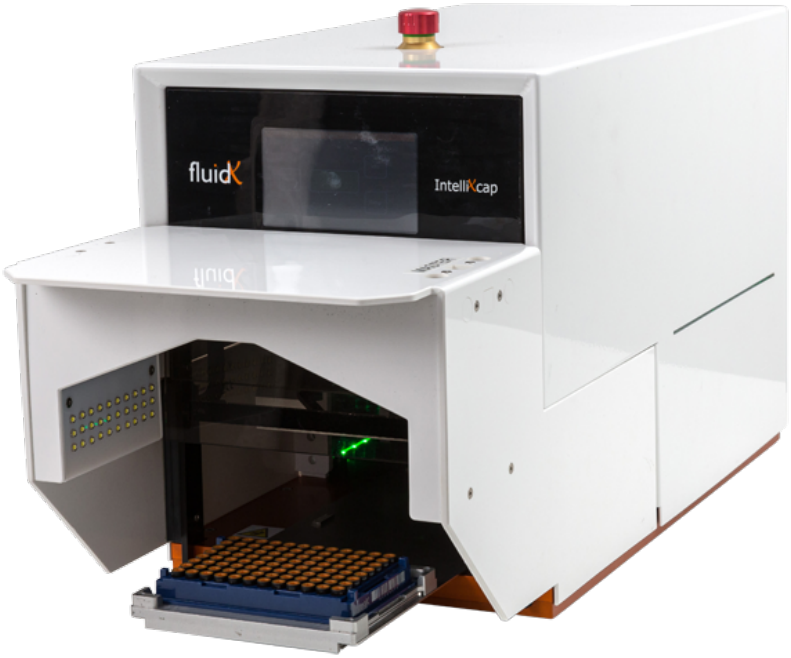

IntelliXcap AcoustiX

User Manual

Part Number 347778 Rev. A

This is the Original instruction for the IntelliXcap AcoustiX.

Brooks Automation, Inc.

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Corporate Headquarters
15 Elizabeth Drive
Chelmsford, MA 01824 U.S.A.

For Technical Support:

Location	Contact Number	Website
North America	+1-800-447-5007 (Toll Free) +1-978-262-2900 (Local)	http://www.brooks.com/
Europe	+49 800 000 9347 (Toll Free Germany) +49 364 176 9999 6 (Has Toll)	
Japan	+81 120-255-390 (Toll Free) +81 45-330-9005 (Local)	
China	+86 21-5131-7066	
Taiwan	+886 080-003-5556 (Toll Free) +886 3-5525258 (Local)	
Korea	1800-5116 (Toll Free)	
Singapore	+65 1-800-4-276657 (Toll Free) +65 6309 0701 (Local)	

Contact Technical Publications directly: Technical.Publications@brooks.com

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Brooks Automation, Inc.
15 Elizabeth Drive
Chelmsford, MA
01824-2400
Tel: +1 978-262-2400
Fax: +1 978-262-2500
www.brooks.com

Brooks Locations Worldwide:

Brooks Automation Inc.
46702 Bayside Parkway
Fremont,CA 94538
Tel: +1-510-661-5000
Fax: +1-510-661-5166

Brooks Life Sciences
BioStorage Technologies
2910 Fortune Circle West,
Suite E
Indianapolis, IN 46241
Tel: +1 317-268-5500
Fax: +1 317-390-1868

Brooks Automation, Inc.
AIM Servicios Administrativos
S de RL de CV
Carretera Huinalá km 2.8
Parque Industrial Las Américas 66640
Apodaca, NL Mexico
Tel: +52 81 8863-6363

Brooks Automation (Germany) GmbH
Ernst-Ruska-Ring 11
07745 Jena, Germany
Tel: +49 3641 4821 100
Fax: +49 3641 4821 4100

Brooks Automation (Germany) GmbH
Daimler-Straße 7
78256 Steißlingen, Germany
Tel: +49-7732-9409-0
Fax: +49-7732-9409-200

Brooks Automation (Germany) GmbH
Karl-Marx-Strasse 23
D-01109 Dresden, Germany
Tel: +49 351 885 930
Fax: +49 351 885 9322

Brooks Automation, Inc.
9601 Dessau Road, Suite 301
Austin, TX 78754
Tel: +1 512-912-2840
Toll-Free: +1 800-367-4887

Brooks Life Sciences
BioStorage Technologies GmbH
Im Leuschnerpark 1B
64347 Griesheim, Germany
Tel: +49 6155 898 1011

Brooks Automation (Israel) Ltd.
Mevo Yerach 5
Kiryat-Gat 82000
Israel
Tel: +972 8672 2988
Fax: +972 8672 2966

Brooks Life Sciences
Brooks Automation AG
Bernstrasse 134
CH-3613 Steffisburg
Switzerland
Tel: +41 (0) 31 770 70 70

Brooks Life Sciences
Northbank, Irlam
Manchester M44 5AY
United Kingdom
Tel: +44 (0) 161 777 2000
Fax: +44 (0) 161 777 2002

Brooks Technology (Shanghai) Limited
2nd Floor, No. 72,
887 Zuchongzhi Road
Zhangjiang Hi-Tech
Park Pudong, Shanghai
China 201203
Tel: +86-21-5131-7070
Fax: +86-21-5131-7068

Brooks Japan K.K.
HEADQUARTERS
Nisso Bldg. No 16, 9F
3-8-8 ShinYokohama, Kohoku-ku
Yokohama, Kanagawa 222-0033
Tel: +81-45-477-5570
Fax: +81-45-477-5571

Brooks Japan K.K.
YOKOHAMA TECHNICAL CENTER
852-1 Kawamuko-cho, Tsuzuki-ku
Yokohama, Kanagawa 224-0044
Tel: +81-45-477-5250
Fax: +81-45-470-6800

Brooks Japan K.K.
YOKKAICHI SERVICE CENTER
Hikari Shokai Yokkaichi Bldg.
2-26 Shinshinmachi
Yokkaichi, Mie 510-0094
Tel: +81-59-359-5611
Fax: +81-59-353-1419

Brooks Japan K.K.
KUMAMOTO SERVICE OFFICE
202 Mirai Office II
312-1 Tatsudamachi Yuge
Tatsuda, Kumamoto 861-8002
Tel: +81-96-327-9720
Fax: +81-96-327-9721

Brooks CCS Japan K.K.
CONTAMINATION CONTROL SOLUTIONS
Nisso Bldg. No 16, 9F
3-8-8 ShinYokohama, Kohoku-ku
Yokohama, Kanagawa 222-0033
Tel: +81-45-477-5570
Fax: +81-45-477-5571

Brooks Automation Ltd.
TAIWANHEADQUARTERS
5F-5, No.32, Tai-Yuen Street
Chu-Pei City
Hsinchu County 302, Taiwan, R.O.C.
Tel: +886-3-552 5258
Fax (G&A): +886-3-552 5255
Fax (Sales): +886-3-552 5200

Brooks Automation Korea, Inc.
#35 Giheungdanji-Ro 121Beon-Gil
Giheung-Gu, Yongin-Si
Gyeonggi-Do, 17086
Korea
Tel : +82-31-288-2500
Fax: +82-31-287-2111

Brooks Automation (S) Pte Ltd
51-18-C1 Menara BHL,
57 Jalan Ahmad Shah,
10050, Penang,
Malaysia
Tel: +60 4 3701012
Fax: +60 4 3701015

Brooks Automation (Singapore) Pte Ltd
Blk 5008 Ang Mo Kio Avenue 5
#05-08, Techplace II
Singapore 569874
Tel: +65-6836-3168
Fax: +65-6836-3177

Brooks Automation Ltd.
TAINAN OFFICE
3F., No.11, Nanke 3rd Rd., Xinshi Dist.

Tainan Science Park
Tainan City 74147, Taiwan (R.O.C.)
TEL: +886-6-505-0268
FAX: +886-6-505-5228

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Revision History

Part Number: 347778

IntelliXcap AcoustiX User Manual

Revision	ECO Number	Date	Explanation of Changes	Author
Revision A	EC128998	06/11/2021	Initial completion of the manual template.	C.Tamilio

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1. Safety

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

NOTICE

It is the responsibility of each person working on this product to know the applicable regulatory safety codes as well as the facility safety procedures, safety equipment, and contact information.

This product is intended for use by industrial customers and should be serviced only by Brooks or Brooks trained representatives. The service manuals and related materials are provided in English at no charge and are intended for use by experienced technicians. It is the responsibility of the user to obtain and assure the accuracy of any needed translations of manuals. If you require assistance please contact Brooks service department. Contact information can be found at www.brooks.com.

If additional safety related upgrades or newly identified hazards associated with the IntelliXcap AcoustiX are identified, Brooks Technical Support notifies the owner of record with a Technical Support Bulletin (TSB).

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Explanation of Hazards and Alerts

This manual and this product use industry standard hazard alerts to notify the user of personal or equipment safety hazards. Hazard alerts contain safety text, safety icons, signal words, and color.

Safety Text

Hazard alert text follows a standard, fixed-order, three-part format.

- Identify the hazard,
- State the consequences if the hazard is not avoided,
- State how to avoid the hazard.

Safety Icons

- Hazard alerts contain safety icons that graphically identify the hazard.
- The safety icons in this manual conform to ISO 3864 and ANSI Z535 standards.

Signal Words and Color

Signal words inform of the level of hazard.

	Danger indicates a hazardous situation which, if not avoided, **will result in death or serious injury**. Danger signal word is white on a red background with an iconic exclamation point inside a yellow triangle with black border.
	Warning indicates a hazardous situation which, if not avoided, **could result in death or serious injury**. Warning signal word is black on an orange background with an iconic exclamation point inside a yellow triangle with black border.
	Caution indicates a hazardous situation or unsafe practice which, if not avoided, **may result in minor or moderate personal injury**. Caution signal word is black on a yellow background with an iconic exclamation point inside a yellow triangle with black border.
	Indicates a situation or unsafe practice which, if not avoided, **may result in equipment damage**. Notice signal word is white on blue background with no icon.

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Meaning of Hazard Alert Symbols

The following hazard alert symbols may be installed on your equipment.

Description	Symbol	Brooks Part Number
Electric Shock/Electrocution		303240

Alert Example

The following is an example of a *Warning* hazard alert.

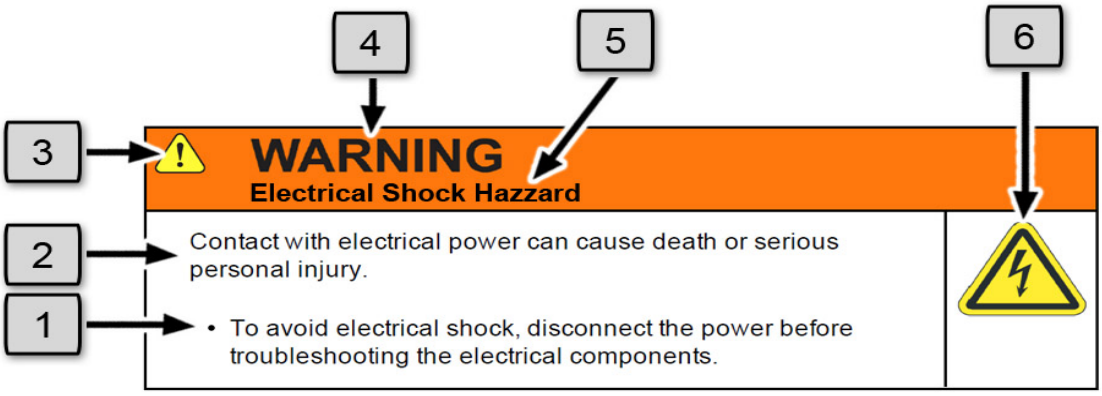

Figure 1-1: Components of a Safety Alert

Number	Description
1.	How to Avoid the Hazard
2.	Source of Hazard and Severity
3.	General Alert Icon
4.	Signal Word
5.	Type of Hazard
6.	Hazard Symbol(s)

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Regulatory Compliance and Declaration of Conformity

The IntelliXcap AcoustiX meets the requirements of the European Union's Machinery Directive 2006/42/EC and 2014/30/EU as a completed machine. In accordance with the Directive, Brooks Automation has issued a Declaration of Conformity and the IntelliXcap AcoustiX has a CE mark affixed.

Brooks	**Declaration of Conformity For the European Union**	**Document #: 297745 Rev.: D**

Description: IntelliXcap - screw cap tube decapper.
Function: The IntelliXcap is designed to remove and replace caps from tubes with screw caps in a rack on closed set tubes in specific rack types.

Product code: 46-8010, 46-8011, 46-8012, 46-8014

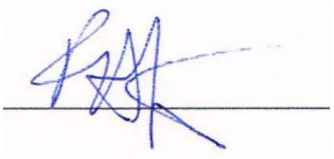
Business name and full address of the manufacturer of the machinery:
Brooks Automation Limited, Northbank, Irlam, Manchester M44 5AY, United Kingdom

Name and address of the person, established in the Community, authorized to compile the relevant technical documentation:
Brooks Automation (Germany) GmbH, Im Wiesengrund 17, 78315 Radolfzell am Bodensee, Germany

The manufacturer declares:

- That this machinery fulfills all the relevant provisions of Directive 2006/42/EC (Machinery Directive)
  - EN 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction
  - ISO/TR 14121-2:2012 ED2 Safety of machinery. Risk assessment. Practical guidance and examples of methods
  - EN 60204-1:2018 Safety of machinery. Electrical equipment of machines. General requirements
- That this machinery fulfills all the relevant provisions of Electromagnetic Compatibility Directive 2014/30/EU
  - EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements (Class A equipment)
- That this machinery is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
  - EN 50581:2012. Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Signed for and on the behalf of Brooks Life Sciences



Print name: Richard Laight
Position: Technical Director C&I
Place: Irlam, Manchester
Date: 11.03.2020

Form: QMS100363 Rev F

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General Safety Considerations

WARNING
Electrical Shock Hazard

Contact with electrical power can cause death or serious personal injury.

- To avoid electrical shock, disconnect the power before troubleshooting the electrical components.

WARNING
Chemical Hazard

The IntelliXcap may be used to de-/recap samples that expose users to chemical hazards which, if not properly handled, may result in death or serious injury.

- Read and understand the safety information for the equipment where the IntelliXcap is used.
- Know the location of the Safety Data Sheets (SDS)in your facility. (also known as Material Safety Data Sheets - MSDS)
- Become familiar with the proper handling of material in the environment of the decapper.

CAUTION
Inappropriate Use

Use of this product in a manner or for purposes other than for what it is intended may cause equipment damage or personal injury.

- Only use the product for its intended application.
- Do not modify this product beyond its original design.
- Always operate this product with the covers in place.

CAUTION
Damaged Components

The use of this product when components or cables appear to be damaged may cause equipment malfunction or personal injury.

- Do not use this product if components or cables appear to be damaged.
- Place the product in a location where it will not get damaged.
- Route cables and tubing so that they do not become damaged and do not present a personal safety hazard.

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CAUTION

Pinch Point

Moving parts of the product may cause squeezing or compression of fingers or hands resulting in personal injury.

- Do not operate the product without the protective covers in place.

NOTICE

Moving parts are subject to pressure and weight. Do not rest a hand on the stage or twist the rack as it may pull the machine out of position or damage moving parts.

NOTICE

The IntelliXcap AcoustiX should be kept clean at all times, please see"Cleaning" on page 44 for information on cleaning requirements.

NOTICE

The IntelliXcap AcoustiX can only be used with tubes and cartridges that have been configured and tested. Do not use alternative tubes and cartridges that have not been configured and tested.

NOTICE

Untrained or Improperly Equipped Personnel

Untrained or improperly equipped personnel performing this procedure may cause damage to the equipment.

- Only Brooks Automation trained personnel should perform this procedure.
- Personnel performing this procedure must read and understand this procedure and have the proper tools and supplies ready before starting.
- Personnel performing this procedure must know the applicable safety codes, facility safety procedures, safety equipment, and emergency contact information.

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Safety Functions

The use and operation of the machine must only be initiated when all safety functions are fully present and in an operable condition. Defective safety functions and protection equipment may lead to unsafe and hazardous situations. In case that a risk to safety is found, do the following:

1. Stop the machine immediately: it can be brought to a safe stop by either the touch screen, activating the Cancel-function, or by the emergency stop button.
2. Disconnect the supply sources to prevent the IntelliXcap AcoustiX from restarting.

E-Stop

The emergency stop button is a safety device designed for use as a complementary protective measure. As an example, the operator can press the emergency stop function to cease all mechanical movement of the IntelliXcap AcoustiX if a hazardous situation arises that could cause personal injury, or damage to the machine or equipment.

Figure 1-2: E-Stop Button

When activating the emergency stop button, the status will appear on the operator monitor: *Error 238 – Emergency stop*

Test the emergency stop function before commissioning the IntelliXcap AcoustiX for use and after each installation or re-installation.

At minimum, the function must be visually checked and activated at least every six months.

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Safety Switch

There is a safety switch installed on the access door that, if the door is not completely closed, the IntelliXcap AcoustiX will not function.

This function protects operators against hazardous moving parts accessible through the front of the IntelliXcap AcoustiX.

Figure 1-3: Access Door

NOTE: The access door can be disabled from the touch-screen, if the user makes sure that another safety measure takes over. For example, when the IntelliXcap AcoustiX is integrated into a robotic cell with its own safety system, please see Appendix A: "Integrating the IntelliXcap for AcoustiX" on page 57 for further information on using the IntelliXcap AcoustiX within an Integrated system.

When theIntelliXcap AcoustiX is commissioned and starts functioning, the automated door closes and the following status message appears on the operator monitor: *Initializing please wait*

The safety door must be activated and tested before commissioning the machine for use.

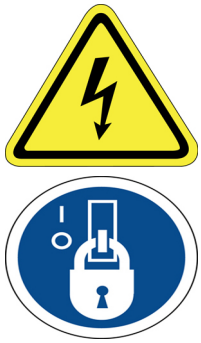
NOTE: At minimum, the safety door should be visually checked and activated at least once a day.

WARNING

Lockout / Tagout

Working with energized equipment may cause sudden movement or electrical shock and may result in death or serious injury.

- All energy must be removed from the equipment per the facility's Lockout/Tagout procedure before servicing.
- If local procedures are not available, follow the procedure for Lockout/Tagout in **OSHA Standard 29CFR 1910.147**.



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2. Overview

This manual describes the proper use of the machine.

With automated glide rail for integration and IntelliXcheck module for decapping validation, IntelliXcap AcoustiX is the only decapper system fully compatible with FluidX AcoustiX™ Sample Tubes.

The instrument includes a base unit, an IntelliXcheck module, and one AcoustiX IntelliXcartridge, especially designed to decap/recap FluidX AcoustiX tubes.

Using this Manual

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

The IntelliXcap AcoustiX is intended for use in a laboratory environment by trained laboratory personnel and should be serviced only by Brooks or Brooks trained representatives. The manuals and related materials are intended for use by trained and experienced technical personnel.

The manufacturer accepts no liability for any other use of the equipment or its individual parts and components. This also applies to service and repair work carried out by unauthorized service personnel. All warranties are declared null and void in the event of non-compliance with these instructions. This also applies to parts not directly affected by any unauthorized repair work.

This manual contains information on safety, specifications, and operation as well as troubleshooting and maintenance of the IntelliXcap AcoustiX. If there are any questions regarding this manual or use of this system or to order additional copies of this publication, contact Brooks Automation Service. See the contact information on page 3.

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Concepts and Terminology

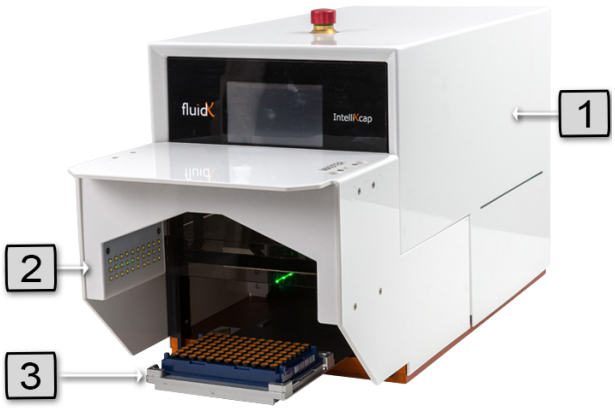
The concepts and terminology defined in this section are used throughout this document. Users should read this section first before continuing with the manual.

Terminology

Word	Definition
Caps	Screw caps
Cycle	The process of first de-capping and then re-capping a rack of tubes = 1 cycle
Decap	Unscrew the caps of the sample-tubes
Instructed person	A person having received the necessary training to carry out a task in a safe and responsible way
Light curtain	System for detecting the height of tube rack on the stage
Recap	Screw the caps back onto the sample-tubes

Product Illustration

46-8014: IntelliXcap



#	Description
1	IntelliXcap 96
2	IntelliXcheck module
3	FluidX AcoustiX™ Tubes and Rack

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3. Specifications and Site Requirements

Specifications

Unit Software and Firmware

Table 3-1: Software and Firmware

Software/Firmware	Version
Controller	45
Display	00.14

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Site Requirements

Space Requirements

The machine has a square footprint and is regarded as highly stable. Place the IntelliXcap AcoustiXin a well-ventilated area on top of an even surface, solid enough to carry its weight. The surface must comply with 1.3.1 of Annex I of 2006/42/EC.

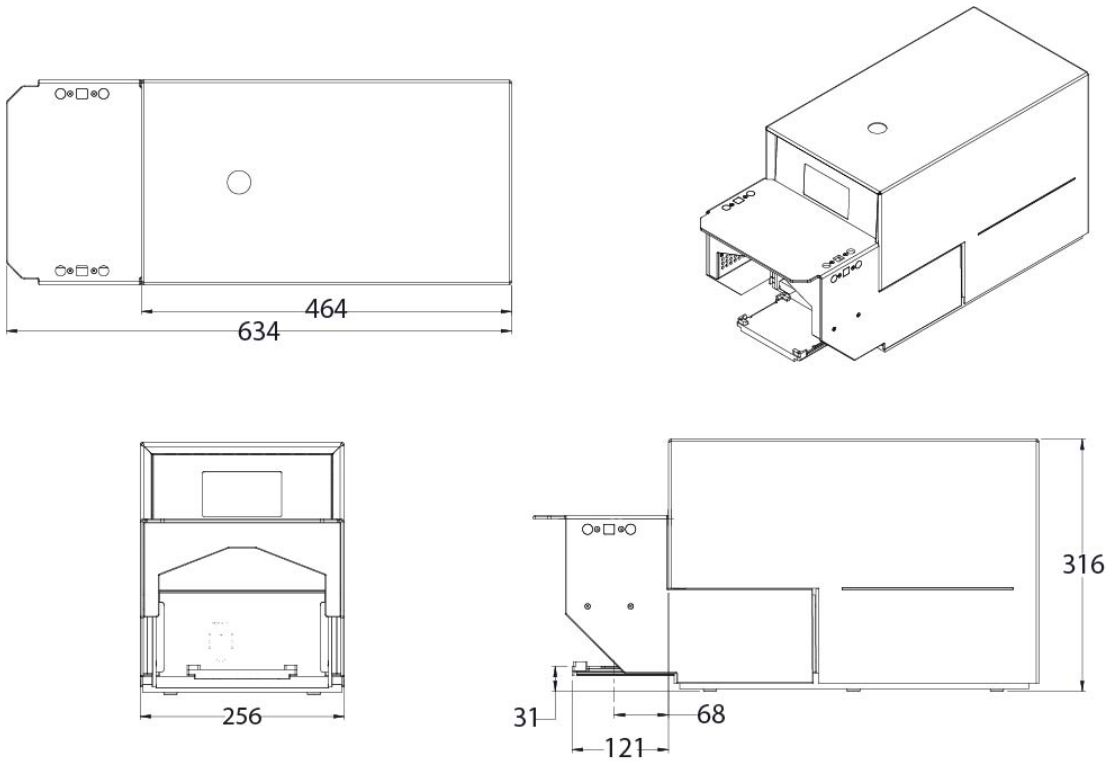

Figure 3-1: Machine Footprint (in mm)

Table 3-2: Space Requirements

Parameter	Specification for IntelliXcap AcoustiX
System Height	316 mm
System Width	256 mm
System Depth	634 mm
Stage Height	31 mm
Stage Distance (when ejected)	121 mm
System Weight	27 kg

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Environmental Requirements

The IntelliXcap shall be used within the rule set of the Good Laboratory Practices, GLP.

The machine must be operated indoors and under the following environmental specifications only:

Table 3-3: Environmental Requirements

Parameter	Specification
Temperature - Transport and Storage	15 to 40°C (59 - 104°F)
Temperature - Operation	0 to 40°C (32 – 104°F) Using the IntelliXcap in an environment where the temperature is 40°C (104°F) or higher for an extended period may cause the screen contrast level of the monochrome LCD to decrease from its original level of brightness.
Storage Humidity	10 to 70% RH Wet bulb temperature 39°C (102°F) max., no condensation
Relative Humidity	10 to 90% RH Wet bulb temperature 39°C (102°F) max., no condensation
Storage Lighting	All external surfaces are resistant to UV-light. Over time UV-light might affect LCD-panels: LCD screens may fade.
IP 30	Protection against small foreign bodies > 2.5 mm (e.g. a screwdriver), and no protection against water
Dust	0.1 mg/m^3 and below (non-conductive levels)
Pollution Degree	For use in Pollution Degree 2 environment Decontamination treatment with Hydrogen Peroxide Gas needs to be avoided as it will damage the electronic parts.

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Electrical Requirements

The system must only operate with the power supply and frequency specified on the system identification stickers mounted on the side of the device. Operating the system with any other power supply or frequency can result in damage to the equipment.

Table 3-4: Electrical Requirements

Parameter	Specification
Supply Voltage	100-120 VAC 1/N/PE / 220-240 VAC 1/N/PE Use IEC 320 plugs only Ground must be connected at all times
Maximum Power Consumption	500W
Idle Power Consumption	100W
Supply Frequency	The machine operates below the noise emissions level: < 70 dB(A)
Fuses	Two fuses: 250 V, 5A (5x20 mm) IEC 60127 fuse only
Insulation Resistance	Not less than 1MΩ at 1,000V Phase 1 = 50GΩ Neutral = 50GΩ
UI Connection	RS 232 cable

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4. Installation

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

NOTICE

It is the responsibility of each person working on this product to know the applicable regulatory safety codes as well as the facility safety procedures, safety equipment, and contact information.

The system is supplied fully assembled from the manufacturer and no further mechanical assembly is necessary.

Before proceeding, please make sure that all items listed "Electrical Requirements" on page 21 were delivered inside the pelicase.

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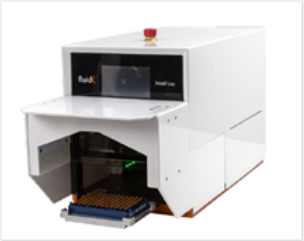
Package Contents

Product Code	Description	Quantity	Part Image
46-8014	ASSY,INTELIXCAP,96,CAP,DECAP,MECHANICAL,ACOUSTIX includes cartridge 48-8013-04 (ASSY,CARTRIDGE,INTELLIXCAP,FX,ACOUSTIC TUBE)	1	
316093	CABLE,POWER EXTENSION,C14 TO 2 X C13, 2.5M,250V,10A	1	
316094	CABLE,ASSY,2COND,18AWG,2X RTANG DC PLUG,BLK,1FT	1	
316095	POWER SUPPLY,AC-DC,12V,5.41A,IEC,2.5MM BARREL PLUG	1	
316096	CABLE,USB-A TO USB-B	1	
20-4012	UPGRADE,INTELLIXCAP 96,E-STOP includes part 315935 and part 315939	1	
323304	POWER CORD,C13 TO UK PLUG,2M,250V,10A	1	N/A
323305	CABLE ASSY,POWER,RIGHT ANGLE,C13,3 POLE,US	1	N/A
323306	CABLE ASSY,POWER,RIGHT ANGLE,C13,3 POLE,EU	1	N/A
323307	CABLE ASSY,USB 2.0 A TO A,M/M,1M	1	N/A
323308	CABLE ASSY,EXTENSION,DB9,M/F,BLK,1M	1	N/A

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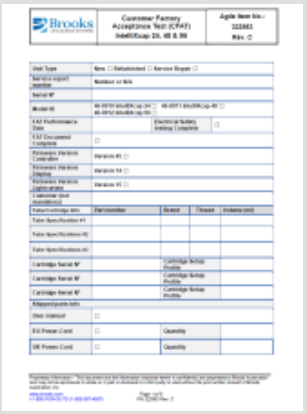
Product Code	Description	Quantity	Part Image
322663	CUSTOMER FAT,INTELLIXCAP,ALL MODELS	1	
354817	FORM,FACTORY ACCEPTANCE TEST,INTELLIXCAP 96	1	
347778	USER MANUAL,INTELLIXCAP ACOUSTIX	1	

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Unpacking

The user manual for IntelliXcap AcoustiX, the original copy of the Factory Acceptance Test (FAT) documentation (for the device and the cartridge), cFAT (customer Factory Acceptance Test), as well as power and communication cables for both decapper and IntelliXcheck module are stored inside the pelicase. The pelicase is used to transport the device.

Safety Requirements

CAUTION

Two-Person Lift Recommended

This product weighs 27kg (59.5). Improper lifting may result in personal injury.

- Do not attempt to lift this product alone. Always use 2-person lift techniques or a lift aid to unpack and install the equipment.
- Use the provided straps installed around the unit when removing the IntelliXcap AcoustiX from the pelicase.

Figure 4-1: IntelliXcap AcoustiX in Pelicase

Preparation

Step	Action
1.	Move the kit to the appropriate unpack area. Unpack the kit and inspect and confirm the contents. Report any missing or damaged items to the seller.
2.	Review this procedure and confirm that you have the proper items required to do the job.
3.	Review "Site Requirements" on page 19 for a full list of environmental, electrical, and space requirements.

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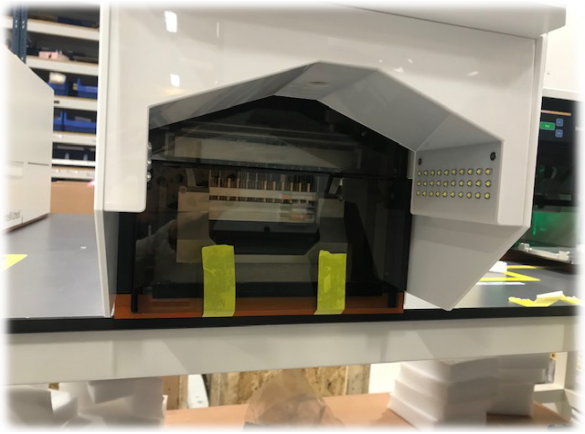
Procedure

Step	Action
1.	Open the pelicase and ensure all the contents listed in "Package Contents" on page 23 are provided.
2.	Remove the key block that locks the instrument in place.
3.	With two people, carefully lift the IntelliXcap AcoustiX system out of the pelicase using the provided straps, and place it on a flat surface able to hold 30kg.
4.	Remove the straps around the instrument. Remove the anti-static bag.
5.	Remove the shipping plastic tape that is securing the door. 
6.	Connect the E-stop cable (PN: 315935) to the E-Stop device (PN: 315935).

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Step	Action
7.	Connect the E-stop cable to the rear panel of the unit.
8.	Release the E-stop button.
9.	Connect the power cable from the instrument back to the electrical power socket (100/240VAC). ***NOTE:*** *Ensure that the door is free from obstructions, and that there is nothing in front of the instrument.*

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Step	Action
10.	Turn the IntelliXcap AcoustiX **ON**, using the switch at the rear of the system. The IntelliXcap AcoustiX initializes and displays the **Start** button. During this process, the door opens and the stage moves into the extended position.

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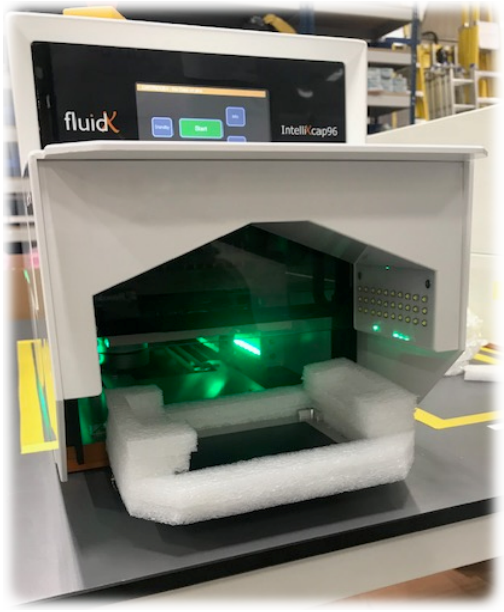
Step	Action
11.	Remove the foam block used to secure the IntelliXcap AcoustiX stage in place. 
12.	Keep the original packing material in a dry/low humidity location in case the IntelliXcap AcoustiX must be transported for service or repair. Follow all local regulations while disposing the original packing solution.

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Setting Up IntelliXcap for AcoustiX

CAUTION

Inappropriate Use

Use of this product in a manner or for purposes other than for what it is intended may cause equipment damage or personal injury.

- Only use the product for its intended application.
- Do not modify this product beyond its original design.
- Always operate this product with the covers in place.
- Do not change settings.

NOTICE

It is the responsibility of each person working on this product to know the applicable regulatory safety codes as well as the facility safety procedures, safety equipment, and contact information.

LED Indicators

Table 4-1: LED Indicators and Definition

LED Color	Definition
Green	Operation ready. The main menu is displayed.
Green Flashing	Operation in progress.
Orange	Standby status. Press any button to leave standby. Message appears on the screen.
Red	Error code is displayed on screen.

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Procedure

Step	Action
1.	Ensure that the door is free from obstructions, and that there is nothing in front of the instrument.
2.	Complete the following steps: a. Connect the provided power cable extension (PN: 316093) to the power transformer. This splits power between the IntelliXcap unit and IntelliXcheck module. b. Connect one end to IntelliXcap unit to power the decapper and the other end to the power supply module of IntelliXcheck (PN: 316095). c. Connect the power cable to an electrical power socket (100-240 VAC). d. Connect the provided USB cable to the IntelliXcheck module and to the computer where the IntelliCode software will be installed.
3.	Power **ON** the laptop.
4.	Power **ON** the IntelliXcap AcoustiX, using the switch at the rear of the system.

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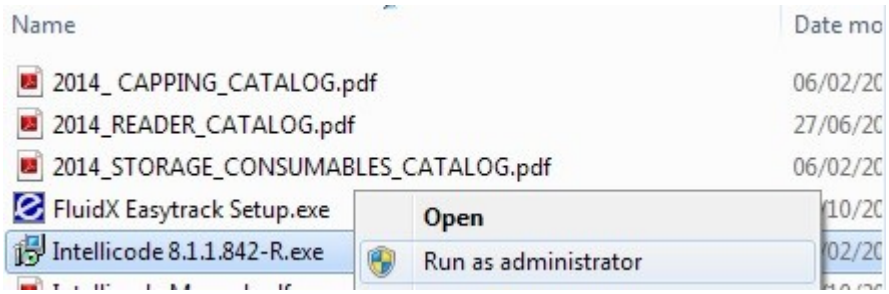
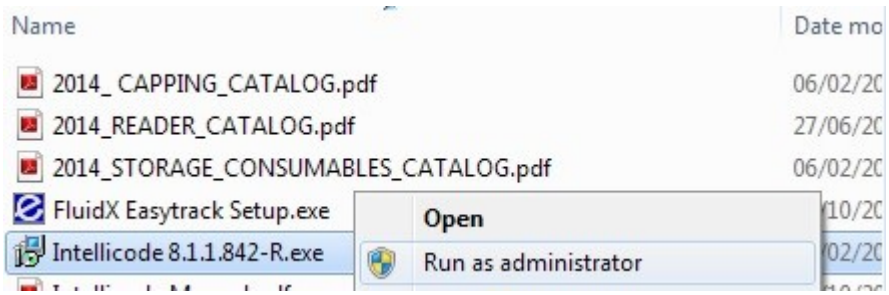
Installing IntelliCode for IntelliXcap

Procedure

Step	Action
1.	Power **ON** your PC and connect the provided USB stick to your PC. ***NOTE:*** *Make sure your computer meets the minimum system requirements of the program:* ***Processor:*** *Intel Core i5, 8GB RAM* ***Free Disk Space:*** *minimum of 1GB*
2.	Ensure you have full admin rights (Read, Write, and Modify) to the registry. Close all other applications during the installation process. ***NOTE:*** *Do not connect IntelliXcap AcoustiX to the PC.*
3.	Open your file navigator and navigate to the connected USB drive.
4.	Open the IntelliCode folder on the FluidX software USB stick. 
5.	Run the application as administrator. 

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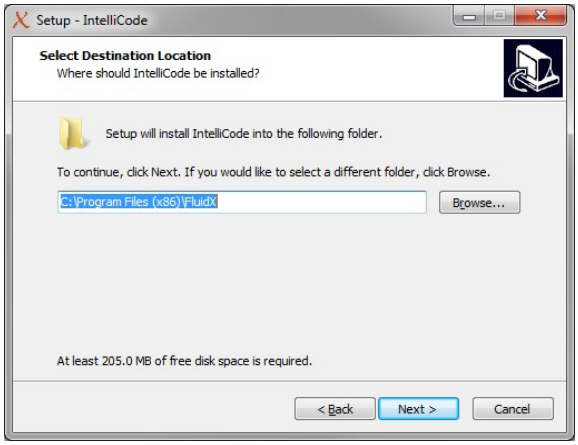
Step	Action
6.	Click **Next** on the *Welcome* screen to start the install process.
7.	Verify the install path and click **Next**. The installation proceeds.  The *Select Components* window appears.
8.	Under **Instruments**, select **IntelliXcheck**.

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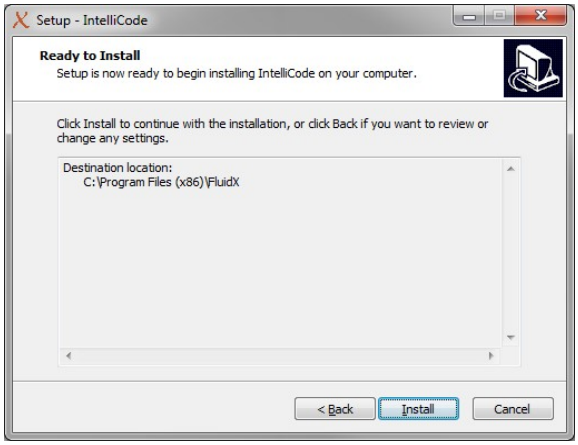
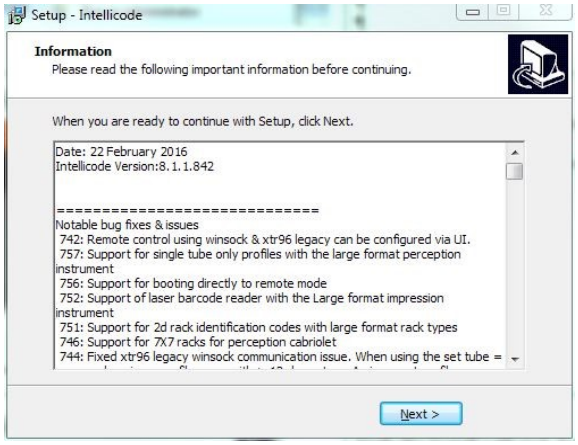
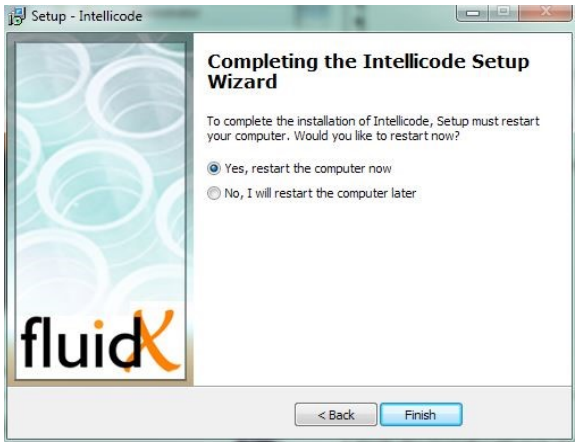
Step	Action
9.	Verify the install details and click **Install**. The installation proceeds.  The installation proceeds. This may take a few minutes.
10.	Read the release note information and click **Next**. 
11.	To finish the installation, select the *Yes, restart the computer now* option, and then click **Finish**. 

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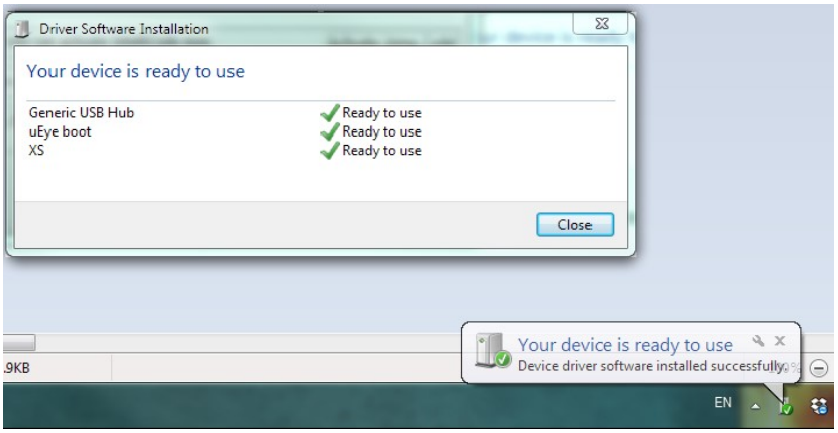
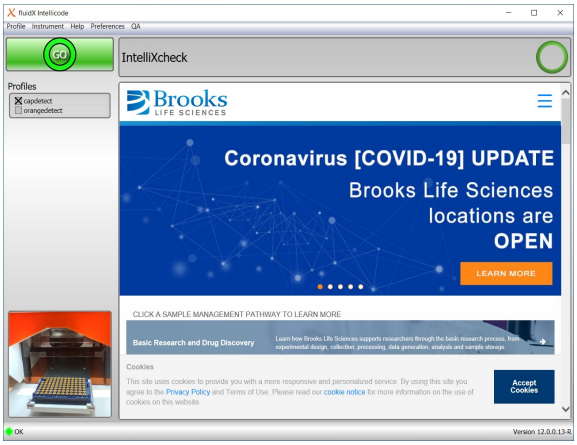
Step	Action
12.	Once the restart finishes, plug the IntelliXcap AcoustiX device into an available port on the PC using the provided cable and wait for the device to be recognized. 
13.	Confirm IntelliCode is successfully installed on the PC.
14.	To open the software, double-click the shortcut on the desktop. The following screen is displayed: 

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Repacking

Safety Requirements

CAUTION

Two-Person Lift Recommended

This product weighs 27kg (59.5). Improper lifting may result in personal injury.

- Do not attempt to lift this product alone. Always use 2-person lift techniques or a lift aid to unpack and install the equipment.
- Use the provided straps installed around the unit when removing the IntelliXcap AcoustiX from the pelicase.

Procedure

Step	Action
1.	Power **OFF** the IntelliXcap AcoustiX and IntelliXcheck module.
2.	Disconnect all cables from the equipment.
3.	Move the pelicase and provided packing equipment (straps and foam blocks) to an appropriate packing area.
4.	Place the decapper inside the provided anti-static bag.
5.	Wrap both straps around the equipment.
6.	With two people, carefully lift the IntelliXcap AcoustiX system and place it inside the pelicase.
7.	Add the key block that locks the instrument in place.
8.	Pack all cables.
9.	Close the pelicase.

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5. Operation

Overview

This chapter provides complete operation directions for the IntelliXcap AcoustiX. The operation of the IntelliXcap AcoustiX is covered for both normal operating conditions and emergency conditions.

TheIntelliXcap AcoustiX has been designed and constructed to allow safe access to all areas where intervention could be necessary during operation.

The settings must not be changed.

Only trained individuals should monitor the IntelliXcap while in use.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

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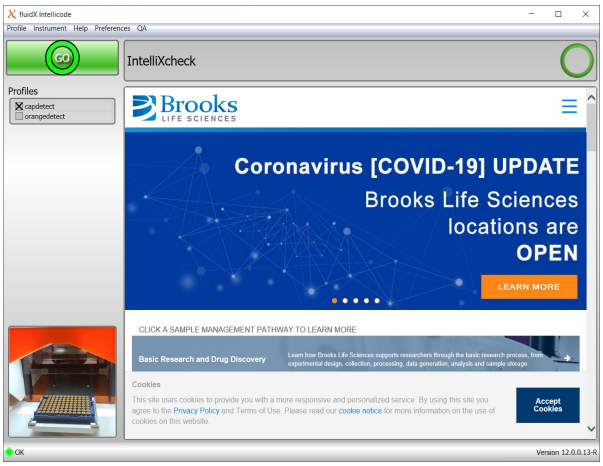
Validating the Decapping Process

Step	Action
1.	Power **ON** the PC.
2.	Power **ON** the IntelliXcap AcoustiX.
3.	Power **ON** the IntelliXcheck module.
4.	Ensure the IntelliCode software is installed on the PC.
5.	Click on the **IntelliCode** icon, available on your desktop.
6.	Click the **Instrument** tab.  The *Instrument Selector* window opens.

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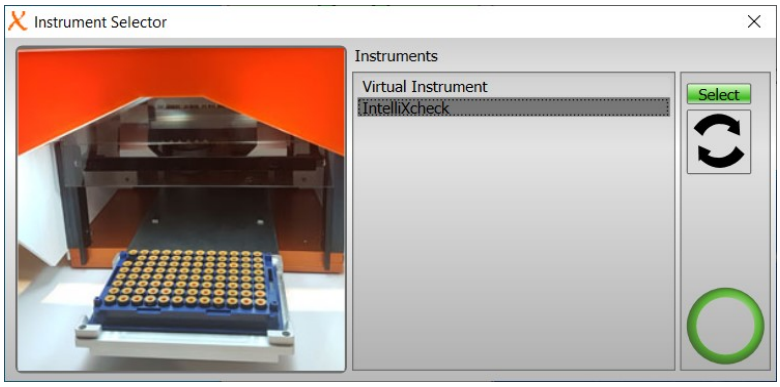
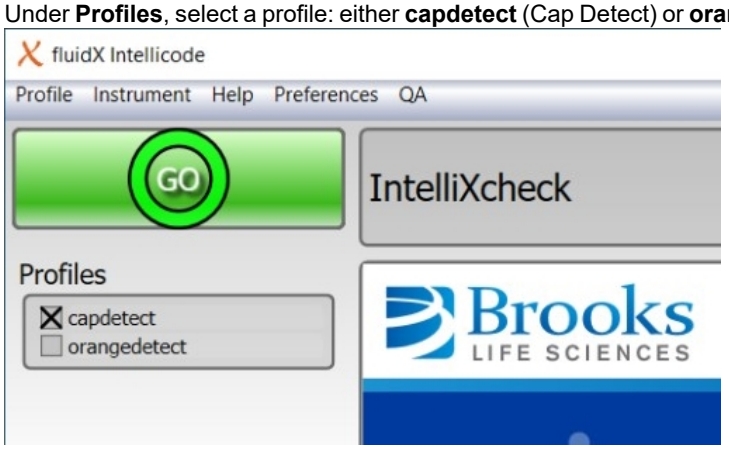
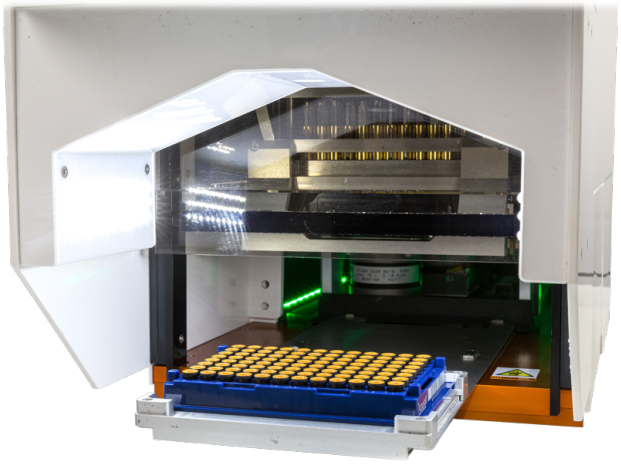
Step	Action
7.	Select **IntelliXcheck**, then click **Select**.  ***NOTE:*** *If only Virtual Instrument is listed, it means that the IntelliXcap AcoustiX is disconnected from the PC or from power (system not detected).*
8.	Under **Profiles**, select a profile: either **capdetect** (Cap Detect) or **orangedetect** (Orange Detect).  ***NOTE:*** *IntelliCode for IntelliXcap AcoustiX is used to detect caps and/or to differentiate AcoustiX tube caps based on their orange color. Capdetect is used to identify the presence or absence of caps on tubes places on the rack. Orangedetect is used to detect the orange AcoustiX caps.*
9.	Place an AcoustiX rack on the decapper. 

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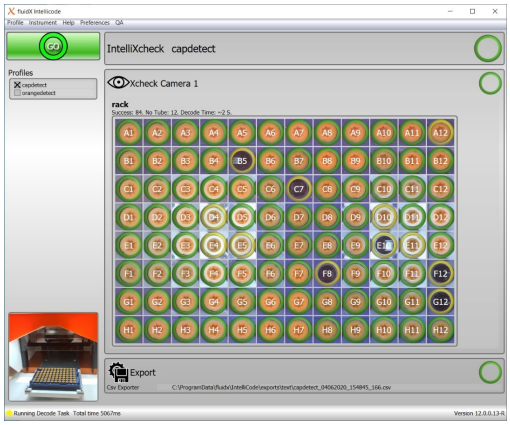
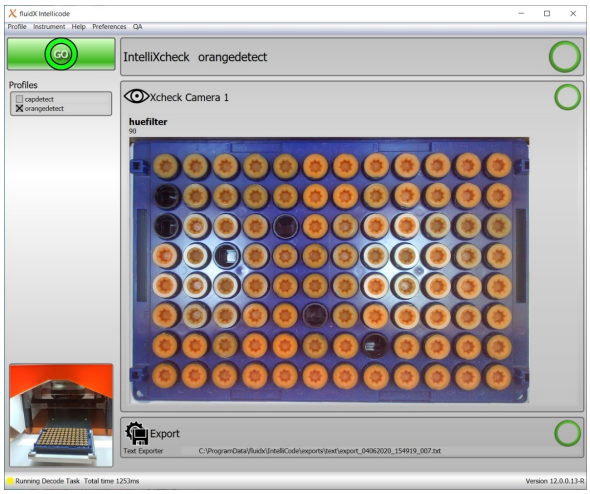
Step	Action
10.	If you selected **capdetect** to detect AcoustiX caps, click **GO**. The following screen is displayed:  The system automatically detects all tubes that have a cap and registers their position on the rack. Select **Export** to export the obtained result in *.csv* format.
11.	If you selected **orangedetect** to detect AcoustiX caps, press **GO**. The following screen is displayed:  Click **Export** to export the obtained results in *.csv* format. ***NOTE:*** *Under certain lighting, the caps can appear slightly yellow and/or red. This may cause issues with cap detection. If additional support is needed, please contact Brooks technical support at BLSS.Service@brooks.com.* *See "For Technical Support:" on page 3.*

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Starting the Decapping and Recapping Process

The basic flow of the decapping and recapping proceeds as follows:

1. The operator places a rack fully or partially filled with capped AcoustiX tubes on the instrument's stage.
2. The IntelliCode software detects if all caps are properly placed on the tubes.
3. The IntelliXcap AcoustiX confirms that the consumable matches the expected height and then decaps or recaps all the tubes on the rack.
4. If the instrument detects that the tube rack's height is different than expected, the instrument returns an error message.

Procedure

NOTICE

It is the responsibility of each person working on this product to know the applicable regulatory safety codes as well as the facility safety procedures, safety equipment, and contact information.

Step	Action
1.	Place the correct rack for the cartridge into the stage.
2.	On the IntelliCode software, select the desired profile and click **GO** to validate the decapping profile.
3.	Press the **START** button on the display of the IntelliXcap AcoustiX. The instrument confirms the height of the tubes and then starts decapping.
4.	When in use, the IntelliXcap AcoustiX displays the current process with a large **STOP** button display indicating the unit that is in use. If needed, stop the process by pressing the **STOP** button on the screen or by pressing the E-Stop button.
5.	Once the decapping process has finished, the IntelliXcap AcoustiX is ready to start the recapping process. When ready, place a rack of uncapped tubes, and press **START**. The instrument scans and detects the correct height of the tubes and begins the recapping process.
6.	Once the cartridge has reached the correct height, the IntelliXcap AcoustiX proceeds automatically and starts recapping the AcoustiX tubes. If needed, stop the process by pressing the **STOP** button on the screen or by pressing the E-Stop button.

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6. Preventative Maintenance

Overview

This chapter provides complete maintenance schedules and procedures for the Brooks Automation IntelliXcap AcoustiX.

Preventative Maintenance

This section provides the schedule and procedures for routine preventative maintenance (PM) of the IntelliXcap AcoustiX to reduce unscheduled downtime. The IntelliXcap AcoustiX is designed to require very little routine maintenance. However, it is recommended that the preventative maintenance procedures and schedule provided in this section be followed to extend the operating life of the IntelliXcap AcoustiX. If additional procedures are required, they will be supplied along with their maintenance schedules by Brooks Automation.

All preventative maintenance procedures and schedules provided here assume that the IntelliXcap AcoustiX is operating in a clean, dry, inert environment. Any deviation from this basic environment will affect the scheduling of PM and may also require additional PM procedures be performed. The user should adjust the preventative maintenance schedule as appropriate to account for any deviations from this environment.

DANGER

Read the Safety Chapter

Failure to review the *Safety* chapter and follow the safety warnings can result in death or serious injury.

- All personnel involved with the operation or maintenance of this product must read and understand the information in this safety chapter.
- Follow all applicable safety codes of the facility as well as national and international safety codes.
- Know the facility safety procedures, safety equipment, and contact information.
- Read and understand each procedure before performing it.

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CAUTION

Unauthorized Service

Personal injury or damage to equipment may result if this product is operated or serviced by unauthorized personnel.

- Only qualified personnel are allowed to transport, assemble, operate, or maintain the Product.
- Properly qualified personnel are those who have received certified training and have the proper qualifications for their jobs.

Parts

Brooks Automation can provide all parts required for preventive maintenance. For a list of these parts, contact Brooks Automation Technical Support. To obtain additional information about parts for preventative maintenance, contact your local Brooks Sales Representative, or call Brooks Automation Technical Support. See the contact information on page 3.

Schedules and Procedures

The service life of theIntelliXcap AcoustiX is 20 years of a daily 8-hour operation (5 days per week). This is based on the presumption that all service and maintenance instructions described in this instruction manual are observed.

Scope of Use

The normal scope of operation is 5 complete cycles (1 complete cycle = 1 decap and recap) per hour, 8 hours a day, and 5 days per week.

Maintenance Schedule

Servicing the machine must only be carried out by qualified personnel. Tasks may require skills and training. These instructions are a minimum requirement and must be carried out according to the plan below.

Keep a logbook, or similar, to document the maintenance and cleaning schedules.

Table 6-1: Preventative Maintenance Schedule

Task	Recommended Service Interval	
	Cap-Driver Cartridge	IntelliXcap AcoustiX
General Visual Inspection	2,500 cycles	NA
Preventative Maintenance Visit	NA	20,000 cycles or 12 months which ever comes sooner
Exchange	5,000 cycles	At 40,000 cycles, it is recommended that the head is replaced

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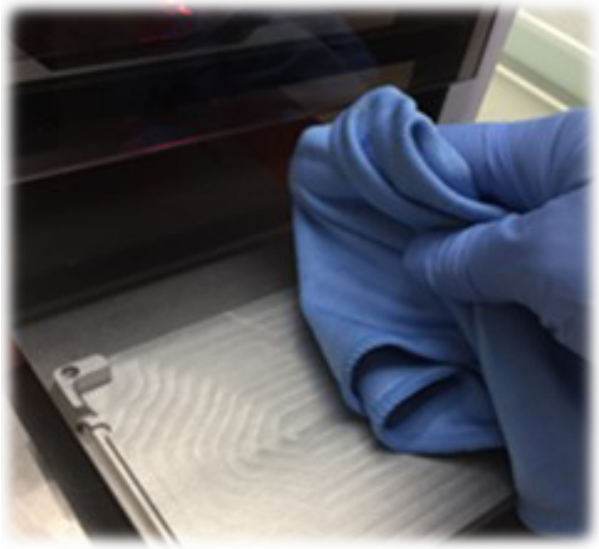
Cleaning

For cleaning tasks, follow safe work practices. This includes the use of personal protective equipment, that machinery and components are put in a safe condition before the task is initiated, and that the manufacturer instructions are complied with.

- Before the task is initiated, ensure that the power supply to the machine is safely disconnected.
- Obtain permission from the person responsible for the IntelliXcap AcoustiX before performing any repair work.
- Shield and/or keep the work area in a moist condition to prevent dust from flying around or smoldering.
- The operator, or specially trained cleaning staff, should tidy up and clean the IntelliXcap AcoustiX and its surroundings daily. During this work, the same requirements for the use of tools and personal protective equipment apply as for the operational work.
- Read and understand this instruction manual before the maintenance and cleaning of the machine is initiated.
- The machine requires no user maintenance other than cleaning with any 70% alcohol solution.
- Keep a logbook, or similar, to document the maintenance and cleaning schedules. If regular maintenance and cleaning of the machine cannot be shown, the manufacturer's warranty may lapse.
- Maintenance and cleaning must comply with 1.6 of Annex I of 2006/42/EC.

Step	Action
1.	Switch off the IntelliXcap AcoustiX to remove any risk of personal injury. Wipe the IntelliXcap AcoustiX externally with a microfiber or lint free cloth.
2.	Wipe the machine drawer for plastic dust debris from the cap driver/tubes. A new cartridge can produce minor plastic dust when first used. 
3.	Wipe the Light curtain, front and back. It is important that the orange filter on the light source is always free of dust so it can always effectively identify the rack and cap carriage.
4.	If necessary, use isopropyl alcohol to disinfect and further clean surfaces.

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Inspecting the Cartridge

The cartridges used on theIntelliXcap AcoustiX have a limited life, generally expected to last around 5000 cycles.

After every 2500 cycles with a cartridge, theIntelliXcap AcoustiX gives a service counter warning.

Step	Action
1.	If you receive a service counter warning, remove the cartridge from the system.
2.	Gently wipe the cartridge over with a lint free cloth and isopropyl alcohol to remove any dust.
3.	Visually inspect for damage or excessive wear and tear. If you find damage, it is necessary to replace the cartridge following the procedure in "Changing the Cartridge" on the next page.

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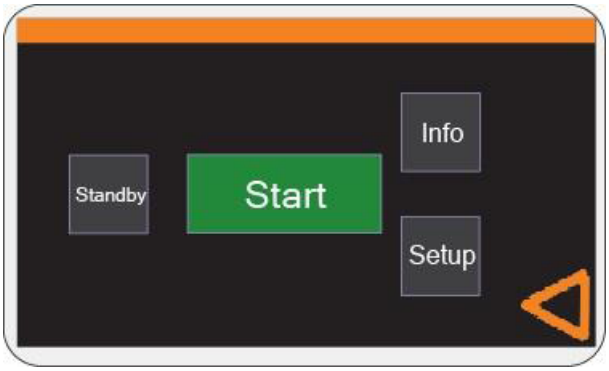
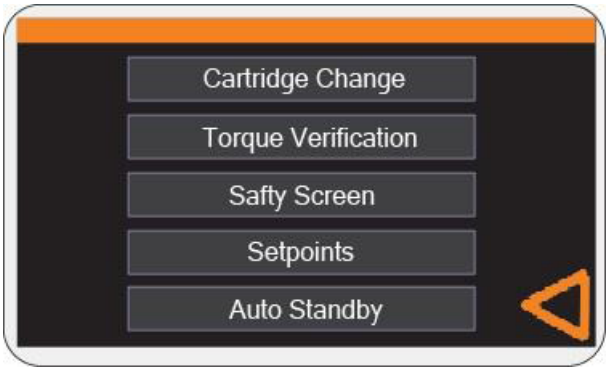
Changing the Cartridge

If a cartridge must be replaced, complete the following steps:

Step	Action
1.	Select the **Setup** menu, then select **Cartridge Change**.  
2.	Press **Continue**. The stage moves inside the unit and the cap-driver cartridge is lowered and placed onto the stage.

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Step	Action
3.	Press **Next**. The stage returns to the home position.
4.	When the homing process is complete, exchange the cap-driver cartridge with another one. ***NOTE:*** *Verify the new cartridge fits the alignment inserts on the sides of the stage's frame.* The stage with the cartridge moves inside the unit and the cap-driver cartridge is collected and attached to the decapping head. The head carries out a re-initialization process which must be completed before the first decapping process can be carried out.

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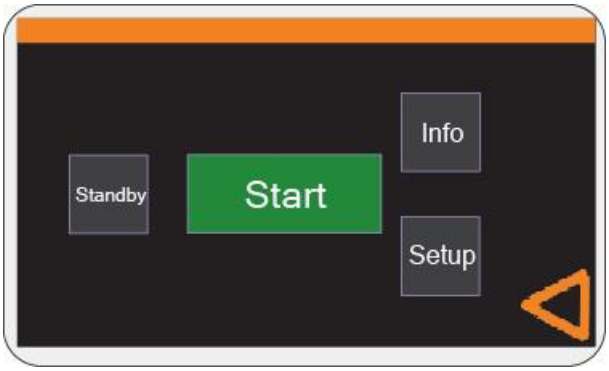
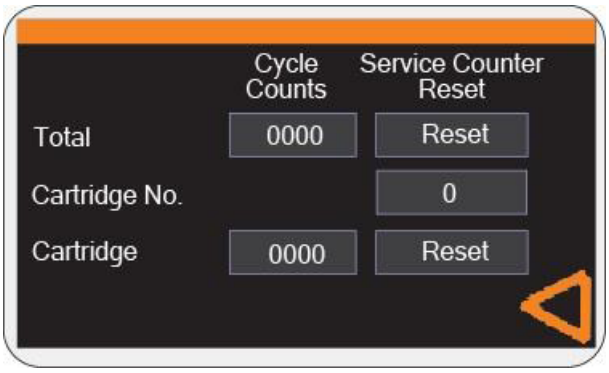
Step	Action
5.	Select the **Info** menu, then select **Counter**.  *Total – Cycle Counts* tells you the total cycles performed by the instrument during its lifetime. Every 20,000 cycles a machine time for service warning is issued to prompt the user to arrange a service visit. The *Service Counter* is reset as part of the service visit. ***NOTE:*** *When a maintenance warning pops up, the instrument does not stop functioning: it is only a notice for you to schedule routine service. The number of cycles remaining until the next warning displays is not shown.* ***NOTE:*** *The system counts the cycles for each cartridge type. If you operate the IntelliXcap with two different kinds of cartridges, it counts*
6.	Remove the cartridge warning by pressing the **Reset** button. 

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Waste Disposal

Switchboards, motors, cables and other electronics must be demounted and treated separately according to local law.

Metal parts are disposed of as scrap metal.

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7. Troubleshooting

CAUTION

Unauthorized Service

Personal injury or damage to equipment may result if this product is operated or serviced by unauthorized personnel.

- Only qualified personnel are allowed to transport, assemble, operate, or maintain the Product.
- Properly qualified personnel are those who have received certified training and have the proper qualifications for their jobs.

Error Messages

Error Code	Cause	Corrective Action
E100	Main Z operation timeout in homing operation.	Call service.
E101	Stage/nest timeout in homing sequence in homing command.	Call service.
E102	Main Z operation timeout in homing command.	Call service.
E103	Main Z operation timeout in homing command.	Call service.
E104	Opening safety door operation timeout in homing command.	Check the door has not been blocked, or damaged. Call service.
E105	Cartridge operation timeout in homing command.	Call service.
E106	Cartridge operation timeout in homing command.	Call service.
E107	Cartridge operation timeout in homing command.	Call service.
E108	Cartridge operation timeout in homing command.	Call service.
E109	Stage operation timeout.	Call service.
E110	Stage operation timeout.	Call service.
E111	Stage operation timeout.	Call service.

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Error Code	Cause	Corrective Action
E112	Closing safety door operation timeout in decap command.	Check the door has not been blocked, or damaged. Call service.
E113	No tube/rack combination found in decap command.	Verify the stage is not empty. Call service.
E114	Tube/rack combination does not match any profile comparison in decap command.	See "Error Recovery" on page 55. Ensure caps are properly screwed onto tubes. Ensure tubes are seated properly in rack. Ensure rack is properly seated in stage. Verify selected tube/rack combination with cartridge setup profile document. Call service.
E115	Opening safety door operation timeout in decap command.	Check the door has not been blocked, or damaged. Call service.
E116	Closing safety door operation timeout in recap command.	Check the door has not been blocked, or damaged. Call service.
E117	No tube/rack combination found in recap command.	Verify the stage is not empty. Call service.
E118	Tube/rack combination does not match any profile comparison in re-cap command.	See "Error Recovery" on page 55. Ensure tubes are seated properly in rack. Ensure rack is properly seated in stage. Verify selected tube/rack combination with cartridge setup profile document. Call service.
E119	Opening safety door operation timeout in Close Tray operation.	Check the door has not been blocked, or damaged. Call service.
E120	Opening safety door operation timeout in recovery mode.	Check the door has not been blocked, or damaged. Call service.
E121	Closing safety door operation timeout in cartridge eject command.	Check the door has not been blocked, or damaged. Call service.
E122	Timeout ejecting cartridge in cartridge eject sequence.	Call service.

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Error Code	Cause	Corrective Action
E123	Opening safety door operation timeout in cartridge eject command.	Check the door has not been blocked, or damaged. Call service.
E124	Opening safety door operation timeout in cartridge load operation.	Check the door has not been blocked, or damaged. Call service.
E125	Main Z sequence timeout in Store command.	Call service.
E133	Main Z timeout in Head Up command.	Call service.
E134	Opening safety door operation timeout in recovery mode.	Check the door has not been blocked, or damaged. Call service.
E135	Decap command did not succeed within allowed automatic retries.	See "Error Recovery" on page 55. Replace any loose or partial unscrewed caps. Retry with a new decap. Retry with a new rack. Call service.
E136	Recap command did not succeed within allowed automatic retries.	See "Error Recovery" on page 55. Replace any loose or partial unscrewed caps. Retry with a new decap. Retry with a new rack. Call service.
E137	Cartridge has reached lower operational limit.	Power cycle instrument. Call service.
E138	Timeout opening stage/nest in Open Tray operation.	Call service.
E139	Cartridge eject initialized, no cartridge detected at startup.	Run cartridge load command. Call service.
E140	Safety door has been forced out of open position.	Verify there is no objects blocking the safety door. Run a decap / recap cycle. Call service.

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Error Code	Cause	Corrective Action
E141	Safety door has been forced out of close position.	Verify there is no objects blocking the safety door. Power cycle the unit. Run a decap / recap cycle. Call service.
E142	Object detected in cartridge eject sequence.	Remove any objects on the stage. Call service.
E143	Object not detected in cartridge load sequence.	Ensure cartridge is placed on the stage. Call service.
E144	Cartridge height detect wrong during cartridge load	Ensure you have the right cartridge for the right instrument. Call service.
E145	Lightcurtain calibration fault in decap sequence.	Remove any direct light sources. Call service.
E146	Lightcurtain calibration fault in recap sequence.	Remove any direct light sources. Call service.
E147	Lightcurtain calibration fault in cartridge eject sequence.	Remove any direct light sources. Call service.
E148	Lightcurtain calibration fault in cartridge load sequence.	Remove any direct light sources. Call service.
E149	Timeout Open Tray operation in recovery mode.	Call service.
E150	Timeout homing cartridge sequence in Store command.	Power cycle instrument. Call service.
E151	Timeout Close Tray operation in recovery mode.	Call service.
E152	Decap Error detected in decap retry operation.	See "Error Recovery" on page 55. Remove any partial screwed on caps. Initialize the instrument. Retry the operation. Call service.
E153	Closing tray sequence timeout in recovery mode close tray operation.	Call service.

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Error Code	Cause	Corrective Action
E154	Timeout Close Tray sequence in close tray operation.	Call service.
E155	Timeout opening stage sequence in Open Tray operation.	Call service.
E156	Main Z operation timeout in init with caps operation.	Call service.
E157	Timeout stage sequence in Init with caps operation.	Call service.
E158	Timeout in cartridge homing sequence in recap operation.	Call service.
E159	Timeout in stage homing sequence in recap operation.	Call service.
E160	Timeout opening safety door sequence in Standby operation.	Verify there are no objects blocking the safety door. Power cycle the unit. Run a Standby operation. Call service.
E161	Main Z operation timeout in init with caps operation.	Call service.
E162	Timeout stage/nest sequence in recovery mode.	Call service.
E163	Caps on Pins detected, RECOVERY MODE activated.	See "Error Recovery" on the facing page. Use "EJECT CAPS" operation to push caps off machine. Use "INITIALIZE" to restart the instrument.
E164	Timeout stage sequence in decap operation.	Call service
E165	Timeout opening safety door during manual retry decap operation.	Check the door has not been bent out of shape and remove any object that is blocking operation. Call service.
E166	Timeout homing stage sequence in manual retry decap operation.	Call service.
E167	Timeout positioning stage sequence in manual retry decap operation.	Call service.
E238	Emergency stop is active.	Twist release emergency stop. Power cycle unit. Call service.

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Error Recovery

Table 7-1: Typical Errors

Error	Symptom	Resolution
CAP ERROR	Tube is not de-capped properly, the IntelliXcap AcoustiXwill automatically make a second attempt. If theIntelliXcap AcoustiX fails on the second attempt, an error message is shown on the screen, and the IntelliXcap AcoustiX stops.	Manually add a new cap to the tubes and perform a new decapping cycle.
RECAP ERROR (Error Code: 136)	Cap is improperly placed onto the corresponding tubes during the recapping process.	Select the **Initialization (Restart)**button and start theIntelliXcap AcoustiX.

Manual Recovery

Figure 7-1: Manual Recovery Screen

In any error situation, you have the option to cancel the process. You are prompted to start a manual recovery process. Choose the most relevant case available on the screen.

Select the **Up** and **Down** arrows to access additional options.

Step	Action
1.	Press the access door **Up** arrow to lift the access door.
2.	Try to move the screwing head up by pressing **Screwing Head Up**.
3.	If there are still caps attached to the ejecting pins, position a bowl to collect the falling caps, then press **Eject Caps**.
4.	Once the caps have been ejected and collected, press **Open Tray**.

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8. Appendices

The following chapter contains the appendices for this manual.

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Appendix A: Integrating the IntelliXcap for AcoustiX

The IntelliXcap AcoustiX can be integrated into an automated environment as well as robotic systems. A serial communication set RS 232 can fully control the entire system and eliminates the use of the touch-screen while operating. Commands for the IntelliXcap AcoustiX vary depending on the version of Firmware being used – to obtain the relevant command set, or for additional support please contact Brooks technical support using the contact information on page 3.

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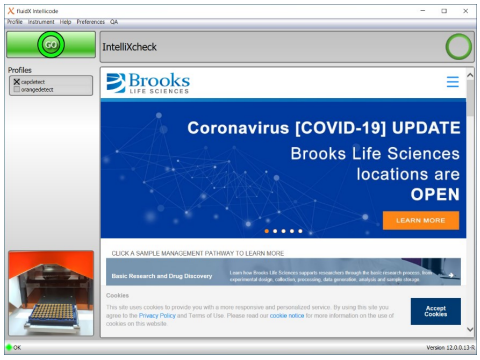
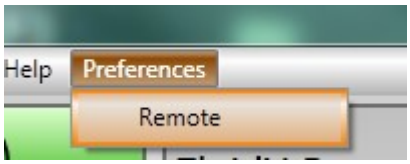
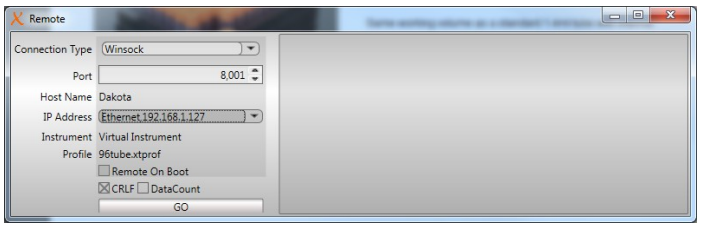
Appendix B: Controlling IntelliCode Remotely

Step	Action
1.	Click the **IntelliCode** icon available on your desktop. The following screen is displayed: 
2.	Click **Preferences**, then click **Remote**.  The following window is displayed: 
3.	Define your preferences, then click **GO**.

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Connection Type	**Winsock Legacy**: This type supports a subset of the xtr96 interface for backwards compatibility.
	Winsock: This type supports IntelliCode features.
Port	IntelliCode listens on this port for connections.
Host Name	This is the host name of the IntelliCode machine.
IP Address	In the situation where multiple network interfaces are available, the drop-down is populated with each interface. Select the interface to use.
Instrument	The current instrument (IntelliXcheck) in use.
Profile	Current profile in use.
Remote on boot	When checked, IntelliCode boots and uses remote access immediately.
CRLF, Datacount	Used for backwards compatibility with xtr96.

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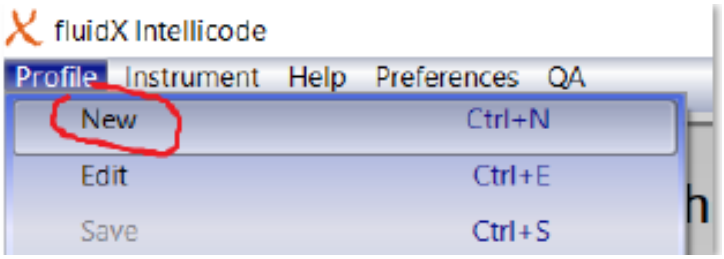
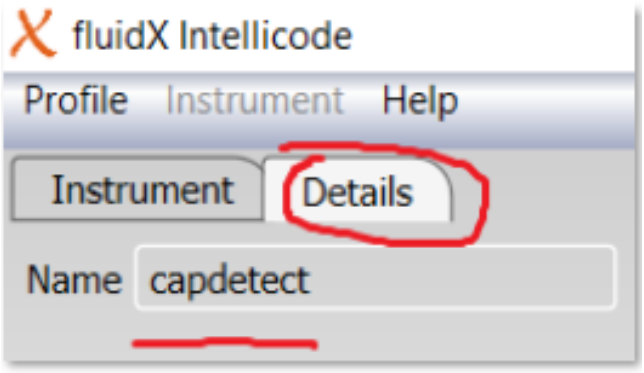
Appendix C: Detection Algorithm

The detection algorithm has two tasks: to find the center of the tube regardless of where it is, and to find if there is a cap present at the center position.

Capdetect

The following procedure shows you how to create a profile to detect if a tube has a cap.

Step	Action
1.	Click the **Profile** tab in the IntelliCode software.
2.	Click **New**. 
3.	Click the **Details** tab. `capdetect` appears in the **Name** field. 

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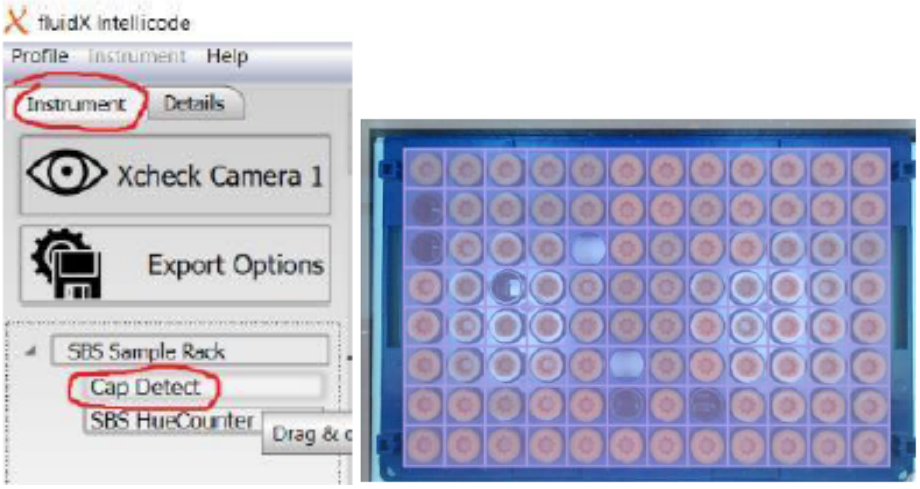
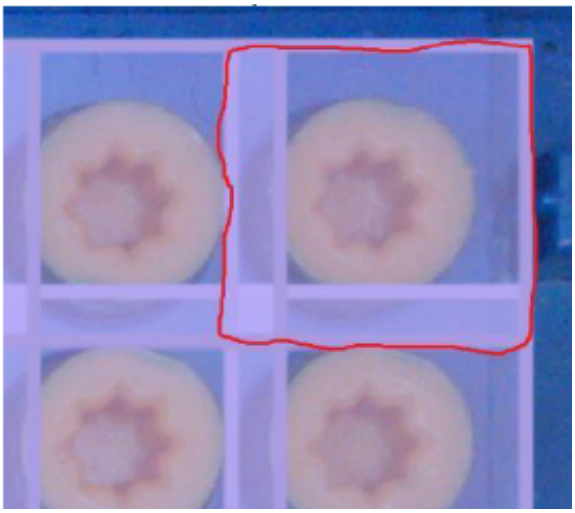
Step	Action
4.	Click the **Instrument** tab. Expand the **SBS Sample Rack** button. Drag and drop **Cap Detect** onto the world image. 
5.	Expand the **rack** tab. Adjust the **ROI Size** to add tolerance for sled movement. Overlapping regions of interest (ROI) are permissible. The following image is an example of overlapping ROIs. 

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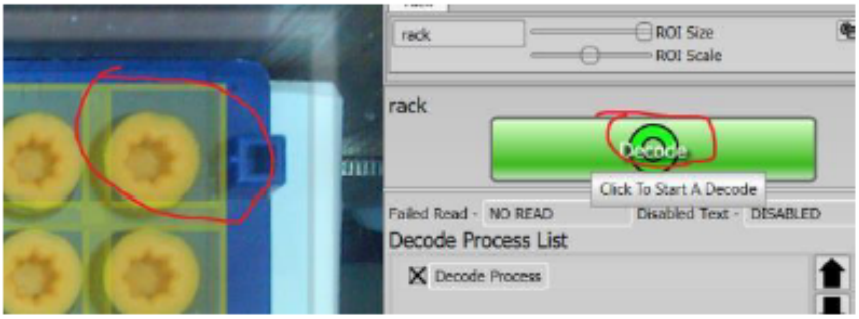
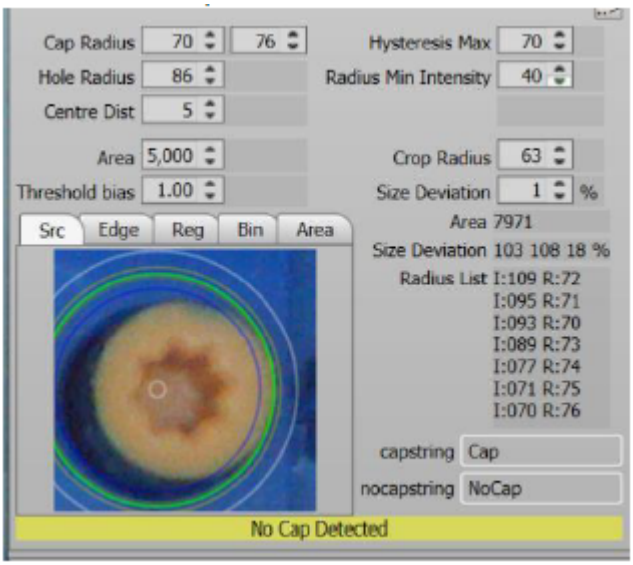
Finding the Center

Step	Action
1.	Click the **Decode** button. Click a **ROI**. 
2.	Ensure you see the detection result for the specified ROI. The following image is an example of a detection result window: 

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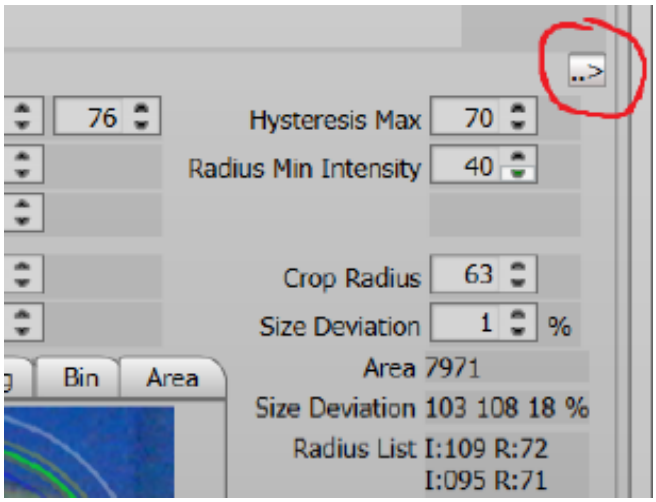
Step	Action
3.	Click the **Expand** button, shown below, to expand the cap image. 

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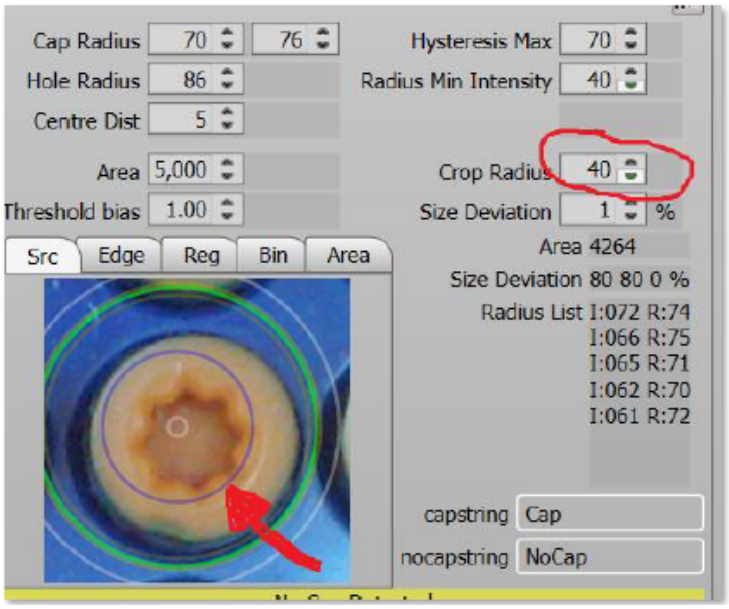
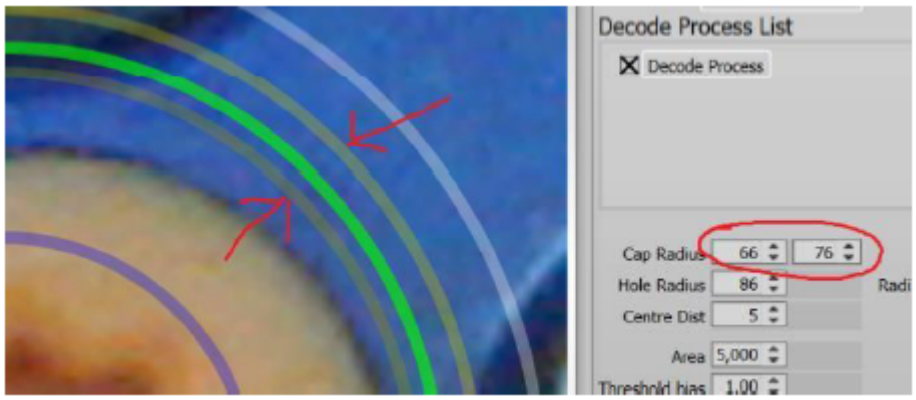
Step	Action
4.	Reduce the **Crop Radius** to its smallest value. The blue circle reduces in size. ***NOTE:*** *The circles on the cap image are used to help set up the decoder parameters.*  The green circle is the best candidate for the cap edge. The two lightly shaded circles on the inside and outside of the green circle are the minimum and maximum the detector uses. 

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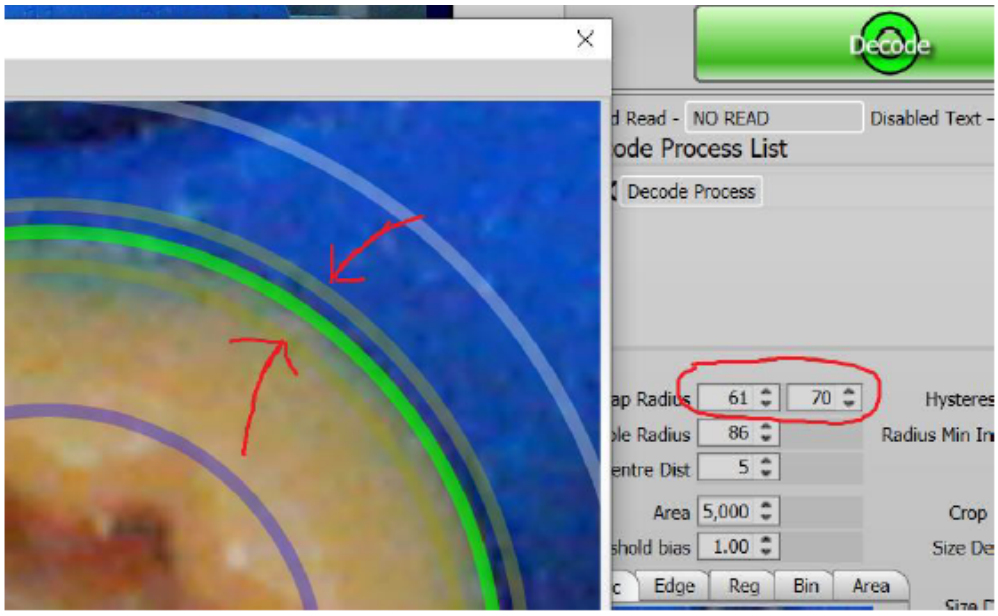
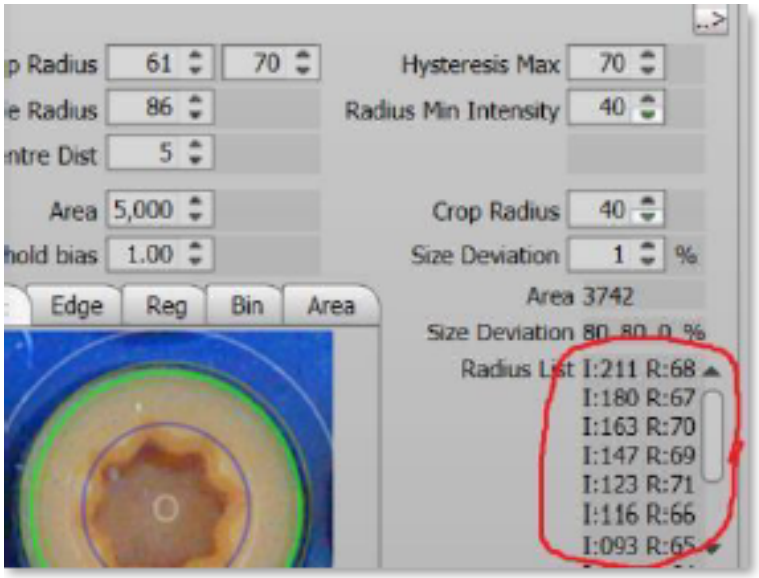
Step	Action
5.	Adjust the *Cap Radius* until the minimum range is inside the cap radius and the maximum range is outside the cap radius. ***NOTE:*** *The values in the image below are set on prototype equipment and may differ from yours.*  The *Radius List* shows the strongest radius detected. The best candidate in the example below has a radius of 68 and strength of 211. 
6.	Click other ROIs. Check if the green circle is the detected cap radius. ***NOTE:*** *Caps at edges may be distorted because of perspective. This may cause the detected cap radius at the edges to be slightly different.*

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Step	Action
7.	Click the **Edge** tab to check the image's edges. The cap radius detection algorithm requires well defined edges. Issues with lighting or focus can cause insufficient edges.

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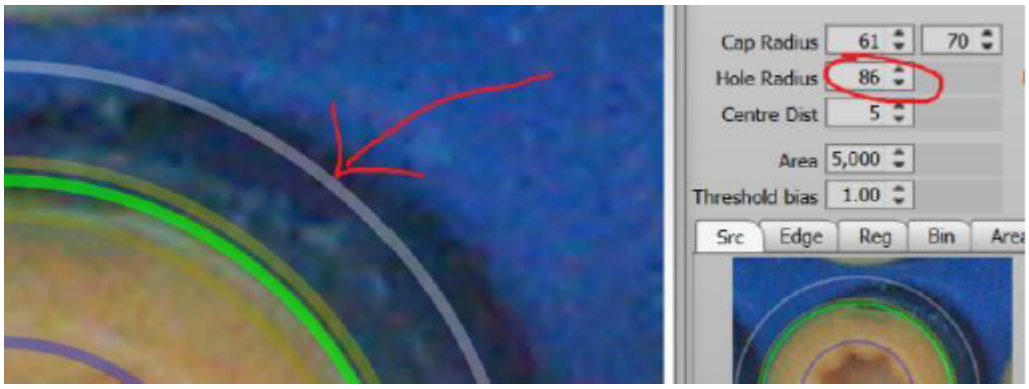
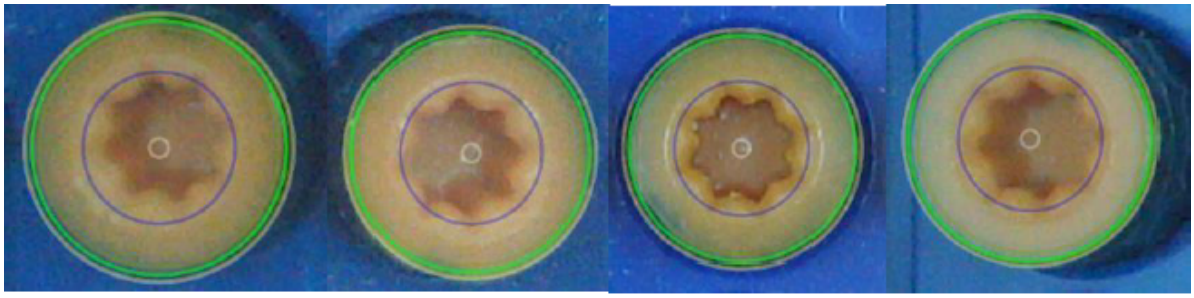
Step	Action
8.	The *Hole Radius* is used for empty well detection. However, computation still occurs. ***NOTE:*** *Empty well detection is not yet implemented.* Reduce the **Hole Radius** to slightly larger than the cap radius once the cap radius is determined.  The following is an example of the *Hole Radius* set to 1 higher than max *Cap Radius*.
9.	Click the other ROIs. Ensure the green cap radius follows the edge of the cap image. 
10.	Click **Scan** to retrieve an image.
11.	Click **Decode** to run the decode.

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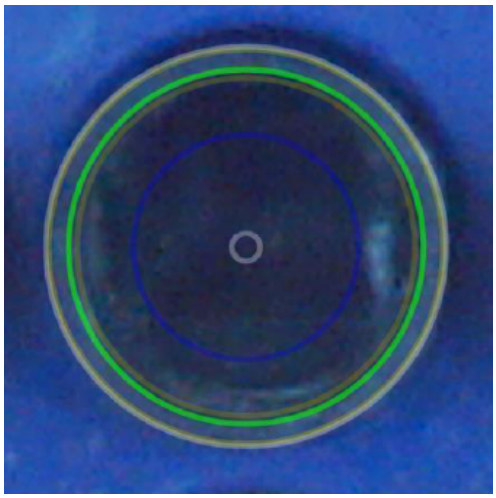
Step	Action
12.	Decap a rack or choose an ROI with no cap. The following image is an ROI with no cap: The decoder detects the tube rim outline as the cap radius. The center is dark. If a cap was in the center, it would be bright. The blue circle (crop radius) is used to determine if a cap exists. The crop radius should be as large as possible and include the tube rim. 

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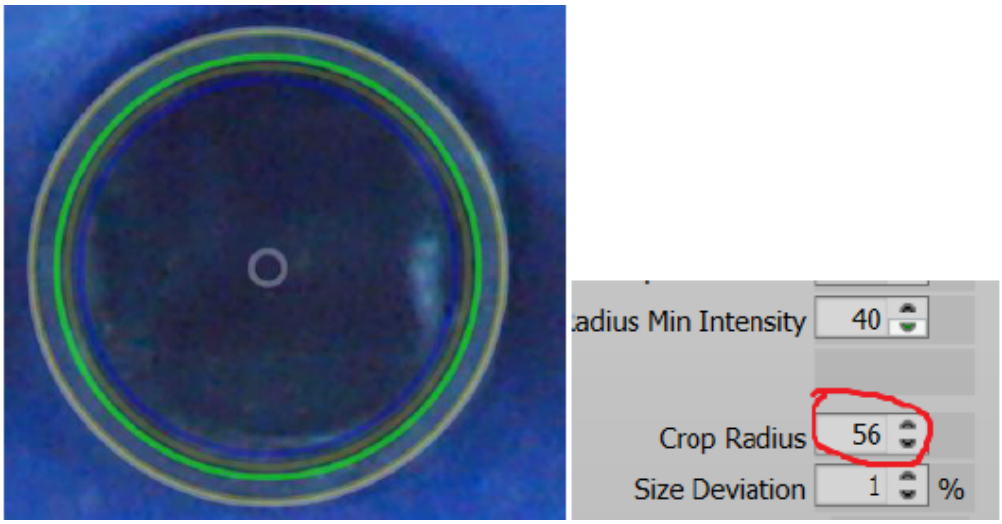
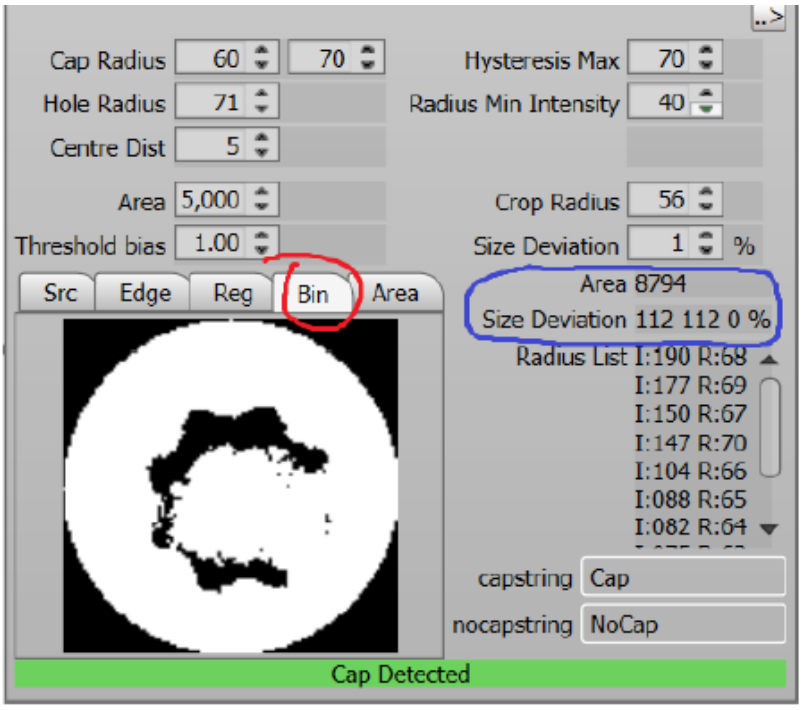
Step	Action
13.	Increase the **Crop Radius** until the blue circle is smaller than the tube rim. 
14.	Click a ROI with a cap.
15.	Click the **Bin** tab to see the binary image of the crop radius. Observe the *Area* and *Size Deviation* results to determine if the binary image is a cap. ***NOTE:*** *The Area is the amount of connected white. The Size Deviation is how the width and height match.* 

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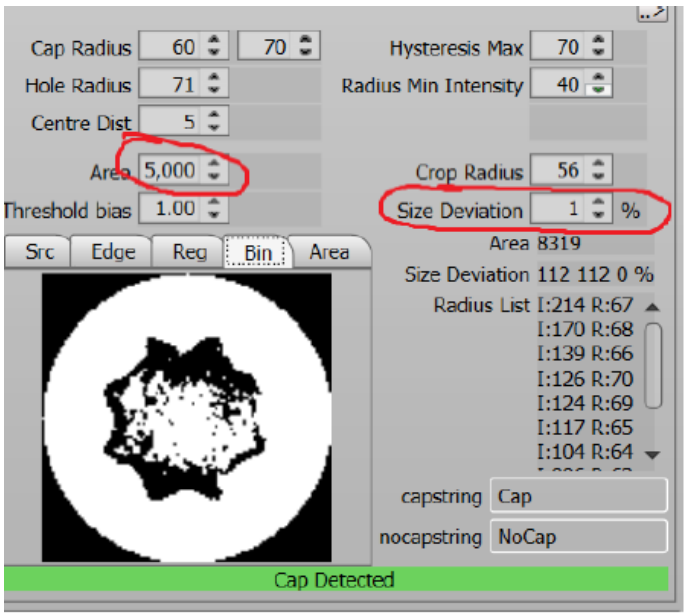
Step	Action
16.	Click the other ROIs with caps to determine the area range. ***NOTE:*** *The rule for a cap is that the area must be above the area parameter and the size deviation has to be below the size deviaiton parameter.* The following example has an *Area* of 5000 and a *Size Deviation* of 1%.  The result area is 8319 and the result deviaiton is 0%, so there is a cap.

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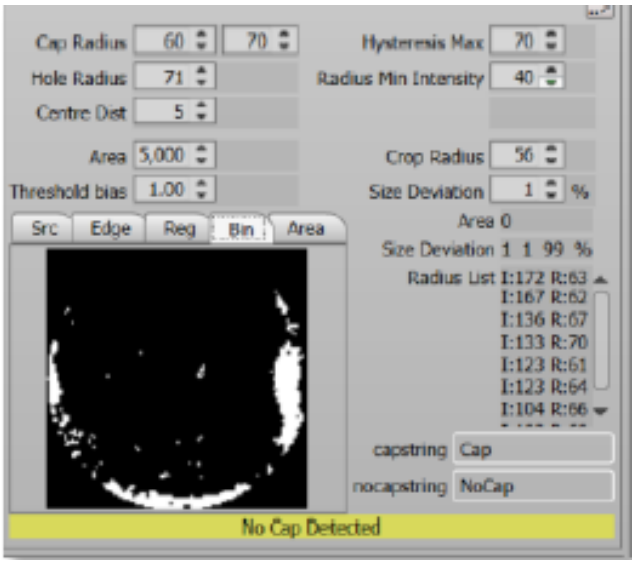
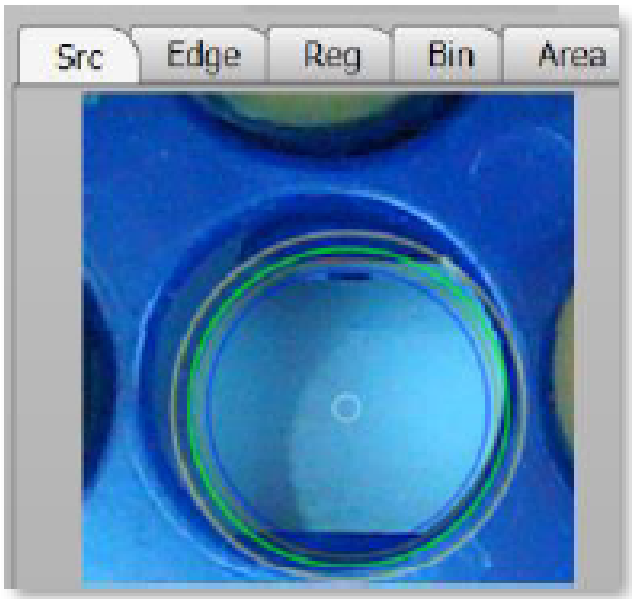
Step	Action
17.	Click a ROI with no cap. Binary images with no caps are mostly black and non-circular. The decoder detects that there is no cap and sets the area to minimum and size deviation to maximum.  The following is an image with no tube. In this case, the sled will be seen through the hole. 

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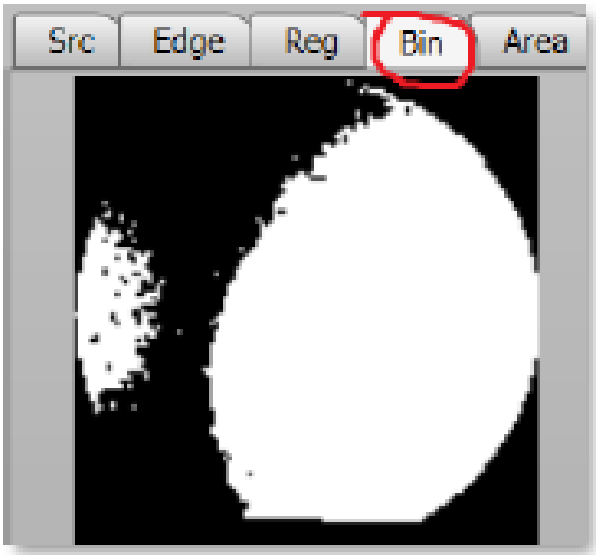
Step	Action
18.	Click the **Bin** tab. Observe that the image is mostly white, so the discoder cannot discard it. 

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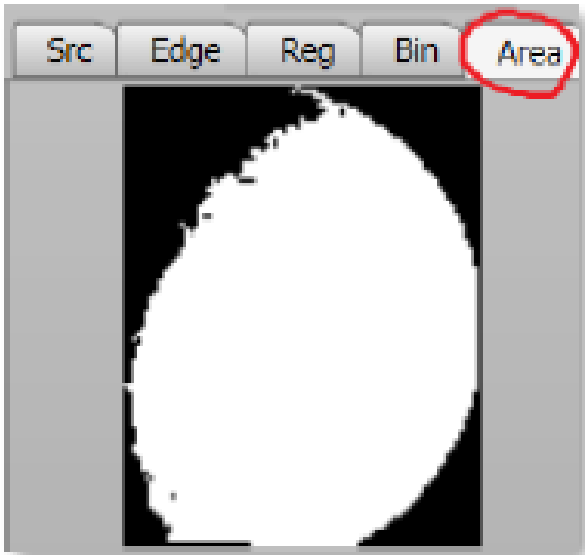
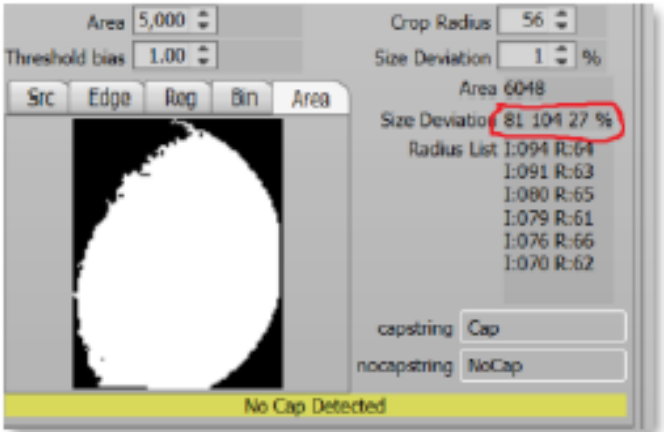
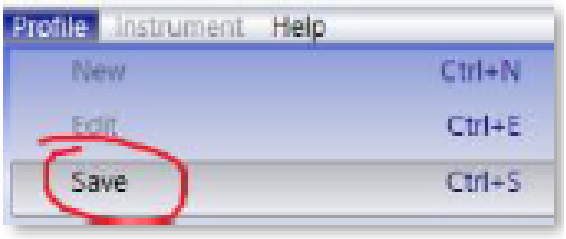
Step	Action
19.	The decoder uses the largest blob to do the area check. Click the **Area** tab to observe which blob is chosen.  The following image shows an area of 6048 pixels, so the area check succeeds. The dimensions are 81 pixels by 104 pixels. The size deviation of 27% results in no cap. 
20.	The cap detect is complete. Click the **Profile** tab. Click **Save**. 

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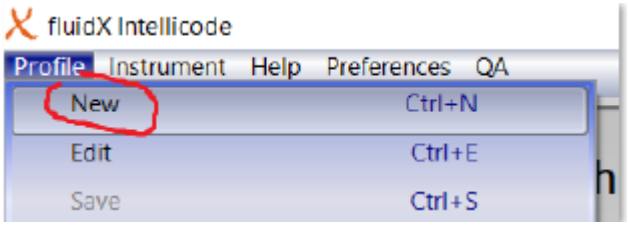
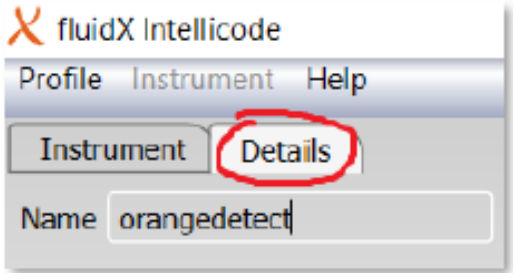
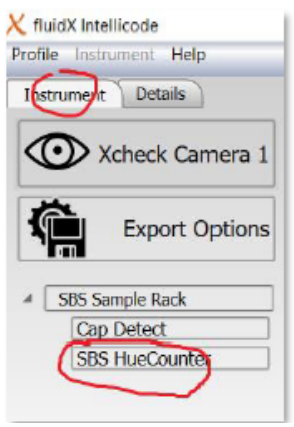
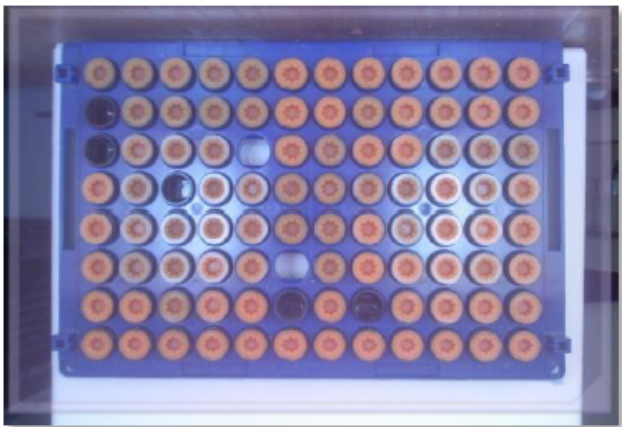
Orangedetect

Orangedetect is used to determine the presence of caps. This is usually performed for caps that fell from inside the instrument onto the rack. Orangedetect can also be used to ensure the rack is decapped.

Step	Action
1.	Click the **Profile** tab. Click **New** to create a new profile. 
2.	Click the **Details** tab. Enter `orangedetect` into the **Name** field. 
3.	Click the **Instrument** tab. Expand the **SBS Sample Rack** drop-down. Drag and drop the **SBS HueCounter** onto the world image.  

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Step	Action
4.	Position and adjust the ROI, so that it covers the rack. Adjust the **ROI Size** in the **huefilter** field to resize.
5.	Click **Decode**.

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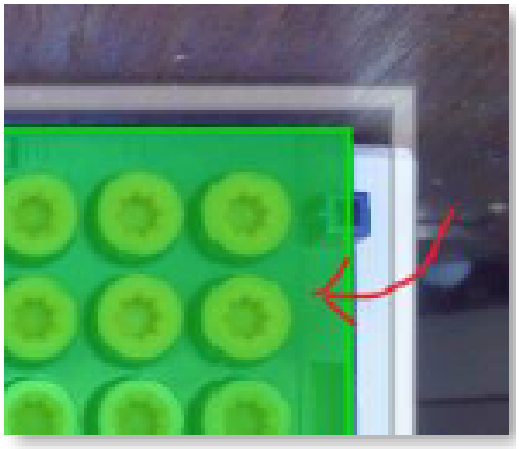
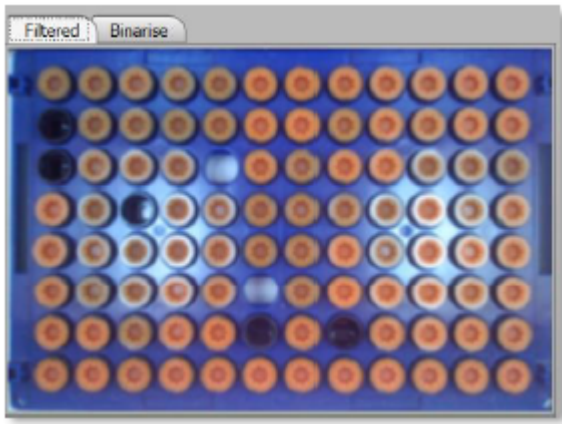
Step	Action
6.	Click the **ROI group**.  The following decoder result appears: 

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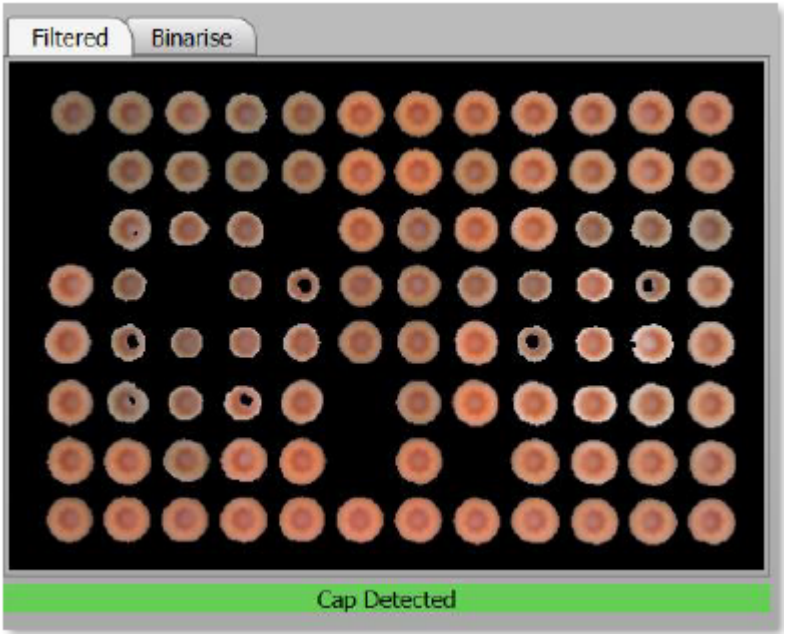
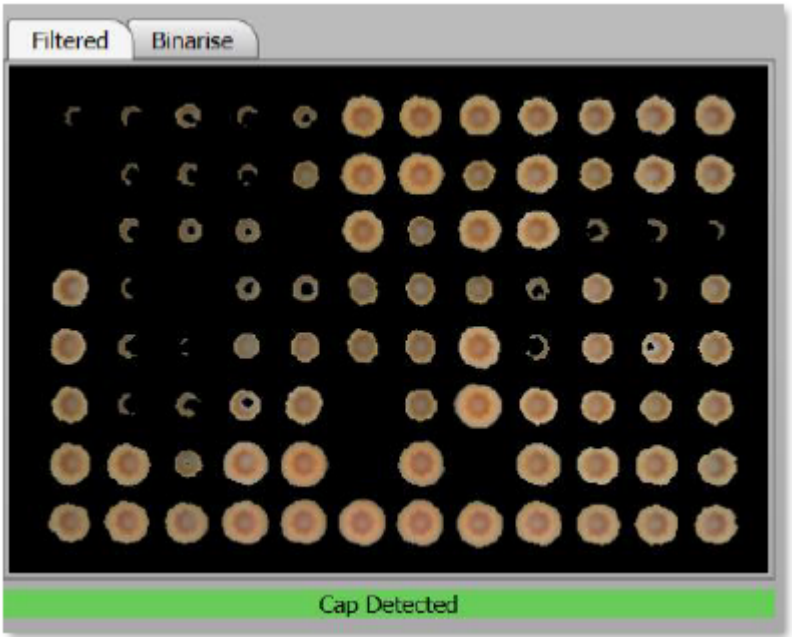
Step	Action
7.	For orange caps, the section of the color spectrum that is not orange must be discarded. Adjust **Hue Min** and **Hue Max** to isolate the orange part of the spectrum. ***NOTE:*** *Any color to the left of Hue Min is removed. Any color to the right of Hue Max is removed.* The following result appears:  ***NOTE:*** *The camera white balance settings have an impact on the result. For example, the following image is the same as above:*  *The top left cap has almost disappeared. A good white balance camera setting is important for robust orange detection.*

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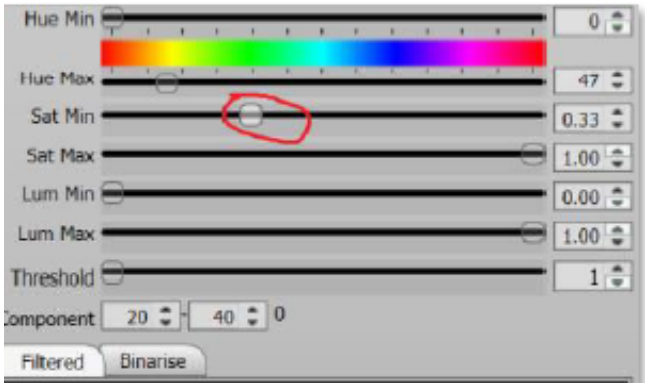
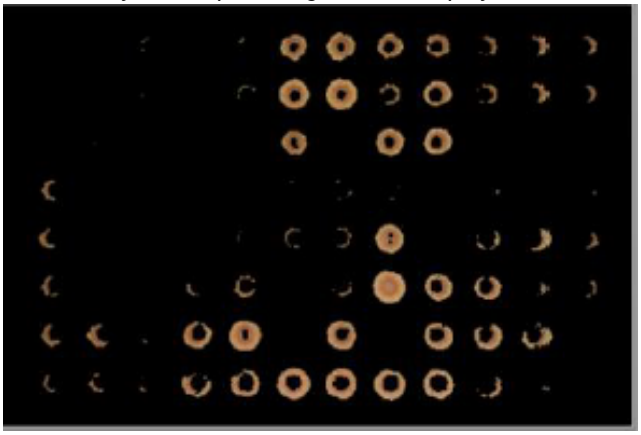
Step	Action
	Slide the **Sat Min**(saturation minimum) slider to the right to remove washed out colors and increase saturation. 
8.	The following result is displayed: ***NOTE:*** *Only the deeper orange color is displayed.* 

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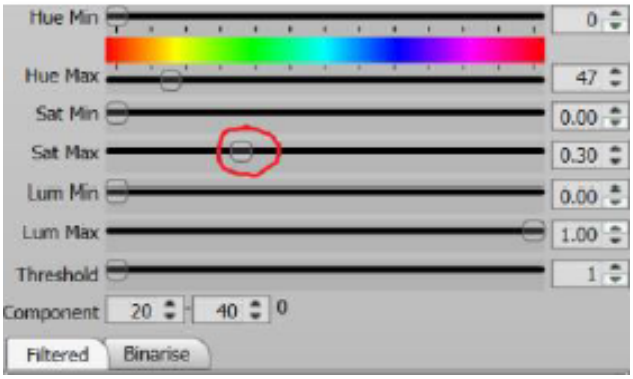
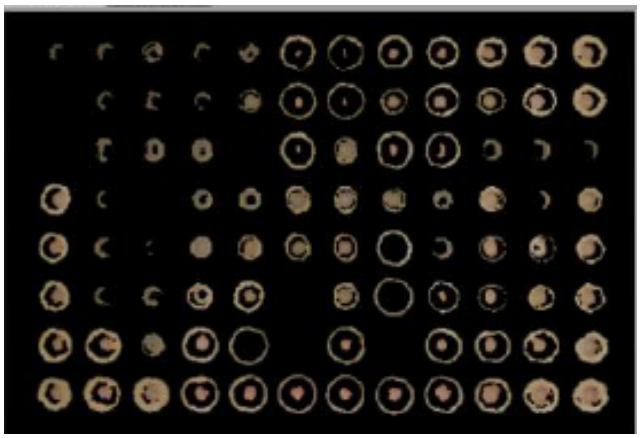
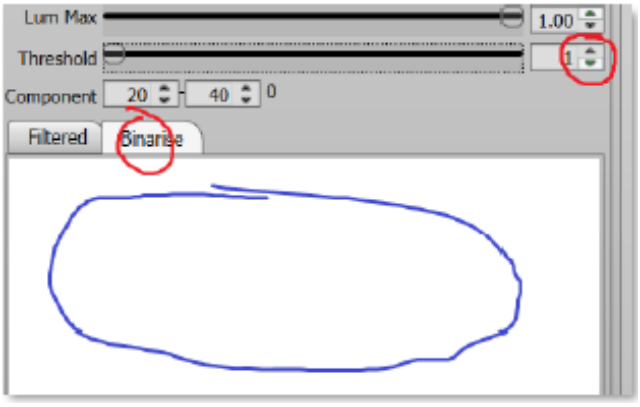
Step	Action
9.	Slide the **Sat Max** to remove the deeper colors. This leaves the washed out colors displayed.  The following result is displayed: 
10.	Adjust **Lum Max** and **Lum Min** to remove brighter or darker colors. Ensure the **Lum Max** field is `1`. 

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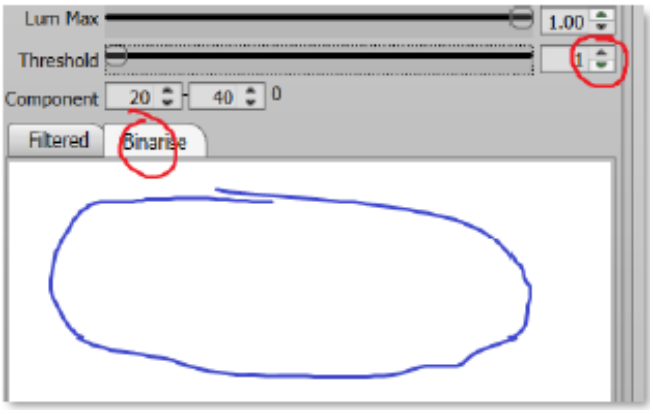
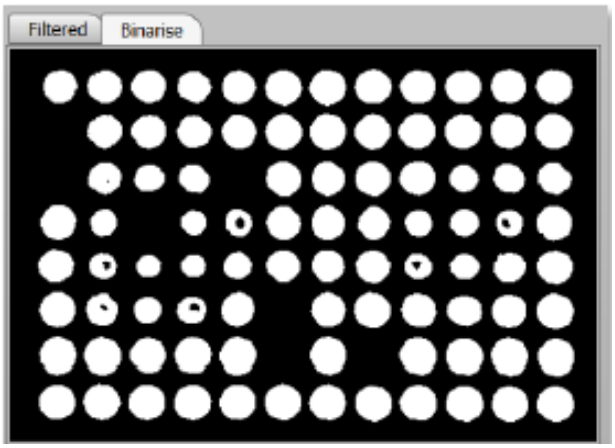
Step	Action
11.	Click the **Binarise** tab. Ensure the **Threshold** field value is `1`. 
12.	A binary image of the caps is displayed. The caps are defined and separated. If the caps are not defined and separated, adjust the parameters and observe the results in real time. 

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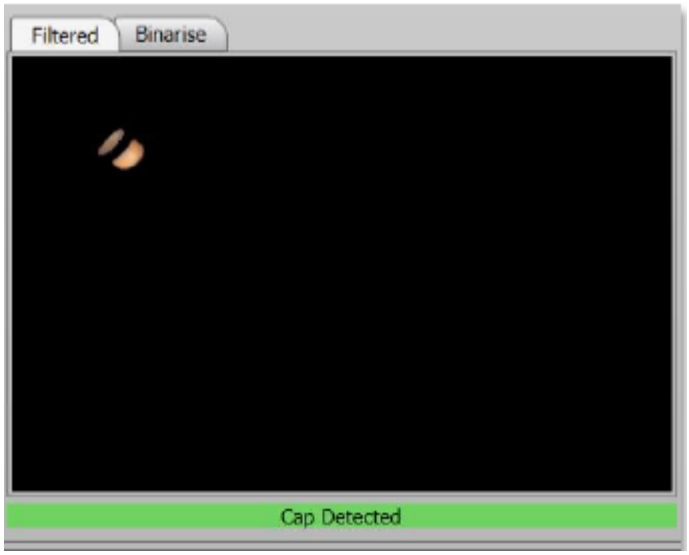
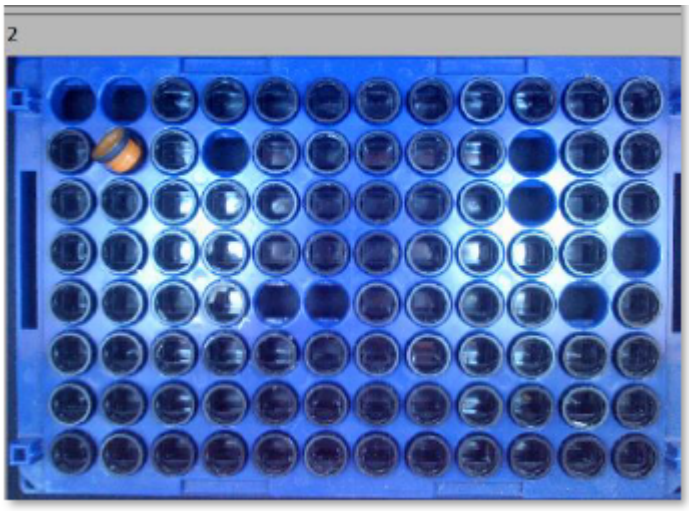
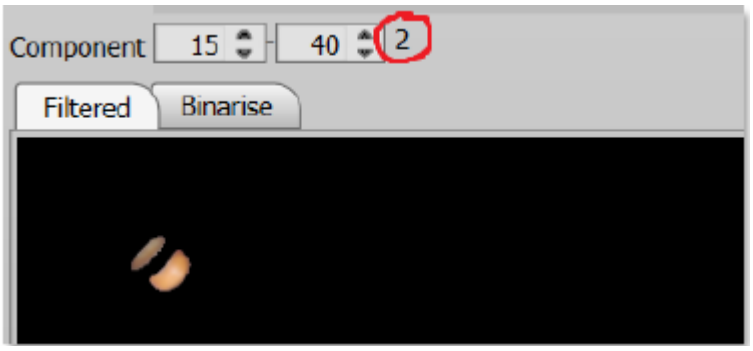
Step	Action
13.	Decap the rack and place a single cap on its side on the rack. The following images show a cap on its side and the decoder result. The cap has a black seal which creates two orange blobs in the result.   The following image is an example of the decoder has finding two components. 

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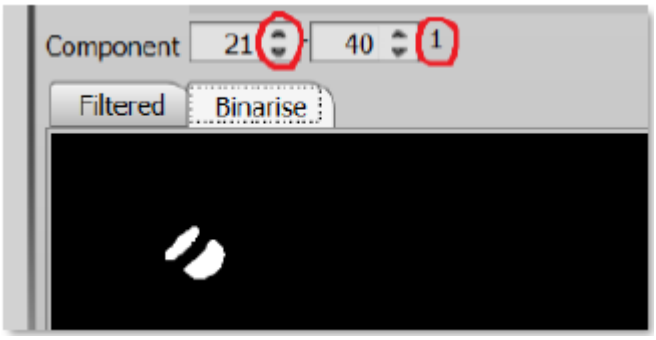
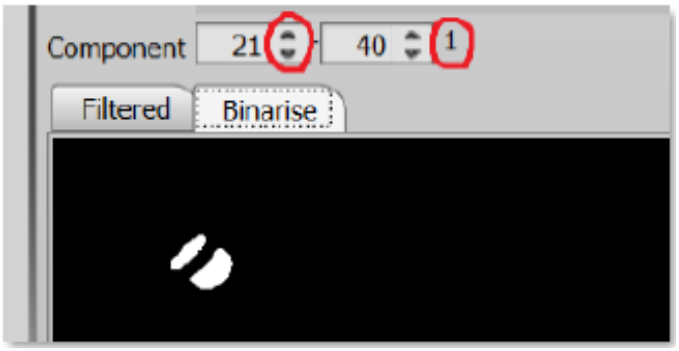
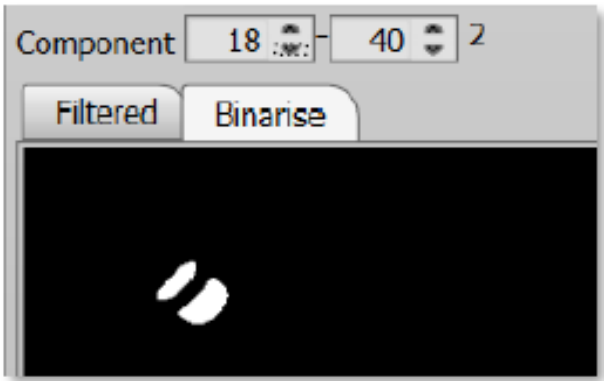
Step	Action
14.	Click **Binarise** to see the components more clearly. The following example shows the cap top and the cap thread. 
15.	In the **Component** field, increase the minimum component size until the decoder finds only one component. The following example shows that the component size was discarded at a minimum size of 21. 
16.	Reduce the **Component** size to add tolerance. 

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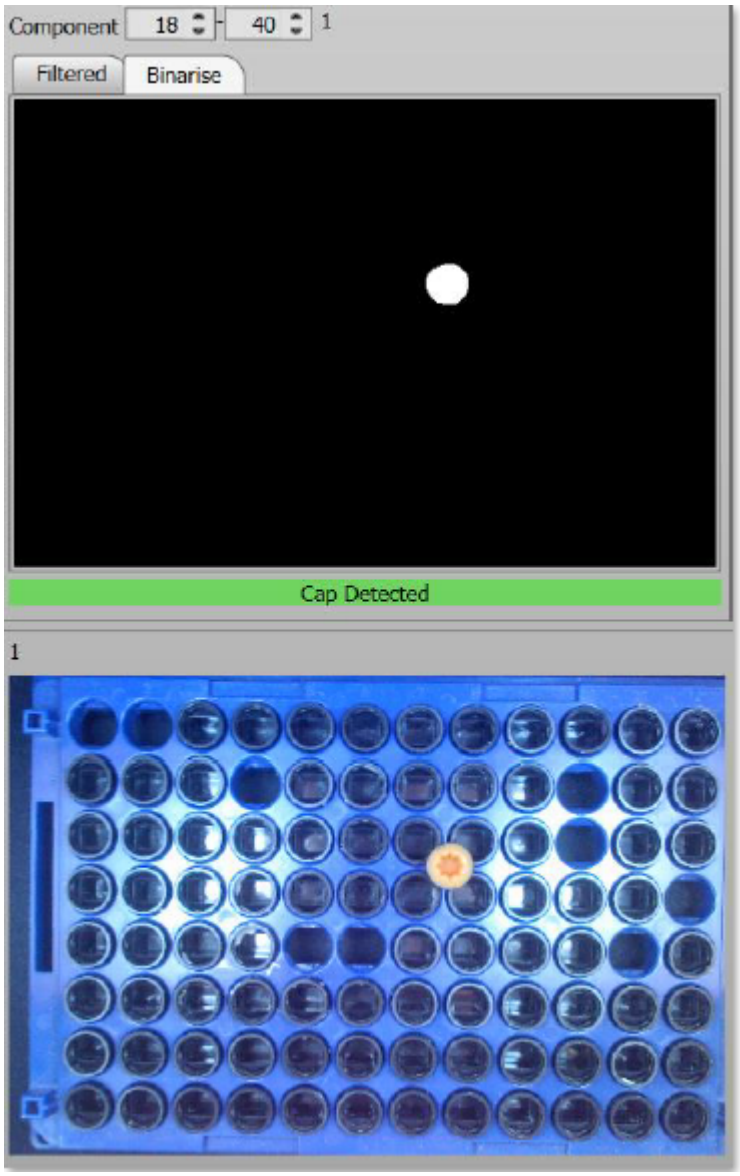
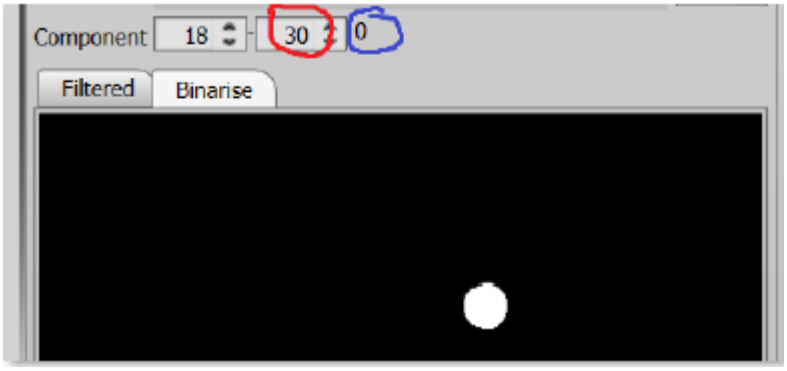
Step	Action
17.	Place a cap face down onto the camera. 
18.	In the *Component* field, decrease the component max size until the component count is `0`. 

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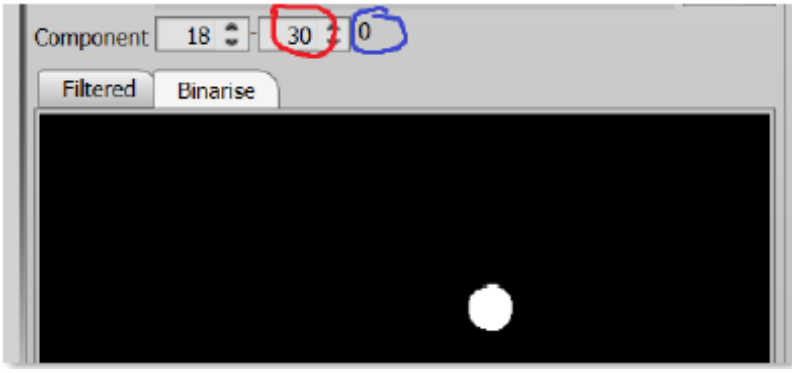
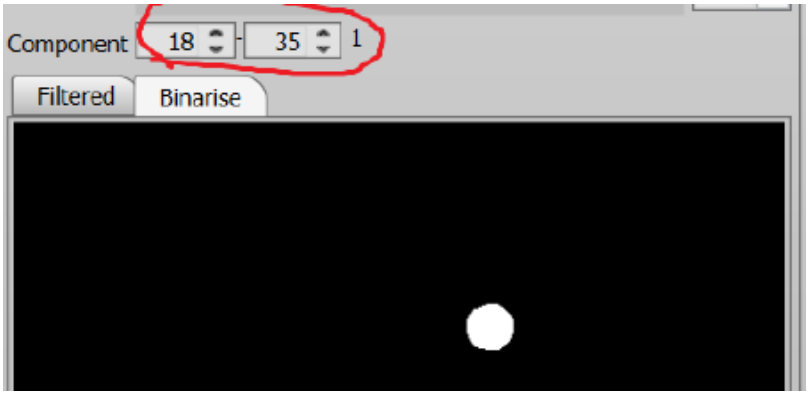
Step	Action
19.	In the *Component* field, increase the max size to add some tolerance.  The component range is approximately 18-35. 

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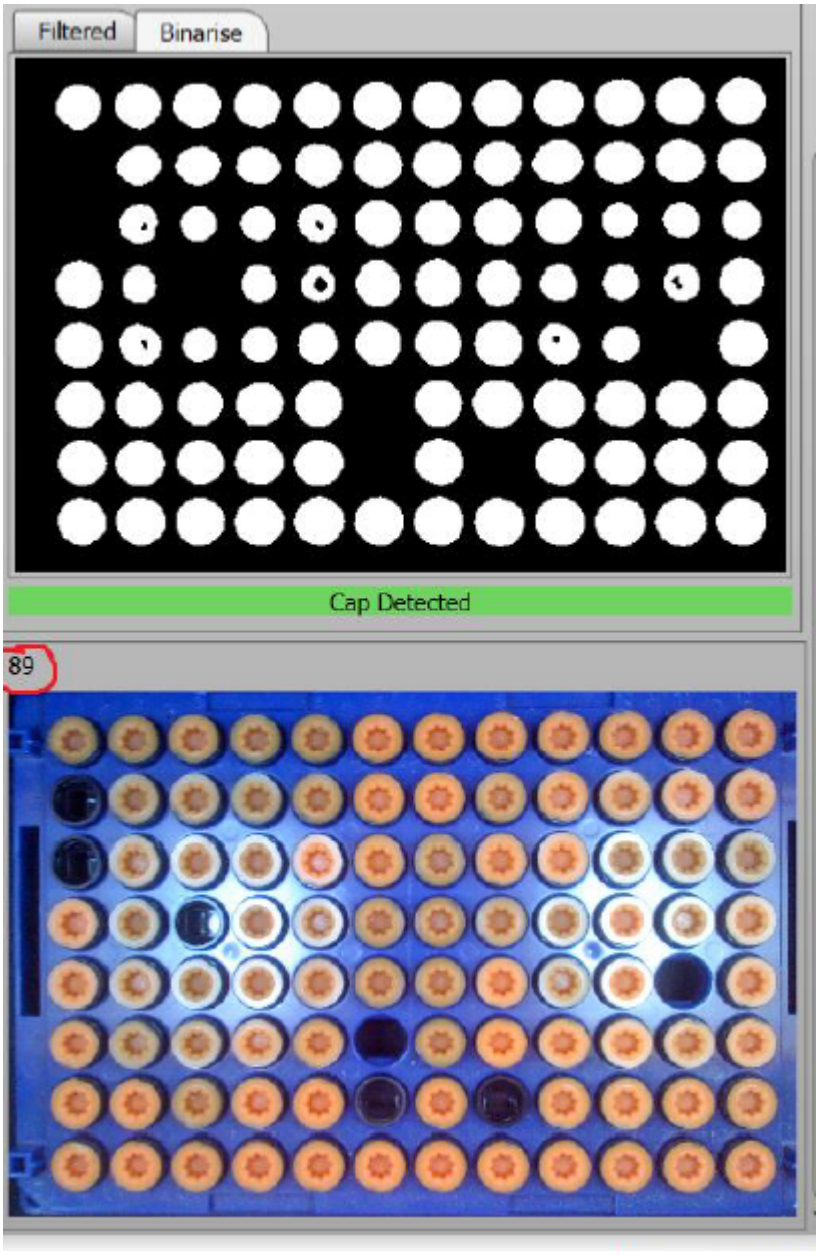
Step	Action
20.	Remove caps from a rack. Place the rack. The orangedetect counts the caps. ***NOTE:*** *If the counter is non-zero then there is at least one cap present. However, it is possible to drop a single cap on its side and have two valid components. If you are using orangedetect to count caps, there should be no caps dropped onto the rack.* 

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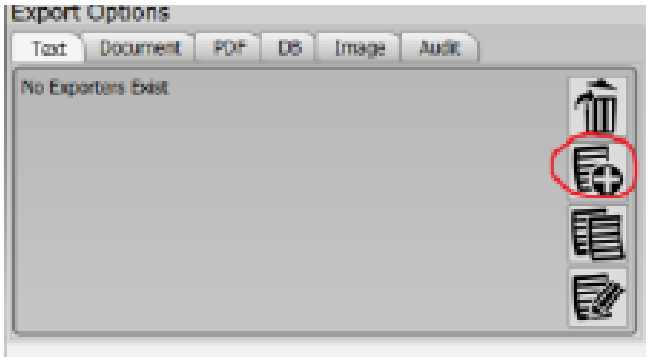
Export and Result

Step	Action
1.	Click **Export Options**.
2.	If there are no exporters, click the **Add** icon. 
3.	The orangedetect is complete. Click the **Profile** tab. Click **Save**.

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Appendix D: WEEE Statement (European Union)

The symbol above indicates that Waste Electrical and Electronic Equipment (WEEE) is not to be disposed of as unsorted municipal waste. Equipment marked with this symbol is to be collected separately.

The objectives of this program are to preserve, protect and improve the quality of the environment, protect human health and utilize natural resources prudently and rationally. Specific treatment of WEEE is indispensable in order to avoid the dispersion of pollutants into the recycled material or waste stream. Such treatment is the most effective means of protecting the customer's environment.

The waste collection, reuse, recycling, and recovery programs available to Brooks Automation-customers, vary by customer location. Please contact the responsible body (e.g., your laboratory manager) for information about local requirements.

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