



Thermo Scientific™ Capit-All™ ScrewTop™ Tube Capper/Decapper

October 2014

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Chapter 1 - Notices

1.1 Safety

Before using this equipment, ensure that you are properly trained in:

- The correct and safe operation of of Capit-All/Capit-All IS equipment

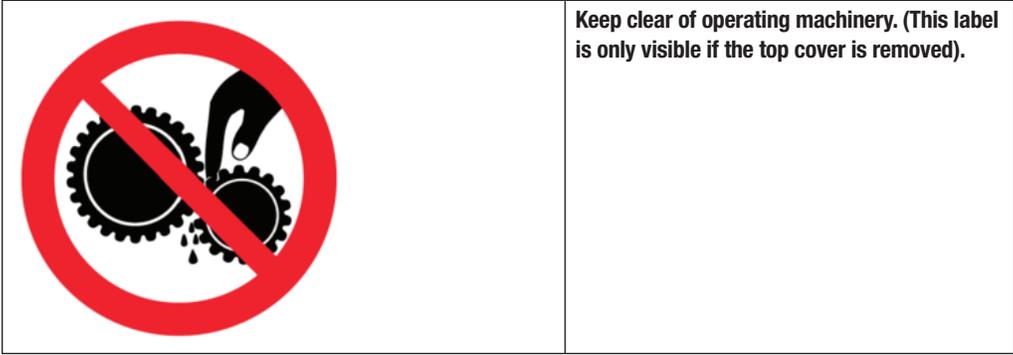
Safety Standards

Capit-All and Capit-All IS Capper/Decappers are CE compliant and certified to NRTL (US and Canada) standards.

Safety Labels

The equipment has a number of safety labels intended to protect the operator from injury, pay attention to these labels at all times. These labels are:

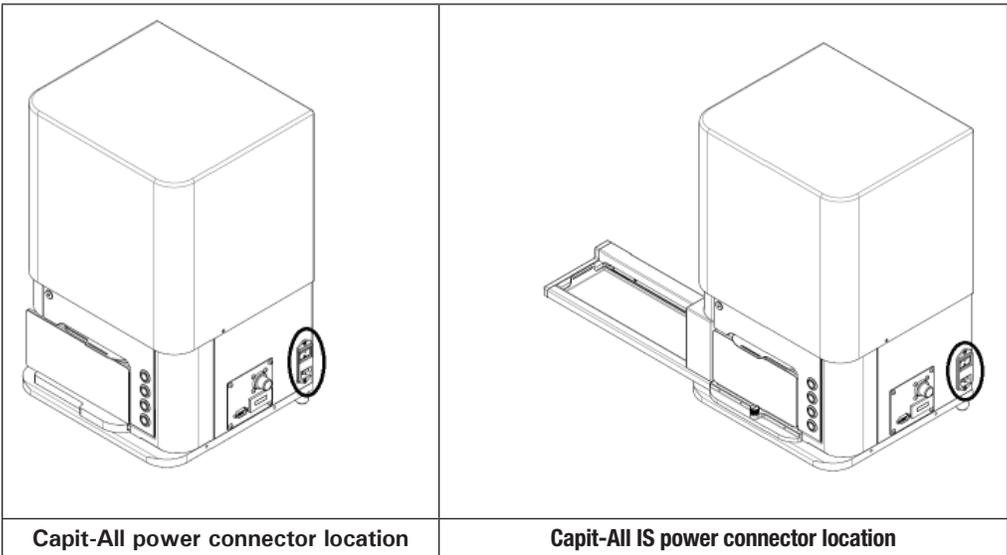
Label	Meaning
	<p>The top cover should only be removed by trained personnel, and never without isolating the unit.</p>
	<p>The rear panel should only be removed after disconnecting power (and only by trained personnel).</p>



1.2 Power

Caution: This equipment requires a protective earth connection. The grounding pin must be connected to an earthed ground. Use the power cord supplied with the instrument, or an alternative cord certified for the country of use.

The power supply is connected at the back of the right hand side of the instrument as shown below. Ensure the power switch is Off (O) before connecting to or disconnecting from the supply.



The equipment is designed for use with the following mains supplies:

Voltage: 110-240VAC

Frequency: 50-60Hz

1.3 Operating Conditions

Operating Temperature	15°C to 30°C
Humidity	<75% RH non condensing

1.4 Warranty

Standard warranty is:

- 12 months

Or:

- 10,500 cap-recap cycles (as measured by the Cycle Counter) for 48 or 96-way compatible systems)
- 7,500 cap-recap cycles (as measured by the Cycle Counter) for 24-way compatible systems)

Whichever occurs first.

Enhanced preventative maintenance and service packages are available. For further details, please contact Thermo Fisher Scientific at the address given in the Contacts section of this User Manual.

1.5 Contact Details

North America Contact (Main Office)

Thermo Fisher Scientific
75 Panorama Creek Drive
Rochester NY 14625
PH: +585 586 8800
1 800 625 4327
technicalsupport@thermofisher.com

Europe Contact

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Chapter 2 - Unpacking

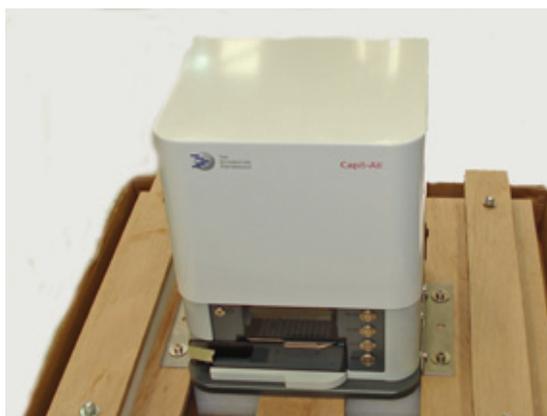
WARNING!

1. The weight of the Capit-All (Bench top) unit and Capit-All (Integrated System (IS)) units is approximately 44kg (97 lb) and 54kg (130 lb) respectively. Please ensure that they are handled safely by at least two people and that appropriate lifting methods are employed.
2. Always lift the Capit-All system by holding its base, and never support the weight of the Capit-All Integrated System (IS) using the extended Carriage. Failure to do so may cause the heavy base to become detached, potentially leading to serious injury.
3. Check that all tables, safety cabinets, or mounting brackets supporting the equipment have been built to accommodate the respective weights

Note: The following instructions are illustrated for the Capit-All Bench top system, but they are similar for the Capit-All Integrated System (IS). If you have any questions, please contact Thermo Fisher Scientific at the address given in the Contacts section of this User Manual.

2.1 Unpacking Instructions:

1. Inspect the ‘tip and tell’ and shock-watch indicators on the outside of the carton, and if these indicate mishandling during transportation, inform Thermo Fisher immediately and take special care to inspect the enclosed items for damage. If damage is observed, or if you have any doubts about the safety or integrity of the unit, inform Thermo Fisher immediately.
2. Carefully remove the tape and banding across the lid of the carton using a knife or heavy-duty cutter. Detach the lid and lift the side section cleanly off and away from the base.



3. Remove the small box of ancillary items (usually fixed by double-sided tape) from the base of the carton.



4. Using the 6mm Allen key provided, remove the four screws holding the two transit brackets to the carton base, but leave them attached to the CapIt-all unit at this time.



5. With the aid of two or more people, carefully remove CapIt-All unit from the carton, discard the outer polythene bag and conduct a visual check for signs of damage during transit. Inform Thermo Fisher Scientific immediately if there are any damaged or loose items.
6. Using the 5mm Allen key provided, remove the four screws holding the two transit brackets to the CapIt-All base.
7. If in the future you need to relocate the CapIt-All unit, or return it to Thermo Fisher Scientific for servicing or repair, you will need to prepare it for transportation using its original packaging. It is therefore advisable to store all the packaging, fixings and tools supplied with the CapIt-All system in a safe place for at least one year.

Note: In the event that the packaging becomes lost or damaged, please contact Thermo Fisher Scientific for a replacement.



2.2 Parts List

Please check that the following items are present when the unit has been unpacked:

- Capit-All unit
- Power cables (3 off to cover applicable international standards)
- Rack (24-Way only)
- Rack Nest and Spacer(s)
- Cap Rack Lifter(s) (96-Way only)
- RS232 cable (Integrated System version only)
- User Manual

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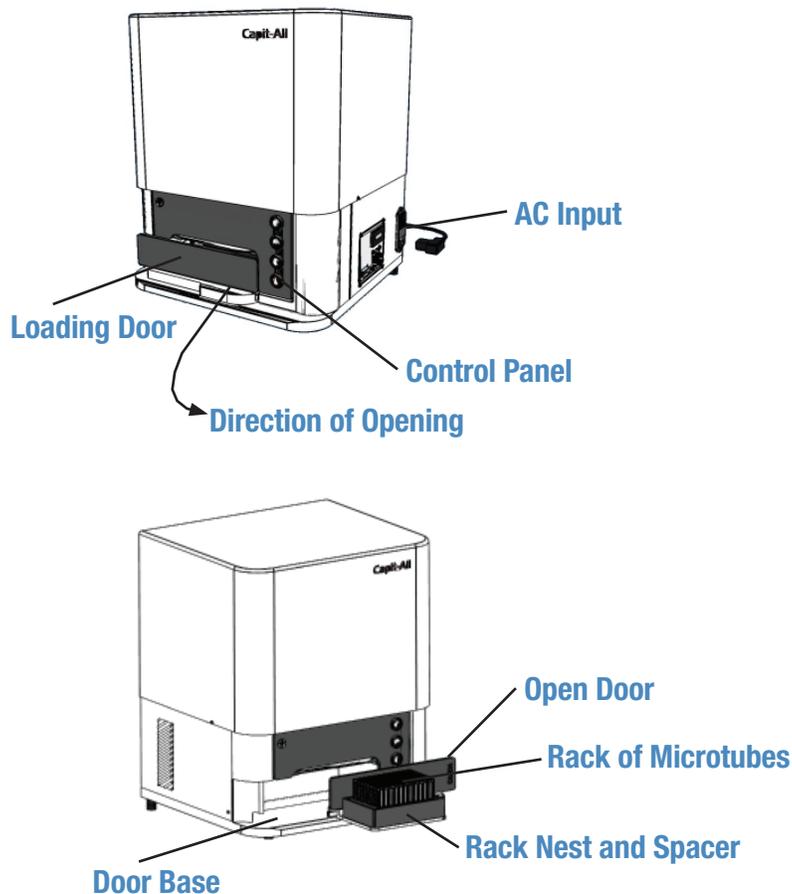
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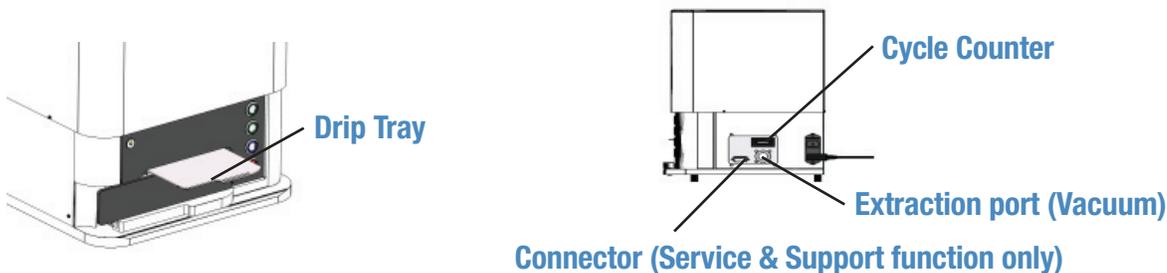
Chapter 3 - Parts

The Capit-All system contains no user serviceable parts, and the following sections summarize the major elements of the Capit-All Bench top and Capit-All Integrated System (IS).

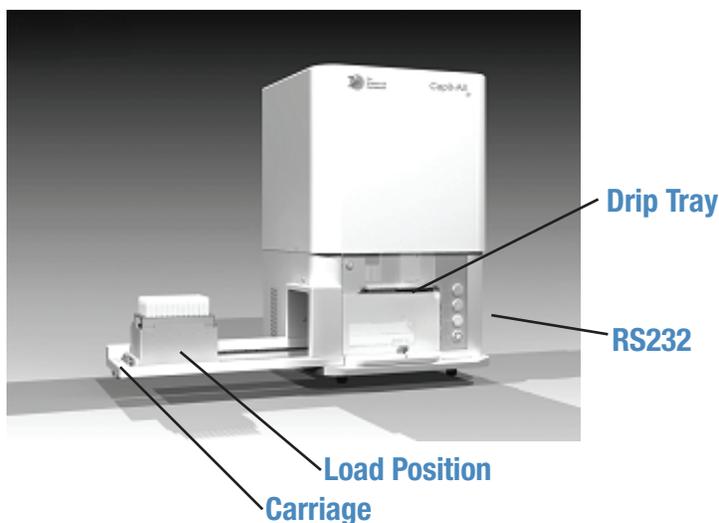
3.1 Capit-All Bench top system

Note: the following illustration shows the 96-way version, but the 24 and 48-way variants are similar having a larger loading door.





3.2 CapIt-All Integrated System (IS)



3.3 Racks, Rack Nest & Spacers, and Cap Tray Lifters

Racks, Rack Nest & Spacers, and Cap Tray Lifters have been designed to support a wide range of different tube types and cap trays, and these are summarized below for the Bench top and Integrated System versions of the CapIt-All instrument.

Note: Cap Tray Lifters are accessories that support the use of Nunc and Matrix cap trays with the CapIt-All Bench top system. They are not compatible with CapIt-All Integrated System (IS) due to the requirement to physically constrain the cap tray within the lifter.

3.3.1 Configurations for the CapIt-All Bench top system

The following table specifies the Racks, Rack Nest & Spacers, and Cap Tray Lifters required for a given tube and cap type, and this is followed by an illustration showing how these are combined in a typical configuration:

Note: TAP part numbers are given in square brackets

3.3.1.1 96-Way Capit-All systems

Capit-All part number:	Capit-All description	Tube type description:	Cat No:	Rack Nest & Spacer:	Cap Tray Lifter:
4111NUN [063-1F1A]	Capit-All Screw Cap Decapper for Nunc 96 way Cryobank vials	Nunc 96-Way 0.5ml [A-9311]	374082, 374083, 374086, 374087 (and equivalents)	[063-0C50]	
		Nunc 96-Way 1.0ml [A-9321]	374084, 374085, 374088, 374089 (and equivalents)	[063-0C05]	
		Nunc 96-Way 0.5ml uncapped	374102	[063-0C50]	
		Nunc 96-Way cap tray	374021 (Blue), 019 (Red), 018 (Green), 017 (Neutral)		N12030 [063-0C93]
		Nunc 96-Way 1.0ml uncapped	374103	[063-0C05]	
		Nunc 96-Way cap tray	374021 (Blue), 019 (Red), 018 (Green), 017 (Neutral)		N12031 [063-0C92]
4111MAT [063-1G1A]	Capit-All Screw Cap Decapper for Matrix 96 way tubes	Matrix 96-Way 0.2ml [A-96F1]	3748	[063-0D93]	
		Matrix 96-Way 0.5ml [A-9611]	3744 (GRE, YEL, BLU, RED, WHI, PUR)	[063-0C52]	
		Matrix 96-Way 1.0ml [A-9621]	3741 (GRE, YEL, BLU, RED, WHI, PUR)	[063-0C06]	
		Matrix 96-Way 0.5ml uncapped	3745	[63-0C52]	
		Matrix 96-Way cap tray	4905 (empty), 4477 (Neutral, GRE, YEL, BLUE, RED, WHI, PUR)		4090 [063-C096]
		Matrix 96-Way 1.0ml uncapped	3742	[063-0C06]	
		Matrix 96-Way cap tray	4905 (empty), 4477 (Neutral, GRE, YEL, BLUE, RED, WHI, PUR)		4091 [063-C097]

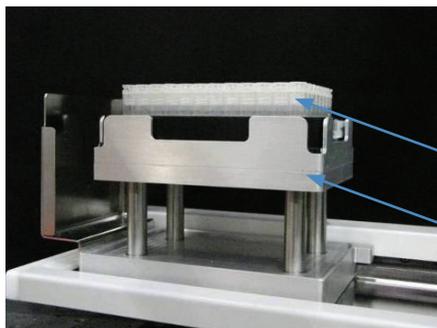
3.3.1.2 48-Way Capit-All systems

Capit-All part number:	Capit-All description	Tube type description:	Cat No:	Rack Nest & Spacer:
4114NUN [063-1F4A]	Capit-All Screw Cap Decapper for Nunc 48 way Cryobank vials	Nunc 48-Way 2.0ml (internal thread)	374221 (Lock-In), 374223 (Lock-In) or 374221, 374223 [A-9251]	[063-0C95 for (Lock-In) tube racks] or [063-0D95]
		Nunc 48-Way 5.0ml (internal thread)	374220 (Lock-In), 374222 (Lock-In) or 374220, 374222 [A-9281]	[063-0C94 for (Lock-In) tube racks] or [063-0D94]
		Nunc 48-Way 1.8ml (external thread)	374500 (2D coded), 374501 (uncoded)	[063-0D95]

3.3.1.3 24-Way Capit-All systems

Capit-All part number:	Capit-All description	Tube type description:	Cat No:	Rack Nest & Spacer:
4113NUN [063-1F2A]	Capit-All 24-way Screw Cap Decapper for Nunc external thread tubes	Nunc 24-Way 1.8ml (external thread) [A-9142]	347627, 375418 [A-9142]	[063-0C16 (001-C1083-F)] [063-0C67]
		Nunc 24-Way 4.5ml (external thread)	347643, 337516 [A-9172]	[063-0C15 (001-C1081-F)] [063-0C81]
4112NUN [063-1F3A]	Capit-All 24-Way Screw Cap Decapper for Nunc internal thread tubes	Nunc 24-Way 1.8ml (internal thread)	377267 [A-9141]	[063-0C16 (001-C1083-F)] [063-0C67]
		Nunc 24-Way 4.5ml (internal thread)	379146 [A-9171]	[063-0C15 (001-C1081-F)] [063-0C84] and [063-0C81]
4113NAL	Capit-All 24-Way Screw Cap Decapper for Nalgene System 100 tubes	Nalgene 24-Way 1.0ml (external thread)	5000-1012 [A-9G23]	[063-0C19 (063-C1100-C)] [063-0C65]
		Nalgene 24-Way 1.5ml (external thread)	5000-1020 [A-9GB3]	[063-0C14 (063-C1151-C)] [063-0C64]

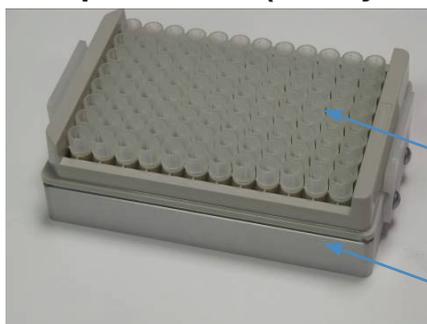
Example 1: Nunc (96-Way 1ml) tube rack configuration



Tube rack

Rack Nest & Spacer
[063-0C05]

Example 2: Matrix (96-Way 0.5ml) Cap Tray configuration



Cap Tray
(4477)

Cap Tray Lifter
[063-0C096]

3.3.2 Configurations for the Capit-All Integrated System (IS)

The following table specifies the Rack Nest & Spacers required for a given tube type:

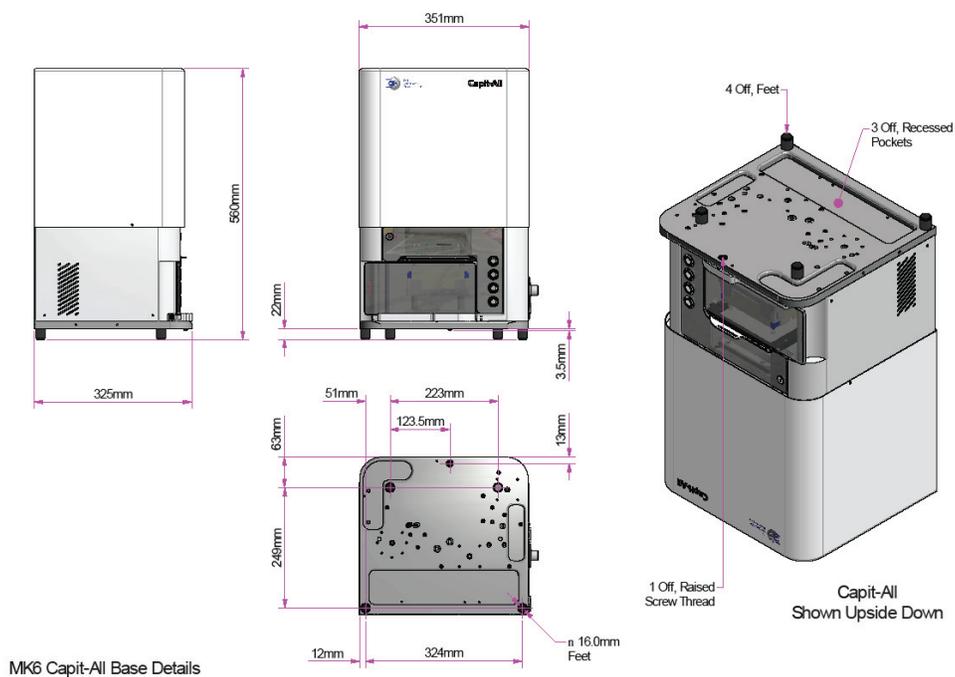
Note: Capit-All IS does not support the use of uncapped tubes with cap trays.

96-Way Capit-All systems

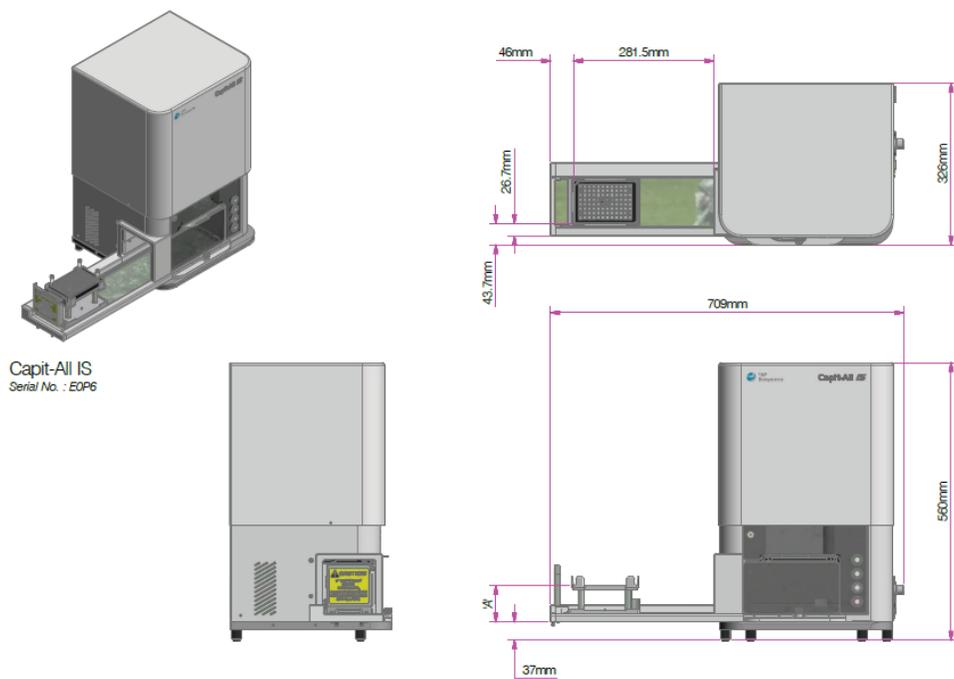
Capit-All part number:	Capit-All description	Tube type description:	Cat No:	Rack Nest & Spacer:
4111NUN-IS [063-3F1A]	Capit-All IS Automation Friendly Screw Cap Decapper for Nunc 96 way tubes	Nunc 96-Way 0.5ml	374082, 374083, 374086, 374087 (and equivalents) [A-9311]	[063-0C50]
		Nunc 96-Way 1.0ml	374084, 374085, 374088, 374089 (and equivalents) [A-9321]	[063-0C05]
4111MAT-IS [063-3G1A]	Capit-All IS Automation Friendly Screw Cap Decapper for Matrix 96 way tubes	Matrix 96-Way 0.2ml	3748	[063-0D93]
		Matrix 96-Way 0.5ml	3744(GRE, YEL, BLU, RED, WHI, PUR) [A-9611]	[063-0C52]
		Matrix 96-Way 1.0ml	3741(GRE, YEL, BLU, RED, WHI, PUR) [A-9621]	[063-0C06]
4114NUN-IS (063-3F4A)	Capit-All IS Automation Friendly Screw Cap Decapper for Nunc 48 way tubes	Nunc 48-Way 2.0ml	374221 (Lock-In), 374223 (Lock-In) Or 374221, 374223 [A-9251]	[063-0C95 for (Lock-In) tube racks] Or [063-0D95]
		Nunc 48-Way 5.0ml	374220 (Lock-In), 374222 (Lock-In) Or 374220, 374222 [A-9281]	[063-0C94 for (Lock-In) tube racks] Or [063-0D94]

3.4 Installation Drawings

3.4.1 Capit-AII Unit



3.4.2 Capit-AII IS Unit



The following table illustrates the height that the labware will sit (Dimension 'A') in the drawing above)

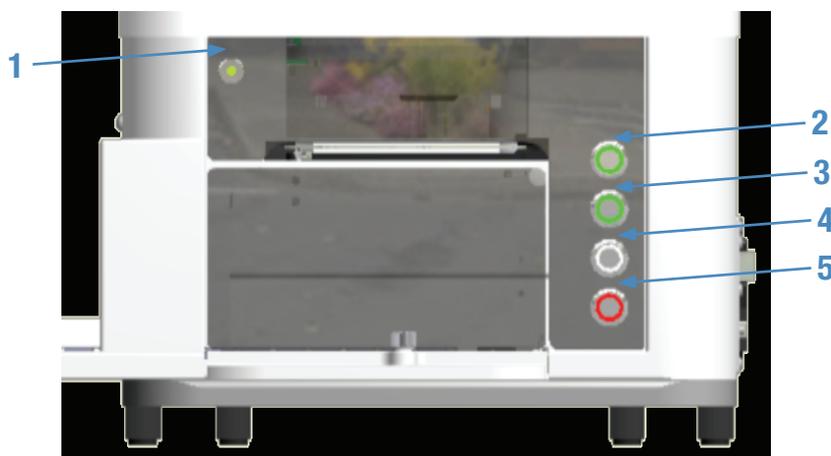
Capit-All Part No(s):	Type of rack	Capacity	Rack Nest/Spacer(s)	Dim 'A'
4111NUN	Lock-In	0.5ml	[063-0C50]	86mm
4111NUN-IS		1.0ml	[063-0C05]	72.8mm
4111MAT	Lock-In	0.2ml	[063-0D93]	98mm
4111MAT-IS		0.5ml	[063-0C52]	81mm
		1.0ml	[063-0C06]	67mm
4114NUN	Lock-In	2.0ml	[063-0C95]	71.8mm
4114NUN-IS		5.0ml	[063-0C94]	29.8mm
	Non 'lock-in'	2.0ml	[063-0D95]	70.3mm
		5.0ml	[063-0D94]	28.3mm

4

Chapter 4 - Operation

4.1 Control Panel - Buttons/Indicators

Note: The Capit-All IS system is shown for illustrative purposes



	Buttons/Indicators:	Function:
1	Power Indicator	Continuously illuminated when Capit-All unit is powered up.
2	Decap Button and Indicator	Press to Decap tubes
3	Recap Button and Indicator	Press to Recap tubes
4	Reset Button and Indicator	Press to reset Capit-All unit to a known condition.
5	Stop Button and Indicator	Press to halt the operation of Capit-All unit.

4.2 Basic Operation

4.2.1 Initial Set Up

Unpack Capit-All unit as described in the Unpacking Instructions, and use the following procedures to set up the system prior to use. It is unlikely that there will be any issue with the set-up and operation of the Capit-All equipment, but if you experience any difficulties, please refer to

the Troubleshooting section of this manual, or request assistance from Thermo Fisher Scientific at the address given in the Contacts section of this manual.

The Capit-All unit features a Cycle Counter, which counts every time a capping cycle is completed. When you receive your Capit-All system, the Cycle Counter will already display a number of counts. This is due to cycles run during quality control testing. If you contact Thermo Fisher Scientific regarding a problem, you may be asked to provide the number displayed on the counter.

Additionally, in the highly unlikely that caps are not successfully 'Decapped' or 'Recapped', you may also be asked to remove the panel in the Loading Door to gain access to a rack of tubes. The procedures for completing this are different for the Bench top and Integrated System versions and these are summarized below:

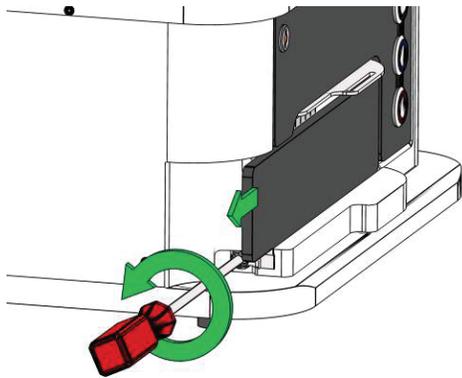
Warning:

Do not exert excessive force to open the Loading Door to gain access, or to close.

Note: Capit-All Capper will not function without the Loading Door in place.

4.2.2 Removing Loading Door - Capit-All Bench top system

Using a screwdriver turn the fastener by one quarter-turn, then slide the panel out. To replace, slide in, and refasten, checking the panel is secure.



4.2.3 Removing Loading Door - Capit-All Integrated System (IS)

To remove, turn the knurled fastener and detach the panel. To replace, refasten, and check that it is secure.



4.2.4 Attaching the Vacuum Line (optional)

The Capit-All unit has a 19mm (outer diameter) port that can be connected to a suitable vacuum-based extraction system to reduce the possibility of contamination through airborne particulates and evaporates. Typically, 1 bar of negative pressure is applied.

Note: Attaching a vacuum line is NOT necessary for successful operation of the Capit-All equipment, but may be useful in some applications.

1. Locate the extraction port on the side of the Capit-All unit, as shown in the diagram in Section 2 of this Manual.
2. Attach flexible hosing to the extraction port and connect the other end to the external vacuum system.
3. Turn the external extraction system ON.

4.2.5 Attaching the AC Power Supply

1. Remove the appropriate AC power cable from the Capit-All packaging and plug one end into the AC input on the side of Capit-All unit, and the other into the AC outlet. The Capit-All unit contains a universal power supply, so there is no need to adjust any voltage settings.
2. Switch the unit ON using the power switch above the AC input.
3. The Power Indicator will light up, and after a brief pause, the 'Reset' Indicator will light up, and the 'Stop' Indicator light will flash.
4. To prepare the Capit-All capper for use, press the 'Reset' button. Wait until the 'Reset' Indicator light has stopped flashing, and the unit has stopped moving.

4.2.6 Loading Racks of tubes

Capit-All systems are configured to work with the tube type specified at the time of order.

Caution: Using incorrect tubes may cause damage. Please ensure that you always use the correct tubes for the current configuration of the Capit-All system. System part and serial numbers are printed on a label at the rear of the unit, and please refer to Section 2 for configuration information.

4.2.7 Configuring the Capit-All Capper for different height tubes

Tubes are supplied in a variety of different working volumes and sizes. To accommodate a range of tube sizes, the Capit-All unit is supplied with a Rack (24-Way only), Rack Nest & Spacer, and Spacer(s).

To configure these items correctly:

1. Identify the exact volume and size of tubes that are to be used.
2. Using the table and illustration given in Section 2, identify the correct configuration of Rack (24-Way only), Rack Nest & Spacer, and Spacer(s) and assemble them as indicated. The Rack Nest & Spacer is placed directly onto the Rack Nest Carriage followed by the tube rack or Rack (24-Way only). If using a Cap Tray, this is loaded directly into the Cap Tray Lifter that in turn is placed onto the Rack Nest & Spacer.

Note: When installing the Capit-All IS system, it may be necessary to attach the Rack Nest Carriage. To do this, locate the moveable Rack Nest Carriage mounting bracket positioned alongside the carriage. This will normally be in the loading position, but if it has moved during transit, it can be repositioned by hand (provided that there is no power to the unit). The mounting bracket has two bars that locate with sockets at the back of the Rack Nest Carriage. Attach the Rack Nest Carriage, and press firmly home, ensuring that it is flat/parallel with the carriage. The Rack Nest & Spacer and tube rack or Rack (24-Way only) may then be loaded onto the Rack Nest Carriage.

Note: Once the correct Rack Nest & Spacer is assembled into the unit, subsequent tube racks or Racks (24-Way only) may be loaded and unloaded without further adjustment

3. Load the system with tubes as follows:

4.2.7.1 Loading racks of tubes (96 and 48-Way operation):

Place the tube rack into the Rack Nest & Spacer ensuring that there is a good fit, and that the rack sits horizontally in the nest. When loading the rack, ensure that it's in the correct orientation (i.e. column 1 is on the left, column 12 on the right). If it's not in this orientation, the rack will not sit properly in the Rack Nest & Spacer, and will fail to be decapped or recapped properly.

4.2.7.2 Loading loose tubes (24-Way operation):

Load the tubes by hand into the mounting holes in the Rack.

Note: It is very important when loading tubes by hand that they are seated correctly, and failure to do so may cause the Capit-All instrument to enter a fault condition. To prevent this, carefully rotate each of the tubes until the anti-rotation feature on the base of the tube locates with the holes in the base of the Rack.

4.3 Loading Cap Trays

Cap Tray Lifters are available to support Nunc and Matrix Cap Trays for use with racks of uncapped tubes from the same vendors.

To configure these items correctly:

1. Identify the exact volume and size of tubes that are to be used.
2. Using the table and illustration given in Section 2, identify the correct configuration of Cap Tray, Cap Tray Lifter, and Rack Nest & Spacer.

Place the Cap Tray into the Cap Tray Lifter by carefully loosening one of the supporting plastic retaining springs, and slipping it into place. Ensure that the Cap Tray sits horizontally within the Cap Tray Lifter, and is in the correct orientation. If it's not, the Cap Tray will not sit properly in the Cap Tray Lifter and will fail to be decapped or recapped properly. Load the Cap Tray Lifter onto the Rack Nest & Spacer.

4.4 Use of the Drip Tray

To reduce the likelihood of cross contamination caused by drops of liquid on the decapped caps falling into neighboring tubes, the Capit-All Bench top version has a manual Drip Tray and the Integrated System has an automated one.

Note: The Drip Tray is detachable, and is NOT necessary for correct operation of the Capit-All system, but may be useful in some applications.

When the Drip Tray is detached, the instructions below for decapping/recapping should be followed, but just omit those specifically relating to this function.

4.4.1 Removal/replacement of drip tray – Bench top version

Detach the Drip Tray by carefully pulling it out of the unit using the serrated handle designed for this purpose.

Replace by inserting it back into the unit, ensuring in its final position that it's firmly home.

4.4.2 Removal/replacement of drip tray – IS version

Release the small clip under the Drip Tray (see diagram below) and detach by carefully pulling it out of the unit using the serrated handle designed for this purpose.

Replace by inserting it back into the unit (with the serrated handle positioned towards the left-hand side of the unit), ensure it's firmly home, and reapply the small clip holding it in place.

To operate the instrument without the drip tray, disable the automatic drip tray function by pressing and holding the STOP and RESET buttons together for about 5 seconds. To re-enable automatic drip tray function after refitting it, press and hold the STOP and RESET buttons together for about 5 seconds.”



4.5 Decapping/Capping

4.5.1 Decapping using the Capit-All Bench top system

1. Ensure the Drip Tray is fully inserted, and if not, push it fully in.
2. Open the Loading Door. Ensure that the correct Rack Nest & Spacer is in place (see Section 2).
3. Load either a tube rack or Rack with tubes (24-Way only).
4. Fully close the Door.
5. Move the Drip Tray into its retracted position by gently pulling it out of the machine until it clicks into place. The Drip Tray does not have to be fully removed from the system.
6. Perform a 'Decap' function by pressing the 'Decap' front panel button

Note: The Decap Indicator light will stop flashing when the operation is complete.

7. Open the Door and remove the decapped tubes. The caps will be retained within Capit-All unit, ready for capping.

4.5.2 Capping using the Capit-All Bench top system

1. Ensure the Drip Tray is fully inserted, and load either a tube rack or Rack with tubes (to be recapped) into the Rack Nest & Spacer.
2. Caution: It is still possible to close the Door if the rack of tubes is not in the correct orientation. Check that the rack is in the correct orientation by ensuring that it is sitting horizontally in the Rack Nest & Spacer.
3. Gently pull the Drip Tray out until it clicks into its retracted position.
4. Perform a 'Recap' function by pressing the 'Recap' front panel button

Note: The Recap Indicator light will stop flashing when the operation is complete.

5. Push the Drip Tray into the unit to return it to its inserted position.
Open the Door and remove the capped tube rack or Rack with tubes.

4.5.3 Using Cap Trays with the Capit-All Bench top system

Using the instructions for decapping and capping racks of tubes described above:

1. Load the Cap Tray as instructed in Section 5.3
2. Perform a decapping operation
3. Remove the Cap Tray and Cap Tray Lifter, and replace with a rack of uncapped tubes held in a Rack Nest, as specified in the table given in Section 2
4. Perform a capping operation.
5. Open the Door and remove the capped rack of tubes.

4.5.4 Decapping using the Capit-All Integrated System (IS)

1. Ensure that the correct Rack Nest & Spacer is in place (see Section 2).
2. Load the tube rack to be decapped into the Rack Nest & Spacer
3. Perform a 'Decap' function by pressing the 'Decap' front panel button (or remotely using the instructions given in the External Control section of this User Manual)

Note: The Decap Indicator light will stop flashing when the operation is complete.

4. Remove the decapped tube rack. The caps will remain inside the Capit-All unit, ready for capping.

4.5.5 Capping using the Capit-All Integrated System (IS)

1. Load the tube rack to be capped into the Rack Nest & Spacer
2. Perform a 'Recap' function by pressing the 'Recap' front panel button (or remotely using the instructions given in the External Control section of this User Manual)

Note: The Recap Indicator light will stop flashing when the operation is complete.

3. Remove the capped tube rack.

4.6 Discarding decapped caps

The User may collect discarded caps by replacing the Rack (24-Way only) and Rack Nest & Spacer with a suitable container (e.g. the lid from an SBS format rack), or Cap Tray.

4.6.1 Discarding caps into a container

1. Remove the Rack (24-Way only) and Rack Nest & Spacer, and replace with a suitable container.

Note: A suitable container is not supplied with the Capit-All system.

2. Follow the instructions above for capping.
3. Open the Door and remove the container holding the discarded caps.

4.6.2 Discarding caps into a Cap Tray

1. Remove the Rack Nest & Spacer.
2. Load the Cap Tray and Cap Rack Lifter as instructed in Section 4.3
3. Perform a capping operation.
4. Open the Door and remove the Cap Tray holding the discarded caps.

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Chapter 5 - External Control

The Capit-All instrument can be operated in two distinct modes:

- Manually using the front panel control buttons
- Remotely using the RS232 control port (Capit-All IS only)

Manual operation has been described earlier in this User Manual, so the following sections focus on the instructions to control Capit-All IS using the RS232 control port.

Note: The Capit-All bench top version is supplied with a 9 pin D socket, but this is NOT for customer use. It is supplied for diagnostic and servicing purposes by staff from Thermo Fisher Scientific (or appointed agents) only.

5.1 RS232 interface (Capit-All IS unit only)

A port (9 pin D-socket) is located on the side of the Capit-All IS unit, allowing control of front panel functions using software commands from a suitable client (e.g. PC).

When using the RS232 interface, Capit-All IS front panel buttons are enabled, and it performs functions on a 'first come first serve basis'.

The client connects to IS using a standard RS232 cable (supplied with the system).

Note: It may be necessary to reconfigure the COM ports on the client (e.g. PC) to ensure successful communication with the Capit-All IS unit.

The following sections give the specification for the RS232 interface and if you require further information, please contact Thermo Fisher Scientific at the address given in the Contacts section of this User Manual.

5.1.1 Hardware specification (9 pin D-socket)

Pin No:	Function:
2	RX
3	TX
5	GND
Outer screen	Screen

5.1.2 Baud rate

The Baud rate is factory pre-set at 9600.

5.1.3 RS232 cable

An RS232 cable is supplied with the Capit-All IS system. This is 9 way D, male to female, pins 2 and 3 swapped at one end, pin 5 and the screen are connected straight through (separately).

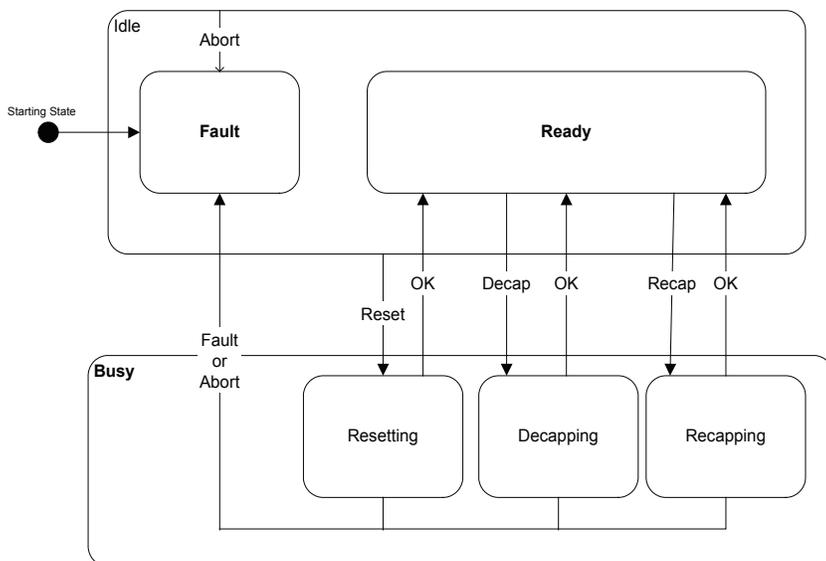
5.1.4 State Model

The unit has three main states:

- Fault is the initial state when the unit is switched on, after an Abort command or after a fault.
- Ready is the state when the unit is ready to decap, or cap, a rack of tubes.
- Busy is the state when the unit is performing an operation (Internally there are different states depending on the operation being performed).

The diagram below shows the valid commands in the different states. It is the responsibility of the client software to know if it is appropriate to Cap or to Recap at any particular point in time. These commands may be initiated either over the remote (RS232) interface or by buttons on the machine. In either case the state model is the same.

The buttons on the machine are illuminated to indicate which commands are available. The remote (RS232) interface will respond with an error code if the machine is not in a state where a command can be executed.



Note: The Status command may be called at any time and will return the current state of the machine.

5.1.5 Command Format

Commands (with the exception of Abort) consist of a single uppercase letter identifying the command followed by a linefeed character <LF> or a carriage return character <CR>. Commands may also be terminated with <CR><LF> or <LF><CR>, since the instrument ignores empty commands.

The unit responds to remote commands that request information (e.g. S) with a line containing the information for the command followed by <CR><LF>. The specific information returned is detailed under the individual commands.

Note: See a following section for the response to the Abort command.

The unit responds to other valid remote commands once the action has completed with the line:

```
OK<CR><LF>
```

The unit responds to an invalid remote command or to remote commands that do not complete successfully with an error line of the form below where code is the error code.

```
ERcode<CR><LF>
```

5.1.6 Error Codes

The following errors may be returned from a command.

ER1 – the unit was busy and the command was ignored.

ER2 – the command was not valid

ER3 – the command was aborted

ER4 – general fault – the machine failed to complete its requested operation for an unspecified reason

ER5 – capping head fault – the capping head failed to operate

ER6 - the rack transfer axis has failed to operate

5.1.7 Command Set

5.1.7.1 Abort (ESC)

The abort command brings the unit to a controlled stop as soon as possible.

The abort command consists of the escape character. Any preceding characters are ignored.

The response to the abort command is an error code serving as acknowledgement both of the Abort command and of any command that was aborted. The error code will be ER3 unless another error arises during execution of the Abort.

Pressing the stop button on the unit while a remotely initiated action is in progress, will abort that action, and the action will return ER3. Pressing the stop button at other times will not cause any text to be sent over the RS232 interface.

After successful completion of the command the state of the unit is Fault.

Note: When you first make a connection to the unit send an Abort command to flush out any characters that may have previously been sent to the unit.

5.1.7.2 Reset (R)

The reset command:

- i) Returns the rack transfer axis to the loading position
- ii) Returns the head mechanics to the pre-start position

After successful completion of the command the state of the unit is Ready.

Caution: Before resetting the system the user should check that the unit is clear of obstructions.

Caution: Any caps in the system will be retained after a reset. These caps will cause a problem if the next action is to decap a rack.

5.1.7.3 Status (S)

The status command returns the status of the unit. The response to the status command is one of:

- BUSY<CR><LF>
- FAULT<CR><LF>
- READY<CR><LF>

The state of the unit is not changed by this command.

5.1.7.4 Decap (D)

The Decap command decaps a rack located on the Carriage and returns it to the Load Position.

After successful completion of the command the state of the unit is Ready

5.1.7.5 Recap (C)

Recaps a rack located on the Carriage and returns it to the Load Position.

After successful completion of the command the state of the unit is Ready.

5.1.7.6 eXtended Recap (X)

Recaps a rack located on the Carriage and returns it to the Load Position.

As well as recapping the rack this command performs any extended functions that may be included in the future (e.g. gas purge).

After successful completion of the command the state of the unit is Ready.

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Chapter 6 - Maintenance

6.1 Cleaning and Decontamination

The outer surfaces and Drip Tray of the Capit-All unit can be cleaned with typical laboratory cleaning agents and 70% alcohol solutions. The system is also tolerant to specific de-contamination regimes based on hydrogen peroxide (e.g. that offered by Bioquell Inc).

The system may be used with samples containing DMSO as a cryo-preserved.

Caution: Do not use Formaldehyde as a de-contamination agent as this will cause permanent damage to the electronic components within the equipment.

On a regular basis (e.g. after every production batch) remove and clean the 'Drip Tray', and flush out the loading area with clean air from an aerosol can (these can be purchased from any general laboratory supplier). This will prevent the accumulation of particulates (not necessary if the vacuum extraction facility is connected). The 'Drip Tray' should then be re-inserted.

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Chapter 7 - Disposal

7.1 WEEE Compliance

The Capit-All instrument is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC, and is marked with the following symbol:



Thermo Fisher Scientific (and its agents) have contracted with one or more recycling or disposal companies in the European Union (EU) and these companies will dispose of or recycle this product.

Please contact Thermo Fisher Scientific at the address given in the Contacts section of this User Manual for further information on compliance with these Directives and the recyclers in your country.

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Chapter 8 - Troubleshooting

The Capit-All Capper/Decapper has been designed to provide trouble-free operation, but the following information is provided to help diagnose and solve any problems that may occur during its life.

Note: The following is designed for troubleshooting the Capit-All Bench top system, and it does NOT offer solutions to problems that arise when the Capit-All IS system is controlled externally or integrated within a larger automated system. For questions of this type, please contact Thermo Fisher Scientific at the address given in the Contacts section of this User Manual.

Symptom:	Cause:	Solution:
The Stop and Reset indicator lights are flashing continuously	A fault has been detected with the safety circuit	Turn the machine off and on again. If the problem persists, contact Thermo Fisher Scientific
The Recap and Reset indicator lights flash alternately with the Decap and Stop lights; then some or all lights are on solid for 10 seconds	A fault has been detected. The fault code is determined by the pattern of lights which are on solid for 10 seconds – see Appendix for details. Note: The Fault Mode will be displayed after a cycle of seven flashing/fault code displays.	Contact Thermo Fisher Scientific (ideally with details of the Fault Mode) who will offer help and remedial action as necessary. Press the Reset button to reset the unit.
The Stop Indicator light is flashing and the Reset Indicator light is lit. The Decap and Recap indicators are not lit, and pressing the Decap and Recap Buttons has no effect.	The unit is in Start Up or Fault Mode.	Press the Reset button. The unit will reset, and the Decap or Recap Indicator lights will illuminate.
Upon pressing the Decap or Recap buttons, the Capit-All unit goes into Fault Mode (Reset Indicator lit, Stop Indicator flashing).	The Drip Tray is inserted.	Ensure that the Drip Tray is fully retracted or removed from the unit. Press the Reset button.

Symptom:	Cause:	Solution:
The Door will not close.	The wrong Rack Nest & Spacer is inserted.	Replace with the correct Rack Nest & Spacer.
	The tube rack is not in the correct orientation.	Remove the tube rack from the Rack Nest & Spacer and rotate the rack by 180°. Check that the rack sits horizontally in the Rack Nest & Spacer.
The Door will not open.	A cap has fallen off and is jamming the Loading Door.	Turn off the power to the Capit-All unit. Remove the Loading Door panel (see section 5). Recover the tube rack by lifting the Rack Nest & Spacer and off its locating pins. You may need to feel around inside the unit to locate the fallen cap and remove it. Replace the Loading Door panel and Rack Nest & Spacer. The unit may now be operated normally.
The Door will not open.	A tube has been lifted out of the rack and remains attached to its cap.	Turn off power to the Capit-All unit. Remove the Loading Door panel (see section 5). Use a tool to push the tube and its cap downwards back into the rack.
	A cap has jammed during recap.	Press the Reset button, and remove the rack. The cap that has caused the error will not be fully tightened up. Manually unscrew the cap, and then screw it back up again. Replace the rack, close the Door and press Recap.
The Capit-All unit is not tightening the caps enough.	Torque is reaching the limits of the specified range.	The Capit-All unit uses individual clutches to ensure that each cap is tightened to the correct torque, as specified by the labware manufacturer. These clutches gradually wear with time. If the unit has decapped and capped more than 10,500 cycles (as measured by the Cycle Counter) for 48 and 96-way configured systems, or 7,500 cycles for 24-way units, the clutches will need to be refurbished and please contact Thermo Fisher Scientific.

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Appendix 1 - Fault Codes

The following tables identify the fault codes which are communicated via the system lights. When a fault is detected, the Recap and Reset indicator lights flash alternately with the Decap and Stop lights to alert the user to the fault condition. The specific fault code is then displayed, one hexadecimal digit at a time, starting with the most-significant digit, using these light patterns. Each digit is displayed for approximately 10 seconds. If there is another digit to display then all four lights flash together for a short period, and then the next digit is displayed. This display cycle is repeated until the instrument is reset.

The Capit-All IS unit has some additional fault codes which are not applicable to the standard Capit-All unit; these are identified in the second table.

Capit-All and Capit-All IS Faults

Light Pattern	Fault	Description
Decap OFF	Nut Plate Motor	An error has occurred within the nut plate motor. The motor has failed to move or the relevant sensor has not been activated.
Recap OFF		
Reset OFF		
Stop OFF		
Decap OFF	Head Motor	An error has occurred within the head motor. The motor has failed to move or the relevant sensor has not been activated.
Recap OFF		
Reset ON		
Stop OFF		
Decap OFF	Drip Tray Inserted	The drip tray is inserted when a decap or recap operation has been requested. If drip tray has been physically removed, then this indicates an issue with the sensor.
Recap OFF		
Reset ON		
Stop ON		
Decap OFF	Stripper Plate Raised	The stripper plate is in its raised position prior to moving the head and nut plate for a decap or recap operation. (I.e. the stripper plate sensors are activated).
Recap ON		
Reset OFF		
Stop OFF		

Light Pattern	Fault	Description
Decap OFF	Stripper Plate Engage	The stripper plate has failed to engage.
Recap ON		
Reset OFF		
Stop ON		
Decap OFF	Stripper Plate Disengage	The stripper plate has failed to disengage.
Recap ON		
Reset ON		
Stop OFF		
Decap OFF	Nut Plate Sensors	One, or more, of the three nut plate sensors has been found to be on when the nut plate is at a different location.
Recap ON		
Reset ON		
Stop ON		

Capit-All IS Additional Faults

Light Pattern	Fault	Description
Decap ON	Rack Shuttle Enable	The rack transfer shuttle has failed to enable correctly.
Recap OFF		
Reset OFF		
Stop OFF		
Decap ON	Rack Shuttle Initialize	The rack transfer shuttle has failed to either initialize, reset, or home correctly.
Recap OFF		
Reset OFF		
Stop ON		
Decap ON	Rack Shuttle Move	The rack transfer shuttle has failed to reach its target destination.
Recap OFF		
Reset ON		
Stop OFF		
Decap ON	Drip Tray Initialize	The drip tray motor has failed to enable or initialize correctly.
Recap OFF		
Reset ON		
Stop ON		
Decap ON	Drip Tray Move	The drip tray motor has failed to complete an extend or retract movement, or the sensors have not detected the drip tray in the correct location.
Recap ON		
Reset OFF		
Stop OFF		
Decap ON	Software Checksum	The checksum calculated by the software, does not match the checksum value calculated and stored during software download.
Recap ON		
Reset OFF		
Stop ON		

Light Pattern	Fault	Description
Decap ON	Cover Guard Switches	The system has detected that the cover guard switches are the inverse of where they should be during an operation (i.e. the door appears to be open, when it should be closed).
Recap ON		
Reset ON		
Stop OFF		
Decap ON	Finger Guard Sensors	The system has detected that the finger guard sensors are the inverse of where they should be during an operation (i.e. they are detecting an obstruction, when they should be clear).
Recap ON		
Reset ON		
Stop ON		

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Appendix 2 - Certifications

The documents in this section provide evidence of certifications obtained for the Capit-All products.

A2.1 Capit-All EC Certificate of Conformity



Capit-All™

EC Declaration of Conformity

Brief Description of the Product:

Automated bench top product for decapping / recapping screw-cap micro tubes.

Standards used in the design and manufacture of Capit-All™

BS EN ISO 12100-1/2	Safety of machinery - Basic concepts, general principles for design.
BS EN ISO 14121-1	Safety of machinery: Risk Assessment
BS EN ISO 953	Safety of machinery - General requirements for the design and construction of guards (fixed, movable).
BS EN ISO 13849-1/2	Safety of machinery - Safety related parts of control systems
EN 1088	Safety of machinery - Interlocking devices with and without guard locking; general principles and provisions for design.
ISO 10218-1	Robotics for Industrial Environments
EN 60204-1	Safety of machinery - Electrical equipment of machines. - Specification of general requirements.
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC regulations, Part 1: General requirements.

Declaration

I declare that as the authorised representative, the above machine complies with the Machinery Directive 2006/42/EC Annex 1, Section 2.1, the Low Voltage Directive 2006/95/EC and its amendments, and the Electromagnetic Compatibility Directive 2004/108/EC and its amendments.

Name of authorised representative **Justin Owen**

Position of authorised representative **Engineering Manager**

Signature of authorised representative

A handwritten signature in black ink, appearing to read "Justin Owen", written over a horizontal line.

Date **13th February 2012**

TAP Biosystems
York Way
Royston
Hertfordshire
SG8 5WY
United Kingdom



A2.2 Capit-All IS EC Certificate of Conformity



Capit-All IS™

EC Declaration of Conformity

Brief Description of the Product:

Automated bench top product for decapping / recapping screw-cap micro tubes, incorporating a rack transfer axis for moving racks from the robotically accessible loading position to and from the capping head.

Standards used in the design and manufacture of Capit-All IS™

BS EN ISO 12100-1/2	Safety of machinery - Basic concepts, general principles for design.
BS EN ISO 14121-1	Safety of machinery: Risk Assessment
BS EN ISO 953	Safety of machinery - General requirements for the design and construction of guards (fixed, movable).
BS EN ISO 13849-1/2	Safety of machinery - Safety related parts of control systems
EN 1088	Safety of machinery - Interlocking devices with and without guard locking; general principles and provisions for design.
ISO 10218-1	Robotics for Industrial Environments
EN 60204-1	Safety of machinery - Electrical equipment of machines. - Specification of general requirements.
EN 61326-1	Electrical equipment for measurement, control and laboratory use – EMC regulations, Part 1: General requirements.

Declaration

I declare that as the authorised representative, the above machine complies with the Machinery Directive 2006/42/EC Annex 1, Section 2.1, the Low Voltage Directive 2006/95/EC and its amendments and the Electromagnetic Compatibility Directive 2004/108/EC and its amendments.

Name of authorised representative Justin Owen

Position of authorised representative Engineering Manager

Signature of authorised representative

Date 13th February 2012

TAP Biosystems
 York Way
 Royston
 Hertfordshire
 SG8 5WY
 United Kingdom



A2.3 Capit-All and Capit-All IS NRTL Certificate

ZERTIFIKAT • CERTIFICATE • 認證書 • CERTIFICADO • CERTIFICAT



CERTIFICATE

No. U8 14 06 86998 004

Holder of Certificate: Tap Biosystems Co.

York Way
Royston
Hertfordshire SG8 5WY
UNITED KINGDOM

Production Facility(ies): 86998

Certification Mark:



Product: Electrical equ. for measurement, control and laboratory use
Decapper/Capper

Model(s): Capit-All, Capit-All IS, Fill-It

Parameters:

Rated Input Voltage:	100-240 V AC
Rated Frequency:	50/60 Hz
Rated Input Current:	6A
Protection Class:	I

Tested according to:

CAN/CSA C22.2 No. 61010-1:2012
CAN/CSA C22.2 No. 61010-2-81/R:2009
UL 61010-1:2012
EN 61010-1:2001
EN 61010-1:2010
EN 61010-2-081/A1:2003

The product was voluntarily tested according to the relevant safety requirements noted above. It can be marked with the certification mark above. The mark must not be altered in anyway. This product certification system operated by TÜV SÜD America Inc. most closely resembles system 3 as defined in ISO/IEC Guide 67. Certification is based on the TÜV SÜD "Testing and Certification Regulations". TÜV SÜD America Inc. is an OSHA recognized NRTL and a Standards Council of Canada accredited certification body.

Test report no.: DI1311124-000

Date, 2014-06-27

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