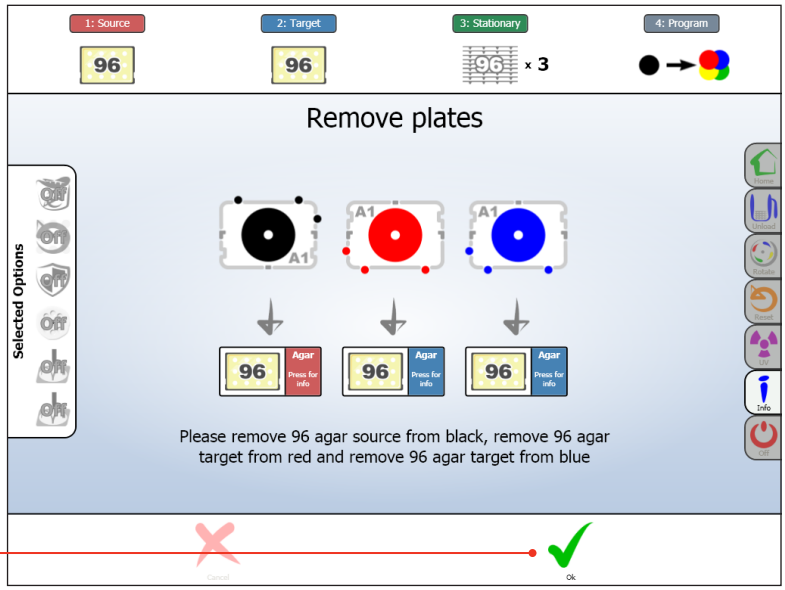
· Make your selection.



2

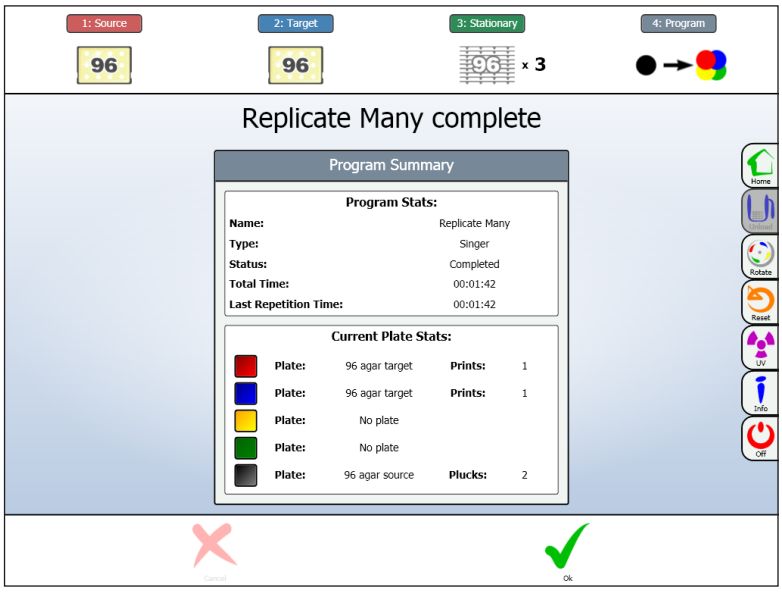
· When pinning is completed, you will be instructed to remove the *Plates*.

· Press *OK* when you are done.



3

· A *Program Summary Page* appears once the program has completed.

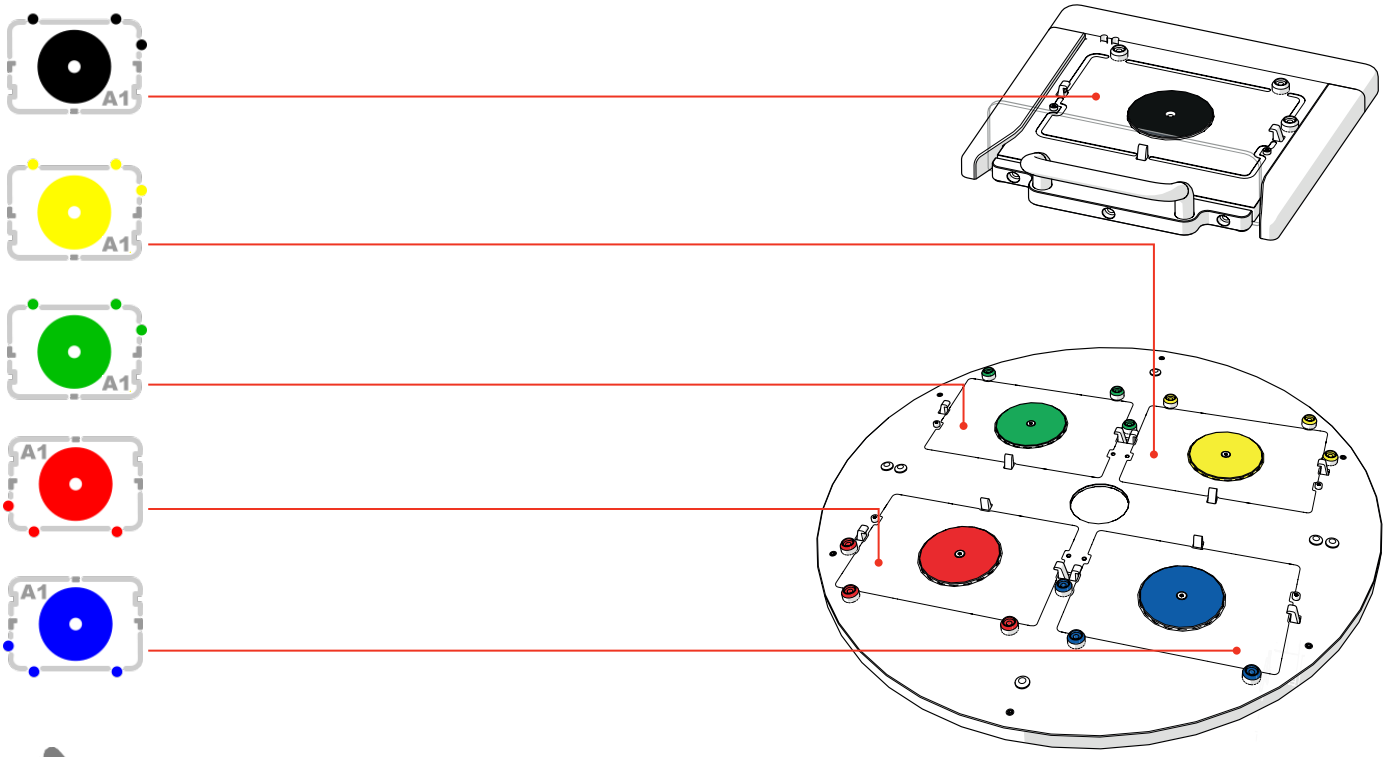


SOFTWARE ICON GUIDE

HOME SCREEN

- *Home:* This will return you to the *ROTOR Home Screen*.
- *Unload:* This allows you to remove the *Hopper* from the *Home Screen.*
- *Rotate:* This rotates the *Turntable*.
- *Reset:* This resets the *ROTOR HDA*.
- *UV:* This opens the *UV Lamp Options.*
- *Info:* This opens the *Info and Settings Screen.* Here you can access the advanced options and online support.
- *Off:* Press to turn off the *ROTOR HDA*.

LOADING PLATES

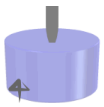


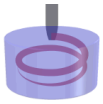
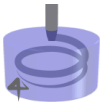
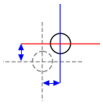
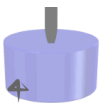
- *Load Plate*
- *Swap Plates*
- *Remove Plate*

ADVANCE OPTIONS

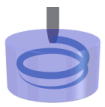
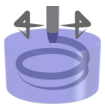
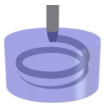
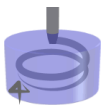
ICON	NAME	SETTING	DESCRIPTION	TAB	UNIT	MIN	MAX	DEFAULT
	Recycle	Off	RePads™/pins are always dumped.	General>Recycle	N/A	N/A	N/A	N/A
	Recycle	Full	RePads™/pins are recycled for the duration of the program.	General>Recycle	N/A	N/A	N/A	N/A
	Recycle	Until Repeat	RePads™/pins are recycled for the duration of one cycle of the program.	General>Recycle	N/A	N/A	N/A	N/A
	Recycle	During Pairs	RePads™/pins are recycled for the duration of each pinning pair.	General>Recycle	N/A	N/A	N/A	N/A
	Revisit Source	On/Off	Revisit ensures that the source is revisited for each pinning. If Revisit Source if off, the source plate will not be revisited unless a new position on the source plate is being pinned.	General>Recycle	Boolean	Off	On	Off
	Plate Protection	On/Off	By protecting the source plates you can ensure that lids are only removed when it is vital to do so. This will increase the time it takes to run each program, but each source plate will be exposed for less time, and the print head will never move over a source plate without a lid on, unless it is pinning from it	General>Plate Protection	Boolean	Off	On	Off
	Repeat Pairs	On/Off	A pinning pair represents pinning from a source plate to a target plate. You can adjust how many times each of these pairs are repeated. During pair repetition, Recycle and Revisit mode rules will be followed as normal.	General>Pairs	Boolean	Off	On	Off
	Offset	Off	No offset is used for source pinning.	Source>Offset	Boolean	Off	On	Off
	Offset	Automatic	An automatic offset is used for each source pinning.	Source>Offset	Boolean	Off	On	Off
	Offset	Random	A random offset is used for each source pinning.	Source>Offset	Boolean	Off	On	Off

SOFTWARE ICON GUIDE

ICON	NAME	SETTING	DESCRIPTION	TAB	UNIT	MIN	MAX	DEFAULT
	Offset	Manual	Select a manual offset before each source pinning.	Source>Offset	Boolean	Off	On	Off
	Offset	Fixed	A pre-specified fixed offset is used for selected source pins.	Source>Offset	Boolean	Off	On	Off
	Source Pinning Pressure		The pressure that the Pad Head will use to push onto the agar.	Source>Pinning	%	0	100	Varies for each pad
	Source Pinning Speed	Agar	The speed that the Pad Head will use to connect to the agar surface.	Source>Pinning	mm/s	1	20	19
	Source Pinning Overshoot	Agar	The amount of travel that will be applied after detecting agar contact. This is to enable operation of the pressure cylinder.	Source>Pinning	mm	Speed dependant	Speed dependant	2
	Repeat Source Pinning	Agar	The number of times each source pinning will repeat.	Source>Pinning	Integer	1	10	1
	Source Pinning Speed	Liquid	The speed applied to pinning to wet source plates.	Source>Pinning	mm/s	1	19	19
	Source Pinning Backoff	Liquid	The retraction distance applied to the Pad Head after sensing the bottom of the plate.	Source>Pinning	mm	-0.5	3	0.5
	Repeat Source Pinning	Liquid	The number of times each source pinning will repeat.	Source>Pinning	Integer	1	10	1
	Dry Mix Source	On/Off	Skipping around on the agar surface to select from a wider area of cells.	Source>Dry Mix	Boolean	Off	On	Off
	Dry Mix Clearance		The distance the pins retract from the agar surface.	Source>Dry Mix	mm	0	4	0.5
	Dry Mix Diameter		The diameter of the mix.	Source>Dry Mix	mm	0.1	2	1
	Dry Mix Cycles		The number of cycles (comprising of 5 steps) that the dry mix on source plates will be executed.	Source>Dry Mix	Integer	1	10	1

ICON	NAME	SETTING	DESCRIPTION	TAB	UNIT	MIN	MAX	DEFAULT
	Wet Mix Source	On/Off	Liquid mixing can be used to invigorate the cells in a liquid solution. Liquid mixing uses either a circular or helical movement.	Source>Wet Mix	Boolean	Off	On	Off
	Source Mixing Diameter		The diameter of the mix applied to both the x and y axis.	Source>Wet Mix	mm	1	3	1
	Source Mixing Speed		The speed at which wet mixes are carried out.	Source>Wet Mix	mm/s	1	25	25
	Source Mixing Cycles		The number of cycles the mix will include.	Source>Wet Mix	Integer	1	10	1
	Source Mixing Travel		The distance that the Pad Head retracts on 3D mixes.	Source>Wet Mix	mm	0.25	15	3
	Permanent offset		A permanent offset can be specified to reset the nominal centre for each source pinning. This feature is useful when pinning from source plates that have been printed to a non-central location.	Source>Permanent Offset	Point	-3,-3	3,3	0,0
	Target Pinning Pressure		The pressure that the Pad Head will use to push onto the agar.	Target>Pinning	%	0	100	Varies for each pad
	Target Pinning Speed	Agar	The speed that the Pad Head will use to connect to the agar surface.	Target>Pinning	mm/s	1	20	19
	Target Pinning Overshoot	Agar	The amount of travel that will be applied after connection to the agar surface has been made.	Target>Pinning	mm	Speed dependant	Speed dependant	2
	Repeat Target Pinning	Agar	The number of times each target pinning will repeat.	Target>Pinning	Integer	1	10	1
	Target Pinning Speed	Liquid	The speed applied to pinning to wet source plates.	Target >Pinning	mm/s	1	19	19
	Target Pinning Backoff	Liquid	The retraction distance applied to the Pad Head after connection to the bottom of the plate.	Target >Pinning	mm	-0.5	3	0.5

SOFTWARE ICON GUIDE

ICON	NAME	SETTING	DESCRIPTION	TAB	UNIT	MIN	MAX	DEFAULT
	Repeat Target Pinning	Liquid	The number of times each target pinning will repeat.	Target >Pinning	Integer	1	10	1
	Dry Mix Target	On/Off	Agar mixing can be used to ensure that a good contact with the target media is established. Agar mixing prints multiple times at a specified radius around the target spot on the agar after the initial central print has been established.	Target >Dry Mix	Boolean	Off	On	Off
	Target Mixing Clearance	Agar	The distance the Pad Head retracts from the agar surface at each stage of the mix.	Target >Dry Mix	mm	0	4	0.5
	Target Mixing Diameter	Agar	The diameter of the mix. Using step-in reduces the diameter from the specified diameter uniformly with each cycle for a thorough mix.	Target >Dry Mix	mm	0.1	2	1
	Target Mixing Cycles	Agar	The number of cycles (comprising of 5 steps) that the dry mix on source plates will be executed.	Target >Dry Mix	Integer	1	10	1
	Wet Mix Target	On/Off	Liquid mixing can be used to ensure thorough depositing of cells in the liquid solution. Liquid mixing uses either a circular or helical movement.	Target >Wet Mix	Boolean	Off	On	Off
	Target Mixing Diameter	Liquid	The diameter of the mix applied to both the x and y axis. Using step-in reduces the diameter from the specified diameter uniformly with each cycle for a thorough mix.	Target >Wet Mix	mm	1	3	1
	Target Mixing Speed	Liquid	The speed at which wet mixes are carried out.	Target >Wet Mix	mm/s	1	25	25
	Target Mixing Cycles	Liquid	The number of cycles the mix will include.	Target >Wet Mix	Times	1	10	1
	Target Mixing Travel	Liquid	The distance that the Pad Head retracts on 3D mixes.	Target >Wet Mix	mm	0.25	15	3
	Pad Pickup Pressure		The pressure applied by the Pad Head when picking up pads.	Pads	%	0	100	80

TECHNICAL SPECIFICATIONS

DIMENSIONS
- Length: 1300mm *(51")*
- Width: 650mm *(26")*
- Height *(from bench top)*: 725mm *(29")*

NOTE: An additional 500mm *(20")* is needed at one end for the bracket mounted MCI. This can fit at either end. The working height of the ROTOR turntable is 300mm *(12")* from the benchtop.

NOTE: For servicing, the ROTOR HDA will require reasonable free space all round.

WEIGHT
- 110kg *(242 lbs)*

COLOURS
- Externally: White *(with red Singer logo)*
- Roller Cover: Grey
- Internal: White/grey
- Stations: Red/blue/yellow/green/black

NO-COST ACCESSORIES:
- Beer bottle cap remover or Corkscrew *(specify)*.

POWER REQUIREMENTS
- 110-240V AC 50-60Hz Power: 500W
- Power connection at Right Hand End *(from front)* via IEC Cable *(supplied)*.

COMPRESSED AIR REQUIREMENT
(FOR COMPRESSOR, SEE PAGE 23)
- Dry, oil-free, compressed air/nitrogen at min 4 bar *(60 psi)* max 10 bar *(150psi)*
- Consumption: 3 l/min *(0.1 CFM)*
- Air connects to LH end *(from front)* see *Compressor Section* for connection details.

HEAD
- Movement: X: 800mm
  Y: 30mm
  Z:90mm
- Clearance above table: 95mm
- Resolution: X: 1µ
  Y & Z: 5µ
- Speed: X: up to 5,000mm/sec,
  Y & Z: 25mm/sec *(selectable)*
- Control: X axis is closed-loop, linear motor with linear encoder.
  Y & Z are open-loop stepper motor drives with optical data setting.

PAD HEAD
- Vacuum-operated and fully floating to comply with agar surface.
- Programmable, variable pressure.

PAD DISPENSER
- Holds max 4 long-pin RePads™ and max 30 other types.
- Dispenser automatically counts RePads™ and flags up shortage on GUI.
- Pad Dispenser rim fingers ensure accurate and repeatable RePad™ positioning.

TURNTABLE
- Diameter: 360mm
- Angle of rotation: 180°
- Time: 2.5sec
- Repeatability better than 10µ
- Fitted with fully automatic plate positioners and latches.
- Bays are colour coded.

LID REMOVERS
- Triple, pneumatic, lift-and-turn lid removers each with double hold-and-lift, vacuum-operated suction cups.
- Arms fitted with anti-rebound dampers.

FUNCTIONALITY
- Suspension transfer *(wet/wet)*
- Spotting *(wet/dry)*
- Colony replicating
- Array generation
- Mating
- Archive *(dry/wet)*
- Dry spotting *(dry/dry)*

DENSITIES OF MEDIA SUPPORTED
- 96, 384, 1536 and 6144 RePads™ *(solid agar)*
- Long-pin 96 and 384 RePads™ *(liquid/liquid-liquid/solid - solid/liquid)*

PLATE
- 96 and 384-well footprint, standard depth
- Singer PlusPlates™ *(Rectangular, single extended cavity, 96-well footprint)*

MACHINE CONTROL INTERFACE
- 15" touchscreen 1224 x 788 resolution
- Intel Atom Processor
- 1GB RAM
- 1.8GHz
- 10GB hard drive
- Windows XP embedded standard

TECHNICAL SPECIFICATIONS

GRAPHICAL INTERFACE

- All functions controlled by simple pictograms. Includes replication, array generation and mating

SOFTWARE

- Commands include automatic and manual offset pinning to ensure even repeat cell pick up from colonies and automatic stirring mode for re-suspention in microtitre wells.
  Remote access and diagnostics and other protocols are under continuous development.

INTERFACES

- 1x Ethernet
- 2x USB
- 1x 25232
- 1x KB/MS/LAN2

LIGHTING/DISINFECTION

- White
- UVc

COMPRESSOR

- Compressor type may vary, please consult your Singer Technician.

- Our standard compressor is very quiet and performs optimally standing on the floor. It has a reservoir inside it and will run only intermittently. The pipe connecting the compressor to the ROTOR HDA is 6mm dia *(1/4")*. The compressor may be sited away from the ROTOR HDA *(please let us know about this so that we can supply a long enough pipe)*.

- 120V or 230V versions of our standard compressor are available.
- Power: 500W.

AIR/GAS CONNECTION

Where we do not supply a compressor, the ROTOR HDA is supplied with a male quick-change coupler. We will supply, in advance, the female mating part to this, so that you can arrange connection before installation.

PERFORMANCE

The ROTOR HDA is manually loaded and unloaded, but very special attention has been paid to speed of replication. The turntable, which conveys plates in and out of the sealed operating zone of the ROTOR HDA, may be unloaded and loaded whilst replication is in progress. This makes the process very continuous.

Performance tests carried out for Singer by a major yeast laboratory claim replication rates in excess of 100 PlusPlates™ per hour.

At the supported densities, this equates to:

- 96: 9,600 colonies
- 384: 38,400 colonies
- 768: 76,800 colonies
- 1536: 153,600 colonies
- 6144: 614,400 colonies

CONSUMABLES

- Singer PlusPlates™: Standard footprint, single well plate with specially extended working area for RePad™ compatibility and meniscus allowance.
- RePads™: 96 Long
  384 Long
  96 Short
  384 Short
  1536 Short
  6144 Short

All consumables are made of plastic and are gamma irradiated and double packed.

Pack sizes:

- PlusPlates™: 10 per sleeve/ 200 per box
- Long 96: 10 per sleeve/ 200 per box
- Long 384: 10 per sleeve/ 200 per box
- Short 96: 20 per sleeve/ 1000 per box
- Short 384: 20 per sleeve/ 1000 per box
- Short 1536: 20 per sleeve/1000 per box
- Short 6411: 20 per sleeve/1000 per box

Running Costs

- Running costs of the ROTOR HDA are much lower than those of conventional robots, particularly when speed and density are taken into account.
- EXAMPLE: At a rate of 100 plate replications per hour at a density of 1536, 153600 colonies can be printed. 100 PlusPlates™ and 100 RePads™ cost approximately US $240* so cost per colony is only $0.0015.
  There are no solvent or detergent costs, or costs associated with a dedicated technician.

SAFETY AND COMPLIANCE

- Safety Interlocks on vision panel and rear control panel.
- UV lamp operation is under software control and is interlocked with main, roller cover closure.
- CE compliance by technical file.

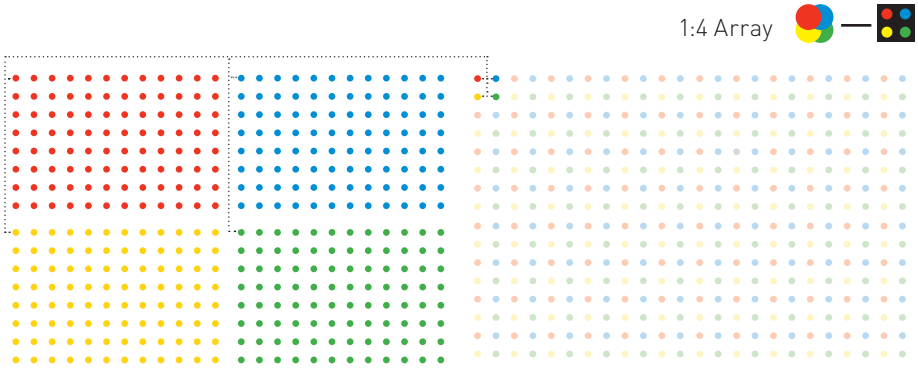
*Price correct at time of printing. Exchange rates fluctuate monthly.

PINNING EXAMPLES

1

1:4 ARRAY

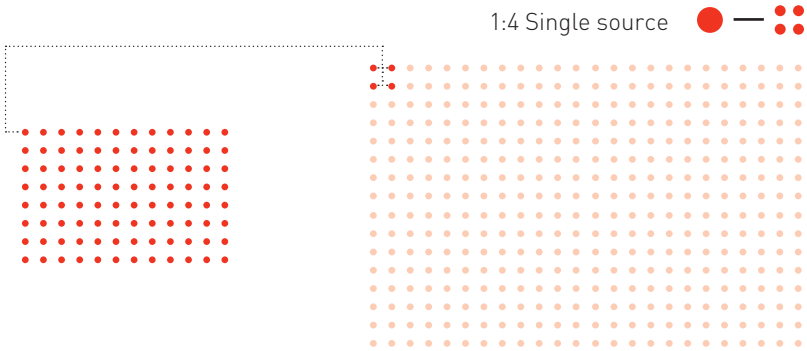
- 4x 96-density plates are combined onto 1x 384-density plate.



2

1:4 SINGLE SOURCE

- Each colony from a 1x 96-density plate replicated in quadruplicate to a 1x 384-density plate. These protocols can be applied at all pinning densities.

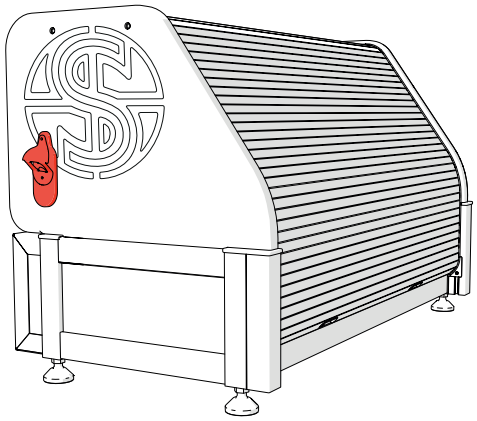


POST-EXPERIMENTAL PROCEDURE

1

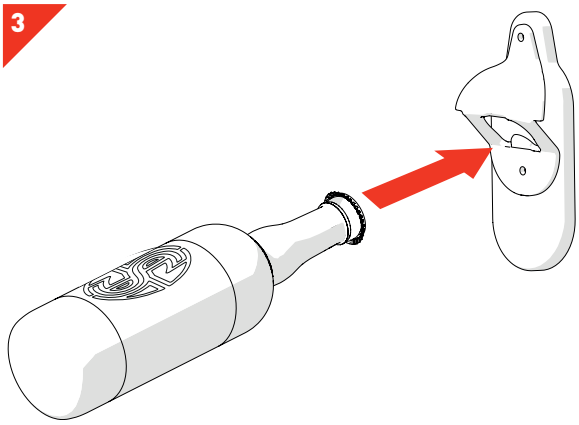
· Select a *Delicious Beer*. Pick a strong one - it's been a hard day!

2



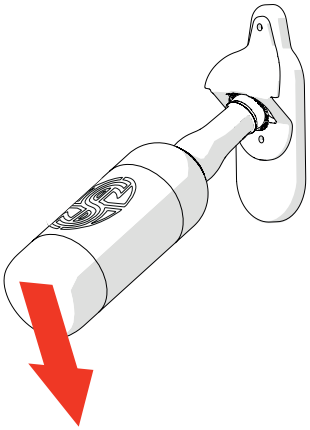
· Locate the *Bottle Opener* on your *ROTOR HDA*.

3



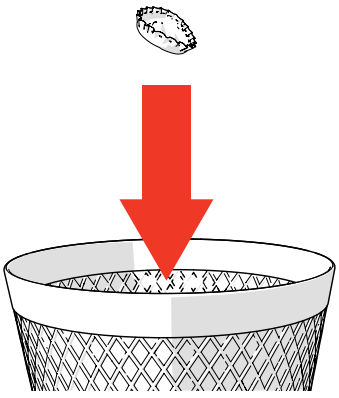
· Insert the *Beer Bottle* into the *Bottle Opener.*

4



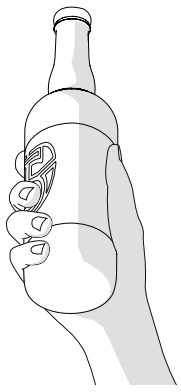
· Lever the *Beer Bottle* to remove the *Bottle Cap*

5



· Place the *Bottle Cap* in the *Bin.* Nobody likes a litter bug!

6



· Success! Time to enjoy your *Delicious Beer* - you've earned it!
· Repeat steps 1-6 until suitably relaxed.

NOTES

NOTES

NOTES

NOTES

SINGER
INSTRUMENTS
A RESPONSIBILITY TO SCIENCE!

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SCAN TO VISIT WEBSITE FOR MORE HELPFUL TIPS AND TUTORIALS!

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