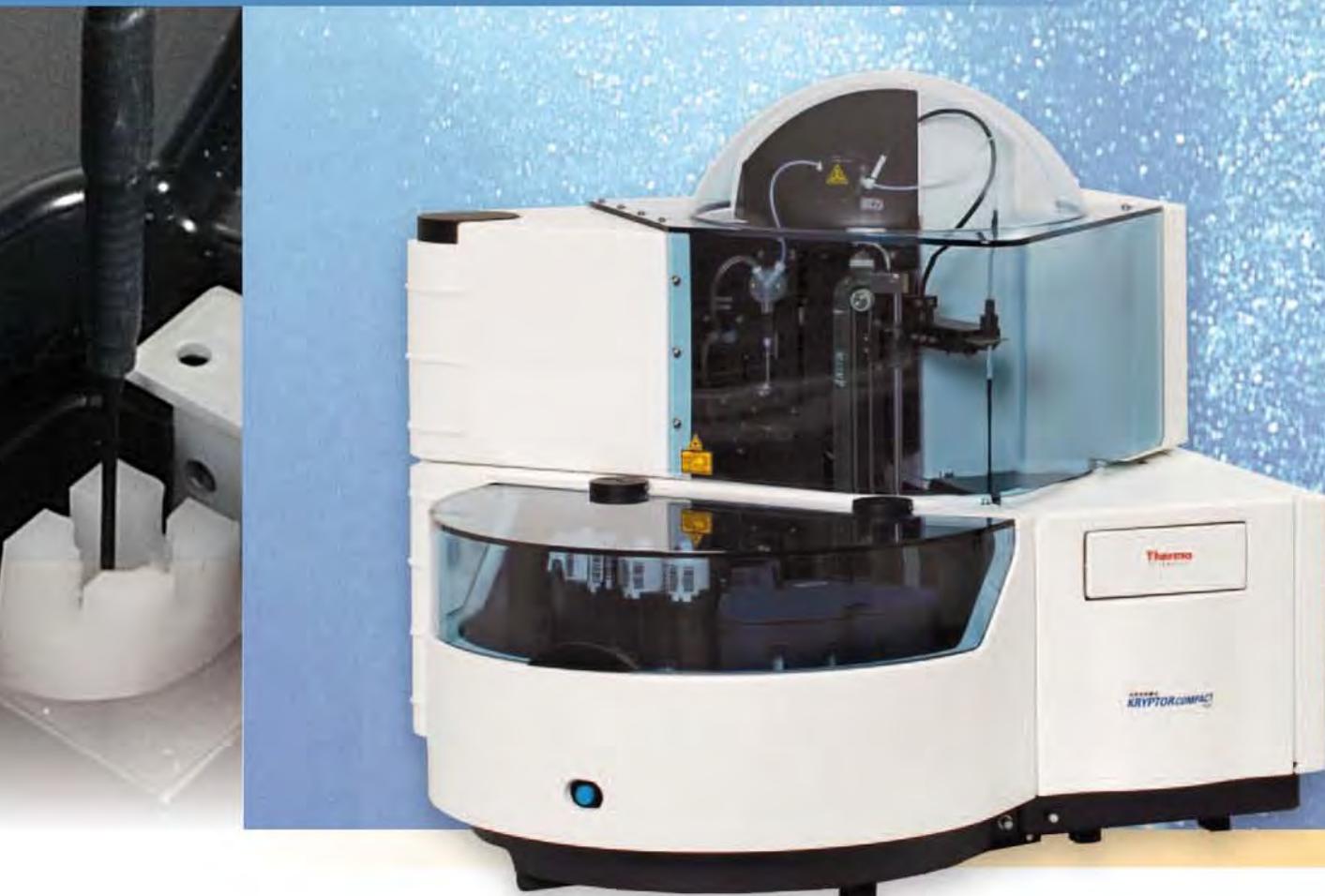


B·R·A·H·M·S KRYPTOR compact PLUS



Service Manual

Thermo
SCIENTIFIC

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B·R·A·H·M·S KRYPTOR compact PLUS

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Caution Before operating the KRYPTOR compact PLUS, read this service manual and take special note of all safety instructions.

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1 Generalities

1.1 Appropriate Use

B·R·A·H·M·S KRYPTOR compact PLUS must only be used by trained and authorized personnel in a medical laboratory. It must not be used in the patient's direct environment.

Using the **B·R·A·H·M·S KRYPTOR compact PLUS** is only permitted in conjunction with the corresponding software or in a configuration which is authorized by B·R·A·H·M·S.

The use of any material other than the one specified in the Service Manual (e.g. non-authorized substances) is forbidden.

The instructions contained in the present Service Manual must be adhered to in particular the safety instructions.

1.2 Warranty limitation

Although the system has been tested, it is highly recommended to perform a snapshot before any installation and use of the software.

B·R·A·H·M·S denies any responsibility in case of:

Wrong use of the software;

Unauthorized modification (willingly or unwillingly);

Damages linked with the use of the software, in particular any data loss or any financial loss which could possibly be attached to the use of the software.

When the instrument is connected to a host, the user takes the entire responsibility for an errorless transmission of the results (hardware, software, firmware, etc...).

1.3 Precautions

The **B·R·A·H·M·S** analyzer must be used only by qualified personnel in a medical laboratory.

Reading and interpretation of results must be done by a qualified user.

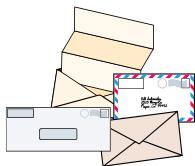
The **B·R·A·H·M·S KRYPTOR compact PLUS** instrument must only be used with materials, equipment and accessories specified in the user manual.

It is mandatory for users of the **B·R·A·H·M·S KRYPTOR compact PLUS** system to pay particular attention to SAFETY INSTRUCTIONS written in the user manual.

Installation of the **B·R·A·H·M·S KRYPTOR compact PLUS** system can only be performed by a trained service engineer. At the time of installation all performance specifications will be verified. Any attempt to install, repair or modify the instrument by unauthorized personnel will invalidate the warranty.

1.4 Research Help

In case of problem not described in this **B·R·A·H·M·S KRYPTOR compact PLUS** Service Manual, please contact you local hotline for support and assistance.



ADDRESS

LOCAL HOT LINE ADRESS



CEZANNE PRODUCT SUPPORT

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E-Mail : spareparts.brahms.frnim@thermo.com

1.5 B·R·A·H·M·S KRYPTOR compact PLUS –TRACE Technology

The **B·R·A·H·M·S KRYPTOR compact PLUS** is a fully automated system for *in vitro* diagnostic, able to process multiple samples and tests per day.

The **B·R·A·H·M·S KRYPTOR compact PLUS** is a closed system and can only operate using reagent kits from B·R·A·H·M·S. The **B·R·A·H·M·S KRYPTOR compact PLUS** system is based on TRACE Technology (Time–Resolved Amplified Cryptate Emission). This technology, which won the Nobel Prize for Jean-Marie Lehn, is under continuous development by Cezanne with cooperation from B·R·A·H·M·S.

1.5.1 Principle of TRACE Technology.

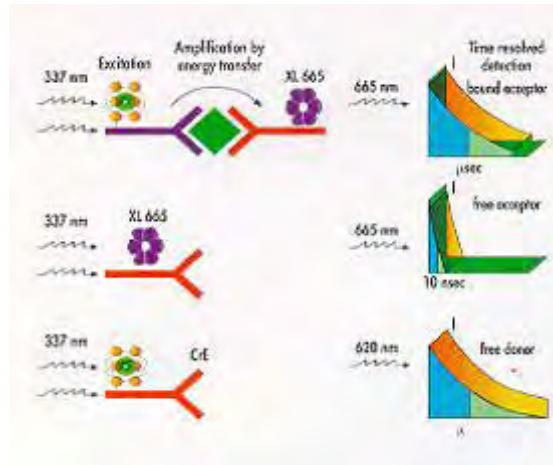
The basis of the TRACE Technology is a non-radioactive energy transfer from a donor (Europium Cryptate) to an acceptor (Fluorophore (XL665)). The energy transfer is possible only if the donor and the acceptor are within close proximity, which occurs when an immuno-complex is formed by interaction with antigen in the sample.

1.5.2 Precise measuring

The donor (Cryptate) excited with a Nitrogen laser at 337nm emits a long-life fluorescent signal at 620nm, while the acceptor (XL665) generates a short-life fluorescence signal at 665nm.

When both components are bound in an immuno-complex, both the signal amplification and the prolonged life span of the acceptor signal occur at 665nm. This long-life signal is proportional to the concentration of the antigen to be measured.

Unspecific signals are eliminated by the temporal delay of the fluorescence measurement: the signal of the short fluorescence, unbound acceptor and medium.

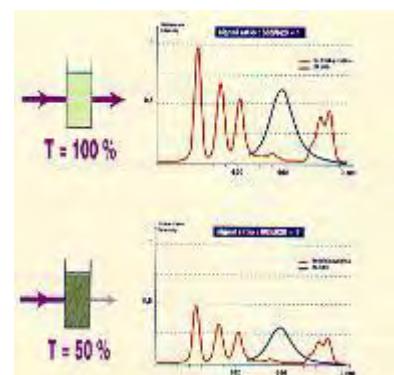


1.5.3 Unspecific signal

The signal generated by the Cryptate at 620nm serves as an internal reference and is measured simultaneously with the signal emitted by the acceptor at 665nm.

Interfering influences, e.g. from turbid serums, are automatically corrected with the internally calculated ratio of the 665nm signal / 620nm signal.

Similarly, turbid serum and variation from the laser excitation are automatically corrected.



2 Safety Instructions

This chapter contains safety instructions in order to ensure safe use of the instrument.

It is mandatory that you read these instructions very carefully before you operate the **B·R·A·H·M·S KRYPTOR compact PLUS** analyzer. If you have any doubts or questions, please contact your Local **B·R·A·H·M·S KRYPTOR compact PLUS** Distributor.

BRAHMS KRYPTOR compact PLUS analyser is a Class 2 laser product.

Use of controls or adjustments or performances of procedures other than those specified herein may result in hazardous radiation exposure.

2.1 Importance of safety instructions

Safety instructions in this Service Manual will allow the technician to avoid personal accidents, material damage and environmental contamination.

This equipment must only be used by qualified personnel in labs working in accordance to GLP local guidelines / regulations. Local Health and Safety regulations must be taken into account and Good Laboratory Practices (GLP) should be employed. eg: use of laboratory coat and gloves is strongly recommended.

2.2 Biological risk

- Always wear gloves and laboratory coat.

Dilution plate: Assay must be treated as potentially infectious:

When you change the dilution plate: visually inspect the corner wells to see if they have been used.

Before disposing of the dilution plate stick the adhesive cover film with biohazard sign on the plate. The adhesive covers are supplied with the dilution plates.

Reaction plate: Assay must be treated as potentially infectious:

Before disposing of the reaction plate: stick the adhesive cover film with biohazard sign on the plate.

Calibrator: treat as potentially infectious:

Read the safety instructions in the package insert

Controls: treat as potentially infectious:

Read the safety instructions in the package insert.

Reagent kits: treat as potentially infectious:

Read the safety instructions in the package insert.

Tip: The arm is labeled to warn about biological risks regarding the tip:

In case of fluid leak: Do not touch the liquid, wear gloves. Please contact your customer service.

Waste maintenance: Caps and bottles are labeled to warn about biological risks:

Wear gloves when emptying the waste container and performing any maintenance.

2.3 Chemical risk

Solution 2, 3 and 4:

Read the safety instructions in the package inserts.

2.4 Optical risk

Laser:

Class 3B laser

Do not look into the laser beam.

Always keep the laser connected to the optical fiber.

Make sure the other extremity of the optical fiber is connected either to the reader head or a joulemeter.

Do not open the casing of the laser

Barcode readers:

Internal and external barcode readers. Do not look at the laser beam. Avoid direct eye exposure.

2.5 Electrical risk

High voltage:

High voltage power supply. Do not handle or disconnect the cables while this part is switched on.

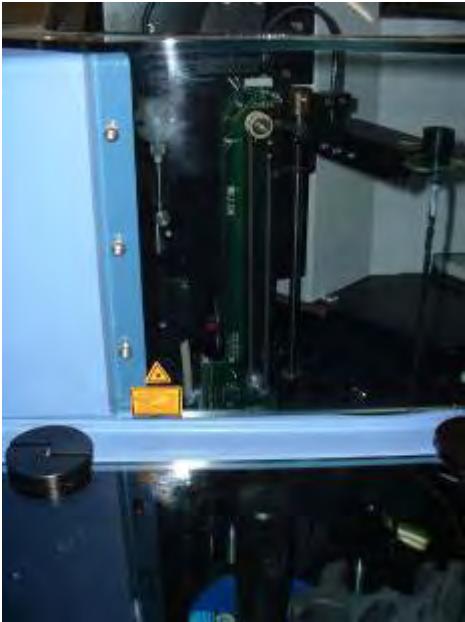
2.6 Classification Of Safety Instructions

All safety instructions are accompanied by following symbols.

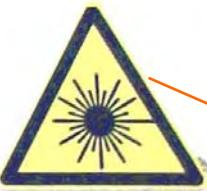
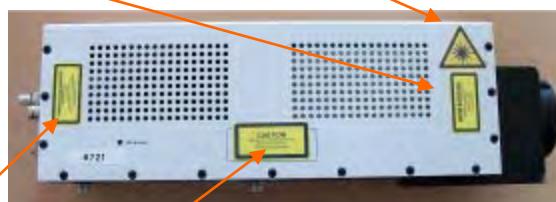
2.6.1 Safety Instructions For Technician

Sign	Location	Risk / Warning
	Samples cassette	<p>User hazard:</p> <p>Tubes, dilution plates, reagent kit must be treated as potentially infectious. Biological risk.</p>
	Cooling cassette	<p>Solutions 2, 3 and 4 (refer to package inserts). Chemical risk.</p> <p>Wear gloves and laboratory coat.</p>

Sign	Location	Risk / Warning
	High Voltage Power Supply	<u>Electrical shock</u> Switch the instrument off and disconnect it from the mains before handling these parts.
	Low Voltage Power Supplies	
	Warning: The presence of warming resistances in the Reading Module can increase the temperature.	<u>Burns</u> Switch the instrument off and wait 5 minutes before opening the reaction area.

Sign	Location	Risk / Warning
	<p>Reagents & samples barcodes readers</p> 	
	<p>On the fluidic hood</p> 	<p><u>Optical risk.</u></p> <p>Class 2 laser barcodes readers.</p> <p>Do not look directly into the laser beam</p> <p>Do not open the casing of barcodes readers.</p>

Sign	Location	Risk / Warning
CAUTION-CLASS 3B INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO THE BEAM	Reader head shielding	<u>Optical Risk:</u> Class 3B laser Do not look into the laser beam Always keep the laser connected to the optical fiber. Make sure the other extremity of the optical fiber is connected either to the reader head or to a joulemeter. Do not open the casing of the laser
CAUTION-CLASS 3B INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID EXPOSURE TO THE BEAM	Side panel of access to the laser	
Laser Radiation Avoid Exposure To Beam Class 3B Laser Product <small>Invisible laser radiation is emitted from this aperture</small> Caution – Laser Radiation Avoid Exposure To Beam Class 3B Laser Product <small>Peak power: 100mW; 2.6ns, 355 nm IEC 60825-1:998</small> LASER APERTURE <small>Invisible laser radiation is emitted from this aperture</small>	LTB Laser	

Sign	Location	Risk / Warning
 <div style="background-color: yellow; padding: 10px;"> <p>AVOID EXPOSURE INVISIBLE LASER RADIATION IS EMITTED FROM THIS APERTURE</p> <p>INVISIBLE LASER RADIATION AVOID EXPOSURE TO BEAM Class 3B laser product 3 ns pulse duration, 200 µJ max. pulse energy 4 mW max. avg. power, 337 nm emitted wavelength Classified to IEC60825-1: 2001-08</p> <p>CAUTION INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM</p> </div>	 <p>SRS Laser</p>	<p><u>Optical Risk:</u> Class 3B laser Do not look into the laser beam Always keep the laser connected to the optical fiber. Make sure the other extremity of the optical fiber is connected either to the reader head or to a joulemeter.</p> <p>Do not open the casing of the laser</p>

Characteristics of the invisible radiations emitted by the lasers depending on their type:

Laser Type	LTB	SRS
Beam Deviation(mrad)	3*3	5*8
Pulse Length (ns)	2.5	<3.5
Max Peak Power (kW)	100	45
Repetition Rate (Hz)	20	20

Sign	Location	Risk / Warning
	<p>Waste bottle and connectors on the instrument</p>  	<p><u>Biological hazard</u></p> <p>Liquid contained in these parts must be considered as potentially infectious. Always wear gloves and a laboratory coat when you handle these parts.</p>
	<p>Waste pump</p> 	
	<p>Clot detection board</p> 	

Sign	Location	Risk / Warning
	Washbowl 	
 7	Clot detection board 	<u>Biological hazard</u> Liquid contained in these parts must be considered as potentially infectious. Always wear gloves and a laboratory coat when you handle these parts.
	Waste collector 	
	Tip 	

2.6.2 Safety Instructions For Instrument

Sign	Location	Risk / Warning
	In the rear electronic assemblies 	<p><u>Electrostatic shocks:</u></p> <p>ESD on parts or boards may damage electronic components.</p> <p>Use an anti-static bracelet connected to the ground before touching the boards.</p>

2.6.3 Symbols and information on the Instrument (identification plates or labels)

B·R·A·H·M·S KRYPTOR compact Pipetting Module

REF 106173

SNPT

nn-0000-R



YYYY-MM

T3.15A



Identification plate of the pipeting module on the left side of the pipeting module

B·R·A·H·M·S KRYPTOR compact Reading Module

REF 106174

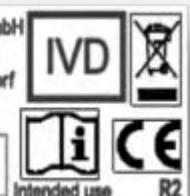
SN RD

nn-0000-R



YYYY-MM

T 5 A



Identification plate of the reading module on the right side of the Reading Module

MODEL B·R·A·H·M·S KRYPTOR compact PLUS

REF 106172

SN K 0000



YYYY-MM

V~ 100-240

Hz 50-60

VA 465

— T 5A

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation.



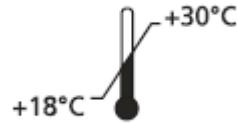
B·R·A·H·M·S GmbH
Neuendorfstr. 25
16761 Hennigsdorf
GERMANY

Intended use



Manufactured in FRANCE by Cezanne SAS R2

Identification plate of the instrument on the rear top of the instrument

	Serial Number of Pipeting Module
	Serial Number of Reading Module
	Serial Number of Instrument
	Part number
	Name and address of the manufacturer
	Date of manufacturing
	Acceptable humidity range for instrument operation
	Acceptable temperature range for instrument operation
	Medical device complies with IVD Directive EU 98/79
	Medical device is CE certified to comply with the IVD Directive
	Consult instructions for use



Electric and electronic equipments have to be selectively collected under the manufacturer responsibility (B·R·A·H·M·S GmbH.)

3 Instrument Specifications

3.1 Performance Data

Refer to **B·R·A·H·M·S KRYPTOR compact PLUS** specifications available on request.

3.2 Load Capacity

- One 96 wells microplate.
- Up to two dilutions plates (24 wells each) per sample cassette.
- Up to four solutions bottles per sample cassette.
- Up to four samples cassettes (16 tubes each).
- Up to two cooled reagent cassettes (4 reagent kits each).
- Three 5 liters bottles (Waste, PBS and H₂O).

3.3 Electrical Specifications

- **Line Voltage:** 100.0 – 240.0 VAC / 50 - 60 Hz, single phase.
- **Current Rating:** 5A Time-lag for Reading Module and 3.15 A Time-lag for Pipeting Module
- **Oversupply protection:** Class II

The instrument must be connected to an Uninterruptible Power Supply: 1000VA (for **B·R·A·H·M·S KRYPTOR compact PLUS**, screen and XPC).

The mains plug shall only be inserted in a socket outlet provided with a protective earth contact.

3.4 Dimensions

- **Height:** 630mm (both Reading Module& Pipeting Module).
- **Width:** 740mm (280mm for Reading Module & 460mm for Pipeting Module).
- **Depth:** 750mm (610mm for Reading Module & 750mm for Pipeting Module).
- **Weight:** 54kg (26Kg for Reading Module & 28Kg for Pipeting Module).

3.5 Environmental Conditions

- **Temperature:** 18 - 30°C.
- **Humidity:** 20 - 85% non-condensing.

- **Altitude:** to be used under 2000 meters.

3.6 Regulations

This instrument is compliant with:

- -Directive IVD 98/79/EC :
- -Standards EN 60825-1 & EN 60825-4 for safety of laser products.
- -Standards EN 61326 for electrical equipment for measurement, control and laboratory.
- -Directive 94/62/EC for packing.
- -Standards EN 61000-6-1 & 61000-6-3 for electromagnetic compatibility (EMC).
- -Standards EN 61010-1 & 61010-2-101: electrical requirements.
- -Standards IEC61010-2-081:2001 + A1
- -Standards FCC part 15 subchapter B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help"

Changes or modifications not expressly approved by B·R·A·H·M·S could void the user's authority to operate the equipment.

4 Decontamination Procedure

4.1 General

Contained below is the B·R·A·H·M·S policy for servicing instruments that are biologically contaminated.

Contained here is the decontamination procedure which is to be used prior to returning instruments or parts to B·R·A·H·M·S. The disinfectants that we recommend are Hexanios; Primactyl, Mucocit-A; Bactinyl and bleach 5%.

4.2 Policy Statement

It is Policy to assume that any instrument having contact with serum or other body fluids is biologically contaminated. Field personnel are to use Universal Precautions whenever the possibility exists for contact with blood borne pathogens. Universal Precautions is an approach to infection control with the concept that all human blood and certain body fluids are treated as if known to be infectious for HIV, HBV and other blood borne pathogens. Therefore we assume that the instrument is biologically contaminated unless the customer has not used samples of human serum or body fluids.

4.2.1 Rules

At a minimum, follow the rules and procedures that are in place within the customer's laboratory.

4.2.2 Equipment

If the possibility of biological contamination exists, the following minimum personal protective equipment must be worn:

Gloves:

While servicing instruments that are biologically contaminated, personal protective equipment such as gloves must be worn while working on the surface of the instrument or anywhere within the sample path.

It is not necessary to wear gloves when working inside the instrument such as on the electronics or mechanisms unless they are within the sample path and potentially contaminated. When not wearing gloves, remember that the surface of the instrument and bench space around the instrument are potentially contaminated.

Gloves must be worn while providing any application or training support where samples of serum or body fluids are used.

Hands must be washed immediately or as soon as possible after removal of gloves.

Safety Glasses:

While providing service to instruments that have the potential for spraying liquid such as Liquid Handling systems, safety glasses must be worn whenever working within the liquid path. Safety glasses must be worn while providing any application or training support where samples of serum or body fluids are used.

4.2.3 Instruments and Parts Being Returned to B·R·A·H·M·S

All instruments that have been used with human serum or other body fluids must be decontaminated prior to being returned to B·R·A·H·M·S. Please apply the Decontamination Procedure given here after.

If for some reason the instrument or part cannot be decontaminated a biohazard label must be attached to the instrument or part stating which portions remain contaminated.

4.2.4 Instruments and parts being transferred from Institution to Institution

All instruments that have been used with human serum or other body fluids must be decontaminated prior to being transferred (i.e. demo to demo). Please apply the Decontamination Procedure given here after

If for some reason the instrument or part cannot be decontaminated a biohazard label must be attached to the instrument or part stating which portions remain contaminated.

4.3 Decontamination Procedure

Biological decontamination must be performed when the instrument has been used with human serum or other body fluids. If decontamination is necessary, the appropriate decontamination procedure must be performed prior to servicing an instrument and/or returning an instrument or parts to B·R·A·H·M·S.

4.3.1 General Information

The customer should be questioned regarding what types of samples have been used in the instrument. With this information, the service engineer can determine if any decontamination is necessary.

Keep in mind, that the most probable areas for contamination are those areas that the customer handles on a frequent basis such as sample racks, keyboards, cassettes, start/stop buttons, and instrument skins. Gloves, lab coat, and safety glasses **MUST** be worn while performing the decontamination procedure.

4.3.2 Biological Decontamination Procedure

Before decontaminating, tape over any sensors or electrical components within the sample path that a spray or liquid could damage. Cover the 2 barcode readers with plastic - **DO NOT TOUCH** barcode readers surfaces.

Do not use any metallic tool inside the carousel while the instrument is switched on. The power for the cooling cassettes remains on after opening the carousel hood; a metallic tool may cause an electrical short circuit on the carousel.

- (1) Switch on the instrument, start the KRYPTOR software.
- (2) Once the instrument is initialized, go in the “**advanced**” menu and select “**System / Maintenance**”
- (3) Close the “**daily**” and “**weekly**” maintenances and run a “**Secure tip cleaning**” under the “**monthly**” maintenance menu.
- (4) Switch off the instrument

- (5) Empty the waste bottle (to empty the waste bottle, follow the rules and procedures in force in the customer's laboratory). Refill the bottle with 5% bleach solution, wait 10 minutes, empty the bottle. Rinse it with 5% bleach solution
- (6) Spray or wipe down all surfaces within the sample path, and those that may have been in contact with the sample including the instrument skins with recommended disinfectants (Hexanios; Primactyl, Mucocit-A; Bactinyl and bleach 5%). A recommended guideline of parts to be decontaminated is given in the next chapter. Please remember that these are only guidelines and COMMON SENSE MUST BE USED.
- (7) The disinfectant should remain in contact with the surface for 10 minutes and then be removed by wiping with a damp cloth. Take care not to put an excessive amount of disinfectant on anodized parts as it may take off a small amount of the dye in the anodizing.
- (8) Print and fill out the decontamination certificate (refer to [Decontamination certificate page 323](#)). Please do not forget to put the laboratory stamp and to sign the document. Fasten the decontamination certificate on the fluidic hood using a piece of adhesive tape.
- (9) For packing the instrument, please refer to [Packing Procedure](#) page 325.

4.3.3 Decontamination Guidelines

Items to be decontaminated include:

Instrument Skins
Wash bowl
Reagent cassette lid
Carousel drip pan
Sample cassettes
Liquid path
Dispensing hole
Waste Line.

5 Installation Procedure

Before starting the installation please read this chapter entirely.

5.1 Power Requirements

Line Voltage: 100.0 – 240.0 VAC / 50 - 60 Hz, single phase.

Power supply unit: 1500 VA (for **B·R·A·H·M·S KRYPTOR compact PLUS**, screen and XPC).

-
- **The mains plug shall only be inserted in a socket outlet provided with a protective earth contact.**
-

5.2 Unpacking the System and Installation

(1) The instrument is shipped in 3 individual packages: 1 for accessories, 1 for the Reading Module and 1 for the Pipeting Module (these 2 last packages will be fastened on the same pallet). Each package is labeled with a designation, a part number and a serial number.

(2) A packing list, a quality control report and a set of sample cassette ID barcodes are included in the packages.

-
- Do not throw the ID barcodes away, they may be required if the customer needs one or two additional sample cassettes or if an ID barcode is damaged and needs to be replaced.
-

(3) 2 persons are required to transport the boxes. Always hold the packages by the handles located on the sides

(4) During the unpacking, preserve carefully packing materials for a later use (storage or transport).

-
- The instrument must always be transported in its original packages in case of transfer or shipment (refer to the [Packing Procedure](#) page 325 if you need to ship the instrument)
-

(5) Cut and Remove the strappings maintaining the packages





(6) Raise and remove the upper parts of the packages.

(7) Cut the adhesive tapes holding the walls together.



- (8) The module are fastened by 2 bars, remove the 4 nuts fixing the bars.



- (9) Move the module a few centimeters on the side and pull the bars out.



(10) Open the accessories box to get the access to the XPC and to the different components. Note that within this box there are 3 additional boxes, 2 of them contain a sample cassette and the third one contains a reagent cassette.

(11) Install the Reading Module (on the right) and the Pipeting Module (on the left) on a flat bench (check with a spirit leveling in all directions). Always handle the modules by their base.

- It should have a 5 cm clearance at the rear, 10 cm at the left side and 20 cm at the right side (space needed for taking the protective window out). Space must be made available for the host computer and the bottles.

(12) Loosen the transport screw located on top and back side of the fluidic hood. **Do not try to rotate the fluidic hood while this screw is tight.** Take off the fluidic hood and the lower skin.



Transport screw maintaining the fluidic hood in a fixed position during the shipment.

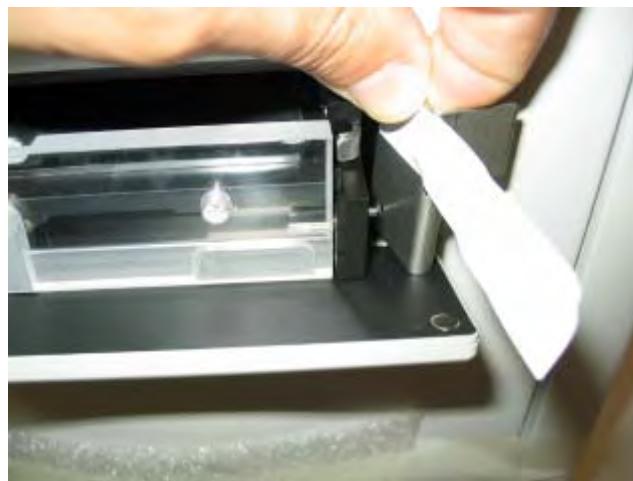
(13) Open the reaction area door



(14) Pull on the white sticker in order to pull the carriage out.



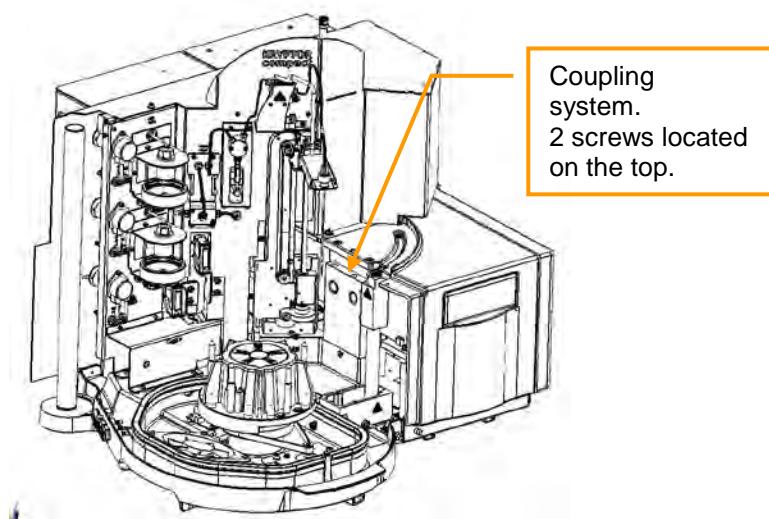
(15) Take the retainer off the pin

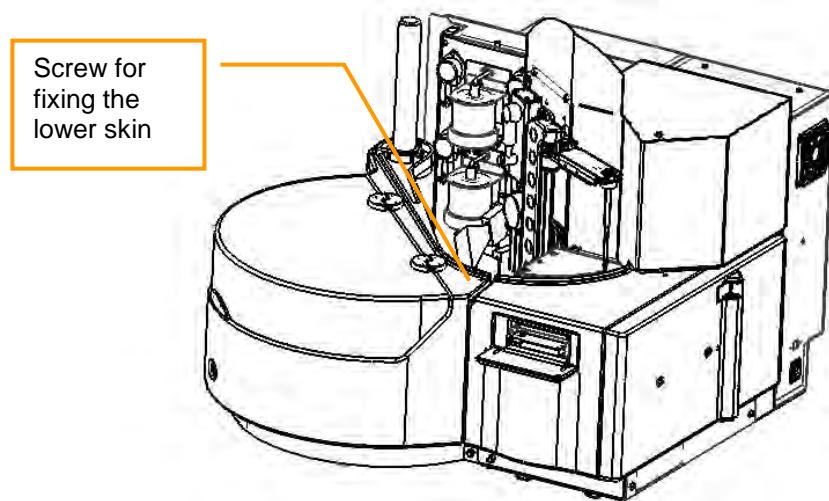


- (16) Insert the retainer in the retainer clamp located at the bottom and rear left side of the reader as shown on the picture here above. The retainer will be stored there for a future use in case of shipment.

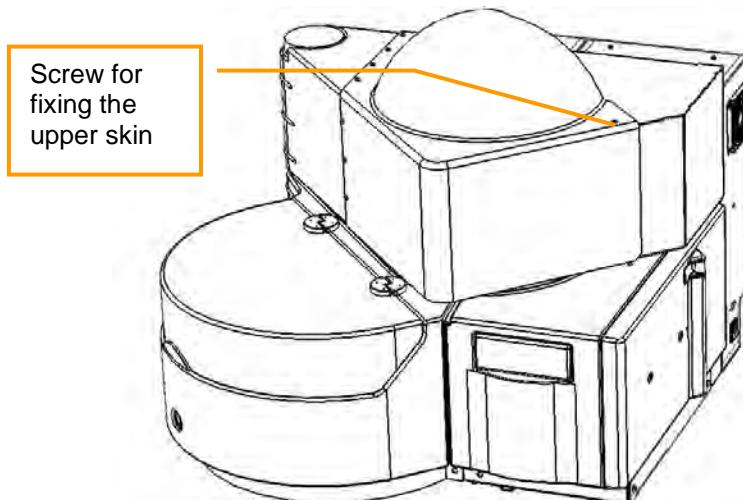


- (17) Cut the cable tie fastening the peristaltic cartridges and plug them on their pumps axis
- (18) Couple the Reading and the Pipeting Modules (put your hands at the positions indicated by the red arrows and assemble the modules). Tighten the 2 screws of the coupling system using an Allen key. It is not necessary to tighten very strong.





- (19) Fix the lower skin of the Pipeting Module on the Reading Module.
- (20) Fix the upper skin of the Pipeting Module on the Reading Module.



- (21) Install the computer (preferably on the right side of the instrument). Connect the screen, the keyboard, the mouse and the hand held scanner. Connect the two power cables.
- (22) The fluidic module must be installed at a lower level than the instrument. Connect the 3 tubings with regards to labels and colors and fill up the bottles with the appropriate liquids.
- (23) Connect the Reading Module directly to the mains and use the looping power cable to bring the power from the Reading Module to the Pipeting Module . Connect the communication cable between the Reading Module and the Pipeting Module.

- (24) Connect the USB cable between the Reading Module and the XPC.
- (25) Check that Reading Module and XPC switches are off then connect their power cables.
- (26) Before this instrument is switched on, make sure it has been properly grounded through the protective conductor of the ac power cable to a socket outlet provided with protective earth contact
- (27) Switch on the instrument.

5.3 Operational Check out

- ↳ If you are a distribution partner, follow / fill out the [B·R·A·H·M·S KRYPTOR compact PLUS installation checklist for FSE page 321](#), perform all the checks and tests requested. Send this checklist along with the validation tests ran during the installation (Matrix 5, PMTTC and fieldtest) to the international hotline at Productsupport.brahms.frnim@thermo.com (compress all the documents in a single zipped file).

Notice that this last requirement is part of the warranty conditions.

- ↳ If you are a local Brahms organization, follow / fill out the [B·R·A·H·M·S KRYPTOR compact PLUS installation checklist for FSE page 321](#), perform all the checks and tests requested. Attach this checklist along with the validation tests ran during the installation to the instrument configuration form in the KSR Lotus Notes database. Collect and send the documents required by your local hotline to your local hotline (refer to [INSTALL PROCEDURE GUIDE LINES page 320](#) and [DOCUMENTS TO BE SENT BACK page 322](#)). The documents in paper format must be signed by the Application Engineer and the Field Service Engineer.

6 System Overview

6.1 General Information

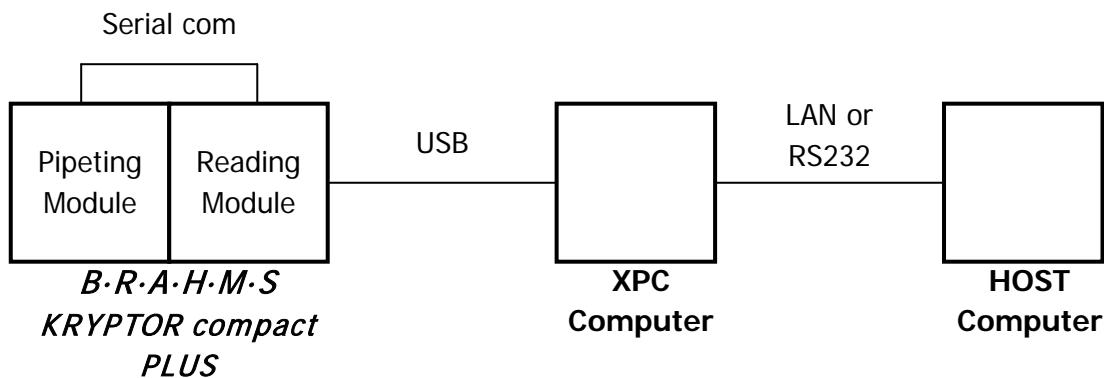
The **B·R·A·H·M·S KRYPTOR compact PLUS** is made of two modules, the Pipeting Module and the Reading Module controlled by an external computer.

Each module has a built in processor based motherboard with its own embedded software and its own settings saved in flash memory.

The communication between **B·R·A·H·M·S KRYPTOR compact PLUS** and the XPC is carried out by an USB connection. Information such as the tests worklist, tests results, instrument status are exchanged through this connection.

The communication inter-modules is carried out by a serial link between both modules and is used to exchange synchronization and status information.

The XPC computer receives the list of tests from the Host computer: Laboratory Information System (or LIS). The results are send back to the host computer after they have been performed.

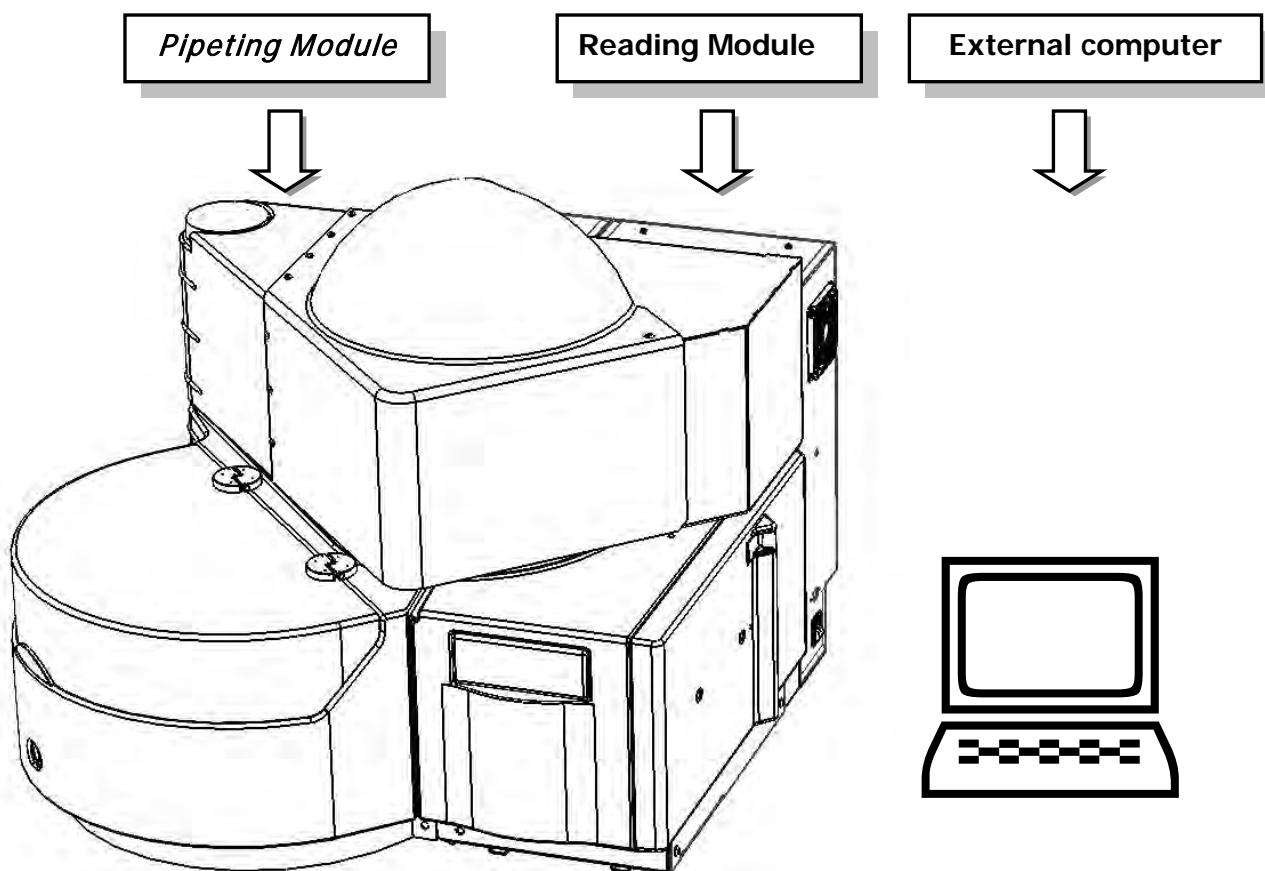


6.2 Concept of modules

The **B·R·A·H·M·S KRYPTOR compact PLUS** has been designed upon the concept of two modules.

This new concept has several benefits:

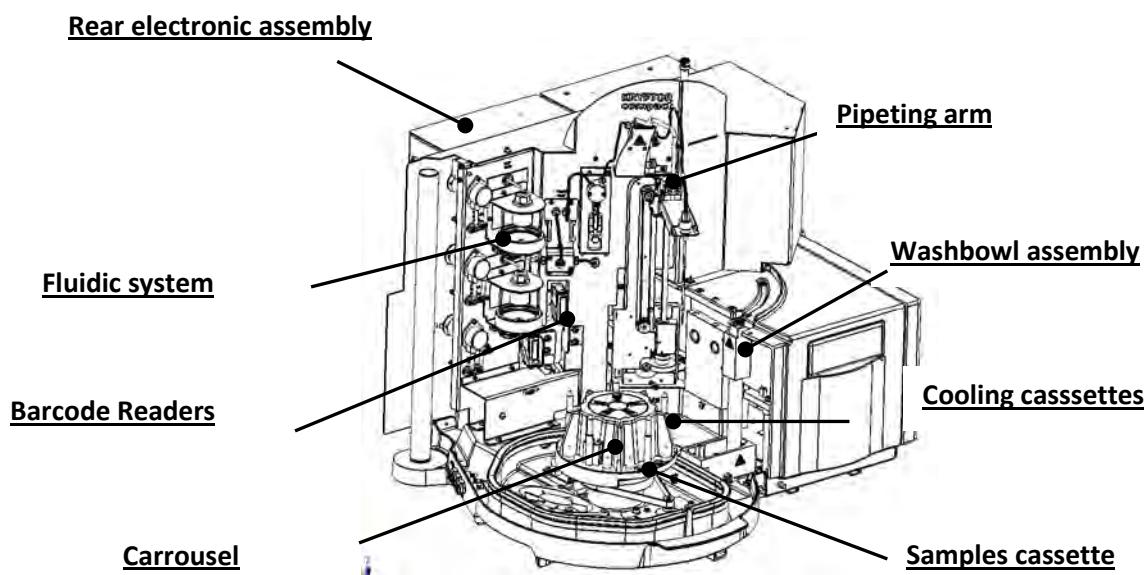
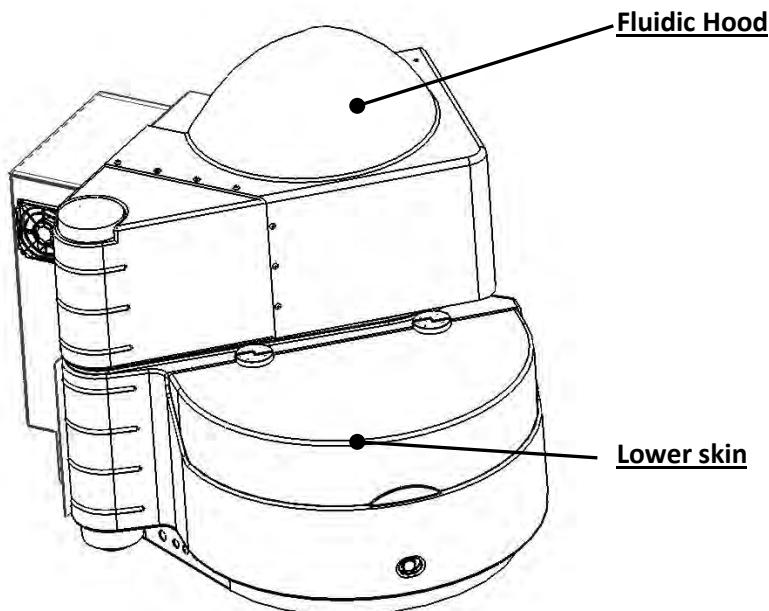
- Easy handling: each module has a reasonable weight and can be handled by a single person.
- Easy installation: a single person can install the instrument and assemble the modules by only two screws.
- Easy maintenance: full access to the parts when the modules are separated. The time required to replace or adjust a part is very short.
- Service efficiency: a module can be replaced in case of a major failure. The new module comes with its pre-loaded settings and does not require any additional adjustments.



6.3 Pipeting Module Overview

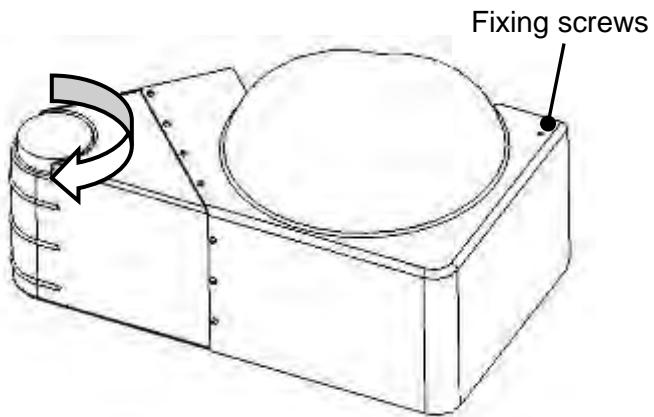
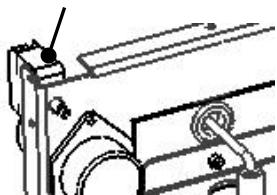
The Pipeting Module manages through 2 barcode readers the samples, the reagents, the washing solutions and the dilutions plates on a five positions carousel. This carousel is flexible and can handle from 1 to 2 cooling cassettes containing the reagents and from 1 to 4 samples cassettes with a capacity of up to 16 sample tubes, up to 4 solution bottles or up to two dilution plates.

The pipeting sequences are carried out by a pipeting arm able to detect and heat the liquid. The fluidic path is always cleaned first by a PBS solution and then rinsed with distilled water.



6.3.1 Fluidic Hood

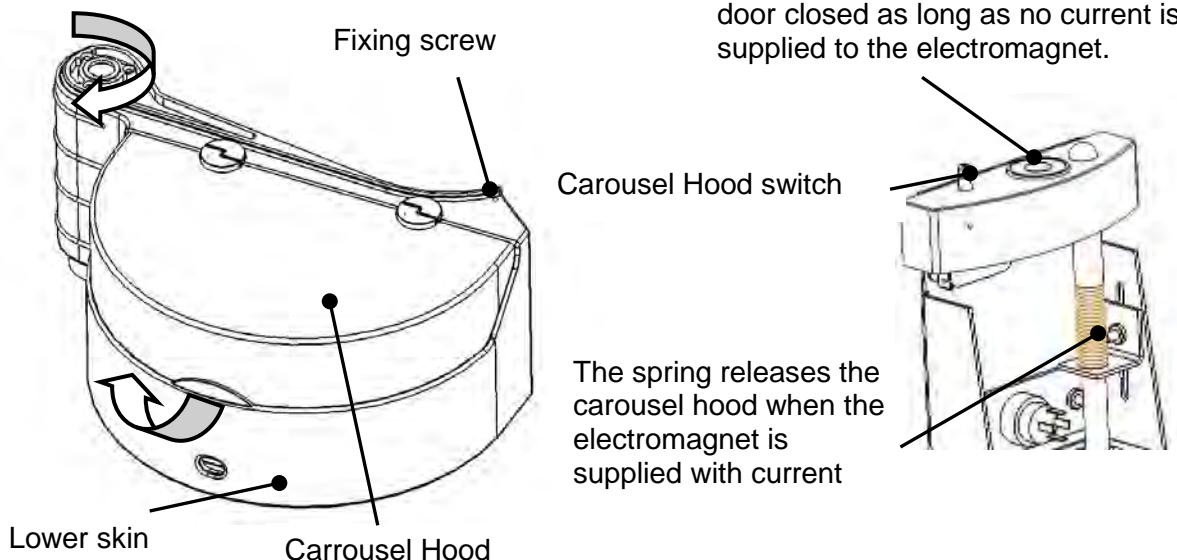
The safety fluidic hood switch detects the upper skin status (open or closed).



The fluidic hood is locked on the Reading Module with 1 fixing screw.

When this hood is opened, the safety switch disables the arm and carousel power in order to prevent any tip or carousel motion. This guarantees user safety.

6.3.2 Lower Skin



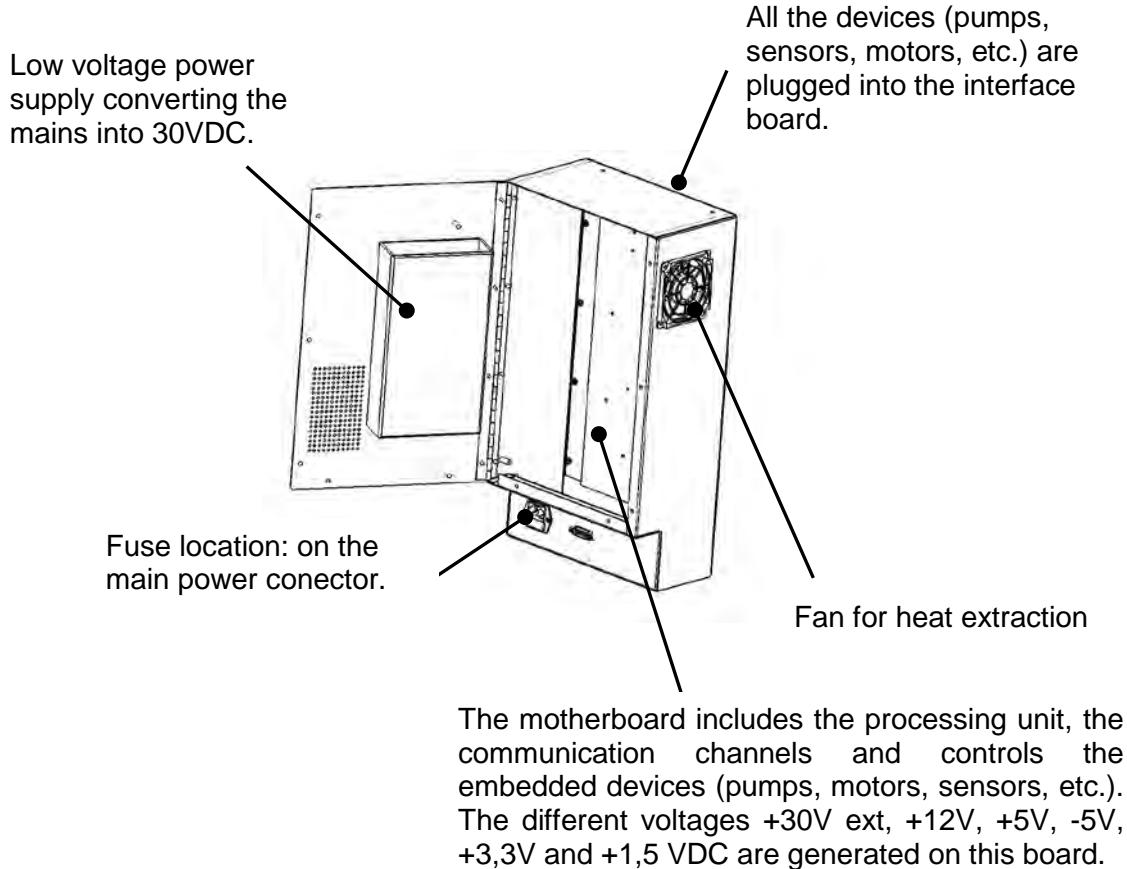
The carousel hood allows the user to access the carousel area.

This hood is closed manually but can only be opened electrically upon a user request through the yellow push button or through the software interface.

When the safety switch detects the hood opening, the power to the carousel motor is switched off preventing any carousel motion while the user is accessing the carousel. When the hood is open, the user can move the carousel manually for handling the cassettes or loading the tubes or the reagent kits or the consumables. However the reagent cassettes are still powered on to keep the reagent kits in good temperature conditions.

The lower skin is fixed to the Reading Module with one screw. Opening this skin allows a service access to the carousel mechanism; it is reserved for the field service engineer only.

6.3.3 Rear Electronic Box Assembly



6.3.4 Pipeting Module Arm

The arm carries out theta and Z motions for pipeting and dispensing the tests.

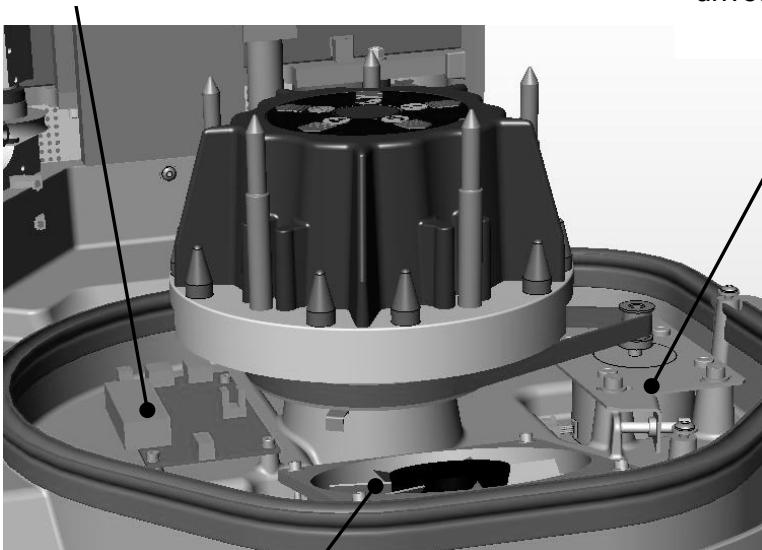
The tip board detects and heats the liquids. A shock detection system is also included in order to protect the tip.



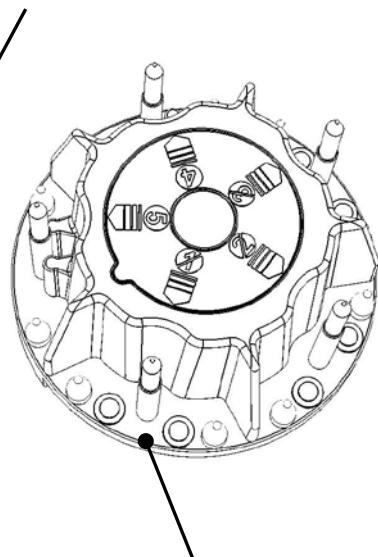
6.3.5 Carousel

The carousel board is a connection board merging the signals from the push button, the power LED, the turning collector, the electromagnet, the carousel safety switch and the carousel fan into a unique cable connecte to the interface board

The carousel stepping motor drives the carousel.



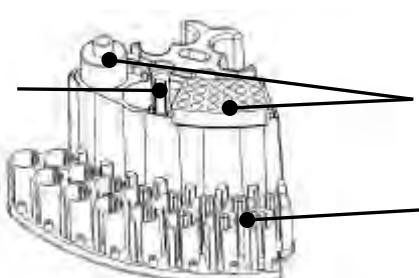
The carousel fan extracts the heating from the cooled sectors.



The carousel supplies 30VDC power on positions 1, 2 and 3 for the reagent cassettes.

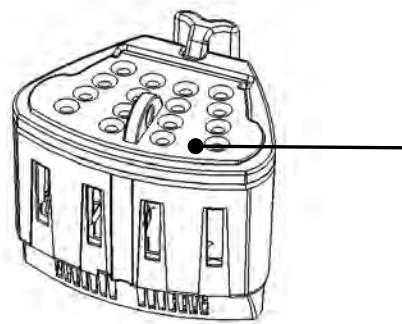
6.3.6 Samples cassette

Sample cassette ID
 (barcodes label)



The sample cassette can receive:
 -2 dilution plates or 4 solution bottles or 1 dilution plate + 2 solution bottles
 -16 samples tubes.

6.3.7 Cooled reagent cassette

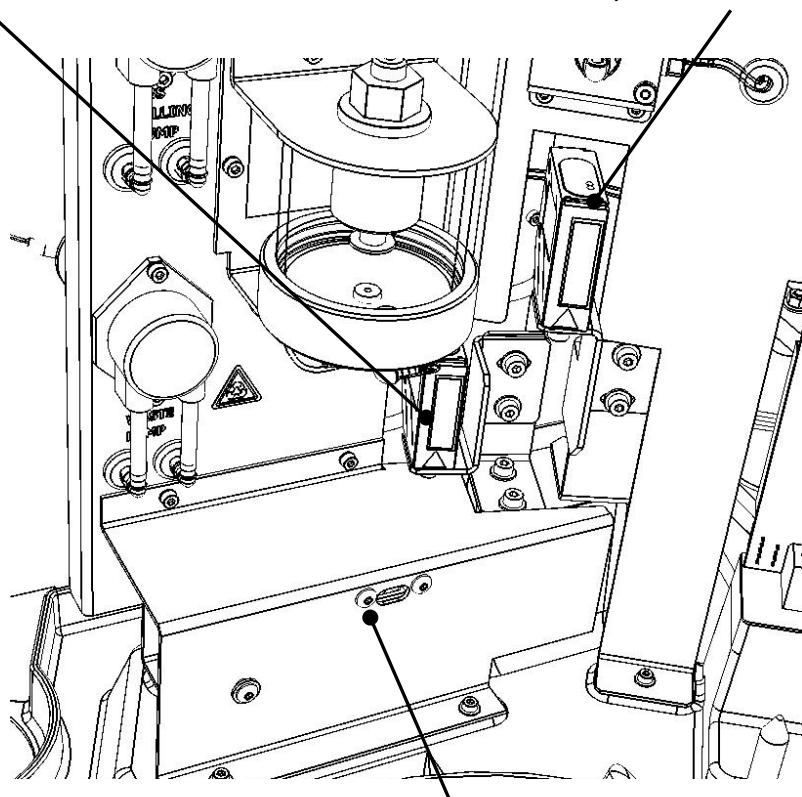


The reagent cassette is capable to maintain 4 reagent kits between 2 and 8°C. Cassette serial number, cooling temperature and others status informations are sent to the instrument each time the cassette crosses the instrument's infrared board position.

6.3.8 Barcode readers

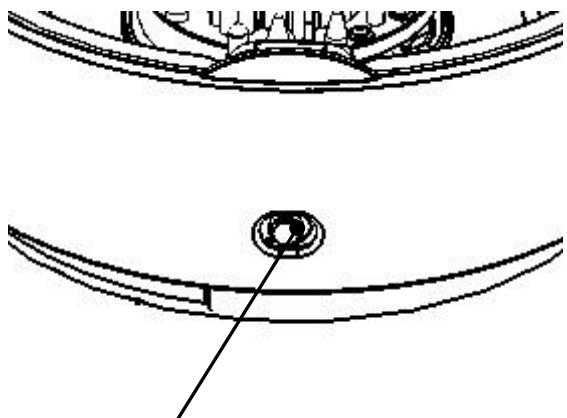
The lower barcode reader reads samples' barcodes but also reagent kits barcodes loaded in the reagent cassettes.

The upper barcode reader reads dilution plates barcodes, washing solution bottles barcodes and sample cassettes ID barcodes.

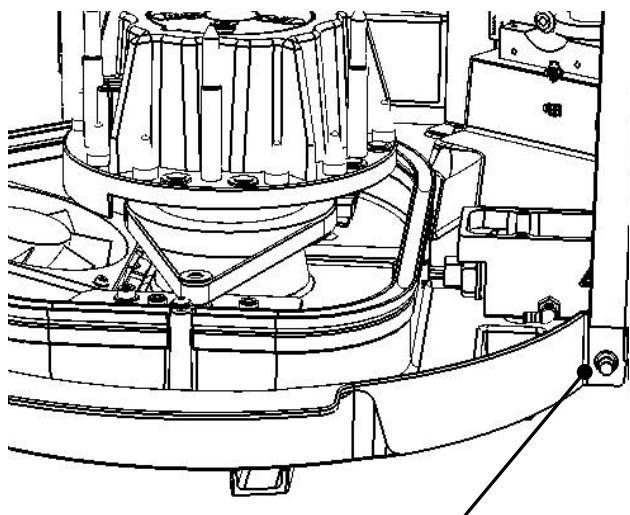


The infrared board communicates with the reagent cassettes to get their serial numbers, cooling temperatures and status informations.

6.3.9 Power LED and Push button functions

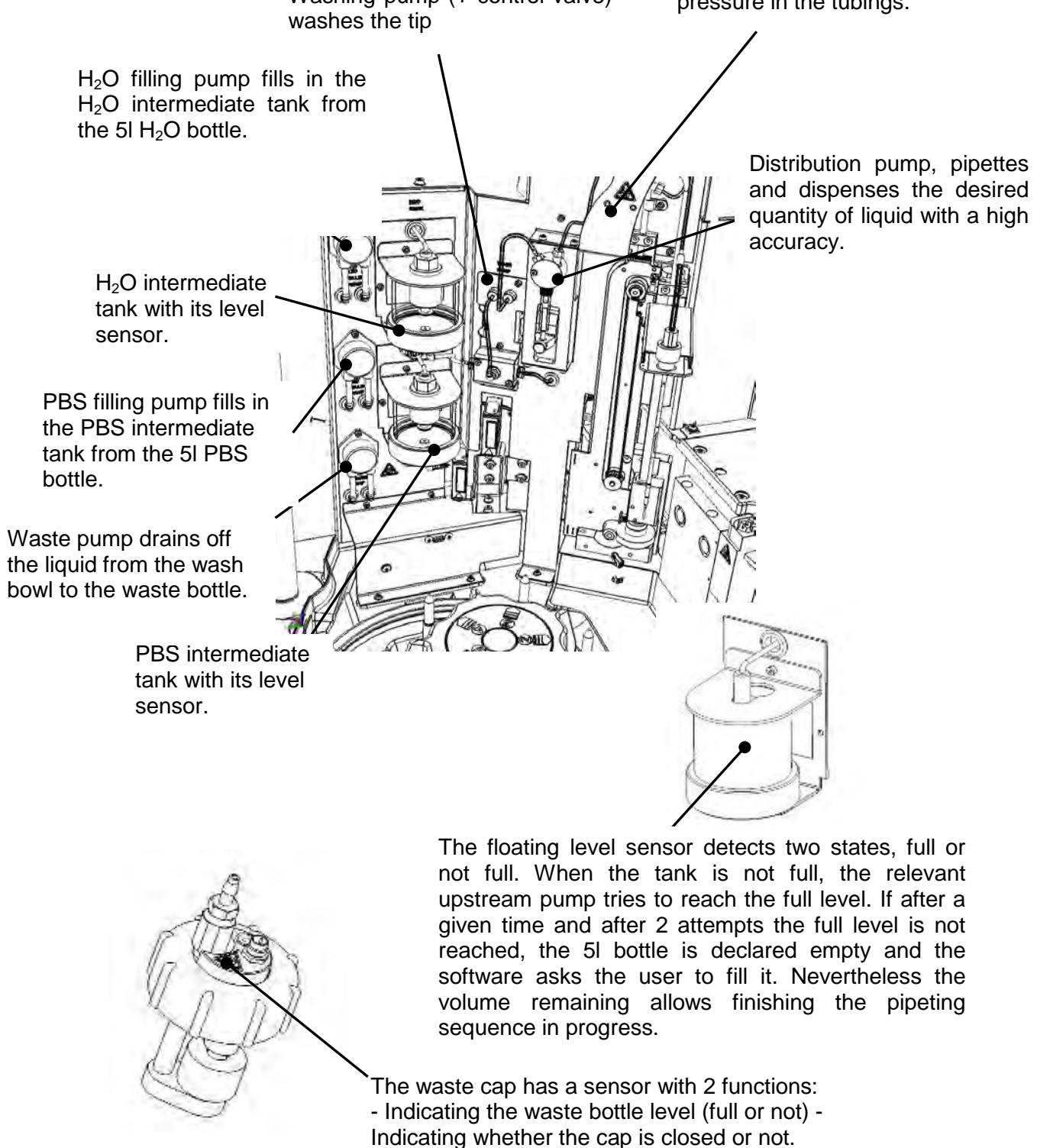


The push button is used to request a pause or a carrousel hood opening. When the push button is pressed, the system completes the last pipeting sequence in progress, washes the tip and opens the carrousel hood allowing a safe access to the user.

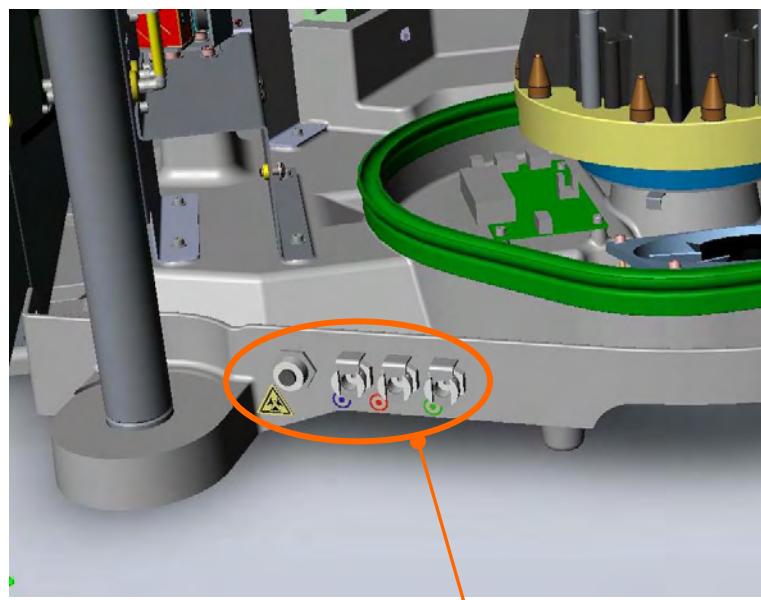
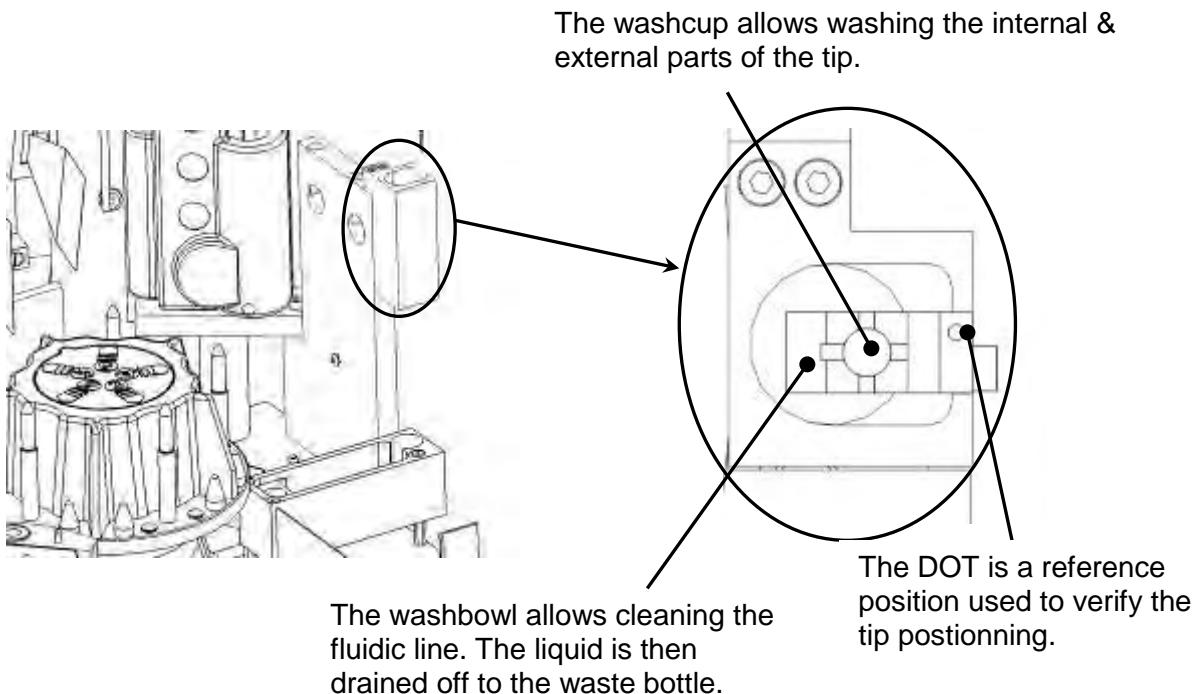


The LED indicates when the Pipeting Module is on.

6.3.10 Fluidic System



6.3.11 Washbowl Assembly



3 fluidic connectors for PBS, H₂O, waste bottles and 1 electrical connector for the waste cap sensor.

6.4 Reading Module Overview

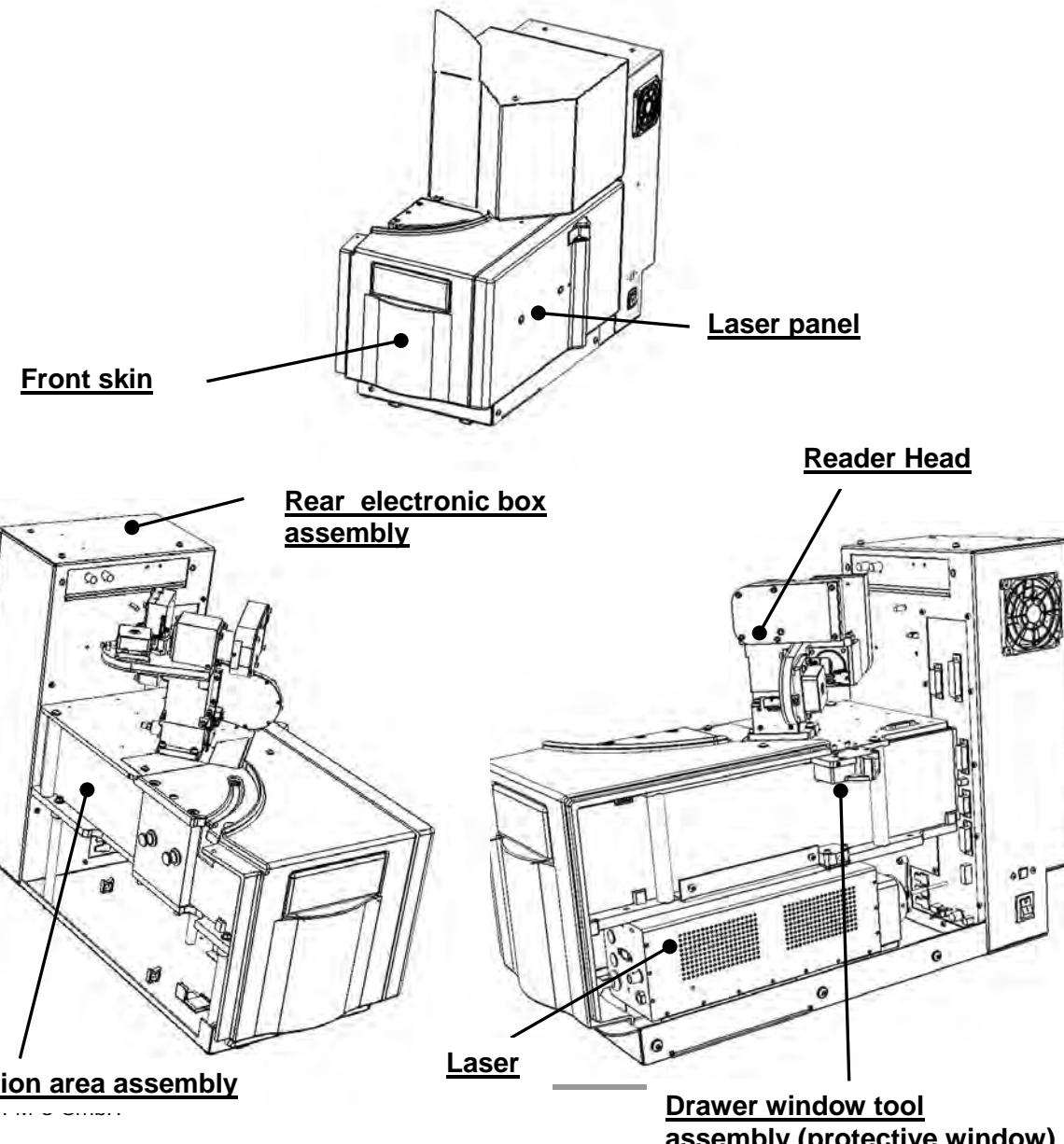
The Reading Module manages and synchronizes the reaction plate motions for the dispensing and reading sequences (marching task). The reaction plate motions are carried out by a carriage driven following 2 dimensions X and Y thanks to 2 stepping motors.

The incubation at 37°C is controlled and regulated by a pan and a ceiling heater and an ambient heater.

The high voltage for the Reader head is delivered by a 2 channels high voltage power supply controlled by software (each channel is independent and controlled separately).

The Reading Module can handle 2 different laser types, SRS laser and LTB laser.

The embedded devices (motors, lasers, high voltage power supply, etc.) are connected to the Reading Module interface board and controlled by the Reading Module motherboard. All the settings are saved in the motherboard flash memory.

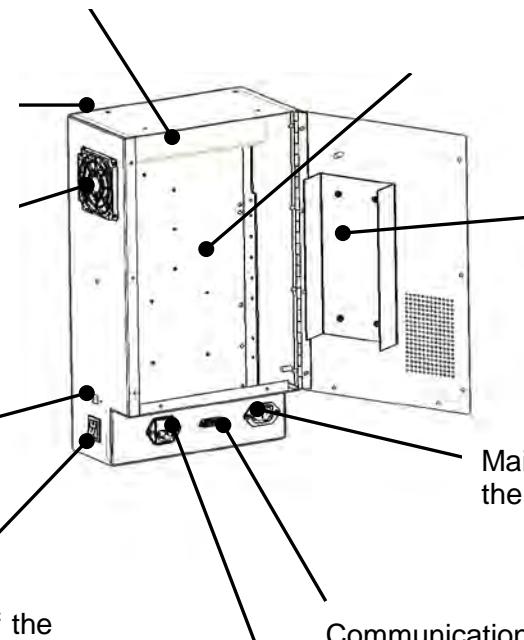


6.4.1 Rear Electronic Box Assembly

The high voltage has 2 independent channels and is controlled remotely by software. It can deliver a voltage up to 1200V max.

The motherboard includes the processing unit, the communication channels and controls the embedded devices (pumps, motors, sensors, etc.). The different voltages +30V ext, +12V, +5V, -5V, +3,3V and +1,5 VDC are generated on this board

All the devices (pumps, sensors, motors, etc.) are plugged into the interface board.

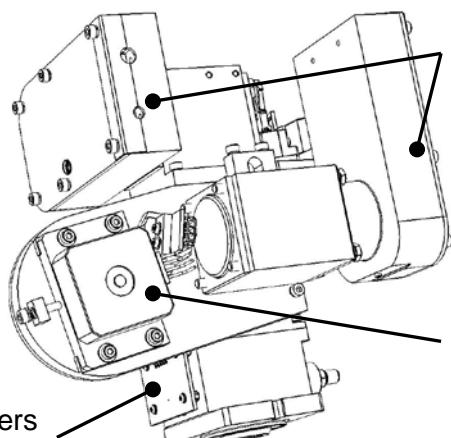


The low voltage power supply unit converts the mains into 30VDC.

6.4.2 Reader head

The Reader head converts the fluorescence signal (photons) into electrical signal.

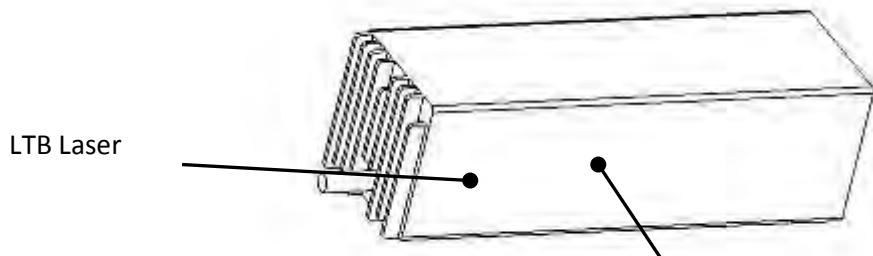
Photodiode board: triggers the counting process after reception of a small part of the laser flash.



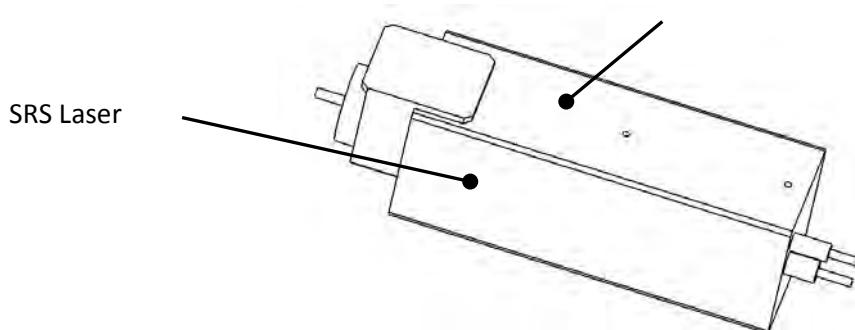
The A (up) & B (down) photomultiplier boards are dedicated to the photomultipliers signals processing.

The motors drive the PM filters independently for A & B channels depending on the wavelength to be used

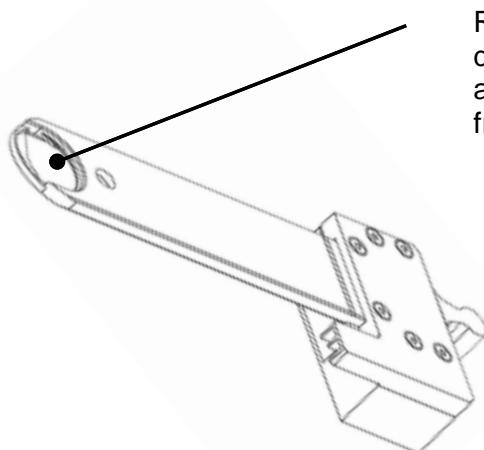
6.4.3 Laser



Nitrogen lasers with a 337nm wavelength:
-SRS lasers are triggered via a BNC connector
-LTB laser is triggered via an optical fiber



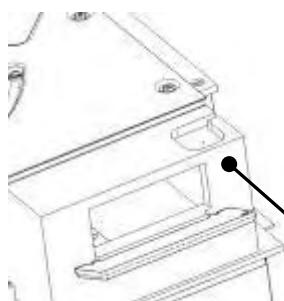
6.4.4 Heated Protective Window



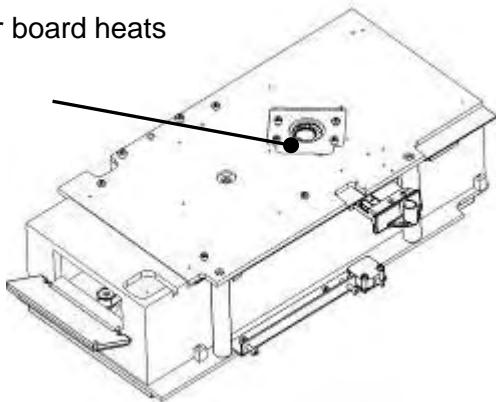
The silica window protects the Reader head lens from splashes or dirts coming from the reaction area. It's heated at 38°C to prevent from condensation.

6.4.5 Reaction Area Assembly

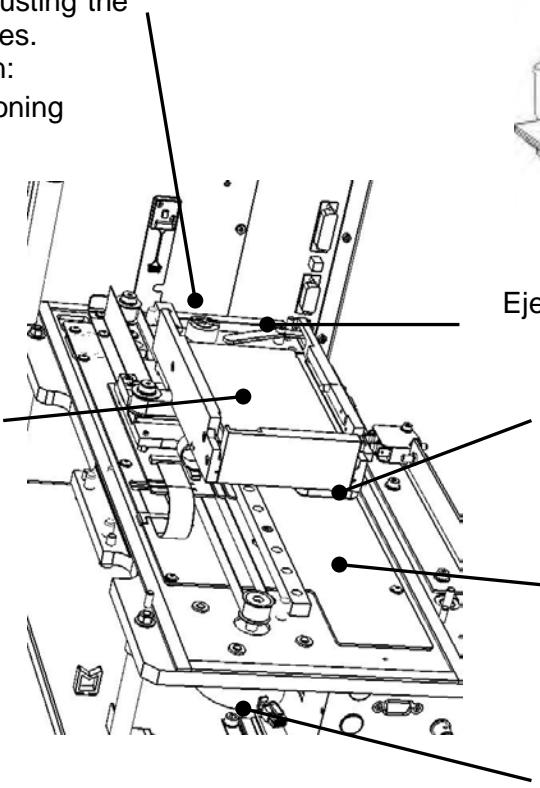
Light source regulated in light intensity. It is used as a reference point for adjusting the reading and dispensing coordinates. The source has a second function: monitoring the reading and positioning systems.



The ceiling heater board heats from the top.



The pan heater board is located below the carriage. It heats the microplate from the bottom.

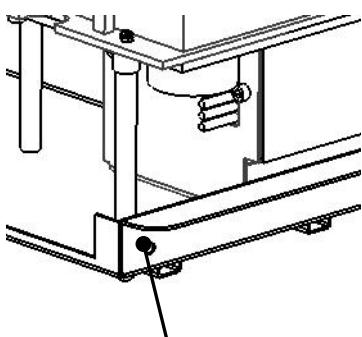


Ejection system for microplate.

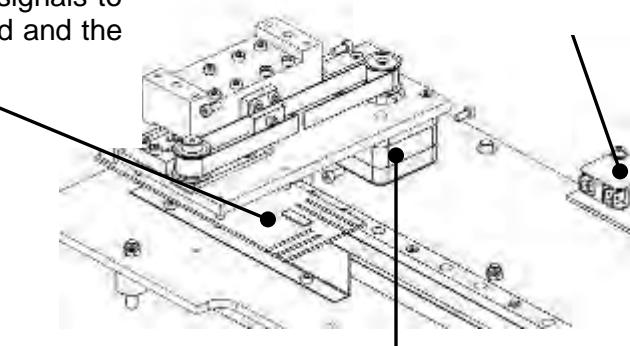
Magnetic sensor (located on the pan heated board) detecting the plexiglass door status (open/closed).

Reaction area ambient heater, heats the reaction area for a better temperature stability

Y motor drives the carriage from the front to the rear of the instrument.



X translator board (or carriage board) supports the X & Y optical home sensors and dispatches the signals to the pan heater board and the X motor.



The laser safety switch detects when the laser panel is open.

When it is open the power to the laser and the high voltage are switched off.

The power LED indicates when the Reading Module is on.

The X motor drives the carriage from the left to the right of the instrument.

6.5 External Computer Overview

The external computer (also named XPC) is composed of 5 parts:

- The central processing unit,
- The screen,
- The mouse,
- The keyboard,
- The hand held barcode reader.



7 KCD Software Manual

7.1 Introduction

KCD (**KRYPTOR compact PLUS** Diagnostic) is a software tool designed to adjust and troubleshoot the instrument.

There are 4 logons (password protected): Expert user, Maintenance, Production, and Development. Each one has several windows and commands available.

Expert user and maintenance accesses will be described in the next chapters, production and development accesses are dedicated to different needs and will not be covered in this service manual.

This chapter describes the different menus, windows and commands available only. The procedures explaining how to adjust and troubleshoot the instrument using this software tool are given in the following chapters.

7.2 KCD windows

7.2.1 Log On

The “Log On” window allows selecting the user group: Expert user, Maintenance, Production, and Development. Each logon is password protected.

For the Maintenance access the password is: “**maintPass**”.

For Expert User access the password is “**expPass**”

“Log On” button

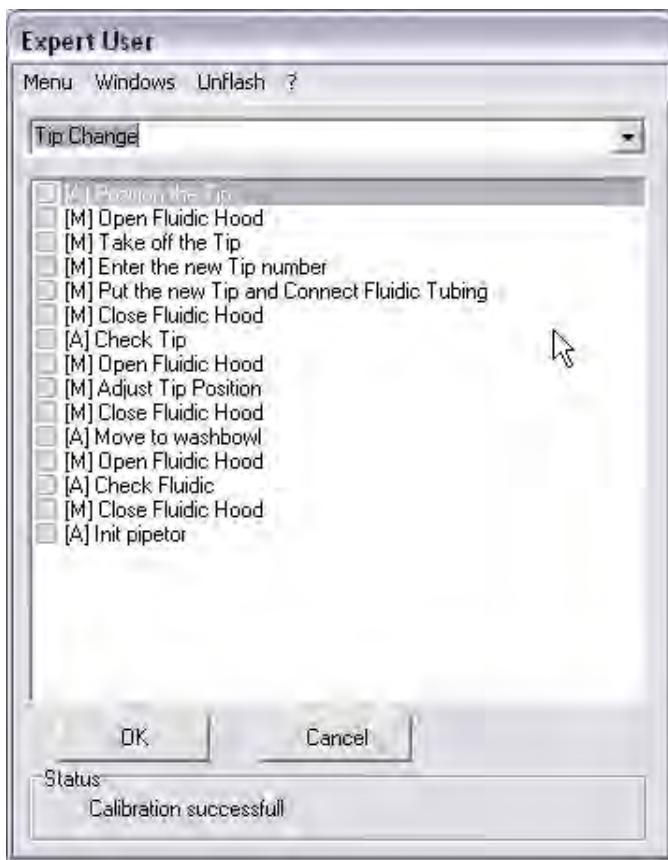
↳ Logs on the user

“Cancel” button

↳ Cancels and closes the application.



7.2.2 Expert User



The “expert user” access is dedicated to some specific user maintenances; they are accessible through a drop down menu. Below this drop down menu, there is a list of actions to do step by step. Some of them are manual and some are automatic.

There are 2 types of actions:

- [M]: the technician must operate manually.
- [A]: the action is done automatically.

OK

- ↳ Validates the action at the top of the list.

Cancel

- ↳ Cancels the maintenance in progress. This function is accessible only at the beginning of the maintenance. It disappears once a critical stage is launched.

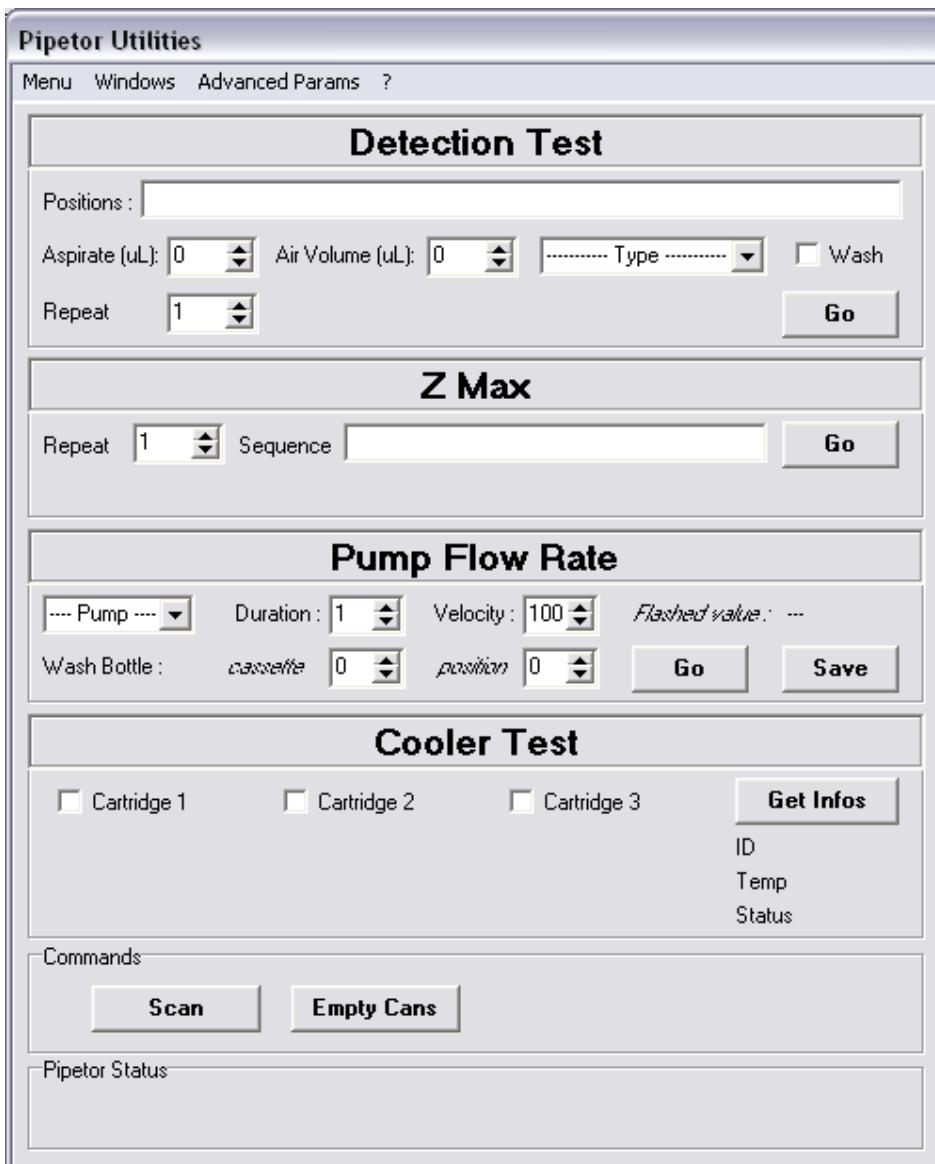
Repeat

- ↳ Allows starting again an automatic operation. This function is accessible at certain stages.

End

↳ Ends the task in progress.

7.3 Pipetor Utilities



Scan

↳ Launches the scan of the barcodes present on the carousel. The barcodes values and their positions are stored in the file 'C:\KCSW\KCD\RESULTS\ScanCarousel.txt'.

Empty Cans

- ↳ Drains the intermediate tanks before shipping, moving the machine or replacing the internal tubings. H₂O and PBS return to their respective external bottles, the bottles contents must be replaced after cleaning of the bottles (the fluidic line between the intermediate tanks and the tip is not drained).

7.3.1 Detection Test

Allows launching cycles of detection or aspiration.

- ↳ **Positions:** *list of positions to be tested*. The positions syntax must be: C1-p1, C2-p2,... where Cn is the cassette number and Pn is the position within the cassette.
- ↳ **Type:** type of container to be tested. It is mandatory to enter the same type of container within a cycle. If you select **Files**, the cycle definition is given in the file "**C:\KCSW\KCD\CYCLE\DetectionTestFieldService.ini**".
- ↳ **Repeat:** number of cycles to be run.
- ↳ **Aspirate:** volume of liquid to be aspirated in µl.
- ↳ **Air volume:** volume of the bubble to be aspirated after the liquid in µl.
- ↳ **Wash:** performs a washing sequence between each test. If the box is not checked, the syringe content is dispensed in the washbowl without any washing sequence.
- ↳ **Go:** launches the cycle.
- ↳ **Stop:** stops the cycle after detection in progress.

The results are saved in the file "**C:\KCSW\KCD\LOG\LogKC.txt**". The results file gives informations whether the liquid is detected or not and if detected at which position (this file is updated all along the cycles).

Some more detailed informations are saved in the file "**C:\KCSW\KCD\RESULTS\Event.txt**". Detection status, altitude of detection, detection level (ADC value), baseline level (ADC value), PWM values are available in this file.

7.3.2 Pump flow rate

Allows checking and adjusting the washing pump flow rate. The liquid is dispensed for a certain time (usually 10 seconds) in an empty solution bottle to allow volume measurement and flow rate calculation.

- ↳ **Pump:** pump to be tested (H2O or PBS downstream pump)
- ↳ **Duration:** pumping time in seconds.
- ↳ **Velocity:** maximum speed in percentage (0 to 100)
- ↳ **Cassette:** cassette position where the solution bottle is located.
- ↳ **Position:** solution bottle position within the cassette.
- ↳ **Go:** launches the cycle.
- ↳ **Save:** Saves the pump flow rate in flash memory

If “cassette” and “position” values are left to 0, the tip dispenses in the washbowl.

7.3.3 Cooler Test

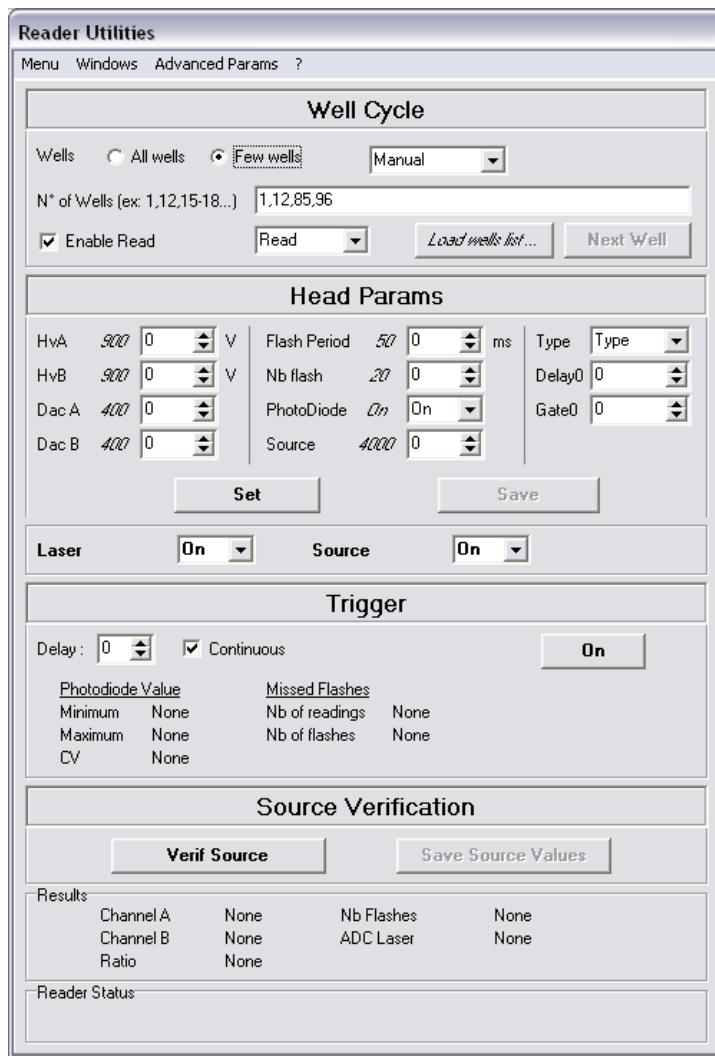
Allows testing the cooling cassettes.

- ↳ **Get Infos:** launches the reading of information on the selected cassettes. ID number, temperature and status of the selected cassettes are displayed.

Meaning of the cassette status:

Bit	Use	Value
0	Regulation in progress	0 no, 1 yes
1	Fan speed	0 min 1 max
2	Temperature in the limits	0 no, 1 yes
3	Maximum stabilization time of the temperature reached	0 no, 1 yes
4		
5		
6		
7		
8	Peltiers driving failure, abnormal current	0 no, 1 yes
9	Peltiers driving failure, abnormal tension	0 no, 1 yes
10	Radiator heat default	0 no, 1 yes
11	Fan defect (at least one fan is defective)	0 no, 1 yes
12		
13		
14		
15	Reset : the board has just been reseted. Put at 0 after reading of the status	0 no, 1 yes

7.4 Reading Module Utilities



7.4.1 Well Cycle

Launches cycles of plate movements (with or without reading/dispensing).

- ↳ **All Wells/Few Wells:** cycle on the whole plate or a list of wells.
- ↳ **Repeat:** number of cycles to be launched (available in **Automatic** mode only).
- ↳ **Enable Read:** carries out readings after move (available in **Read** mode only).

- ↳ **Enable Disp:** dispenses 150µl of water in the selected well (available in **dispense** mode only).
- ↳ **N° of wells:** list of wells, W1, W2 types (available in **Few Wells** mode only).
- ↳ **Load Wells:** loads the list of the wells.
- ↳ **Next Well/Go:** goes to the following well if in **Manual** or launch the cycle if in **Automatic**.
- ↳ **Manual/Automatic:** allows to do wells one by one or all with the continuation.
- ↳ The field “**N° of the wells**” can be filled in: with a unique well number or with a list of wells separated by a comma (ex: 2,12,84) or with a list of wells intervals, an interval being a section of successive wells (ex: 4-16,24-34).
- ↳ For the “**read**” function, the results are saved in the file “**C:\KCSW\KCD\RESULTS\results.xls**” (this file is updated after each reading). The number of counts on the channels A and B, the ratio, the number of flashes detected and the ADC sum are also displayed in real time on the screen in the section “**results**”.

7.4.2 Reader head Parameters

- When opening this window, the displayed values are the last ones sent and the values in italic are the current values in flash memory. The “**set**” button saves the values for the current KCD session only while the “**save**” buttons saves the values in flash memory as permanent values.

Set: Sends the parameters to the instrument in Ram memory (current KCD session only)

Save: Sends the parameters to the instrument in Flash memory (permanent settings)

HvA: High Voltage value in volts for A channel

HvB: High Voltage value in volts for B channel

DacA: Always 400

DacB: Always 400

Source: Source value (0-4096) this value must be set at 2500

Nb flash: Number of laser flashes (20)

Flash Period: Time between 2 consecutive laser flashes (50ms)

PhotoDiode: On/Off

Delay0: Beginning of the reading windows (50µs)

Gate0: Window duration (400µs)

Type: reading on the specified window or on the whole spectrum (whole spectrum is dedicated to the development/production tests only)

Laser: on/off

Source: on/off

-
- To switch on the source, specifying a value is not enough, the box “**Source**” must be also set to “**on**”
 - The settings in the boxes “**Laser**” (on/off) and “**Source**” (on/off) are taken into account as soon as they are selected in the list. For these two settings, it is not necessary to click on **set/save**.
-

7.4.3 Trigger

Triggers a sequence of laser flashes (20 flashes per sequence). The results of the readings are displayed in the section **Read/Results** (at the bottom of the window) and saved in the file ‘C:\KCSW\KCD\Results\TrigResults.xls’.

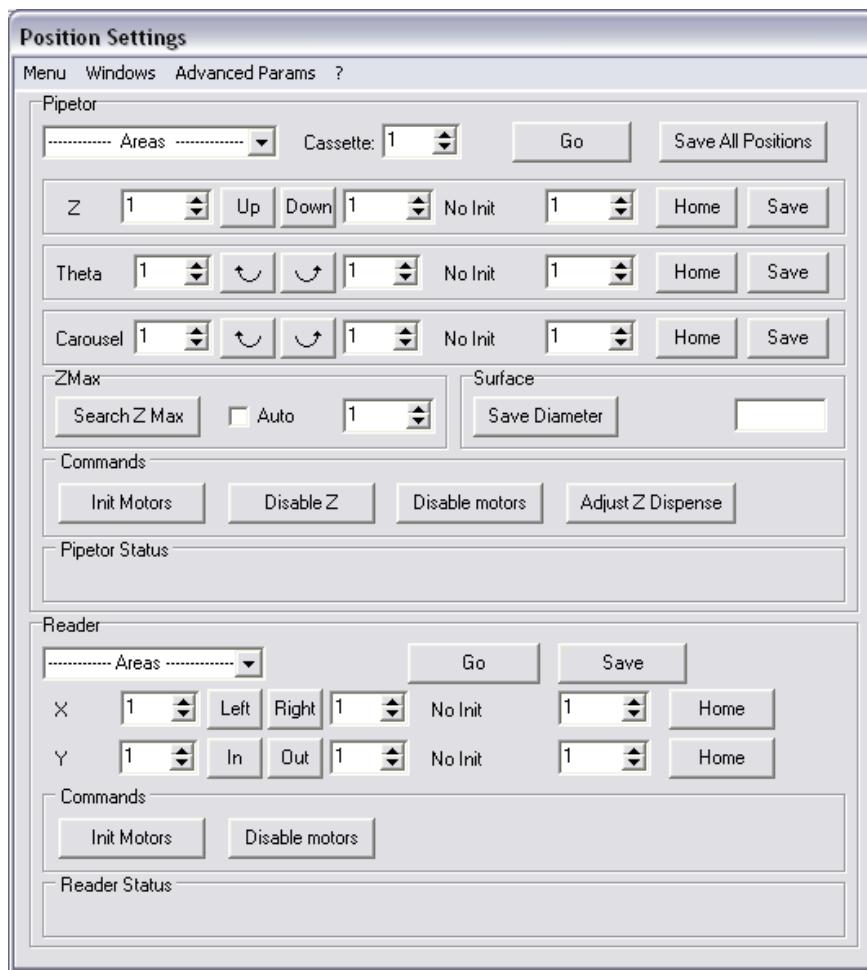
- ↳ **Repeat:** number of cycles to be launched.
- ↳ **Continuous:** allows launching continuous sequences.
- ↳ **On/Off:** launches or stops the cycle.

Warning: The results are saved in the file “C:\KCSW\KCD\RESULTS\ TrigResults.xls”. This file is overwritten each time you start the test.

7.4.4 Verif Count

Reads the source and compares the result (counts on A and B channels) to the values saved in the head settings (values saved in flash memory and visible through head.ini).

7.5 Positions Settings



7.5.1 Pipetor

Areas

- ↳ List of defined areas. During the selection of an area, the corresponding value in step is posted within the frameworks located on the right.

Go

- ↳ Goes to the selected position.

- By default, the coordinates used are the coordinates indicated when the Pipeting Module area is selected (from the values saved in flash memory). You can enter manually target coordinates and reach them by clicking on “Go”.

Save All

- ↳ Saves the whole coordinates in flash memory for the chosen area.

Home

- ↳ Carries out a re-homing of the corresponding motor.

Up/Down/Left/Right

- ↳ Carries out a relative movement of the different motors. The movement is given in steps.

Save

- ↳ Saves in flash the coordinate of the related motor for the chosen area.

Search ZMax

- ↳ The arm goes down, when the tip reaches the bottom: the Z value is saved as Zmax and ZII is calculated and saved automatically, then the arm goes to ZII.
 - Launch this function only with an empty container.

Save ZMax

- ↳ Used to save Zmax when Zmax is adjusted in manual mode. ZII is calculated and saved automatically when clicking on “**Save ZMax**”.

Auto

- ↳ When this box is ticked, the mode is the automatic mode and you can see the button “**Search ZMax**”. When this box is not ticked, the mode is the manual mode and you can see the button “**Save ZMax**”.

Init Motors

- ↳ Initializes the Pipeting Module motors.

Disable Z

- ↳ Releases the Z motor.

Disable motors

- ↳ Releases all the Pipeting Module motors.

- Sample 1, µcup 1, Calibrator 1, Wash Bottle 1, APC 1 and DilWell 1 are the reference positions for their respective areas, the other ones are defined by offsets regarding these reference positions. For a given area, you must adjust its reference position first.

- Sample 15, µcup 15 and Calibrator 15 define the number of carousel steps needed to go from position 1 to position 15 (of the same cassette). This carousel angle is defined by the last saved of these 3 positions.

7.5.2 READER

Areas

- ↳ List of reference positions..

Go

- ↳ Moves to the selected position.

- By default, the coordinates used are the coordinates indicated when the Reading Module area is selected (from the values saved in flash memory). You can enter manually target coordinates and reach them by clicking on "Go".

Save

- ↳ Saves in flash memory the coordinates for the selected area. The value(s) saved is (are) the current coordinates (greyed values).

Left/Right/In/Out

- ↳ Carries out a relative movement of the different motors. The value of move is given in steps.

Home

- ↳ Carries out a re-homing of the related motor

Init Motors

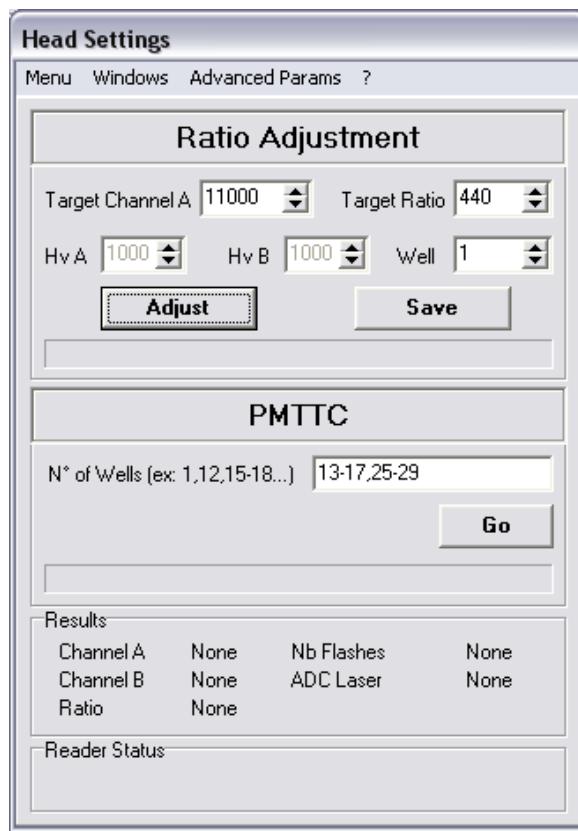
- ↳ Initializesd the motors of the Reading Module

Disable Motors

- ↳ Releases the motors(maintaining current is switched off).

- The adjustments must be carried out in this order: Source, Well1 and finally Well96, the last ones being dependent from the first ones.

7.6 Head Settings



7.6.1 High Voltage Adjustments

Adjusts automatically the high voltage values on A and B channel in order to reach the targets in terms of number of counts on A and ratio.

Target Channel A: Target value for A channel in counts (cps)

Target Ratio: Target ratio.

Well: well used (dispensed with cryptate) to perform the adjustment.

HvA: automatically adjusted setting on A channel to reach the targets.

HvB: automatically adjusted setting on B channel to reach the targets.

Adjust: starts the automatic adjustment process.

Save: saves the determined parameters (HV values) in flash memory.

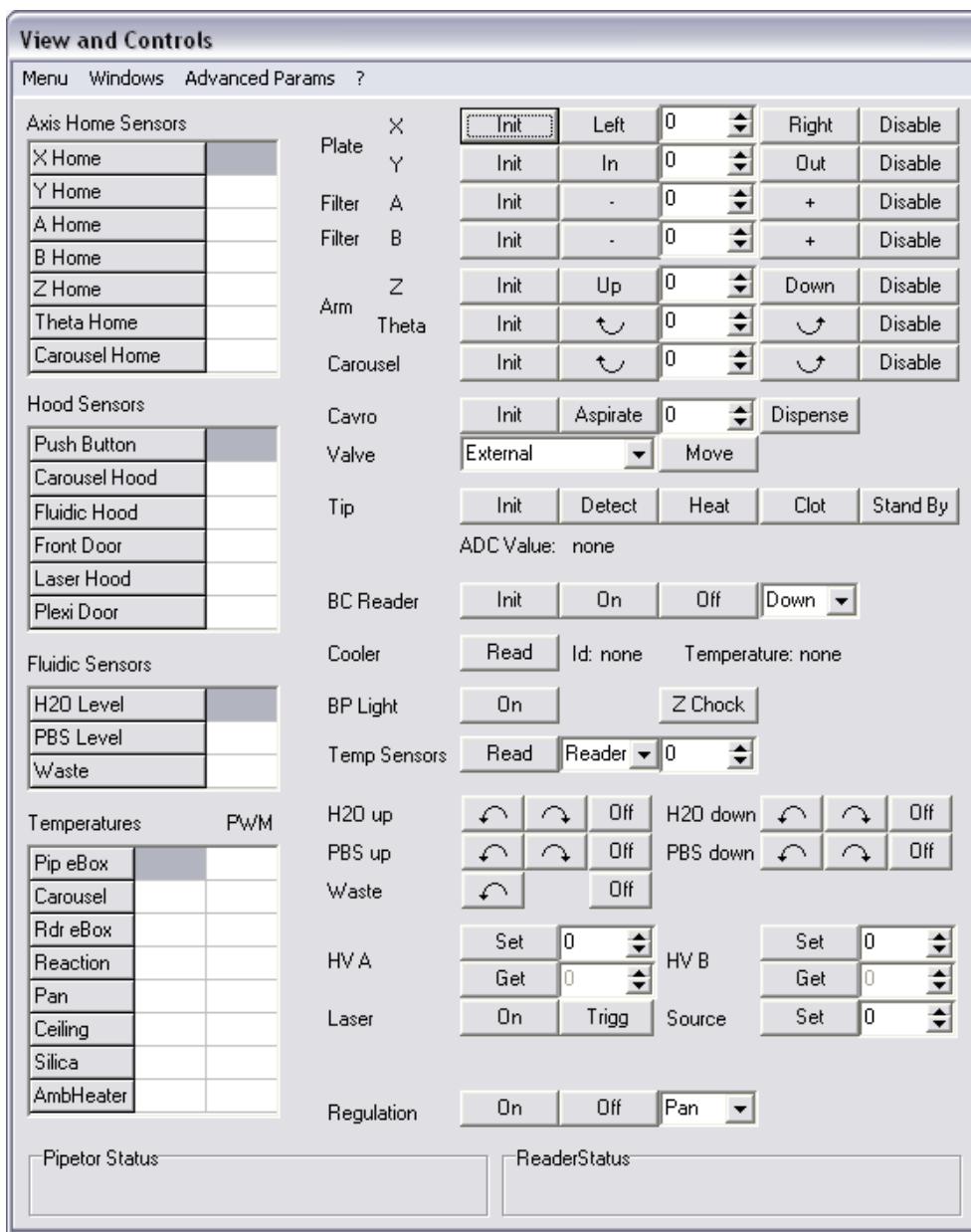
7.6.2 PMTTC

Reads the specified wells with and without the silica window (refer to PMTTC chapter for more details).

N° of Wells: list of the wells to be read.

Go: starts the test.

7.7 View and Controls



- Under "View and Controls" the securities are disabled, for your safety remove your hands from the machine before requesting any movement. Pay attention to the requested movements (check that they are feasible) and especially for the arm movements.
- This view does not require a Pipeting Module or a Reading Module initialization however you have to initialize the axis to its home position prior to requesting the first movement on that axis.

7.7.1 Sensors

The board displays a list of the different instrument sensors and their status. This board is updated every 2 seconds approximately. The sensors Pan and Ceiling return a temperature only when the regulations are activated.

The Waste sensor is at the same time a presence and a level sensor: when the status is "**High**" that means that the waste bottle is either full or not present (the waste bottle cap is not closed).

7.7.2 Motors

Init

- ↳ Initializes and homes the selected motor.

Up/Down/Left/Right

- ↳ Carries out a relative movement of the different motors. The movement unit is given in steps.

Disable

- ↳ Releases the corresponding motor.

7.7.3 Cavro

Init

- ↳ Initializes the syringe.

Aspirate/Dispense

- ↳ Aspirates or dispenses the entered volume (in μl). The valve is always positioned in external position, id towards the tip.

7.7.4 Valve

Move

- ↳ The valve turns in internal position (towards the tanks), external position (towards the tip) or in Bypass position.

7.7.5 Tip

Init

- ↳ Initializes the tip program. Check the heating and liquid detection system..

Detect

- ↳ Switches the tip in detection mode (led D7 lit). Goes down until the liquid is detected.

Heat

- ↳ Switches the tip in heating mode (led D5 lit).

Stand By

- ↳ Switches the tip in stand by mode.

7.7.6 BC readers

Init

- ↳ Initializes the corresponding barcode reader.

On/Off

- ↳ Switches on and off the selected barcode reader.

7.7.7 Cooler

Read

- ↳ Reads the reagent cassette located in front of the infrared board. If a cassette is detected, its serial number and its temperature are posted.

7.7.8 Push Button Light

On/Off

- ↳ Switches on and off the blue push button LED.

7.7.9 Zchock

Displays the status of the shock detection sensor: **In** or **Out**

7.7.10 Temp Sensors:

Read the temperature of the chosen sensor

Reading Module

- 0: Pan sensor
- 1: Pan security sensor
- 2: Ceiling sensor
- 3: Ceiling security sensor
- 4: Ambient reaction area
- 6: Ambient Reading Module
- 7: Silica Window

Pipeting Module

- 2: Carrousel temp sensor
- 6: Ambient Pipeting Module

7.7.11 Pump

On/Off

- ↳ Switches on and off the pumps. The Waste pump is always active. If the cavro pump is installed, the valve is set to bypass" mode.

-
- The automatic filling function is disabled under view and controls and there is no liquid level monitoring on the intermediate tanks, this can lead to an intermediate tank overflow or a functioning with empty intermediate tanks.
-

7.7.12 HVA & HVB

Set

↳ Adjusts the high voltage value.

Get

↳ Gets the feedback from the ADC converter (value is given in volts)

7.7.13 Laser

On/Off

↳ Switches the laser **On** or **Off**.

Trigg

↳ Triggers a sequence of 20 flashes.

-
- The laser is switched off if the laser panel is open.
-

7.7.14 Source

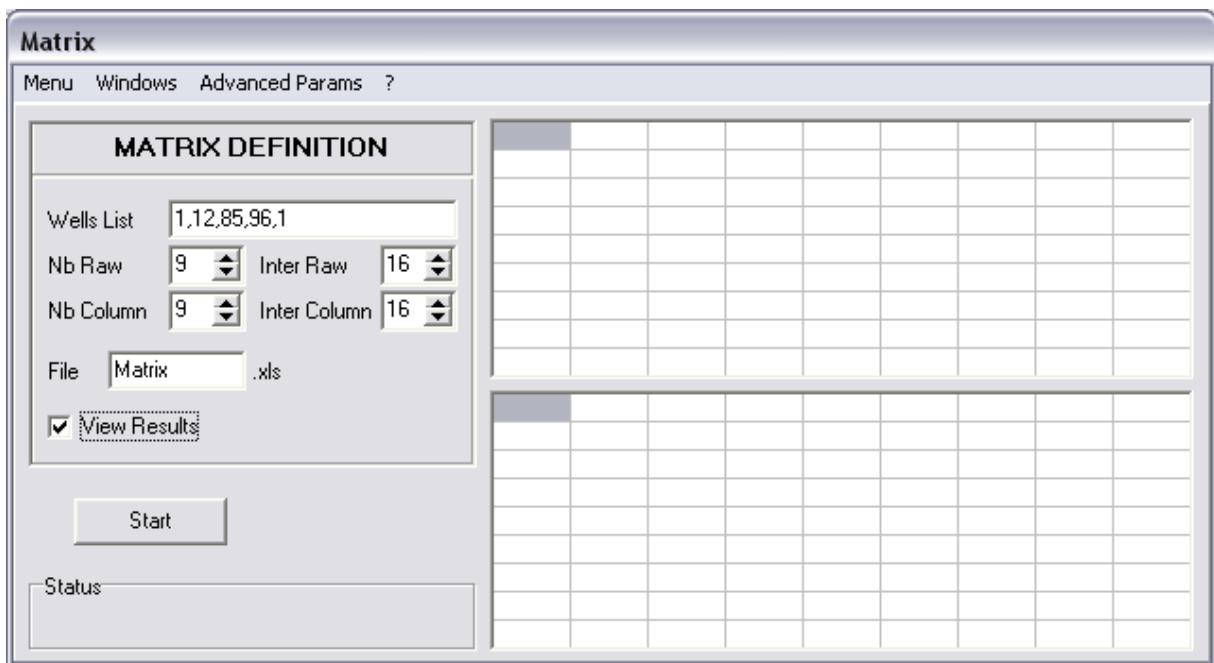
Set

↳ Adjusts source value.

7.7.15 Regulation

Activates / disable the temperature regulation on the selected heater (Pan, Ceiling, Silica)

7.8 Matrix



Start: Launches the acquisition. The results are displayed in real time if the box “**View Result**” is selected.

Stop: Stops the acquisition.

- ↳ **Wells List:** List of wells where the matrix test has to be carried out. By default, the wells list is 1, 12, 85, 96, 1.
 - ↳ **Nb Raw:** number of rows.
 - ↳ **Nb Column:** number of columns.
 - ↳ **Inter Raw:** numbers of steps between two rows.
 - ↳ **Inter Column:** numbers of steps between two columns.
 - ↳ **File:** filename given to the file containing the raw data. The results file is located in c:\KCSW\KCD\RESULTS\, the default filename is matrix.xls.
-
- If the file already exists, it is overwritten.
-

7.9 Barcode reader test

Barcode Reader Test

Menu Windows Advanced Params ?

<input type="checkbox"/> Reagent				
C 1 Results	C 2 Results	C 3 Results	C 4 Results	C 5 Results
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
ID	ID	ID	ID	ID
DP 1				
DP 2				
WB 1				
WB 2				
WB 3				
WB 4				

Clear **Clear** **Clear** **Clear** **Clear**

Pipetor Status

Barcode Nb : Scan Test

Scan Nb : Calibration

0%

7.9.1 Scan Test

Compares the codes read with the codes entered manually on the interface. Carry out one or more carousel scans and checks whether the codes have been read properly or not.

- ↳ **Scan Nb:** numbers of scans to be run.
 - ↳ **Results:** for each barcode, the number of reading(s) is displayed in the column “results”.

- ↳ **Reagent**: you have to tick this box to indicate that the barcodes to be read are kits barcodes located in a reagent cassette.
- ↳ **ID**: identification barcode of the sample cassette.
- ↳ **DP**: identification barcodes of a dilution plate.
- ↳ **WB**: identification barcodes of a solution bottle.
- ↳ For the solution bottles and the dilution plates, the two codes must have been entered.
- ↳ The barcodes can be entered in the cells thanks to the hand scanner.

7.9.2 Calibration

Calibration

Adjusts the scan parameters.

Clear

Deletes the barcodes in the related cassette.

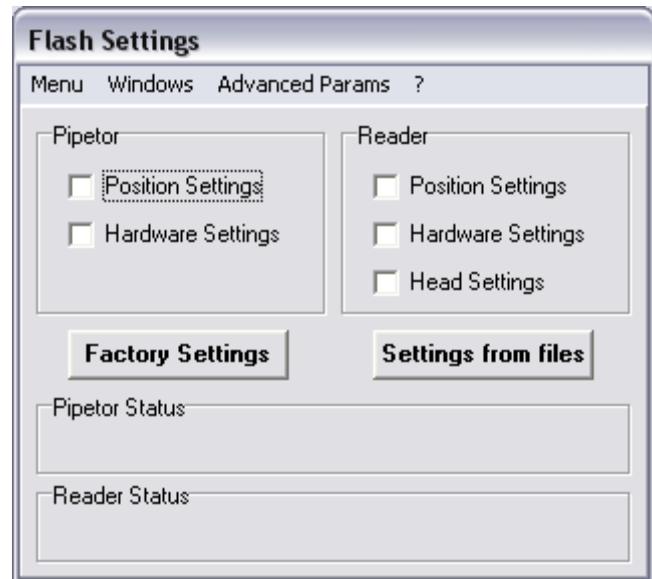
7.10 Flash Settings

7.10.1 Factory Settings

Sends the “factory” settings selected into flash memory.

7.10.2 Settings from files

Sends the settings coming from backup files into flash memory. For each ticked check box, you will see a browsing window and you will have to indicate the related file.

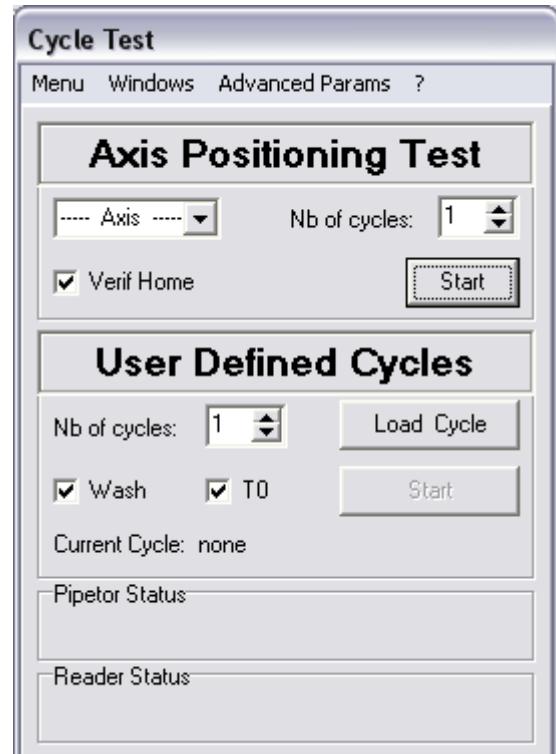


7.11 Cycle Test

7.11.1 Axis Positioning Test

Launches one or several cycles on the different axis in order to check the positioning system.

- ↳ **Axis:** axis selection. (“*Plate*” stands for simultaneous movements of X and Y axis).
- ↳ **Nb of cycles:** number of cycles to perform.
- ↳ **Check Home:** checks that after each cycle the axis can go back to the home position without loosing too much steps. The results are saved in the file “C:\KCSW\KCD\Log\LogKC.txt”.
- ↳ **Start:** launch the cycles. The cycles are defined in the file C:\KCSW\KCD\Cycle\AxisTest.ini”.



7.11.2 User Defined Cycles

Load Cycles

- ↳ Opens a browsing window allowing choosing a predefined cycle.

Start: Launches the cycle.

- ↳ **Wash:** carries out a washing sequence between each test.
- ↳ **T0:** carries out a T0 reading for each test defined in the cycle.

7.12 Unflash function

The unflash function is used to remove the current embedded software from the flash memory. This function will be used for software updates only.

7.13 About



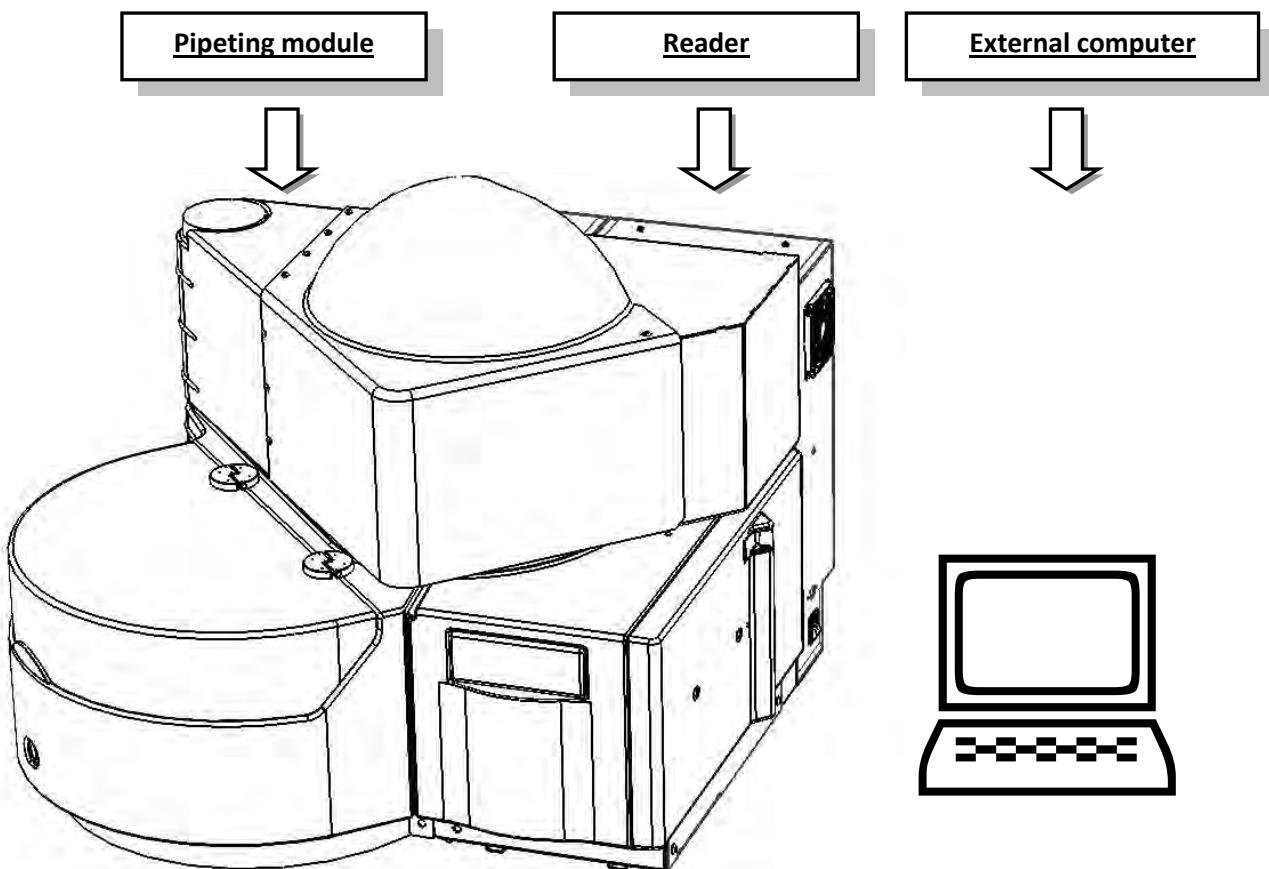
Displays the KCD software version, the Pipeting Module and the Reading Module embedded softwares versions. The compatibility between KCD and the embedded software version is checked. In case of non compatibility, the embedded software version required to work with KCD is displayed on this window.

User Manual: this link is a shortcut to the HTML KCD user manual.

8 Parts Replacement

Refer to appendix - [Tests by interventions page 333](#) - to know the appropriate checks/adjustments and tests to be performed after replacement of parts during a service intervention (including installation and preventive maintenance).

This chapter explains how to replace the main parts.



8.1 Crosses Reference Lists

The Part Numbers are composed of the letter C and 6 numbers (S is also used for refurbished parts):

The spare part catalog is provided separately.

If you want to order some spare parts, please contact the Spare Part Department:
spareparts.brahms.frim@thermofisher.com

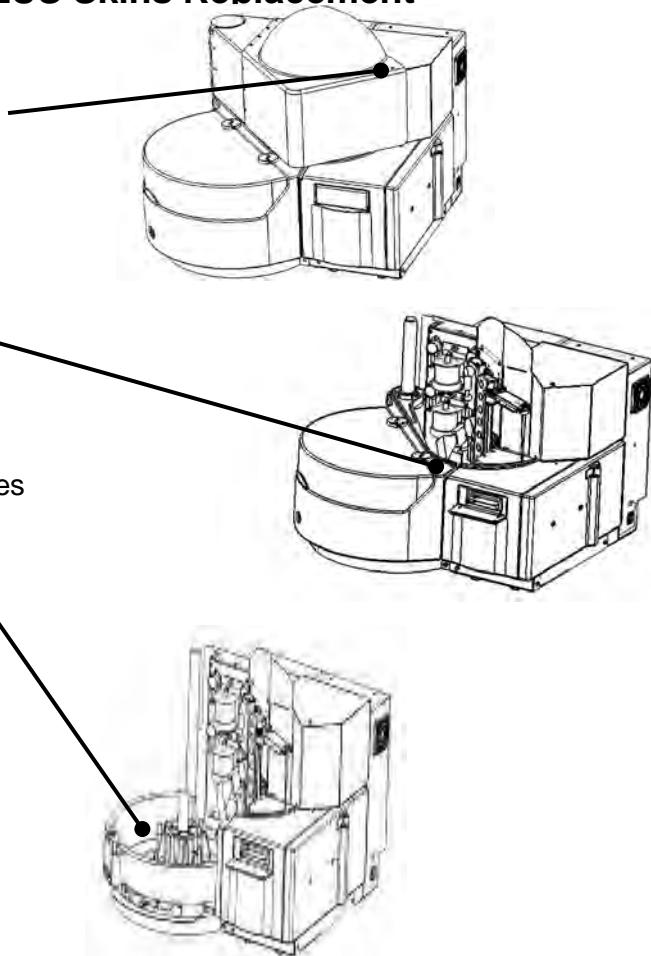
8.2 Necessary Tools

5.5 flat wrench.
2.5 screwdrivers for slotted head.
Little screwdriver for Pozidriv head.
Set of Metric hexagonal keys.
Set of Metric sockets
Multimeter (high voltage compatible, up to 1500V).
A Joulemeter
A belt tension meter tool
Empty kits, dilution plates, calibrator vials, microcups+holders, sample tubes and solution bottles for pipeting coordinates adjustment.

8.3 B·R·A·H·M·S KRYPTOR compact PLUS Skins Replacement

8.3.1 Pipeting module

- (1) Remove the screw of the fluidic hood.
- (2) Raise and take off the fluidic hood.
- (3) Remove the screw on the lower skin
- (4) Raise the lower skin and take it off.
- (5) Remove all samples and reagent cassettes
- (6) Remove the carousel tray (4 screws).



- Take care to the fan extracting the air below the carousel when you operate the instrument without the carousel tray. The blades may hurt your hands.

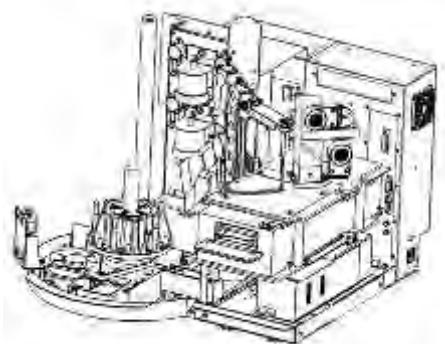
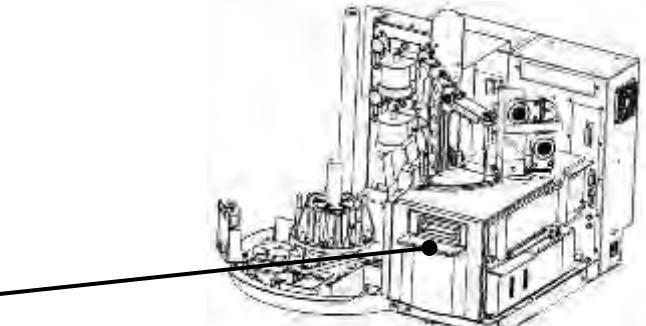
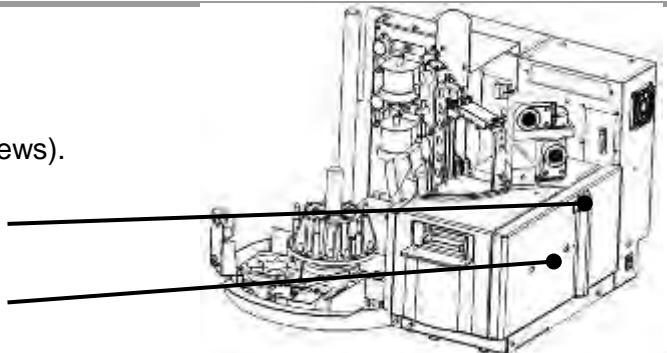
8.3.2 Reading module

(1) Remove the reader head cover (3 screws).

(2) Remove the silica window drawer.

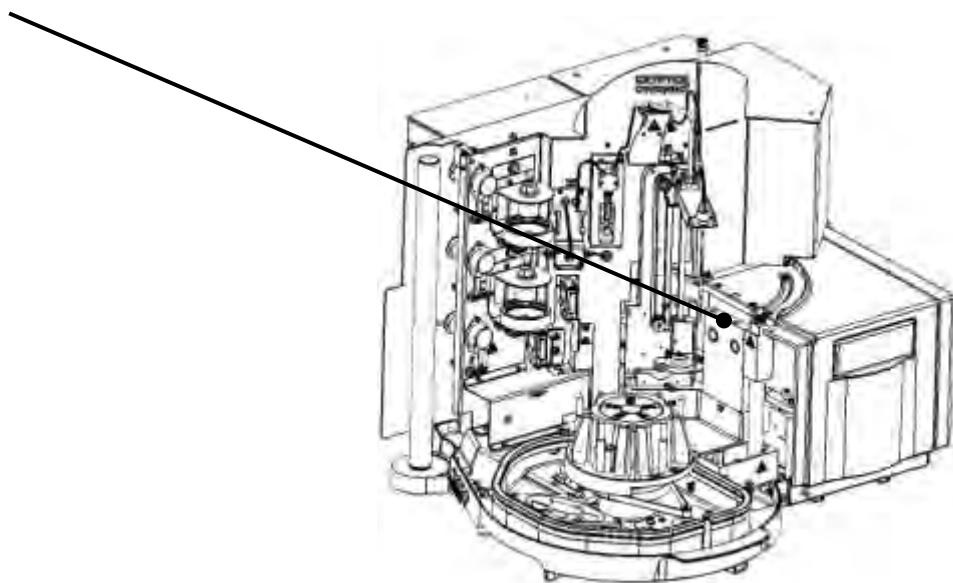
(3) Remove the laser panel (2 screws).

(4) Remove the front skin (1 screw).

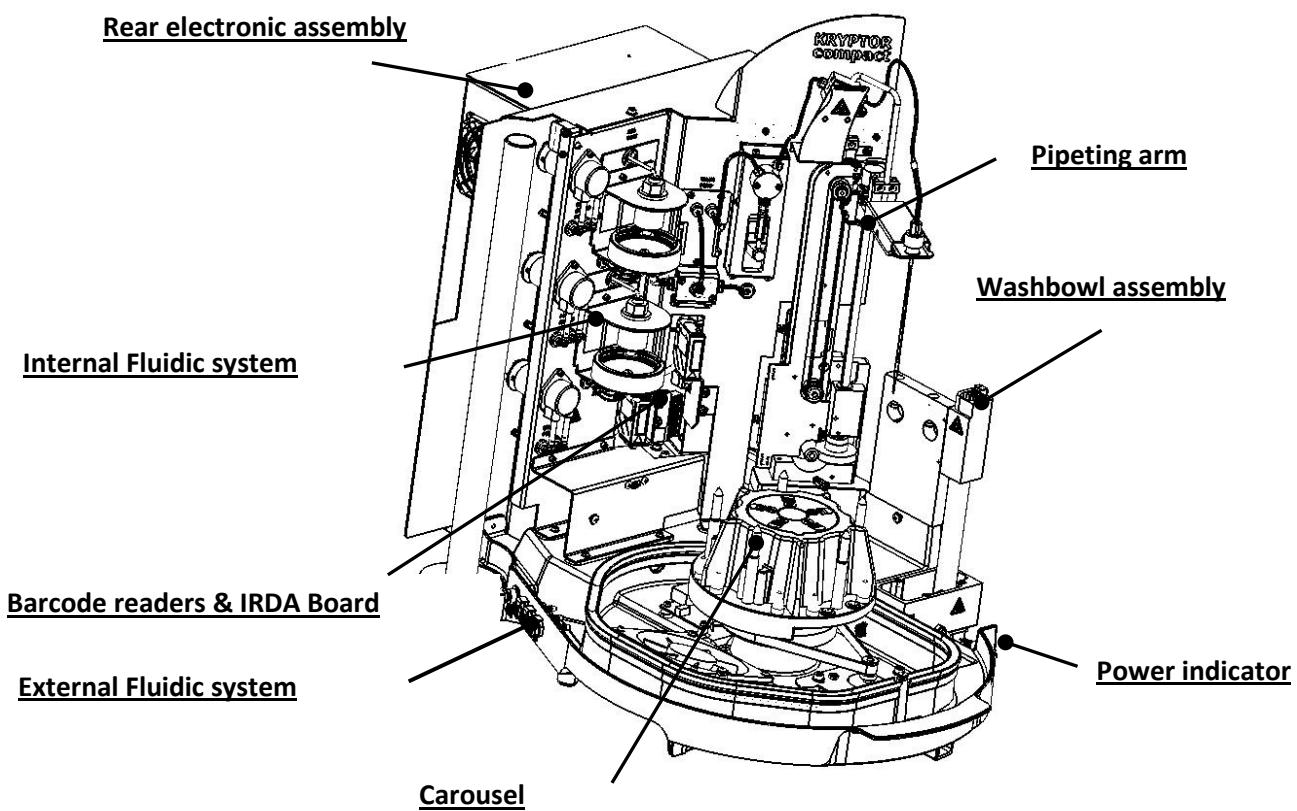
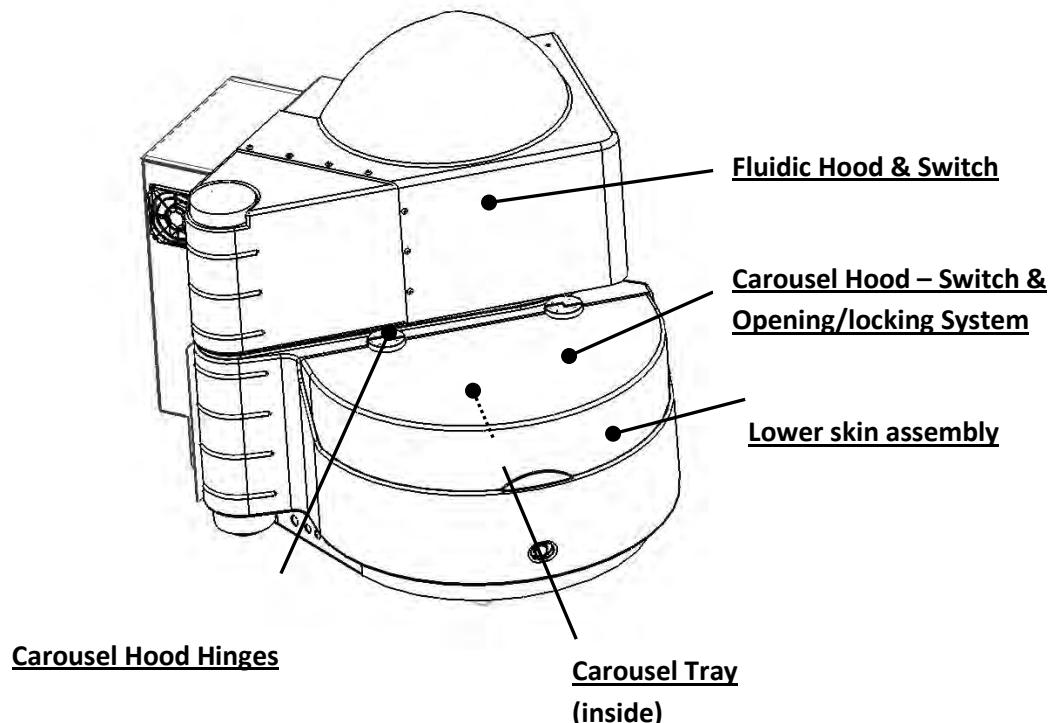


8.3.3 Modules separation

(1) Unscrew the 2 screws of the coupling system. To separate the reading module from the pipeting module, pull the reading module to the right.



8.4 Parts replacement on Pipeting Module

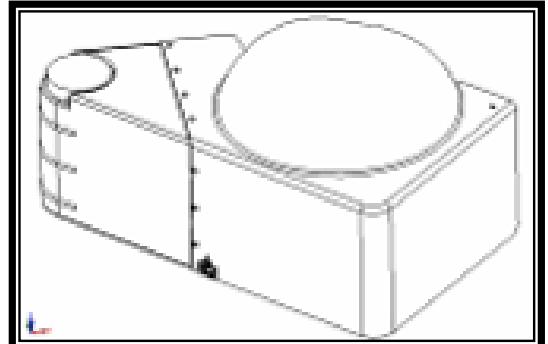


8.4.1 Skins and parts relative to the skins

8.4.1.1 Fluidic Hood Assy– C326038

Replacement:

- (1) Remove the screw locking the fluidic hood.
- (2) Insert the new fluidic hood along the axis



Adjustments:

- (3) Verify that the new assembly can close correctly.

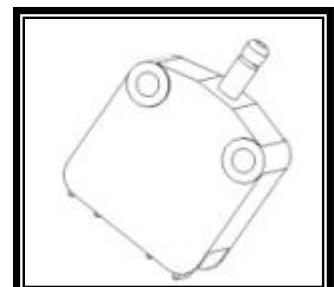
Controls:

- (4) Use the **View and Controls** window in KCD software to check that the fluidic hood safety switch detects both hood statuses: open/closed.

8.4.1.2 Fluidic Hood Safety Switch – C448007

Replacement:

- (1) Remove the fluidic hood.
- (2) Remove the 2 screws fixing the safety switch and replace it.



Adjustments:

- (3) No adjustment

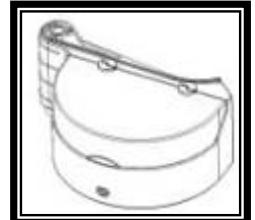
Controls:

- (4) Use the **View and Controls** window to check if the sensor detects correctly both fluidic hood statuses: close and open.

8.4.1.3 Lower Skin Assembly without carousel hood–C326056

Replacement:

- (1) Remove the fluidic hood.
- (2) Remove the old lower skin assembly.
- (3) Insert the new one along the axis.
- (4) Put the carousel hood from the old assembly
- (5) Put back the fluidic hood.
- (6) The part is comes without the locking mechanism. Use the one from the old part.



Adjustments:

- (7) Verify that the push button is well centered and adjust it if necessary.
- (8) Verify that the lower skin can close properly (locking mechanism).
- (9) Verify that the carousel hood can be closed/opened normally.

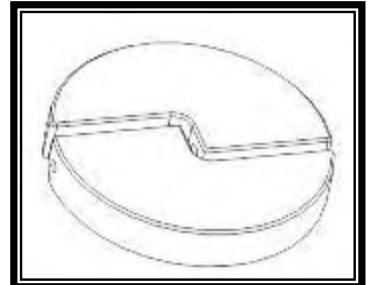
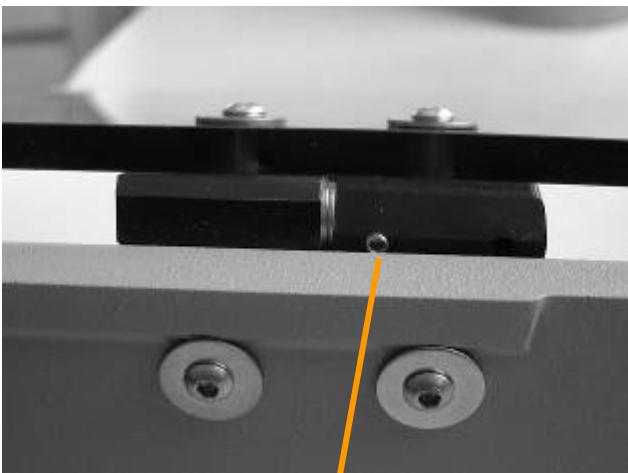
Controls:

- (10) Use the **View and Controls** window to check that the carousel safety switch is detected properly.

8.4.1.4 Carousel Hood Hinge (x2) – C326057

Replacement:

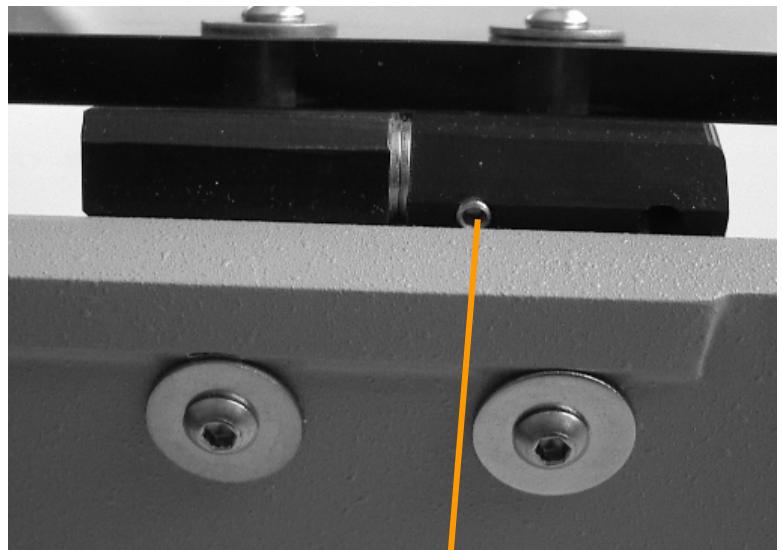
- (1) Open the fluidic hood and the lower skin.
- (2) Remove the 2 hinges and replace them as shown on the figure here below.



Headless screw is accessible

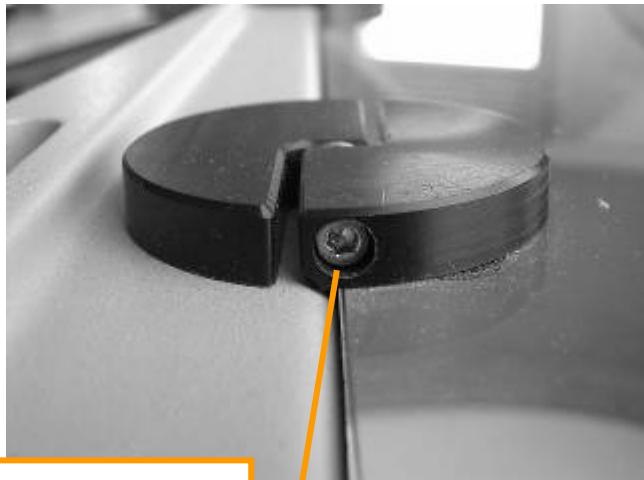
Adjustments:

- (3) Open the carrousel hood
- (4) Using an Allen key size 1.5 loosen the small headless screw shown here below (this screw is used to secure the force adjustment afterwards)



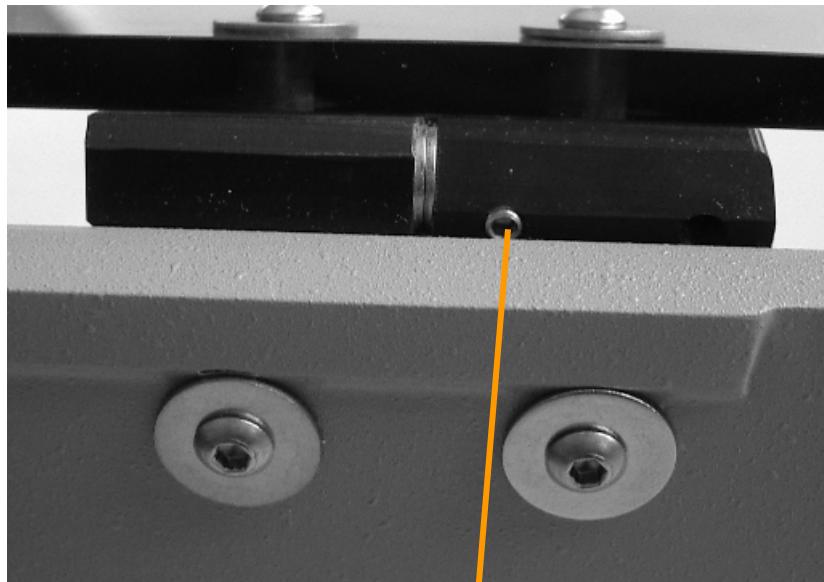
Loosen this screw (do not remove it)

- (5) Using an Allen key size 2.5 tighten or loosen the screw located on the hinge side depending whether you want to increase or decrease the hinge force.



Turn clockwise to increase the force and counter clockwise to decrease the force.

- (6) Repeat the same procedure for the second hinge.



Tighten this screw in order to secure the adjustment

- (7) Tighten the headless screw of each adjusted hinge in order to lock the adjustment.

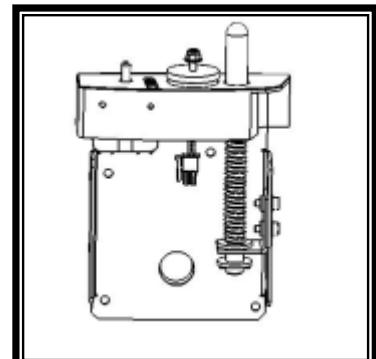
Controls:

- (8) Open and close the carrousel hood several times and check if the force is adjusted properly (when the hood is close to 90° regarding the horizontal level the carrousel must remain open on its own)
- (9) Use the **View and Controls window** to check that the carrousel safety switch is well detected.

8.4.1.5 Carousel Hood safety Switch – C448007

Replacement:

- (1) Switch off the instrument
- (2) Open the carrousel hood and the lower skin assembly.
- (3) Remove the 4 screws fixing the locking mechanism assy
- (4) Remove the 2 fixing the black plastic part on the metallic bracket in order to get an access to the safety switch
- (5) Remove the 2 screws fixing the safety switch
- (6) Disconnect the switch & replace it.
- (7) Reconnect the switch cable and rebuild the pipetor



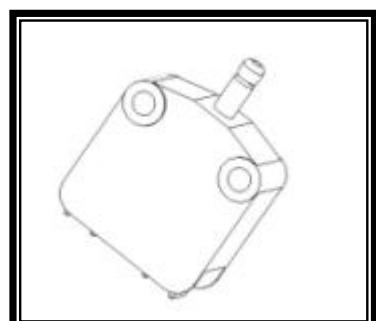
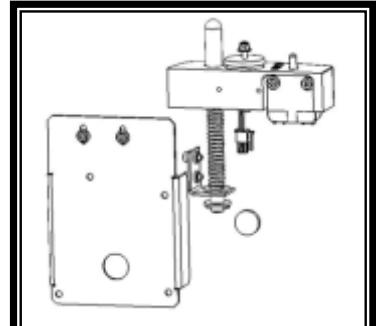
Adjustments:

- (8) No adjustment needed.

Controls:

- (9) Use the **View and Controls** window to check that the carrousel safety switch is detected properly.

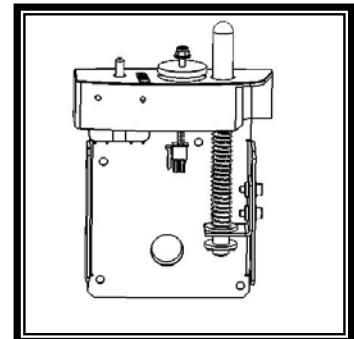
Remark: this part and the fluidic hood safety switch are the same (same part number).



8.4.1.6 Carousel Hood lock assy– C213034

Replacement:

- (1) Switch off the instrument
- (2) Open the carousel hood and the lower skin assembly.
- (3) Remove the 4 screws fixing the locking mechanism assy
- (4) Disconnect the cables and replace the locking mechanism by a new one.
- (5) Reconnect the cables and rebuild the pipetor



Adjustments:

- (6) Adjust the metallic nut from the carousel hood (up/down) to have the contact when the carousel hood is closed.

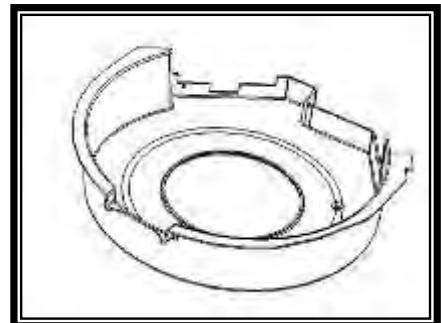
Controls:

- (7) Use the push button to check that the electromagnet releases the carousel hood.

8.4.1.7 Carousel Drip Tray – C326060

Replacement:

- (1) Open the fluidic hood and the lower skin assembly.
- (2) Remove the old carousel tray (4 screws) and replace it.



Adjustments:

- (3) No adjustment.

Controls:

- (4) Check that there is no interference with the carousel or with the sample cassettes when they are turning.

8.4.2 Cassettes

8.4.2.1 Reagent Cassette – C213029

Replacement :

- (1) Open the carousel hood.
- (2) Replace the reagent cassette.



Adjustments:

- (3) Check the pipeting coordinates in the reagent cassette.

Controls:

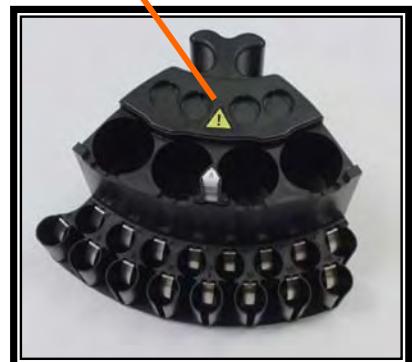
- (4) Using KCD pipetor utilities check that the instrument is able to read the serial number and the temperature (Wait 20 minutes, check that the temperature is below 8°C).

8.4.2.2 Sample cassette – C214040

Replacement:

- (1) Open the carousel hood.
- (2) Replace the old cassette by the new one.
- (3) Stick a cassette ID barcode (a set of ID labels is delivered along with the instrument). The label is stuck on a metallic bracket, extract this bracket using a thin screwdriver, stick the label carefully (make sure it is flat as a curved label can generate error popups during the carousel scan) put the bracket back in the cassette.

Cassette ID



Do not mix these cassettes with sample cassettes from a KRYPTOR compact V2.

Adjustments:

- (4) Check the pipeting coordinates in the sample cassette.

Controls:

- (5) Run a barcode readers calibration
- (6) Make a **barcode reader test** to check that the cassette ID can be read.

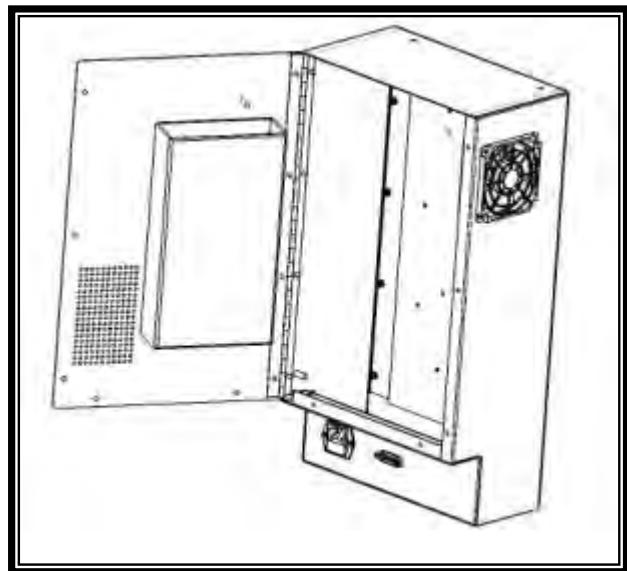
8.4.3 Electronics

-
- All the parts replacements in this chapter must be done with the instrument switched off and disconnected from the mains.
-

8.4.3.1 Pipetor electronic Box Assembly –C218006

Replacement:

- (1) Switch off the instrument and disconnect it from the mains.
- (2) Disconnect all cables connected to the electronic box assembly.
- (3) Remove the old box (4 screws attaching the box from the bottom).
- (4) Replace it and reassemble following the procedure in the opposite way.



Adjustments:

- (5) Make sure the Harware Design Program and the Embedded software are the latest ones otherwise update the firmware; refer to [Firmware Update, download of LCT table. 245](#)
- (6) Restore the settings from the last good snapshot into the flash memory (restore the settings prior running the validation tests), refer to [Restoring factory settings from a backup page 220](#)

Controls:

- (7) Refer to the annex paragraph [Tests By Interventions](#) page 333

8.4.3.3 Motor Board – C212058

Replacement:

- (1) Switch off the instrument.
- (2) Remove the 3 screws fixing the board
- (3) Unplug the motor board from the motherboard
- (4) Replace by a new one
- (5) Reassemble following the procedure in the opposite way

Adjustments:

No subject.

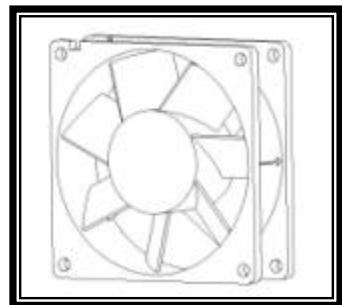
Controls:

- (6) Switch on the instrument and verify that it can be initialized normally

8.4.3.4 Fan assy for Electronic box – C424002

Replacement:

- (1) Switch off the instrument
- (2) Open the rear electronic assembly.
- (3) Disconnect the defective fan (4 screws).
- (4) Replace it with a new one.



-
- Respect the direction of the arrow on the fan in order to extract the air from the unit.
-

Adjustments:

No subject.

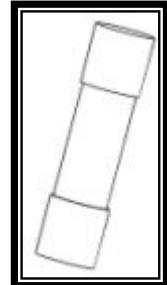
Controls:

- (5) Switch on the instrument and check that the new fan is working.

8.4.3.5 Pipetor Power Filter Fuses – C443005

Replacement:

- (1) Switch off the instrument and disconnect it from the mains
- (2) Open the main power filter.
- (3) Remove the 2 fuses.
- (4) Replace them with new ones (never use a different model).



Adjustments:

No subject.

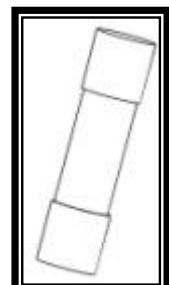
Controls:

- (5) Switch the power on and check that the instrument can operate normally.

8.4.3.6 Mainboard Fuse(s)– C443004

Replacement:

- (1) Switch off the instrument and disconnect it from the mains
- (2) Remove the screws closing the pipeting module electronic box
- (3) Open the electronic box
- (4) Unplug the defective fuse from its fuse holder and plug the new one
- (5) Close the electronic box and tighten the screws



Adjustments:

No subject.

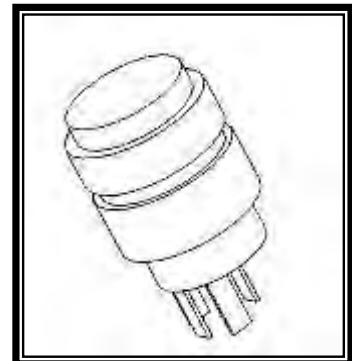
Controls:

- (6) Switch the power on and check that the pipeting module can operate normally.

8.4.3.7 Pause Switch Assembly – C448005

Replacement:

- (1) Switch off the instrument
- (2) Open the carousel hood and the lower skin
- (3) Disconnect the push button cable
- (4) Unscrew the nut fixing the push button
- (5) Remove the push button and replace it.
- (6) Screw the nut on the push button
- (7) Connect the cable



Adjustments:

No subject.

Controls:

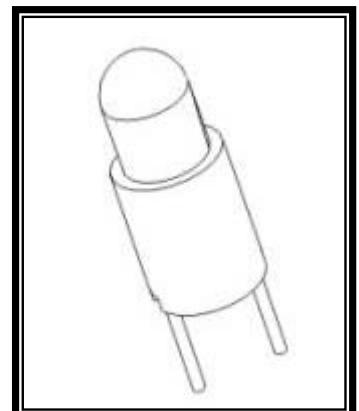
- (8) Check the button light under the “**View and controls**” window
- (9) Use the “**View and controls**” window to check the button status (open/closed).

8.4.3.8 LED for Pause Button – C417001

Replacement:

- (1) Switch off the instrument.
- (2) Remove the cap of the LED.
- (3) Remove the old LED and replace it with the new one.

• Respect the polarity: X on + sign.



Adjustments:

No subject.

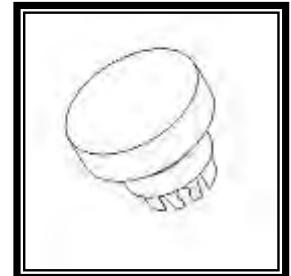
Controls:

- (4) Check the button light under the “**View and controls**” window.

8.4.3.9 Pause Switch Lens – C448006

Replacement:

- (1) Unplug the lens using a small screwdriver.
- (2) Plug the new one



Adjustments:

No subject.

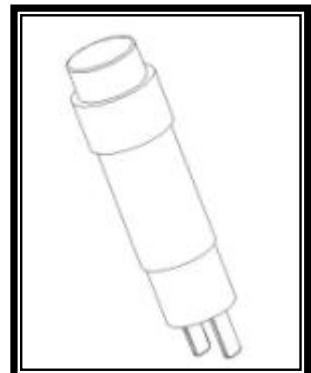
Controls:

- (3) Use KCD and the “view and controls” window to check the push button status (open / closed)

8.4.3.10 Power Light Assembly – C417002

Replacement:

- (1) Switch off the instrument.
 - (2) Open the fluidic hood and the lower skin.
 - (3) Disconnect the old power light assy. by unscrewing the nut.
Keep the cable.
 - (4) Replace the old power light assy. with a new one.
-
- Respect the polarity: X on +.
-



Adjustments:

No subject.

Controls:

- (5) Check that the indicator is lighting when the machine is on.

8.4.3.11 LED for Power Light – C417001

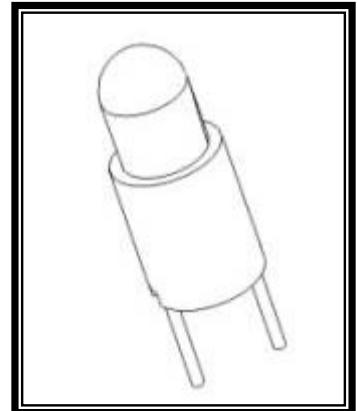
Replacement:

- (1) Switch off the instrument.
- (2) Remove the cap of the LED.
- (3) Remove the old LED and replace it with the new one.

-
- Respect the polarity: X on +.
-

Adjustments:

No subject.



Controls:

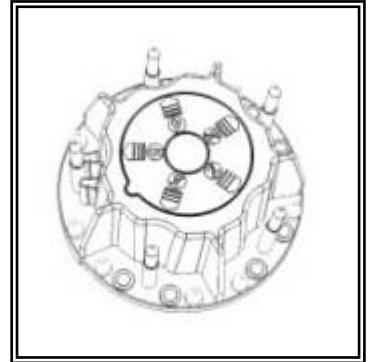
- (4) Check that the indicator is lit when the machine is on.

8.4.4 Carousel & Fan

8.4.4.1 Carousel Assembly – C213035

Replacement:

- (1) Switch off the instrument
- (2) Disconnect all the cables from the carousel board.
- (3) Loosen the carousel belt
- (4) Pull the instrument on edge of the bench in order to have access from the underneath to the 3 screws maintaining the carousel assembly.
- (5) Remove these 3 screws.
- (6) Remove the carousel assembly
- (7) Replace it and reassemble following the procedure in the opposite way.



Adjustments:

- (8) Adjust the belt tension

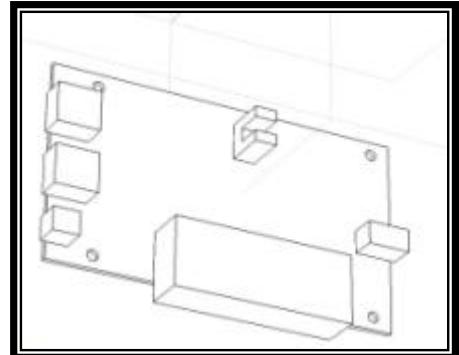
Controls:

- (9) Run all the tests required: refer to the annex paragraph [Tests By Interventions](#) page 333.

8.4.4.2 Carousel Board – C210003

Replacement:

- (1) Switch off the instrument
- (2) Remove the carousel assembly. See paragraph [Carousel Assembly – C213015](#) page 97
- (3) Replace the defective board with the new one.



Adjustments:

- (4) Check that the flag can pass through carousel home sensor, adjust the flag position if necessary (altitude).

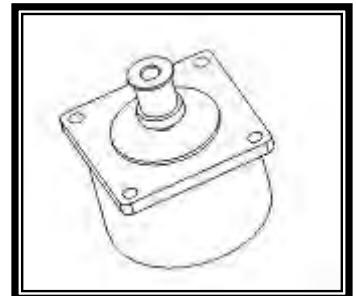
Controls:

- (5) Use the “**View and controls**” window to check that the fan, the stop button, the electromagnet, the carousel hood switch, the power LED, the home sensor, the temperature sensor work correctly.
- (6) Install a reagent cassette on the 3 mixed position to check that each position is supplied with 30V. Read the cassette in each position.
- (7) Use the “**View and controls**” window to request a carousel initialization.
- (8) Check and adjust if necessary the pipeting coordinates.

8.4.4.3 Carousel Motor With Pulley – C423003

Replacement:

- (1) Switch off the instrument
- (2) Remove the carousel assembly (refer to paragraph: [Carousel Assembly – C213015](#) page 97)
- (3) Unscrew the 4 screw fixing the motor
- (4) Disconnect the motor
- (5) Remove and replace the motor
- (6) Reassemble following the procedure in the opposite way.



Adjustments:

- (7) Adjust the belt tension.

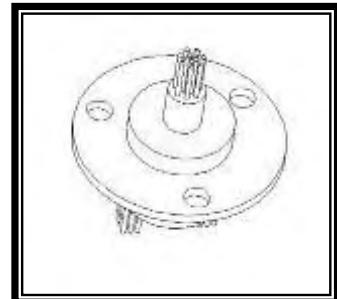
Controls:

- (8) Run the same tests as for the replacement of a carousel assembly (refer to annex paragraph [Tests By Interventions](#) page 333)

8.4.4.4 Carousel Slip Ring – C213016

Replacement:

- (1) Switch off the instrument
- (2) Remove the carousel assembly. See paragraph [Carousel Assembly – C213015](#), page 97
- (3) Remove the carousel bell.
- (4) Disconnect the 6 wires under the carousel plate and the connector on the board.
- (5) Remove the slip ring (3 screws).
- (6) Replace it by the new one.
- (7) Reassemble following the procedure in the opposite way.



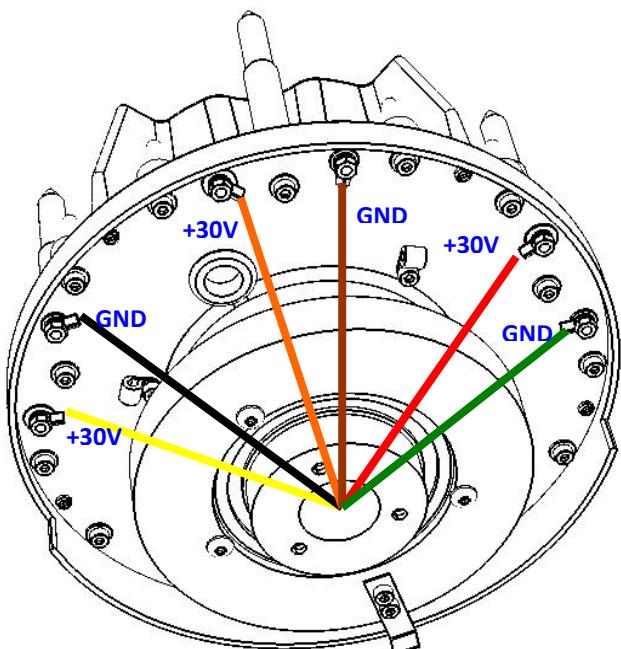
- Reconnect following the schematic below.

Adjustments:

No subject

Controls:

- (8) Verify the voltage on the 3 mixed position : 30Vdc
- (9) Use the Pipetor Utilities window under KCD to make sure that the instrument is able to read a reagent cassette on the 3 mixed positions.

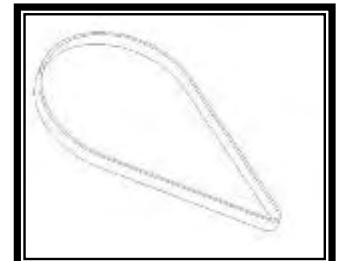


Seen from underneath

8.4.4.5 Carousel Belt – C614005

Replacement:

- (1) Switch off the instrument
- (2) Remove the carousel assembly. See paragraph [Carousel Assembly – C213015](#) page 97
- (3) Replace the old belt by the new one.



Adjustments:

- (4) Adjust the belt tension. See [Belts Tensions adjustment](#) page 146

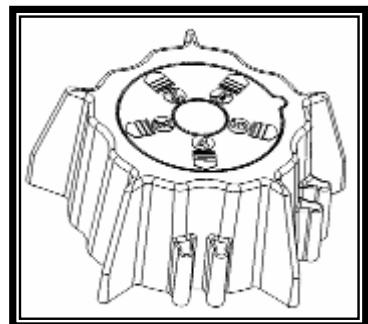
Controls:

- (5) Run all the required tests, refer to annex paragraph [Tests By Interventions](#) page 333

8.4.4.6 Carousel Bell – C214020

Replacement:

- (1) Switch off the instrument
- (2) Remove the carousel assembly see paragraph [Carousel Assembly – C213015](#) page 97
- (3) Remove from the underneath the 5 screws fixing the bell
- (4) Replace it by a new one.
- (5) Reassemble following the procedure in the opposite way.
(make sure to install positions 1, 2, 3 in front of the positions equipped with supplying dots)



Adjustments:

No subject.

Controls:

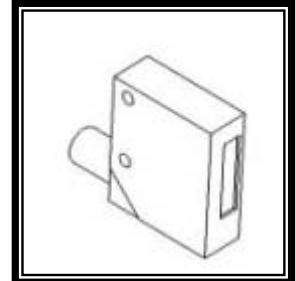
- (6) Run all the tests as for the replacement of a carousel assembly. Refer to appendix section [Tests By Interventions](#) page 333.

8.4.5 Barcode readers & IRDA communication board

8.4.5.1 Cabled Lower Barcode Reader – C212068

Replacement:

- (1) Switch off the instrument
- (2) Separate both modules
- (3) Remove the screw fixing the barcode reader + its bracket.
- (4) Disconnect the barcode reader from the interface board
- (5) Remove the 2 screws fixing the barcode on the bracket
- (6) Replace the barcode reader
- (7) Reassemble following the procedure in the opposite way.



Adjustments:

- (8) Adjust mechanically the barcode reader (refer to [Barcode readers adjustment](#) page 213)
- (9) Run a barcode reader calibration (refer to [Barcode readers calibration](#) page 216)

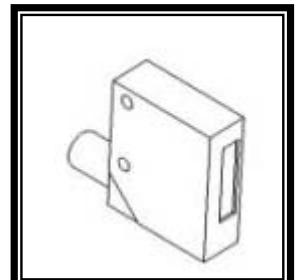
Controls:

- (10) Run all the tests required. Refer to appendix section [Tests By Interventions](#) page 333.

8.4.5.2 Cabled Upper Barcode Reader – C212068

8.4.5.3 Replacement:

- (1) Switch off the instrument
- (2) Remove the 2 screws fixing the barcode reader.
- (3) Disconnect the barcode reader from the interface board
- (4) Replace it by the new one.
- (5) Reassemble following the procedure in the opposite way



Adjustments:

- (6) Run a barcode reader calibration (refer to [Barcode readers calibration](#) chapter 216)

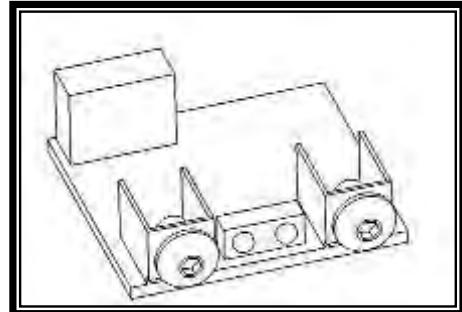
Controls:

- (7) Run all the tests required. Refer to annex paragraph [Tests By Interventions](#) page 333.

8.4.5.4 IRDA communication board – C212070

Replacement:

- (1) Switch off the instrument
- (2) Remove the metallic part maintaining the IRDA board.
- (3) Disconnect the old IRDA board.
- (4) Replace it by the new one.
- (5) Reassemble following the procedure in the opposite way.



Adjustments:

No subject.

Controls:

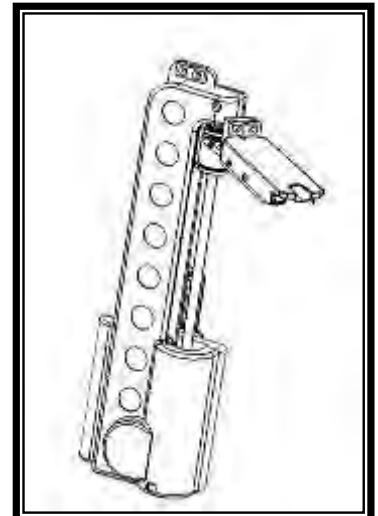
- (6) Use the **Pipetor Utilities Menu** and check that the instrument is able to read the reagent cassettes.

8.4.6 Arm & Tip

8.4.6.1 Arm assembly – C213012

Replacement:

- (1) Switch off the instrument
- (2) Separate both modules.
- (3) Remove the tip board assy
- (4) Remove the 2 screws fixing the arm assembly (underneath the arm).
- (5) Disconnect the flat cable from the old arm.
- (6) Replace the arm by a new one.
- (7) Reassemble following the procedure in the opposite way.



Adjustments:

- (8) Adjust the pipeting coordinates.

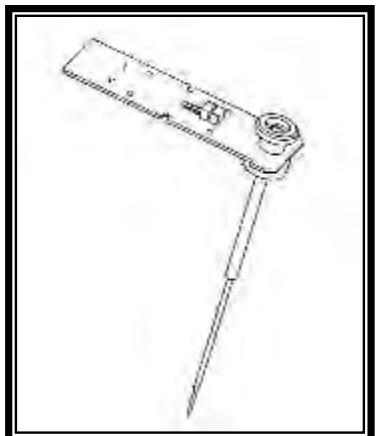
Controls:

- (9) Run all the tests required. Refer to chapter annex paragraph [Tests By Interventions](#) page 333

8.4.6.2 Heated Pipette and Board Assy– C651020

Replacement:

- (1) Use the window Expert User form in KCD
- (2) Follow step by the procedure described



Adjustments:

- (3) Check the pipeting coordinates (adjust if necessary)

Controls:

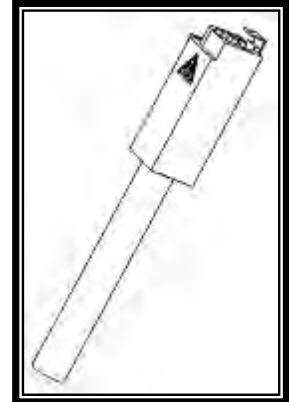
- (4) Run all the tests required. Refer to appendix section [Tests By Interventions](#) page 333

8.4.7 Internal Fluidic System

8.4.7.1 Washbowl & Cup Assembly – C318010

Replacement:

- (1) Switch off the instrument
- (2) Separate the pipeting module from the reading module.
- (3) The assembly is screwed (1 screw) and stuck. Remove the screw first and rotate the assembly in order to break the glue.
- (4) Remove the old dried glue from the support and stick the new assembly with cyanoacrylate glue.
- (5) Put the screw back
- (6)



Adjustments:

- (7) Check and adjust the pipeting coordinates in the washing area if necessary.

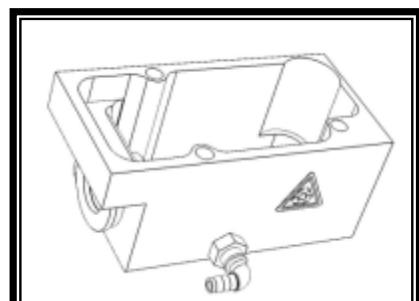
Controls:

- (8) Make sure that there are no leaks under the washbowl.

8.4.7.2 Waste Collector Assembly – C318011

Replacement:

- (1) Switch off the instrument
- (2) Drain the waste tubings.
- (3) Separate the pipeting module from the reading module.
- (4) Remove the washbowl assembly. See paragraph
[Washbowl & Cup Assembly – C318008](#) page 105
- (5) Remove the waste collector
- (6) Disconnect the tubing located underneath the waste collector
- (7) Disconnect the float and take it out from the waste collector
- (8) Put the new part
- (9) Rebuild following this procedure in the opposite way.



Adjustments:

No subject.

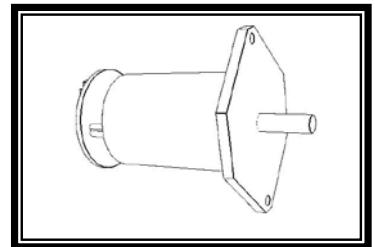
Controls:

- (10) Check that the tip is still centered on the Dot.
- (11) Check the feedback from the float in the waste collector using KCD View and Controls window.
- (12) Check that there are no leaks

8.4.7.3 55ml (10/30) Peristaltic Pump (motor only)– C423010

Replacement:

- (1) Switch off the instrument
- (2) Drain the fluidic circuit.
- (3) Disconnect the pump and replace it by the new one.
- (4) Notice that the pump is delivered without any cartridge.



Adjustments:

No subject.

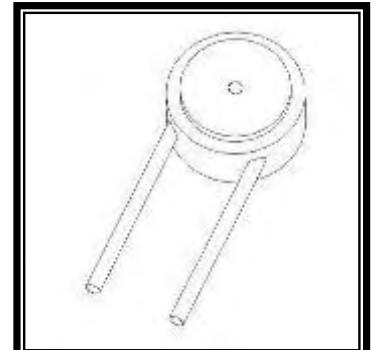
Controls:

- (5) Check/adjust the flow rate, it must be higher than 1 ml/s
- (6) Check that there are no leaks.

8.4.7.4 55ml (10/30) Peristaltic Pump Cartridge – C633005

Replacement:

- (1) Disconnect the cartridge from its connectors.



Adjustments:

No subject

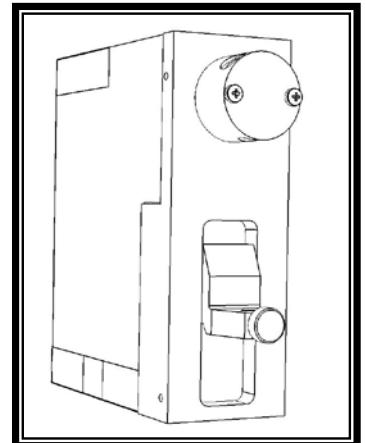
Controls:

- (2) Check that there are no leaks.

8.4.7.5 Distribution Pump – C631005

Replacement:

- (1) Switch off the instrument
- (2) Separate both modules
- (3) Drain the fluidic system.
- (4) Disconnect the tubings from the 3 ports valves
- (5) Remove the screws maintaining the pump
- (6) Disconnect the pump
- (7) Replace the pump by a new one
- (8) Reassemble following the procedure in the opposite way.



Adjustments:

No subject.

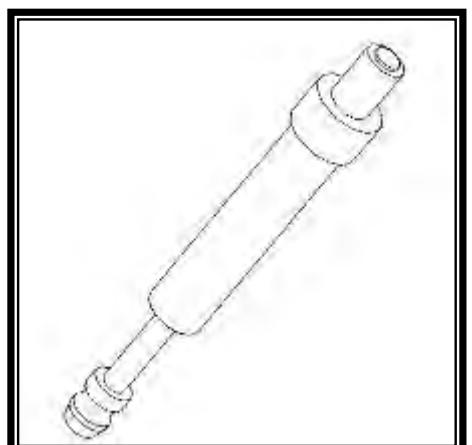
Controls:

- (9) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.4.7.6 500µl Syringe – C632002

Replacement:

- (1) Move the piston down (manually or using KCD under view and controls)
- (2) Unscrew the syring body
- (3) Losen the screw fixing the piston
- (4) Replace the syringe assy



Adjustments:

No subject.

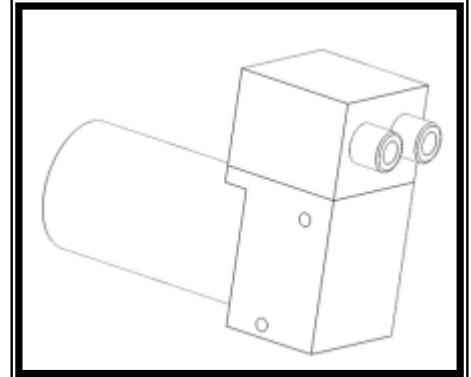
Controls:

- (5) In KCD run several primes
- (6) Make sure there are no leaks

8.4.7.7 Diaphragm pump – C651015

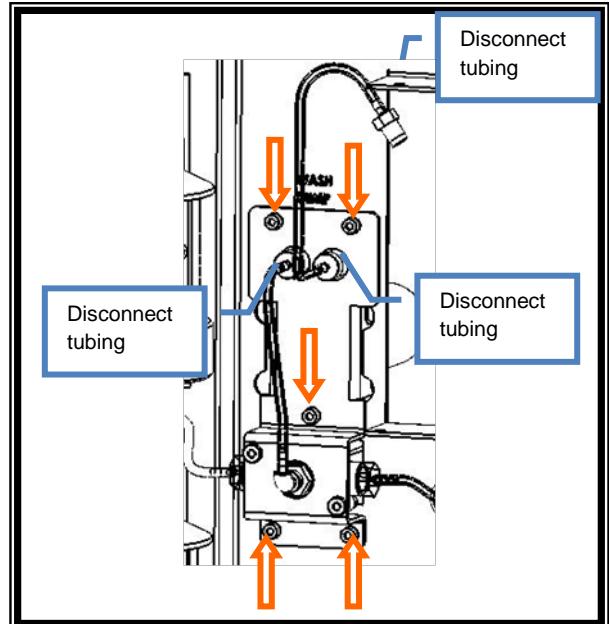
Replacement:

- (1) Switch off the instrument
- (2) Separate both modules
- (3) Disconnect the diaphragm pump from the interface board (P004)
- (4) Disconnect the tubing from the 3 ports valves (place a piece of tissue paper underneath in case some liquid falls down).
- (5) Disconnect the tubings from the diaphragm pump
- (6) Remove the 5 screws fixing the pump + control valve assembly
- (7) Remove both screws fixing the diaphragm pump.
- (8) Replace the pump by a new one
- (9) Reassemble following the procedure in the opposite way.



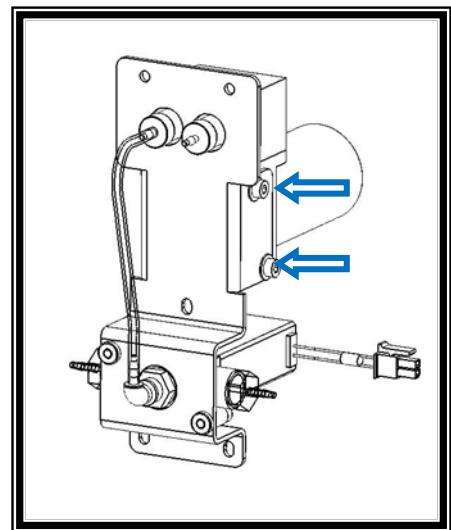
Adjustments:

No subject.



Controls:

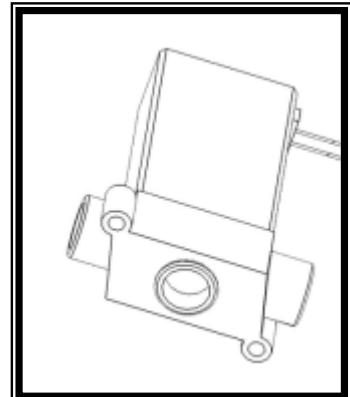
- (10) Run a pump flow rate test and readjust the flow rate if necessary [Pumps flow rate adjustment \(or check\)](#) page 218



8.4.7.8 Control valve – C633008

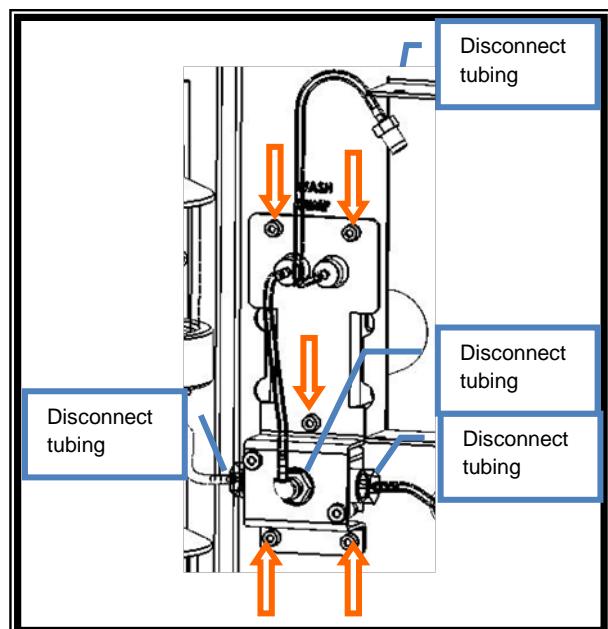
Replacement:

- (11) Switch off the instrument
- (12) Separate both modules
- (13) Disconnect the control valve from the interface board (P002)
- (14) Disconnect the tubing from the 3 ports valves (place a piece of tissue paper underneath in case some liquid falls down).
- (15) Disconnect the 3 tubings from the control valve
- (16) Remove the 5 screws fixing the pump + control valve assembly
- (17) Remove both screws fixing the control valve.
- (18) Replace the control valve by a new one
- (19) Reassemble following the procedure in the opposite way.



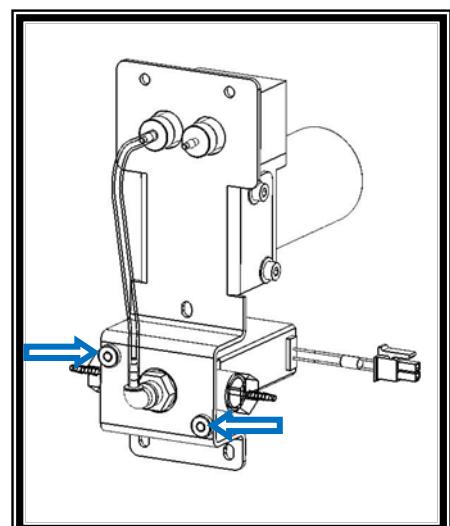
Adjustments:

No subject.



Controls:

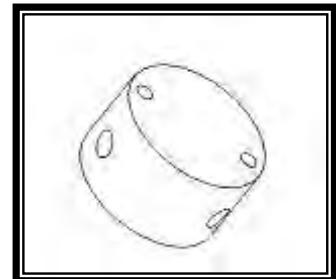
- (20) Run a pump flow rate test and readjust the flow rate if necessary [Pumps flow rate adjustment \(or check\)](#) page 218



8.4.7.9 Y valve (or 3 Ports Valve) – C622011

Replacement:

- (1) Switch off the instrument
- (2) Open the fluidic hood
- (3) Make sure the tip is above the washbowl or washcup
- (4) Disconnect both fluidic connectors on the Y valve.
- (5) Move the piston down (manually or using KCD under view and controls) and remove the syringe
- (6) Remove the 2 screws fixing the 3 ports valve
- (7) Replace the Y valve
- (8) Reassemble following the procedure in the opposite way.



Adjustments:

No subject.

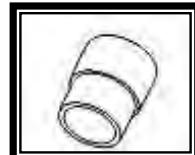
Controls:

- (9) Using KCD, run several primes
- (10) Make sure there are no leaks.

8.4.7.10 500µl Syringe Seal - C631004

Replacement:

- (1) Dismantle the syringe (see previous chapter)
- (2) Remove the old seal
- (3) Put the new one on the syringe barrel very carefully.
- (4) Dampen it with some ethanol (to avoid bubbles formation)
- (5) Insert gently the syringe barrel + seal into the syringe body (do not force to insert)



Adjustments:

No subject.

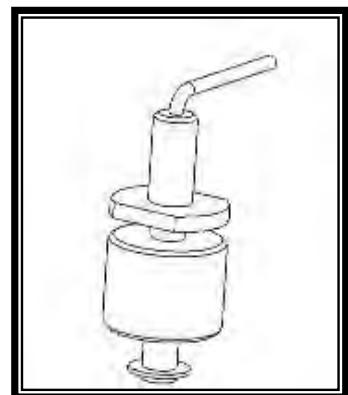
Controls:

- (6) Using KCD run several primes.
- (7) Make sure there are no leaks

8.4.7.11 Level (floating) Sensor – C213031

Replacement:

- (1) Switch off the instrument
- (2) Open the fluidic hood
- (3) Remove the top of the intermediate tank (one screw)
- (4) Disconnect the sensor.
- (5) Replace the old sensor by the new one.
- (6) A black seal and a plastic nut may be delivered in the kit, do not use them.



Adjustments:

No subject.

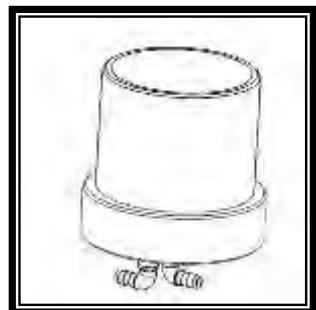
Controls:

- (7) Use the **View and control Menu** to see the sensor status.

8.4.7.12 Intermediate Tank Assembly – C214032

Replacement:

- (1) Switch off the instrument
- (2) Remove the peristaltic cartridge from the upstream pump axis (do not disconnect the tubings) in order to drain the tank or move the H2O upstream pump counterclockwise under View and Controls.
- (3) Remove the top of the tank with the sensor (1 screw).
- (4) Disconnect the tubings.
- (5) Replace the old tank by the new one (2 screws)
- (6) Make sure to reconnect the tubings at their original place (do not swap).



Adjustments:

No subject.

Take off the peristaltic cartridges from their axis



Controls:

- (7) Use the **View and control Menu** to see the sensor status.
- (8) Make sure there are no leaks.

8.4.7.13 Clot Detection Board – C651014

Replacement:

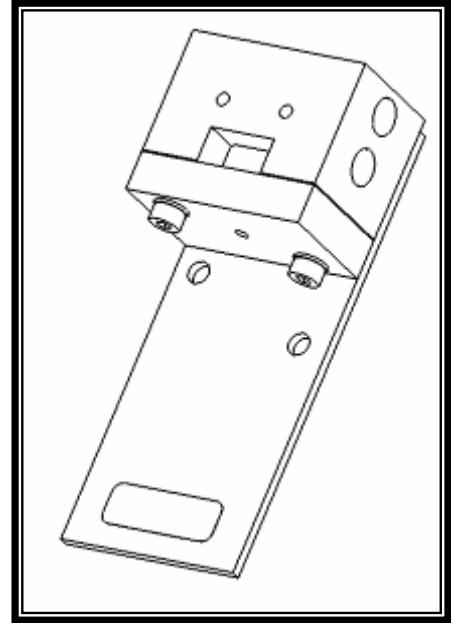
- (1) Switch off the instrument
- (2) Drain the fluidic path
- (3) Disconnect the tubings from the board
- (4) Disconnect the cable
- (5) Remove the board.
- (6) Replace it by a new one
- (7) Reassemble following the opposite procedure.

Adjustments:

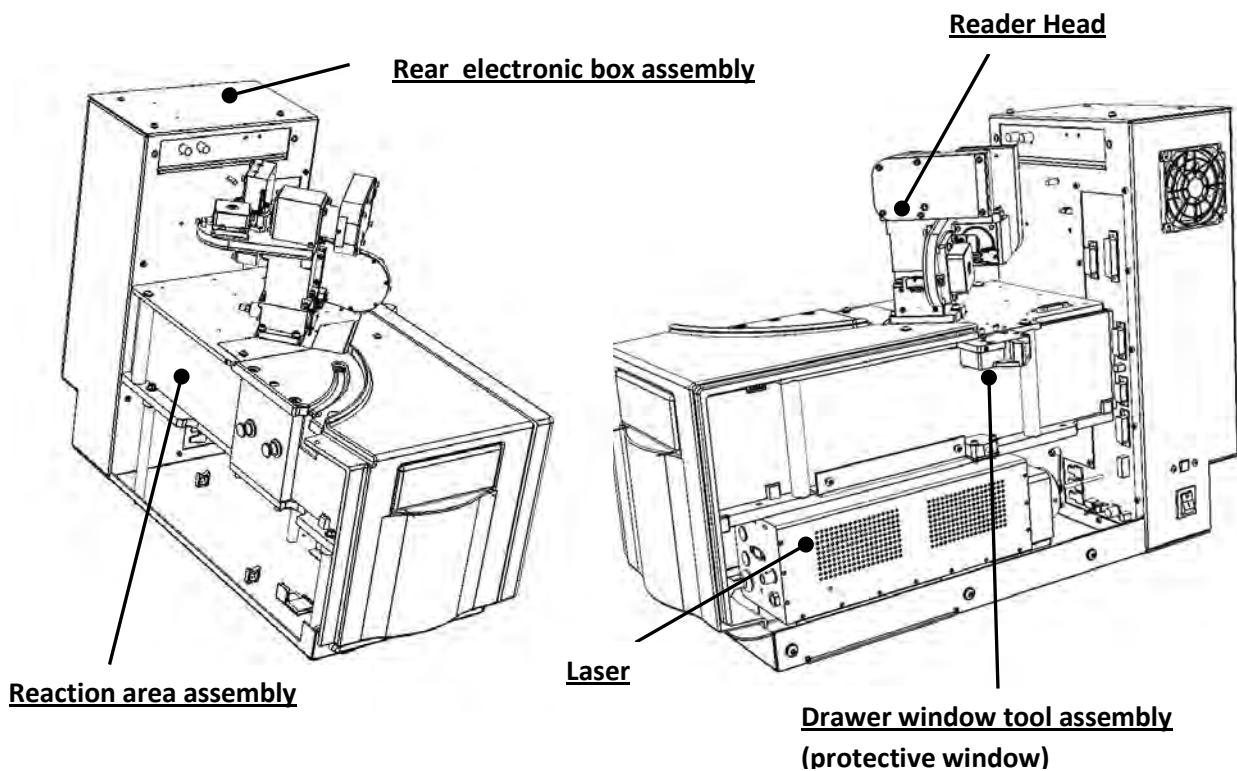
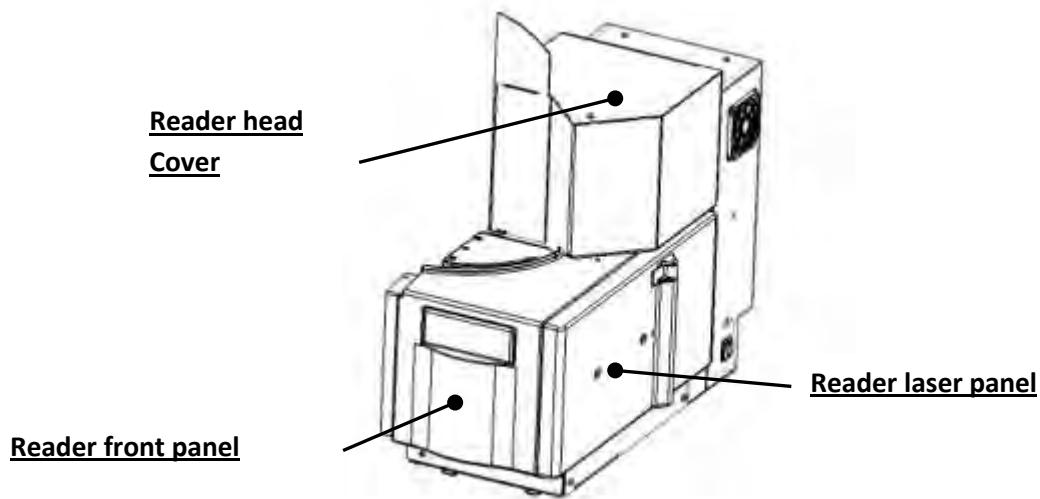
No subject.

Controls:

- (8) Using KCD, run several primes
- (9) Run the tests required for this intervention. Refer to [Tests By Interventions](#) page 333.



8.5 Parts replacement on Reading Module



8.5.1 Skins

8.5.1.1 Reader Head cover – to be defined

Replacement:

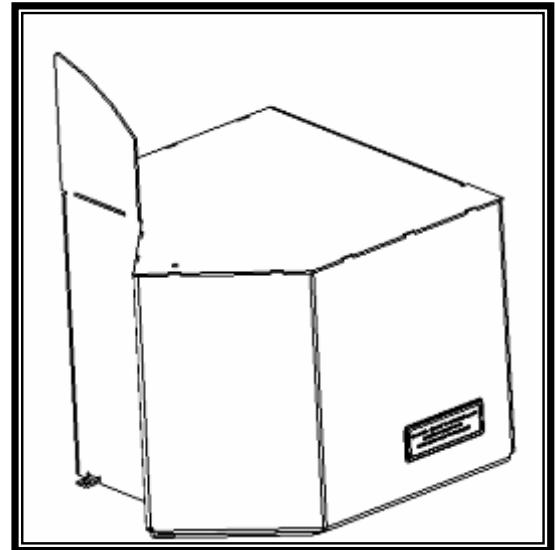
- (1) Replace the old head cover by the new one.

Adjustments:

No subject.

Controls:

No subject.



8.5.1.2 Reading module Front Skin – C326049

Replacement:

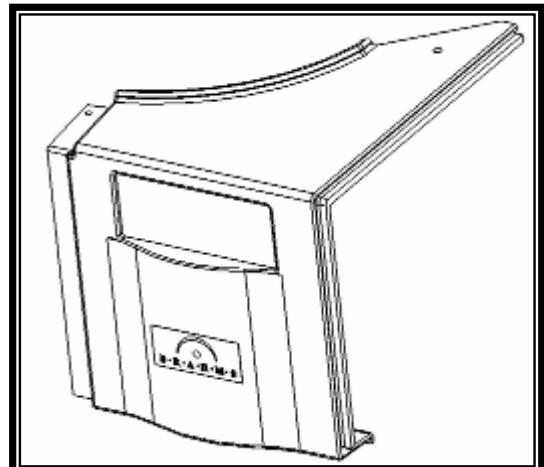
- (1) Replace the old skin by the new one.

Adjustments:

No subject.

Controls:

- (2) Check any interference with the front door.



8.5.1.3 Laser panel – C326055

Replacement:

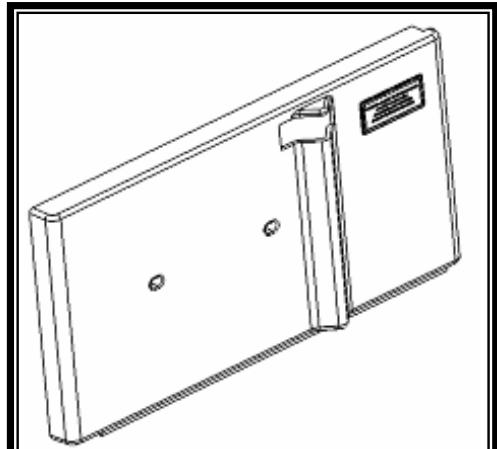
- (1) Replace the old skin with the new one.

Adjustments:

No subject.

Controls:

- (2) Check for any interference with the drawer.
- (3) Trig the laser and make sure it works.

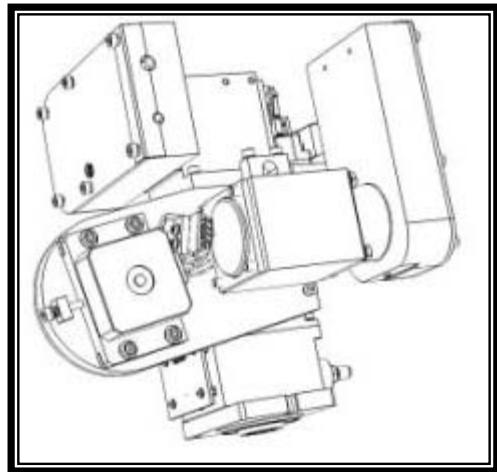


8.5.2 Reading

8.5.2.1 Reader Head – C220100

Replacement:

- (1) Switch off the instrument.
- (2) Remove the reader head cover.
- (3) Disconnect the RH cables and the optical fiber.
- (4) Remove the 2 screws located on the left side of the RH and just loosen the one at the rear and on the



right side.

- (5) Remove the RH by tilting and sliding it from the remaining screw
- (6) Replace the RH with the new one after having removed the lens protective plug (red).
- (7) Reassemble following the procedure in the opposite way.



- Take care not to leave finger prints on the bottom lens when the protection is removed!
- Respect ESD precautions.
- **Do not use other screws than the original ones (longer screws can damage the ceiling heater).**
- **Do not tighten too much the screws fixing the reader head.**

Adjustments:

- (8) Copy the linearity correction table **RHxxxxV3.flash** from the disk that comes along with the reader head to C:_factory folder. The linearity correction tables are available on the ftp site as well.
- (9) Download the linearity correction table in the reader flash memory; refer to [Download of the Linearity Correction Table \(LCT\)](#) page 245.
- (10) Modify the reader head serial number in C:\KCSW\KCINI\ID.ini.
- (11) Check the value of **_ADCThreshold** in **C:\windows\Xipc_var.ini**. This value must be 15600.
- (12) Do all the adjustments required. Refer to [Tests By Interventions](#) page 333

Controls:

- (13) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.5.2.2 Optical Fiber (64 cm)– C676000

Replacement:

- (1) Switch off the instrument
- (2) Open the laser panel.
- (3) Remove the reader head cover
- (4) Disconnect the optical fiber at both ends.
- (5) Replace the old fiber with the new one.

Adjustments:

- (6) The optical fiber must follow the same path as the previous one.
- (7) Fasten the optical fiber with the clips stuck on the reader electronic box.
- (8) Check the fiber position (no constraint).

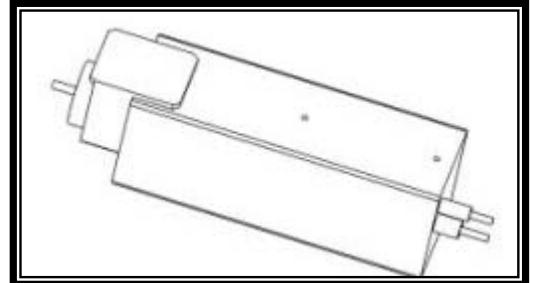
Controls:

- (9) Do all the adjustments required. Refer to [Tests By Interventions](#) page 333

8.5.2.3 Laser

Replacement:

- (1) Switch off the instrument
- (2) Open the laser panel.
- (3) Disconnect the cables and the optical fiber.
- (4) Remove the laser ass'y from the instrument (2 screws).
- (5) Separate the laser from its bracket (2 screws).
- (6) Replace with a new laser.
- (7) Reassemble following the procedure in the opposite way.



Adjustments:

- (8) Do all the adjustments required. Refer to [Tests By Interventions](#) page 333

Controls:

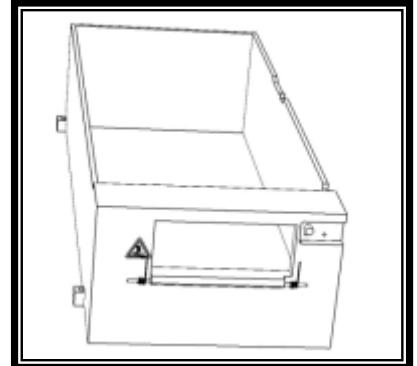
- (9) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.5.3 Reaction area

8.5.3.1 Reaction Area Housing –C326054

Replacement:

- (1) Switch off the instrument
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the cable from the heated silica window socket
- (6) Remove the reaction area top.



- Take care not to damage the reader head or the reader head lens.

- (7) Replace the old reaction area housing with the new one.

Adjustments:

No subject.

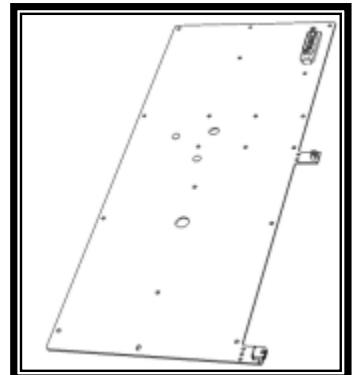
Controls:

- (8) Check the matrix on the source.

8.5.3.2 Ceiling Heater Board assy– C210005

Replacement:

- (1) Switch off the instrument
- (2) Remove the read head cover, the front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area



- Take care not to damage the reader head and the reader head lens.

- (7) Remove all the screws fixing the aluminium diffusion plate and take off this plate.
- (8) Remove the ceiling heater board from the white composite plate but take care not to lose the spacers that maintain an air gap between the board and the composite plate.
- (9) Replace the ceiling heater board but do not forget to put the spacers back (this air gap is very important for the temperature regulation)

Adjustments:

- (10) Do the required adjustments. Refer to [Tests By Interventions](#) page 333

Controls:

- (11) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.5.3.3 Pan Heater Board – C212072

Replacement:

- (1) Switch off the instrument
 - (2) Remove the read head cover as well as the front and laser panels
 - (3) Disconnect the optical fiber
 - (4) Disconnect all the connectors on the ceiling board
 - (5) Disconnect the reader head cables
 - (6) Remove the top of the reaction area.
-
- Take care not to damage the reader head and the reader head lens.
-
- (7) Remove the 4 screws maintaining the carriage
 - (8) Disconnect the flat cable connected to the pan heater board.
 - (9) Remove the 4 screws fixing the board on the carriage
 - (10) Replace the old board with the new one; **put some thermal paste** in the hole that will receive the temperature sensor.
 - (11) Reassemble following the procedure in the opposite way.

Adjustments:

No subject.

Controls:

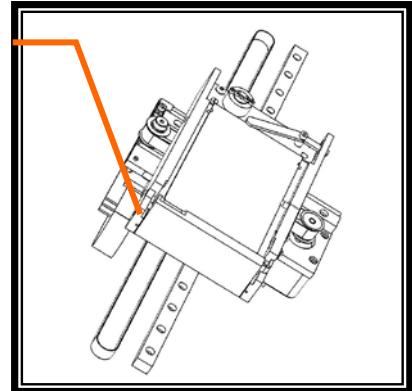
- (12) Run all the required tests. Refer to [Tests By Interventions](#) page 333

8.5.3.4 X Y Translator Assembly – C213037

Replacement:

- (1) Switch off the instrument.
- (2) Disconnect the flat cables from the X/Y carriage board
- (3) Remove the Y belt.
- (4) Remove the screws maintaining the Y rail. Put a piece of adhesive tape at each extremity. The slide must not be removed from the rail in order to avoid loosing the balls from the bearing.
- (5) Replace the old assembly with the new one.
- (6) Reassemble following the procedure in the opposite way.

XY carriage board



- Do not unscrew any screw on the new assembly. The X/Y perpendicularity is adjusted in factory. This adjustment must never be modified.

Adjustments:

- (7) Check the X belt tension. See chapter [X Belt tension](#).page 147
- (8) Adjust the Y belt tension. See chapter [Y Belt tension](#).page 147

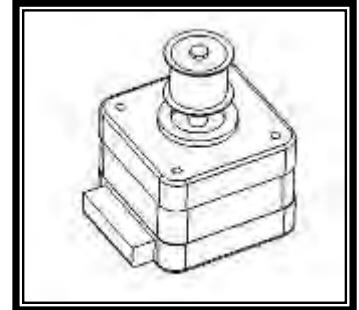
Controls:

- (9) Run all the required tests. Refer to [Tests By Interventions](#) page 333

8.5.3.5 X Motor With pulley– C423005

Replacement:

- (1) Switch off the instrument.
- (2) Remove the [X Y Translator Assembly](#) page 121
- (3) Disconnect the Y flat cable
- (4) Unscrew the X free pulley system.
- (5) Remove the belt from the motor pulley
- (6) Remove the 4 screws fixing the motor
- (7) Disconnect the motor cable
- (8) Replace the motor with a new one
- (9) Reassemble following the procedure in the opposite way.



Adjustments:

- (10) Adjust the X belt tension. See chapter [X Belt tension](#). page 147
- (11) Adjust the Y belt tension. See chapter [Y Belt tension](#). page 147

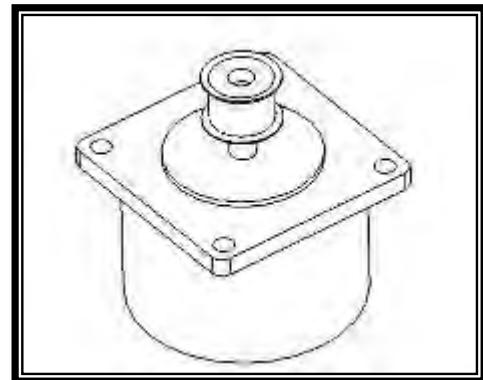
Controls:

- (12) Do all the adjustments required for an intervention on the translator. Refer to [Tests By Interventions](#) page 333

8.5.3.6 Y Motor With pulley – C423004

Replacement:

- (1) Switch off the instrument
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Remove the top of the reaction area.



- Take care not to damage the reader head and the reader head lens.

- (6) Unscrew the Y free pulley system.
- (7) Remove the Y belt from the motor pulley
- (8) Remove the 4 screws maintaining the motor
- (9) Disconnect the motor cable
- (10) Replace the old motor with the new one.
- (11) Reassemble following the procedure in the opposite way.

Adjustments:

- (12) Adjust the Y belt tension. See chapter [Y Belt tension](#), page 147

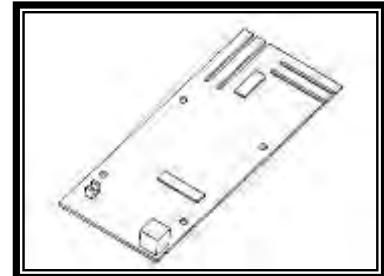
Controls:

- (13) Run all the tests required for an intervention on the translator. Refer to [Tests By Interventions](#) page 333.

8.5.3.7 X/Y Carriage board – C212073

Replacement:

- (1) Switch off the instrument.
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area.



- Take care not to damage the reader head and the reader head lens.

- (7) Unscrew the Y free pulley
- (8) Remove the belt from the pulleys
- (9) Remove the screw maintaining the Y rail. Put a piece of adhesive tape at each rail extremity, the rail must not be removed from the slide in order to prevent the balls from falling down from the bearing.

- (10) Disconnect the flat cables from the carriage board
- (11) Put the X/Y translation system on the side to have a free access to the carriage board.
- (12) Remove the 4 screws maintaining the carriage board

- Never remove the plastic washers

- (13) Replace the old board with the new one.
- (14) Reassemble following the procedure in the opposite way.

Adjustments:

- (15) Adjust the Y belt tension. See chapter [Y Belt tension](#) page 147

Controls:

- (16) Run all the tests required for an intervention on the translator assembly. Refer to [Tests By Interventions](#) page 333.

8.5.3.8 X flat cable – C216051

Replacement:

- (1) Switch off the instrument
- (2) Remove the read head cover as well as the front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area.

-
- Take care not to damage the reader head and the reader head lens.
-

- (7) Remove the 4 screws maintaining the carriage
- (8) Disconnect the flat cable connected to the pan heater board.
- (9) Disconnect the cable and replace it with the new one.
- (10) Reassemble following the procedure in the opposite way.

Adjustments:

- (11) No subject

Controls:

- (12) Run all the tests required for an intervention on the translator. Refer to [Tests By Interventions](#) page 333.

8.5.3.9 **Y flat cable – C216052**

Replacement:

- (1) Switch off the instrument.
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area.

-
- Take care not to damage the reader head and the reader head lens.

-
- (7) Disconnect the cable and replace it with the new one.
 - (8) Reassemble following the procedure in the opposite way.

Adjustments:

No subject.

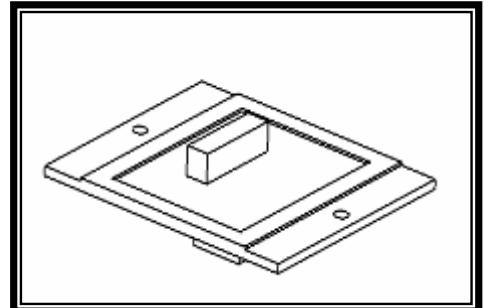
Controls:

- (9) Run a matrix test on the source.
- (10) Check the reading module sensors under “view and controls”

8.5.3.10 Reaction Area Connection Board – C212076

Replacement:

- (1) Switch off the instrument.
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area.



- Take care not to damage the reader head and the reader head lens.

- (7) Disconnect the Y flat cable from the reaction area connection board
- (8) Remove from underneath the screws fixing the reaction area connection board
- (9) Replace with a new one.

Adjustments:

No subject.

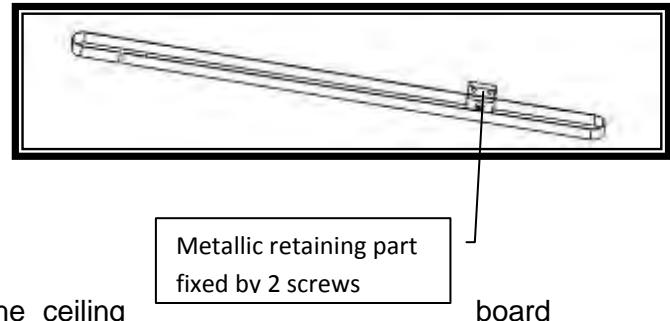
Controls:

Using KCD make sure that the reading module can be initialized without any error message.

8.5.3.11 Y belt Assembly – C614007

Replacement:

- (1) Switch off the instrument.
- (2) Remove the read head cover, front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect the reader head cables
- (5) Disconnect all the connectors on the ceiling
- (6) Remove the top of the reaction area.



Metallic retaining part
fixed by 2 screws

board

- Take care not to damage the reader head and the reader head lens.

- (7) Unscrew the Y free pulley
- (8) Remove the belt from the pulleys
- (9) Remove the screw maintaining the Y rail. Put a piece of adhesive tape at each extremity.
The slide must not be removed from the rail in order to avoid loosing the balls from the bearing.
- (10) Put the X/Y translation system on the side to have a free access to the carriage board.
- (11) Remove the 2 screws fixing the Y belt metallic retaining part and replace the new system.
- (12) Reassemble following the procedure in the opposite way.

Adjustments:

- (13) Adjust the Y belt tension. See chapter [Y Belt tension](#). page 147

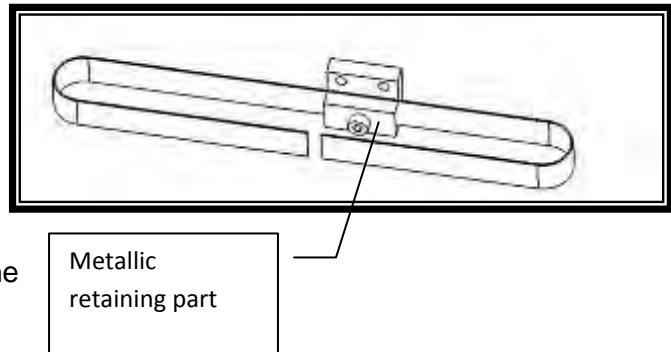
Controls:

- (14) Run all the tests required for an intervention on the translator. Refer to [Tests By Interventions](#) page 333

8.5.3.12 X belt Assembly – C614006

Replacement:

- (1) Switch off the instrument
- (2) Remove the read head cover as well as the front and laser panels
- (3) Disconnect the optical fiber
- (4) Disconnect all the connectors on the ceiling board
- (5) Disconnect the reader head cables
- (6) Remove the top of the reaction area.



- Take care not to damage the reader head and the reader head lens.

- (7) Remove the 4 screws maintaining the carriage
- (8) Disconnect the flat cable connected to the pan heater board.
- (9) Take out the carriage
- (10) Unscrew the X sliding pulley.
- (11) Remove the belt from the pulleys
- (12) Remove the 2 screws fixing the X belt metallic retaining part and replace with the new X belt assy
- (13) Reassemble following the procedure in the opposite way.

Adjustments:

- (14) Adjust the X belt tension. See chapter [X Belt tension](#), page 147

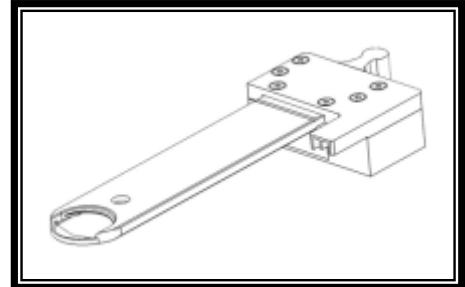
Controls:

- (15) Run all the tests required for an intervention on the translator. Refer to [Tests By Interventions](#) page 333

8.5.3.13 Heating Silica Window Drawer – C213032

Replacement:

- (1) Pull the old drawer and insert the new one.



Adjustments:

- (2) Check there is no mechanical interference with the reaction plate.

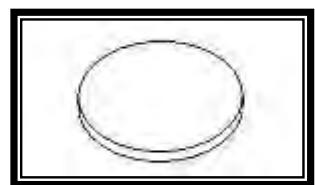
Controls:

- (3) Use the **View and control Window** to check the sensor status.
- (4) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.5.3.14 Silica Window Diam23– C675005

Replacement:

- (1) Pull the drawer.
- (2) Replace the old silica window with a new one.



Adjustments:

- (3) Check there is no stripe or finger mark.

Controls:

No subject.

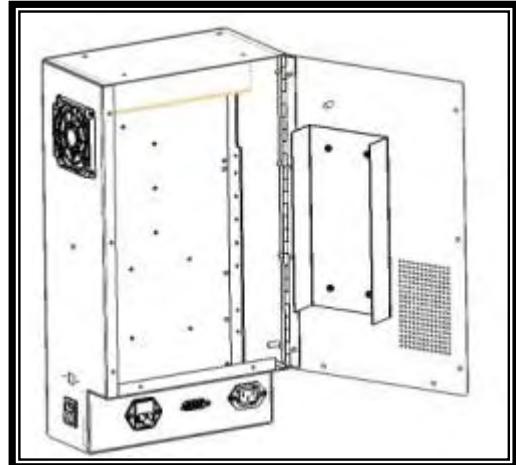
8.5.4 Electronics

- All the parts replacements in this chapter must be done with the instrument switched off and disconnected from the mains.

8.5.4.1 Reader Electronic Box Assembly – C218006

Replacement:

- (1) Switch off the instrument.
- (2) Remove the reader head cover.
- (3) Disconnect all cables connected to the box.
- (4) Remove the old unit (4 screws under).
- (5) Replace it with the new one.
- (6) Reconnect all cables.
- (7) Make sure the Harware Design Program and



Embedded software are the latest ones otherwise update the firmware, refer [Firmware Update, download of LCT table. 245](#)

- (8) Download the linearity correction table related to the reader head currently installed, refer to [Firmware Update, download of LCT table. 245](#)
- (9) Restore the settings from the last good snapshot into the flash memory (Restore the settings prior running the validation tests), refer to [Restoring factory settings or settings from a backup page 220](#)

Adjustments:

- (10) Restore the settings from the last good snapshot into the flash memory from files in XPC (Restore the settings prior running the tests).
- (11)

Controls:

- (12) Run all the tests required. Refer to [Tests By Interventions](#) page 333

8.5.4.2 Motor Board – C212058

Replacement:

- (1) Switch off the instrument
- (2) Remove the 3 screws maintaining the board
- (3) Unplug the motor board from the mainboard
- (4) Replace with a new one (reassemble following the procedure in the opposite way)

Adjustments:

No subject.

Controls:

- (5) Switch on the instrument and verify that it can be initialized normally

8.5.4.3 Twin High Voltage Power Supply – C433002

Replacement:

- (1) Switch off the instrument
- (2) Open the rear electronic assembly and remove reader head cover.
- (3) Disconnect the old HVPS.
- (4) Replace it with the new one.

Adjustments:

No subject.

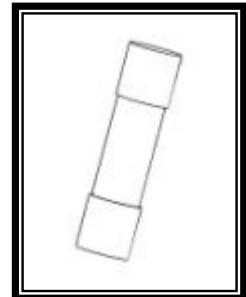
Controls:

- (5) Run all the tests required in the table [Tests By Interventions](#) page 333

8.5.4.4 Reader Power filter Fuses (x2) – C443004

Replacement:

- (1) Switch off the instrument and disconnect it from the mains.
- (2) Open the filter.
- (3) Remove the 2 fuses.
- (4) Replace them with the new ones.



Adjustments:

No subject.

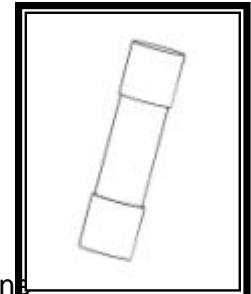
Controls:

- (5) Check that the reading module can operate normally.

8.5.4.5 Mainboard Fuse(s)– C443004

Replacement:

- (1) Switch off the instrument and disconnect it from the mains
- (2) Remove the screws closing the reading module electronic box
- (3) Open the electronic box
- (4) Unplug the fuse defective from its fuse holder and plug the new one
- (5) Close the electronic box and tighten the screws



Adjustments:

No subject.

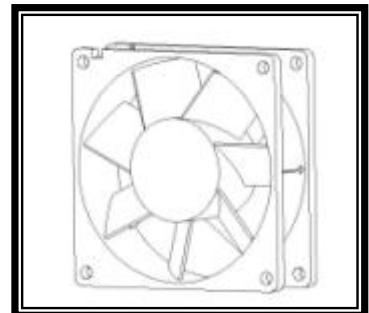
Controls:

- (6) Check that the reading module can operate normally.

8.5.4.6 Fan assy for electronic box- C424002

Replacement:

- (1) Switch off the instrument
- (2) Open the reader electronic box assembly.
- (3) Disconnect the old fan.
- (4) Replace it with the new one.



-
- Respect the direction of the arrow on the fan in order to extract the air from the unit.
-

Adjustments:

No subject.

Controls:

No subject.

8.5.4.7 USB MTA Connection Board – C212066 / Internal USB board C121059

Replacement:

- (1) Switch off the instrument
- (2) Open the rear electronic assembly.
- (3) Disconnect the cable from the USB connection board
- (4) Remove the screws fixing the board.
- (5) Replace the old board with the new one.

Adjustments:

No subject.

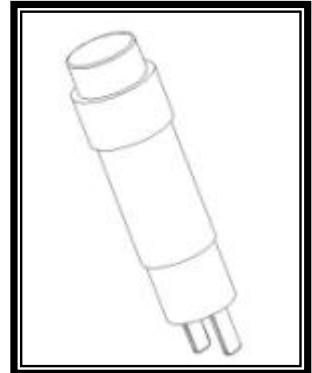
Controls:

- (6) Check that the software dialogues with the reading module.

8.5.4.8 Power Light Assembly (Led incl.) – C417002

Replacement:

- (1) Switch off the instrument
- (2) Open the front skin.
- (3) Disconnect the old power indicator. Keep the cable.
- (4) Replace it with the new one.
• Respect the polarity: X on +.



Adjustments:

- (5) Verify that the LED lights when the instrument is on.

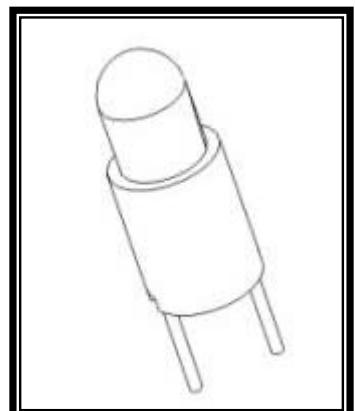
Controls:

No subject.

8.5.4.9 LED for Pause Switch and Power Light – C417001

Replacement:

- (1) Switch off the instrument
- (2) Remove the cap of the LED.
- (3) Remove the old LED and replace it with the new one.
• Respect the polarity: X on +.



Adjustments:

- (4) Verify that the LED lights when the instrument is on.

Controls:

No subject.

8.6 XPC replacement

Replacement procedure

When an XPC replacement is required, the main problem encountered is recovering the customer's data.

There are 3 different situations:

- 1- the current XPC is still operating and the data can be saved on a USB memory stick (the whole customer's data can be recovered and the opened kits can still be used)
- 2- the current XPC is defective but the hard drive is safe and the data can be recovered from that hard drive (the whole customer's data can be recovered and the opened kits can still be used)
- 3- the current XPC is defective because the hard disk crashed and there is no way to recover the data (the customer's data cannot be recovered and the opened kits are not usable anymore, they have to be thrown away).

The procedure is different for each of the 3 situations mentioned here above.

8.6.1 Replacement procedure while the current XPC is still operating

- (1) Switch on the current XPC
- (2) Plug a USB key (you will need more than 50 Mb free on it)
- (3) Open Windows Explorer
- (4) Save the complete **C:\Kryptor\Data** folder to the USB key
- (5) Save the complete **C:\Kcsw\Kcini** folder to the USB key
- (6) Save the complete **C:_factory** folder to the USB key
- (7) Save C:\Windows\Fia.ini and Xipc_var.ini to the USB key
- (8) If the customer is using KIM save **C:\Windows\Klis.ini** to the USB key as well
- (9) Close Windows Explorer and switch off the XPC
- (10) Disconnect all the cables and external devices from the XPC
- (11) Take the current XPC out and instead of it place the new one
- (12) Reconnect the printer, monitor, mouse, keyboard, hand held scanner, KRYPTOR compact PLUS USB cable and the power cable.
- (13) Switch on the computer

- (14) Install the printer drivers if required (or additional external devices drivers)
- (15) Plug the USB key containing the data
- (16) Open Windows Explorer
- (17) Copy the **Data** folder from the key and paste it in **C:\Kryptor** (overwrite any existing Data folder)
- (18) Copy the **Kcini** folder from the key and paste it in **C:\Kcsw** (overwrite any existing Kcini folder)
- (19) Copy the **_factory** folder from the key and paste it in **C:** (overwrite any existing _factory folder)
- (20) Copy **Fia.ini** and Xipc_var.ini files from the key and paste them in **C:\Windows** (overwrite any existing files)
- (21) Install KIM if the instrument is connected to LIS (refer to KB-169D or the most recent LIS KB)
- (22) Copy **Klis.ini** from the key and paste it in **C:\Windows**
- (23) Install a remote control software if needed
- (24) Run the Kryptor software and make sure the instrument is initializing properly
- (25) Make sure that the kits that were in use are still recognized during the scan
- (26) Ask the customer to run a control to make sure that all is running smoothly
- (27) Check the LIS connection
- (28) Print a page in order to check the printer
- (29) Check the modem connection if you need a remote controlled access for service.
- (30) The whole data are recovered and the opened kits are usable again.

8.6.2 Replacement procedure while the current XPC is defective but the hard drive is safe

- (1) Switch off the current XPC
- (2) Disconnect all the cables and external devices from it
- (3) Try to find a place where you will have enough space to dismantle the current XPC



- (4) Remove both screws located at the rear of the casing and take out the hood.



- (5) Disconnect the 3 clips located at the front of the XPC



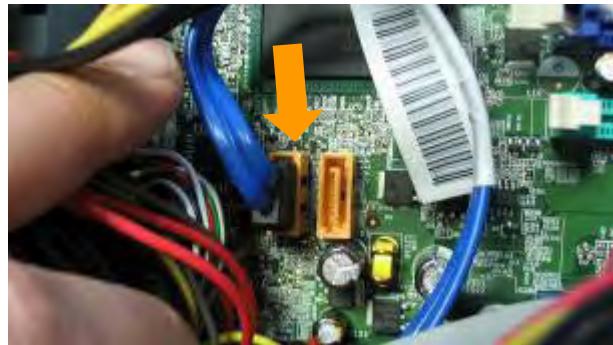
(6) Rotate the front skin towards the bottom and take it out.



(7) Remove both screws shown on the picture here below

(8) Slide the CD drive + floppy disk assembly out but do not remove it





(9) Disconnect the Serial ATA cable from the motherboard

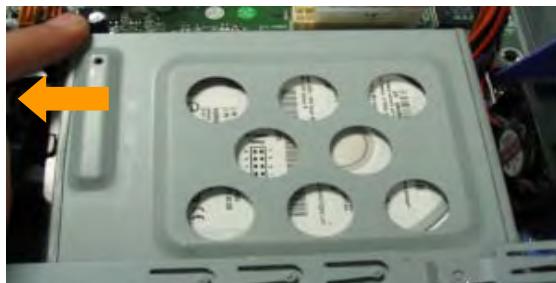
(10) Turn the CD + floppy assembly at 90°



(11) Remove both screws fixing the hard drive assembly to the frame



(12) Slide out the assembly to the left and rotate towards the top



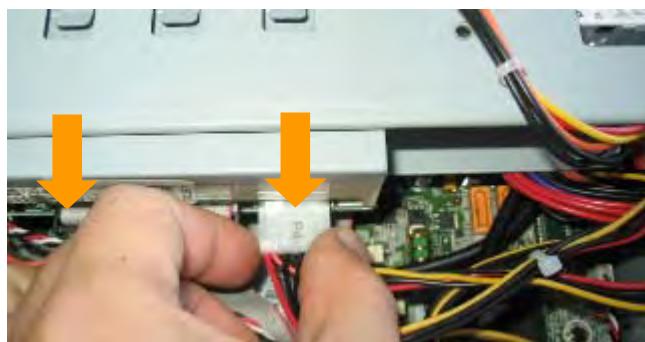
- (13) Disconnect the power cable from the hard drive (but keep the serial ATA cable plugged in).



- (14) The current hard drive is now ready to be connected to the new XPC for data transfer
- (15) Remove the hood of the new XPC (remove both screws as shown here below and take out the hood)



- (16) Disconnect the power cable and the IDE flat cable from the CD drive



- (17) Put the hard drive from the current XPC on top of the CD drive and connect the power cable that was connected previously to the CD drive



- (18) Connect the SATA cable from the current hard drive to the SATA connector that was left free on the motherboard



- (19) **WARNING:** Take care not to swap both SATA cables otherwise you will have to reactivate windows XP.
- (20) Reconnect the printer, monitor, mouse, keyboard, hand held scanner, KRYPTOR compact PLUS USB cable and the power cable.
- (21) Switch on the computer and do not enter the BIOS the hard drive will be recognized automatically.
- (22) Install the printer drivers if required (or additional external devices drivers)
- (23) Open Windows Explorer
- (24) Copy the **Data** folder located in **D:\Kryptor** and paste in **C:\Kryptor** (overwrite any existing Data folder)
- (25) Copy the **Kcini** folder located in **D:\Kcsw** and paste it in **C:\Kcsw** (overwrite any existing Kcini folder)
- (26) Copy the **_factory** folder located in **D:** and paste it in **C:** (overwrite any existing _factory folder)
- (27) Copy **Fia.ini** and **Xipc_var.ini** files from **D:\Windows** and paste them in **C:\Windows** (overwrite any existing files)
- (28) Install KIM if the instrument is connected to LIS (refer to KB-169D or the most recent LIS KB)
- (29) Copy **Klis.ini** from **D:\Windows** and paste it in **C:\Windows**
- (30) Install Remote control software if needed
- (31) Switch off the XPC
- (32) Disconnect the current hard drive from the motherboard (SATA cable)
- (33) Disconnect the power cable from the current hard drive
- (34) Reconnect the power cable and the IDE flat cable to the CD Rom drive

- (35) Put back the hood and its screws
- (36) Put the current hard drive in its original location
- (37) Rebuild the current XPC following the procedure (steps 4 to 13) in the opposite way
- (38) Switch on the new XPC
- (39) Run the Kryptor software and make sure the instrument is initializing properly
- (40) Make sure that the kits that were in use before the XPC replacement are still recognized during the scan
- (41) Ask the customer to run a control to make sure that all is running smoothly
- (42) Check the LIS connection
- (43) Print a page in order to check the printer
- (44) Check the modem connection if you need a remote controlled access for service.
- (45) The whole data are recovered and the opened kits are usable again.

8.6.3 Replacement procedure while the current XPC is defective because the hard drive crashed

- (1) Disconnect all the cables and external devices from the XPC
- (2) Take the current XPC out and instead of it place the new one
- (3) Reconnect the printer, monitor, mouse, keyboard, hand held scanner, KRYPTOR compact PLUS USB cable and the power cable.
- (4) Switch on the computer
- (5) Install the printer drivers if required (or additional external devices drivers)
- (6) If you have a recent snapshot continue with the following steps otherwise jump to step 14
- (7) Copy the snapshot to C:\Snapshot

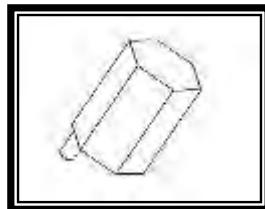
- (8) Extract it
- (9) After extraction you will have 4 subfolders: **_factory, Kcsw, Kryptor, Windows**
- (10) Copy **fia.ini** file from the snapshot (**Windows** subfolder) and paste it to **C:\Windows**
- (11) Copy **Xipc_var.ini** file from the snapshot (**Windows** subfolder) and paste it to **C:\Windows**
- (12) Copy **Id.ini** from the snapshot (**Kcsw\Kcini** subfolder) and paste it to **C:\Kcsw\Kcini**
- (13) Copy the linearity correction table **RHxxxxV3** from the snapshot (**_factory** subfolder) and paste it in **C:_factory** (if the file is not available please request it to the product support hotline).
- (14) Install the latest K-Disk Ana available
- (15) Install KIM if necessary (New Laboratory Information System). Please refer to the “KB-169D – KIM or the most recent LIS KB”.
- (16) If you have a backup of the last configuration file “**klis.ini**”, copy it on C:\windows.
- (17) Install Remote control software if needed
- (18) Run the Kryptor software and make sure the instrument is initializing properly
- (19) Tell the customer that **all the kits already opened and registered with the old XPC have to be thrown away** (the databases being lost or not updated we are not able to restore their status (date of opening, reconstitution performed or not, number of tests remaining, ...))
- (20) Ask the customer to register a new kit and to perform the calibration in order to make sure that the instrument is running smoothly.
- (21) Print a page in order to make sure that the printer is working properly.
- (22) Check the modem connection if you need a remote controlled access for service.
- (23) The data are partially recovered if you can get a recent snapshot but the opened kits are not usable anymore.

9 Adjustment Procedures

9.1 Belts Tensions adjustment

9.1.1 Necessary tools

Belt Tension meter Tool SM4 ref: C691018



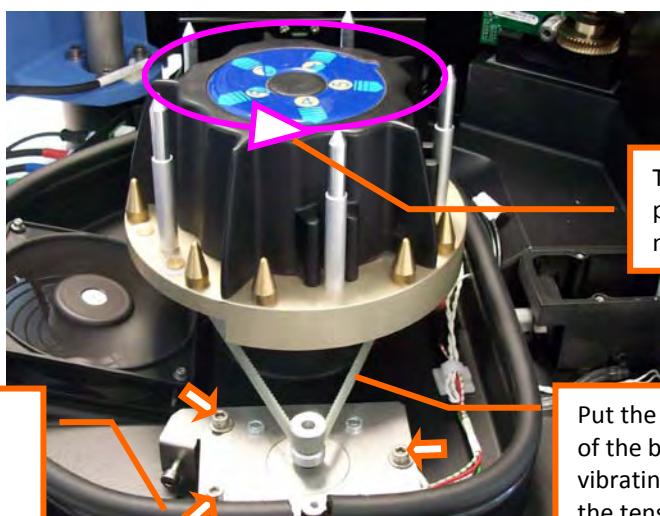
Eccentric tension adjuster for XY belts ref: C614008

This tool is screwed inside the reaction area (front right corner, closed to the Y motor).

9.1.2 Carousel belt

Adjust the belt tension in order to have the following values:

145Hz in 5 positions (the instrument must be off for safety reasons and for get rid off the vibrations)



The 5 values must be between **90Hz** and **170Hz**.

The average of these 5 values must be between **135Hz** and **165Hz**.



9.1.3 Z Arm belt

9.1.3.1 How to check the Z belt tension:

- (1) Raise the arm to the upper position
- (2) Make the belt vibrating and measure the belt tension using the belt tension tool. The value must be **40Hz ± 3Hz**

(measure on the left side of the belt as shown on the picture hereafter).

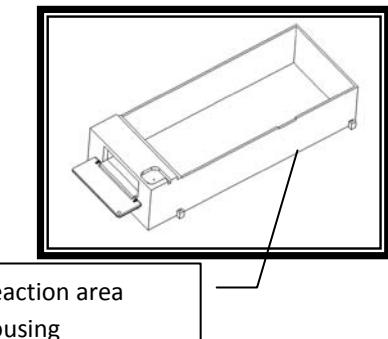
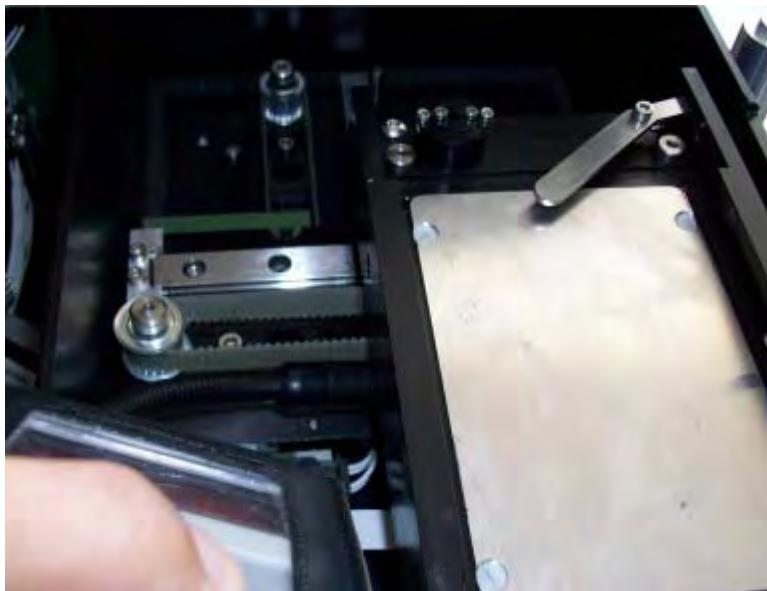
9.1.3.2 How to adjust the Z belt tension:

- (1) Remove the reader head cover
- (2) Raise the Z arm to the upper position
- (3) Losen the screw fixing the top pulley (you can access the pulley when the reader head cover is off).
- (4) Raise the pulley to increase the belt tension and lower the pulley to decrease the belt tension.
- (5) Tighten the screw and check the belt tension again.
- (6) If the belt tension is not in the range, repeat the adjustment from step 3.



9.1.4 X Belt tension

- (1) Push the translator assembly on the right side; do not remove the reaction area housing.
- (2) Make the belt vibrating, using the belt tension tool and a socket wrench adjust the belt tension to reach a frequency of: **60Hz ± 5Hz** (measure on the front side of the belt).



9.1.5 Y Belt tension

- (1) Pull the translator to the front until it is in contact with the front of the reaction area housing.

- (2) Make the belt vibrating, using the belt tension tool and a socket wrench adjust the belt tension to reach a frequency of: $30 \text{ Hz} \pm 2\text{Hz}$ (warning: not below 28 Hz)



9.2 Pipeting Module positions settings

Each pipeting position is defined with its Z and theta coordinates, and with a carousel coordinate if located on the carousel area.

The arm amplitude is 35000 steps in Z and the Zhome value is always 35000. This value decreases when the arm is moving down.

Resolution for Z movement = 200 steps / mm.

For a better accuracy, it is recommended to avoid splitting the movements into short movements and especially very short movements (less than 200 steps). For example if you have to move down the tip from 2 cm, it's better to use 1 movement of 1000 steps rather than using 10 movements of 100 steps.



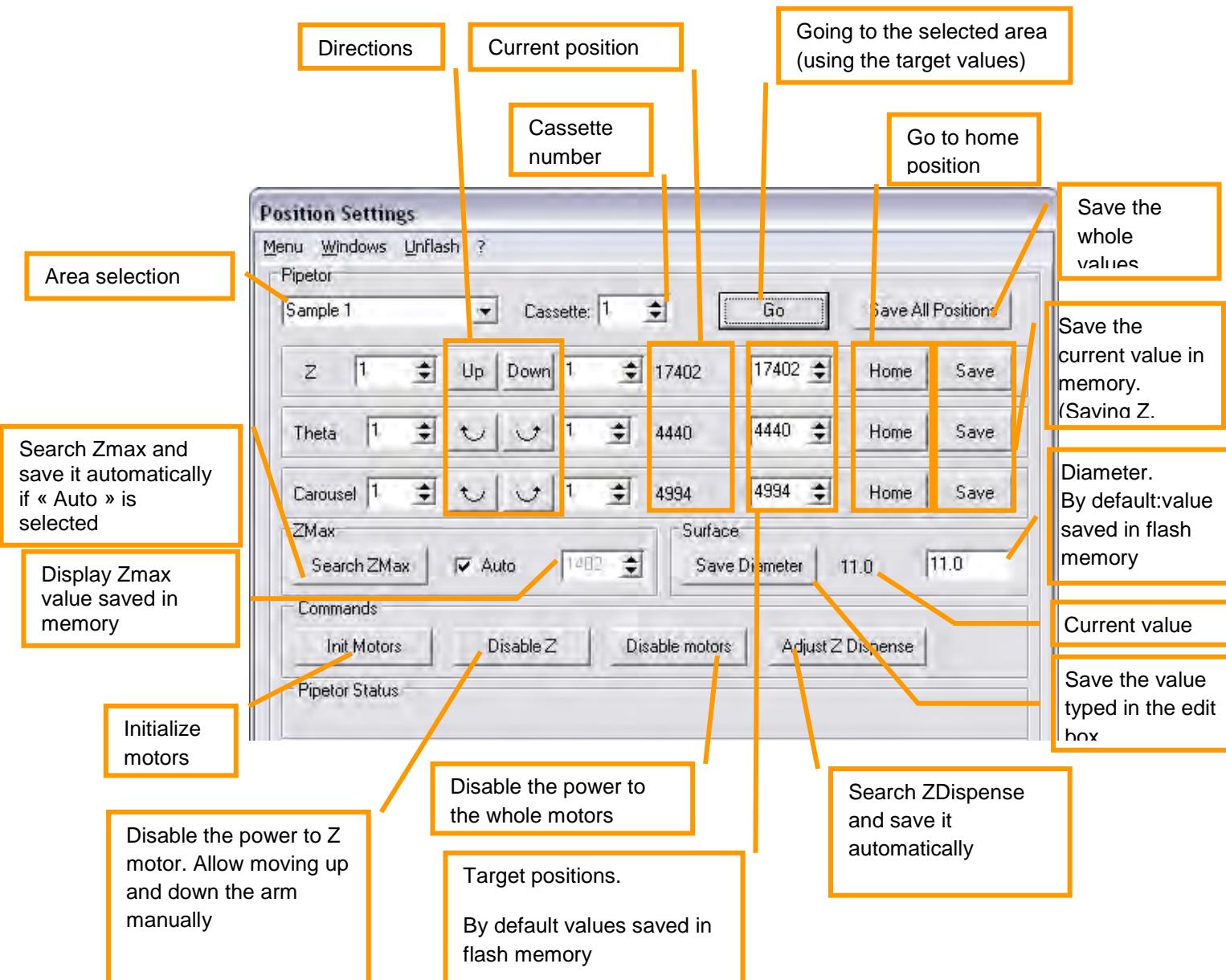
Resolution for Theta movement = 0.075°/step.

-
- Theta movement can be carried out only through software. Any forced displacement of the arm in this movement involves a re-adjustment of the pipeting coordinates.
-

The carousel has 5 cassette positions. 3 are mixed (position 1, 2 and 3) allowing installation of reagents or sample cassettes.

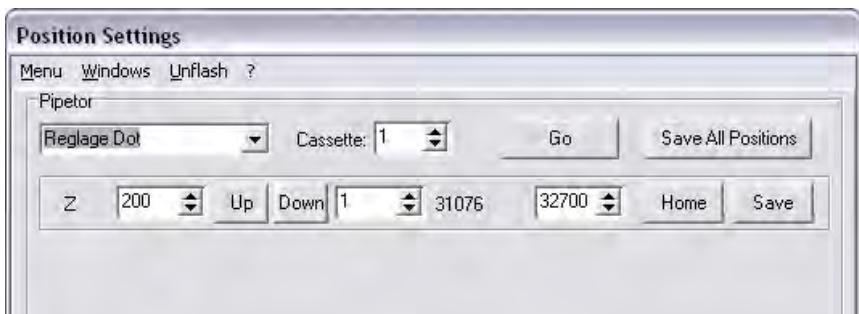
Positions 4 and 5 are designed to receive only sample cassettes.

The pipeting coordinates are saved in the Pipeting Module flash memory. To modify and readjust them, you have to use the “**position settings**” window in KCD software.



9.2.1 Dot Adjustment

This position is a reference for the tip position. The Dot is used to check day after day (or upon a user request) that the tip position has not changed and thus that the pipeting positions are valid.



- (1) Select the Dot position in the drop down menu.
- (2) Click on Init Motors (the tip remains at Zhome position but moves in theta to Dot position).
- (3) Click on disable Z.
- (4) Move down manually the tip.
- (5) Check that the tip is aligned in theta with the dot.
- (6) If a readjustment is required, loosen the screw maintaining the tip board holder and readjust manually the theta position reach the center of the DOT, and finally tighten the screw firmly.



to

- Tightening is very important to secure the reference position in theta.

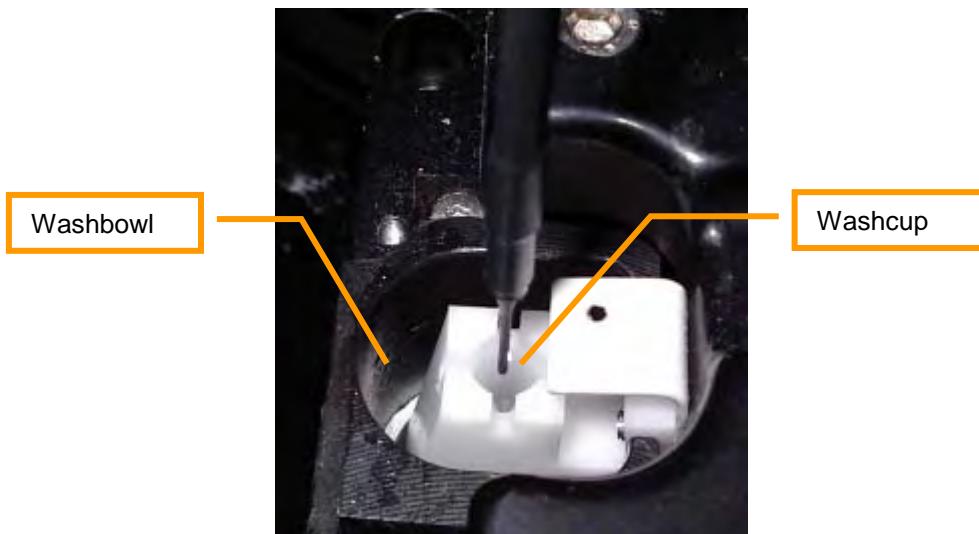
- (7) Click on the “home” button to bring the arm back to the home position.
- (8) Enter 1800 steps in the box located at the right of the down button and click on “down” in order to bring it close to the DOT.

- (9) Enter 100 steps in the box located at the right of the down button and click on "down" until reaching the DOT surface (adjust accurately by movements of 25 to 50 steps).
- (10) Move down 400 steps more to insert the tip in the Dot hole.
- (11) Click on SAVE.

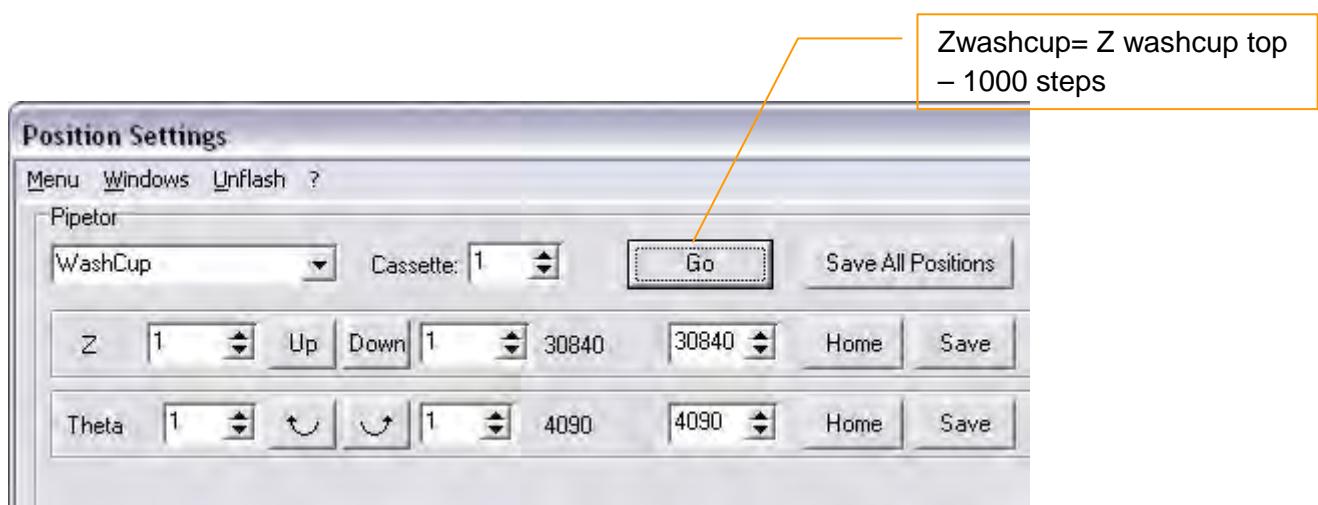


9.2.2 Washcup

- (1) Select **Washcup** in the drop-down menu and click on Go.
- (2) Adjust theta if necessary and click on **SAVE**. [Note theta value on a printing of the sheet KC pipeting coordinates adjustment page 173](#)

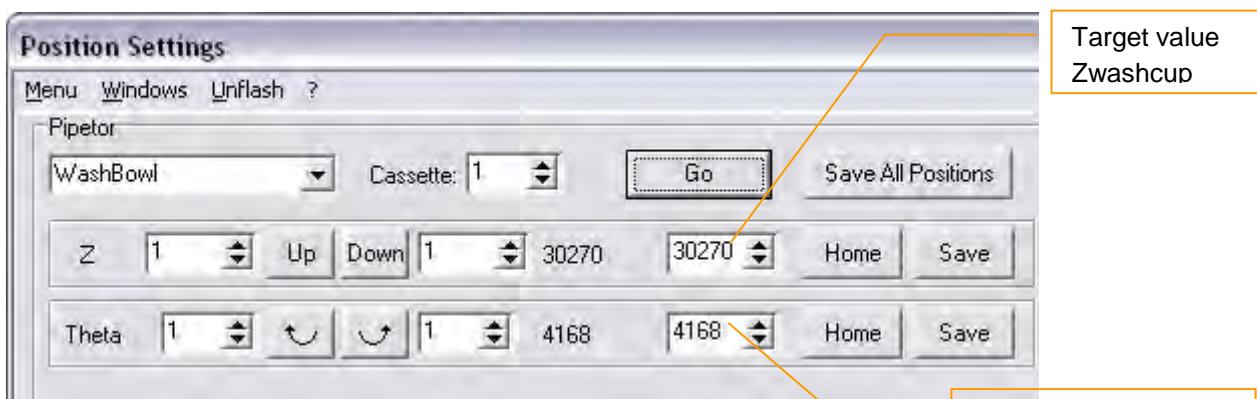


- (3) Move up in Z and move theta to bring the tip above the washcup top.
- (4) Move down until reaching the washcup top and note the Z value.
- (5) $Z_{Cup} = Z_{washcup\ top} - 1000$ steps.
- (6) Enter this target value for Z and click on Go.
- (7) Save Z and [Note \$Z_{washcup}\$ value on a printing of the sheet KC pipeting coordinates adjustment page 173](#)

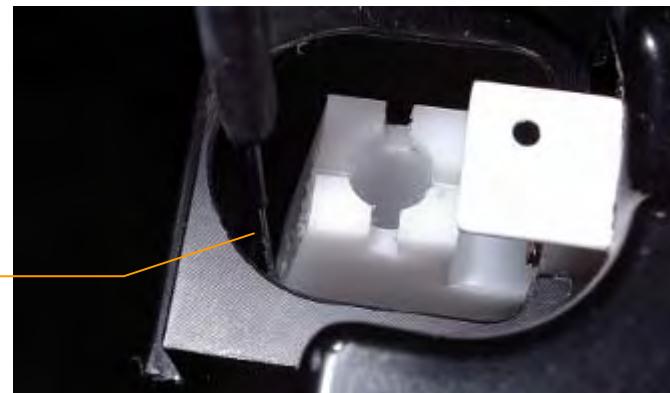


9.2.3 Washbowl

- (1) Select **Washbowl** in the drop-down menu and click on GO.
- (2) Theta Washbowl = theta Washcup + 85 steps.
- (3) Enter theta washcup value + 85 in the target value for theta and click on GO.
- (4) Click on Save.
- (5) Z Washbowl=ZWashcup.
- (6) Enter Z Washcup value in the target value of Z and click on GO.



- (7) Click on Save.
- (8) Run a prime and check that the jet of water brakes against the washbowl slope otherwise readjust theta a few steps counterclockwise.



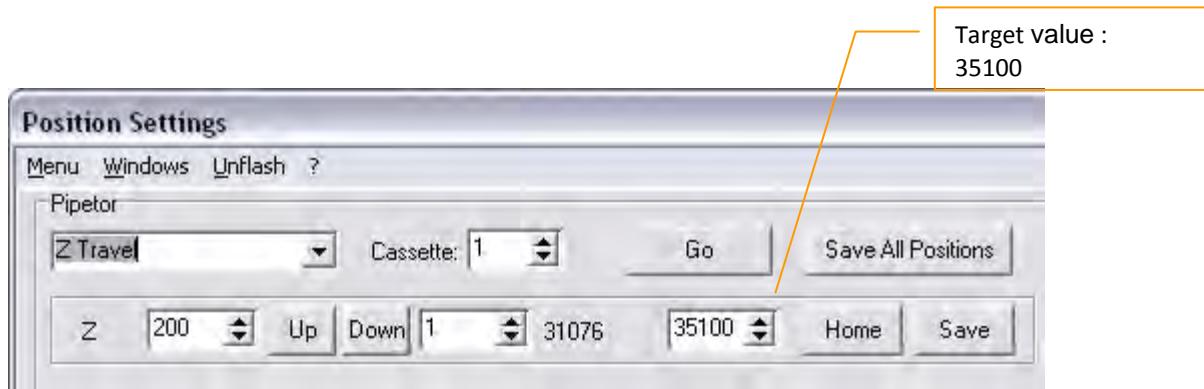
Jet of water
brakes against
the slope.

9.2.4 ZOverwash

- (1) Select **ZOverwash** in the drop-down menu and click on Go.
- (2) ZOverwash = Zwashcup + 2000 steps.
- (3) Enter this target value for Z and click on Go.
- (4) Click on save.

9.2.5 Ztravel

- (1) Select **Ztravel** in the drop-down menu.
- (2) Click on **GO**.
- (3) Enter 35100 in the target value of Z and click on GO.
- (4) Click on **SAVE**.

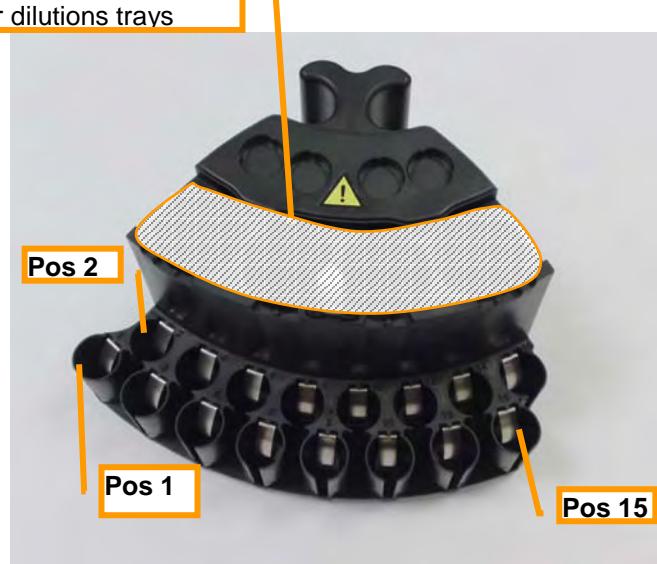


9.2.6 Samples Cassette

9.2.6.1 Introduction

Pipeting coordinates adjustments on samples cassettes are carried out through specific positions for each area to be adjusted: **samples tubes, calibrator vials, microcups, solutions bottles and dilution trays**.

Combo positions : solutions bottles or dilutions trays



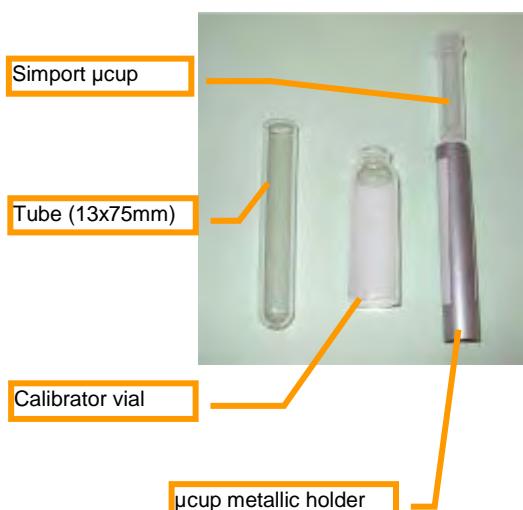
Sample 1, Calibrator 1, Microcup 1, Wash bottle 1 and DilWell 1 are the reference positions of the related areas, that means **they must be adjusted first** (before sample 2, sample 15, Calibrator 2, calibrator 15, etc.). The others ones are defined with offsets compared to the reference positions.

The adjustments required for the reference positions (positions 1 of the different areas as mentioned above) are carousel, theta, Zmax and Zll adjustments (Zmax and Zll are defined once for each area and in positions 1 only).

The adjustments required for positions 2 will be carousel and theta adjustments.

The adjustment required for positions 15 will be carousel adjustment only (theta is the same as position 1 since position 1 and 15 are in the same row).

For convenience, the sample cassette will be put in position 1 (but note that we can adjust the pipeting coordinates with the cassette in the 5 five positions, we just need to fill the "cassette" field with the relevant number) and the samples inserted in positions 1, 2 and 15.



9.2.6.2 Zmax and ZII management

Zmax is the position where the tip is in contact with the bottom of the tube, its adjustment is very important because Zmax is used to define the dead volumes. In order to guarantee that there is enough volume in the tube before pipeting the test, the remaining volume must be more important than the dead volume. When this condition is not satisfied the tube is declared empty.

Zmax can be adjusted either manually or by an “auto search Zmax” feature available on **B·R·A·H·M·S KRYPTOR compact PLUS**. This feature uses the shock detection system present on the tip board to detect the bottom of the tube.

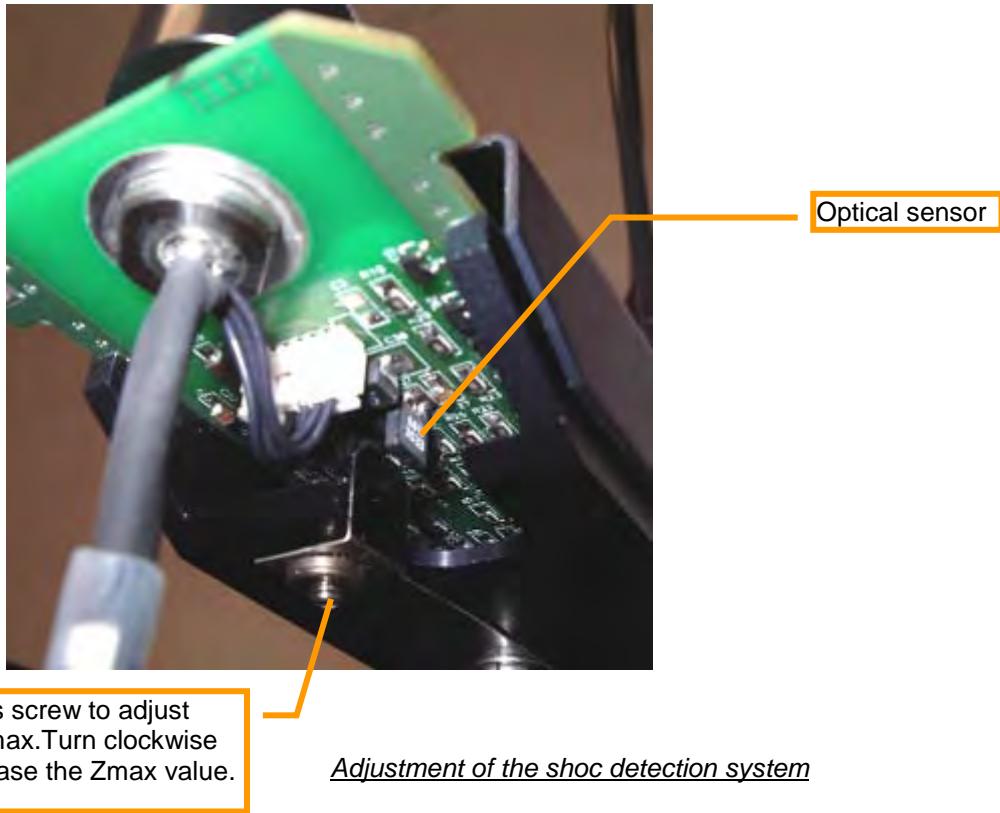
ZII is the position from which the system begins to search for liquid (it's normally a little bit above the samples vials).

The distance between Zmax and ZII is function of the vial height. For the calibrators, the microcups and the samples tubes (13x75 mm by default) this value is well known and will remain the same. The software calculates automatically a new ZII value each time a new Zmax value is defined but we can correct it manually if needed (for example if the samples tubes are different from the 13x75mm ones).

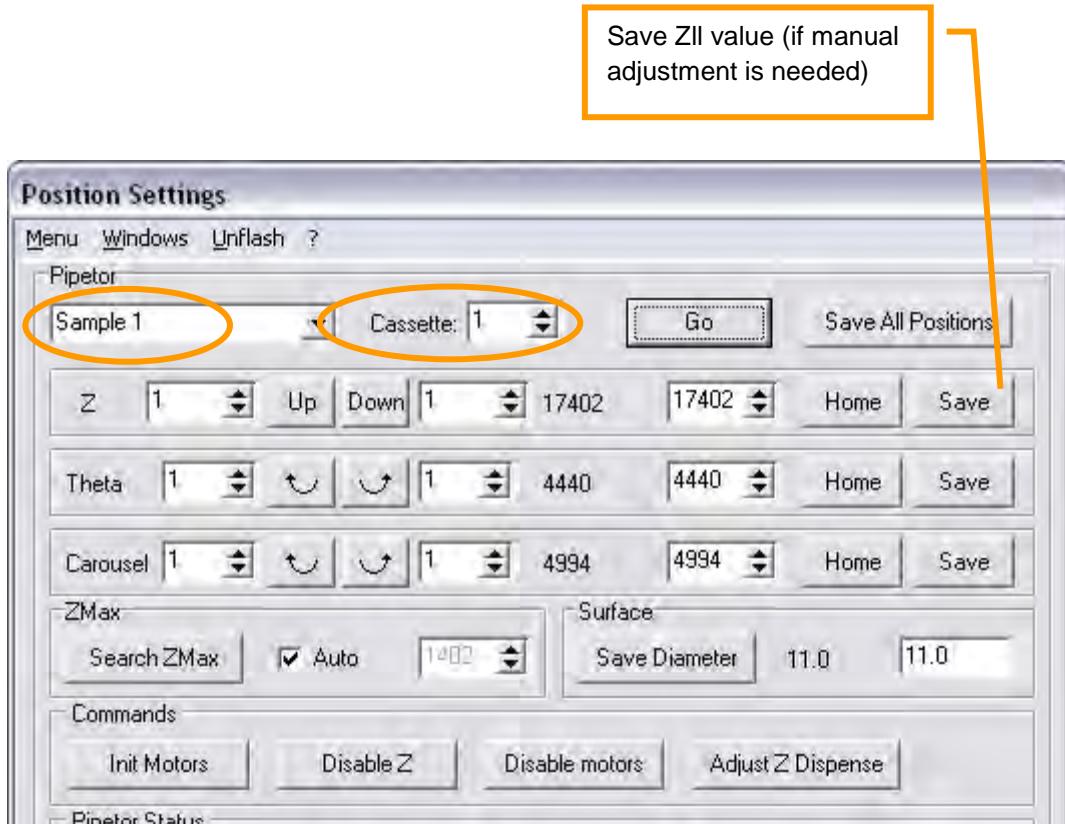
The automatic Zmax have to be compared to a manual Zmax during sample 1 adjustment.

Zmax Auto must be in the range: Zmax Manual -200 to Zmax Manual -300 (for example 1300 in manual mode and 1100 in automatic mode)

If the difference is not in that range, the detection shock system must be adjusted (see figure below).

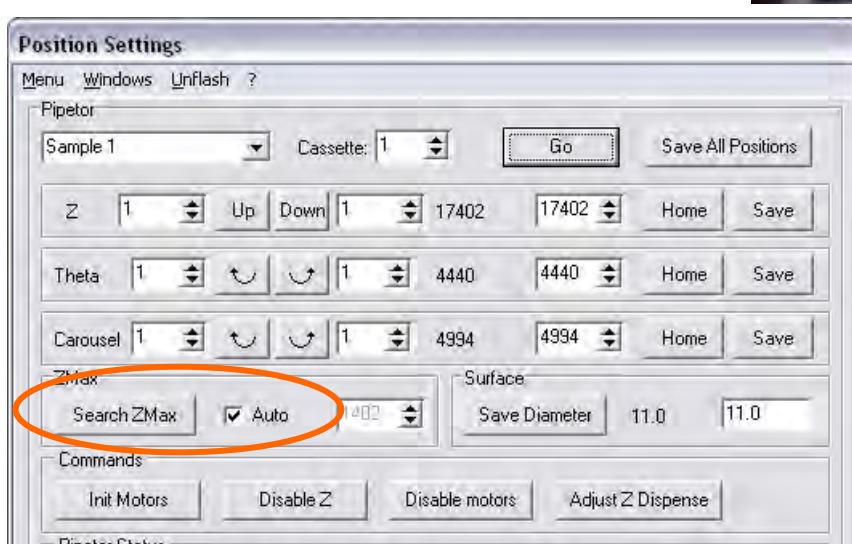


9.2.6.3 Sample 1 (reference position for the samples area)



- (1) Put a sample cassette in position 1 with 3 empty sample tubes in positions 1, 2 and 15.
- (2) Select **Sample 1** in the drop-down menu and select cassette 1.
- (3) Click on **GO**.
- (4) Center the tip in the tube using theta and carousel movements.
- (5) Save theta and carousel .
- (6) Tick "Auto" and click on "search Zmax", the automatic process is as follow:
- (7) The tip is initialized first to Zhome, goes down until the contact with the bottom of the tube and goes back to Zhome. **Zmax is saved automatically**.
- (8) Based on the new Zmax value, **ZII is calculated and saved automatically** and the tip goes to this new ZII. Zmax and ZII value are refreshed on the screen with the new saved values.

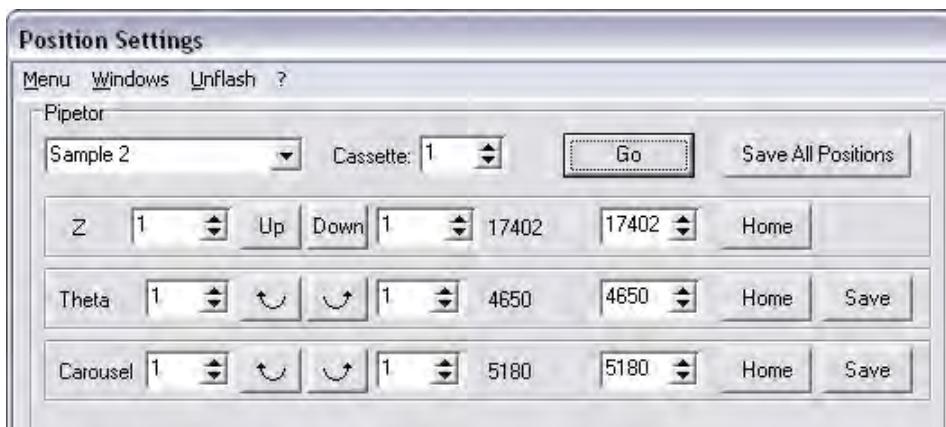
- (9) If needed (for example if the tube is taller or smaller than 75 mm) **ZII can be corrected manually:** use the move up or down Z buttons until the tip is about 1mm above the tube, **when done save Z.**
- (10) On sample 1, check manually Zmax: fill the target value for Z with Zmax found in automatic mode + 1000 steps and click on "Go". Move down by movements of 50 steps until reaching the bottom of the tube. Reduce the number of steps and find accurately Zmax (by touching the tip you can feel when the tip is rubbing against the bottom).
- (11) Verify that the automatic Zmax is acceptable (Zmax Auto is in the range: Zmax Manual -200 to Zmax Manual -300). **This check has to be done only once for the whole Pipeting Module position settings.**



- (12) If absolutely necessary the Zmax found manually can be saved: unselect the check box "Auto", the value in Zmax section becomes available, enter the Zmax found manually in this box and click on "Save Zmax". Offset to ZII will be set automatically and the new ZII value will be saved as well.
- (13) If the tube diameter has an inner diameter different from 11 mm enter the new value (it could be a decimal value: 7.5 for example) and click on "Save Diameter". Be carefull, this value will influence the arm speed during the aspiration (liquid following); if different tubes are used, enter the section of the narrowest tube.

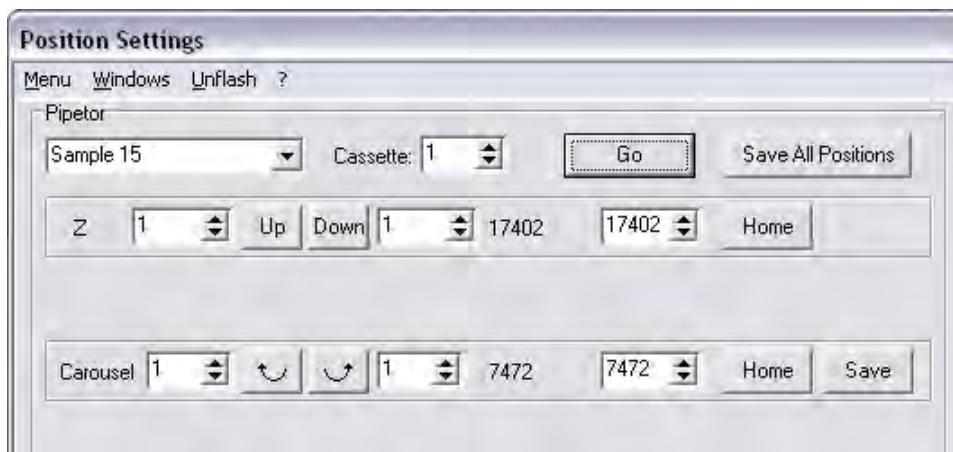
9.2.6.4 Sample 2

- (1) Select **Sample 2** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the tube using theta and carousel movements.
- (4) Save theta and carousel.



9.2.6.5 Sample 15

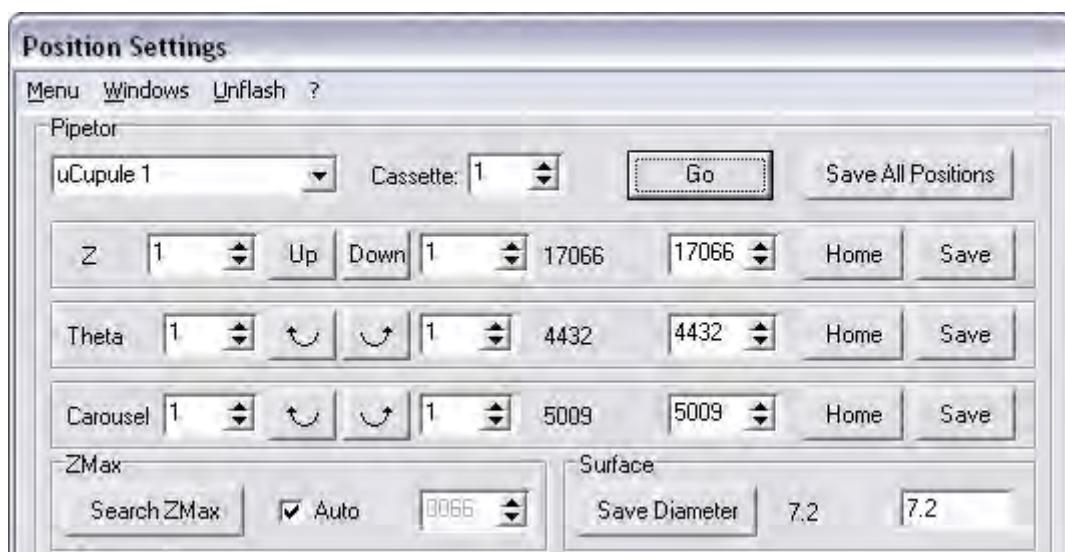
- (1) Select **Sample 15** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the tube using carousel movements.
- (4) Save carousel.



Remark: position 15 of the sample cassette is used in combination with position 1 to define the cassette size (carousel coordinate for position 15 – carousel coordinate for position 1). The cassette size is the parameter saved in flash memory. This same parameter is calculated and saved when you save Sample 15 or μCupule 15 or Calibrator 15. The value taken into account will be the value calculated last.

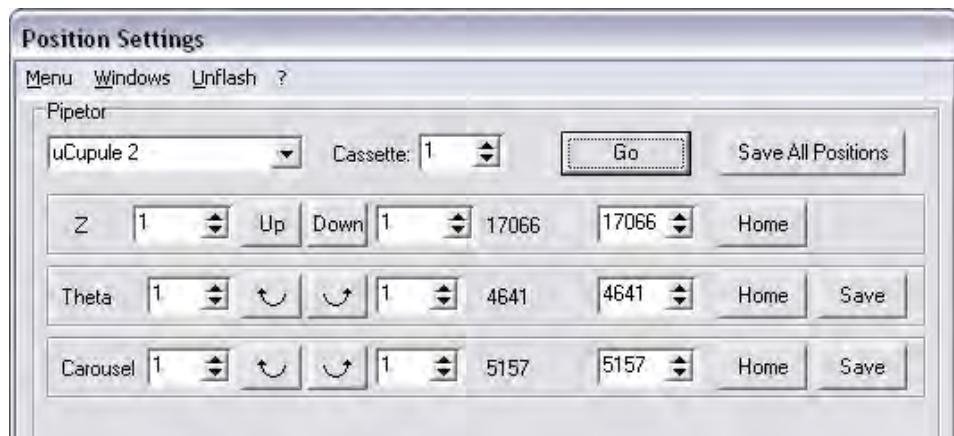
9.2.6.6 **uCupule 1 (reference position for uCupule area)**

- (1) Select **uCupule 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the microcup using theta and carousel movements.
- (4) Save theta and carousel .
- (5) Click on search Zmax (“Auto” check box is ticked).
- (6) Zmax and ZII are saved automatically.
- (7) If the microcup is not a “Simport” microcup and it has a different diameter enter the diameter of the microcup that the customer is using (the diameter to be taken into account is the diameter above the cone where the walls are vertical) and click on “Save Diameter”.



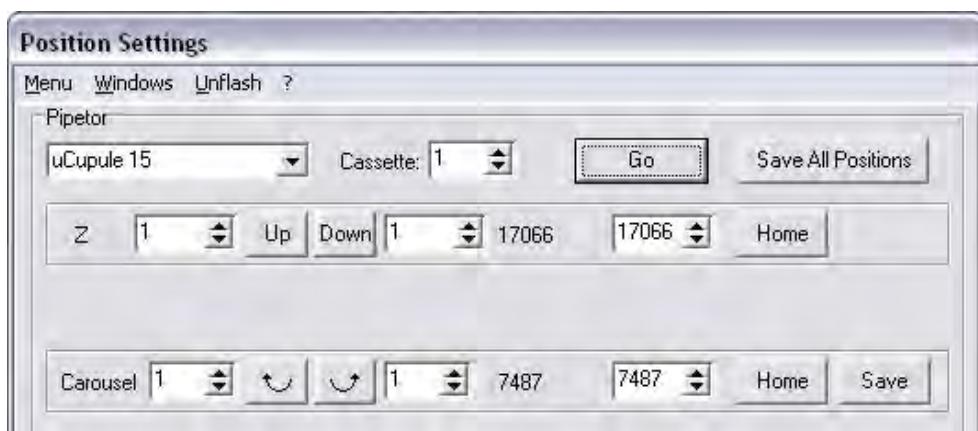
9.2.6.7 μcupule 2

- (1) Select **μCupule 2** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the microcup using theta and carousel movements.
- (4) Save theta and carousel.



9.2.6.8 μcupule 15

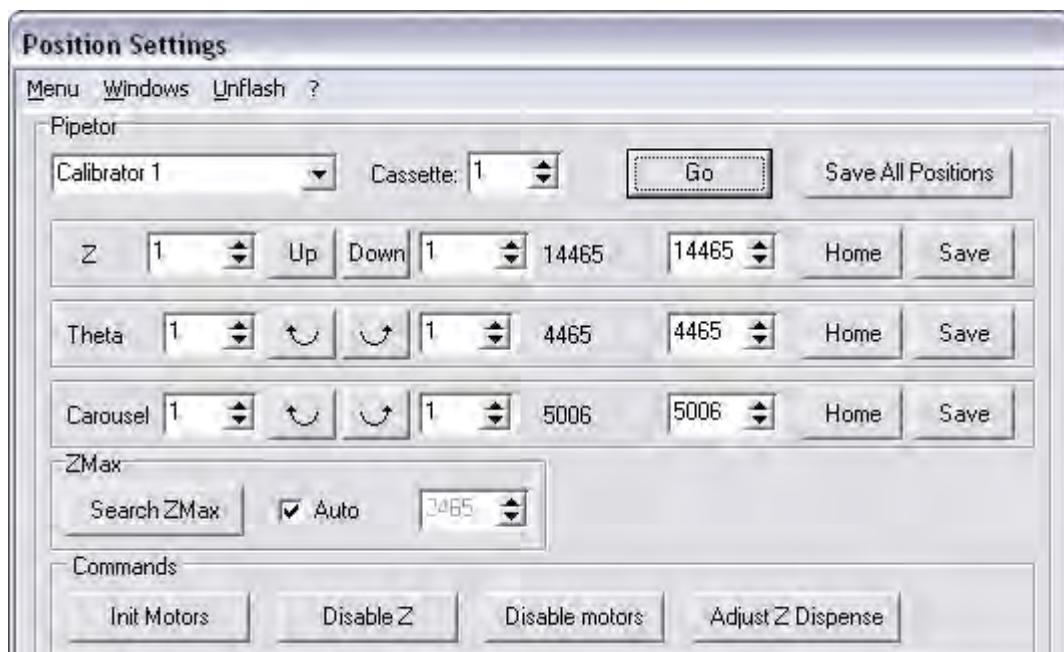
- (1) Select **μCupule 15** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the microcup using carousel movements.
- (4) Save carousel.



Remark: position 15 of the sample cassette is used in combination with position 1 to define the cassette size (carousel coordinate for position 15 – carousel coordinate for position 1). The cassette size is the parameter saved in flash memory. This same parameter is calculated and saved when you save Sample 15 or μCupule 15 or Calibrator 15. The value taken into account will be the value calculated last.

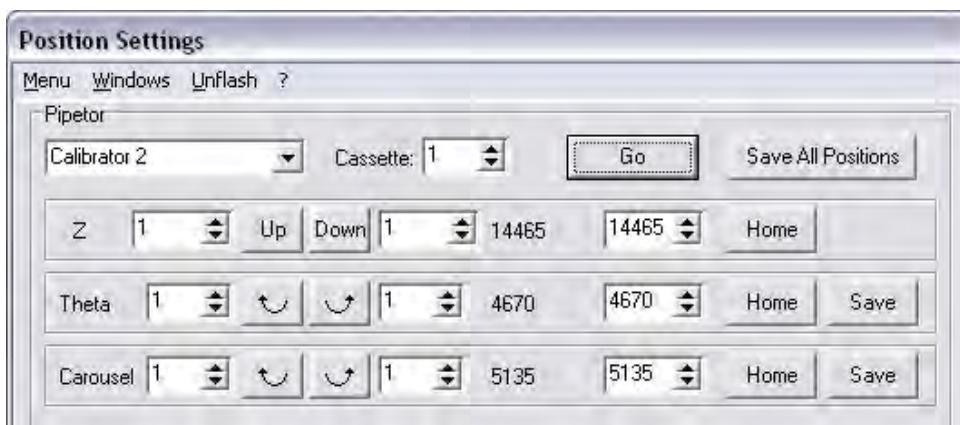
9.2.6.9 Calibrator 1 (reference position for calibrator area)

- (1) Select **Calibrator 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the calibrator using theta and carousel movements.
- (4) Save theta and carousel .
- (5) Click on search Zmax (“Auto” check box is ticked).
- (6) Zmax and ZII are saved automatically.



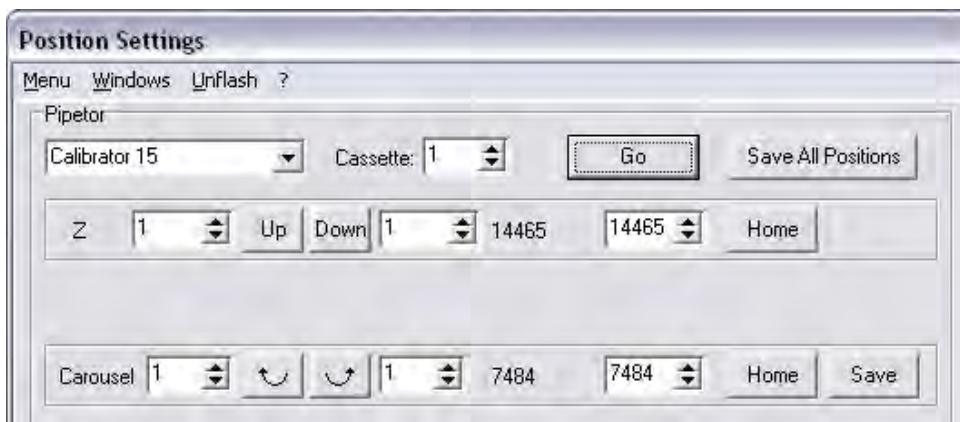
9.2.6.10 Calibrator 2

- (1) Select **Calibrator 2** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the calibrator using theta and carousel movements.
- (4) Save theta and carousel .



9.2.6.11 Calibrator 15

- (1) Select **Calibrator 15** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the calibrator using carousel movements.
- (4) Save carousel.



Remark: position 15 of the sample cassette is used in combination with position 1 to define the cassette size (carousel coordinate for position 15 – carousel coordinate for position 1). The cassette size is the parameter saved in flash memory. This same parameter is calculated and saved when you save Sample 15 or μ Cupule 15 or Calibrator 15. The value taken into account will be the value calculated last.

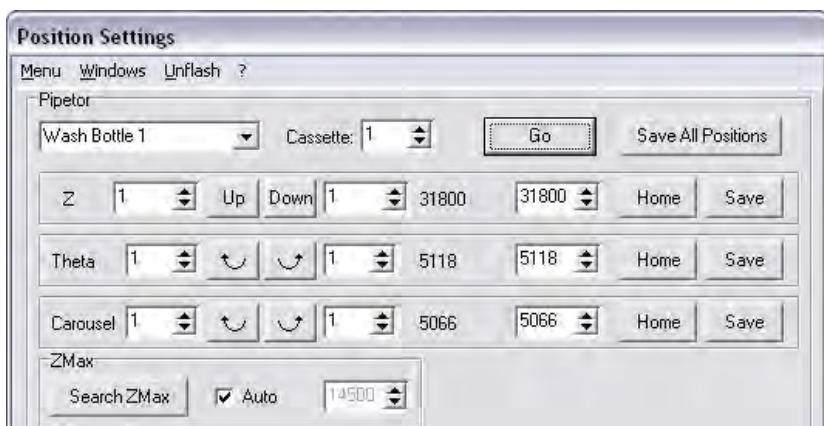
9.2.7 Solutions 1, 2, 3 et 4



The solutions are adjusted through positions 1 and 4 of the cassette.

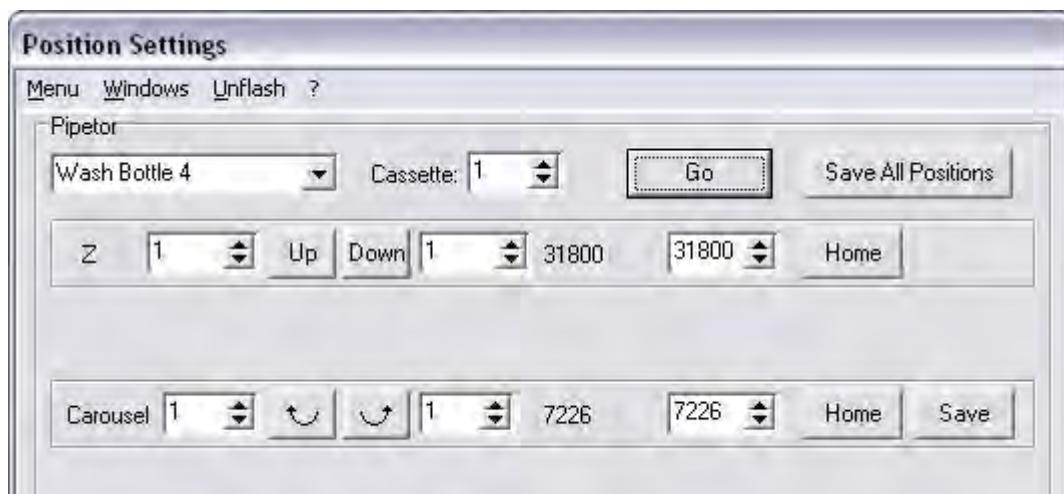
9.2.7.1 Wash Bottle 1 (reference position for the wash bottle area)

- (1) Select **WASH BOTTLE 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the bottle using theta and carousel movements.
- (4) Save theta and carousel.
- (5) Click on search Zmax ("Auto" check box is ticked).
- (6) Zmax and ZII are saved automatically.



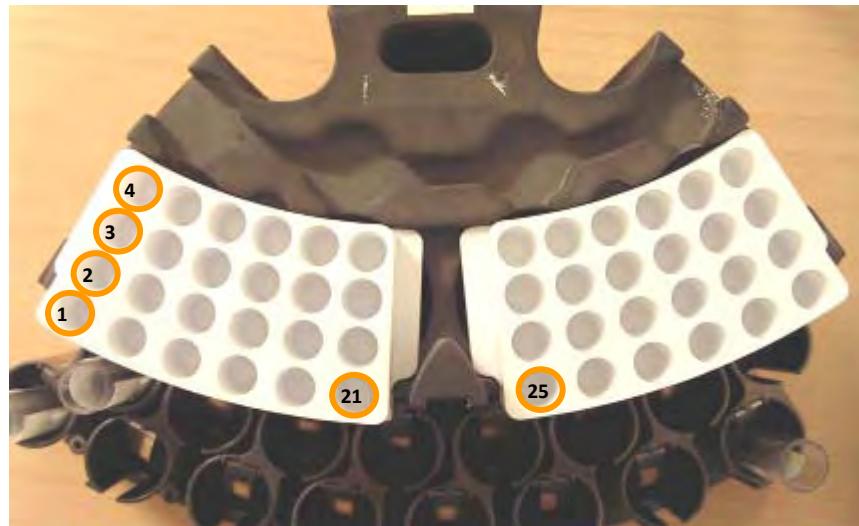
9.2.7.2 Wash Bottle 4

- (1) Select **WASH BOTTLE 4** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the bottle using carousel movements.
- (4) Save carousel .



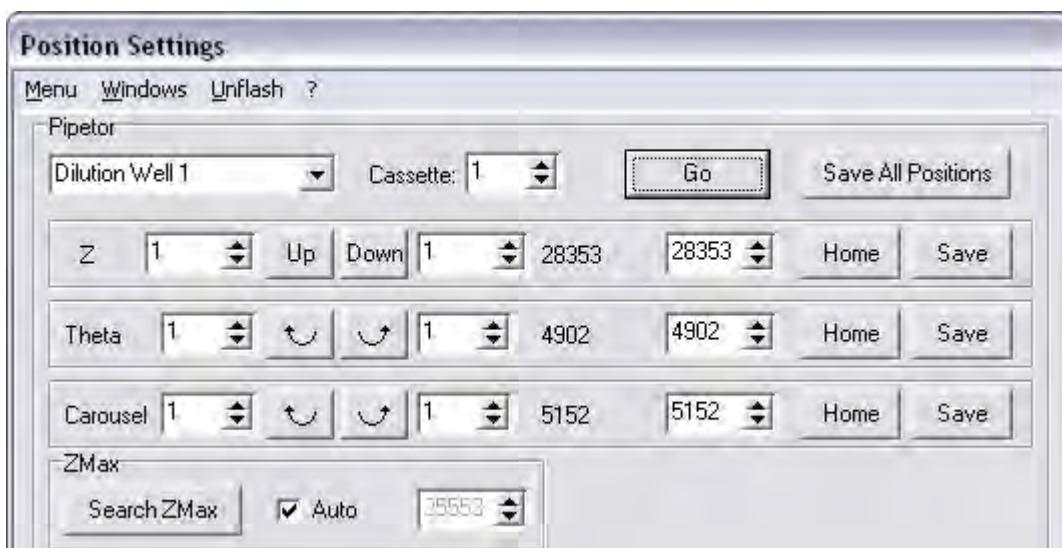
9.2.8 Dilution Plate

The dilution plates are adjusted through wells 1, 2, 3, 4, 21 and 25.



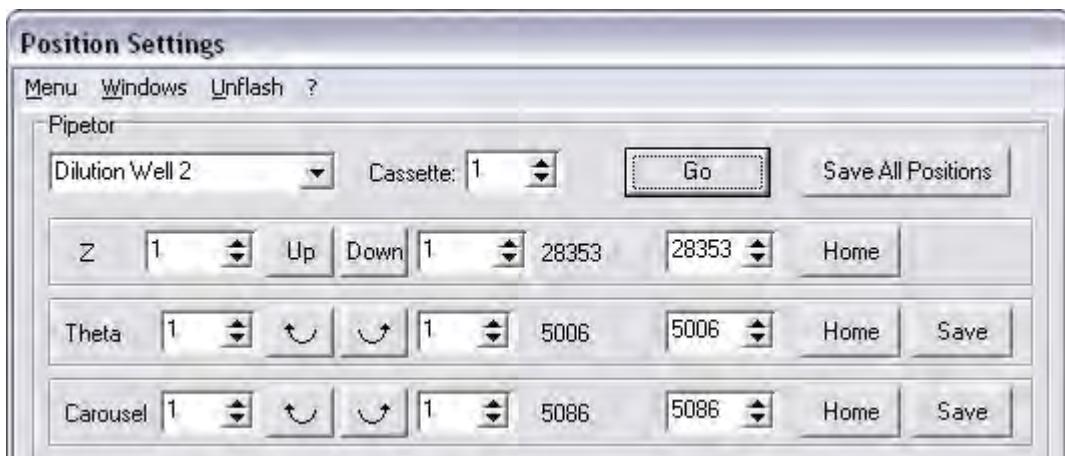
9.2.8.1 Dilution Well 1 (reference position for the Dilution well area)

- (1) Select **Dilution well 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the dilution well 1 using theta and carousel movements.
- (4) Save theta and carousel .
- (5) Click on search Zmax (“Auto” check box is ticked).
- (6) Zmax and ZII are saved automatically.



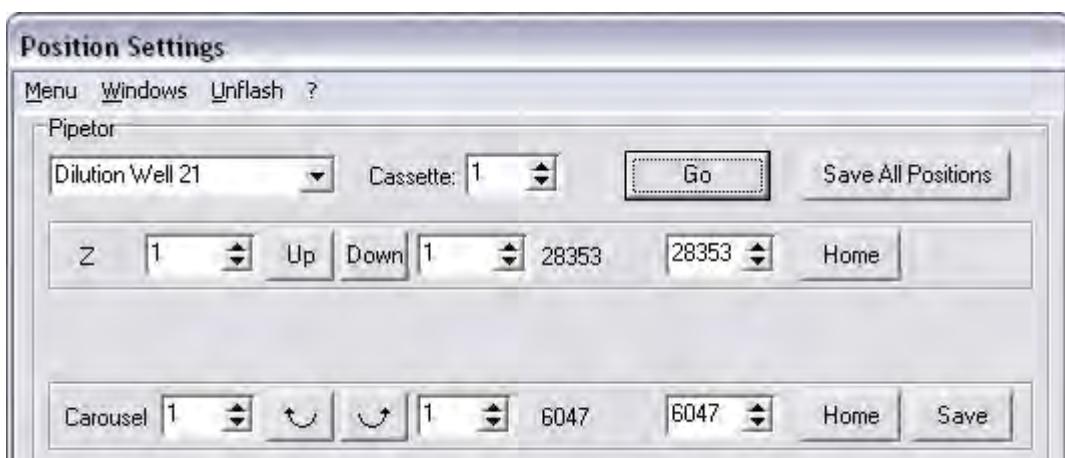
9.2.8.2 Dilution Well 2, 3, 4

- (1) Select **Dilution well 2** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the dilution well 2 using theta and carousel movements.
- (4) Save theta and carousel .
- (5) Follow the same procedure for wells 3 and 4.



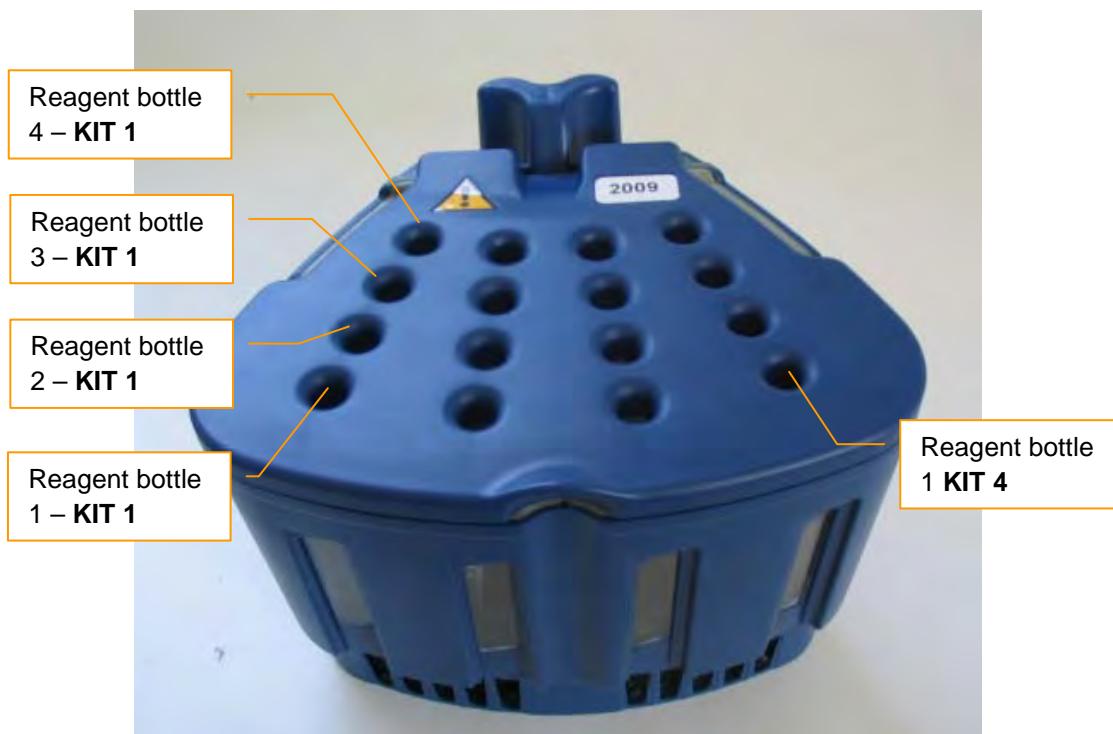
9.2.8.3 Dilution Well 21 et 25

- (1) Select **Dilution well 21** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the dilution well using carousel movements.
- (4) Save carousel .
- (5) Follow the same procedure for well 25.



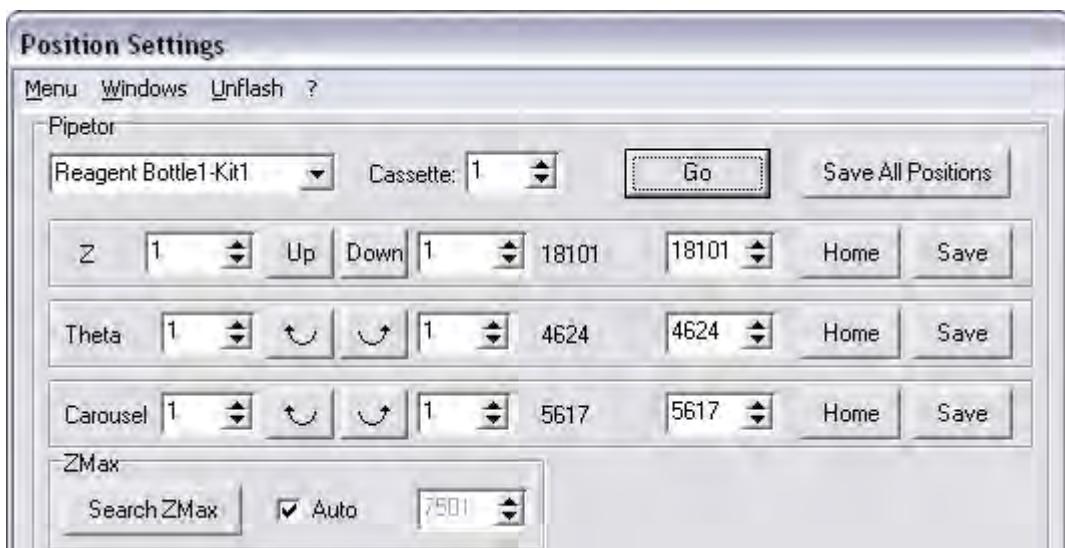
9.2.9 Reagent Cassettes

Put one reagent cassette on the carousel position 1. Insert 2 kits within the cassette in positions 1 and 4. (Note the cassette is put in position 1 for convenience, this adjustment can be done with the reagent cassette in position 1, 2, or 3; the relevant number has to be indicated in the field "Cassette").



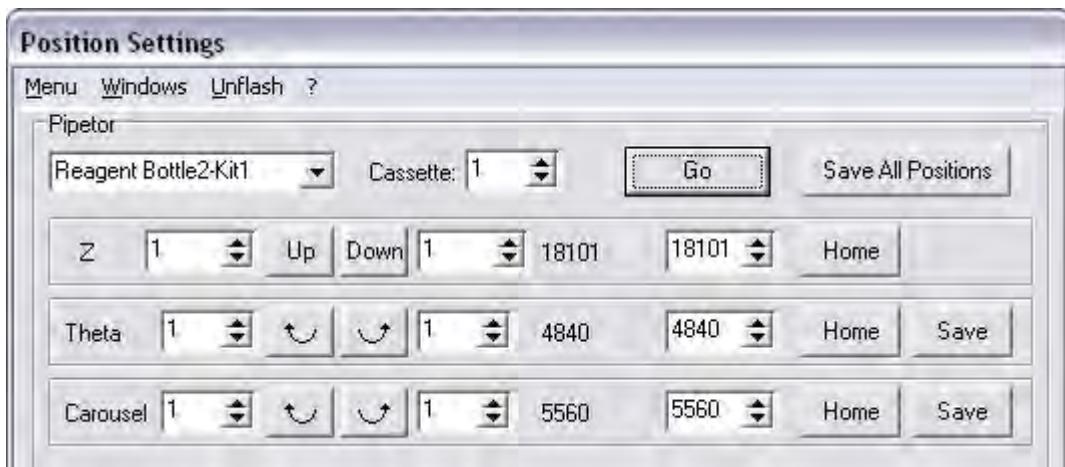
9.2.9.1 Reagent Bottle 1 Kit 1 (reference position for the reagent area)

- (1) Select **Reagent bottle 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the kit bottle 1 using theta and carousel movements.
- (4) Save theta and carousel.
- (5) Click on search Zmax (“Auto” check box is ticked).
- (6) Zmax and ZII are saved automatically.



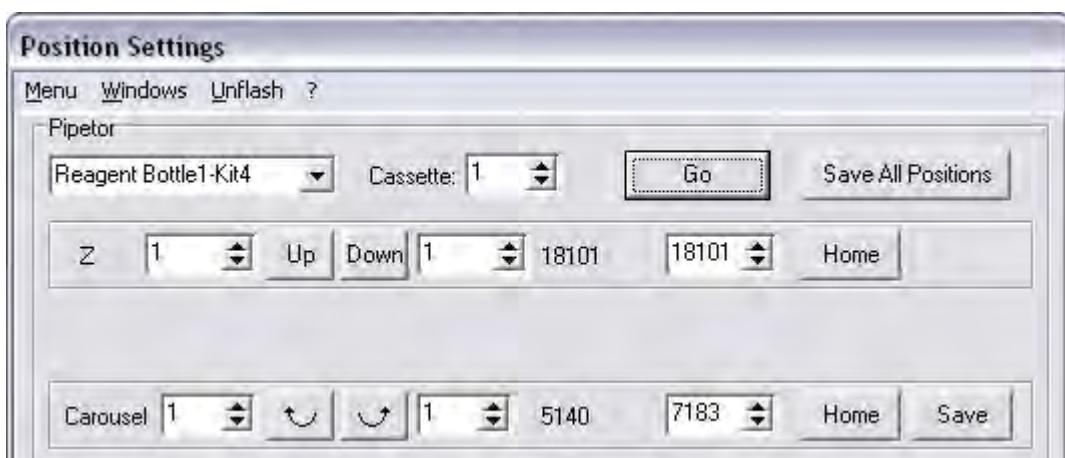
9.2.9.2 Reagent Bottle 2, 3, 4 Kit 1

- (1) Select **Reagent Bottle 2 kit 1** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of kit bottle 2 using theta and carousel .
- (4) Save theta and carousel.
- (5) Follow the same procedure for reagent bottles 3 and 4.



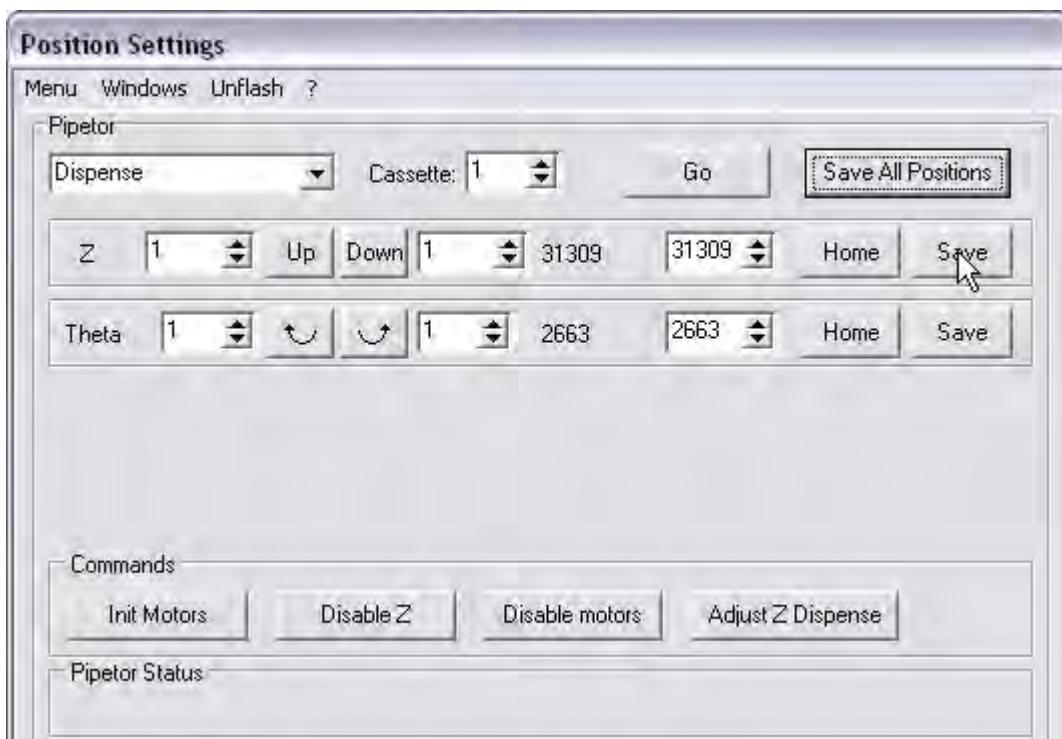
9.2.9.3 Reagent Bottle 1 KitT 4

- (1) Select **Reagent Bottle 1 kit 4** in the drop-down menu.
- (2) Click on **GO**.
- (3) Centre the tip in the hole of the cassette lid using carousel movements.
- (4) Save carousel .



9.2.10 Adjustment of dispensing position in the Reaction Area

Adjusting this position allows to make sure that the distribution is done in the center of the dispensing hole at a certain height above the well. This ensures a good homogenization.



- (1) Initialize the pipetor motors
- (2) Select **Dispense** in the drop-down menu.
- (3) Click on **GO**, the tip will go in the dispensing hole
- (4) Adjust visually the tip in the center of the dispensing hole using theta movements
- (5) Save Theta
- (6) Click on "**Adjust Z Dispense**"
- (7) The instrument will unload the plate
- (8) If a reaction plate is already loaded, please unload the plate and click "**OK**"
- (9) The instrument will load the carriage
- (10) The tip will move down into the dispensing hole until it reaches the plate support.
- (11) From this position the arm will move up (an offset value is defined in the software). This final position is **Zdispense**, it is saved automatically by KCD into the flash memory, it is not necessary to click on "Save".



9.2.11 Sheet KC pipeting coordinates

<u>Positions</u>	<u>Z coordinates</u>	<u>Theta coordinates</u>
DOT	Top of the hole – 400 steps $Z_{dot}=$	DOT hole (mechanical adj.)
Wascup	=Wascup top – 1000 steps $Z_{washcup}=$	Visually $Theta\ washcup=$
Overwash	=ZWascup + 2000 $Z_{overwash}$	
Washbowl	=ZWashcup $Z_{washbowl}=$	=Theta Washcup + 85 $Theta\ Washbowl=$
Z Travel	= 35100	
Sample	Automatic (Manually: ZII=Zmax sample + 16000)	Visually
Microcups (Simport)	Automatic (Manually: ZII=Zmax µcup + 9000)	Visually
Calibrator	Automatic (Manually: ZII=Zmax calibrator + 12000)	Visually
Wash Bottles	Automatic (Manually: ZII=33500)	Visually
Dilution plate	Automatic (Manually: ZII=Zmax dil well + 3100)	Visually
Reagent kit	Automatic (Manually: ZII=Zmax reag bottle + 10600)	Visually
Dispensing hole	Automatic (Manually: ZDisp=Plate support + 3260)	Visually

9.3 Reading Module positions settings

9.3.1 Introduction

The X/Y translator transports the reaction plate into 2 different areas:

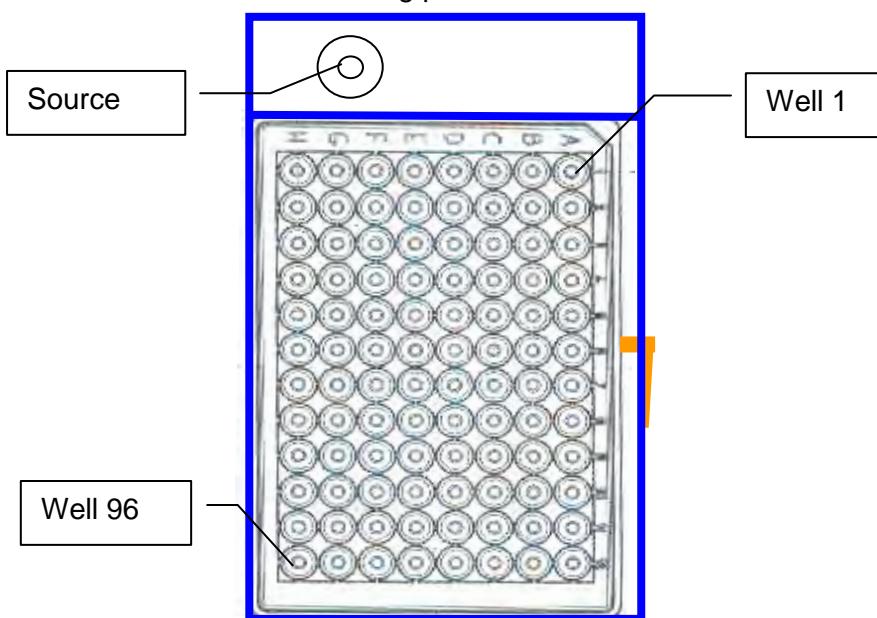
- below the dispensing hole for dispensing the tests in the wells.
- below the reader head for reading the wells.

Reading and dispensing coordinates are defined from a reference device: **the source**.

The source is a light source, controlled and regulated in light intensity. It is located on the carriage just behind the reaction plate. This light source is stable and independent from the laser and the liquid handling. It is used to adjust, monitor and troubleshoot the reading and positioning systems.

To adjust the reading positions (wells positions below the Reader head), 3 positions have to be defined from the Reader head:

- (1) Read source: reference position for all the reading positions.
- (2) Read Well 1: gives the distance between the first well of the reaction plate and the source.
It is defined by offsets (X & Y) from the source.
- (3) Read Well 96: in combination with well 1 position, allows calculating inter-wells distances in X & Y directions.
- (4) To adjust the dispensing positions we use only one position:
- (5) Dispense source: defines the source position regarding the dispensing hole. Dispensing coordinates of the reaction plate wells are calculated using source/well 1 offset and inter-well distance defined for the reading positions.



These values are saved in the Reading Module flash memory but they are visible through the file C:\KCSW\KCINI\config.ini which is a copy of the instrument positions settings (see below an extract of a config.ini file).

[Plate]

Section plate defining the Reading Module position settings

X_HOME=10000	X home coordinate is always 10000, see figure 1
X_UNLOAD=10000	X position during plate unloading: always 10000
X_LOCK=9850	X position after plate unloading (locked position)
X_SOURCE_DISP=9440	X coordinate for source dispensing
X_SOURCE_READ=9392	X coordinate for Read Source, see figure 2
X_SOURCE_WELL1=1741	X Offset between Source and Well1, see figure 2
X_OFFSET_WELL=2867	X Offset inter-well x10 (based on the X distance between well1 and Well96 divided by the number of intervals), see figure 3
Y_HOME=10000	Y home positions: Always 10000, see figure1
Y_LOAD=10000	Y position after loading the plate
Y_UNLOAD=15650	Y position to reach for unloading the plate
Y_SOURCE_DISP=13325	Y coordinate for source dispensing
Y_SOURCE_READ=9744	Y coordinate for read source, see figure 2
Y_SOURCE_WELL1=803	Y Offset between Source and Well1, see figure 2
Y_OFFSET_WELL=2890	Y Offset inter-well x10 (based on the Y distance between well1 and Well96 divided by the number of intervals), see figure 3 .

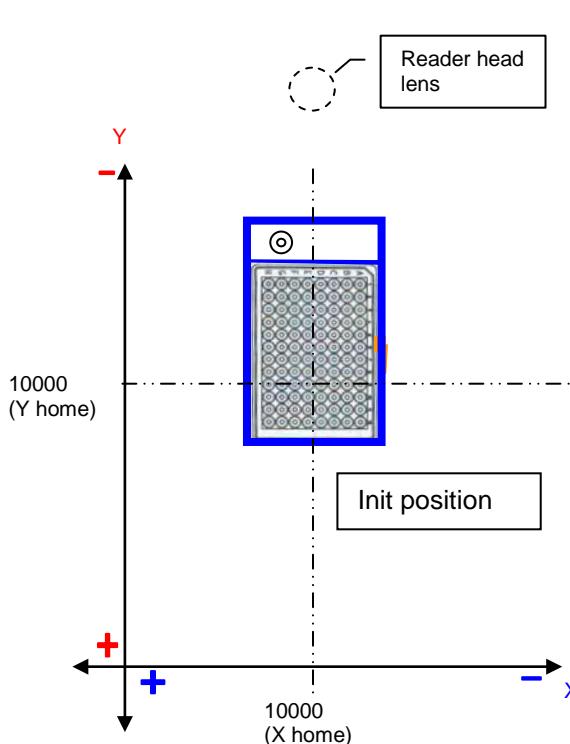


Figure 1

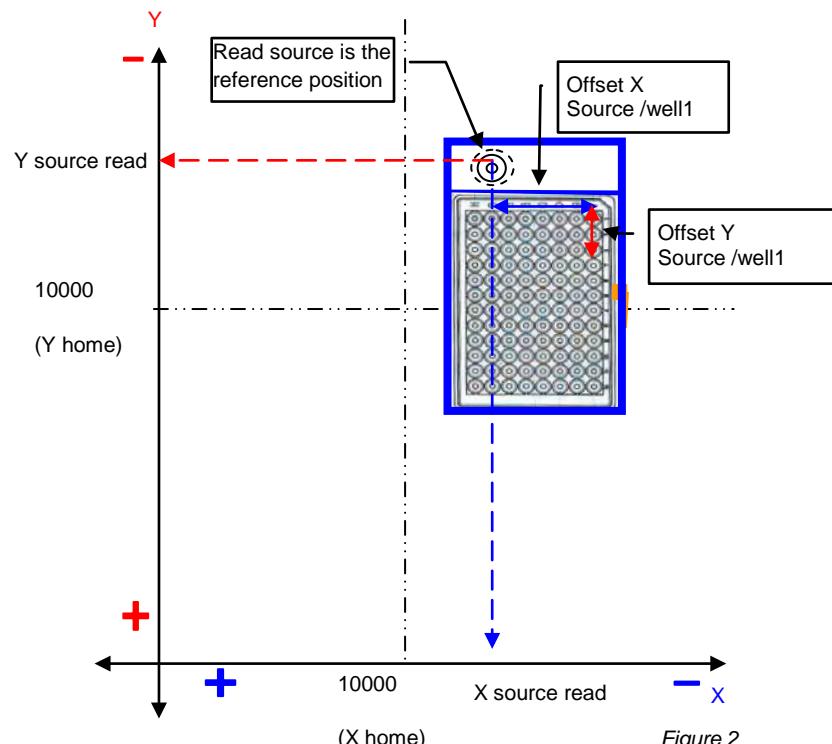


Figure 2

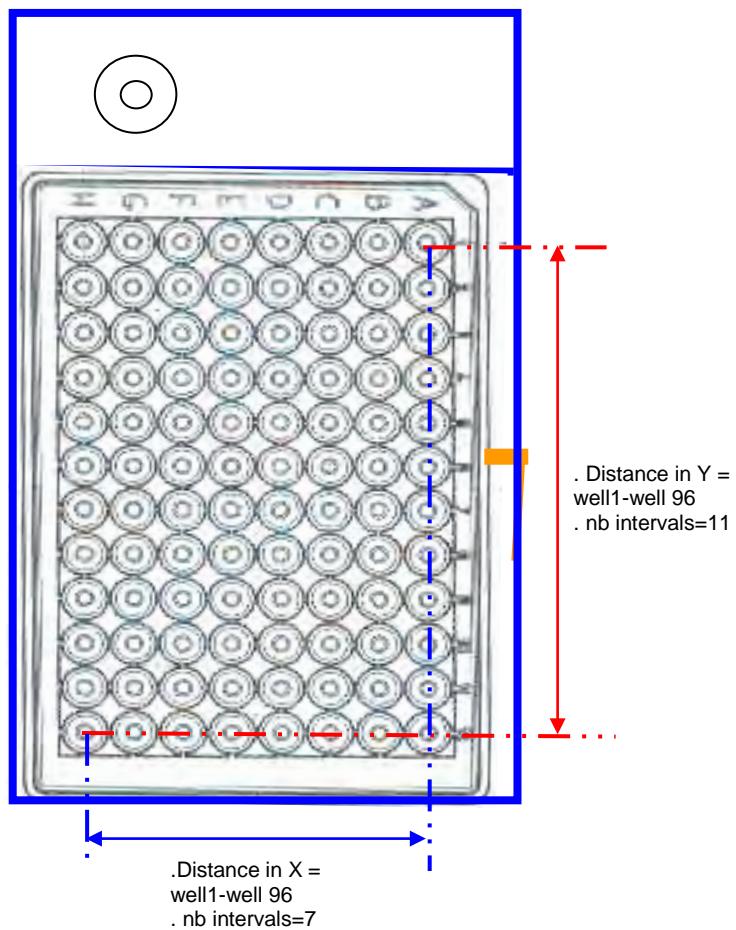


Figure 3

X offset inter-wells= Distance X (well1-well96)/7

Y offset inter-wells= Distance Y (well1-well96)/11

9.3.2 Dispensing Order

By default when the instrument is powered on the dispensing/reading order in the wells is 1,2,3, ... 96. This means that if you request a dispense for well 1 the instrument will dispense in the first well of the reaction plate (column A, row 1). If you request a dispense for well 2 the instrument will dispense in the second well of the reaction plate (column A, row 2) and so on.

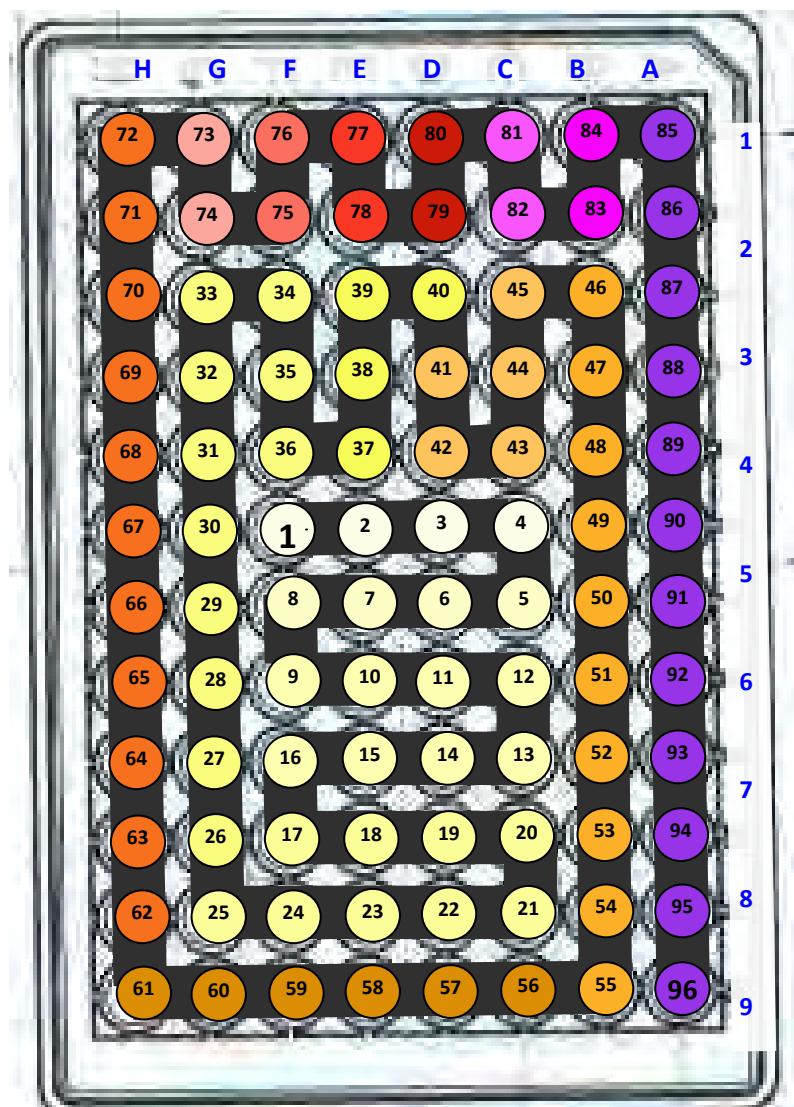
In routine mode the instrument dispenses in the reaction plate following a specific order (called "Snake dispensing" because the drawing showing the dispensing order looks like a snake). This dispensing order provides a better temperature homogeneity between the reaction wells. The dispensing sequence is contained in the file C:\KCSW\kcini\ KCWellMap.ini and it is sent to the instrument whenever the user interface and xipc.exe are started (see correspondance tables here below).

Snake Dispensing Order Vs Well Number (or well coordinates)

Dispense order	Well Number	Well Coordinates	Dispense order	Well Number	Well Coordinates	Dispense order	Well Number	Well Coordinates
1	66	F6	33	75	G3	65	92	H8
2	54	E6	34	63	F3	66	91	H7
3	42	D6	35	64	F4	67	90	H6
4	30	C6	36	65	F5	68	89	H5
5	31	C7	37	53	E5	69	88	H4
6	43	D7	38	52	E4	70	87	H3
7	55	E7	39	51	E3	71	86	H2
8	67	F7	40	39	D3	72	85	H1
9	68	F8	41	40	D4	73	73	G1
10	56	E8	42	41	D5	74	74	G2
11	44	D8	43	29	C5	75	62	F2
12	32	C8	44	28	C4	76	61	F1
13	33	C9	45	27	C3	77	49	E1
14	45	D9	46	15	B3	78	50	E2
15	57	E9	47	16	B4	79	38	D2
16	69	F9	48	17	B5	80	37	D1
17	70	F10	49	18	B6	81	25	C1
18	58	E10	50	19	B7	82	26	C2
19	46	D10	51	20	B8	83	14	B2
20	34	C10	52	21	B9	84	13	B1
21	35	C11	53	22	B10	85	1	A1
22	47	D11	54	23	B11	86	2	A2
23	59	E11	55	24	B12	87	3	A3
24	71	F11	56	36	C12	88	4	A4
25	83	G11	57	48	D12	89	5	A5
26	82	G10	58	60	E12	90	6	A6
27	81	G9	59	72	F12	91	7	A7
28	80	G8	60	84	G12	92	8	A8
29	79	G7	61	96	H12	93	9	A9
30	78	G6	62	95	H11	94	10	A10
31	77	G5	63	94	H10	95	11	A11
32	76	G4	64	93	H9	96	12	A12

Well Coordinates (or Well Number) Vs Snake Dispensing Order

Well Coordinates	Well Number	Dispense order	Well Coordinates	Well Number	Dispense order	Well Coordinates	Well Number	Dispense order
A1	1	85	C9	33	13	F5	65	36
A2	2	86	C10	34	20	F6	66	1
A3	3	87	C11	35	21	F7	67	8
A4	4	88	C12	36	56	F8	68	9
A5	5	89	D1	37	80	F9	69	16
A6	6	90	D2	38	79	F10	70	17
A7	7	91	D3	39	40	F11	71	24
A8	8	92	D4	40	41	F12	72	59
A9	9	93	D5	41	42	G1	73	73
A10	10	94	D6	42	3	G2	74	74
A11	11	95	D7	43	6	G3	75	33
A12	12	96	D8	44	11	G4	76	32
B1	13	84	D9	45	14	G5	77	31
B2	14	83	D10	46	19	G6	78	30
B3	15	46	D11	47	22	G7	79	29
B4	16	47	D12	48	57	G8	80	28
B5	17	48	E1	49	77	G9	81	27
B6	18	49	E2	50	78	G10	82	26
B7	19	50	E3	51	39	G11	83	25
B8	20	51	E4	52	38	G12	84	60
B9	21	52	E5	53	37	H1	85	72
B10	22	53	E6	54	2	H2	86	71
B11	23	54	E7	55	7	H3	87	70
B12	24	55	E8	56	10	H4	88	69
C1	25	81	E9	57	15	H5	89	68
C2	26	82	E10	58	18	H6	90	67
C3	27	45	E11	59	23	H7	91	66
C4	28	44	E12	60	58	H8	92	65
C5	29	43	F1	61	76	H9	93	64
C6	30	4	F2	62	75	H10	94	63
C7	31	5	F3	63	34	H11	95	62
C8	32	12	F4	64	35	H12	96	61

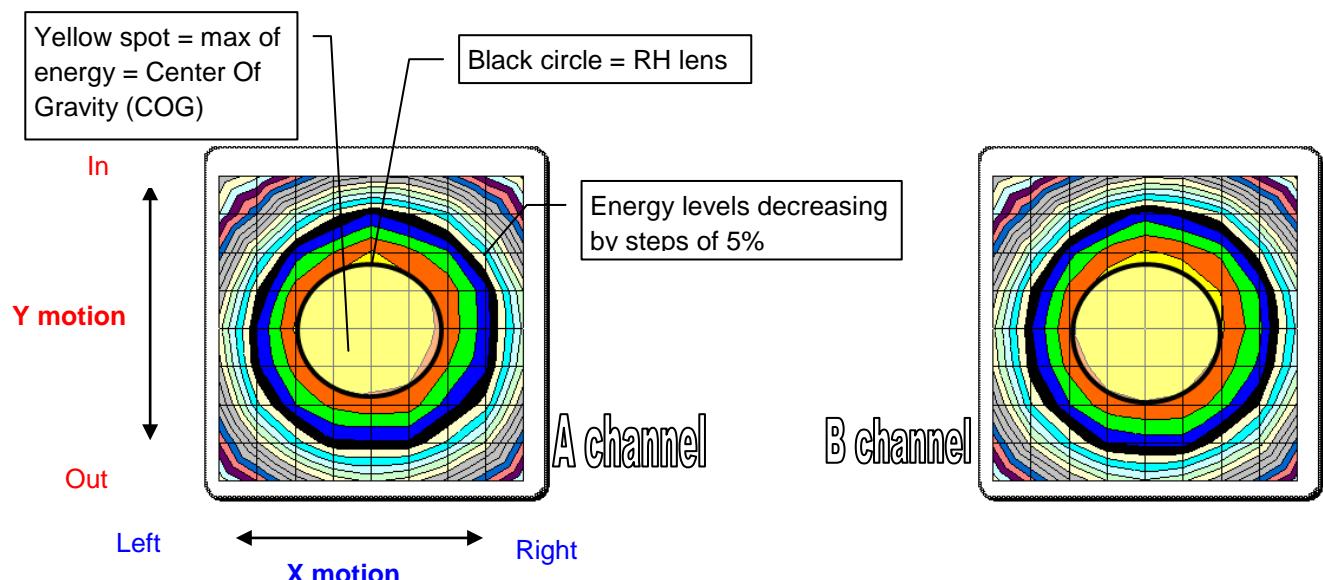


Remark: The colors have no meaning; their use allows just a better visualization.

9.3.3 Matrix test

The matrix test (available in KCD through the “Matrix” window) allows adjusting the source and reference wells positions below the Reader head. The optimal reading position is at the center of the well where the maximum of energy is delivered. By moving the plate with small movements all around the well coordinates and measuring the counts of A and B channels after each movement, an energy map can be created, it is the **matrix**.

The matrix is made of 81 acquisitions related to 81 positions around the well coordinates. The columns represent the movements in Y direction: there are 9 positions per column and the



distance between each position is 16 steps (0,5mm).

The rows represent the movements in X direction: there are 9 positions per row and the distance between each row is 16 steps also (0,5mm).

The black circle represents the Reader head lens and the yellow spot the maximum of energy, it is called the center of gravity (COG). The circles around the yellow spot represent energy levels decreasing by steps of 5%.

We will use the matrix test to know how we have to readjust a reading position coordinates.

9.3.4 Reading coordinates adjustment

The reading coordinates adjustment has to be done after a Reader head or a translator removal, or you can run a matrix test just as a check.

9.3.4.1 Matrix test on the source

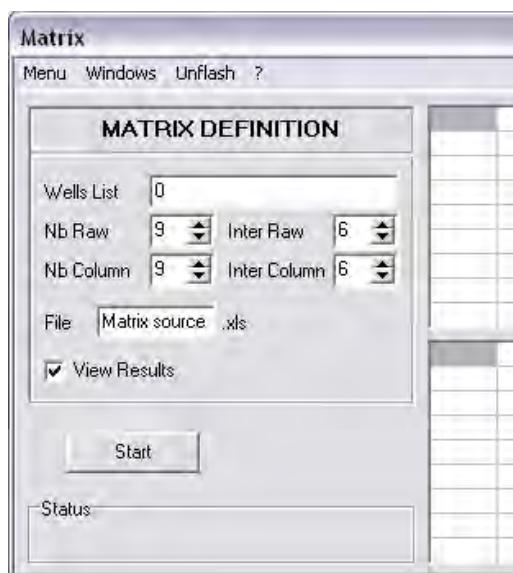
Running the matrix test:

The source has to be adjusted before well 1 and well 96 because it's the reference.

The source providing its own energy the laser will be disabled (to avoid any auto-fluorescence phenomenon).

(1) Go in the “Matrix” window, in the field “Wells list” enter “0” (well 0 represents the source).

The software will change automatically the Inter Raw and inter Column values to 6 steps and switch the laser off (6 steps are used only for a matrix on the source because in this case the carriage movements have to be very small to ensure a more accurate adjustment).



(2) By default, the result file is “Matrix.xls”; we recommend naming it “Matrix source”. The result file is located in **C:\KCSW\KCD\RESULTS**.

Notice that if you run several tests with this filename: only the last one will be available (the file is overwritten each time if you don't change the filename).

(3) Make sure the protective window is in for at least 1mn30 and its temperature regulation is active. If you are not sure, initialize the reader and wait for 1mn30.

- If the silica window is not heated for at least 1mn30 you may have condensation on it. The condensation has an impact on the matrix result.

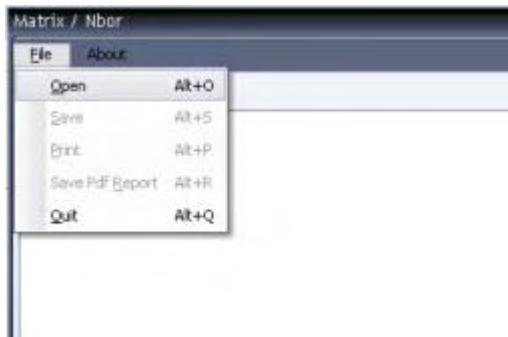
(4) Click on “Start” to run the test. As the laser is disabled, you should just hear the translator moving and see on the screen row and column numbers increasing.

(5) Wait for the test completion.

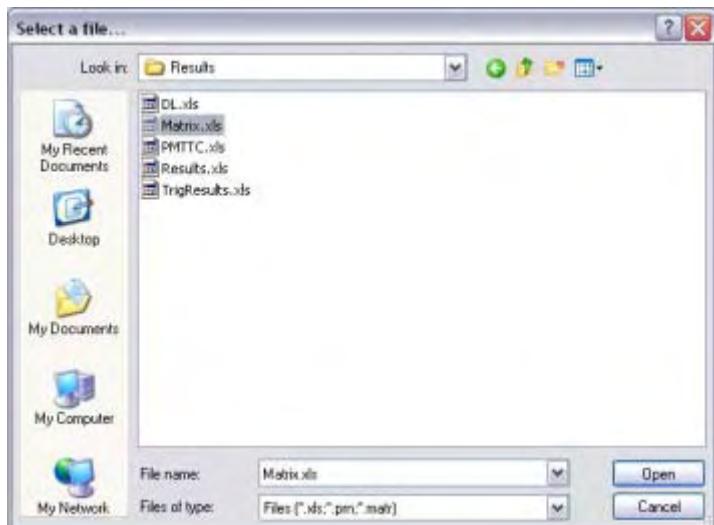
Results analysis:

(1) Run the Matrix utility

(2) Click on “File” menu and select “Open” (or press Alt + O)



(3) Browse the disk and select the file containing the matrix raw data

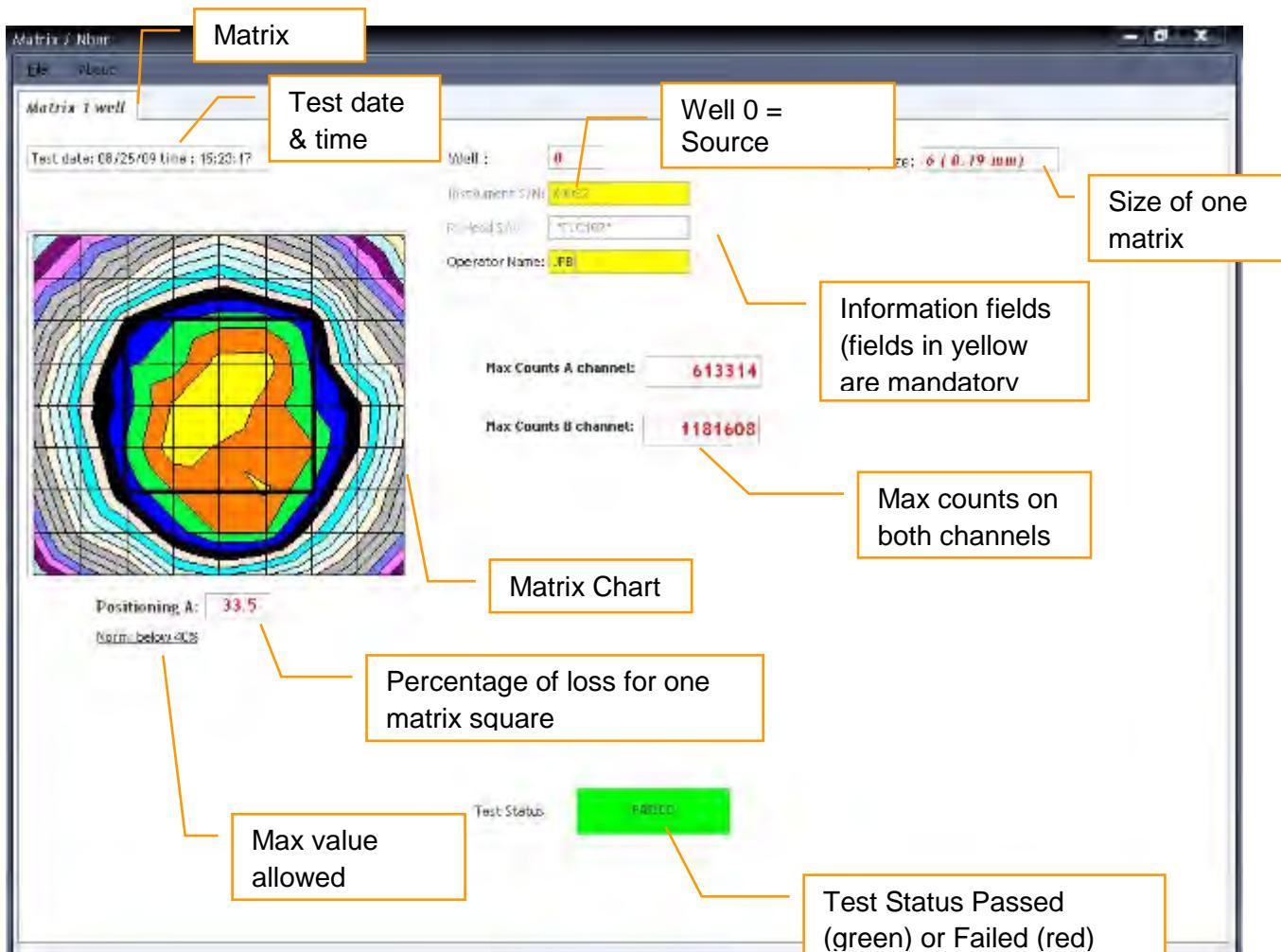


(4) Click on “Open”

- (6) When the Matrix utility is ran **directly on the XPC** (I:\FIA\ld.ini or C:\KCSW\KCINI\ld.ini is available) a popup window will propose you to collect and fill automatically the instrument information (instrument and reader head serial numbers). When the information fields are filled automatically they are not modifiable anymore but you can fill them manually if you decline to get the information automatically

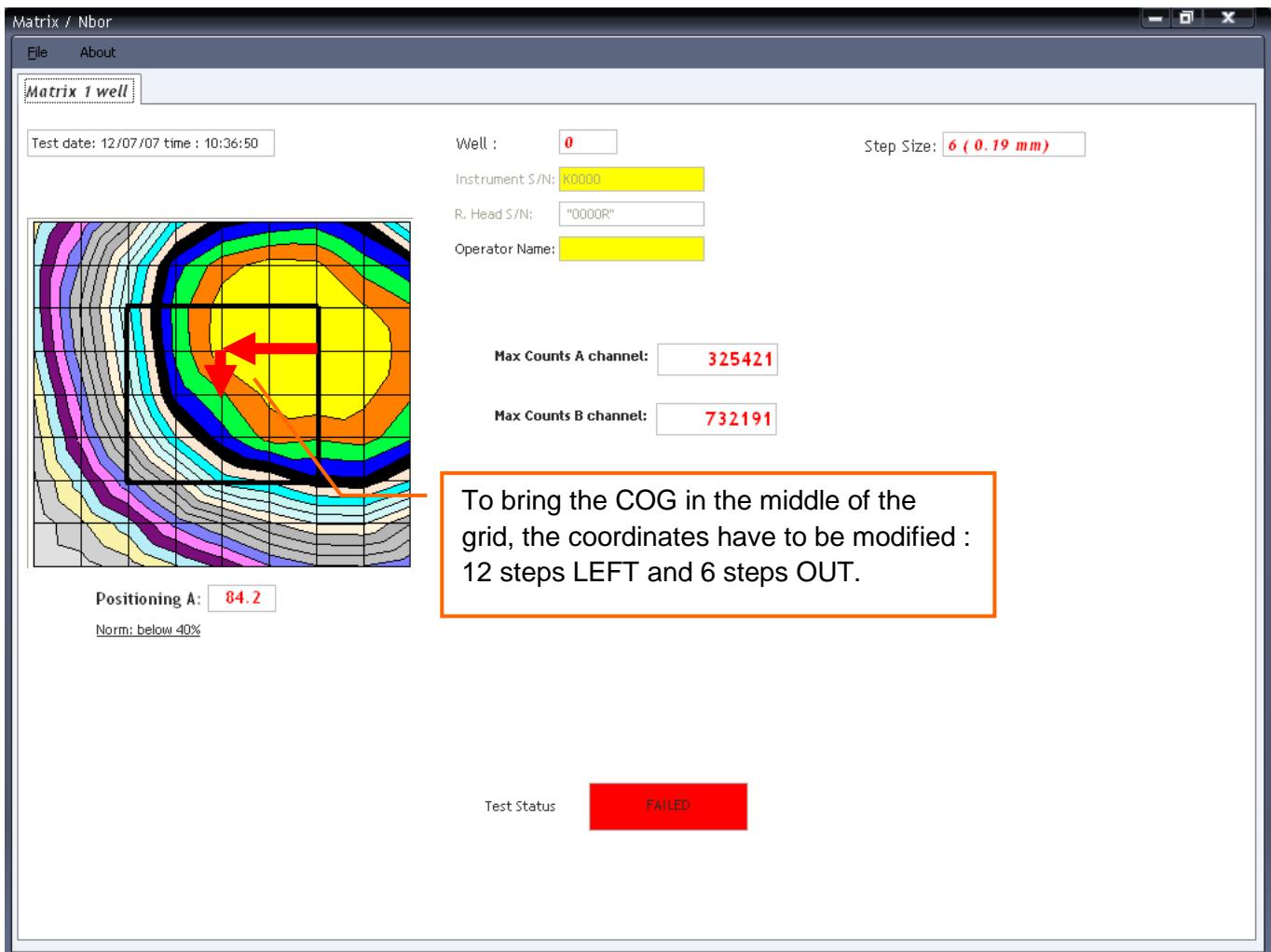


- (7) The results will be displayed on a single window



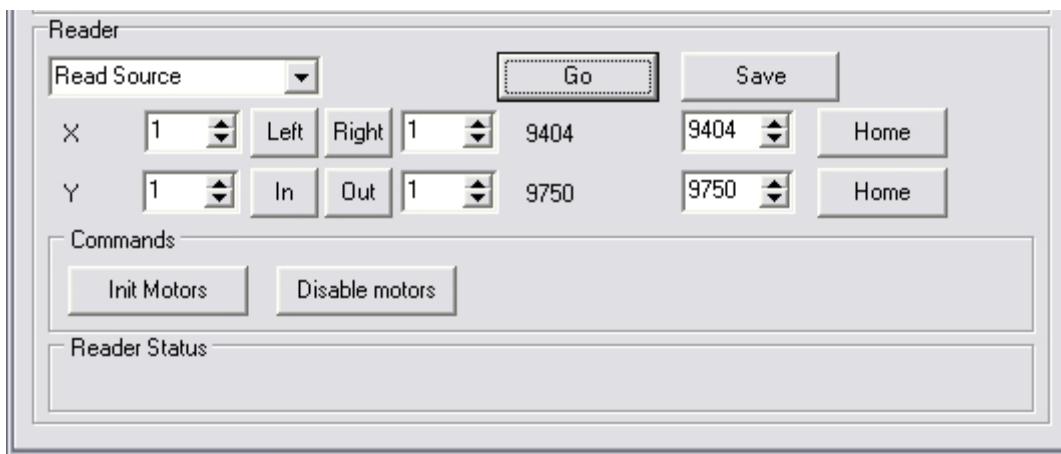
- (8) A single channel is displayed, the A channel. At this stage, the goal is adjusting the source position as a reference position; we do not need the B channel.
- (9) If the criterion is fulfilled: « **positioning** » is under: 40%; the status is **PASSED**

- (10) The shape of the yellow spot is not perfectly round and its normal on the source, we do not master the shape of the light emitted by the source (white LED).
- (11) If the criterion is not fulfilled, « **positioning** » is above 40%: the status is “**Failed**”. In that case, you have to adjust the position of the source. One square being 6 steps in X and Y directions, you can assess how many steps are required in X and Y to bring the COG in the middle of the matrix (in the example below: the COG is not centered. To bring it in the center the coordinates have to be corrected: 2 squares to the LEFT (12 steps) and one square OUT (6 steps).



Readjusting the source position:

- (1) In the section “Reader” of the window “Position Settings”, select “read source” and click on “Go”.
- (2) Enter the number of steps needed in X and Y to bring the COG in the middle of the matrix (Left or Right for X and In or Out for Y)



- (3) Click on the corresponding buttons to move (LEFT, RIGHT, IN, OUT).
- (4) Click on “Save” to save the new coordinates in memory.
- (5) Run the matrix test again and check that with the corrected position the result is “PASSED”.
- (6) Repeat the process until you reach a good result.

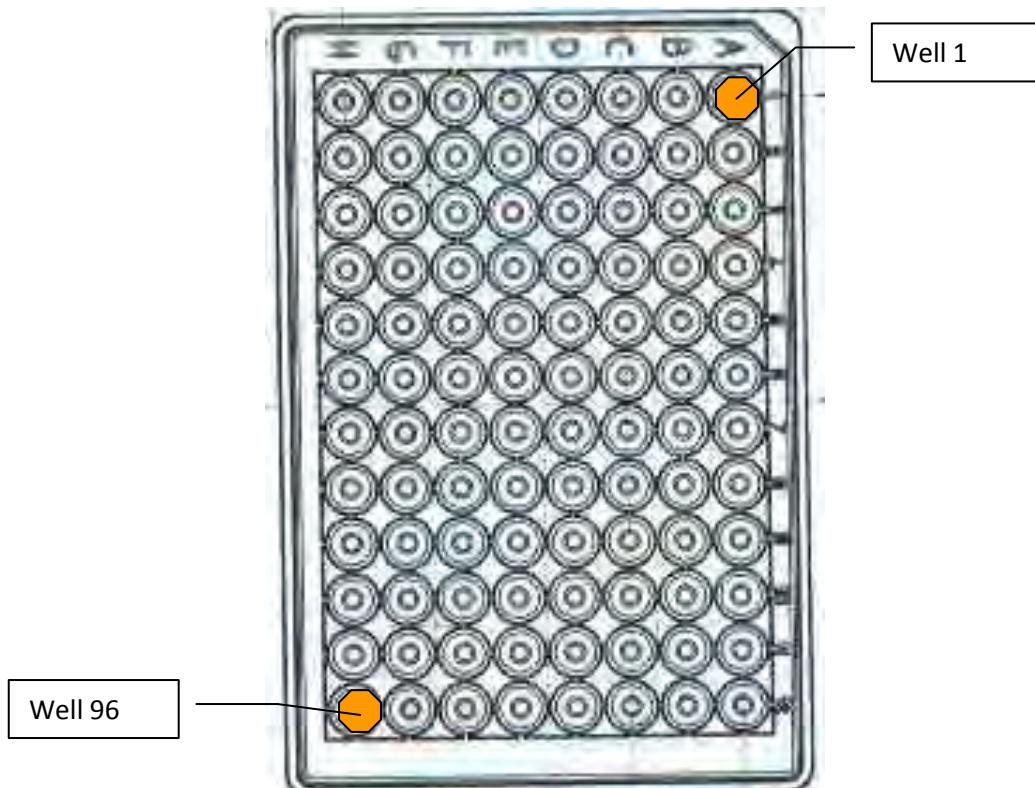
9.3.4.2 Matrix test on Well 1 and Well 96.

- The well 1 must always be adjusted after the source **but before** well 96. Well 1 defines the beginning of the reaction plate but it is used also in combination with well 96 to define the distance between 2 consecutive wells: inter-well distance.

We use the same process to adjust Well 1 and Well 96.

Running the matrix on well 1 (or well 96):

- (1) Dispense 150µl of Cryptate in Well 1 (or well 96). See procedure for Reference conjugate reconstitution RECPROxx.rtf (where "xx" is the reference conjugate lot #). This file is dispatched via a Kryptor bulletin before releasing a new lot.



Do not let the Cryptate in the wells for a too long time. After 30 minutes in the reaction area the liquid starts to evaporate. Do not use a reaction plate with cryptate that stayed more than 40 minutes in the reaction area: dispense another reaction plate.

- (2) Go in the « Matrix » window under KCD,
- (3) In the field “Wells List” enter: “1” (or 96 if you are checking Well 96).

(4) “Nb Row”, “Nb Column” must be **9**, “Inter Raw” “Inter Column” will be automatically set to **16** and the laser will be activated if you type in a well number different from 0.

(5) By default, the result file is “**matrix.xls**”, we recommend to call it “**matrix Wellxx**” where xx is the number of the well. The result file is located in C:\KCSW\KCD\RESULTS\.

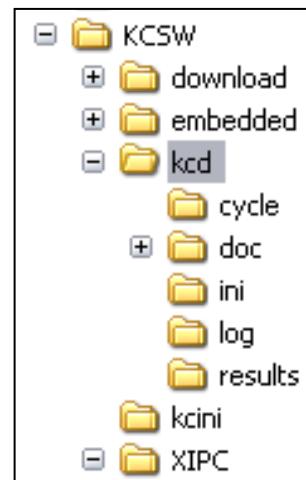
Notice that if you run several tests with the same filename: only the last one will be available (the file is overwritten if you do not change the filename)

(6) Make sure the protective window is in for at least 1mn30 and its temperature regulation is active. If you are not sure, initialize the reader and wait for 1mn30.

If the silica window is not heated for at least 1mn30 you may have condensation on it. The condensation have an impact on the matrix result.

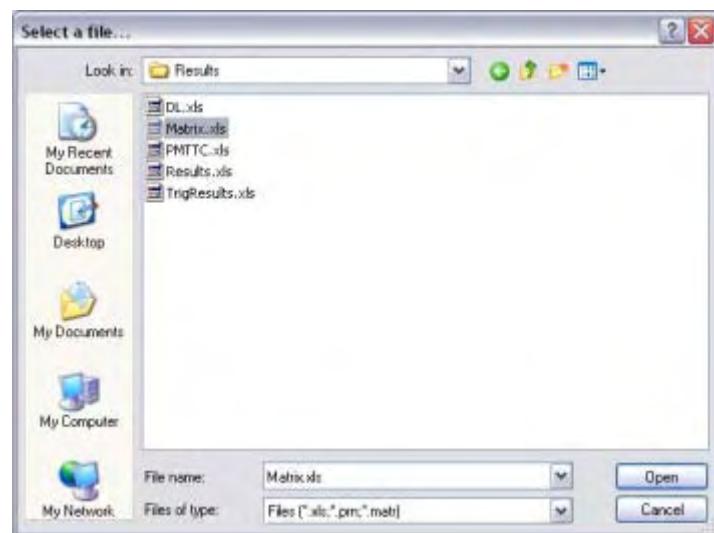
(7) Click on “**Start**” to run the test. You should hear the laser triggering and see on the screen row and column numbers increasing.

(8) Wait for the test completion.

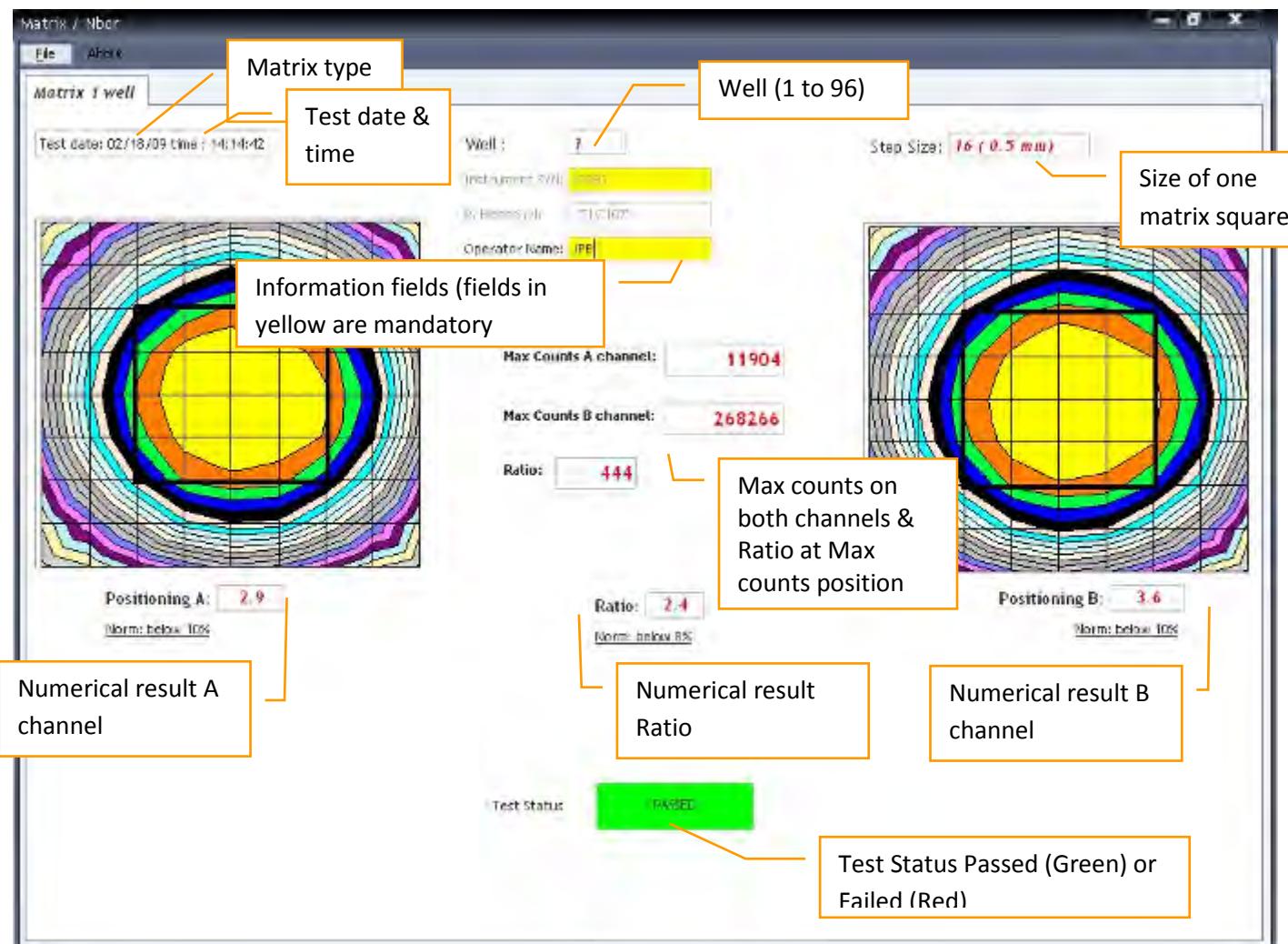


Results analysis:

- (1) Run the Matrix utility
- (2) Click on “**File**” menu and select “**Open**” (or press Alt + O)
- (3) Browse the disk and select the file containing the matrix raw data
- (4) Click on “**Open**”

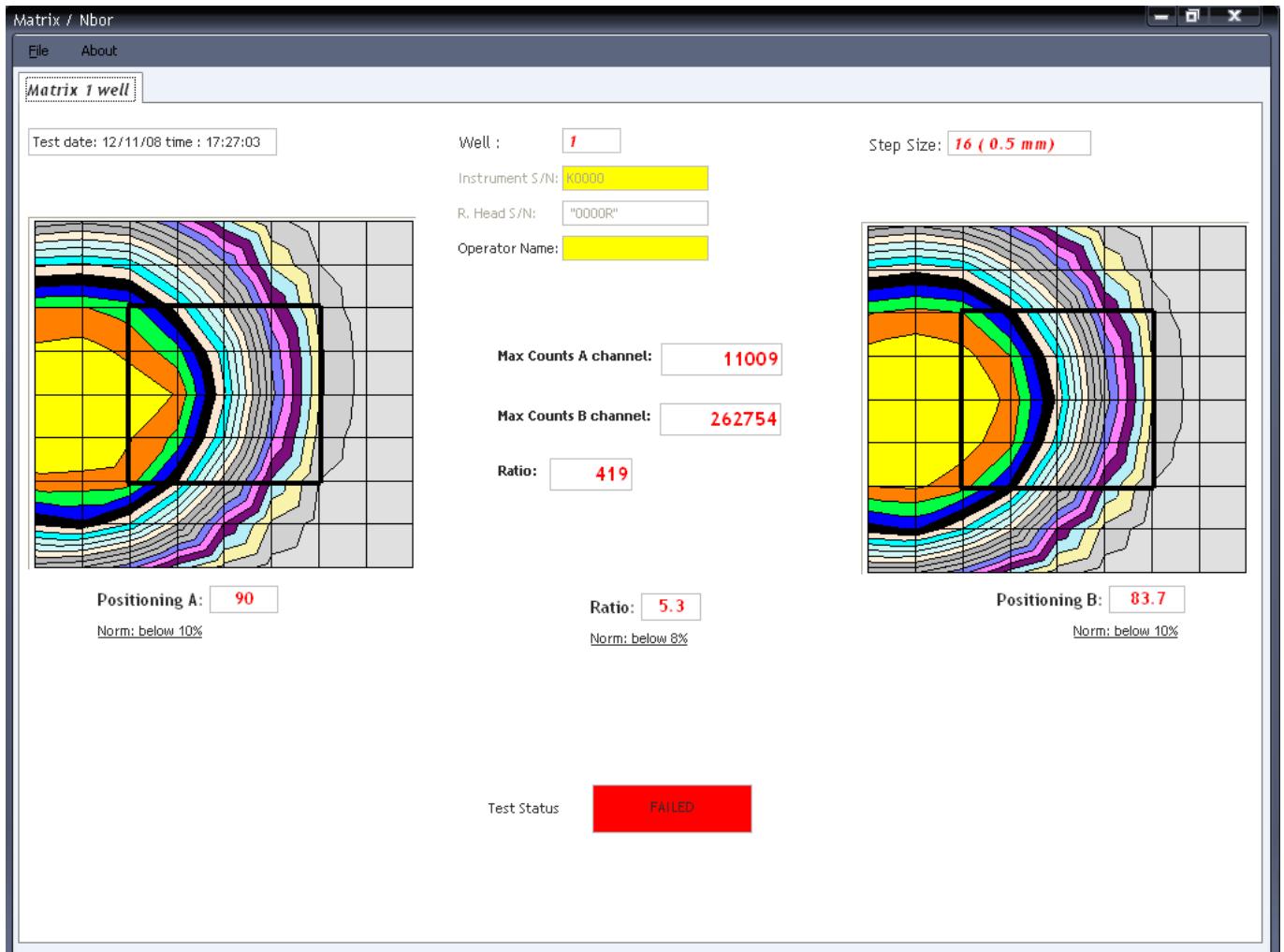


- (5) The test results are displayed on a single window.



- (6) If criteria are fulfilled: « **positioning** » are under the norms: 10% for channel A and B, 8% for ratio; the status is “**PASSED**”.
- (7) The yellow spot must have a round shape. If the shape is different from a round shape and even if the result is “**PASSED**”, check the positioning system (belts tension, hard point, etc), check the dispensing in the well (bubbles, particles, etc), check that the silica window is clean.

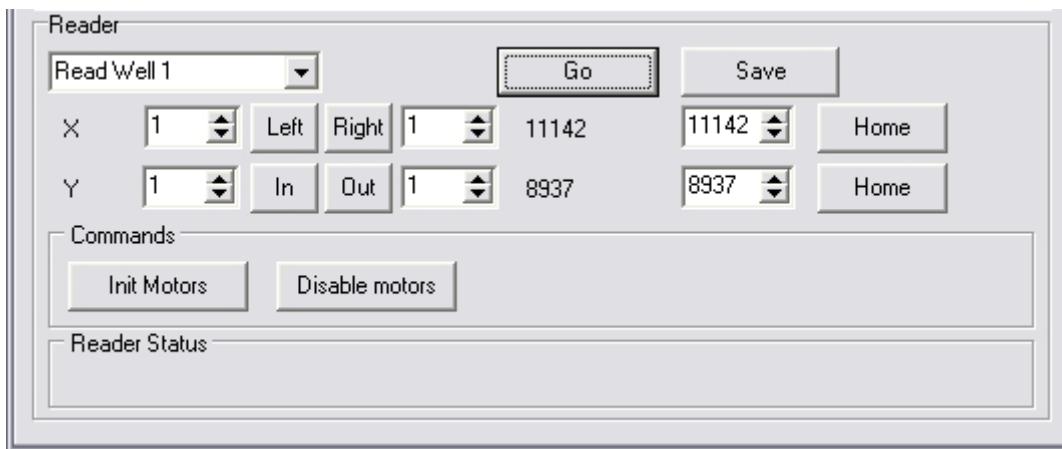
- (8) If one of the criteria is not fulfilled, positioning or ratio is above the norms, the status is “FAILED”.



- (9) The COG is not in the middle of the matrix: one square side being 16 steps in X and Y directions, you can assess the numbers of steps required to correct the well coordinates and bring the COG in the middle of the grid. In the example above, moving 3 squares (48 steps) to the RIGHT is required.
- (10) If the Reader head has an optical default: A and B channels are not correctly aligned => it is not possible to bring the yellow spots in the middle at the same time. Contact the technical support to ask if the reader head is usable.

Readjusting the well position:

- (1) Use the “Position settings” window and “Reader” section to readjust the position coordinates to good values.
- (2) Select “Read well1” (or “Read well 96” if you have to readjust well 96 position)
- (3) Click on “Go”.
- (4) Enter the number of steps needed in X and Y to bring the COG in the middle of the matrix (Left or Right for X and In or Out for Y)



- (5) Click on the corresponding buttons to move.
- (6) Click on “Save” to save the new coordinates in memory.
- (7) Run the matrix test again and check that the result is “PASSED”.
- (8) Repeat the process until you reach a good result.

9.3.5 Matrix 5 wells

9.3.5.1 Introduction:

This test is a **validation test** running automatically 5 matrix tests on 5 wells: the four corners (wells 1, 12, 85 and 96) plus well 1 again.

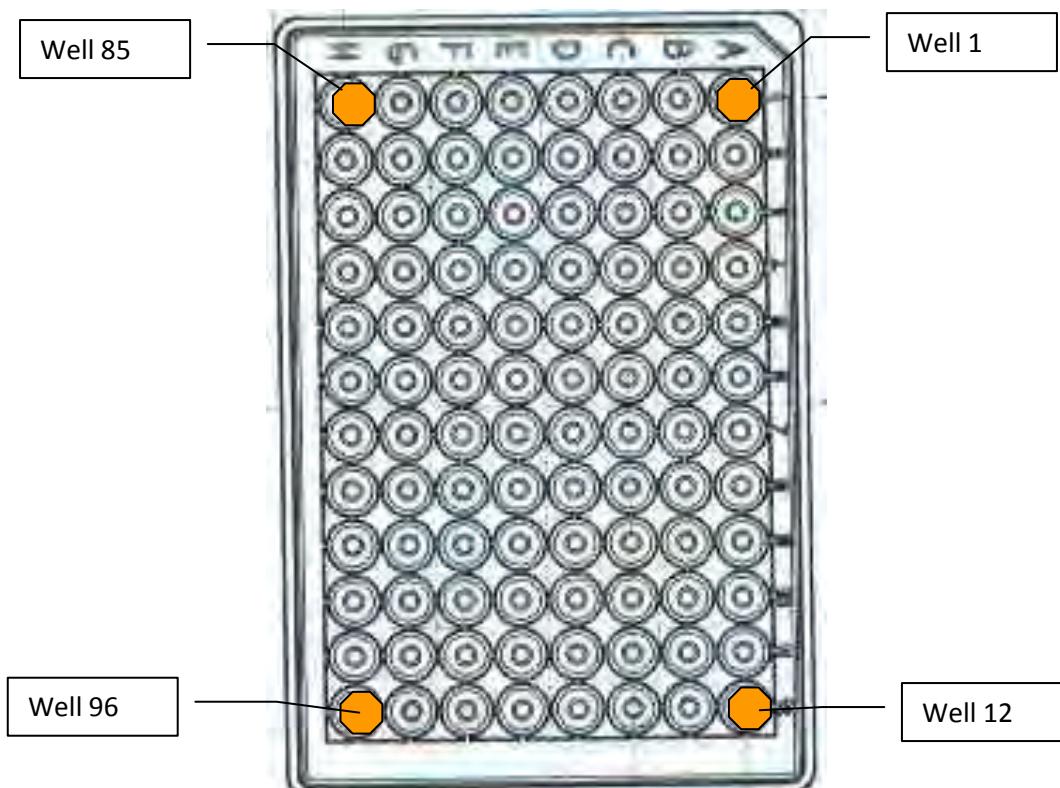
The goal of this test is to validate the reading positions settings and the positioning system at the same time.

You can validate that X and Y axis are perpendicular and the reading positions are good when the four corners are perfectly centered in their matrixes.

You can validate the repeatability of the positioning system if you have the first matrix on well 1 identical to the last matrix on well 1.

9.3.5.2 Running matrix 5 wells:

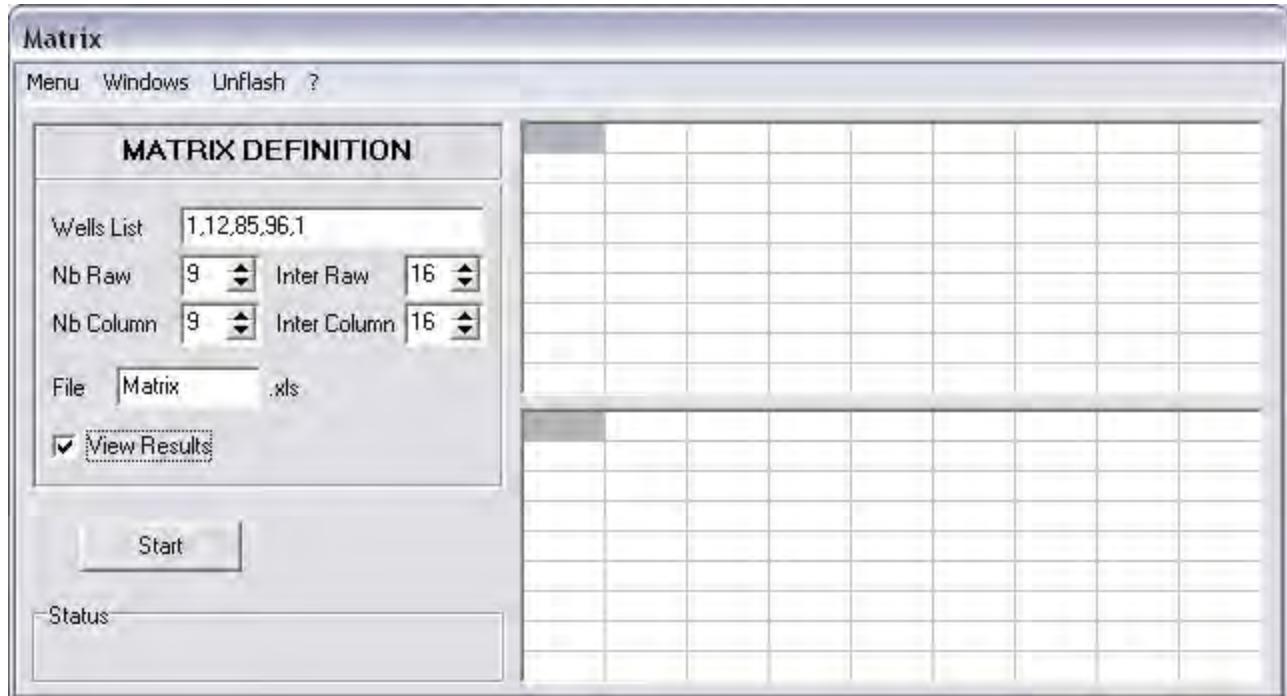
- (1) Put 150µl of Cryptate in wells 1,12,85,96 (four corners) and load the plate. See procedure for Reference conjugate reconstitution RECPROxx.rtf (where "xx" is the reference conjugate lot #). This file is dispatched within each field test Kryptor bulletin.



Do not let the Cryptate in the wells for a too long time. After 30 minutes in the reaction area the liquid starts to evaporate. Do not use a reaction plate with cryptate that stayed more than 40 minutes in the reaction area: dispense another reaction plate.

(2) In the “Matrix” windows, enter the list of wells in the field “Wells list” as follow:
 1,12,85,96,1.

(3) “Nb Raw”, “Nb Column” must be at 9 and “Inter Raw” “Inter Column” must be at 16.



(4) By default, the result file is “matrix.xls” but another filename can be chosen. The result file is overwritten if you restart the test. It is located in C:\KCSW\KCD\RESULTS\.

(5) Make sure the protective window is in for at least 1mn30 and its temperature regulation is active. If you are not sure, initialize the reader and wait for 1mn30.

- If the silica window is not heated for at least 1mn30 you may have condensation on it. The condensation has an impact on the matrix result.

(6) Click on “Start”.

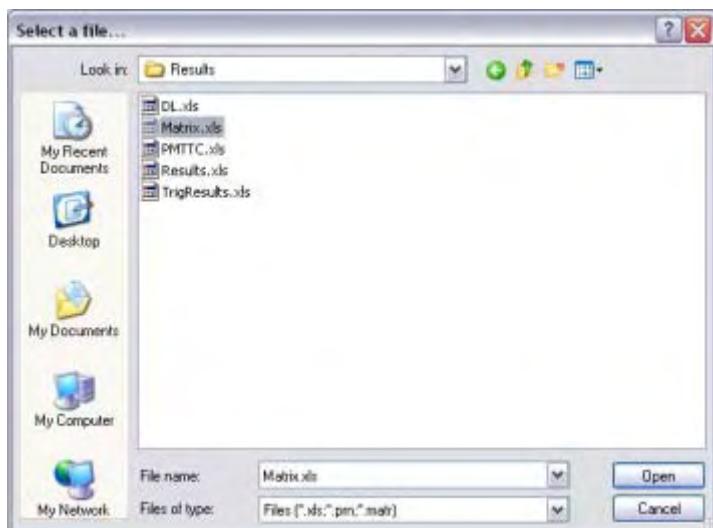
(7) Wait for the completion of the test (approximately 15 minutes).

9.3.5.3 Results analysis:

- (1) Run the MatrixPMTTC utility
- (2) Click on “File” menu and select “Open” (or press Alt + O)

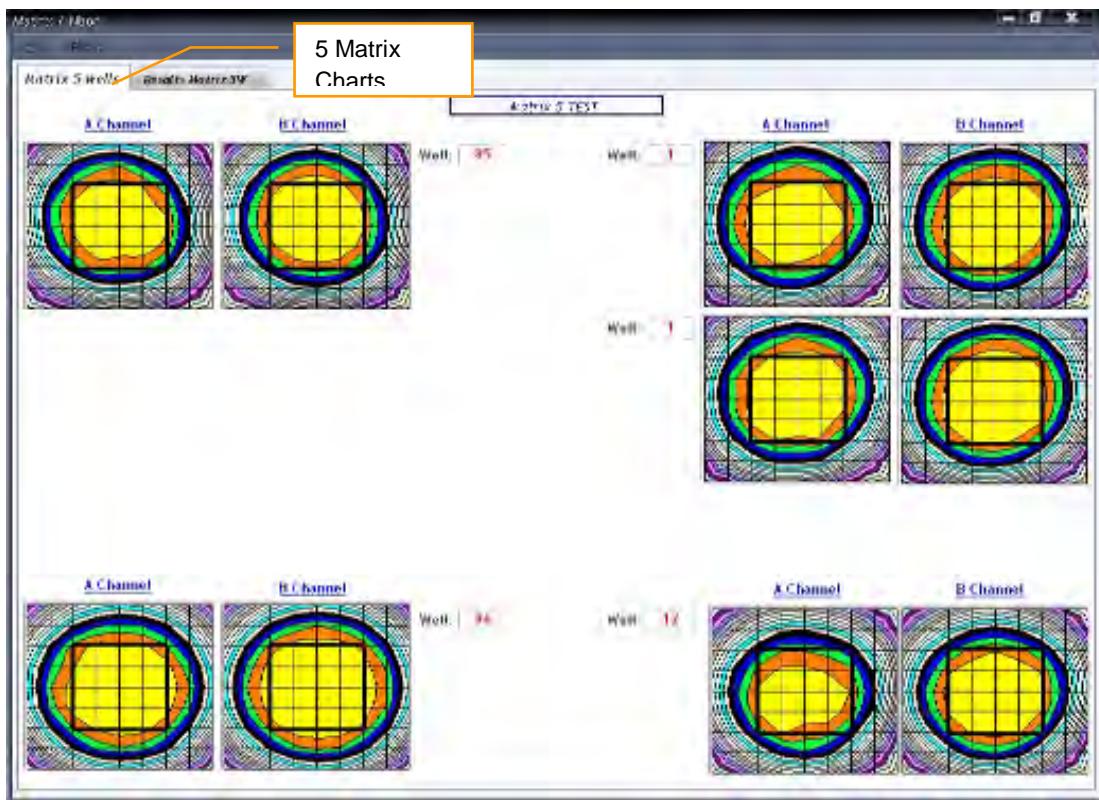


- (3) Browse the disk and select the file containing the matrix raw data

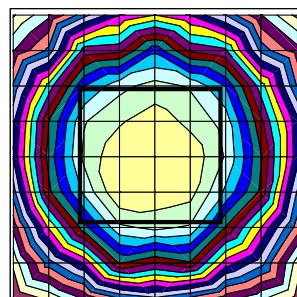


- (4) Click on “Open”

- (5) The results are displayed on 2 windows (tabs). The first one shows the 5 matrixes and second one gives the numerical results with a test status based on these numerical results.



- (6) Make sure that the yellow spots on the different charts are centered and the circles around the spots have a round shape (see example next to the text). Otherwise, you have to find the cause, the matrix 5 test cannot be accepted even if the numerical values are acceptable and the test status is passed. The most common problems for having such a problem are bad X and / or Y belt tension or fluctuations on the high voltage.





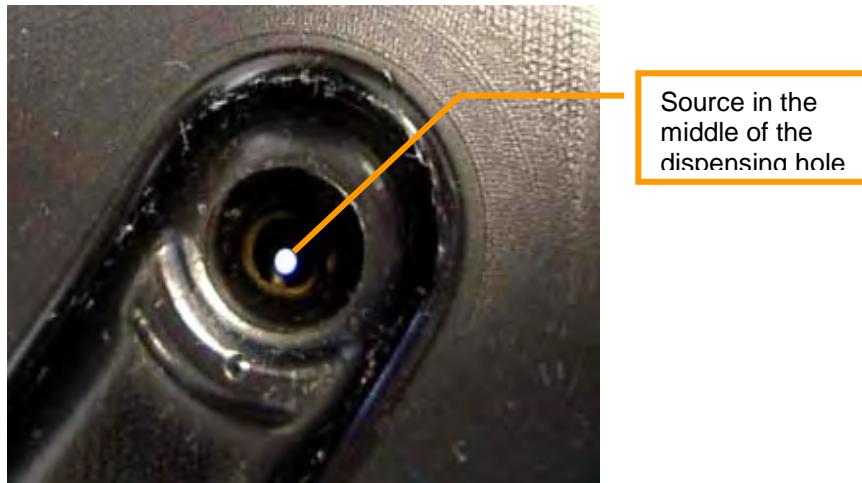
- (7) The second tab gives the numerical values for each well and an overall status for the test "PASSED" or "FAILED" based on the several criteria. The criteria are:
- (8) For each well the energy loss for a positioning error of 0,5mm (1 matrix square) on A (665 nm) and B (620 nm) channels must be less than 15%.
- (9) For each well the ratio variation for a positioning error of 0,5mm on A (665 nm) and B (620 nm) channels must be less than 10%.
- (10) All these criteria must be fulfilled for having a test "accepted".
- (11) If the result is "FAILED" check and readjust the well 1 or well 96 coordinates.
- (12) If well 1 or/and well 96 are not well adjusted, readjust the position(s) and rerun the test.
- (13) If well 1 and well 96 are well adjusted but only well 12 or well 85 is off-center: check the translator mechanism (hard point, obstacle ...).

- (14) If well 1 and well 96 are well adjusted but well 12 **and** well 85 are off-center in opposite directions: the axis X and Y are probably not perpendicular. In that case, it is mandatory to replace the translator mechanism; it is not possible to adjust the perpendicularity X/Y in the field.
- (15) If the four corners are perfectly adjusted but the last matrix on well 1 is off-center, we have a problem of repeatability: check the translator mechanism (hard point, belts tension, obstacle, motors ...).

9.3.6 Dispensing coordinates adjustment

The reference position to adjust the dispensing coordinates is the source below the dispensing hole. This adjustment is done visually, as the source is lighting and it is very close to the dispensing hole it can be seen very easily.

- (1) The dispensing position is adjusted though KCD in the window “**reader position settings**”.
- (2) In the section “**Reader**”, select “**dispensing source**”
- (3) Click on “**Go**”.
- (4) Look inside the dispensing hole, depending on the source position enter the number of



steps to move in X and Y directions (16 steps = 0.5mm).

- (5) Click on the corresponding buttons (LEFT, RIGHT, IN, OUT) to bring the source in the middle of the dispensing hole,
- (6) Click on “**save**” to save the coordinates.

9.4 Laser energy check/adjustment

9.4.1 Introduction

The laser energy must be adjusted or at least checked before adjusting the ratio and during each installation or preventive maintenance.

On **B·R·A·H·M·S KRYPTOR compact PLUS**, the nominal laser energy is 120 -5/+5 µJ (so the range is 115 to 125 µJ). The laser energy will decrease all along the laser lifetime and will be readjusted at its nominal value during each preventive maintenance or whenever it reaches 80µJ (the minimum acceptable energy being 72µJ).

9.4.2 Short notice for use of joulemeters

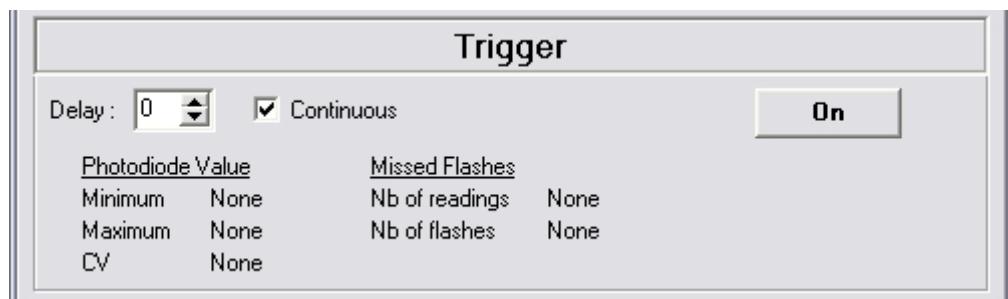
Refer to appendix [notice for joulemeters page 314](#)

9.4.3 Laser energy check

- **Never look into the laser beam. Always operate the laser with one extremity of the optical fiber connected at the laser output and the other extremity connected either to the reader head or the joulemeter.**

- (1) Switch off the instrument.
- (2) Disconnect the optical fiber from the Reader head
- (3) Connect it to the joulemeter coupler. You can also connect the joulemeter optical fiber directly to the laser output but the previous method is preferable because it gives the actual energy provided to the Reader head with its own optical fiber.
- (4) During the measurement, the laser panel must remain closed.
- (5) Switch on the instrument and run KCD.
- (6) Under KCD and in the “**Reader Utilities**” window, uncheck the checking box “**continuous**” and set the “**delay**” value to “**0**”. Number of **Repeats=20** (1 repeat is a cycle of 20 flashes so 20 repeats are 400 flashes).
- (7) Setup the joulemeter to log the laser energy (refer to the notice regarding the joulemeters)





(8) Click on the “ON” button and wait for completion.

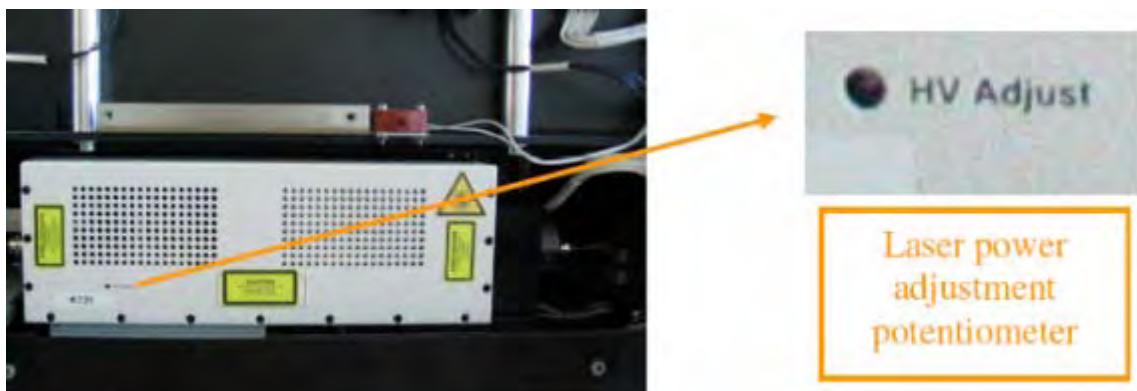
(9) The Joulemeter will provide the average energy for the 400 flashes and the standard deviation.

9.4.4 Laser energy adjustment

The nominal laser energy on **B·R·A·H·M·S KRYPTOR compact PLUS** is 120 -5/+5 µJ (so the range is 115 to 125 µJ). A nitrogen laser has an energy loss of 2µJ per month in average. The laser energy will be readjusted to its nominal value every six months, during the preventive maintenance.

The lasers have an internal high voltage power supply (around 10000V) and the flash energy is function of this high voltage value, thus the laser energy will be adjusted playing on its high voltage value.

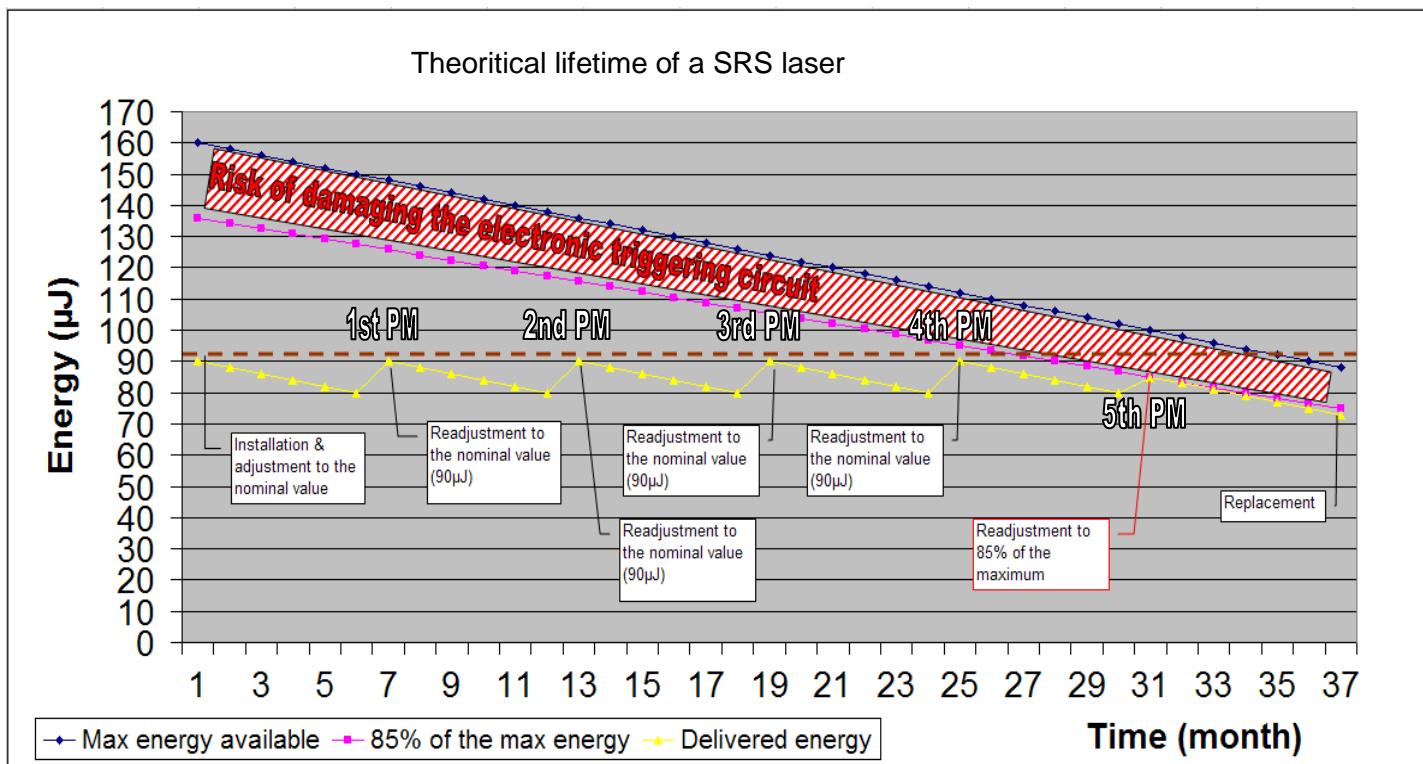
- Due to the high voltage inside the laser, the laser should never be open nor should any object put into the laser casing openings.



9.4.4.1 Laser energy adjustment on a SRS Laser

On the the SRS laser, we can increase the internal high voltage up to 85% of its maximum value, above this value there is a risk of auto triggering and a risk of damaging the electronic triggering circuit.

That means we will be able to readjust the laser energy a certain number of times, until we reach the limit of 85 % of the maximum energy. Never adjust the laser energy to a value higher than 85% of the maximum or if there is no other solution plan to replace it within the next week.



Procedure:

- (1) Install the joulemeter and start KCD “Reader Utilities” window as described previously (refer to chapter [Laser energy check page 197](#))
- (2) Open the laser panel
- (3) The safety switch must remain closed to allow the measurement. Use a piece of adhesive tape for example to keep it in closed position.
- (4) Before each adjustment, you will have to check what the limit is for the laser high voltage: use an **isolated screwdriver** and turn **gently** the potentiometer clockwise until reaching the maximum (do not force, take care not to break the potentiometer).

- (5) Trig the laser for 1 repeat (20 flashes) and note down the value displayed on the joulemeter
- (6) Calculate 85% of this value (it is the limit).
- (7) If the limit found is below the nominal value but above the minimum value, adjust to this limit and plan to replace the laser within the next 6 months.
- (8) If the limit is below 72 µJ you have to replace the laser immediately.
- (9) If the limit is higher than the nominal value, adjust to the nominal value if possible.
- (10)

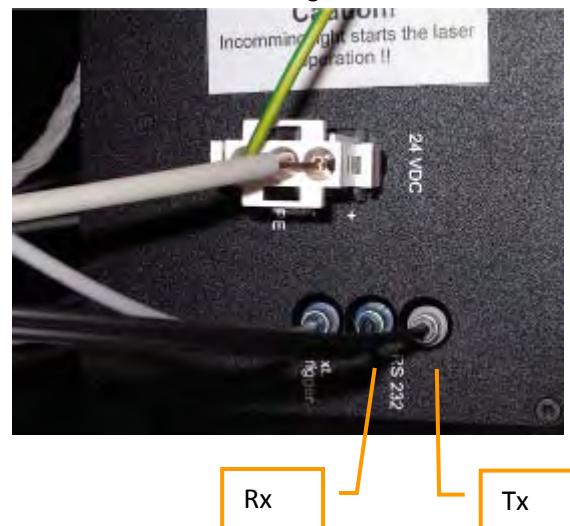
9.4.4.2 Laser energy adjustment on a MNL 100 LTB laser.

On the MNL LTB laser you can also adjust the internal high voltage to control the laser flash energy. The technology is different from the SRS laser: the adjustment is made by software.

The LTB laser is equipped with a serial link managed by 2 optical channels. The first one Rx (blue) receives data and the second one Tx (grey) sends data to the Reading Module.

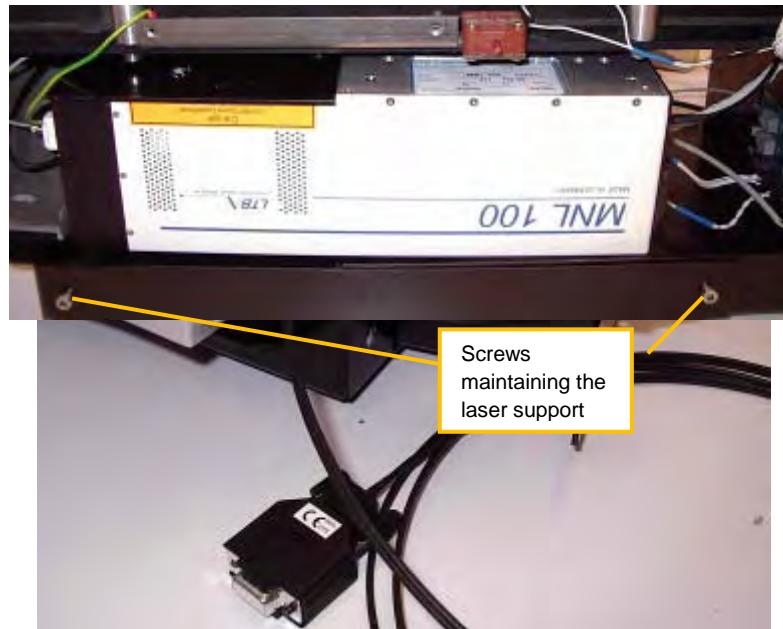
This link is used during a normal operation to ensure the communication between the LTB laser and the Reading Module (the communication optical fibers are connected between the laser and the Reading Module interface board).

To adjust the LTB laser flash energy you will use the Marathon Control software installed on the XPC and a specific cable allowing a direct communication between the XPC serial port and the laser **ref: C216082**



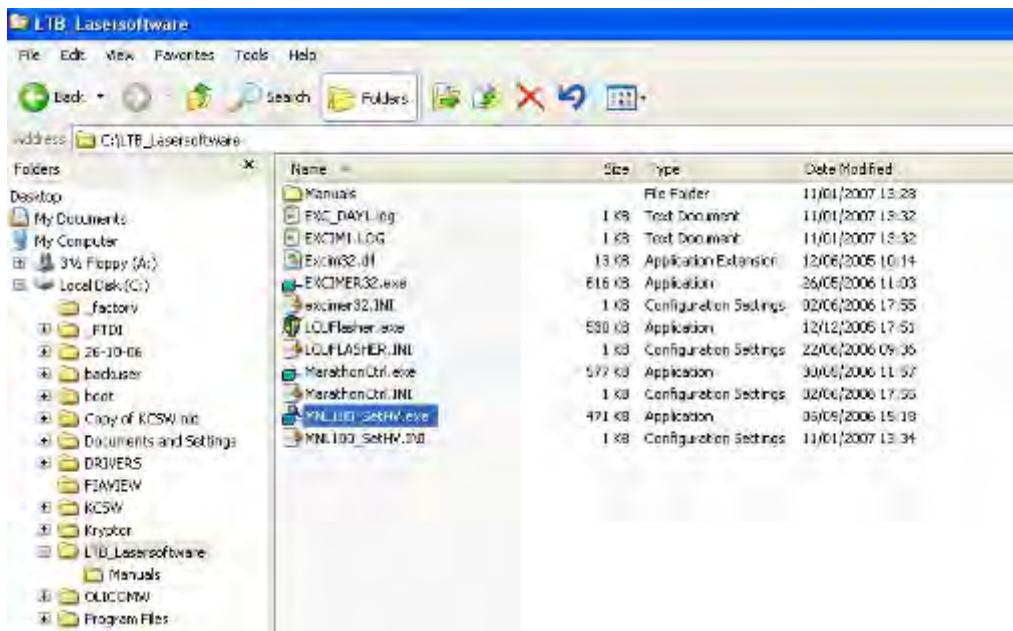
Procedure:

- (1) Switch off the instrument
- (2) Open the laser panel
- (3) Remove the 2 screws maintaining the holding part supporting the laser.
- (4) Extract the laser a little bit in order to have an access to the communication optical fibers.



- (5) Disconnect them
- (6) Connect the specific cable shown previously (respect the colors: blue plug with blue socket and grey plug with grey socket)
- (7) Connect the DB9 female connector to the XPC DB9 male serial port.
- (8) The safety switch must remain closed to allow operating the laser during the adjustment: keep it closed using a piece of adhesive tape for example.
- (9) Install the joulemeter, switch on the instrument and run KCD (window Reader Utilities) as described in the chapter [Laser energy check. page 197](#) Starting KCD after you have plugged the communication cable is very important, otherwise KCD will not be able to trigger the laser.

- (10) Run the window explorer and go in the folder C:\LTB_lasersoftware



- (11) Run the file MNL100_SetHV.exe
 - (12) You will use this window to adjust the laser internal high voltage thanks to the arrows.
 - (13) In KCD, window “**Reader Utilities**”, tick the box “**continuous**” and click on “**On**”.



- (14) Check the laser energy on the joulemeter.

(15) Adjust the internal laser HV playing on the arrows in order to reach the nominal value of laser energy: $120^{-5/+5} \mu\text{J}$ (115 to 125 μJ).

(16) Stop triggering the laser, close MNL 100 set HV window.

(17) Switch off the instrument

- Note that for the LTB laser adjusting the laser up to 100% of the maximum high voltage is allowed.

9.4.5 Photodiode measurement

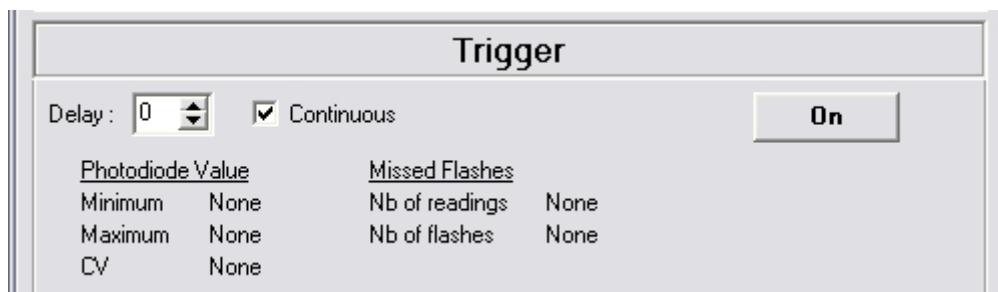
The laser flash delivered by the mean of the optical fiber to the Reader Head input is reflected by a mirror inside the Reader Head towards the reader head lens. A small quantity of the laser flash passes through this mirror and is measured by a photodiode located behind it. The signal measured by the photodiode is used for detecting the laser flash and triggering the counting process.

The signal from the photodiode board is converted into a digital value by an ADC converter. When this value falls down below 15600 (72μJ) the user is warned that the laser energy has reached the minimum acceptable value (a flag is displayed on the tests results: "Low laser power"). In such a case the laser energy must be increased or if not possible the laser has to be replaced.

The photodiode ADC value must never be used for adjusting or checking the actual laser energy, always use a joulemeter for that.

9.4.5.1 How to check the ADC value returned by the photodiode board

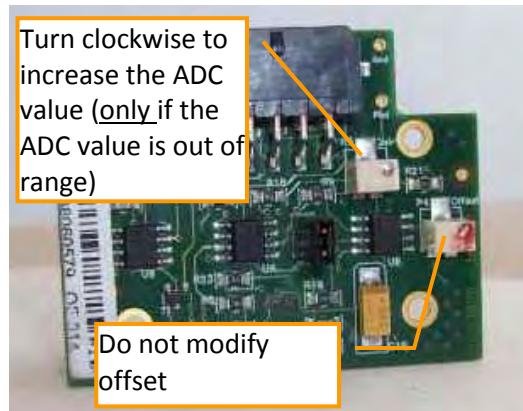
- (1) Measure the Laser energy using a joulemeter.
- (2) Start KCD
- (3) Go to the window "Reader utilities"
- (4) In the section "Trigger", click on the "On" button



- (5) Note down the photodiode ADC value at the bottom of the window, in the "Results" section (the value can fluctuate +/-500, try to estimate the average during a 20 seconds time frame).

Results			
Channel A	96	Nb Flashes	20
Channel B	181	ADC Laser	26079
Ratio	5303		
Reader Status			
On Trigg...			

- (6) The ADC value returned by the photodiode board must be in the following range: **Laser Energy x 217 +/-5%**. For example if the laser energy is 90 µJ the ADC value must be $(90 \times 217) = 19530 \pm 5\%$ or 18533 to 20506.
- (7) If the value is out of range, make sure that there is no constraint on the optical fiber (bad positioning) and **try to readjust its position** (it should be the most natural) **in order to have the highest value** and measure again. Finally, if you are not able to get a value in the range use the Gain potentiometer to increase the ADC value (turn the potentiometer clockwise to increase).



Warning : The ADC value returned by the photodiode board is monitored by the software. A test result is flagged with the flag: "Low Laser Power" when an ADC value lower than 15600 is measured during the readings.

Make sure that the photodiode ADC value is correlated with the theoretical value EACH TIME you disconnect and reconnect the optical fiber from the reader head or you change the optical fiber position.

9.5 Ratio adjustment and PMTTC

9.5.1 Ratio adjustment

9.5.1.1 Introduction

The ratio is defined as: (number of counts on A channel x 10000) / number of counts on B channel.

The specifications for the ratio and the number of counts on both channels are defined here below. These values have been chosen in order to be in good reading conditions whichever analyte is used.

-The number of counts on A will be adjusted at **11000 counts +/- 10%** for a reading on 150 μ l of AFP cryptate conjugate and laser energy at 120 μ J.

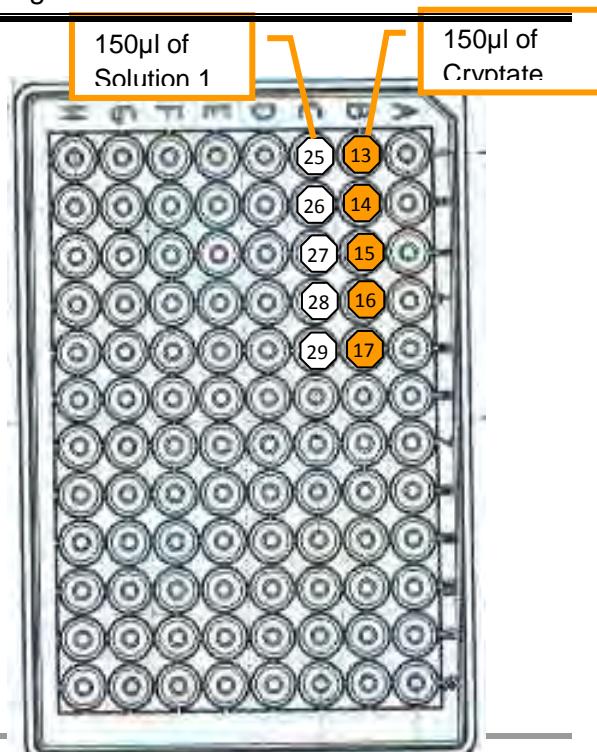
-The number of counts of B channel be will be adjusted to reach a ratio of 440 +/- 10.

If the laser energy is different from 120 μ J, the target for A channel must be calculated proportionally. For example for 100 μ J the target for A is $11000 \times 100/120 = 9167$ +/- 10%.

9.5.1.2 Preparation of the reaction plate

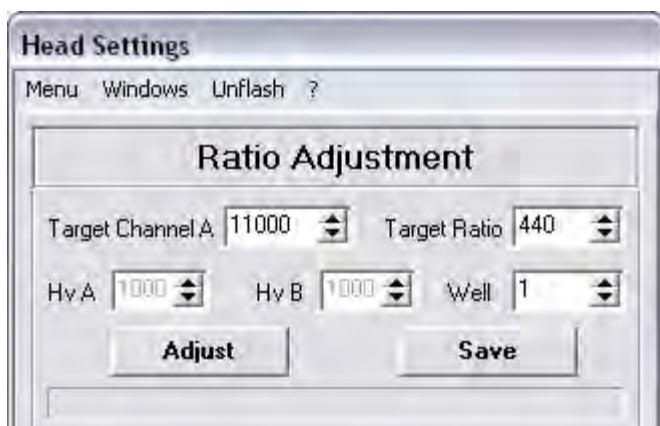
- Always use a freshly reconstituted vial of AFP cryptate conjugate. Make sure to use the right reconstitution volumes and use new solution 1 and 2 bottles. See procedure for Reference conjugate reconstitution RECPROxx.rtf (where "xx" is the reference conjugate lot #). This file is dispatched via a Kryptor Bulletin for each new lot number.
- Do not leave this reaction plate more than 30 minutes in the reaction area after that time the wells start to evaporate and this can influence the level of signal measured.

- (1) Dispense carefully 150 μ l of AFP cryptate conjugate (equilibrated at room temperature) in wells **13, 14, 15, 16, 17** (you can use the same plate as for the matrix adjustments).
- (2) Dispense carefully 150 μ l of fresh solution 1 in wells **25, 26, 27, 28, 29**



9.5.1.3 Procedure for the ratio adjustment.

- (1) The reaction plate must be ready (see previous chapter)
- (2) Measure the laser energy with a joulemeter (never rely on the photodiode value).
- (3) Calculate the target for channel A regarding the laser energy.
- (4) Make sure the protective window is present in the drawer.
- (5) Open the window Head settings.
- (6) Enter the target value for A channel. The acceptable range is: 5500 to 11500 (corresponding to 60µJ to 125µJ).
- (7) The target ratio is always **440**.
- (8) Enter Well number **13**.
- (9) Load the plate in the Reading Module
- (10) Click on the “**Adjust**” button the software checks that the heated protective window is

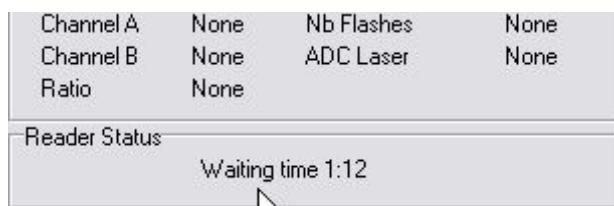


inserted, if not a popup window asks you to insert it. Insert it and click “**Ok**”.

- (11) If the protective window is still absent, you will have another popup and the test will not start.



- (12) Once the protective window is detected in the reader the software starts a timer and displays a popup window asking you to wait during heating of the protective window, **click "Ok"**. Once the timer is elapsed, the adjustment starts automatically.



- The software detects whether or not a heated protected window is installed (the software key Use_silica_win is set to 1 in c:\windows\xipc_var.ini when a heated protective window is installed otherwise the key has to be set to 0). If a non heated protective window is installed, you will not get any popup nor timer, **but you have to make sure that the protective window is in the reader for at least 1mn 30 before starting the ratio adjustment.**

- (13) The software will play on the high voltage value of the A channel to reach the target value and then on the high voltage of the B channel to reach the target ratio.
 (14) When the process is complete the values found for HvA and HvB are displayed on the screen (the process can take from 1 to 5 minutes)
 (15) **Click on save.** The values are saved in the Reading Module flash memory; you can

```
head.ini - Bloc-notes
Fichier Edition Format Affichage i
;head.ini file
[PARAMS]
hvA =835
hvB =825
dacA =400
dacB =400
source =2500
nbFlash =20
mSentFlash =50
laserON =1
photoDiodeON =1
fullHisto =0
hvConv = 2.431
laser=1
photoDiode=1
```

see a copy of these values in the file C:\KCSW\KCD\KCINI\head.ini.

- Whenever you change the ratio or the HV values ask the user to calibrate all the analytes (some parameters calculated previously with the previous calibrations are no more valid).

9.5.2 PMTTC test

9.5.2.1 Introduction

The PMTTC is a validation test required for each preventive maintenance and must be run after each ratio adjustment to validate that:

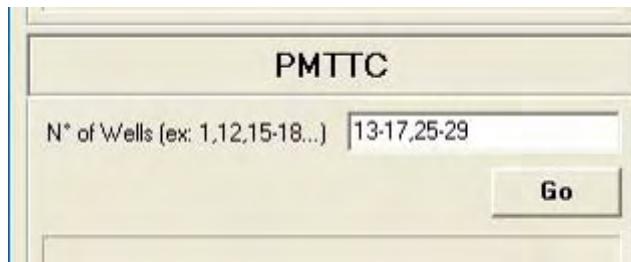
- the Reader head is adjusted regarding the norms (number of counts on A and ratio).
- the Reader head performances are within the norms (background noise, photomultiplier sensitivity).
- the protective window is clean (the silica window can increase the background noise when it is dirty).

This test can be run for troubleshooting purpose as well.

9.5.2.2 Procedure to run the PMTTC

- Do not use wells let more than 30 minutes inside the reader, the evaporation created by the heat can decrease the volume in the wells. Dispense in a new reaction plate.

- (1) The reaction plate must be prepared
- (2) Open the window “**Head settings**”.
- (3) Make sure the wells list is **13-17, 25-29**.



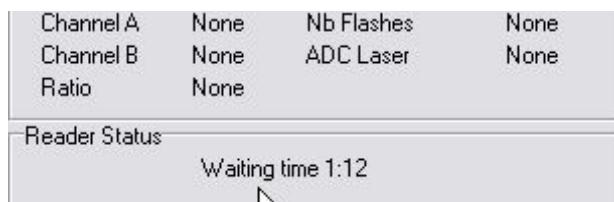
- (4) Click on the “**Go**” button the software checks that the heated protective window is inserted, if not a popup window asks you to insert it. Insert it and click “**Ok**”.



- (5) If the protective window is still absent you will have another popup and the test will not start.



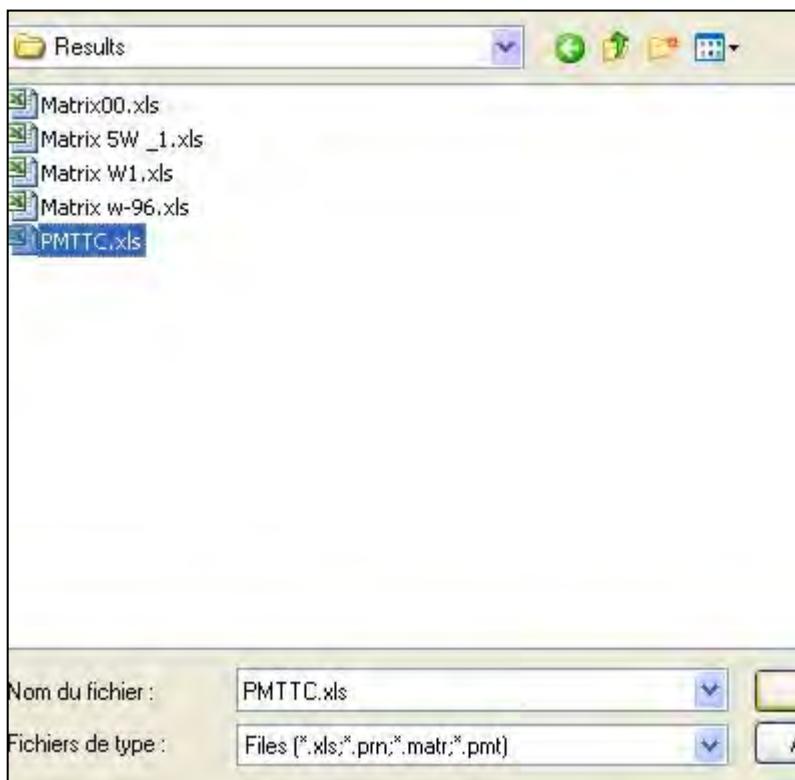
- (6) Once the protective window is detected in the reader the software starts a timer and displays a popup window asking you to wait during heating of the protective window., click "Ok". Once the timer is elapsed, the adjustment starts automatically.
- (7) Make sure the protective window is in since at least 5 minutes to avoid that condensation appears.



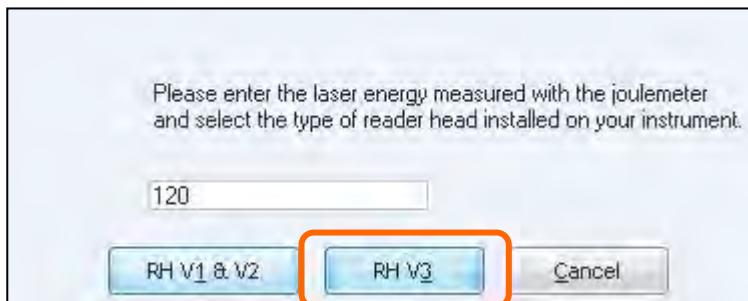
- (8) Load the plate prepared previously for the ratio adjustment (you may have a popup message: "**this plate is already used, do you really want to use it?**" Ignore this message and click "**yes**").
- (9) When asked, remove the protective window.
- (10) When the test is complete, save the file C:\KCSW\KCD\RESULTS\pmt.xls on a removable device.
- (11) Process the data using the Matrix/PMTTC V1.22 (or higher) utility.
- (12) Click on the **File** menu and then **Open**.



- (13) Select the PMTTC test (Pmt.xls) and click Open



- (14) You will get a popup window where you have to enter the laser energy you have



measured using a joulemeter and choose.

- (15) For a **KRYPTOR compact PLUS** (reader head V3) click on **RH V3** button

- (16) The software will process the data and display the results in a window like the one here below

Information fields. Fields in yellow are mandatory	Field Service Mode TC About	Type of test																																																																																				
PMTC KRYPTOR compact PLUS RHV3 Field Service																																																																																						
Date/Time: 07/30/2009 11:21:25 Operator Name: JPB Instrument S/N: Proto2 Reader Head S/N: Proto6 Laser Type: SRS Laser S/N: 23142 PMT DAC A: 400 PMT DAC B: 400 High Voltage A (V): 894 High Voltage B (V): 845																																																																																						
With protective window <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4">Specifications</th> <th colspan="4">Results</th> </tr> <tr> <th colspan="2"></th> <th>Target</th> <th>Min</th> <th>Max</th> <th colspan="2"></th> <th>Average</th> <th>CV (%)</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td colspan="2">ADC Value</td> <td>26 040</td> <td>24738</td> <td>27342</td> <td colspan="2">ADC Value</td> <td>25 463</td> <td>0.43</td> <td>PASSED</td> </tr> <tr> <td colspan="2">Laser Energy (μJ)</td> <td>120</td> <td>72</td> <td>125</td> <td colspan="2">Laser Energy (μJ)</td> <td>120</td> <td></td> <td>PASSED</td> </tr> <tr> <td rowspan="2">Ref.</td> <td>Counts A</td> <td>11000</td> <td>9900</td> <td>12100</td> <td rowspan="2">Ref.</td> <td>Counts A</td> <td>11 148</td> <td>1.8</td> <td>PASSED</td> </tr> <tr> <td>Counts B</td> <td>271605</td> <td>220000</td> <td>281395</td> <td>Counts B</td> <td>251 698</td> <td>0.68</td> <td>PASSED</td> </tr> <tr> <td rowspan="2">Conjugate</td> <td>Ratio</td> <td>440</td> <td>430</td> <td>450</td> <td rowspan="2">Conjugate</td> <td>Ratio</td> <td>443</td> <td>1.19</td> <td>PASSED</td> </tr> <tr> <td>Solution 1</td> <td>Counts A</td> <td></td> <td>< 520</td> <td>Solution 1</td> <td>Counts A</td> <td>223</td> <td>3.82</td> <td>PASSED</td> </tr> <tr> <td></td> <td>Counts B</td> <td></td> <td>< 1100</td> <td></td> <td>Counts B</td> <td>402</td> <td>3.34</td> <td>PASSED</td> </tr> </tbody> </table>			Specifications				Results						Target	Min	Max			Average	CV (%)	Status	ADC Value		26 040	24738	27342	ADC Value		25 463	0.43	PASSED	Laser Energy (μ J)		120	72	125	Laser Energy (μ J)		120		PASSED	Ref.	Counts A	11000	9900	12100	Ref.	Counts A	11 148	1.8	PASSED	Counts B	271605	220000	281395	Counts B	251 698	0.68	PASSED	Conjugate	Ratio	440	430	450	Conjugate	Ratio	443	1.19	PASSED	Solution 1	Counts A		< 520	Solution 1	Counts A	223	3.82	PASSED		Counts B		< 1100		Counts B	402	3.34	PASSED
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SD Of Ref. Conjugate: PASSED Lot of Ref. Conjugate: 54 SD Of Solution 1: PASSED LCT table: Activated			Comments: This is just an example			Test Status: PASSED																																																																																

- (17) This window contains 4 main parts.
- (18) The information part is the one at the top and contains the information related to the instrument.
- (19) The second part contains the specifications and the results of the test **with the protective window**

Specifications on the ref Conjugate and Solution 1, ADC value and laser energy

Average results and test status on the ref Conjugate and Solution 1.

Specifications				Results				
	Target	Min	Max		Average	CV (%)	Status	
ADC Value	26 040	24738	27342	ADC Value	25 463	0.43	PASSED	
Laser Energy (μ J)	120	72	125	Laser Energy (μ J)	120		PASSED	
Ref. Conjugate	Counts A	11000	9900	Counts A	11 148	1.8	PASSED	
	Counts B	271605	220000	Counts B	251 698	0.68	PASSED	
	Ratio	440	430	Ratio	443	1.19	PASSED	
Solution 1	Counts A		< 520	Solution 1	Counts A	223	3.82	PASSED
	Counts B		< 1100		Counts B	402	3.34	PASSED

(20) The third part contains the specification and the results of the test **without the protective window**

Specification for the window contribution on solution 1

Window contribution values and tests status

Specifications		Results				
	Wind. Contrib.		Average	CV (%)	Wind. Contrib.	Status
Ref. Conjugate	Counts A					
	Counts B					
Solution 1	Counts A	< 100				
	Counts B	< 250				

(21) The fourth part contains the status of the standard deviation on solution 1 and on the reference conjugate, some information related to the lot of the reference conjugate and to the activation of the linearity correction table and finally the overall test result. The overall test is Passed if all the single tests ar passed.

SD Of Ref. Conjugate: PASSED

SD Of Solution 1: PASSED

Lot of Ref. Conjugate: 54

LCT table: Activated

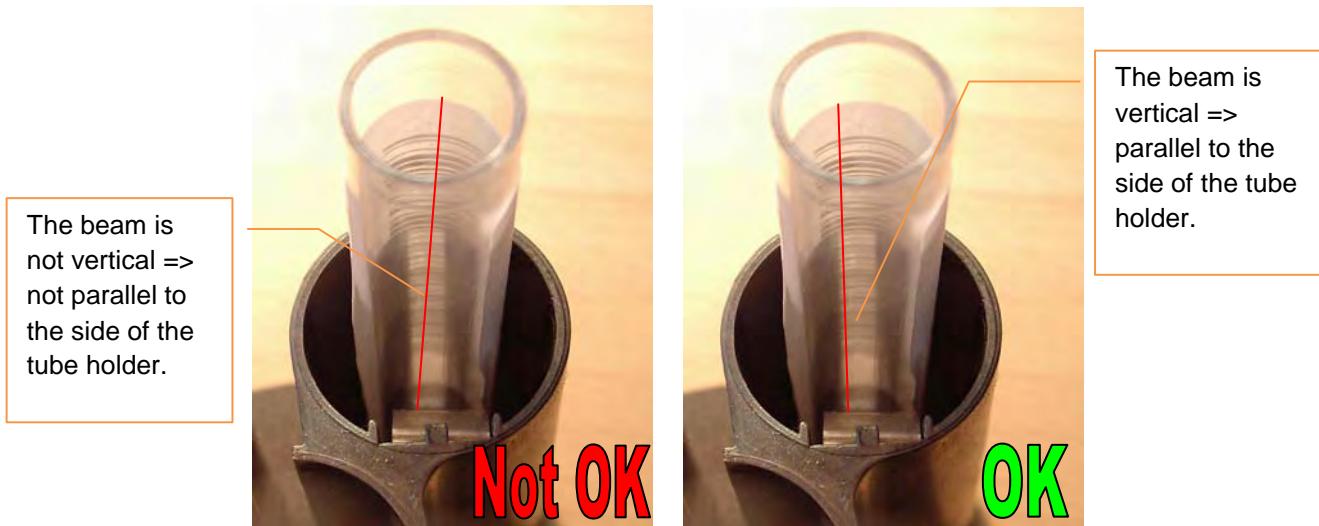
Comments: This is just an example

Test Status: PASSED

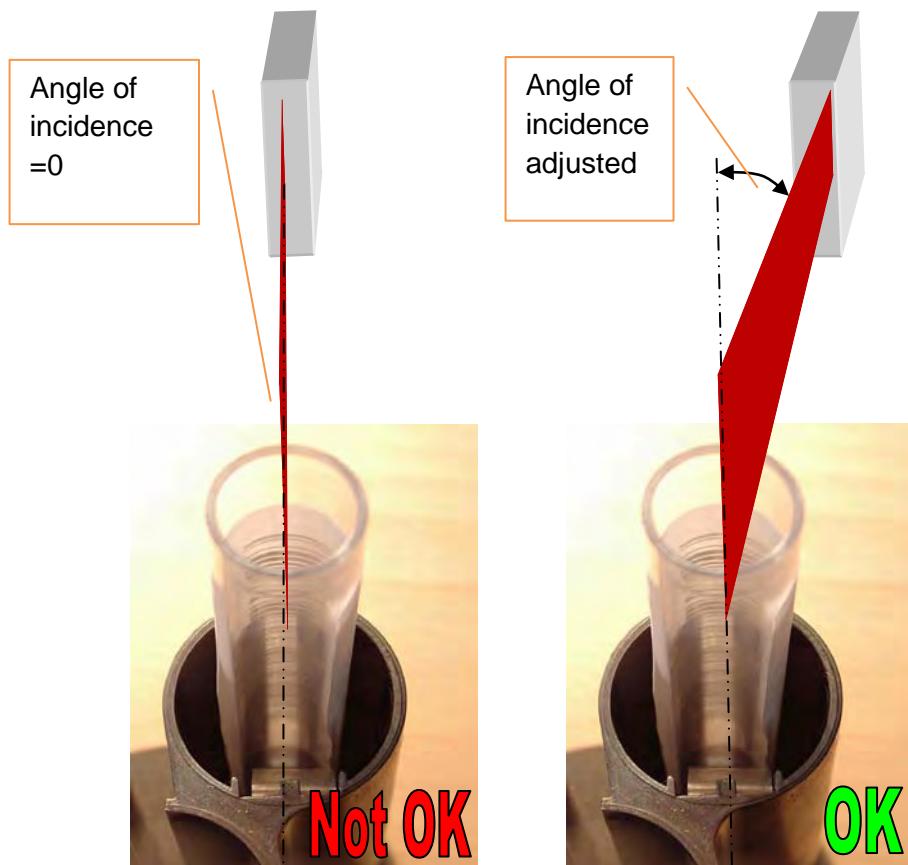
The overall test status is Passed if all the individual tests are passed otherwise the test is failed and you have to troubleshoot the problem as with the Excel template

9.6 Barcode readers adjustment

In order to reach the best conditions for reading, the barcodes readers must be mechanically adjusted. The first adjustment concerns the beam verticality: the sides of the tube holder and the beam from the barcode reader must be aligned.



The second adjustment concerns the angle of incidence of the beam regarding the barcode label: the angle of incidence will be adjusted in order to avoid dazzling the barcode reader.



9.6.1 Adjustment of the beam verticality

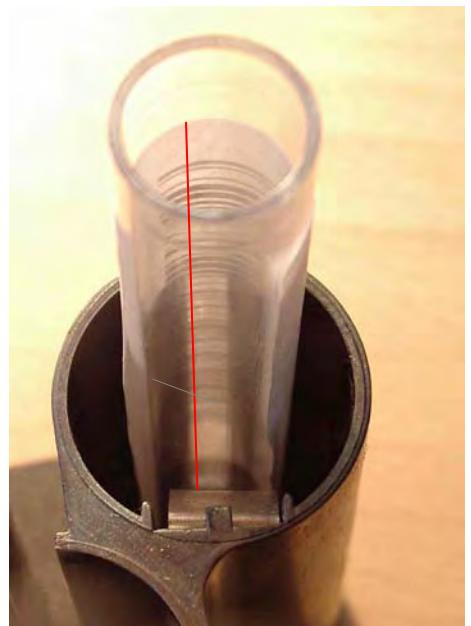
- (1) Install onboard a sample cassette with 1 tube labeled.
- (2) Under KCD select the window “**view and controls**”.
- (3) Select the lower barcode reader: click on “**Down**”



- (4) Switch it on: click “**On**”
- (5) Disable the carousel motor
- (6) Bring manually the tube in the laser beam
- (7) Loosen the Allen screws on the lower barcode reader bracket.
- (8) Adjust the beam verticality, the beam must be vertical.
- (9) Tighten the Allen screw.



Loosen both Allen screws and move the barcode reader until the beam is vertical



9.6.2 Adjustment of the angle of incidence

- (1) Remove all the cassettes from the carousel.
- (2) Remove the drip pan.
- (3) Remove the 3 screws maintaining the infrared board panel.
- (4) Take off the panel
- (5) Under KCD select the window “**view and controls**”.
- (6) Switch on the lower barcode reader (select Down)
- (7) Click on “**init**” Carrousel
- (8) Enter the value **8520** steps for the carousel
- (9) Click on the arrow to move **counter clockwise**.
- (10) From the underneath, loosen a little the 2 screws fixing the barcode reader on the bracket.
- (11) Rotate carefully the barcode reader to bring the beam of the barcode reader at the top of the conical shaped part as shown on the picture below.



Rotate the barcode reader in order to bring the beam at the top of the conical shaped part (position 1).



8520 steps counter clockwise from carrousel init.

9.7 Barcode readers calibration

- (1) Remove all the cassettes from the carousel.
- (2) Install an empty sample cassette in position 1
(no tube, no dilution plate, no wash bottle).
- (3) Put 2 tubes with good quality barcodes (containing different codes) within the cassette in position 1 and 2.
- (4) Adjust accurately the position in the tube holders.
- (5) In KCD, open the window: **“Barcode Reader Test”** (figure below).
- (6) Click on the button **“calibration”**.
- (7) Wait for the completion of the calibration.
- (8) The status **“calibration successful”** should be displayed in the field **“Pipeting Module Status”**. Otherwise make sure that the cassette and the tubes are in the good positions, check that the tubes have a label with barcodes of good quality, check through **“view and controls”** that the barcode readers are able to read the barcodes.



Barcode Reader Test									
Menu Windows Unitech ?									
Reagent		Reagent		Reagent					
C 1	Results	C 2	Results	C 3	Results	C 4	Results	C 5	Results
1		1		1		1		1	
2		2		2		2		2	
3		3		3		3		3	
4		4		4		4		4	
5		5		5		5		5	
6		6		6		6		6	
7		7		7		7		7	
8		8		8		8		8	
9		9		9		9		9	
10		10		10		10		10	
11		11		11		11		11	
12		12		12		12		12	
13		13		13		13		13	
14		14		14		14		14	
15		15		15		15		15	
16		16		16		16		16	
ID		ID		ID		ID		ID	
DP 1		DP 1		DP 1		DP 1		DP 1	
DP 2		DP 2		DP 2		DP 2		DP 2	
WB 1		WB 1		WB 1		WB 1		WB 1	
WB 2		WB 2		WB 2		WB 2		WB 2	
WB 3		WB 3		WB 3		WB 3		WB 3	
WB 4		WB 4		WB 4		WB 4		WB 4	
<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>	
Pipette Status Ready					Barcode Nbr: 0 / Scan Nbr: 0 / 1				
					Scan Test Calibration				
					0%				

« calibration successfull » is displayed when the calibration is complete

Start calibration

The settings for scanning are defined by the barcode readers' calibration. The settings values are saved in flash memory but you can see a copy in the file C:\KCSW\KCD\KCINI\KChws.ini.

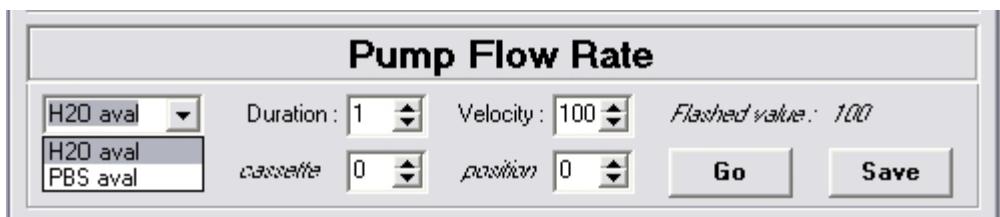


9.8 Pumps flow rate adjustment (or check)

9.8.1 Introduction

The tip is cleaned internally and externally during the washing sequence, and then the liquid path is rinsed out with water to avoid any risk of crystallization and corrosion due to the PBS.

A good flow rate of PBS is very important in order to decontaminate and clean properly the tip. This flow rate must be in the range 2.5ml/s 0 to +0.2ml/s. It can be adjusted playing on the speed of the Washing pump (from 0% to 100% of the maximum speed). The PBS flow rate must be adjusted whenever the pump is changed or whenever there is a doubt on the washing efficiency (tip carry over).



9.8.2 Flow rate adjustment

- (1) Open the window “**Pipetor Utilities**”.
- (2) Select the PBS pump.
- (3) Set the “Duration” to 10 seconds.
- (4) The current speed is displayed on the screen (flashed value).
- (5) Put an empty bottle of washing solution in position 1 of a sample cassette and put onboard this cassette in carousel position 1. Close the carousel hood. (Note that you can choose different positions on the carousel and within the cassette. Position 1 is chosen for convenience).

Make sure that the cassette and the bottle are in the correct position before starting the test otherwise the liquid will be dispensed in another cassette or directly on the drip pan.

- (6) Click on “**Go**”
- (7) The PBS will be dispensed in the empty bottle for 10 seconds.

- (8) Pour the liquid into a Beaker to measure the volume.
- (9) The flow rate in ml/s is the volume measured divided by 10.
- (10) The flow rate must be in the range 2.5ml 0 to +0.2ml. Increase or decrease the pump velocity if necessary and repeat the process until you reach the good flow rate. Finally click on “Save”, this value is saved in the Pipeting Module flash memory. Notice that this flow rate is the same for PBS and H2O since there is only one pump for both liquids.
- (11) If the PBS flow rate is always too low, check that the tip or the tubings are not clogged up. You may have to replace the pump itself.
- (12) A copy of this value is visible in the file C:\KCSW\KCD\KCINI\KChws.ini.

```
rec2ThPctage = 2
rec3ThPctage = 2
[PRIME]
H2O_PERIPUMP_SPEED=70
H2O_PERIPUMP_TIME=9000
H2O_FLUSHES=2
PBS_PERIPUMP_SPEED=70
PBS_PERIPUMP_TIME=6000
PBS_FLUSHES=0
[LIQUID_LEVEL]
PUMP_SPEED=100
TIME_TO_FILL=20000
[WASTE]
```

9.9 Restoring factory settings or settings from a backup.

Introduction

Most of the instrument settings are saved in the pipetor and reader flash memories but a copy of the settings is automatically done at each software start. The settings values can be seen through these files.

C:\KCSW\KCINI\config.ini: contains the reader and pipetor positions settings (pipeting, dispensing and reading coordinates)

C:\KCSW\KCINI\KChws.ini contains the pipetor and reader hardware settings: peristaltic pumps speeds, temperature set point for the tip, noise threshold for testing the reaction plate, etc.

(note that only a part of these parameters are saved in flash memories)

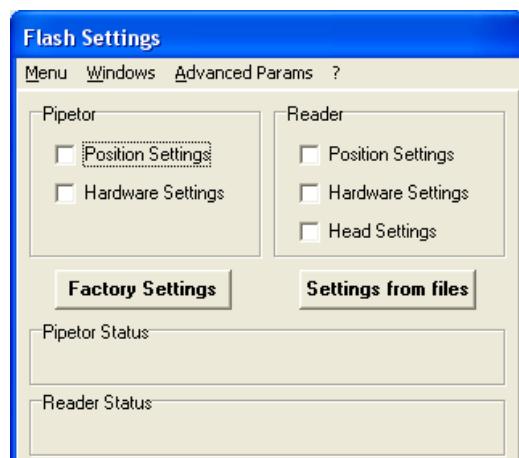
C:\KCSW\KCINI\Head.ini contains the reader head parameters.

All these files are saved in the snapshots and can be used to restore a part or the whole settings thanks to the window “**Flash settings**”.

In case of real trouble or when a backup does not exist, the factory settings can be restored. Factory settings are really usefull to restore approximated settings values.

Procedure to restore settings from a backup

- (1) Tick the box(es) depending on the settings you want to restore
- (2) Click on “Settings from files”.
- (3) A browser popup appears
- (4) Select the folder containing the snapshot (normally c:\snapshot\mmddyyyy)
- (5) The file to be selected is automatically filled in the browsing window.
- (6) Click “open”
- (7) Once the copy from the file to the flash memory is complete a message “**Flash transfer ok**” appears at the bottom in the “**reader or pipetor status**” area.
- (8) If several boxes were ticked another browser window appears with the next file to select.
- (9) Once the restoration process is complete the instrument has to be reinitialized.
- (10) If you have restored the hardware settings, you have to copy the file KChws.ini from the snapshot into the folder C:\KCSW\KCINI\ as well to get a complete restoration.



10 Others validation and troubleshooting tests:

Depending on the intervention performed, one or several validation tests must be done in order to guarantee a good operation of the instrument. The main interventions are summarized in the table “tests by interventions” ([refer to appendix Tests By Interventions page 333](#)).

We recommend saving all the results and logs files in a folder C:\Interventions to be created on the XPC hard drive if further analysis is needed. Create a subfolder for each intervention with the following format: C:\Service\YYYYMMDD\.

Save a copy of Matrix 5 tests, PMMTC, and Field Tests on your laptop. The result of these tests can be requested by the product support hotline to investigate on a specific problem.

10.1 Field test

10.1.1 FIELD TEST DEFINITION

10.1.1.1 What is a Field Test

- ↳ Field test is a simplified performance test to be used in the field. The Field test is the way to check the overall performance of a **B·R·A·H·M·S KRYPTOR compact PLUS** in a limited amount of time.
- ↳ Since it's a simplified test, passing the Field test doesn't mean that everything has been checked and is satisfactory, but not passing the Field test means something is wrong.
- ↳ Field test reagents are provided under the reference K-TEST-KIT unit and should be used with the associated Field Test disk. The installation files + procedure + data reduction template are released via a Kryptor Bulletin (KB) for each new Field Test lot..
- ↳ Each lot of K-Test kit has a relevant version of field test disk. The acceptance norms are dependant from the K Test kit lot number, thus a K test kit must be used with the relevant field test version.

10.1.1.2 When do we need to run a Field test

↳ It is MANDATORY for Service people to run a Field Test

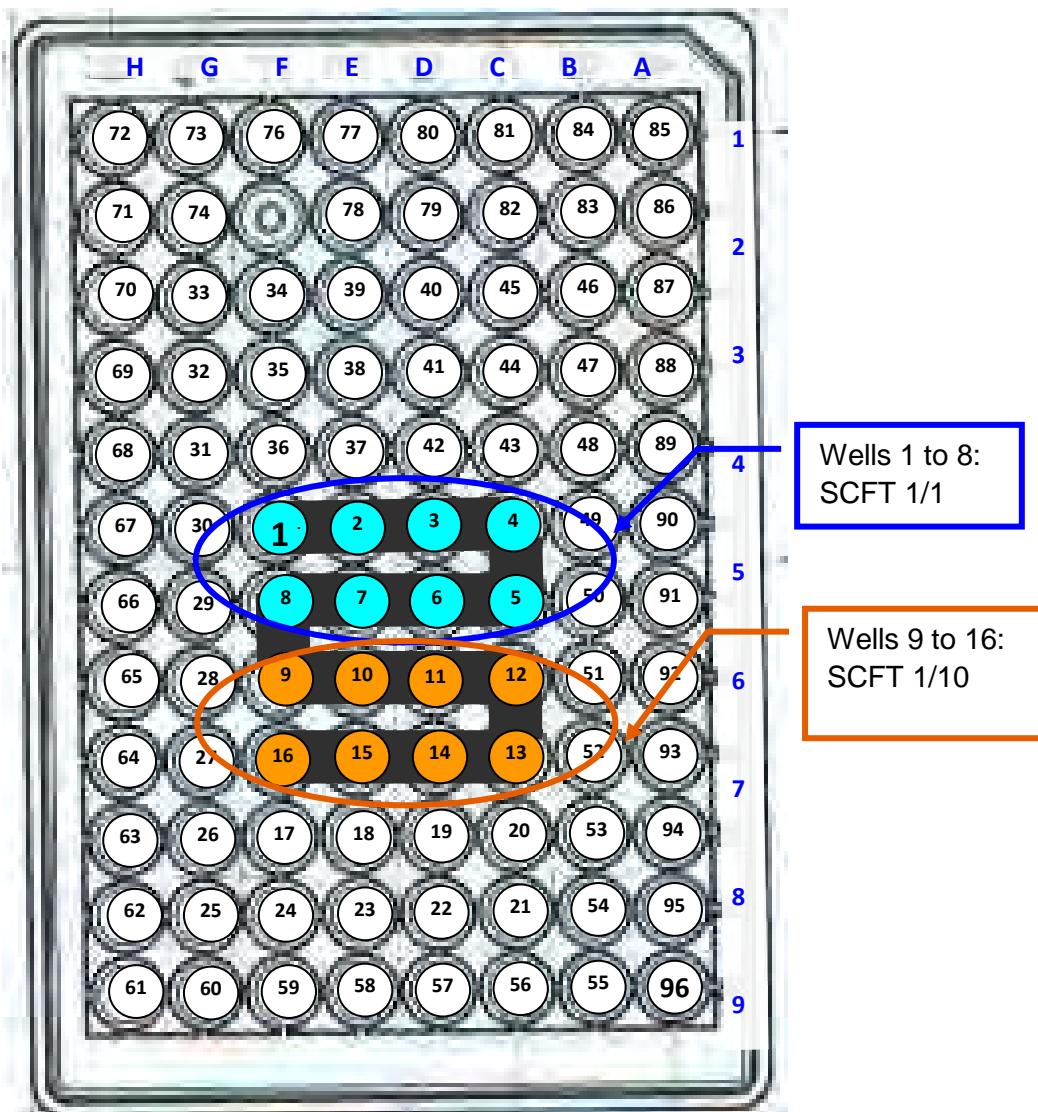
- After each major intervention on **B·R·A·H·M·S KRYPTOR compact PLUS**, to validate that the instrument has been repaired and set correctly. Major interventions are the ones affecting the performances of the instrument ([refer to chapter Tests by Interventions page 333](#)).
- At the end of the installation phase
- After each preventive maintenance

↳ It is RECOMMENDED for Service engineers to run a Field Test

Whenever they have a doubt on the good performances of the instrument.

10.1.2 FIELD TEST PRINCIPLE

- ↳ The field performance test is a 16 wells immunoassay with AFP (8 wells without dilution - 8 wells diluted to 1/10) and gives information about :
 - RFU calculation
 - Level of signal
 - Ratio (Rt0)
 - Reproducibility of measurement (pipeting - dilution - tray positioning)
 - Quality of reconstitution
- ↳ The maximum total time to perform a Field test is 57' (30' for max pre-heat + 27' run).



10.1.3 Field Test software environment :

To avoid interfering with the customer's databases the Field Test runs under a specific environment (the Field Test files are located in a different folder). The application WLUTIL32.EXE is used to switch from the user environment to the Field Test environment and vice versa. In the Field Test environment, the configuration is the following:

- The XPC software uses the data from the directory "c:\Ftkc". This directory is copied from the field test disk and contains all the data required to run the test (reagent registration, calibration, worklist ...).
- The file FIA.ini is modified in order to have these settings:
 - Sample name in Patient Data
 - Automatic redilution OFF
 - Automatic validation OFF
 - Automatic start up at the end of the pre-heat: activated.
 - Automatic shutdown after 2 hours idle: activated.

When the field test is complete, we must save the data from the field test and reset the configuration to the user environment. We will use **WLUTIL32** to:

- Copy the data to be analyzed on a removable device.
- Create a snapshot in order to have the maximum of information saved. (This can be useful if we need to analyze some very detailed log files).
- Restore the configuration to the user environment (initial conditions: main directory C:\Kryptor and original software settings: original FIA.ini)

10.1.4 Field test procedure.

Please refer to the procedure included in the field test Excel template corresponding to your K Test kit lot number.

10.1.5 Field test results analysis

-
- Some additional softwares are required to process the data on your laptop:
-

-Transfbf: this software is provided with each field test disk as a zip file: Transdbf.exe.zip and is located in the folder \Execfiles. If this software is not installed on your laptop, please install it.

-IDAPI 16: this software is available on the KRYPTOR bulletin KB-008 on the Lotus Notes Database; install it in the root of your computer hard drive.

The data from the field test must be processed using the Excel template provided with the KB related to you K-Test kit lot number.

The automatic data processing is done by clicking on the button: "**KRYPTOR compact PLUS analyze**". Results (RFU, number of counts and CVs) are accepted if they fall within the specified range.
(see [Example Of FT Results page 225](#))

A field test is passed if:

- The test is complete and no error occurred during the test.
- The wells have been dispensed correctly (no drops outside the wells, no empty or partially dispensed wells).
- All the measured values in the template have a "**Passed**" indication or a maximum of two "**Marginal**" indications.

A field test is failed if:

- An error occurred during the test
- More than 3 "**Marginal**" indications
- One or several "**Failed**" indications
- All the indications are passed but the reaction plate is **not dispensed** correctly (presence of drops or splashes, wells).

Note: The specifications to pass a Field test are based on RFUs and counts that are automatically taken into account by the template. The results indicated in the user interface are given in terms of concentrations and **MUST NEVER** be used for qualifying the instrument.

Example of Field test results:

NORMES 83

Fieldtest Results

Fieldtest Results

Results in terms of RFU on wells 1 to 8 (SCFT without dilution)

Results in terms of RFU on wells 9 to 16 (SCFT with dilution 1/10)

Results and range of acceptation (norms)

Status

SCFT 1:1

	test 1	test 2	test 3	test 4	test 5	test 6	test 7	test 8	All rows	Norms	Valid	
	14.16	13.51	14.02	13.72	14.34	14.20	13.8	14.51	Average Cv%	14.06 2.32%	13.3 - 21.7 < 3%	Passed Passed

SCFT 1:10

	test 9	test 10	test 11	test 12	test 13	test 14	test 15	test 16	All wells	Norms	Valid	
	1.61	1.59	1.53	1.64	1.65	1.53	1.56	1.52	Average Cv% Range	1.58 3.35% 8.68%	1.55 - 2.52 < 4% < 10%	Passed Passed Passed

SCFT 1:1

	test 1	test 2	test 3	test 4	test 5	test 6	test 7	test 8	All rows	Norms	Valid	
counts 665 nm	4915	4690	4827	5029	4972	5233	4740	5285	Average Cv%	4944 3.7%	> 2600 < 5%	Passed Passed
counts 620 nm	108197	102435	104254	108646	108172	117813	102578	119180	Average Cv%	108253 4.9%	> 54100 < 5%	Passed Passed

RT0

	0.0452	0.0440	0.0444	0.0446	0.0438	0.0428	0.0451	0.0436	Average Cv%	0.0442 1.8%	0.042 - 0.054 ///	Passed ///
--	--------	--------	--------	--------	--------	--------	--------	--------	----------------	----------------	----------------------	---------------

RT0 calculated by regression. Wells 1 to 8 (pure SCFT).

Results in terms of number of counts on A & B channels. Wells 1 to 8 (pure SCFT)

Comments :

Template version related to the K-test kit lot number

Serial numbers

Instrument serial	System Name
K0000	KRYPTOR_COMPACT
ID PIPETOR	PT0000A
ID READER	RD0000A
Reader Head	"0000R"
HVA	745
HVB	893
DAC A	400
DAC B	400
TIP ID	0605002

High voltage values.

DACs values: always 400

10.1.6 Results interpretation

10.1.6.1 SCFT 1:1 values

SCFT 1:1	test 1	test 2	test 3	test 4	test 5	test 6	test 7	test 8	All rows	Norms	Valid
	14.16	13.51	14.02	13.72	14.34	14.20	13.98	14.51	Average Cv%	13.3 - 21.7 < 3%	Passed Passed

The averaged RFU is out of the norms. Possible causes:

- (1) -Incorrect SCFT reconstitution.
- (2) -The SCFT or the kit is damaged (shipment, stored in bad conditions)
- (3) -Incorrect kit reconstitution (leakage or liquid detection problems, the CV should be high also) => Check the fluidic path for any leakage, check the liquid detection system
- (4) -Pipeting problem (CV should be high also) => Check the pipeting coordinates (refer to [Pipeting Module positions settings](#) page 149), check the liquid detection system (refer to [Level sense test](#) page 230), check the fluidic path.

The CV is above 3%

- (1) Pipeting problem => Check the pipeting coordinates (refer to [Pipeting Module positions settings](#)), check the liquid detection system (refer to [Level sense test page 230](#)), check the fluidic path (included syringe and 3 ports valve).
- (2) Dispensing problem: reaction plate with splashes or wells with different volumes => Check the dispensing coordinates (refer to Adjustment of dispensing position in the Reaction Area page 172 and Dispensing coordinates adjustment page 196), check the state of tip extremity.
- (3) Reading problem: bad positioning or bad reading coordinates => Check the X & Y belts tensions (refer to [Belt Tension adjustment page 146](#)), check the reading coordinates (matrixes) (refer to [Reading coordinates adjustment page 181](#))

10.1.6.2 SCFT 1:10 values

SCFT 1:10	test 9	test 10	test 11	test 12	test 13	test 14	test 15	test 16	All wells	Norms	Valid.
	Average	1.58	Cv%	3.35%	Range	8.68%	<	4%	<	10%	Passed
	1.61	1.59	1.53	1.64	1.65	1.53	1.56	1.52			Passed

Response out of the specifications.

- (1) -If the SCFT non diluted is out of specifications refer to the same causes as the non diluted SCFT
- (2) -If the SCFT non diluted is within the specifications the possible causes are:
- (3) -Response too high: possible carry over => check the tip and the washing (flow rate, position in the cup, ...)
- (4) Reponses too low: bad pipeting coordinates adjustment in the dilution area (Zmax), or bad liquid detection within the dilution plates (bad CV) => check pipeting coordinates ([refer to Pipeting positions- Dilution Plate page 167](#)) and liquid detection system in the dilution area (refer to [Level sense test page 230](#)).

10.1.6.3 SCFT 1:1 values in terms of counts (values at T0)

SCFT 1:1	test 1	test 2	test 3	test 4	test 5	test 6	test 7	test 8	All rows	Norms	Valid.
	counts 665 nm	4915	4690	4827	5029	4972	5233	4740	5285	Average 4944 Cv% 3.7%	Passed
	counts 620 nm	108197	102435	104254	108646	108172	117813	102578	119180	Average 108253 Cv% 4.9%	Passed

Counts out of the specifications. Possible causes:

- (1) -The laser has a low laser energy => check the laser energy with a joulemeter (refer to [Laser energy check/adjustment page 197](#))
- (2) -Dirty protective window => clean it.
- (3) Incorrect reading coordinates (CV should be above 5% also) => check them (matrixes) (refer to [Reading coordinates adjustment page 181](#))
- (4) -PMT aging => replace the reader head if necessary

CV out of the specifications. Possible causes:

- (1) -The dispensing coordinates are not correct (incorrect dispensing coordinates may cause a bubble and may affect the counts at T0), readjust the dispensing coordinates.

10.1.6.4 RT0 values (calculated from the first reading on SCFT 1:1)

RT0	0.0452	0.0440	0.0444	0.0446	0.0438	0.0428	0.0451	0.0436	Average Cv%	0.0442 1.8%	0.042 - 0.054 ///	Passed ///
-----	--------	--------	--------	--------	--------	--------	--------	--------	-------------	----------------	----------------------	---------------

Response out of the specifications. Possible causes:

- (1) -Ratio not adjusted properly => check the ratio again, run PMT test (refer to Ratio adjustment and PMTTC page 205).
- (2) -Reagent kit reconstitution problem

10.1.7 Manual removal of the field test worklist

Sometimes, it may happen that the automatic Field Test removal, via **WLUtil32.EXE**, does not work properly.

In this case, following instructions should help getting out of this trouble:

Step 1 :

In C:\KcsW\Kcini\

- o If file7 exists
- o Delete SeqKC.scr
- o Rename file7 into SeqKC.scr

Step 2 :

In C:\KcsW\XipC\Log\

- o If file1 exists
- o Delete KC_TCLog and rename file1 into KC_TCLog
- o If file2 exists
- o Delete XIPClog.txt and rename file2 into XIPClog.txt
- o If file3 exists
- o Delete log.txt and rename file3 into log.txt
- o If file4 exists
- o Delete ScanParse.txt and rename file4 into ScanParse.txt
- o If file5 exists
- o Delete scanraw0.txt and rename file5 into scanraw0.txt
- o If file6 exists
- o Delete scanraw1.txt and rename file6 into scanraw1.txt

Step 3 :

In C:\Windows\:

- If FIA.WLU exists
- Delete Fia.ini
- Rename Fia.wlu into Fia.ini

- Edit Fia.ini
- In the [Dir] section you must have: FIADataDir=C:\Kryptor\DATA and in the [WLUtil] section you must have Name=

Step 4 :

- If C:\Ftkc\ folder exists
- Delete C:\Ftkc\ folder.

Troubleshooting :

If FILE7 does not exist in C:\KcsW\Kcini\, check existing seqKC.scr. If SeqKC.scr version is not correct according to your current software version, get SeqKC.scr from an existing snapshot, or user backup and paste it in C:\KcsW\Kcini\.

In case of FIA.WLU does not exist in C:\Windows folder :

Check the existing C:\Windows\Fia.ini : The key "FIADataDir" must be C:\KRYPTOR\DATA (or should not exist, by default C:\Kryptor\data will be used).

If this key "FIADataDir" is "C:\Ftkc", you must get Fia.ini from a previous snapshot or backuser.

If you think you really are in a deep trouble follow this procedure:

Step1:

In C:\KcsW\Kcini\ delete:

- SeqKC.scr
- File7 (if existing).

Step2:

In C:\Windows delete:

- C:\Windows\Fia.ini
- C:\Windows\Fia.wlu (if existing)
- Delete C:\Ftkc folder (if existing).

Step3:

Perform a regular installation update (latest available software version).

Only installation of following components is necessary :

- Compact.
- XPC32
- X-Utils

10.2 Level sense test

10.2.1 Introduction

The level sense test is a test designed to validate or troubleshoot the liquid detection system.

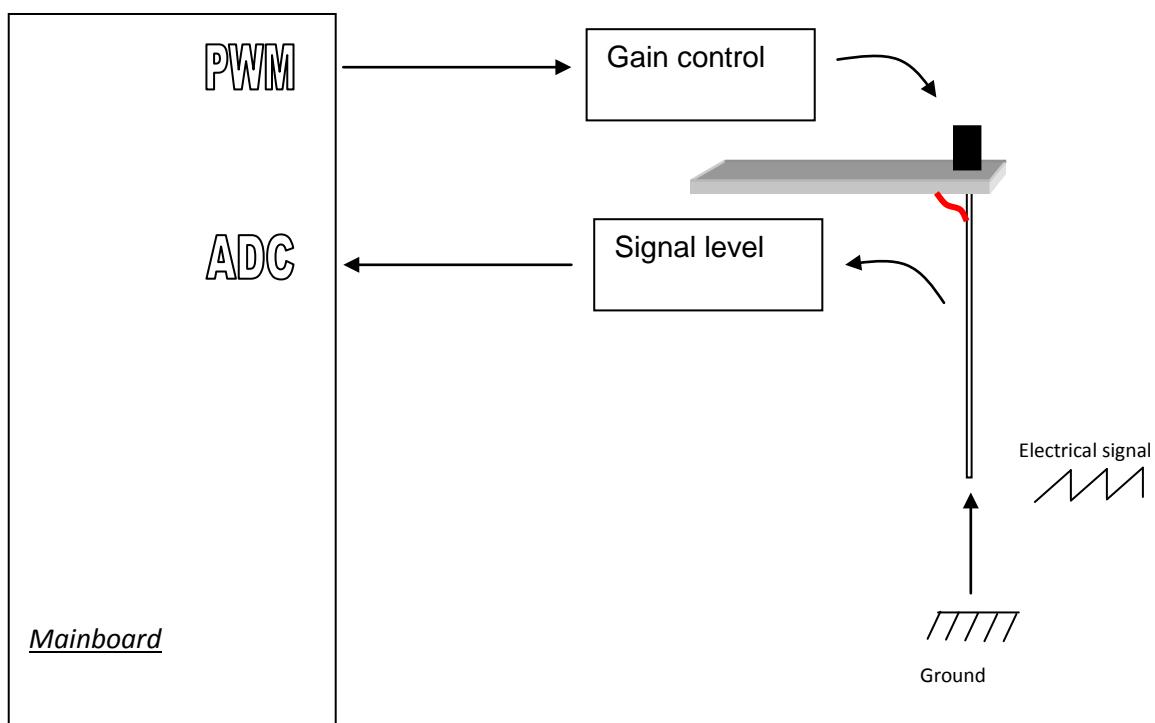
When used as a validation test the detection test will use a predefined sequence written as a script in the file C:\KCSW\KCD\CYCLE\DetectionTest.ini. The whole areas will be verified.

When used as a troubleshooting test, the detection test can be run on a specific area (samples, dilution plate, reagent kit, etc.)

10.2.2 Principle of the liquid detection:

The liquid detection is based on the principle of a capacitive detection. When the tip is in the air the capacity between the tip extremity and the ground is very small but it increases significantly when the tip is in a liquid.

An electrical signal with a high frequency is generated on the tip board and provided to the tip extremity. This signal is adjusted in amplitude thanks to a command called “**PWM**” and a feedback called “**tip ADC**”.

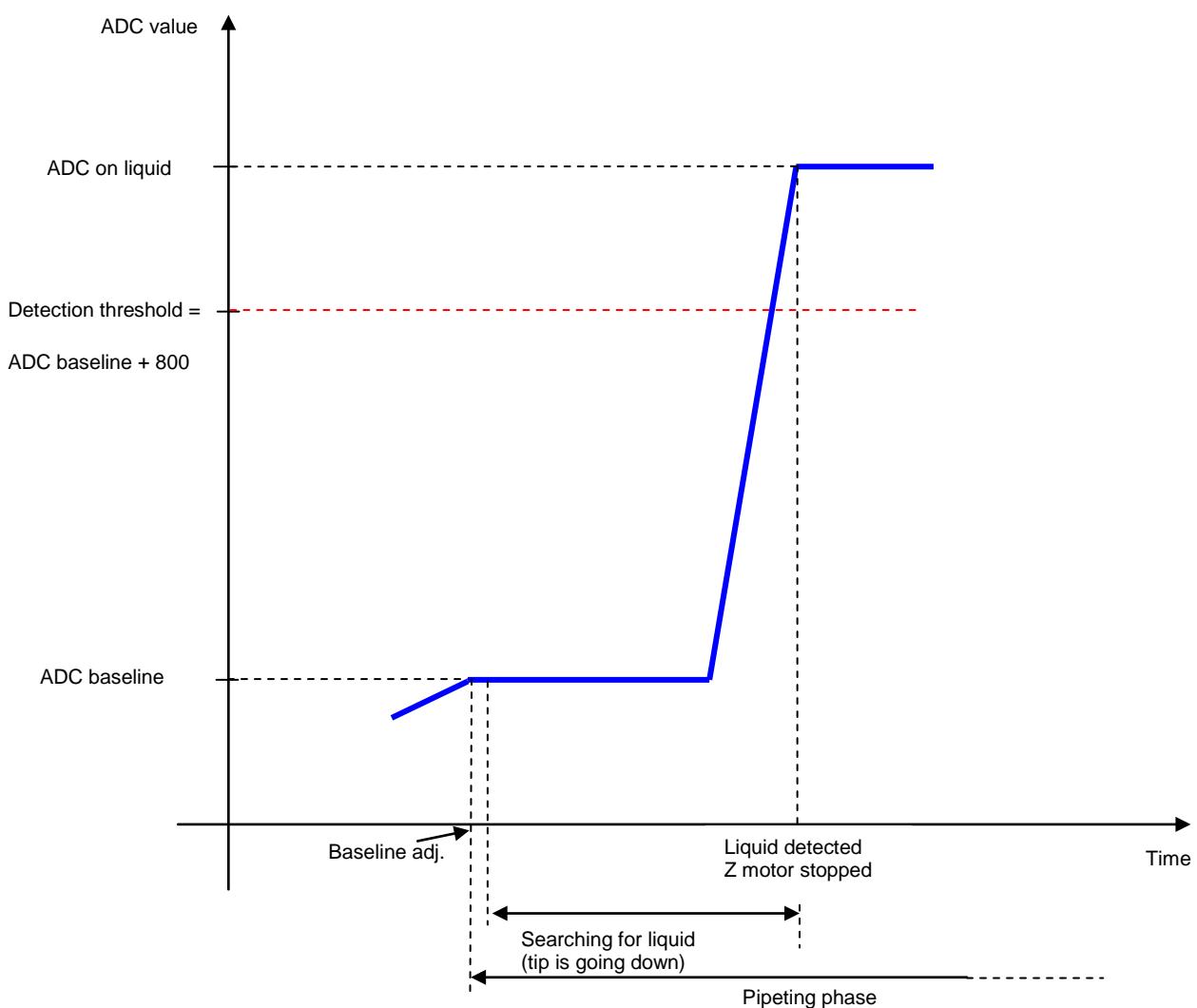


Before each pipeting phase, the signal at the tip extremity is auto adjusted to approximately 8V. It is the **Baseline** adjustment, the “**PWM**” command is tuned by the embedded software in order to have a “**tip ADC**” in the range 200 to 400.

When the tip reaches the liquid: the capacity increases and the electrical signal decreases. The ADC value being inverse proportion to the electrical signal: the ADC value increases.

A liquid is detected when the following condition is satisfied:

ADC value > ADC baseline + 800

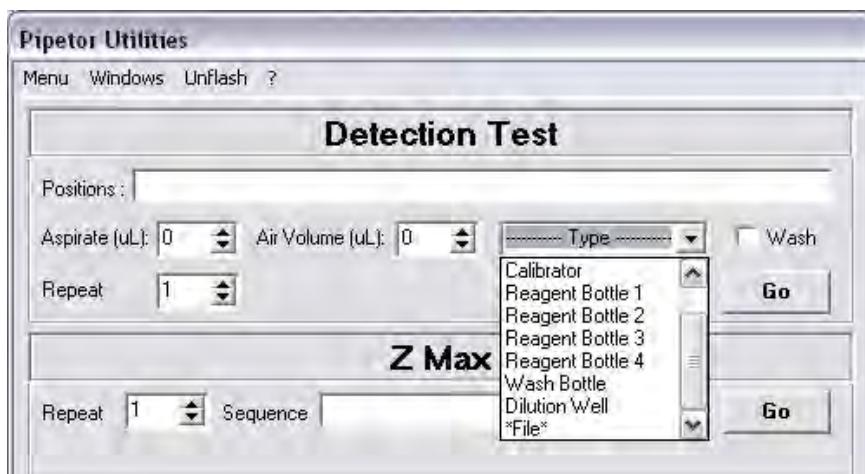


10.2.3 How to Run the level sense test as a validation test

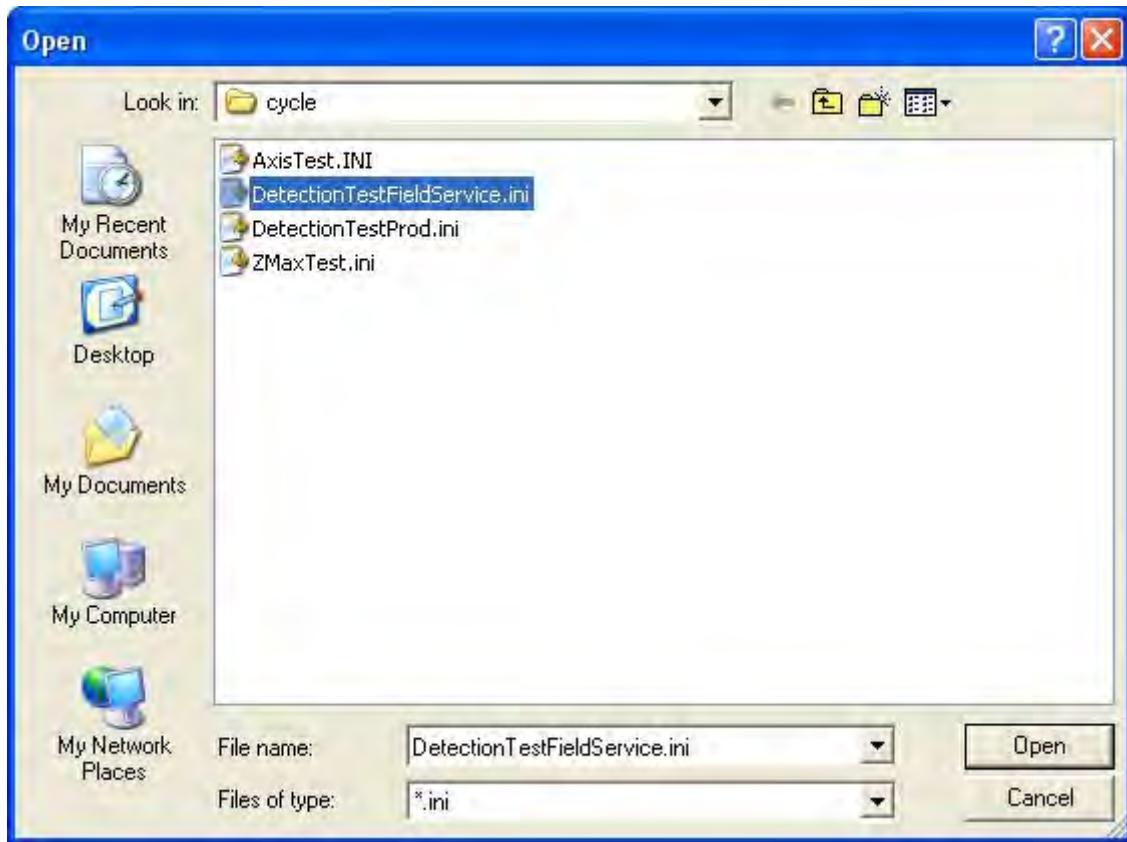
- (1) Install onboard a sample cassette in position 1 and a reagent cassette in position 2
- (2) Put a sample tube in position 1 of the sample cassette with 150µl of solution 1
- (3) Put a calibrator vial in position 2 of the sample cassette with 600µl of solution 1
- (4) Put a Simport micro cup + holder in position 3 of the sample cassette with 80µl of solution 1
- (5) Put a dilution plate in position 1 of the sample cassette with 250 µl of solution 1 in well 1 and well 7
- (6) Put a solution bottle in position 3 of the sample cassette with 4 ml of solution 1



- (7) Put a reagent kit in position 1 of the reagent cassette with 700µl of solution 1 in bottle 1 and bottle 4.
- (8) Open the window “**Pipetor Utilities**” in KCD
- (9) In the section “**Detection Test**” click on the drop down menu and select “**file**”



- (10) In the browsing window select the file “**DetectionTestFieldService.ini**” and click “**Open**”



- (11) Click on “**Go**” and wait for the completion of the test.

10.2.4 Results interpretation

The results are logged in 2 files:

- [LogKC.txt](#)

This file summarizes the test results, it is located in C:\KCSW\KCD\LOG\.

The informations given in LogKC.txt are the following:

- (1) Date and time of each liquid detection
- (2) Arm position (Z) for each liquid detection.
- (3) Numbers of errors (non detections) on the whole test.
- (4) Distribution of the errors on the different locations.

N.B.: The script is designed to check the liquid detection 5 times on each area (5 areas in the sample cassette and 1 area in the reagent cassette (see locations defined in the previous chapter).

Example of LogKC.txt:

12/29/06 11:20:57 : 1 cycles launched
12/29/06 11:21:07 : Liquid detected at 25474
12/29/06 11:21:16 : Liquid detected at 25456
12/29/06 11:21:26 : Liquid detected at 25476 }
12/29/06 11:21:36 : Liquid detected at 25456
12/29/06 11:21:45 : Liquid detected at 25456
12/29/06 11:22:02 : Liquid detected at 1361 }
12/29/06 11:22:16 : Liquid detected at 1412
12/29/06 11:22:31 : Liquid detected at 1412 }
12/29/06 11:22:46 : Liquid detected at 1412
12/29/06 11:23:02 : Liquid detected at 1412
12/29/06 11:23:16 : Liquid detected at 2256 }
12/29/06 11:23:31 : Liquid detected at 2256
12/29/06 11:23:45 : Liquid detected at 2238 }
12/29/06 11:23:59 : Liquid detected at 2238
12/29/06 11:24:14 : Liquid detected at 2238
12/29/06 11:24:28 : Liquid detected at 8112 }
12/29/06 11:24:42 : Liquid detected at 8076
12/29/06 11:24:54 : Liquid detected at 8094 }
12/29/06 11:25:08 : Liquid detected at 8094
12/29/06 11:25:21 : Liquid detected at 8094 }
12/29/06 11:25:36 : Liquid detected at 15546
12/29/06 11:25:50 : Liquid detected at 15544 }
12/29/06 11:26:03 : Liquid detected at 15544
12/29/06 11:26:18 : Liquid detected at 15544 }
12/29/06 11:26:32 : Liquid detected at 15544
12/29/06 11:26:48 : Liquid detected at 8380 }
12/29/06 11:27:02 : Liquid detected at 8415
12/29/06 11:27:17 : Liquid detected at 8416 }
12/29/06 11:27:31 : Liquid detected at 8380
12/29/06 11:27:45 : Liquid detected at 8380 }
12/21/06 11:27:47 : End of 1 cycles
Errors: 0 / 30 } Number of errors on the whole test
Sample: 0 }
Cupule: 0 } Distribution of the errors on the different areas
Calibrator: 0 }
Cryptate: 0 }

-
- The liquid detection is valid if no error occurs on the whole test and if within the same area the positions of detection are in a range of 160 steps max.
-

Delta max (pos max – pos min)= 160 steps.

Example:

12/29/06 11:23:16 : Liquid detected at 2256
12/29/06 11:23:31 : Liquid detected at 2256
12/29/06 11:23:45 : Liquid detected at 2238
12/29/06 11:23:59 : Liquid detected at 2238
12/29/06 11:24:14 : Liquid detected at 2238



On calibrator cassette 1 pos 2
Max – Min = 2256-2238=18 steps
Delta is OK

• Event.txt

This file is located in C:\KCSW\KCD\LOG\ and gives the following detailed informations for each liquid detection:

PWM value tuned during the baseline adjustment

ADC Baseline

ADC on liquid

Arm position in Z during liquid detection

Area numbers where the liquid detection was performed (see list below)

1: Samples / Calibrators / microcups

2: Reagent Kit pos. 1

3: Reagent Kit pos. 2

4: Reagent Kit pos. 3

5: Reagent Kit pos. 4

6: WashBottle 1

7: WashBottle 2

8: WashBottle 3

9: WashBottle 4

10: DilutionPlates

11: WashBowl

12: WashCup

0: Unknown

Extract of Event.txt:

12/29/06 11:21:01 : Arm adjust Pwm = 599. Area = 10 PWM tuned during baseline adjustment
12/29/06 11:21:02 : Level Sense Baseline. ADC = 338. Area = 10 ADC Baseline value
12/29/06 11:21:03 : On liquid. ADC = 1342. Area = 10 ADC value on liquid
12/29/06 11:21:03 : Liquid detected. ZI=25474.Area=10 Position of detection in Z Area: dilution plate

12/29/06 11:21:11 : Arm adjust Pwm = 601. Area = 10
12/29/06 11:21:12 : Level Sense Baseline. ADC = 257. Area = 10
12/29/06 11:21:13 : On liquid. ADC = 1210. Area = 10
12/29/06 11:21:13 : Liquid detected. ZI=25456.Area=10

12/29/06 11:21:21 : Arm adjust Pwm = 601. Area = 10
12/29/06 11:21:22 : Level Sense Baseline. ADC = 254. Area = 10
12/29/06 11:21:23 : On liquid. ADC = 1207. Area = 10
12/29/06 11:21:23 : Liquid detected. ZI=25476.Area=10

12/29/06 11:21:31 : Arm adjust Pwm = 601. Area = 10
12/29/06 11:21:32 : Level Sense Baseline. ADC = 250. Area = 10
12/29/06 11:21:32 : On liquid. ADC = 1207. Area = 10
12/29/06 11:21:32 : Liquid detected. ZI=25456.Area=10

12/29/06 11:21:40 : Arm adjust Pwm = 601. Area = 10
12/29/06 11:21:41 : Level Sense Baseline. ADC = 254. Area = 10
12/29/06 11:21:42 : On liquid. ADC = 1204. Area = 10
12/29/06 11:21:42 : Liquid detected. ZI=25456.Area=10

-
- The PWM value must be in the range 500 to 700.
 - If the PWM is higher than 700 the tip board must be replaced (loss of sensitivity).
-

10.2.5 Possible causes of failure:

- Pipeting coordinates not adjusted properly (tip not centered) => check the pipeting coordinates refer to [Pipeting Module positions settings page 149](#)
- Leakage in the fluidic line (a drop can occur at the tip extremity and disturbs detection) => check the fluidic path refer to [Leaks problems page 289](#)
- The tip board is not plugged properly in the arm => check the connection
- Tip board defective => replace the tip board.

10.2.6 How to run the level sense test as a troubleshooting test

This test will be used to focus the troubleshooting on a specific type of area. For example if the liquid detection fails sometimes but only on the calibrators, this test offers the possibility to check the system only on this kind of vials, on different locations of the carousel and for the chosen number of times.

- (1) In the drop down menu “type”, select the area you want to troubleshoot.
- (2) In the box “positions” enter the location(s) with the following syntax: “cassette position a”-“position within the cassette b”, “cassette position c”-“position within the cassette d”, etc.
- (3) Example: 4-2,3-1,3-2
- (4) Enter the number of repetitions.
- (5) Depending on the area and the location(s) selected, install onboard the good cassette(s) with the good vial(s) filled with the minimum volume of solution 1 (see below).
- (6) Minimum volumes: Sample: 150µl
- (7) Calibrator: 600µl
- (8) Microcup: 80µl
- (9) Dilution plate: 250µl
- (10) Wash bottle: 4ml
- (11) Reagent kit: 700µl
- (12) Click on “Go” to start the test



- This is optional and increases the test time: you can simulate a pipeting phase by entering values in “Aspirate” and “Air Volume” and ticking “Wash”. The first value defines the volume of liquid to be aspirated after the liquid detection and the second one the volume of air to be aspirated after liquid aspiration. The liquid is then dispensed in the wash bowl and the fluidic line is washed.

10.2.7 Results interpretation

- (1) The results are logged in 2 files : LogKC.txt and Event.txt.
- (2) The results interpretation is the same as for a validation test, the only difference is that the test is performed on a single area. Refer to [Result Interpretation page 233](#)

10.3 Axis Positioning Test

10.3.1 Introduction

The Axis Positioning Tests are dedicated to troubleshoot or validate the different axis (carousel, X, Y, Plate (plate is the combination of X and Y movements)). They are useful to highlight a mechanical problem (belt tension, motor seized up, ...) or a random problem.

Each test is defined as a predefined script of 100 positions and can be repeated several times. The axis is initialized first (Homing) and move into the 100 positions. At the end of the cycle, the axis is brought back to the theoretical home position and the distance to the home sensor is measured. The difference between the home sensor and the theoretical home position represents the positioning error. Due to the home sensor accuracy, this error must not be higher than 30 steps.

-
- Z and Theta tests are foreseen for future developments and must not be used.
-

10.3.2 Procedure to run a cycle test

- (1) Go in the window “Cycle Test”
- (2) Initialize the instrument
- (3) Select the axis
- (4) Tick the check box “Verif Home”



- (5) Enter a number of cycles
- (6) For the carousel always run the test with the maximum reagent cassettes available onboard in order to be in the most difficult conditions.
- (7) Click on “Start”

10.3.3 Logs interpretation

The test logs are saved in the file C:\KCSW\KCD\LOG\LogKC.txt

This file is continuously updated with the new logs from the new tests.

The informations given in the log file are:

- the number of cycles launched
- for each cycle: the steps difference after the cycle, the module number, the motor number

Module and motors numbers:

Module 0= reading module

Motor 0= X motor

Motor 1= Y motor

Module 1= pipeting module

Motor 0= theta motor

Motor 1= Z motor

Motor 2= carousel motor

Examples of LogKC.txt

07/28/06 12:13:45 : Launch 3 cycles
 07/28/06 12:14:38 : step difference: -1, module 0, motor 0
 07/28/06 12:15:30 : step difference: -1, module 0, motor 0.
 07/28/06 12:16:21 : step difference: -1, module 0, motor 0.
 07/28/06 12:16:21 : End of the 3 cycles



Cycles on X motor Reading M.
 Step difference is less than 30
 Test is OK

04/11/06 11:03:55 : Launch 2 cycles
 04/11/06 11:04:29 : step difference: 19, module 1, motor 2.
 04/11/06 11:05:02 : Home Error, module 1, motor 2.
 04/11/06 11:05:02 : New home made, module 1, motor 2.
 04/11/06 11:05:05 : End of the 2 cycles



Cycles on carousel Pipeting M.
 On the second cycle the step
 difference is more than 30 steps
 Home error => test is not OK

10.3.4 Possible causes of failure:

- Belt tension not properly adjusted => check the belt tension refer to [Belt Tension adjustment page 146](#)
- Obstacle in the path => check manually the movement and search for any obstacle
- Mechanical problem: hard point, motor seized up => check manually the movement and lubricate/replace any defective mechanical part
- Motor board defective => replace the motor board.

10.4 Barcodes reader test

10.4.1 Introduction

The barcodes reader test is a test designed to validate or troubleshoot the barcodes scanning system. It is composed of 2 laser barcodes readers Leuze BCL8.

The upper one reads the sample cassettes IDs, the solution bottles barcodes and the dilution plates barcodes

The lower one reads the samples barcodes and the reagent kits barcodes.

The barcodes readers must be adjusted mechanically and the system has to be calibrated in order to reach the best reading performances.

Run the barcodes reader test whenever the scanning system or the carousel assembly is modified (replacement of carousel assembly, replacement or mechanical adjustment of a barcode reader).

In order to have a “calibrated” test (reproducible from one instrument to another one and having the same features) the barcodes to be used are given on a sheet of barcodes, refer to appendix [Barcode library for barcodes reader test page 332](#)

-
- Print it with a good laser printer on a sheet of adhesive labels, use a paper of good quality (to avoid smudges) with the following features: Size=A4, 40 labels/sheet (4 labels/line - 10 lines), label size: height= 29.7mm - width=51mm.
-

This sheet merges most of the symbologies usable on **B·R·A·H·M·S KRYPTOR compact PLUS** (code 128, Codabar, Interleaved 2/5, Code 39, EAN13). The number of characters, the resolution and the ratio used for these barcodes make the test very restrictive.

A successful test ensures that the scanning system is properly tuned and provides the best performances.

This does not mean that all the barcodes used by the lab will be read. The scanning is dependent from many others parameters: the quality of printing, the quality of paper (matt or bright), the contrast, the conditions of illumination in the lab, a proper position in the tube holder, the barcodes features (number of characters, resolution and ratio), etc.

In case of problem the test will help to discriminate between an instrument problem and a problem linked to the barcodes labels themselves.

10.4.2 Procedure for running the test:

- (1) Print the sheet of barcodes and stick them on 30 tubes (or use a set of tubes already prepared).



- (2) Install the tubes in 2 samples cassettes and add 2 calibrators vials.
- (3) Install a reagent cassette onboard in position 3 and load 4 reagent kits in it (empty or used kits)
- (4) In the first samples cassette add 4 solution bottles.
- (5) In the second samples cassette add 2 dilution plates.
- (6) In KCD open the window “**Barcodes Reader Test**”.
- (7) You can either enter the codes manually in the cells or ask the software to do it for you; the second solution is of course more convenient.
- (8) Count the total number of codes present in the carousel including the cassette IDs and the codes of the kits (notice that you have to indicate which position contains a reagent

<input type="button" value="Clear"/>	<input type="button" value="Clear"/>			
Barcode Nb :	<input type="text" value="0"/>	<input type="button" value="Scan Test"/>	<input type="button" value="Calibration"/>	
Scan Nb :	<input type="text" value="0 / 1"/>			

Indicate here the total the number of codes in the carousel.

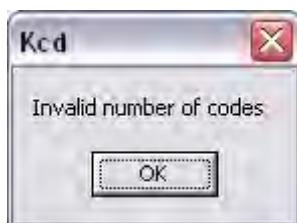
- cassette) and enter this value in the field “**Barcode Nb**”..
- (9) For example if you have 2 sample cassettes with 30 tubes and a reagent cassette with 4 kits, you have to enter 36 codes (there are 2 cassettes IDs).
 - (10) Click on Scan test

(11) The software will read the codes and if the number of read codes matches with the

Barcode Reader Test		Barcode		Barcode	
<input type="checkbox"/> Readout		<input type="checkbox"/> Present		<input checked="" type="checkbox"/> Results	
C1	F0001	C2	R0001	C3	R0001
1	1281281281	2	0000000000	1	2000000000
2	1281281281	3	0000000000	2	481BF81212
3	1281281281	4	0000000000	3	604B12F1
4	1281281281	5	0000000000	4	9C7A00E
5	12811	6	0000000000	5	
6	17002	7	0000000000	6	
7	1280000001	8	0000000000	7	
8	32999939913	9	0000000000	8	
9	33832	10	0000000000	9	
10	12801	11	0000000000	10	
11	12800000011	12	0000000000	11	
12	32999939911	13	0000000000	12	
13	32999939995	14	0000000000	13	
14	32999939995	15	0000000000	14	
15	1280000000	16	0000000000	15	
16	3299993995	17	0000000000	16	
ID		ID		ID	
D-1		D-1		D-1	



number of codes you have entered, the software will fill automatically the table with the read codes. Otherwise, you will get a popup “Invalid number of code”.



(12) Enter “Scan nb” = 10 and click on the button “Scan Test”.

<input type="button" value="Clear"/>	<input type="button" value="Clear"/>	<input type="button" value="Scan Test"/>	<input type="button" value="Calibration"/>
Barcode Nb : <input type="text" value="0"/>	Scan Nb : <input type="text" value="0 / 1"/>	Enter 10 cycles.	

The results are shown in the same window. In front of each barcode, you can see the number of readings compared to the number of scans in real time while the test is running. The overall result is given in percentage. The overall result must be **higher or equal to 97 %.**

Barcode Reader Test

Menu Windows Advanced Params Unflash ?

C 1	Results	C 2	Results	C 3	Results	C 4	Results	C 5	Results
1	1/1	1281281281	1	1/1	9999999999	1		1	
2	1/1	1281281281	2	1/1	12811	2		2	
3	1/1	1281281281	3	1/1	0252525252	3		3	
4	1/1	1281281281	4	1/1	0252525252	4		4	
5	1/1	12811	5	1/1	0252525252	5		5	
6	1/1	12812	6	1/1	025252	6		6	
7	1/1	3939393911	7	1/1	0252525252	7		7	
8	1/1	3939393913	8	1/1	025251	8		8	
9	1/1	39392	9	1/1	1313131313	9		9	
10	1/1	39391	10	1/1	1313131313	10		10	
11	1/1	3939393914	11	1/1	1313131313	11		11	
12	1/1	3939393911	12	1/1	1313131313	12		12	
13	1/1	9999999999	13	1/1	1313131313	13		13	
14	1/1	99391	14	1/1	1313131313	14		14	
15	1/1	9939999999	15	1/1	4108351	15		15	
16	1/1	9999999999	16	1/1	1603051	16		16	
ID		ID		ID		ID		ID	
DP 1		DP 1	1/1	+44		DP 1		DP 1	
			1/1	.58					
DP 2		DP 2	1/1	+44		DP 2		DP 2	
			1/1	.45					
WB 1	1/1	WB 1	-108081500C			WB 1		WB 1	
	1/1		6229600324						
WB 2	1/1	WB 2	-2080810700C			WB 2		WB 2	
	1/1		6229800019E						
WB 3	1/1	WB 3	-307042400C			WB 3		WB 3	
	1/1		6230000010E						
WB 4	1/1	WB 4	-408093000C			WB 4		WB 4	
	1/1		6311900415						
<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>		<input type="button" value="Clear"/>	
Pipetor Status:				Start		Scan Nb. 1 / 1		Scan Test Calibration	

Nb of readings
compared to the
nb of scans.

Overall result

11 Firmware Update, download of LCT table.

11.1 Introduction

The KRYPTOR compact PLUS software is a set of several softwares saved in different locations:

1. In the XPC harddrive (XPC32.exe and XIPC.exe)

XPC32 software displays the interface but is also in charge of managing the databases, calculating the concentrations, ...

XIPC is a gateway between XPC32 and the instrument. It does not control directly the instrument hardware but sends and receives high level of informations.

2. In the Reading module flash memory (Firmware)

The Reader Firmware is composed of the Reader Hardware Design program and the reader embedded software

The Reader Hardware Design program is loaded at the instrument power on in order to set up the reader processor board. It contains the reader processor board architecture (functions, pins allocation, ...).

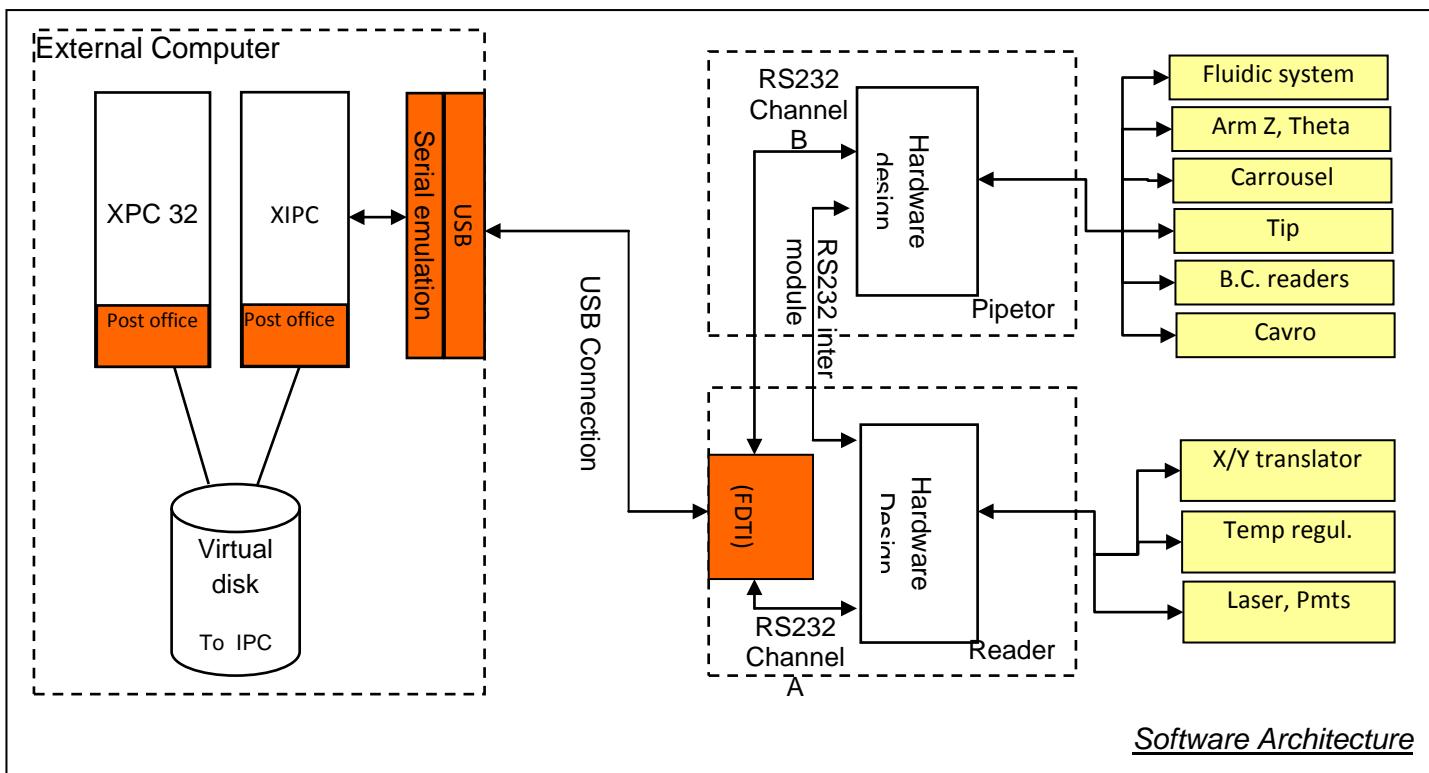
The reader embedded software is loaded once the processor board is set-up, it is in charge of managing low level functions (X, Y movements, counting, heating regulation, ...).

3. In the Pipeting module flash memory (Firmware)

The Pipetor Firmware is composed of the Pipetor Hardware Design program and the Pipetor embedded software.

The Pipetor Hardware Design program is loaded at the instrument power on in order to set up the pipetor processor board. It contains the pipetor processor board architecture (functions, pins allocation, ...).

The pipetor embedded software is loaded once the processor board is set-up, it is in charge of managing low level functions (Z, theta, carousel movements, liquid detection, barcodes reading, ...).



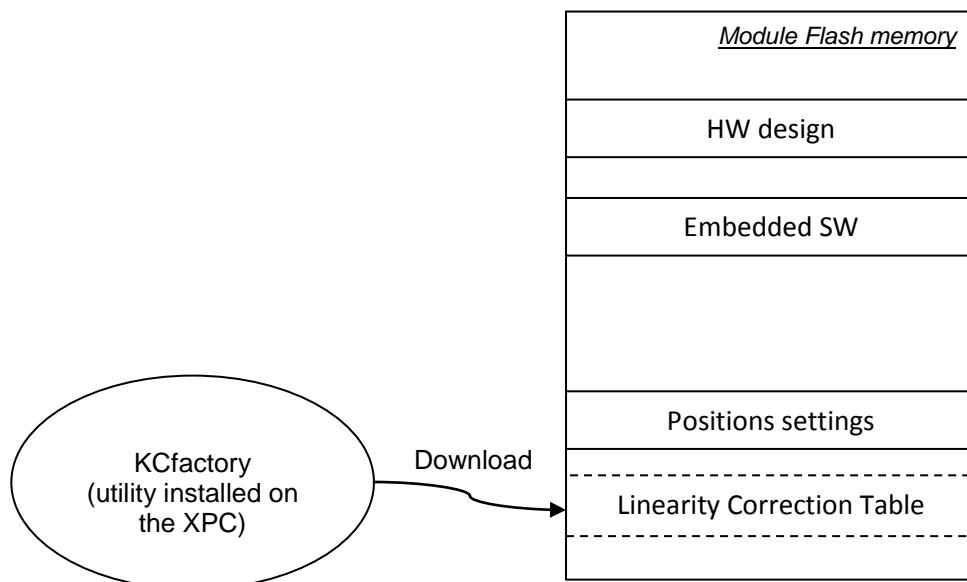
11.2 Firmware update

The firmware update is not a frequent operation, it is needed sometimes the software update requires an embedded software update as well. In this case you have to follow the procedure given within the Kryptor Bulletin when the software update is released.

11.3 Download of the Linearity Correction Table (LCT)

This operation has to be done after a reader electronic box replacement or after a reader head replacement.

The LCT download will be done using KCfactory.



Initial conditions:

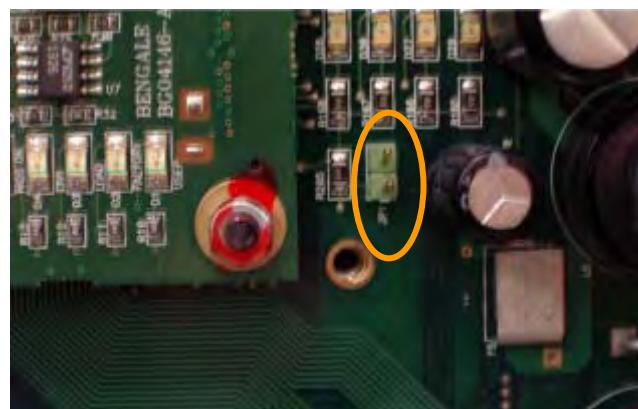
All the cables and boards are plugged and the screws are tightened.

Stop any KRYPTOR compact PLUS program running on the XPC (KCD, XIPC, XPC32, QC or any utility)

The instrument is off.

-
- **Never turn instrument off if any problem occurs during flashing operation.**
-

(1) Switch off the instrument



(2) Put a jumper on the reader mainboard at the location JP1

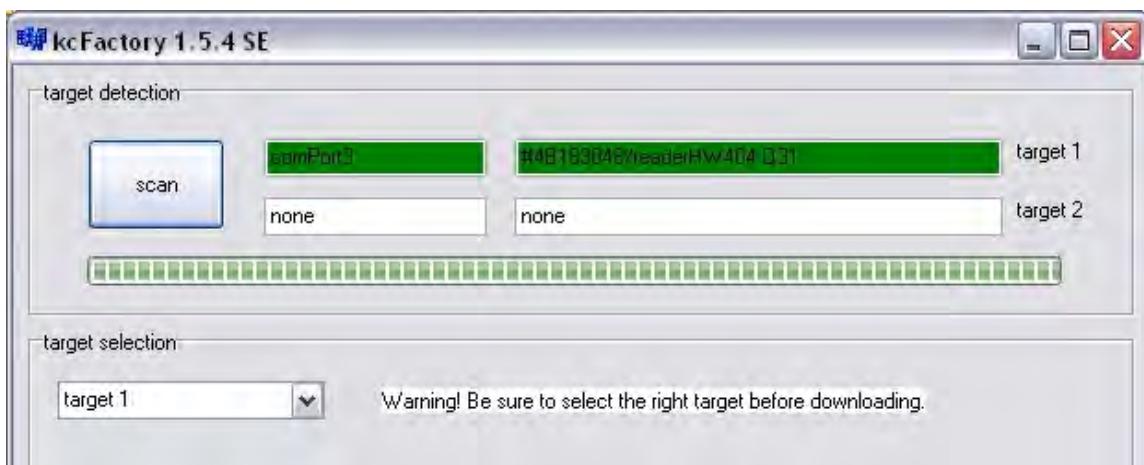
(3) Disconnect the communication cable between the Reader and the Pipetor (grey cable) on one side only.

(4) Switch on the instrument

(5) Look at the processor board LEDs, 10 seconds after power on: D1 and D6 should be on, the others should be off. If D4 is on: the mainboard is defective or the Hardware Design Program has been damaged. If D3 is blinking make sure that the jump is on and switch off and on again.

(6) Go to Start/programs/service/kcFactory

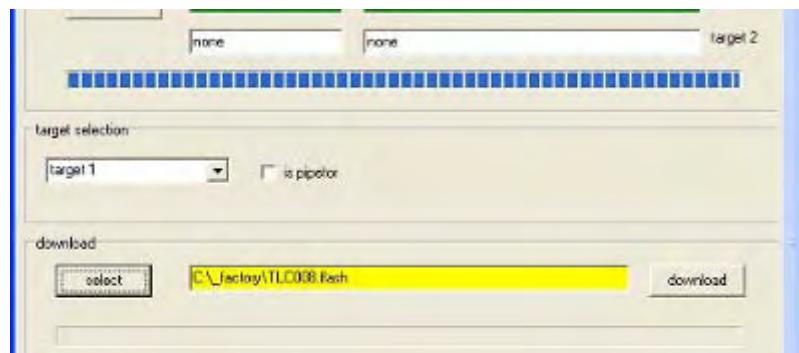
(7) KcFactory main windows appears. Click on “Scan”.



The current version of hardware design program is displayed in « **target 1** » field.

(8) The current version of Hardware Design Program is displayed in “target 1” field.

- (9) The format should be “**readerHWxxxxxxxx**” where **xxxxxxxx** is the version of the Hardware Design Program.
- (10) Click on “**Select**” button: a browser pops up.
- (11) With the browser select “**RHxxxxV3**” file in “**c:_factory**” folder (xxxx corresponds to the reader head serial number), and click “open”. The file name is displayed in the “**download**” section with a yellow background. If the file does not exist within the folder, contact the product support hotline to ask for the file corresponding to the reader head installed on the instrument.



- (12) Click on “**Download**” button.
- (13) The progress bar starts refreshing:

-
- **Do not use the XPC computer anymore, the progress bar may be frozen but the download is still in process: In such a case, wait for at least 20 mn.**

-
- (14) The download is complete when the file name background turns to green.

12 Troubleshooting

12.1 Important Notes

All the informations given in this document are not strict rules. Even if the symptoms are usually leading to a specific diagnostic, the final cause of the problem can sometimes be different.

'Fluidic' is a general term, it means all the parts that are involved in the fluidic system of the **B·R·A·H·M·S KRYPTOR compact PLUS** instrument:

- ↳ Muffler + bottles (clean, no particles,...)
- ↳ Tubing
- ↳ Pumps (all peristaltic pumps)
- ↳ 3-ports valves
- ↳ Distribution pump
- ↳ Syringe (seal/plunger cap and body/barrel)
- ↳ Tip (Tip body but also the Tip temperature regulation)
- ↳ Pipeting coordinates
- ↳ Liquid level sense
- ↳ Dispensing coordinates,
- ↳ Bubbles, splashes, contamination, carry-over, etc, etc...

'Reading' is a general term; it means all the parts that are involved in the reading system of the **B·R·A·H·M·S KRYPTOR compact PLUS** instrument:

- ↳ Low voltage power supply (LVPS)
- ↳ High voltage power supply (HVPS)
- ↳ Laser (+ trigger-signal cable)
- ↳ Optical fiber
- ↳ Silica window (clean, good position...)
- ↳ Photodiode (sensor, board and cable to DSP board)
- ↳ Reader head (including Photomultiplier Tubes + PM boards)
- ↳ Reader head cables (for HV, LV and data)
- ↳ Reading coordinate adjustment
- ↳ PMTTC / Ratio adjustment, etc...

'Reagent' is a general term, it means all the 'things' that could be involved in (or could lead to) a reagent problem:

- ↳ Reagent production (assembling - leaks-, conditioning... kits, controls, calibrators...)
- ↳ Reagent storage conditions (temperature conditions at the customer site, shipment conditions, use by date, etc...)
- ↳ Reagent reconstitution (Kits: automatic reconstitution)
- ↳ Manual reagent reconstitution (Calibrators, controls...from the customer: pipette problem, way to reconstitute the calibrators, way to aliquot the controls, etc...)
- ↳ Characteristics of reagent kit and calibrators (stability...)
- ↳ Contamination / Carry-over (could be link with a fluidic problem: Tip, tubing, Tip heater, etc...)
- ↳ Samples specific conditions (proteins, fluorescence, hemolized, etc...)
- ↳ etc, etc...

In order to troubleshoot and to discriminate a problem, the Application Specialists (AS) from Local HotLine (LHL) and the Field Service Engineers (FSE) should work as a team. Some parts of this troubleshooting are dedicated to the AS (analyze of results, analyze of kinetics with Fiaview, discrimination of a reagent/sample problem, reagent request to the Kryptor Customer Service (KCS), etc...) and some other parts are dedicated to the FSE (troubleshooting of the instrument mainly, exchange of parts, discrimination of an instrument problem, technical request to the KCS, etc...). Their analyzes and actions should complete each other.

It is strongly recommend, each time the problem is not obvious, to discriminate a reagent problem first. The LHL should request a FSE intervention only when it is quite sure to face an instrument problem.

12.2 Preliminary Checks and collecting information

Before starting your investigation try to collect the maximum of information from the customer about the problem. Ask him to clearly and accurately describe the problem and its conditions of occurrence.

- (1) Ask for any symptoms: splashes on reaction plate, on dilution plate, on tip path, different volumes in the wells (wells containing S0 calibration tests are lower than the others, this is not a failure), abnormal noise or unusual instrument behaviour ...
- (2) Always check the detail.log file (visible from the user interface or in C:\Kryptor\Maintain\ for any error message which should confirm what the customer said
- (3) Check the Xipclog.txt file in C:\KCSW\XIPC\Log\). This file logs all the events and errors that occur during the instrument operation. This file is very complex and we will describe the main error messages only in this manual.
- (4) If necessary, have a look at the QC control software (notably the Levey-jenings plots) for a control problem and in the result window for a sample or calibration problem → paragraph "Result window" and "Calibration" for more information and what to do.
- (5) Always make a snapshot before and after any technical intervention, keep a copy of the latest snapshot on your laptop in case you need to send it by email to the International Support (productsupport.brahms.frim@thermo.com) for expertize.
- (6) Problems on sample's results and/or controls and/or calibrations: always try to discriminate FIRST between a reagent problem and an instrument problem. If the problem seems to come from the instrument, the second step will be to try to discriminate, between all the subsystems, which one can be involved in the problem (fluidic, readings, coordinates, etc...)

12.3 Conditions of occurrence.

- (1) Is this problem happening on only ONE sample (or only ONE control: multiparametric or not, etc...)?
- (2) Specific sample (fluorescence, hemolized, etc...)?
- (3) Control reconstitution problem? Reconstitute another control with different pipettes (pipettes under metrology).
- (4) Does the problem occur on SEVERAL samples AND always with the same KIT (\rightarrow kit reconstitution defective, reagent production problem, etc...) or same LOT (\rightarrow reagent production problem)?
- (5) Check the reagent storage conditions, shipment, try another kit, try another lot, ask the KCS for investigation on a reagent production problem.
- (6) Systematic or random problem (rerun the samples and have a look during pipetting sequence).
- (7) Systematic: Check the reagent storage conditions and shipment, try another kit, try another lot, ask the KCS for investigation on a reagent production problem.
- (8) Random: Rerun the samples in the same conditions (same kits, same positions,...) and stay in front of the Kryptor during the pipetting sequence to see if something unusual is happening (bubbles in the tubing, bad Liquid detection, etc...: likely 'fluidic' problem)
- (9) During Calibrations: If the problem is not a reagent problem (when the reagent kit is at the end of life the RT0 is sometimes higher than usual) it's usually due to a 'fluidic' problem (See the paragraph "Calibration" for more information and what to do), except for "Beta out of range" error which is usually due to a bad ratio adjustment (error message on several analytes) or (very rare) RH counting problem on ONE channel
- (10) Clean the silica window (and the RH lens if necessary) and readjust the ratio. PMTTC should be PASSED.

12.4 Calibration Principle and Troubleshooting

12.4.1 Calibration Principle

A calibration curve is a mean to convert the KRYPTOR response (fluorescence => RFU) into an Antigen concentration (familiar unit for the user).

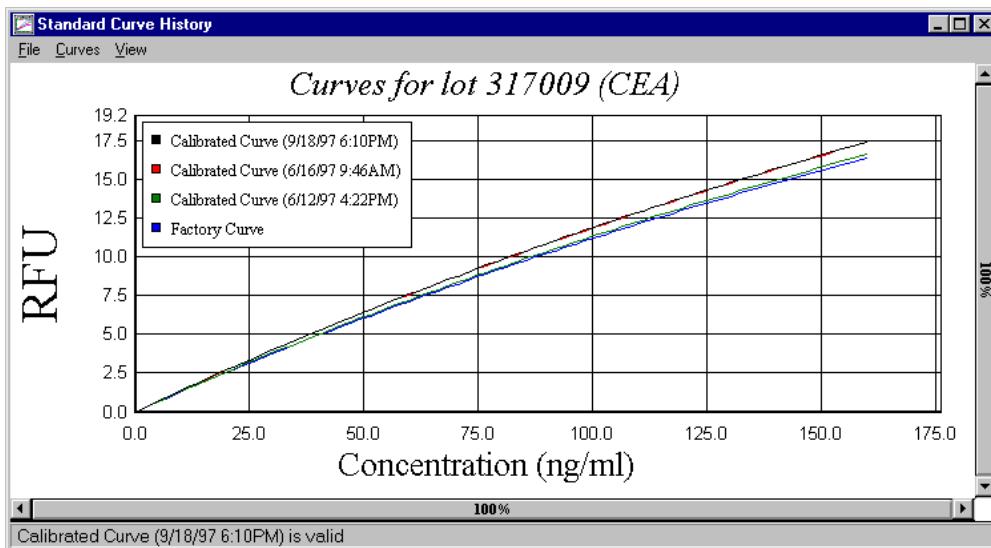
The calibration curve is calculated during the calibration process, this curve will be the actual conversion curve RFU => concentration of the user's instrument, this curve is calculated using the response of a sample known concentration: the calibrator.

A factory curve is associated to a particular lot of reagent, a difference between factory curves from different reagent lots (same analyte) reflects a slight manufacturing variation between the different lots. Parameters defining the factory curve are downloaded to the KRYPTOR software when registering a new lot of reagent (standard card).

A difference between calibration curve and factory curve of the same reagent lot reflects a difference in RFU ⇔ concentration conversion between the user's instrument and the set of instruments used for the factory curve.

A difference between successive calibration curves from the same reagent lot reflects small changes in the RFU ⇔ concentration conversion performances (due to instrument or reagent aging).

Example of Factory and successive Calibration curves viewed via the Curve utility :



Calibration curves displayed in curve utility will always have the same colors , based on the order of calibration :

- ↳ Factory curve : Red
- ↳ First calibration curve : Green
- ↳ Second calibration curve : Dark blue
- ↳ Third calibration curve : Light blue
- ↳ Calibration points : Magenta

Functions of the calibration :

- ↳ Calibration process on KRYPTOR has 3 functions :
- ↳ setting the correct conversion curve
- ↳ calculation of Rt0 cal , used for the RFU calculation of all samples .
- ↳ setting the detection phase limits , used for example to calculate the correct dilution factor.

12.4.2 Validating calibration

When a calibration run is complete, the user has to click on Validate Curve button in the result window for the calibration calculation to be made.

The software first checks several parameters to assure the reliability of the new calibration curve:

- ↳ presence of the 2 replicates
- ↳ R0 range- R0 CV
- ↳ distance from the master curve- measurement CV
- ↳ OOR Limit CV(see [Calibrations checks](#)).

If all these checks meet the specifications, a message “**Calibration: new curve is acceptable**” is indicated at the bottom of the curve utility.

The user can then accept (only if software has considered the new curve as acceptable) or reject the new calibration curve by clicking on one of these 2 buttons in the Calibration Validation window:



A calibration curve not superimposed to the factory curve is totally normal since the calibration process readjusts the conversion Instrument response (RFU) / Analyte concentration to the actual RFU ⇔ concentration conversion of the user's instrument (provided that the calibration curve is considered acceptable by the software)

A new calibration curve should be very closed to the previous one (provided that the previous calibration curve has been done less than 2 or 3 weeks before).The new curve is the reflect of small changes in the RFU ⇔ concentration conversion (due to instrument or reagent aging).

=> as an example , the expected decrease of RFU due to reagent aging is less than 2% every two weeks.

A newly accepted calibration curve replaces any previous calibration curve for the same reagent lot. When a new curve is accepted, the user can no longer go back to the previous curve for the sample concentration calculation.

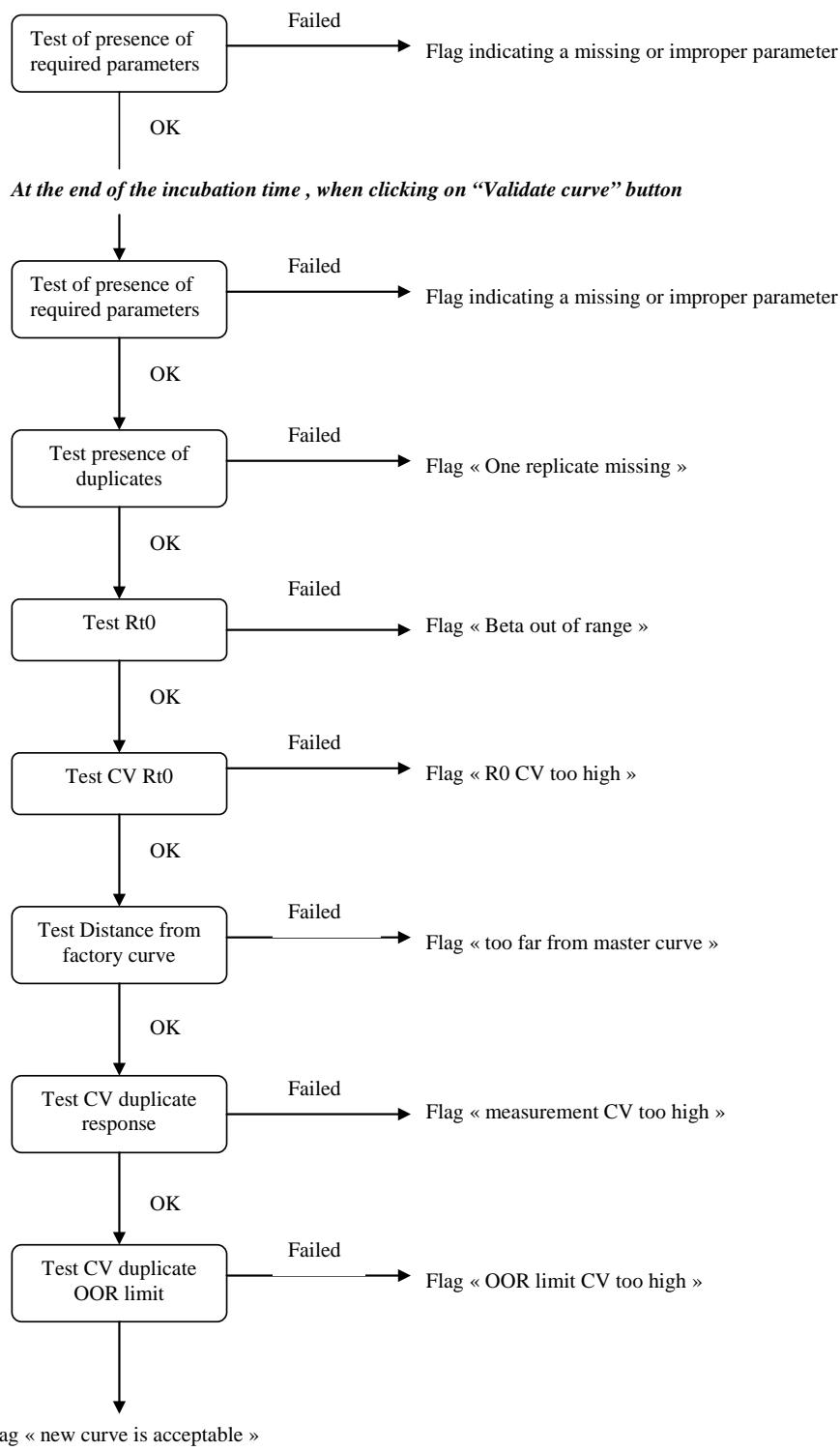
As a general rule, the user can trust the instrument and accept the calibration if the instrument has considered the new curve as acceptable.

There are two major exceptions to that rule :

- ↳ A new curve should never be accepted if a Tip heater error or an insufficient volume error is indicated on one or both replicates. In such a case, an incorrect Rt0 may be calculated, which will alter all the sample concentrations calculated with that calibration.
- ↳ When the new curve is far from a previous calibration curve of the same reagent lot (provided that the previous calibration curve has been done 2 or 3 weeks before). Such a case could be the sign of a rapidly degrading reagent or a drastic change in instrument setting.

Figure 1 : SOFTWARE CHECKS DURING CALIBRATION PROCESS

At the time of the carousel scan , after requesting a calibration



12.4.3 Calibration Messages

A message is issued whenever the software has detected a problem that renders the calibration unreliable and the curve is automatically rejected by the software. The user cannot accept a calibration rejected by the software, his (her) only choice is to let the calibration non validated or to reject it (we recommend not to reject the curve let it non validated)

Some messages can be found at the bottom of the curve utility when validating the calibration, or in Detail.log after the operator has rejected the calibration. Messages are most of the time one of the following:

(1) Calibration: one replicate missing

↳ **Cause :**

- One of the 2 replicates is not in "Needs res." status. The curve can not be validated.

↳ **What to do :**

- Check Results flags and Detail.log to find out the reason for the failure.
- Relaunch the calibration with a new calibrator sample.

(2) Calibration: R_{t0} out of range:

The new calculated R_{t0} (average of the 2 calculated R_{t0} for each calibrator replicates) is out of the range defined for the reagent lot.

↳ **Possible causes :**

- If R_{t0} too high :
 - Pipetting problem (volume of cryptate conjugate lower than expected).
 - Dirty window or reader head lens
 - Damaged calibrator (calibrator vial should be open just before use).
 - Aging reagent lot or calibrator lot.
 - Incorrect ratio setting.
- If R_{t0} too low :
 - Incorrect ratio setting.

↳ **What to do :**

- Calculate an estimated R_{t0} from raw data (via Dump.WL or FIAVIEW : see in Appendix 3) and compare with the limits (HST file).

- If Rt0 too high :
 - Check Detail.log for any pipetting or reading detected error.
 - Clean the window.
 - Check presence of bubbles in sample, reagent and tubing.
 - Check if sufficient liquid in calibrator tube or reagent vials (calibrator samples are good for only ONE calibration).
 - Do the calibration with a new calibrator sample , or/and a new reagent kit of the same lot.
 - If calibration failed again , check the ratio and the blank (PMT threshold check procedure).
- If Rt0 too low :
 - Check the ratio (PMT Threshold check procedure).
 - In any case, relaunch the calibration with a new calibrator vial after fixing the problem.

(3) Any type of "CV too high" (RO , measurement or OOR limit CV)

The CV of the 2 calibrator replicate Rt0 , RFU or Out of Range dilution class limit , respectively , is above the value defined for the analytes .

↳ **possible causes :**

- Pipetting problem on one of the 2 replicates (major cause of "CV too high" occurrence).
 - no or low counts on B channel (lack of cryptate conjugate)
 - no or low increase of counts with time (lack of sample or XL665 conjugate , if 620 counts are OK)
- Both of them can be due to
 - Bubbles in fluid system
 - Bubble in reagent vials
 - Bubble in sample
 - Insufficient sample of reagent volume for the second replicate.
 - Dust particle in one well: high counts at T0 or for B channel increase with time.

↳ **what to do :**

- Check Detail.log for any detected pipetting or reading error.
- Check the kinetics (WL.act or FiaView) to identify the origin: pipetting problem or dust particle.
- In case of pipetting problem :
 - Check for bubbles in tubing, reagent vials and sample.

- Check for leak on all connections, syringe seal and valves, tubing / tip connection.
- Check if sufficient liquid in calibrator tube or reagent vials (calibrator samples are good for only ONE calibration).
- Check liquid level sense sensitivity.
- Replace the tip (if badly damaged).
- In case of dust particle: pay attention to unwrap the reaction tray just prior to use.
- In any case, relaunch the calibration with a new calibrator vial after fixing the problem.

(4) Calibration: too far from the master curve

The distance between the new calculated curve and the factory curve is above the value defined for each analyte (limit = around 30 % on the current analytes).

↳ **possible causes :**

- If response close to 0 => the immunological reaction did not occur :
 - No pipetting of cryptate : check the B channel counts (WL.act or FIAview)
 - No pipetting of calibrator: possible, but only one replicate should be affected.
 - No pipetting of XL665 : possible , but impossible to confirm , even by looking at the counts or the kinetics
- If response too low but above 0 => Ag or conjugates concentration is lower than expected :
 - Damaged calibrator or reagent (calibrator vial should be opened just before use).
 - Incorrect calibrator reconstitution (too much liquid).
 - Pipetting problem.
 - Dirty window, increasing the Rt0 and bringing the RFU too low (see example in Appendix 2).
 - Dirty reader head objective lens.
- If response too high : Ag or conjugates concentration is higher than expected :
 - Incorrect calibrator reconstitution (not enough liquid).
 - Incorrect reagent kit reconstitution (not enough liquid due to a leak in the fluidic system)
 - Evaporation on calibrator tube (open long before use).If on screen the 2 duplicates are far apart, bringing the average RFU too far from master curve, see the section "CV too high".

↳ **what to do :**

- Check Detail.log for any detected pipetting or reading error.
- Check the kinetics (WL.act or FIAview) to identify the origin: pipetting problem or dust particle.

- If response too low (including close to 0):
 - Check presence of bubbles in sample, reagent and tubing.
 - Check if sufficient liquid in calibrator tube or reagent vials (calibrator samples are good for only ONE
 - Calibration to be open just prior to use .
 - Clean the window.
 - Relaunch a calibration with a new calibrator vial , or/and a new reagent kit.
- If response too high :
 - Check the calibrator remaining volume.
 - Check the fluidic system for leaks.
 - Relaunch a calibration with a new calibrator vial , or/and a new reagent kit.

notes:

- An incorrect ratio has no effect on the RFU

It is possible to relaunch once a calibration if a pipetting problem is suspected, but if the calibration failed again for a similar reason, try to investigate and find out the problem before relaunching calibrations.

⇒ It doesn't make sense to relaunch a failed calibration 10 times without changing anything , the same reason that made the calibration being rejected the first time , is likely to make the calibration being rejected the other attempts.

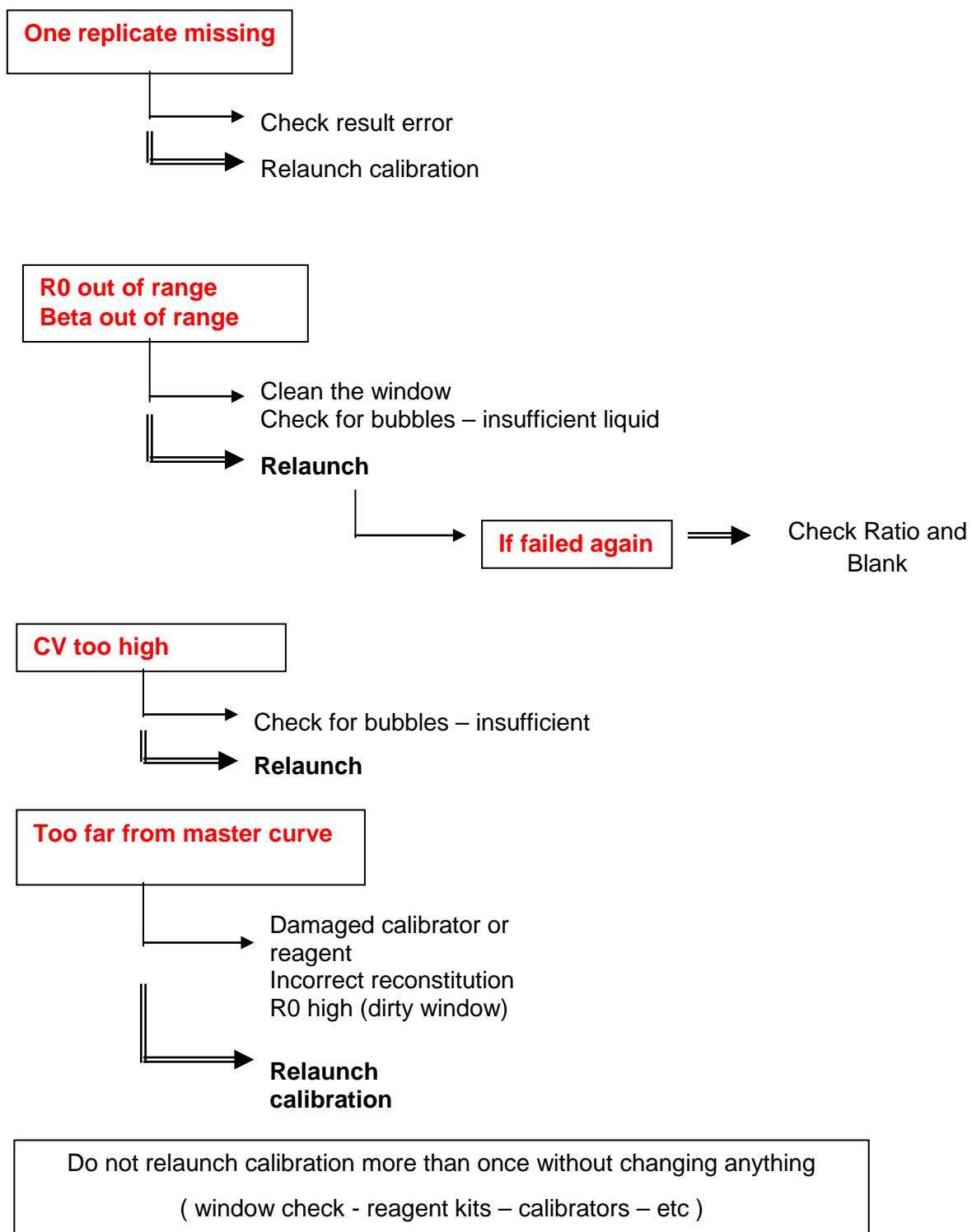
Test order

Parameters are checked in a particular order (see Figure 1). Whenever the software detects a parameter above the limits, the curve is rejected and the other parameters are not tested. By consequence, only the flag for the first parameter rejected is issued, even if other parameters are also above the limits.

Example: the curve can be too far from the master curve, but the message could be "R0 CV too high", if CV is also above limits.

Always check visually on the curve utility, or with FIAVIEW (for Rt0) , if other parameters than the one indicated are above limits , this is specially important for :

- Rt0 out of range
- Distance to the master curve
- Response very different between the 2 calibrator replicates.



12.4.4 Calibration process remarks

- (1) Use of α and β parameters for calibration limits

RFU calculation uses α and β parameters:

$$RFU = \frac{R_{Te} - \alpha}{\beta}$$

α = minimizes influence of non specific fluorescence

β = normalizes the response.

On the current analytes, the parameter β = calibrator Rt0 and the parameter α = calibrator or sample Rt0 (depending on the analyte and the sample).

By consequence, the test "Rt0 out of range" is actually a test " α or β out of range" and the limits are expressed in α and β limits:

- ↳ the value of Rt0 is compared to the β parameter limits (β_min_1 and β_max_1) during the calibration validation (*These parameter limits can be found in [VALIDATION] section of the CRV and HST files*)
- ↳ when α = calibrator Rt0 , the value of Rt0 is compared to the α parameter limits (α_min_1 and α_max_1) during the calibration validation.
- ↳ when α is = sample Rt0 , no α value is calculated during calibration , the "Rt0 out of Range" test exists only for the parameter β .

Notes :

- When more than one calibrator is used , parameters α and β are generally calculated from the Rt0 (or Rte) of only one of them (generally the lowest concentration one). In such a case, only the calibrator used for α and β parameters generation is tested, an incorrect Rt0 on the other calibrator will not be detected.
- Reagent lot registration barcode sheet is printed using *Rt0 cal 1 (Min Max)* and *Rt0 cal 2 (Min Max)* instead of α and β limits. When registering the reagent lot , these parameters are automatically converted by the software to of α and β limits as followed :

Rt0 cal 1 min=> β_min_1

Rt0 cal 1 max=> β_max_1

Rt0 cal 2 min=> α_min_1

Rt0 cal 2 max=> α_max_1

Analytes using α is = sample Rt0 all the time for the RFU calculation have only *Rt0 cal 1 (Min Max)* limits in the registration sheet.

Analytes using α is = calibrator Rt0 for the RFU calculation have *Rt0 cal 1 (Min Max)* and *Rt0 cal 2 (Min Max)* limits in the registration sheet.

(2) Automatic swapping of calibrator tests with inverted pipetting order

In the case of 2 calibrators analyte, when the incubation of the lowest calibrator is complete after the incubation of the highest calibrator, the system will automatically commute the results from the two calibrators to prevent a calibration calculation error.

(3) Calibration is not performed if splitted across two kits

Problem : When a calibration is requested on a reagent kit with only one test remaining , no warning indicates that the second duplicate will not be performed.

Solution : Always check the number of tests remaining before requesting a calibration.

(4) Clot detection is disabled on calibrator

Current calibrator vial are known to trigger false clot detection due to the insufficient space between the liquid surface and the inverted U bottom. To prevent this false triggering from happening, the clot detection system is disabled on samples registered as calibrators.

12.4.5 Calibration curve FILES (CRV)

Curve files (extension .crv) are created whenever a curve is valid. Two types of curve files exist :

- **Factory curve :**

- Factory curve file contains all the information to calculate the factory curve and all the parameters that will be used to calculate the calibration curve at the time of the calibration validation.
- Factory curve file is created at the time of a new reagent lot registration.

- **Calibrated curve :**

- Calibrated curve file contains all the information to calculate the calibration curve , the OOR dilution classes and the abnormal serum detection classes.
- Calibrated curve file is created at the time of the calibration validation. No file is created if the software rejects the curve or if the user doesn't validate the curve.

Notes : Only 4 curves : 1 Factory curve and the last 3 calibration curves can be stored on KRYPTOR and accessible through the curve utility , which is not very convenient in a troubleshooting point of view.

A much more convenient file for troubleshooting is the History file, which provides the same information as the curve file but not limited to the last 3 calibrations (see below).

- **Curve name :**

- Factory curve file name is : nnnnnnnaa.crv , “nnnnnn” is the reagent lot number, last two characters are almost always “aa”
- Calibrated curve file name is: nnnnnnnaa.crv , “nnnnnn” is the reagent lot number, last two characters are usually « ab , ac , ad or ae ».

Notes :

It may happen that a factory curve file is created with other last two characters than “aa”. This may happened if a “aa” file with the same reagent lot number is already present : for example if a corrupted KITLOTS database has been removed and a new empty one created , the software will not prevent from re-registering this reagent lot.

In such a case, only the last 2 calibration curves are stored on KRYPTOR and accessible through the curve utility

“ab” is the first calibrated curve file created if the factory curve is “aa”,

“ac” is the second calibrated curve file,

“ad” is the third calibrated curve file,

“ae” is the fourth calibrated curve file, at this time the “ab” file (first calibrated curve) is automatically deleted because no more than 3 calibrated curve files can be stored for a given reagent lot.

“ab” is the fifth calibrated curve file, at this time the “ac” file (second calibrated curve) is automatically deleted, and so on.

- ***Location :***

Curve files are located on KRYPTOR under C:\KRYPTOR\DATA.
Location on a Snapshot is under KRYPTOR\DATA.

See in Appendix 4 for detailed explanation of items contained in curve files.

12.4.6 Calibration History FILES (HST)

A calibration history file (extension .hst) is a copy of all the curve files for this reagent lot, in a chronological order:

- file name is : nnnnnn.hst , “nnnnnn” is the reagent lot number
- located on KRYPTOR under C:\KRYPTOR\DATA\REAGHIST directory.
- located on a Snapshot under KRYPTOR\DATA\REAGHIST directory.

Calibration history files are created at the time of the first calibration validated of a new reagent lot , and updated each time a new calibration is validated for this reagent lot .

They are very useful files, more convenient than the curve files in a troubleshooting point of view: all the successive accepted calibration curves are written on history files , not only the last 3 calibration curves as for the curves files.

the information is listed in a chronological order , with the Factory curve data at the top , followed by all the successive Calibration curve data.

The major drawback, share with the curve files, is that no file is created when the curve has been rejected by the instrument or by the user.

In such a case, the only possibility to have information on the calibration is to use KRYPTOR demo with the Replay function, or to look at the kinetics with FIAVIEW. These possibilities are only available to Application Engineers or TSE , but not to customers.

Example of calibration history file :

Factory curve

[VERSION]
LotID=117006 ⇒ Reagent lot #
Acronym=CEA ⇒ Name of the analyte
Type=Factory Curve

[GENERAL]
ExpDate=05/18/97
Diluent=0
Volume=100
ValidFor=15

[CURVE]
X1=100.000000 ⇒ Antigen concentration of the virtual standard (fixed within each reagent lot)
Y1=12.73276 ⇒ Response of KRYPTOR for the virtual standard on the Factory curve:
⇒ used as a reference to calculate the allowable distance between factory and calibration curves (comparison between Y values on factory and calibration curves)

W1=1

Standard_Fixed_Values=0 1 391.438

[OOR]
L5=0.5
L6=1.4
L7=2
L8=1.25

[VALIDATION]
Beta_min_1=0.045 ⇒ Beta low threshold for the instrument to accept the calibration.
Beta_max_1=0.08 ⇒ Beta high threshold for the instrument to accept the calibration.

[PARAMETERS]
P1=< _06007 -1
P2=N _06008 281

***** 3/18/97 5:15PM ***** **date of the 1st calibration**

[VERSION]

LotID=117006 ⇒ Reagent lot #
Acronym=CEA ⇒ Name of the analyte
Type=Calibrated
Curve
Time=858723305 ⇒ Time of the calibration , down to the second , to separate between different calibration done on the same day
Date=3/18/97 ⇒ Date of the calibration

[GENERAL]

ExpDate=05/18/97
Diluent=0
Volume=100
ValidFor=15

[CURVE]

X1=100.000000 ⇒ Antigen concentration of the virtual standard (fixed within each reagent lot)
Y1=9.611320 ⇒ Response of KRYPTOR for the virtual standard :
⇒ used to calculate the distance between factory and calibration curves
(comparison between value on factory and calibration curves)
⇒ used to detect a drift between successive calibration curves (comparison between value on successive calibration curves)

W1=1

Standard_Fixed_Values=0 1 391.438

[OOR]

L5=0.5
L6=1.4
L7=2
L8=1.25
L1=14336.177500
L2=0.088527
L3=0.143158
L4=0.136758

[VALIDATION]

Beta_min_1=0.045 ⇒ Beta low threshold for the instrument to accept the calibration.
Beta_max_1=0.08 ⇒ Beta high threshold for the instrument to accept the calibration.

[PARAMETERS]

P1=< _06007 -1
P2=N _06008 281

[Response]

beta=0.065134 ⇒ Value of parameter Beta => Calibrator Rt0 on the current analytes

alpha=0.065134 ⇒ *Value of parameter Alpha => Calibrator Rt0 on the current analytes*

***** 3/25/97 6:05PM *****

date of the 2nd calibration

[VERSION]

LotID=117006 ⇒ Reagent lot #
Acronym=CEA ⇒ Name of the analyte
Type=Calibrated
Curve
Time=859331151 ⇒ Time of the calibration , down to the second , to separate between different calibration done on the same day
Date=3/25/97 ⇒ Date of the calibration

[GENERAL]

ExpDate=05/18/97
Diluent=0
Volume=100
ValidFor=15

[CURVE]

X1=100.000000 ⇒ Antigen concentration of the virtual standard (fixed within each reagent lot)
Y1=8.942082 ⇒ Response of KRYPTOR for the virtual standard :
⇒ used to calculate the distance between factory and calibration curves
(comparison between value on factory and calibration curves)
⇒ used to detect a drift between successive calibration curves (comparison between value on successive calibration curves)

W1=1

Standard_Fixed_Values=0 1 391.438

[OOR]

L5=0.5
L6=1.4
L7=2
L8=1.25
L1=13595.491250
L2=0.096240
L3=0.145670
L4=0.138089

[VALIDATION]

Beta_min_1=0.045 ⇒ Beta low threshold for the instrument to accept the calibration.
Beta_max_1=0.08 ⇒ Beta high threshold for the instrument to accept the calibration.

[PARAMETERS]

P1=< _06007 -1
P2=N _06008 281

[Response]

beta=0.067977 ⇒ Value of parameter Beta => Calibrator Rt0 on the current analytes

alpha=0.067977 ⇒ *Value of parameter Alpha => Calibrator Rt0 on the current analytes*

Table 1 : Comparison between Factory curve data and Calibrated curve data :

Factory curve Calibration 1 Calibration 2 Calibration 3

	*** 3/18/97 5:15PM ***	*** 3/25/97 6:05PM ***	*** 4/8/97 11:10AM ***
[VERSION]	[VERSION]	[VERSION]	[VERSION]
LotID=117006	LotID=117006	LotID=117006	LotID=117006
Acronym=CEA	Acronym=CEA	Acronym=CEA	Acronym=CEA
Type=Factory Curve	Type=Calibrated Curve	Type=Calibrated Curve	Type=Calibrated Curve
	Time=858723305	Time=859331151	Time=860453027
	Date=3/18/97	Date=3/25/97	Date=4/8/97
[CURVE]	[CURVE]	[CURVE]	[CURVE]
X1=100.000000	X1=100.000000	X1=100.000000	X1=100.000000
Y1=12.73276	Y1=9.611320	Y1=8.942082	Y1=8.630254
[VALIDATION]	[VALIDATION]	[VALIDATION]	[VALIDATION]
Beta_min_1=0.045	Beta_min_1=0.045	Beta_min_1=0.045	Beta_min_1=0.045
Beta_max_1=0.08	Beta_max_1=0.08	Beta_max_1=0.08	Beta_max_1=0.08
	[Response]	[Response]	[Response]
	beta=0.065134	beta=0.067977	beta=0.069524
	alpha=0.065134	alpha=0.067977	alpha=0.069524

RFU variation of the virtual standard :

- Factory curve : 12.73
- Calibration curve 9.61 8.94 8.63 => small variations.
: => customer instrument has a little bit lower RFU / Conc conversion than factory instrument.

Rt0 (beta response) : 0.065 0.067 0.069 => very small variations.
1 9 5 => far from the limit (0.045 – 0.080).

12.4.7 Calibration report

↳ Calibrator report can be created just after the USER validation , regardless if the user accepts or rejects the calibration

↳ click on one of these 2 buttons in the Calibration Validation window to Validate or Reject the curve :



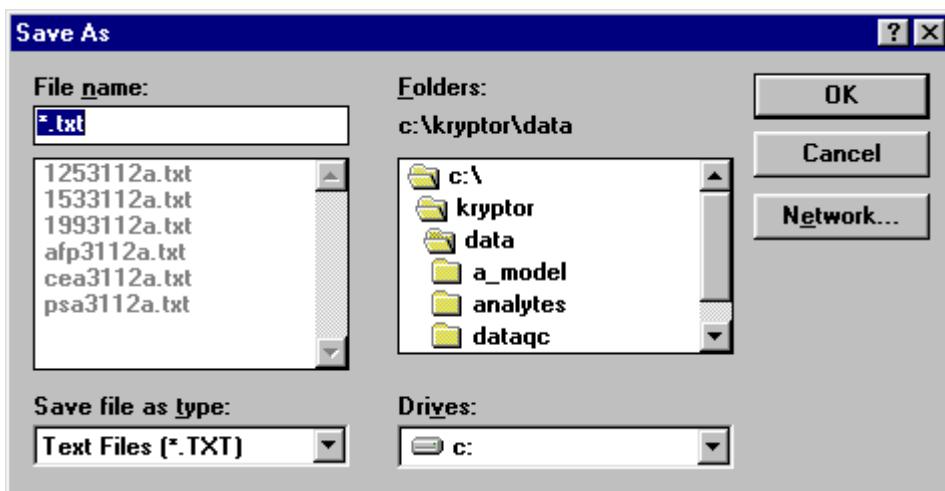
↳ Print Selection window pops up :



↳ select the format for the report (Printer or/and Disk file).

↳ click OK to create the calibration report.

↳ if a Disk file format has been selected , a name should be indicated :



Example of calibration report :

Calibration Report

Reagent Lot: 216007 Expires: 15-6-97

Reagent Kit: 216007000515 Expires: 6-3-97

Calibrator : _16005 Expires: 18-5-97

Validated on : 19-2-97

Instrument validation : Curve Accepted Software decision

User Validation : **Curve Rejected** User decision

Calibrator RFU %CV

----- 1) _16005S1 13.5468 0.6611

Calibrator response CV of
the 2 replicates

Average calibrator response

Calibrator ID used

Instrument Flags:

1a) _16005S1 1st replicate

None

1b) _16005S1 2nd replicate

None

=====

Calibration Expires: 6-3-97

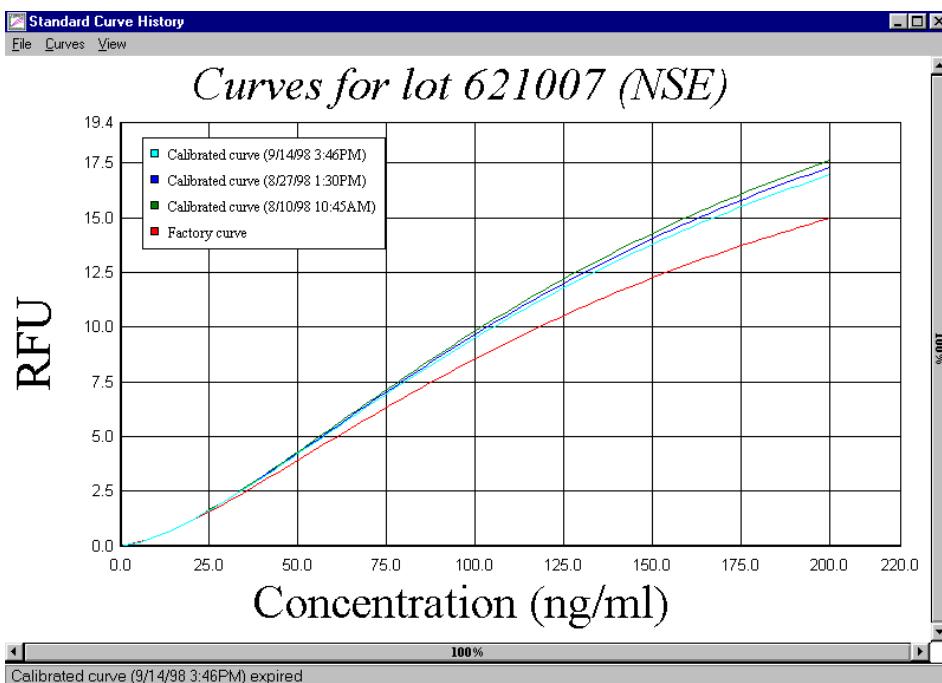
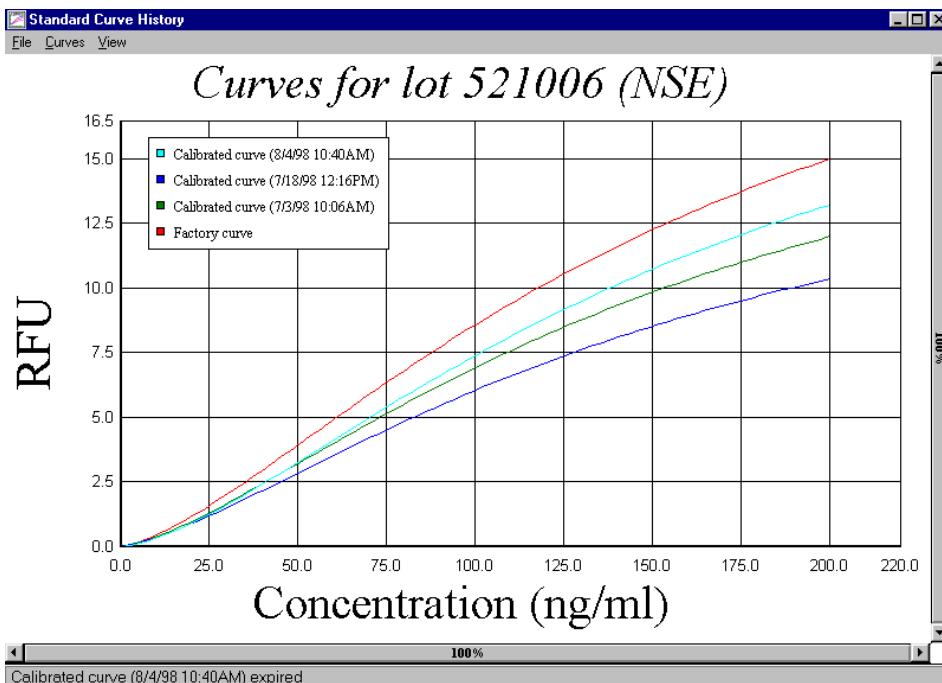
=====

Notes :

↳ The current calibration report gives limited information for troubleshooting, only the Calibrator average response and CV.

↳ Other useful information for troubleshooting are Calibrator Rt0 and CV Rt0 , the first one (Rt0) can be found in the curve or the history files but only if the curve has been accepted.

1. Consequences of Reagent degradation on calibrator curves :



2. **Consequences of Background increase on calibrators Rt0 and RFU**

AFP	665 nm	620 nm	Rt0	RFU	Comments
Time 0 End point	4801 45682	106682 81652	0.045 0.559	11.42	
Blank = + 200 counts					
Time 0 End point	5001 45882	106882 81852	0.046 0.560	11.17	Rt0 = + 0.001 RFU = -2.2 %
Blank = + 400 counts					
Time 0 End point	5201 46082	107082 82052	0.048 0.561	10.68	Rt0 = + 0.003 RFU = - 6.5 %

CA 125	665 nm	620 nm	Rt0	RFU	Comments
Time 0 End point	1932 8031	31496 25505	0.061 0.314	4.14	
Blank = + 200 counts					
Time 0 End point	2132 8231	31696 25705	0.067 0.320	3.77	Rt0 = + 0.006 RFU = -10 %
Blank = + 400 counts					
Time 0 End point	2332 8431	31896 25905	0.073 0.325	3.45	Rt0 = + 0.012 RFU = -17 %

12.4.7.1 **Consequences of Ratio variation on calibrators Rt0 and RFU :**

AFP	665 nm	620 nm	Rt0	RFU	Comments
Time 0 End point	4801 45682	106682 81652	0.045 0.560	11.43	
Ratio (380) = + 20 % (B channel = - 20 %)					
Time 0 End point	4801 45682	85345 65321	0.0563 0.699	11.43	Rt0 = + 0.011 RFU = 0 %

CA 125	665 nm	620 nm	Rt0	RFU	Comments
Time 0	1932	31496	0.061		
End point	8031	25505	0.315	4.13	
<i>Ratio (380) = + 20 % (B channel = - 20 %)</i>					
Time 0	1932	25197	0.0767		Rt0 = + 0.016
End point	8031	20404	0.393	4.13	RFU = 0 %

12.4.8 View calibration kinetic data on WL.act file

WL.act file contains all the individual readings and some calculations (Ratio for each reading, RFU, Concentration).

12.4.8.1 1) Generation :

Go to System menu / TSE Diagnostics

Click on DumpWL

=> a WL.ACT file is generated.

- Accessible only when logon by " Service".
- Accessible at any time after starting a run, without pausing.
- this file is an image of the current run information , the information is reset at the time of the Startup

=> Generation of previous day run file is still possible after Shutdown provided the KRYPTOR program on XPC has not been closed and a new Startup has not yet been requested.

12.4.8.2 2) Editing WL.ACTfile :

Go to C:\KRYPTOR\DATA through the Explorer.

Edit the file by clicking twice on the icon.

12.4.8.3 3) Example of WL.ACT file :

Data For each test already pipetted is composed by a header and a table of counts:

Active list :

[001] _05008S1: CA125II 1:1 cal 8 (03,00,04,001) 2 3.9918 243.0000 0 0 505018000219						
0	1.3	1702.26	779.16	26779.74	1109.06	0.0636
0	2.3	1671.06	756.79	26436.03	1098.01	0.0632
0	3.3	1733.01	769.22	26350.80	1176.04	0.0658
0	4.3	1581.84	773.27	25427.01	1085.02	0.0622
0	5.3	1598.96	793.30	25972.33	1078.03	0.0616
1	20.1	1784.36	784.19	25218.09	1169.04	0.0708
2	21.6	1752.37	719.45	25431.29	1151.11	0.0689
2	74.0	1888.52	760.74	20290.69	1230.10	0.0931
2	196.7	3246.45	1055.91	24665.36	2061.42	0.1316
2	316.9	4119.88	1159.07	24100.61	2573.92	0.1709
3	1640.	7200.99	1775.93	22339.43	4312.91	0.3223
	0					
3	1641.	7350.03	1753.43	22257.83	4339.27	0.3302
	0					
3	1641.	7073.94	1758.41	21960.85	4319.83	0.3221
	9					

3	1642.	6997.65	1770.65	21785.57	4308.72	0.3212
	9					
4	1768.	7230.89	1714.08	22031.83	4392.17	0.3282
	4					
4	1769.	7220.96	1767.20	21852.28	4391.40	0.3304
	4					
4	1770.	7286.17	1761.52	21823.31	4498.14	0.3339
	4					
4	1771.	7180.04	1752.54	21735.73	4429.49	0.3303
	5					

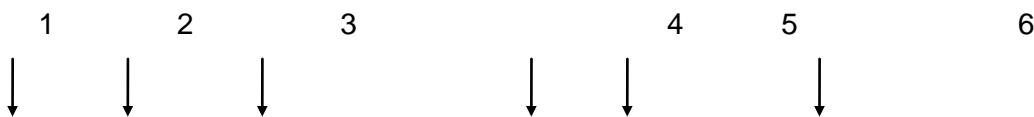
When tests are pending or within the first minute after pipetting , only the header is present :

Active list :

[000] _05008S1: CA125II 1:1 cal 8 (03,00,04,000) 1 4.0501 243.0000 0 0 505018000219
[001] _05008S1: CA125II 1:1 cal 8 (03,00,04,001) 2 3.9918 243.0000 0 0 505018000219

12.4.8.4 4) How to read calibration information on WL.ACT file :

Header



[001] _05008S1: CA125II 1:1 cal 8 (03,00,04,001) 2 3.9918 243.0000 0 0 505018000219

1 = calibrator ID.

2 = test requested.

3 = sample type (cal = calibrator, ctl = control, std = standard, unk = unknown).

4 = Response (expressed in RFU) => NULL indicated if calculation is not yet done.

5 = Concentration => NULL indicated if calculation is not yet done.

6 = reagent kit ID.

Counts

Read type	Elapsed time	A1	A2	B1	A3	A1 / B1
0	1.3	1702.26	779.16	26779.74	1109.06	0.0636
0	2.3	1671.06	756.79	26436.03	1098.01	0.0632
0	3.3	1733.01	769.22	26350.80	1176.04	0.0658
0	4.3	1581.84	773.27	25427.01	1085.02	0.0622
0	5.3	1598.96	793.30	25972.33	1078.03	0.0616
1	20.1	1784.36	784.19	25218.09	1169.04	0.0708
2	21.6	1752.37	719.45	25431.29	1151.11	0.0689
2	74.0	1888.52	760.74	20290.69	1230.10	0.0931
2	196.7	3246.45	1055.91	24665.36	2061.42	0.1316
2	316.9	4119.88	1159.07	24100.61	2573.92	0.1709
3	1640.0	7200.99	1775.93	22339.43	4312.91	0.3223
3	1641.0	7350.03	1753.43	22257.83	4339.27	0.3302
3	1641.9	7073.94	1758.41	21960.85	4319.83	0.3221
3	1642.9	6997.65	1770.65	21785.57	4308.72	0.3212
4	1768.4	7230.89	1714.08	22031.83	4392.17	0.3282
4	1769.4	7220.96	1767.20	21852.28	4391.40	0.3304
4	1770.4	7286.17	1761.52	21823.31	4498.14	0.3339
4	1771.5	7180.04	1752.54	21735.73	4429.49	0.3303

Notes :

Read type 0 = Time 0 reading

1 = Time 1 reading

2 = marching reading

3 - 4 = End point reading

Elapsed time in seconds from dispensing.

A1 main window on A channel (665 nm)

A2 early window on A channel (665 nm)

B1 main window on B channel (620 nm)

A3 late window on A channel (665 nm)

A1/B1 main ratio.

=> an estimation of the Calculated Rt0 can be done by making a rough extrapolation to 0" from the 5 Time 0 ratios.

12.4.9 Explanation of parameters in curve files

[VERSION]	<i>Identification information :</i>
LotID=110009	Lot ID. Curve is valid for every kits of this lot.
Acronym=PSA	Analyte name.
Type=Calibrated Curve	Type of curve : Factory or Calibrated.
Time=866556119	Time of calibration validation (in sec. from 01/01/70) – only for calibrated curve <i>Note : triggers the calibration expiration date</i>
Date=6/17/97	Date of calibration validation – only for calibrated curve. <i>Note : has no influence on the calibration expiration date</i>
[GENERAL]	<i>Information on reagent lot :</i>
ExpDate=02/12/1998	Reagent lot expiration date.
Diluent=0.06	Ag concentration of diluent .
Volume=100	Number of tests that can be performed with a new kit of that lot.
ValidFor=29	How many days the reagent kit is valid after opened or reconstituted.
[CURVE]	<i>Information on curve :</i>
X1=70.000000	Concentration of virtual standard.
Y1=30.848946	RFU of virtual standard.
W1=1	Weights for virtual standards if more than one virtual standard used .
Standard_Fixed_Values=0 139	Value for Standard Fixed Parameter , not adjusted during the calibration.

[OOR]	Abnormal and out of range reference limit values :
L9=110	In this example :
L10=55	
L11=0.3	
L12=1.4	<ul style="list-style-type: none"> • the first series (L9 to L18 in example shown) are fixed limits (same for the factory curve and all the calibration curves) , specific to this reagent lot , and defined when registering the reagent lot. • the limits of the second series (L1 to L8 in example shown) are calculated at the time of the calibration.
L13=1.9	
L14=1.3	
L15=1.5	
L16=1.4	
L17=3	
L1=25448.769000	
L2=0.702399	
L3=0.083568	
L4=0.053206	
L5=0.097772	
L6=0.754387	
L7=0.134467	
L8=0.062751	
[VALIDATION]	<i>Valid Rt0 range :</i>
Beta_min_1=0.046	Beta (Rt0) low threshold for the instrument to accept the calibration.
Beta_max_1=0.068	Beta (Rt0) high threshold for the instrument to accept the calibration.

[PARAMETERS]	<i>Validation parameters for the association calibrators-reagent lots</i>
P1=< _06007 -1	=> calibrator lot 7 and below non usable with this reagent lot.
P2=N _06008 281	=> concentration of calibrator lot 8 = 281 , when used with this reagent lot.
[Response]	<i>Values for Delta F responses parameters :</i>
beta=0.060376	Value of parameter Beta => Calibrator Rt0 on the current analytes
Alpha=0.060376	Value of parameter Alpha => Calibrator Rt0 on the current analytes

12.5 Most common error messages in Xipclog.txt

12.5.1 Introduction

Xipclog.txt is a log file located in C:\KCSW\XIPC\LOG\ that logs all the events (warnings and errors included) during the instrument operation.

The informations contained in this file have to be used in combination with the session log (or detail.log file).

This log file contains the information (commands) sent to the embedded softwares but also the feedback from the embedded software (status, data, error codes ...).

Each line contains Date, Time, Log Type (Event, Warning, Error) and the Log Message.

The XIPC software logs the errors coming from the embedded software with an error message plus a sckError code. SckErrors stands for System Control Kernel Errors.

For example:

14/2/2008 10:22:35 -> Error: Reader's motors initialization failed - sckError=CETIME41

There are several types of sckErrors and we cannot cover all of them in this chapter. The most common ones are:

Cetime errors (stands for Common Error Time): The operation in process is not completed within the allowed timeout

Cedom errors (stands for Common Error DOMain): The operation returns a value that is not in the allowed range of values.

The cases given here after are based on logs from the software version 6.02.03, the log messages can change in future versions.

12.5.2 Errors concerning the Pipeting Module

12.5.2.1 Error CETIME 38

12.5.2.2 Error meaning

This error means that the instrument was unable to adjust the tip ADC baseline (200 to 400) within the allowed timeout.

Example of Xipclog.txt:

3/9/2008 15:51:44 -> Event: Reconstitution is starting kit ANTITPO 752026002015

3/9/2008 15:51:44 -> Event: Pipetor's currents parameters set

3/9/2008 15:51:44 -> Event: Reconstitution bottle=1 sol_bottle=1 vol=466 homogene=0 currentVol=0

3/9/2008 15:52:21 -> Error: Pipetor initialization failed - **sckError=CETIME38**

12.5.2.3 Possible causes and solutions:

Cause 1: There is some PBS in the H2O bottle or the PBS bottle and H2O bottles are swapped. The presence of PBS is disturbing for the tip baseline adjustment.

Solution 1: Rinse several times the H2O bottle with distilled water, fill the H2O bottle with water and rinse the fluidic line by turning on the H2O downstream pump under KCD (View and Controls window). Then initialize the pipeting module and run several primes.

Cause 2: The tip board assembly is defective (there is no PBS in the fluidic line during the baseline adjustment).

Solution 2: Replace tip board assy.

12.5.2.4 Error CEDOM 39

12.5.2.5 Error meaning

This error means that the Clot baseline was out of range during the pipetor initialization. The range for the clot baseline is: 884 to 2000

Example of Xipclog.txt

28/9/2007 11:53:00 -> Event: Arm adjust: PWM=607

28/9/2007 11:53:02 -> Event: ADC clot pressure: 820
28/9/2007 11:53:02 -> Error: Pipetor initialization failed - **sckError=CEDOM39**
28/9/2007 11:53:04 -> Warning: Pipetor initialization needed - Check hoods

12.5.2.6 Possible causes and solutions:

Cause 1: The fluidic line is empty (instrument moved for example) and this is affecting the pressure.

Solution 1: Fill the fluidic line by turning on the H2O downstream pump under KCD (View and Controls window). Then initialize the pipeting module and run several primes.

Cause 2: The clot detection board is defective (the fluidic line is filled)/ or not connected.

Solution 2: Set *EnableClotDetection* to 0 in *C:\windows\Xipc_var.ini* (the customer can work without any clot detection, this is a temporary solution) but plan to replace the board ASAP.

12.5.2.7 Error CETIME 2 or CETIME 10

12.5.2.8 Error meaning

Z movement is too slow or Zhome is not detected

Example of Xipclog.txt

9/6/2008 18:41:22 -> Warning: Fatal pipetting

9/6/2008 18:41:22 -> Warning: Init Needed Set to true

9/6/2008 18:41:26 -> Error: Generic pipette failed - ID=SCFT008 TestN=48
sckError=CETIME2

12.5.2.9 Possible causes and solutions:

Cause 1: The Zhome is not found because the flag is not inserted properly in the Zhome sensor.

Solution 1: Measure the pulley at top of the arm, if the width is 12mm replace it with a 10mm width pulley reference: C614009

Cause 2: The Z motor board is defective

Solution 2: Replace the Z motor board

Cause 3: The arm belt is too tight

Solution 3: Adjust the arm belt to 40hz +/-3hz

Cause 4: The Z movement was obstructed

Solution 4: Check the Z path.

12.5.3 Errors concerning the Reading Module

12.5.3.1 Waiting XY verification failed

12.5.3.2 Error meaning

This error means that the mechanical plate positioning test has failed.

Example of Xipclog.txt

```
29/11/2007 9:03:34 -> Event: Reading received - ID=_14023S0 TestN=1 ReadType=4  
Flashes=20 ADCSum=32659 ChanA[0]=1131 ChanB[0]=19472  
29/11/2007 9:03:44 -> Error: Waiting for XY verification failed - ID=_14023S0 TestN=1  
29/11/2007 9:03:44 -> Event: Test complete - ID=_14023S0 TestN=1 Well=1  
29/11/2007 9:03:44 -> Event: Final results sent - ID=_14023S0 TestN=1  
29/11/2007 9:03:45 -> Event: Marching task stopped  
29/11/2007 9:03:45 -> Warning: Fatal positioning. Run stopped
```

12.5.3.3 Possible causes and solutions:

Cause 1: Something is obstructing the path of the translator in the reaction area.

Solution 1: Check the reaction area for any obstacle in the path. Check that the reaction plate does not rub against the protective window. Check the cables.

Cause 2: The position is not stable after stop because the belts tensions are too loose

Solution 2: Check and readjust the X an Y belts tensions

Cause 3: The movement is too slow or not smooth enough.

Solution 3: Check the belts tensions (sometimes too high) check the axis without the belts (the motion must be smooth), it might be a mechanical problem with the balls bearings and in that case the translator replacement is mandatory.

12.5.3.4 Load reaction plate failed (timeout error)

12.5.3.5 Error meaning

The instrument is not able to load the plate within the allowed time

Example of Xipclog.txt

```
6/6/2008 13:41:17 -> Error: Load reaction plate failed (timeout error)  
16/6/2008 13:41:17 -> Warning: Command sent to reader while last response  
not received  
16/6/2008 13:41:18 -> Warning: LocalReport.header != instruction.header  
(2b0000dd 2c0000de)  
16/6/2008 13:41:19 -> Event: Reaction plate unloaded
```

12.5.3.6 Possible causes and solutions:

Cause: Something is blocking the carriage during the loading sequence

Solution: Check the screws fixing the plexiglass window on the carriage and specially the one on the left side (they might be loosen and interfering with the frame during loading).

12.6 Initialization problems:

12.6.1 Introduction

The instrument follows an initialization sequence; each step in this sequence must pass successfully. If only one step fails, the initialization sequence is declared failed and the instrument goes in shutdown mode. The log messages will be helpful for the troubleshooting (refer to most common error messages) but knowing the initialization sequence can provide additional information: you can follow visually the sequence and in case of problem find out which step failed, then you can focus your investigations on the device related to that step.

12.6.2 Pipetor initialization sequence

- (1) All voltages are turned on (if some of them were off)
- (2) Flash memory verification
- (3) All pumps are turned off (if they were running)
- (4) Z axis initialization (arm brought to Z home)
- (5) Theta initialization (brought to Theta home)
- (6) Carousel initialization (brought to carousel home)
- (7) The tip is brought to the washbowl position
- (8) Initialization of the lower barcode reader (2 led should blink and BC reader beam should be visible for a short time)
- (9) Initialization of the upper barcode reader (2 leds should blink and BC reader beam should be visible for a short time, finally only the green LEDs must remain on)
- (10) If the intermediate tanks are not full the filling task is ran once.
- (11) Tip initialization: baseline adjustment + PWM value logged in Xipclog.txt, tip heater check (if the system is not able to adjust the baseline in the allowed range within 1 second the initialization fails and the following error message is logged in C:\Kcs\Xipc\Log\Xipclog.txt: **Error: Pipetor initialization failed - sckError=CETIME38**).

- (12) Check clot baseline: $880 < \text{baseLine} < 2000$ (if the clot baseline is not in the range the initialization fails and the following error message is logged in C:\KcsW\Xipc\Log\Xipclog.txt: **Error: Pipetor initialization failed - sckError=CEDOM39**).
- (13) ClotThreshold calculation
- (14) Rec1Threshold calculation
- (15) Rec2Threshold calculation
- (16) Rec3Threshold calculation
- (17) Clot baseline value logged in Xipclog.txt
- (18) Distribution pump initialization
- (19) Initialization of the communication with the reader
- (20) Tip is brought to the washcup position

12.6.3 Reader initialization sequence

- (1) Reader Initialization (send C:\KcsW\Kcini\dsp.ini parameters to the embedded software)
- (2) X axis initialization (translator to X home position)
- (3) Y axis initialisation (translator to Y home position)
- (4) Check Laser type (LTB or SRS)

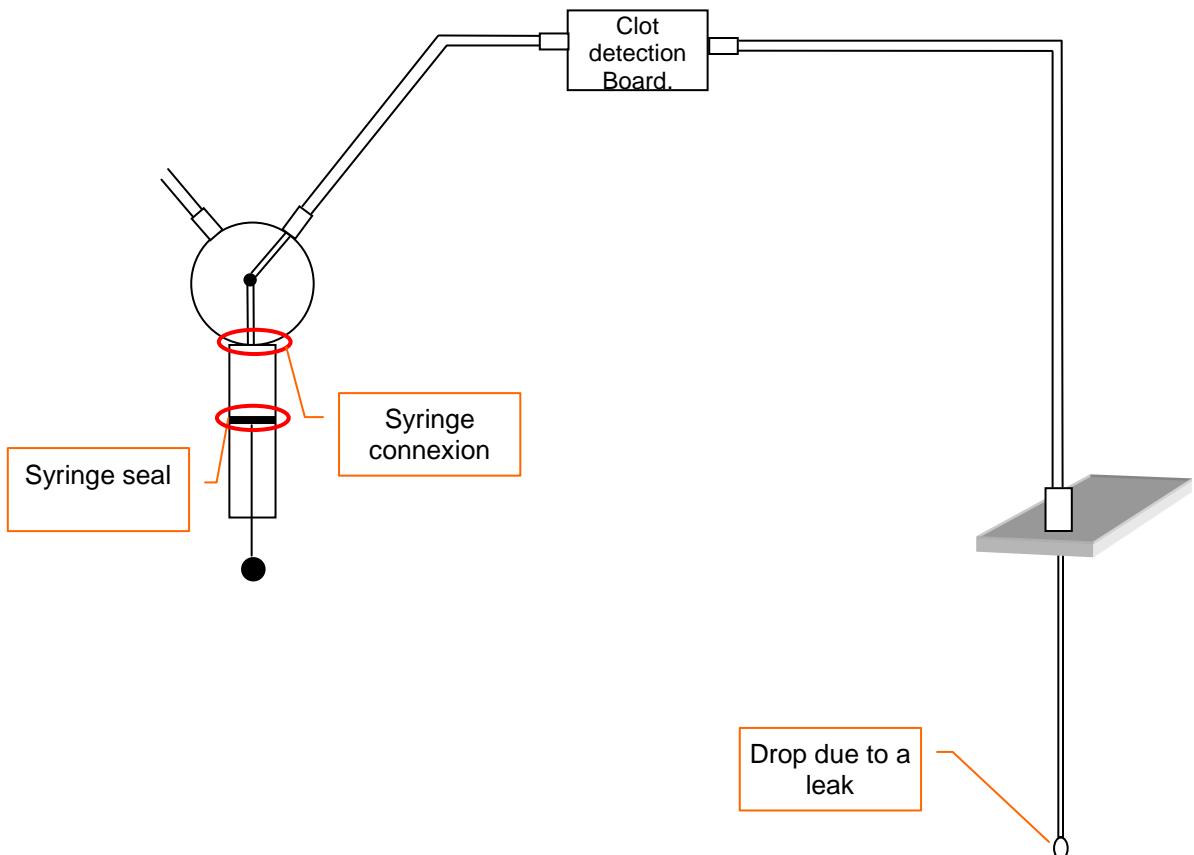
12.7 Leaks problems:

Leak problems in the fluidic system result in having bad volumes pipeted or dispensed, this directly impacts the concentrations given by the instrument and the CVs.

12.7.1 How to troubleshoot a leak problem

- (1) Start KCD
 - (2) Go under “View and Controls” window
 - (3) Initialize the pipeting module
 - (4) Prime
 - (5) Click on “Z Init” button (tip extremity is now visible)
 - (6) In the “Valve” list, select “Bypass” and click on “Move” button (get rid of the pressure from the upstream tubings).
 - (7) In the “Valve” list select “Internal” and click on “Move” button. Remove any drop formed at the tip extremity using a piece of tissue paper.
 - (8) Look at the tip extremity and wait for **at least one minute**: no drop of liquid should form at the tip extremity otherwise that means there is a leak (air inlet) in the circuit. The possible causes for that leak are a bad connexion (connector not tightened enough or extremity damaged) or a defective 3 ports valve (see drawing).
-
- | View and Controls | | | | | | | |
|-------------------|--------|----------------|--------|-----------|----------|----------|-------------|
| Axis Home Sensors | | | | | | | |
| X Home | In | Pulse | Init | Left | 0 | Right | Disable |
| Y Home | In | | Init | Up | 0 | Down | Disable |
| Z Home | Out | All | Init | Up | 0 | Down | Disable |
| Theta Home | In | | Init | Up | 0 | Down | Disable |
| Carousel Home | Out | Carousel | Init | Up | 0 | Down | Disable |
| Fluid Sensors | | | | | | | |
| Push Button | Off | Carrousel Hood | Closed | Valve | External | Aspirate | Dispense |
| Fluidic Hood | Open | Fluidic Hood | Open | Type | Init | Select | Stand By |
| Front Door | Closed | Front Door | Closed | EC Reader | Init | On | Off |
| Laser Hood | Open | Laser Hood | Open | Cooler | Read | Id none | Temperature |
| Plexi Door | Closed | Plexi Door | Closed | EP Light | On | Z Check | |
| Fluidic Sensors | | | | | | | |
-

- (9) In the “**Valve**” list select Internal and click on the “**Move**” button (perform this step and the next one if you do not have any leak at the previous step)
- (10) Look at the tip extremity and wait for **at least one minute**: no drop of liquid should form at the tip extremity otherwise that means there is a leak (air inlet) in the circuit. The possible causes for that leak are a syringe connexion (syringe not tightened enough or surface is damaged) or a defective syringe seal (see diagram below).



12.8 Windows settings problems:

12.8.1 Regional Settings

The Kryptor softwares (user interface, QC, KIM) require a certain Windows configuration and particularly for the regional settings (they define the format of the dates, numbers ...).

In case of a bad configuration you will have the following popup window when registering a reagent kit (standard card).

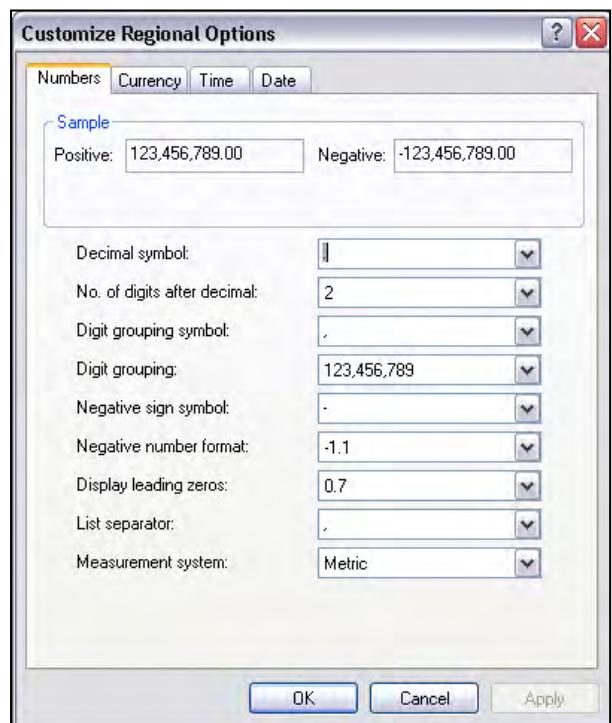
The Regional Settings (accessible via **Start button/Settings/Control Panel**) must have the following configuration:

- (1) Regional Options Tab:
- (2) Language = English (United States)

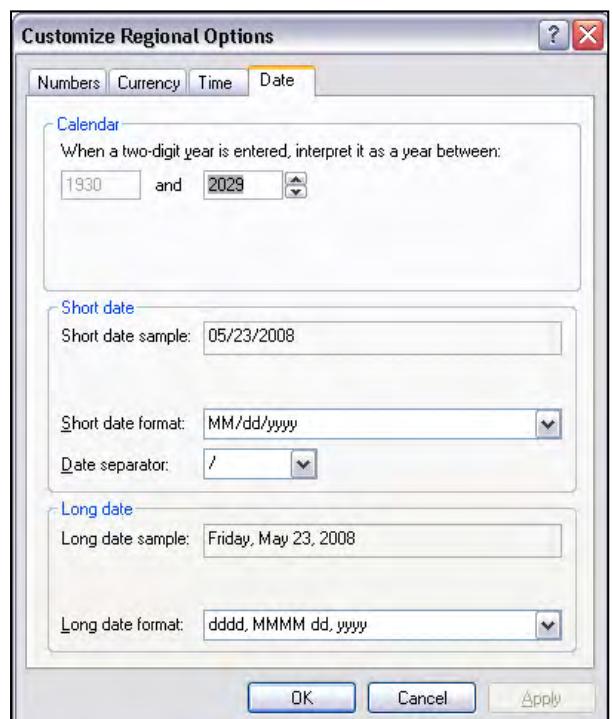
- (3) Click on the Button **Customize**



- (4) Numbers Tab:
- (5) Decimal symbol = “.”
- (6) Digit grouping symbol = “,”.
- (7) Measurement system = **Metric**



- (8) Date Tab :
- (9) Short date format = **MM/dd/yyyy**.
- (10) Date separator = “/”.
- (11) Calendar = 2029 ou plus.

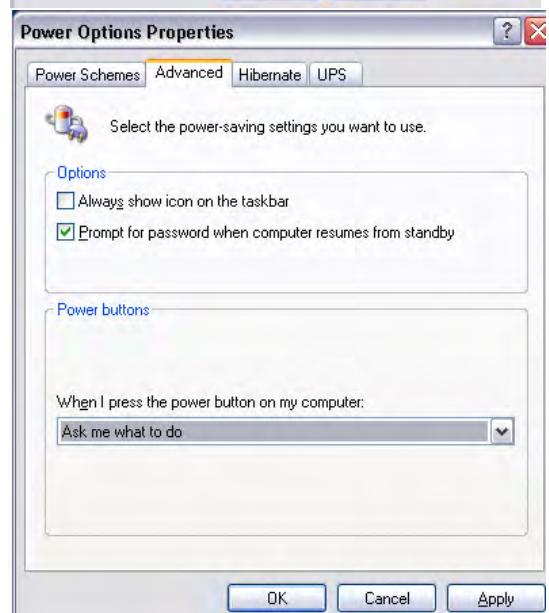


- (12) Click on “OK”

12.8.2 Screen Saver & Power Settings

The presence of a screen saver or a bad configuration of the power settings can interfere with the operation of the Kryptor software (unexpected shutdown of the XPC for example).

- (1) Click on Start button /Settings /Control Panel /Display and select Screen Saver Tab
- (2) The Screen Saver selection must be **None**
- (3) Click on the button “**Power...**”
- (4) “Power Schemes” value must be: *Home/Office Desk*
- (5) “Turn off monitor” value must be: *Never*
- (6) “Turn off hard disks” value must be: *Never*
- (7) “System Standby” value must be: *Never*
- (8) Click on “**Advanced**” Tab
- (9) Power button configuration must be: “**Ask me what to do**”



12.9 Communication problems using KcFactory

12.9.1 Emulated com ports numbers

KcFactory communicates with the instrument through the USB connection using 2 emulated serial ports. These emulated serial ports are available only if the drivers of the KRYPTOR compact PLUS USB board are installed properly. Kcfactory has a limitation: it is not able to use a com port having a port number high than 9.

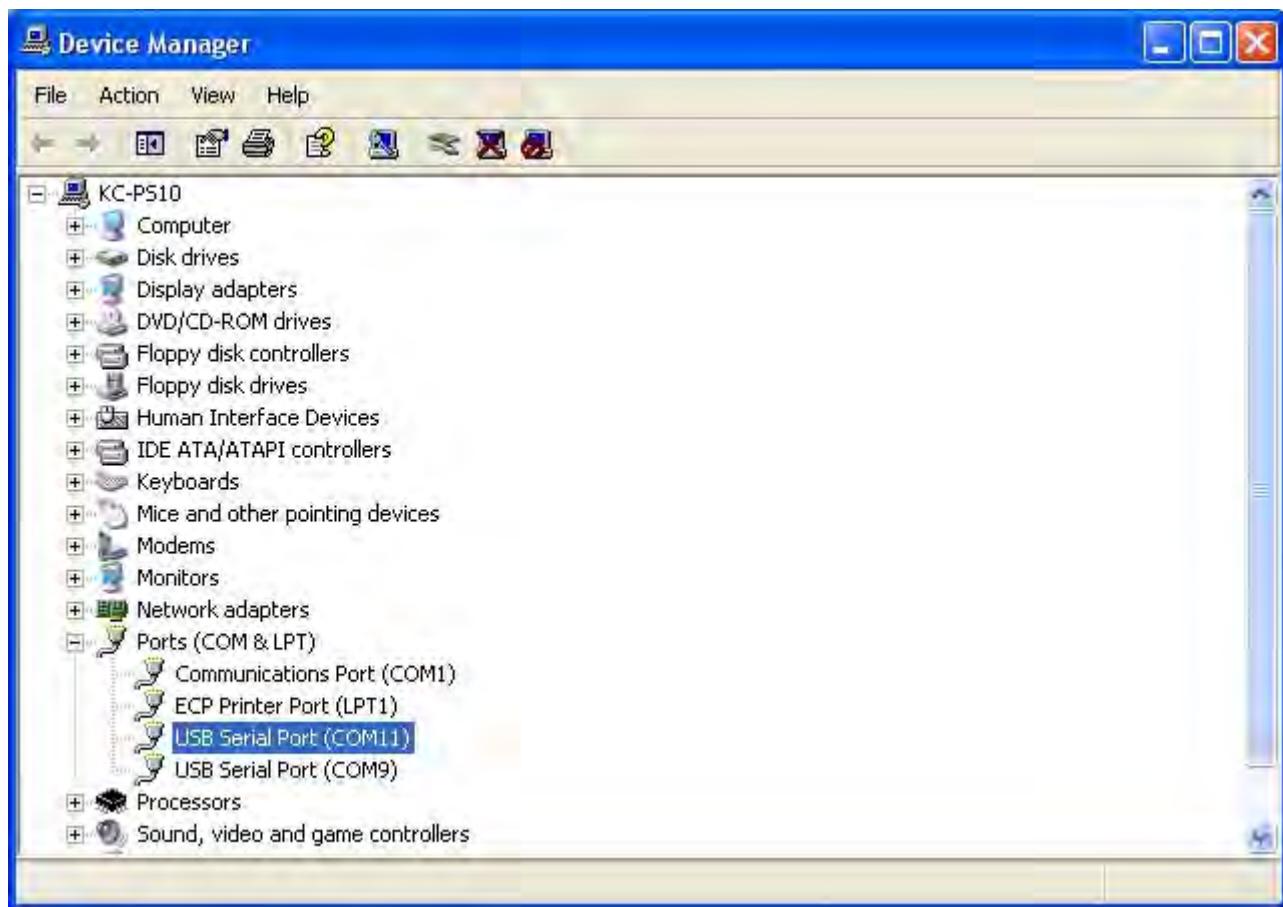
In some rare cases Windows can allocate a com port number higher than 9. If this situation occurs follow the procedure here after to change the port number and choose one between 2 and 9.

12.9.1.1 How to change the emulated com ports numbers

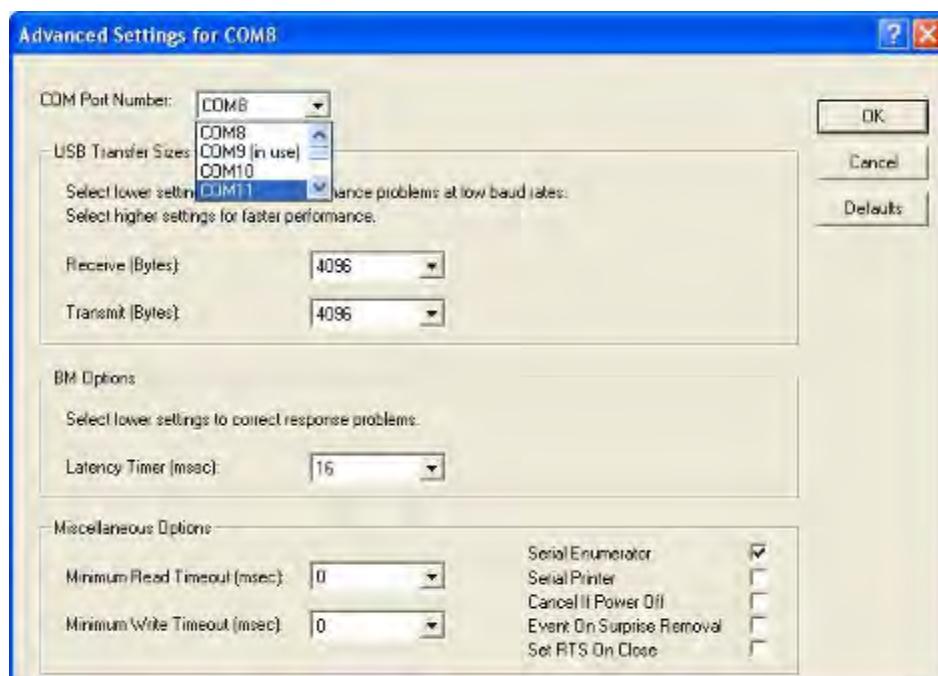
- (1) Open the Windows Control panel



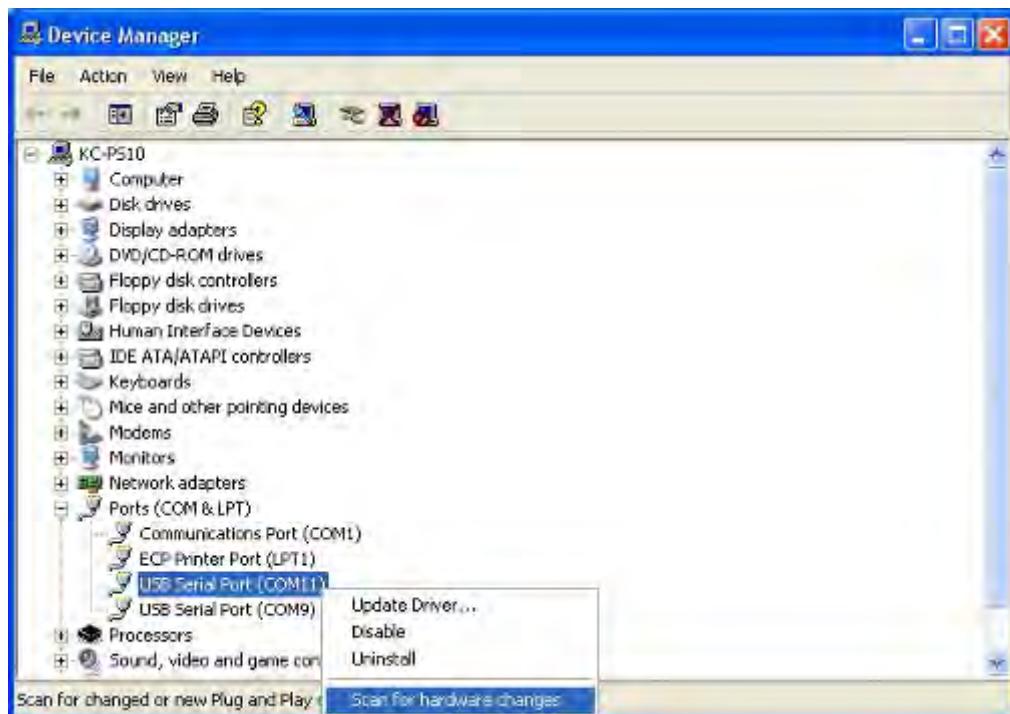
- (2) Open the Device Manager
- (3) Check the com port numbers allocated by Windows



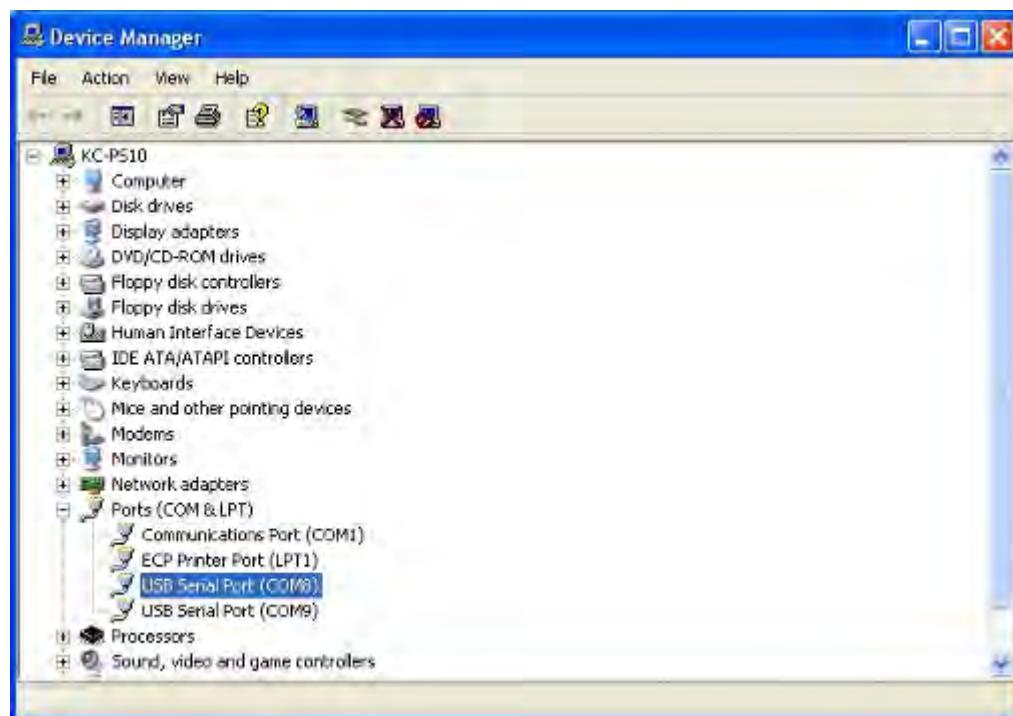
- (4) Select the USB Serial port having a number higher than 9, double click on it



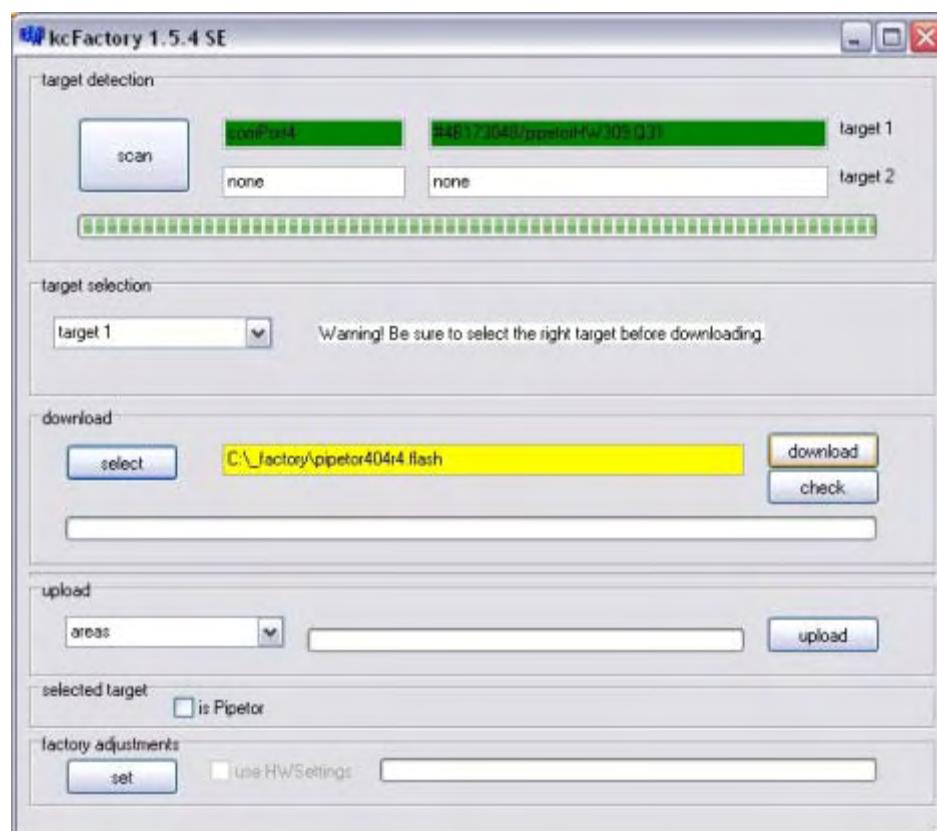
- (5) Change the com port number: choose any number from 2 to 9 (com port 1 is normally the physical com port available on the computer and must not be selected). Of course, choose a different number for each of both emulated ports.
- (6) Click “OK”
- (7) Click with the right mouse button on the com port you have modified and select “Scan for hardware changes”



- (8) The Device Manager should now display the new port number you have selected previously.



- (9) Exit from the Device Manager. KcFactory should be now able to communicate through this emulated com port.



13 Preventive Maintenance

13.1 General

The preventive maintenance has to be done every 6 months. Try to plan the PM (with your customer) the day the calibrations expire. Ask the customer to make all the necessary user maintenances before coming.

Ask the customer for any problem (questions).

- (1) Make a snapshot.
- (2) Print the PM checklist.
- (3) Start the user interface.
- (4) Note down all the software versions (go in **help** menu, **about** and click on the button **version**).
- (5) Note down all the version numbers required.

13.2 Decontamination and cleaning:

- (1) From the monthly maintenance window, run a “**secure tip cleaning**”.
- (2) When done, open the fluidic hood and clean the washbowl with a cotton swab dripped in Bleach 5%.
- (3) Remove the sample and reagent cassettes (make sure there is no kit in the reagent cassettes otherwise ask to keep them in a fridge).
- (4) Clean the drip pan and the tip path with Bleach 5%.
- (5) Wipe the outside of the tip with water first to eliminate any serum traces.
- (6) Wipe gently the tip extremity (last 12mm) with Ethanol.
- (7) Pour some Bleach in the wash bowl.
- (8) Close the fluidic hood and run the prime for 5 times.
- (9) Shutdown the instrument.
- (10) Remove the skins
- (11) Remove the drip pan and clean the carousel fan to remove any dust.
- (12) Clean the collector with Bleach 5%.
- (13) Check the internal tubings, if they are in bad condition (leaks, algae contamination) apply the cleaning procedure [Cleaning Procedure page 312](#) and jump directly to step 19 afterwards. If the cleaning procedure is not efficient enough replace the internal tubings, a kit is available with the tubing already cut at the good sizes + connectors (ref C629023).

- (14) Remove the mufflers from their connectors and put H2O and PBS tubings back into their respective bottle
- (15) Take off the peristaltic cartridges from their axis without disconnecting the tubings. This will drain off the intermediate tanks, if this is not sufficient switch on the H2O upstream pump counterclockwise using KCD and view and controls window.
- (16) Clean the peristaltic pumps' axis with ethanol.
- (17) Remove the top of the intermediate tanks and wipe the inside with **alochol or ethanol** (do not use bleach)



- (18) Fill up the intermediate tanks with distilled water and empty the tanks in order to rinse the fluidic lines (repeat this twice).
- (19) Clean the barcode readers window with a soft cloth dampened with ethanol (Do not use aggressive cleaning agent).
- (20) Clean the dispensing hole with a cotton swab dripped in Bleach 5%.
- (21) Clean the silica window with a soft cloth dampened with some distilled water first and then with a soft cloth dampened with pure ethanol (using ethanol first may fix proteins in the silica window).
- (22) Remove the Reader head cover.
- (23) Remove the skins from the reading module.
- (24) Remove the top of the reaction area + Reader head.
- (25) Clean the reaction area and the ceiling if necessary.
- (26) Clean the plate support with ethanol.
- (27) Clean the Reader head lens **only if necessary**, always with a soft cloth dampened with some distilled water first and then with a soft cloth dampened with pure ethanol (using ethanol first may fix proteins in the silica window).

13.3 Mechanical checks and adjustments

- (1) Clean the X and Y rails with a cloth dampened with ethanol.
- (2) Lubricate the rails using a cloth impregnated with 3 or 4 drops of oil. Do not pour the oil directly on the rail.
- (3) Measure the X and Y belts tension and note down the values on the PM checklist.
- (4) Adjust the X and Y belts tensions only if necessary (refer to the chapter [Belt Tension adjustment page 146](#)), in case of adjustment note down the new values on the PM checklist.
- (5) Measure the carousel belt tension and note down the value on the PM checklist.
- (6) Adjust the carousel belt tension only if necessary (refer to the chapter [Belt Tension adjustment page 146](#)), in case of adjustment note down the new value on the PM checklist.
- (7) Clean the arm axis with a cloth dampened with ethanol.
- (8) Lubricate the arm axis using a cloth impregnated with 3 or 4 drops of silicone oil. Do not pour the oil directly on axis.
- (9) Adjust the arm belt tension only if necessary (refer to the chapter [Belt Tension adjustment page 146](#)), in case of adjustment note down the new value on the PM checklist.
- (10) Clean the without end screw of the distribution pump with a cloth dampened with ethanol.
- (11) Lubricate the cavro pump axis with the specific lubricant in syringe ref. C920000
- (12) Check carousel hinges and the locking system.
- (13) Check the fluidic hood (closing, safety switch detection).
- (14) Check the carousel fan mechanically (smooth motion, not noisy, etc.).
- (15) Check also the fans in the electronic boxes.
- (16) Check the cassettes springs using a 10mm tube and replace the ones that are too weak (set of 10 springs ref C217010).
- (17) Check the reagent cassettes lid and hinges.

13.4 Systematic parts replacement

- (1) Replace the 3 peristaltic cartridges.
- (2) Replace both mufflers.
- (3) Replace the 3 ports valve.
- (4) Replace the syringe seal.

13.5 Fluidic path checks / replacements:

- (1) Clean the syringe barrel.
- (2) Check for any hard point when moving the piston or leaks (replace the complete syringe if necessary ref C632002).
- (3) Check the tip condition (not damaged, not bent).
- (4) Check the tubings between the clot detection board and the tip (good condition, no contamination). Replace it if necessary (ref C629013).
- (5) Rebuild the instrument and switch it on.
- (6) Start KCD and initialize both modules.
- (7) Under the window “**view and controls**” run several primes.
- (8) Check that there is no leakage.
- (9) Disable the Z motor and bring the tip above the washcup.
- (10) Wait for one minute, verify that no drop has formed at the tip extremity, otherwise search for the cause of the leakage, and fix it.

13.6 Performances checks and validation tests

- (1) Check the low voltage power supply on both modules (30V +/- 0.5V).
- (2) Adjust the PBS flow rate (refer to chapter [Flow rate adjustment](#) page 218) and note down the value on the PM checklist.
- (3) Check and readjust if necessary the Pipeting Module positions settings.
- (4) Run the “matrix 5 wells” test (refer to chapter [Matrix 5 wells page 191](#)). Save the result file in the folder C:\Service\YYYYMMDD\ and process the result with Matrix analysis utility

(save a copy of the processed results on your laptop, this file can be requested to help to troubleshoot a problem).

- (5) Check the laser energy (refer to chapter [Laser energy check/adjustment page 197](#)) and note down the value on the PM checklist. Readjust the laser energy to $120\mu\text{J}$ $-5+5\mu\text{J}$ and note down the new value on the PM checklist.
- (6) Run a PMTTC test (refer to chapter [PMTTC test page 208](#)) save the result file in the folder C:\Service\YYYYMMDD\ and process the result with the last template available PMT_KCvxx.xls (save a copy of the processed results on your laptop, this file can be requested to help to troubleshoot a problem).
- (7) Readjust the counts and the ratio depending on the PMTTC test results (refer to chapter [Ratio adjustment: page 205](#)) note down the value on the PM checklist.
- (8) Run the field test (refer to chapter [Field test page 221](#)). Process the result files with the template related to the filed test lot number used and confirm that the field test is accepted (save a copy of the processed results on your laptop, this file can be requested to help troubleshoot a problem).

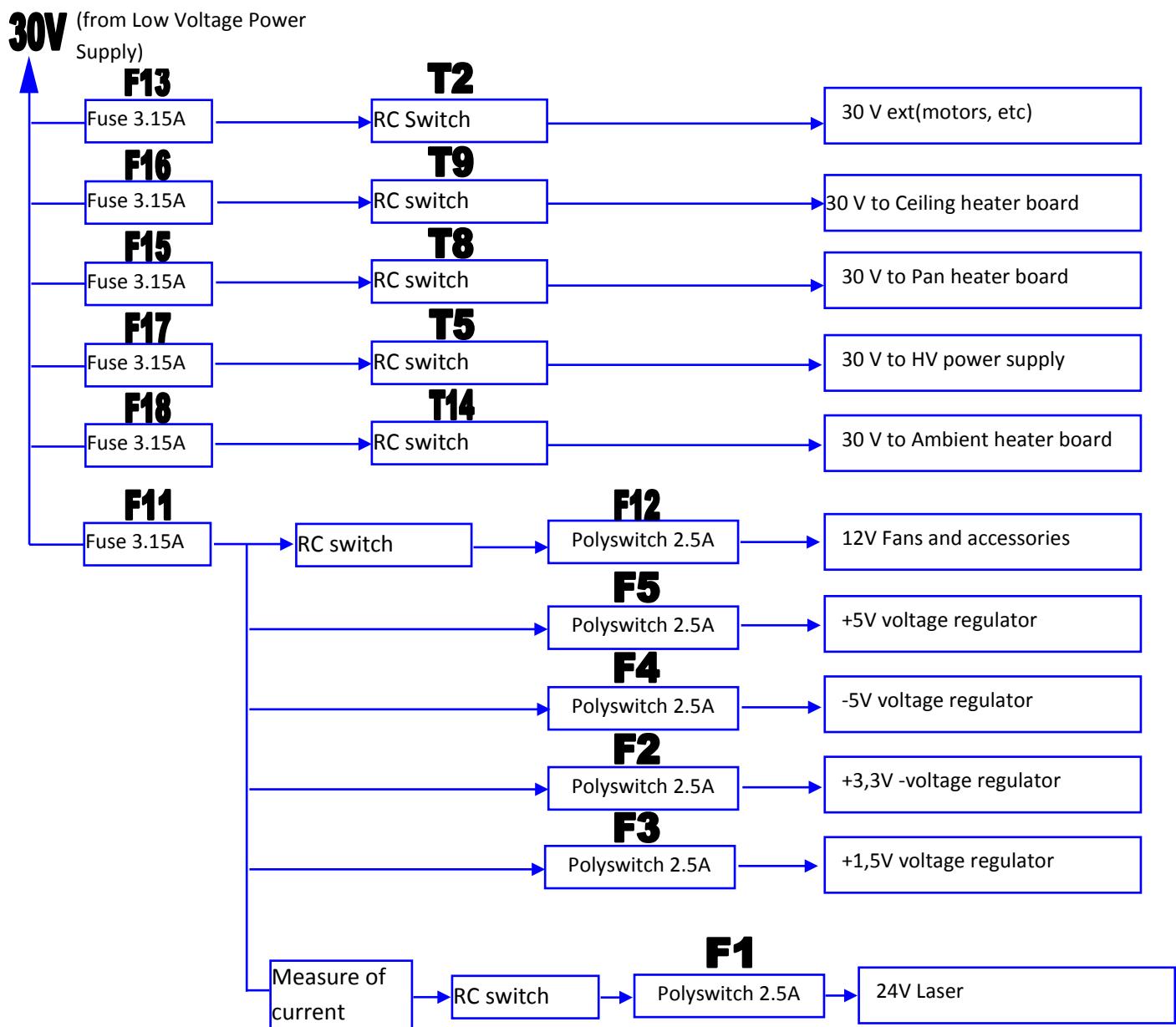
13.7 Miscellaneous

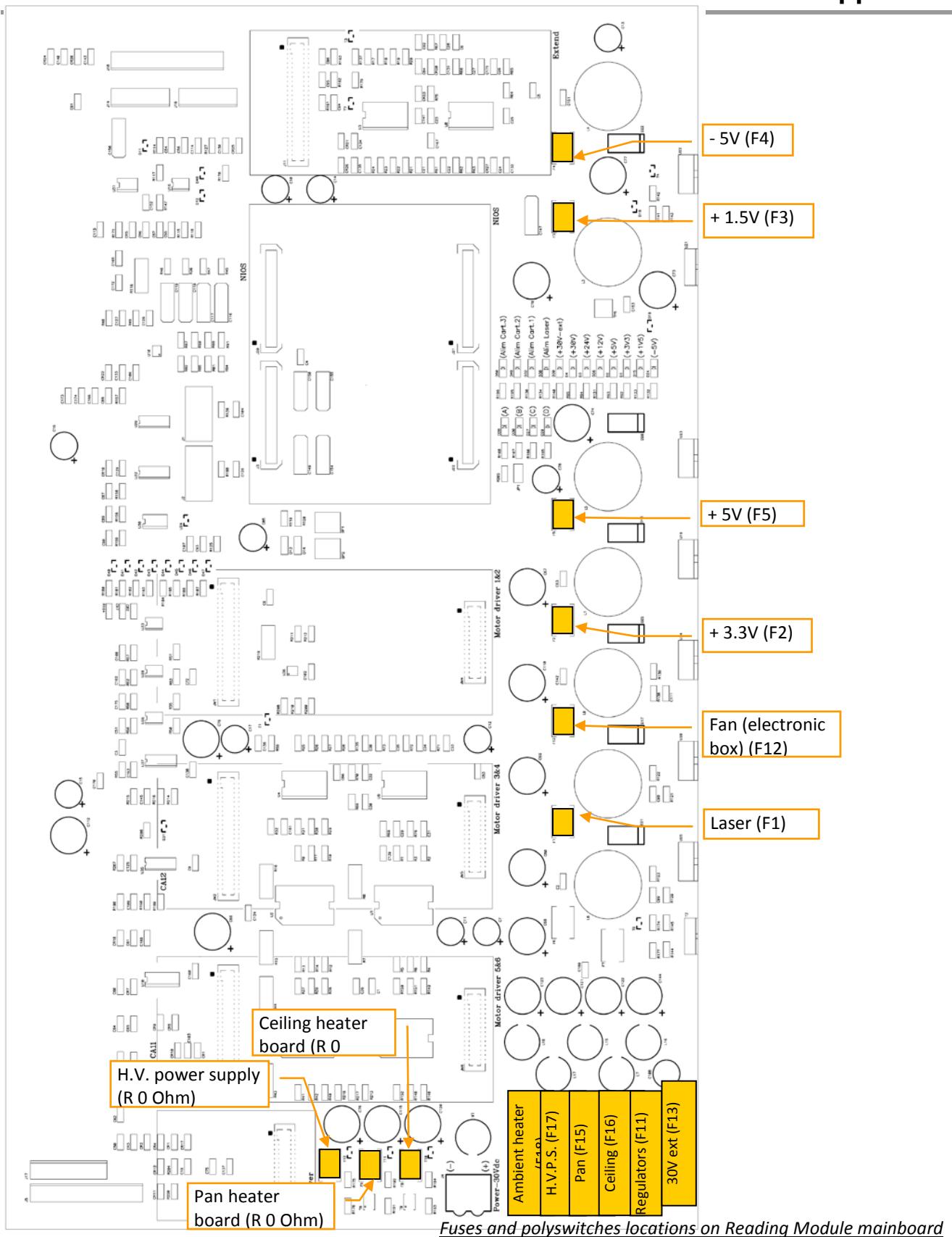
- (1) Fill out the PM checklist with the comments or remarks you have regarding the problems found on the instrument.
- (2) Make a snapshot.
- (3) Sign the PM checklist and send it with the results of the matrixes, the PMTTC and the field test to your local hotline.

14 Appendix

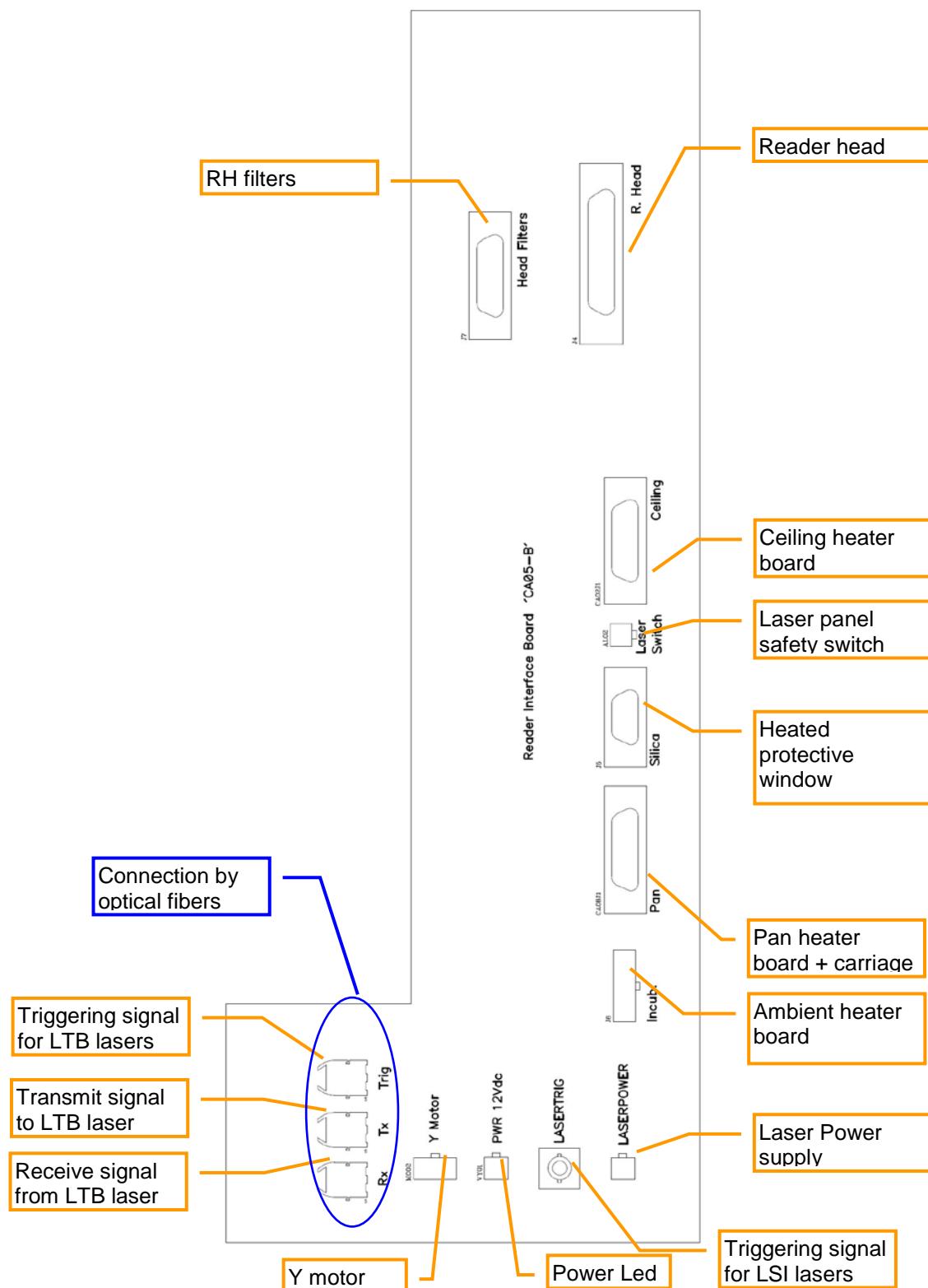
14.1 Schematics

14.1.1 Electrical Schematic of Reading Module





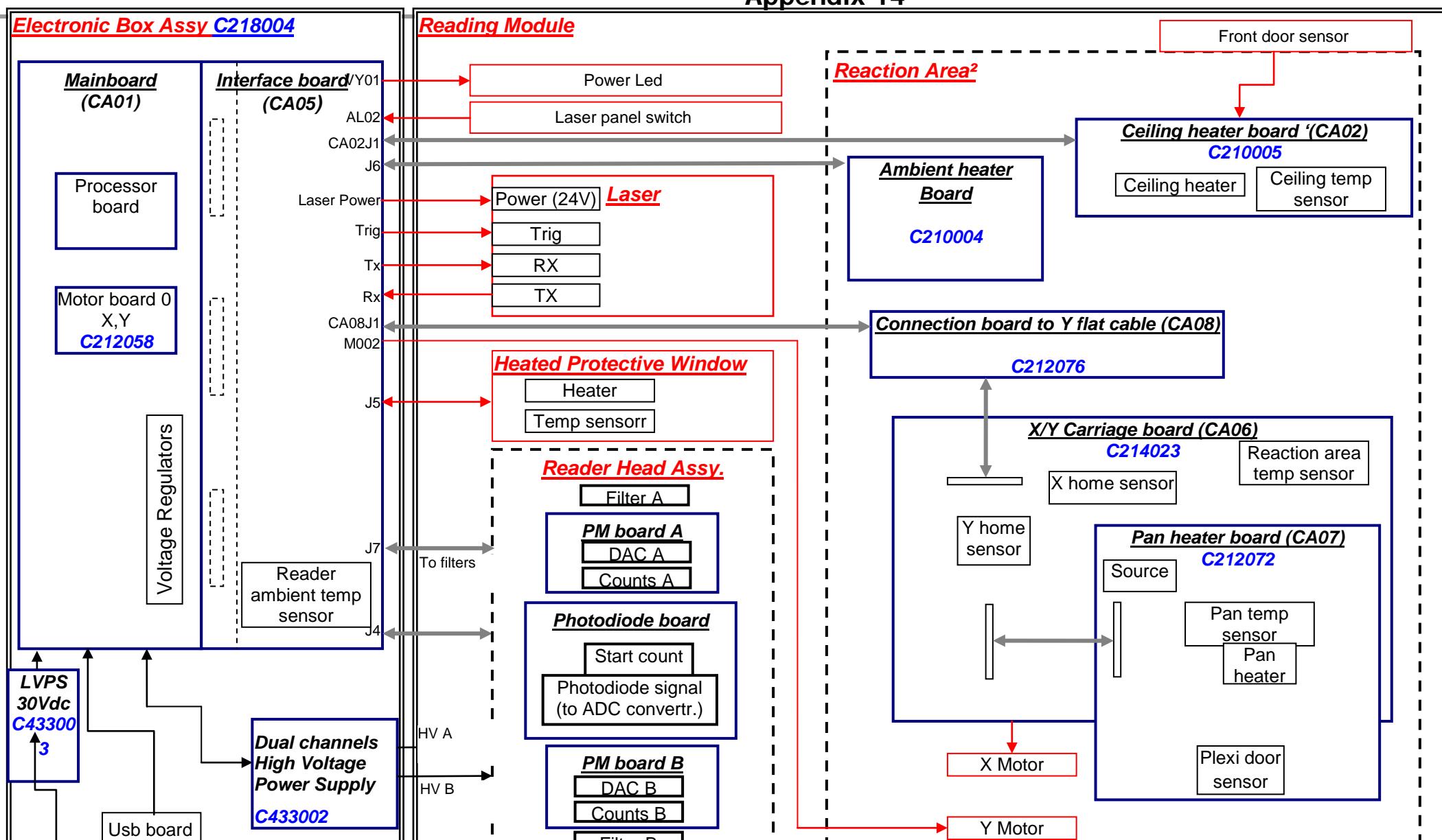
(Polyswitches can be used as test points)



Connexion of Reading Module devices to interface board

Appendix 14

Electronic Box Assy C218004



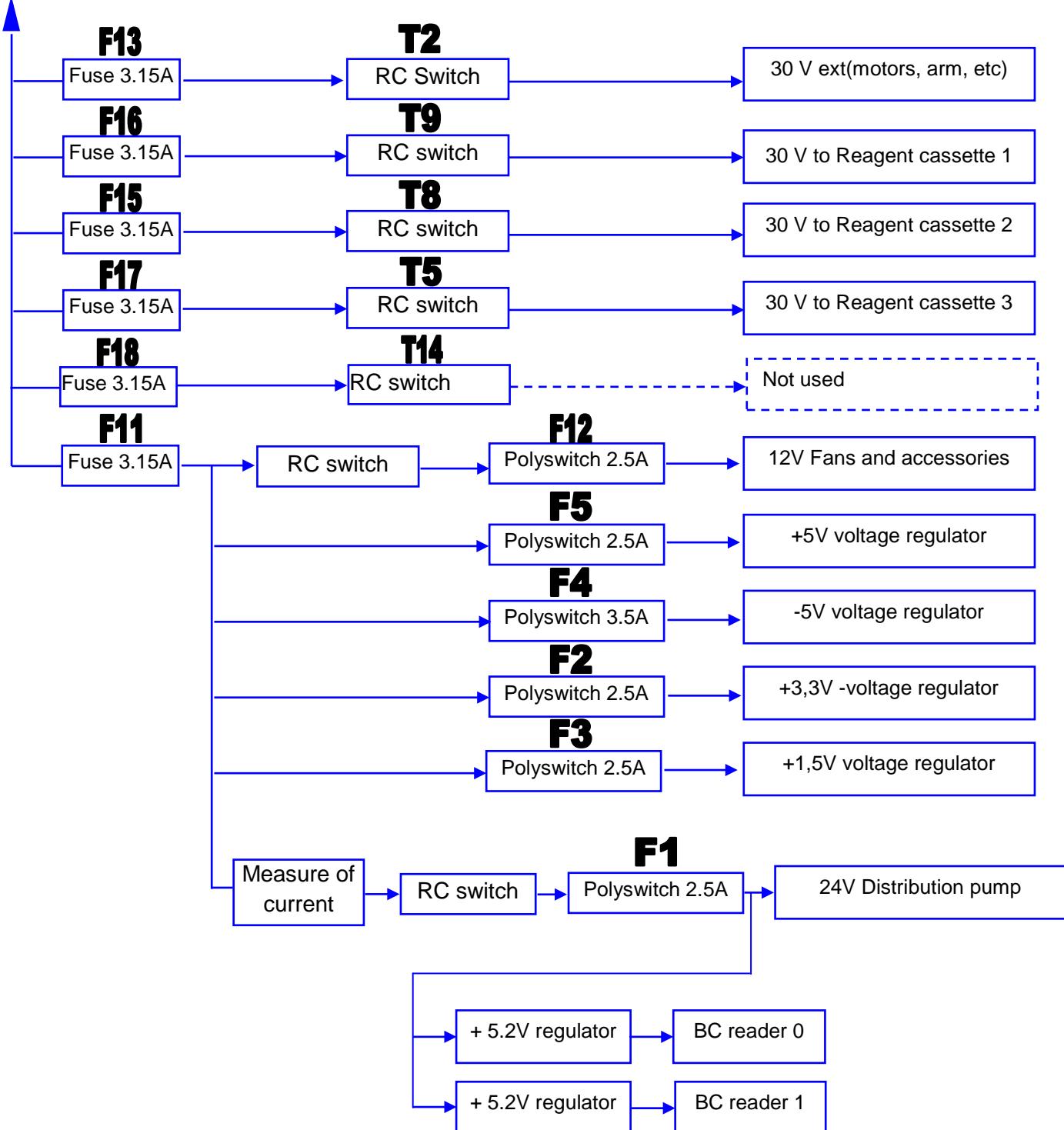
Mains input
from pipetor

Serial connection
with pipetor

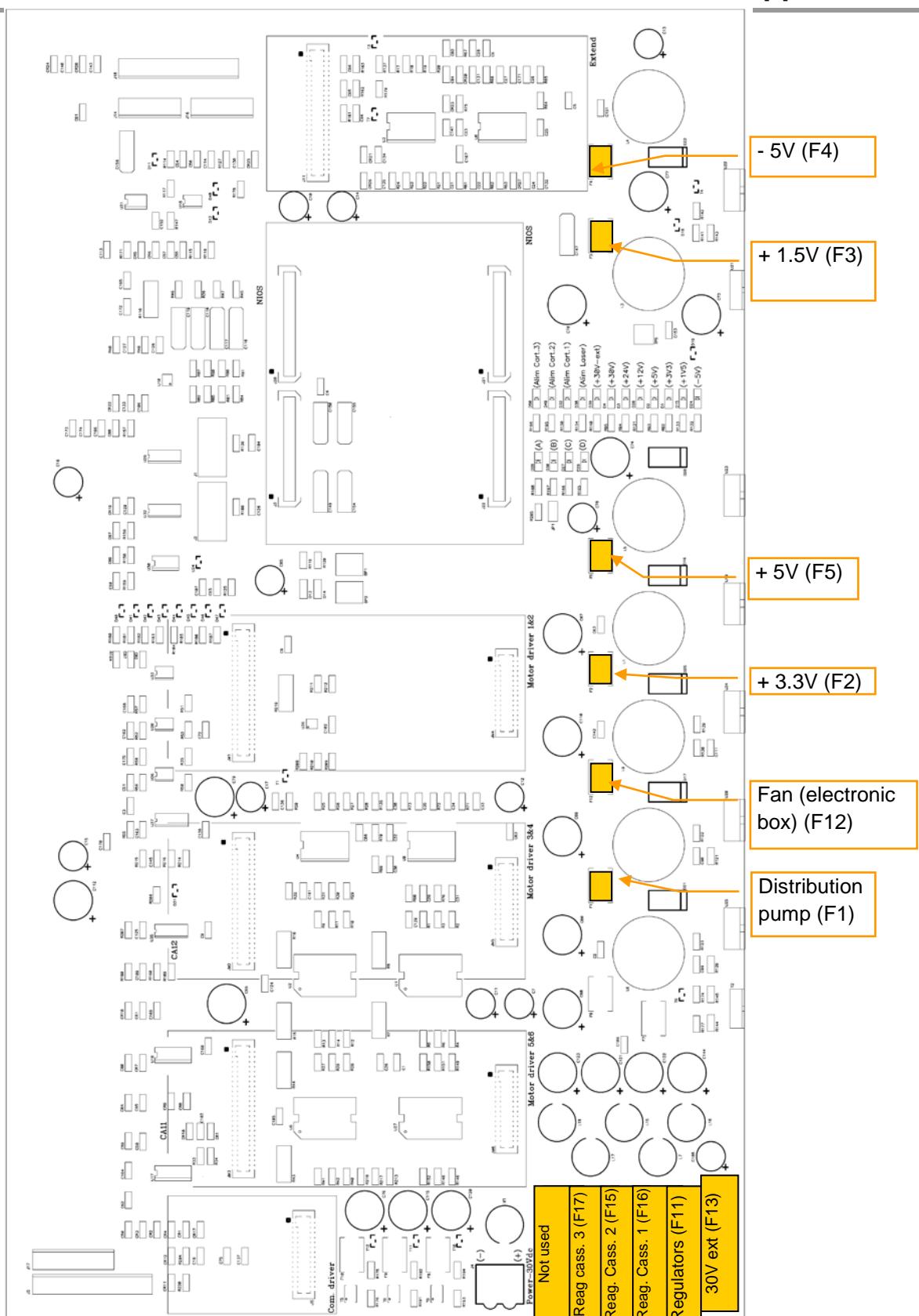
Synoptic of Reading Module

14.1.2 Electrical Schematic of Pipeting Module

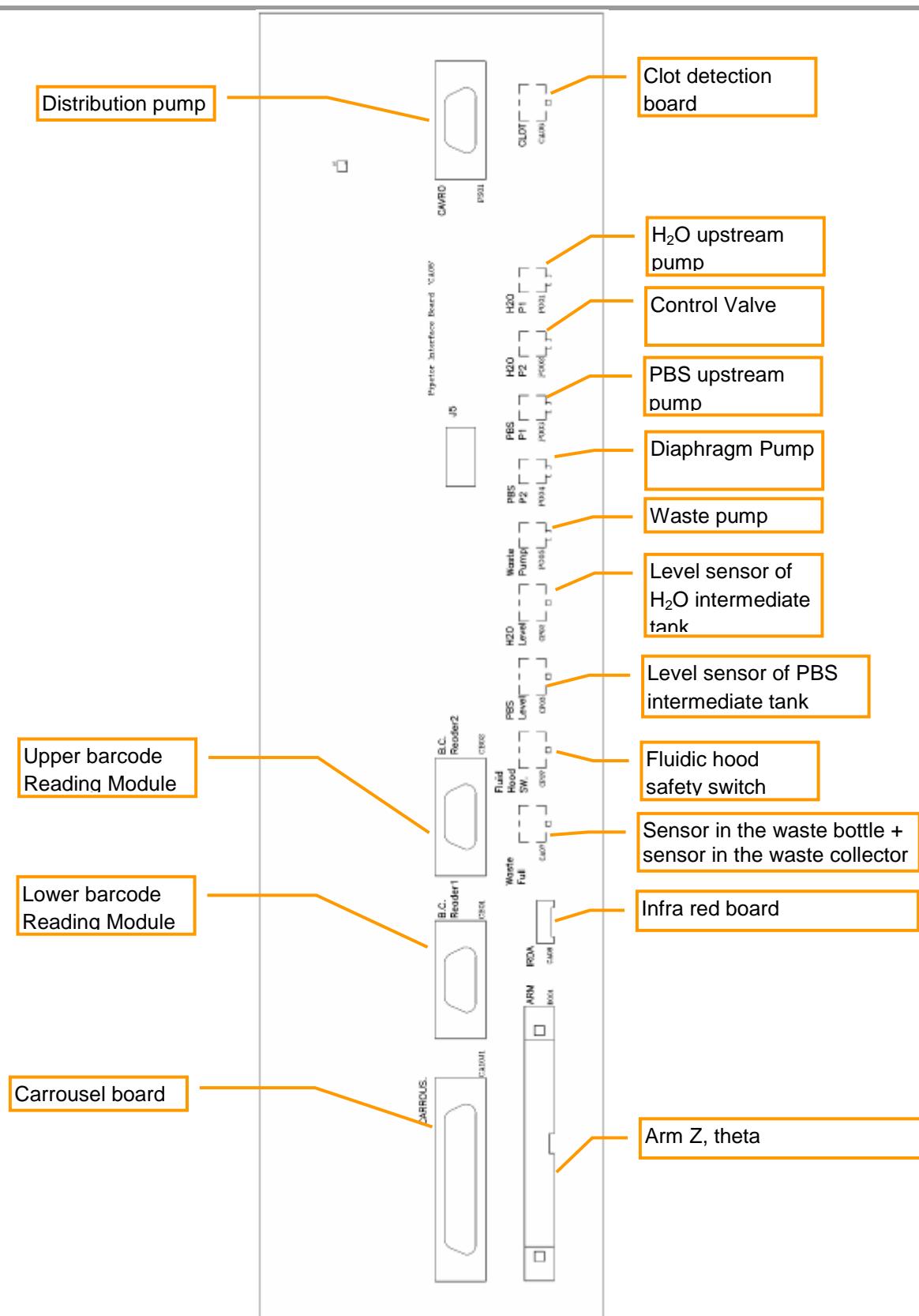
30V (from Low Voltage Power Supply)



Synoptic of Pipetting Module power supply distribution



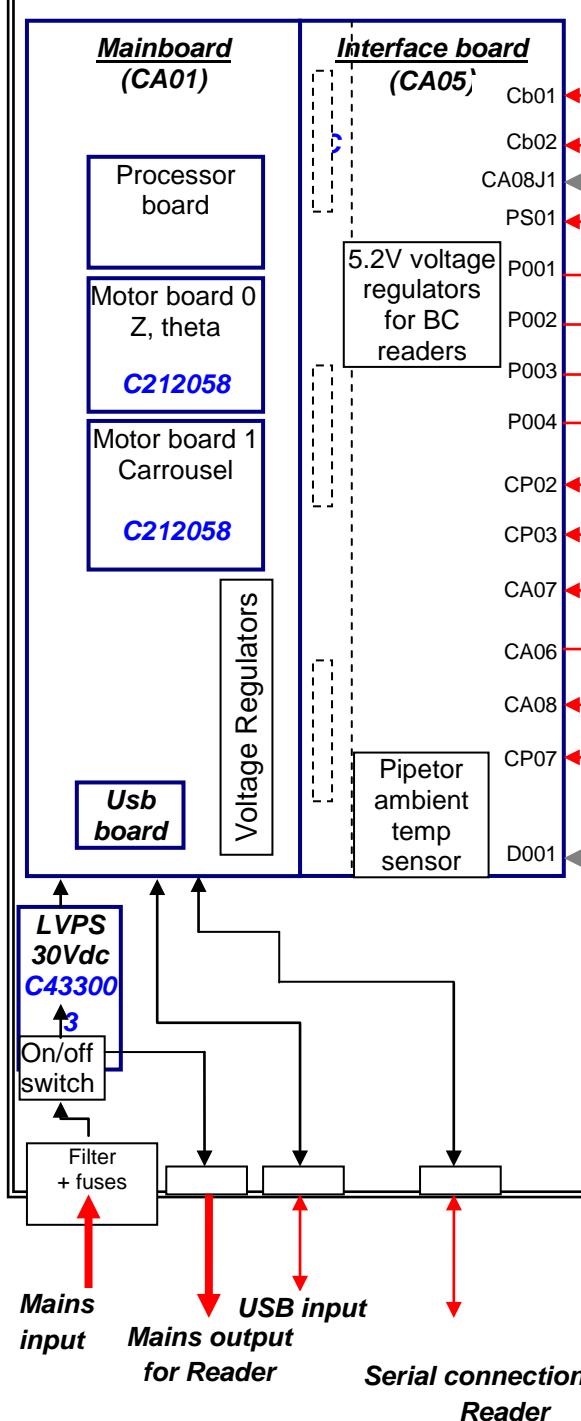
Fuses and polyswitches locations on Pipetting Module mainboard



Connexion of Pipetting Module devices to interface board

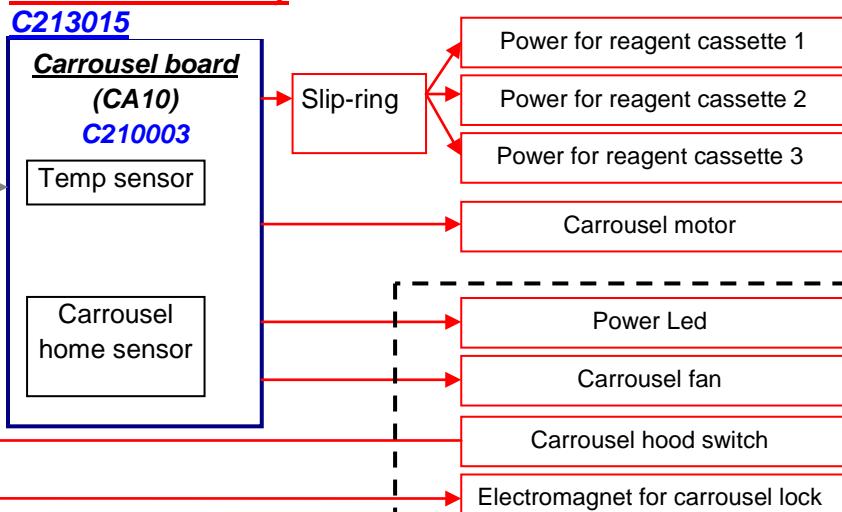
Appendix 14

Electronic Box Assy. C218005

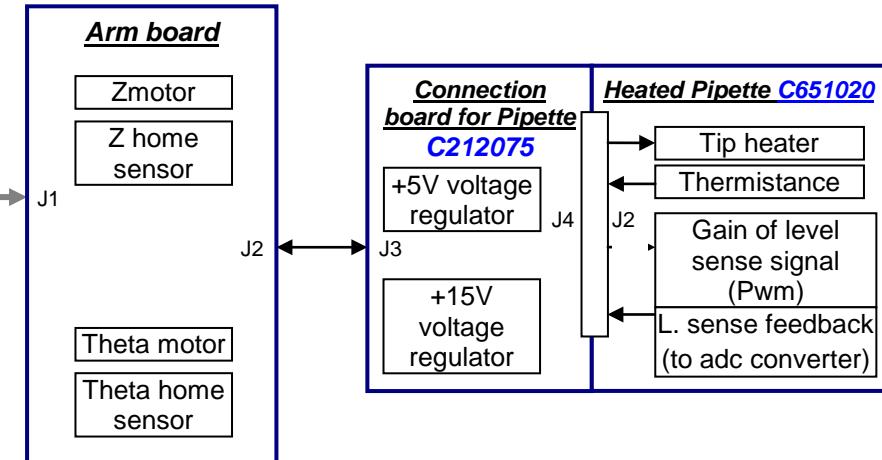


Pipeting Module

Carrousel assembly

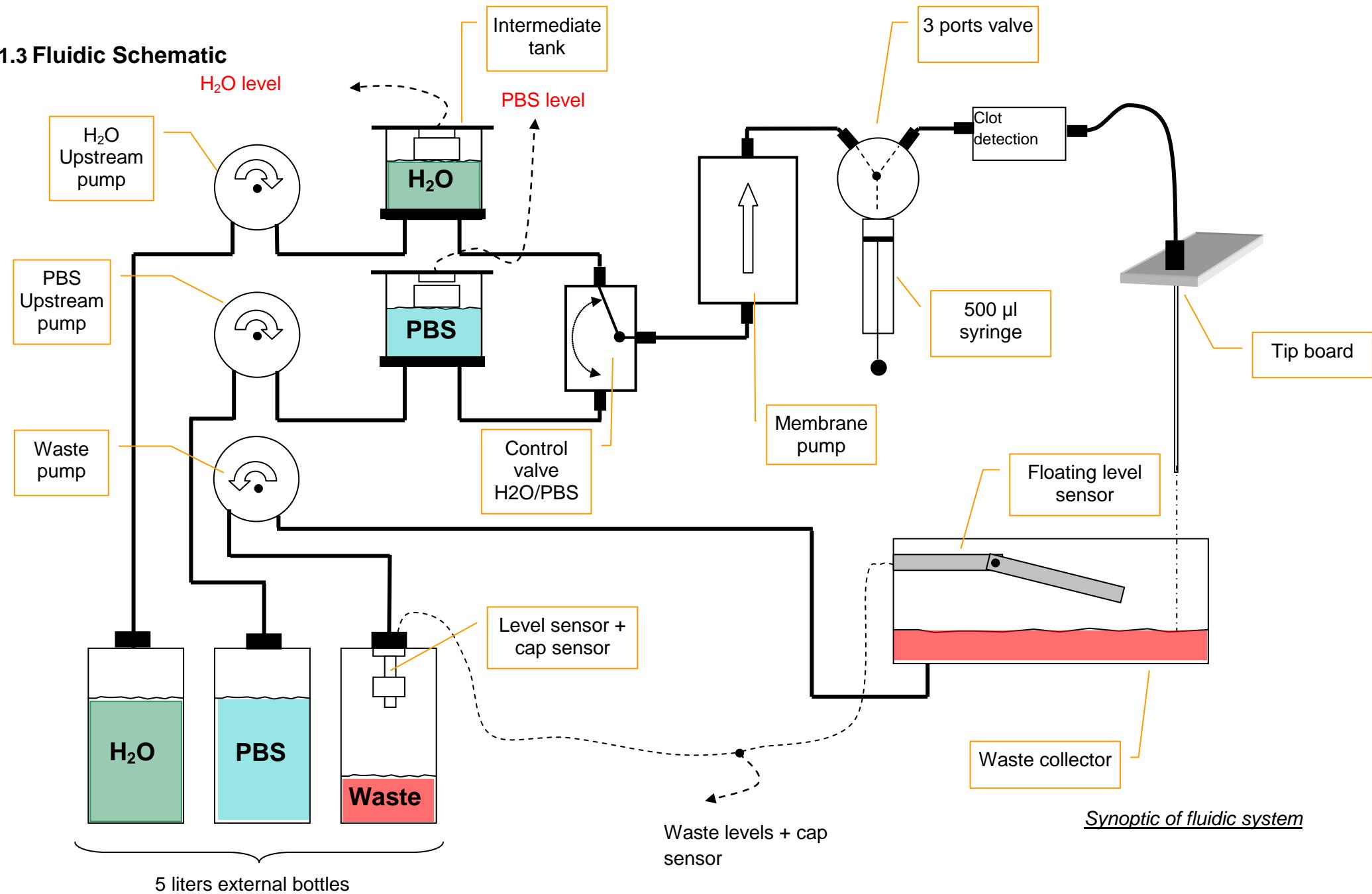


Arm assembly C213012



Synoptic of Pipeting Module

14.1.3 Fluidic Schematic



14.2 Fluidic System Cleaning Procedure

14.2.1 Overview

This procedure has to be applied whenever the fluidic system is contaminated by algae (tubing are green or even brown). If the tubings remain dirty after applying the cleaning procedure you have to replace the internal tubings using the internal tubings kit (ref. C629023).

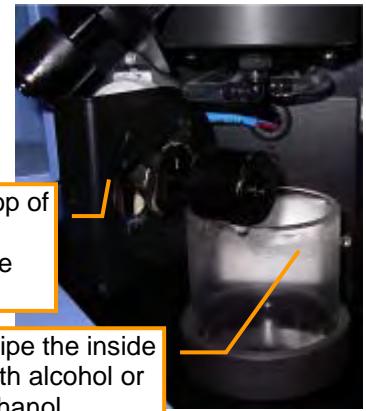
This procedure requires 2 bottles of solution 3 and 1 liter of distilled water.

14.2.2 Cleaning Procedure

- (1) Remove the mufflers from the PBS and H2O bottles
- (2) Put the PBS and H2O tubings in an empty container
- (3) Start KCD and go under the “**View and Controls**” window
- (4) Drain the intermediate tanks using the upstream pumps: switch on the PBS and H2O using the counterclockwise way buttons 
- (5) When the intermediate tanks are empty (~2mins) switch the pumps off (“Off” buttons)
- (6) Remove the top of the intermediate tanks.
- (7) Pour a bottle of solution 3 (30ml) in the H2O intermediate tank and another bottle of solution 3 in the PBS intermediate tank.
- (8) Click on H2O down button  wait **3s** then switch the pump off: click on the Off button 
- (9) Click on PBS down button  wait **3s** then switch the pump off: click on the “Off” button 
- (10) Click on H2O up and PBS up buttons  wait **25s** then switch the pumps off: click on the Off buttons 
- (11) Wait **2 minutes** in order to let the solution 3 act.
- (12) Drain the intermediate tanks: Click on H2O up and PBS up buttons  until the intermediate tanks are empty, then click on the “Off” buttons 



- (13) Pour some **distilled water** directly into the intermediate tanks and fill them up until the liquid is 0.5cm away from the edge of the tanks.
- (14) Drain the intermediate tanks: Click on H2O up and PBS up buttons  until the intermediate tanks are empty, then click on the “Off” buttons 
- (15) Clean the inside using some lint free paper soaked with Ethanol or pure alcohol (90% or 95%).
- (16) Put the top of the intermediate tanks back; put the screws back.
- (17) Fill up the H2O bottle with 5 liters of distilled water; reconnect the filter and close the H2O bottle.
- (18) Fill up the PBS bottle with 5 liters of PBS, reconnect the filter and close the PBS bottle.
- (19) Prime the fluidic system **thrice** and make sure there is no leak from the tip connector.



14.3 Notice for joulemeters

↳ Joulemeters are used for checking and adjusting nitrogen lasers used as light source on Kryptor instrument. Two models can be supplied: OPHIR and GENTEC. Both come in a protective case with all accessories required for measuring the laser energy at the output of an optical fiber.

↳ Contents of each box is as follows:

- Main joulemeter electronics with display.
- Measuring coupler with connection cable to electronics, fitted with special SMA adapter.
- Stand for measuring head.
- Optical fiber cable for connection to laser.
- AC/DC transformer for instrument charging, with cables.
- Instruction booklet.
- Calibration certificate.

↳ In addition, GENTEC instrument features USB cable and drivers disk for connection to a computer (display, data logging and data processing). The main SW can be found on Gentec Internet Site at:

↳ <http://www.gentec-eo.com>: download last version of PC Solo.exe. All necessary drivers can also be downloaded from this source.

↳ Each joulemeter is delivered calibrated and adjusted for your specific application. All useful parameters/coefficients have been determined and loaded at Cezanne, so you will be able to use your instrument directly without any further adjustment. **It is strongly recommended that no modification whatsoever is done to the SW of each joulemeter in order to avoid modifying measuring performance and correlation within the KRYPTOR joulemeters.**

↳ Most specific parameters are stored in the memory present in the measuring head connector, so do not mix measuring heads and associated electronics in order to keep adjustments valid. If electronic is started alone (no head connected), you will not be able to check proper configuration.

↳ Please allow complete overnight charging of the unit before any measurement is performed. It is advised that measurements are performed with a recently charged device, and that the measurements are made without charging device being connected to the instrument (this may cause unwanted interferences leading to erroneous SD results, due to electrical line). This stands particularly true for GENTEC instrument.

⚡ **Use of OPHIR Joulemeter NOVA with PE 25 measuring head**

1. Connect measuring head to electronics
2. Switch the instrument on by sliding the lateral switch upwards
3. You can make direct measurements from this screen. Values will be averages of 10 pulses. Measuring will take place as soon as a signal is detected by the measuring head.
4. In order to realize statistical measurements, you need to go to another menu:
 - Press twice on the 'Menu' key
 - Press the key under 'More'
 - Press the key under 'Select' as many times as necessary to light 'Log' on the screen
 - Press the key under 'Go'
 - Instrument will begin to log data
 - You can stop acquisition by pressing 'Exit'. Instrument will display results as Min, Max, Average, SD and number of data acquired (minimum acceptable is 200 or 10 seconds)
 - You can also begin acquiring a new set of data without stopping process by pressing the last key on the left when instrument is already logging data.
 - When done, return to default screen by pressing 'Exit' again.

⚡ **Be cautious when selecting function or you can display a parameter adjustment screen. If so, take care to exit using the right key and never select the 'save' option in order not to modify any preselected settings.**

↳ **Use of GENTEC Joulemeter SOLO-PE**

1. Connect measuring head to electronics
2. Switch the instrument on by pressing briefly the 'I' key.
3. The default measuring screen will be displayed after a few seconds. Measuring will take place as soon as a signal is detected by the measuring head.
 - Note: Gentec instrument SW is based on Microsoft logics, so you can access any feature through menus, by selecting the desired function using the direction keys. When function is selected, you will access to it by pressing the 'Return' key <-. Menus are activated by pressing the 'F' key once.
4. In order to realize statistical measurements, press 'F' key once. Display options menu will appear.
 - Select the 'Statistics' mode by pressing the down direction key several times
 - Press 'Return' key. The statistics measurement window will appear.
 - Select 'Start' using down direction arrow
 - Press 'Return' key. Instrument will begin to log data for the preselected period of time (20 seconds).
 - You can stop acquisition by selecting 'Stop' then 'Return'. Instrument will display results as Min, Max, Average, SD and number of data acquired, plus other relevant information.
 - You can also begin acquiring a new set of data without stopping process by selecting the 'Reset' option when instrument is already logging data.
 - When done, return to default screen by selecting 'Close' and then 'Return'.
 - To switch off the instrument, press down the 'I' key for a few seconds until it stops. Pressing this key briefly when already switched on will backlight the screen.

↳ **Be cautious when selecting function or you can display a parameter adjustment screen. If so, take care to exit using the right key and never select the 'save' option in order not to modify any preselected settings. Particularly, if you go to the 'Settings' menu and then to the 'Corrections' function, if you highlight either 'Multiplier' or 'Offset', never press the 'Return' key for exiting or your parameters will be reset to default values, then altering following measurements. Exit this function using the left arrow key instead. In case you have deleted mistakenly one of these parameters, the correct value for your instrument can be found on the data sheet provided with your joulemeter. The correct parameter can be re-entered by going to the 'Corrections' Menu, then to the selected parameter, then pressing 'Return' key and entering value using the virtual keypad on the screen then selecting 'OK' and pressing 'Return' key again when done.**

↳ **In case of technical problem found on a joulemeter (ie:giving wrong values, need of calibration control...), you have to contact certified companies dealing with this device. As we have two different suppliers, we have two certified companies for which you will find below the needed information.**

1. Gentec joulemeters:

Joulemeters have to be sent back to France to the following address:

OPTON LASER INTERNATIONAL
Parc Club Orsay Université
29 rue Jean Rostand
91893 ORSAY cedex - FRANCE
Tél.: +33 (0) 1 69 41 04 05
fax : +33 (0) 1 69 41 32 90

2. OPHIR joulemeters:

Please inquire at your own your nearest BFI Optilas office (www.bfioptilas.com), where addresses can hereunder. All conditions will have to be discussed with your local office. Calibrations are usually made in Germany.

BFI OPTiLAS offices Location and Map access http://www.bfioptilas.com/bfioptilas_offices.html

European Offices

Belgium

Email: info.be@bfioptilas.com
Cipalstraat , 3 B-2440 GEEL
Tel : +32 (0) 14 570 670 - Fax : +32 (0) 14 570 679

France

Email: info.fr@bfioptilas.com
4, Allée du Cantal Z.I. La Petite Montagne Sud
CE 1834 - 91018 - EVRY Cedex
Tel : +33(0)1.60.79.59.00 - Fax : +33(0)1.60.79.89.01

Germany

Email: info.de@bfioptilas.com
Boschstrasse, 12
D-82178 PUCHHEIM
Tel : +49(0)89 890 13 50 - Fax : +49(0)89 800 25 61

The Netherlands

Email: info.nl@bfioptilas.com
Chr. Huygensweg 17 (Po Box 222) -
2408 AJ ALPHEN AAN DEN RIJN
Tel : +31(0)172 44 60 60 - Fax : +31(0)172 44 34 14

Spain

Email: info.es@bfioptilas.com
C/Anabel Segura, 7 Planta Acceso
28050 Alcobendas MADRID
Tel : +34 (91) 453 11 60 - Fax : +34 (91) 662 68 37

United Kingdom

Email: info.uk@bfioptilas.com
Mill Square, Wolverton Mill South -
MILTON KEYNES MK12 5ZY
Tel : +44(0)1908 326326 - Fax : +44(0)1908 221110

NORDIC OPERATIONS

Sweden

Email: info.se@bfioptilas.com
Bangårdsgatan, 8 - P.O.Box 1335 -
S-751 43 UPPSALA
Tel : +46 18 565830 - Fax : +46 18 565835

Denmark

Email: info.dk@bfioptilas.com
Hedelykke, Hovedgaden 451K
DK-2640 HEDEHUSENE
Tel : +45 46 55 99 99
Fax : +45 46 55 99 98

ITALY

Milan office:
Email: info.it@bfioptilas.com
Via Brembo 27 - 20139 Milano
Tel : +39 02 535831
Fax : +39 02 53583201/202

Rome office:
Email: info.it@bfioptilas.com
Via Emilio De Marchi 27- 00141 ROMA
Tel : +39 06 86894259
Fax : +39 06 86595354

14.4 Notice for belt tension meter SM4

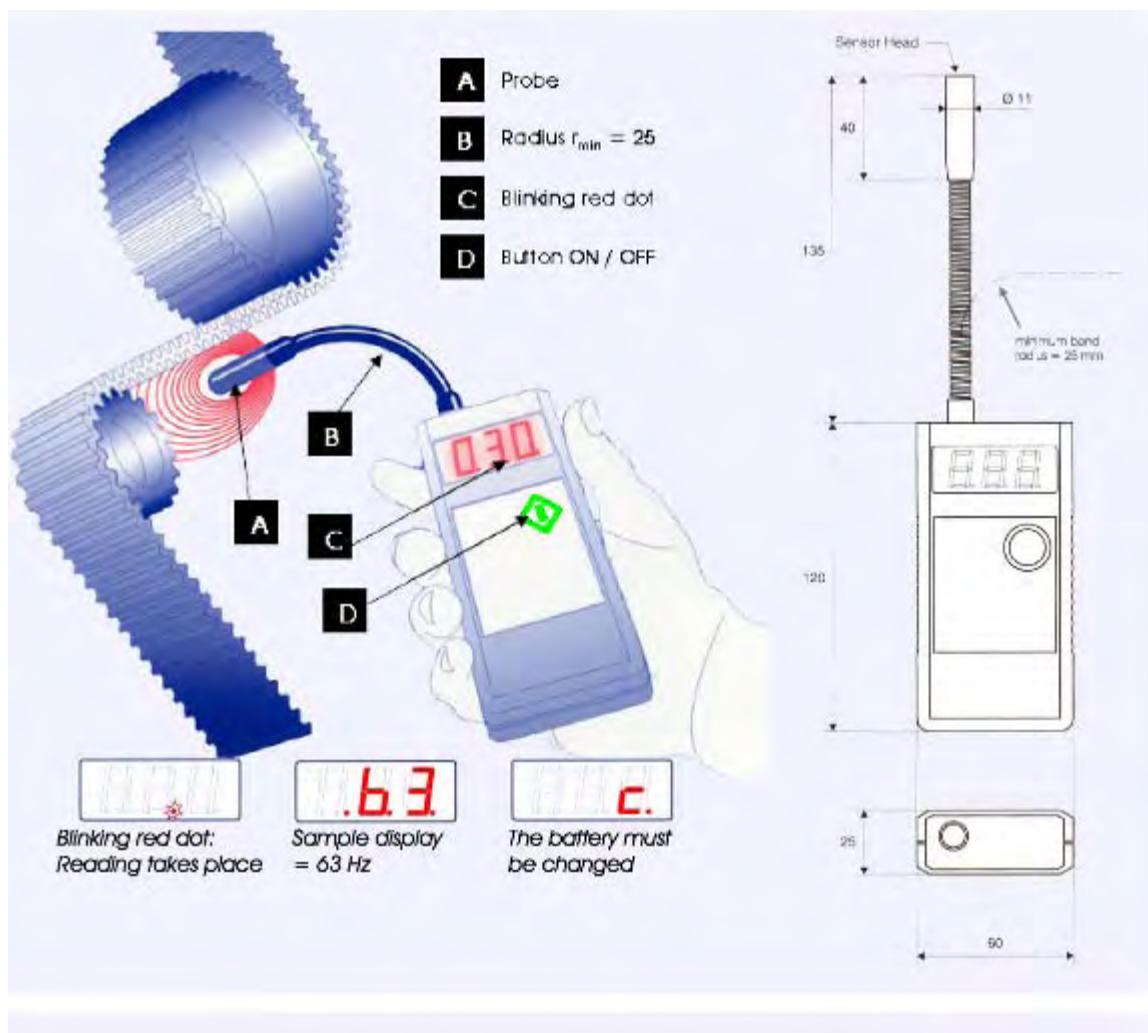
The SM4 Tension Meter is designed to measure the static tension of the belts.

Operating Instructions Set-up

- (1) Insert battery at the back of the tension meter, connect it, and close the case.
-  (2) Press , the red dot in the display will light up, indicating that the tension meter is operational.

Using the Tension Meter SM4

- (1) Make sure the belt drive is static (not in motion).
- (2) Hold the tension meter close to the static belt section to avoid any misreading due to hand movement.
- (3) Place the probe a few millimeters beside the belt.
- (4) Tap the belt to generate vibrations. At the same time press and  hold.
- (5) The red dot in the display lights up in response to the belt frequency. When a measurement is obtained, the device will beep and display the frequency of vibrations in Hertz (the red dot do not represent commas).
- (6) If no reading is obtained, repeat steps 1 – 5.
- (7) To reset the display,  release.



Remarks

Accuracy is +/- 5%.

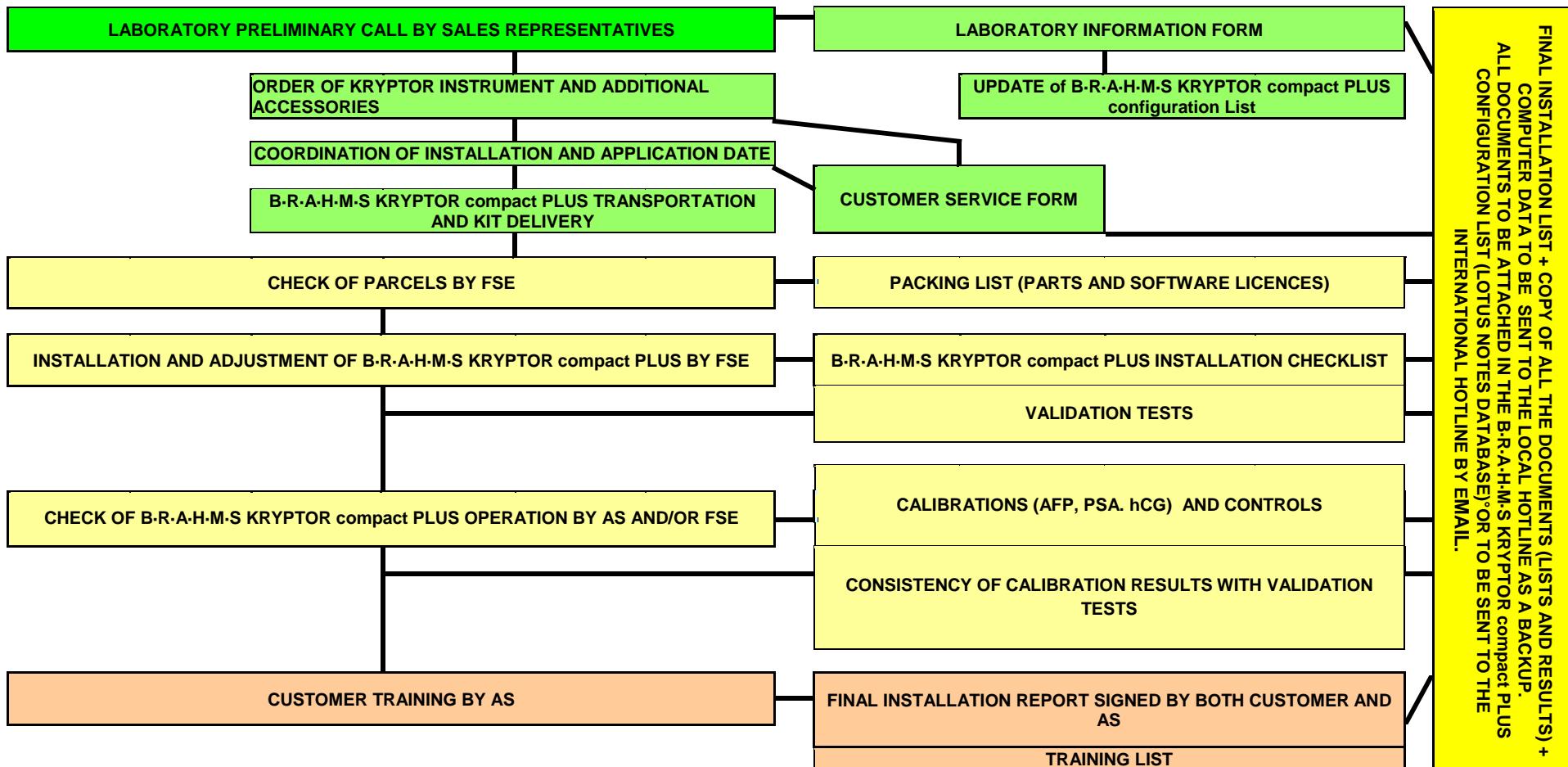
Frequency Range is 6 – 350 Hz.

It is recommended that several readings be taken in order to obtain an average for increased accuracy.

The beep indicates when a reading is obtained and the frequency is displayed. No hand movement is permitted at low frequency.

Change the battery when the letter "C" appears in the display.

14.5 Install Procedure Guide Lines (For Local Brahms Organizations only)



14.6 B·R·A·H·M·S Kytor compact PLUS Installation Check List (to be filled by Field Service Engineer)

B·R·A·H·M·S KRYPTOR compact PLUS S/N: (See label on the plate screwed at the rear on both modules)	XPC SW version: (During field test see in help menu-> about)	
Pipeting Module S/N: (See label on left side)	Embedded SW: (See in KCD-> help->About)	Tip S/N: (Label on the tip)
Reading Module S/N: (See label on right side)	Embedded SW (See in KCD-> help->About)	Reader head S/N: (See CSW\KCINI\ld.ini)
Installation date :		
Laboratory Name :		
FSE Name & signature :		

Installation	Successful	Failed (with remarks)
Packing list validation		
Assemble pipeting and reading modules		
Connect Mouse, Keyboard and hand barcode reader to XPC		
Connect Video screen to XPC		
Plug in USB cable to Instrument and XPC		
Fill PBS and H2O bottles and connect them to instrument		
Install sample and reagent cassettes onboard		
Check XPC manual voltage selector (115/240V)		
Plug in Instrument, XPC and Video screen to electrical supply		

Checks & validation tests	Successful	Failed
Visual checks	Skins	
	Hoods	
	Cassettes	
	Tip	
	Protective window	
Switch on XPC + start KCD (connect to pipetor & reader, log onto maintenance access)	Check modules power on Leds	
	Check arm power Leds	
	Check fans (noise)	
Snapshot		
System initialization & sensors Checks to be done under View and Controls	Init pipeting module Init reading module Fill tanks (prime) Check hoods switches Check temp. sensors Check push button Check reagent cassette (IR com.) Check tip choc detection Check HV ADC	
Check dot & pipeting coordinates (readjust only if necessary)		

Checks & validation tests	Successful	Failed
(1) Check reading coordinates (Matrix 5) + dispense source (readjust only if necessary)		
Measure laser energy / ADC PD (readjust only if necessary)	Σ value: SD value:	
(1) Run Pmttc and check ratio (readjust only if necessary))		
(1) Fieldtest		
Calibration(s) (if done by FSE)		
Snapshot		

(1) Excel files: To be sent by email (1 single zipped file) to Local and International Hot Line (Productsupport.brahms.frnim@thermo.com), this checklist included.

14.7 Documents to be sent back (for local Brahms organizations only)

DOCUMENTS TO BE SENT BACK

TO LOCAL BRAHMS ORGANIZATIONS

(as described in KRYPTOR-install procedure-guide lines)

Paper sheets or e-forms

	FSE	AS
LABORATORY INFORMATION FORM	<input type="checkbox"/>	
PACKING LIST (DELIVERED WITH THE INSTRUMENT)	<input type="checkbox"/>	
B·R·A·H·M·S KRYPTOR compact PLUS INSTALLATION CHECKLIST by FSE (WORD DOCUMENT OR HARDCOPY)	<input type="checkbox"/>	
if Calibration / Controls done by FSE	<input type="checkbox"/>	
if Calibration / Controls done by AS	<input type="checkbox"/>	
B·R·A·H·M·S KRYPTOR compact PLUS TRAINING LIST	<input type="checkbox"/>	
B·R·A·H·M·S KRYPTOR compact PLUS INSTALLATION CERTIFICATE (if applicable)	<input type="checkbox"/>	
B·R·A·H·M·S KRYPTOR compact PLUS INSTALLATION QUALITY REPORT (if applicable)	<input type="checkbox"/>	<input type="checkbox"/>

Computer Data

	FSE	AS
VALIDATION TESTS (Matrix5, PMTTC, Field Test)	<input type="checkbox"/>	
ZIPPED SNAPSHOT DONE AFTER CALIBRATIONS / CONTROLS	<input type="checkbox"/>	
if Calibration / Controls be done by FSE	<input type="checkbox"/>	
if Calibration / Controls be done by AS		<input type="checkbox"/>

14.8 Decontamination certificate

Decontamination Certificate

Check the appropriate box and complete the statement as necessary.

- The instrument or parts which are being returned for rework were not used for any application involving blood or other potentially infectious material.
- The instrument or parts which are being returned for rework **have been decontaminated**.
- The instrument or parts **have NOT been decontaminated**. Every effort must be made to decontaminate before returning instruments or parts to the factory. Include a statement which identifies the type of potentially infectious materials involved, e.g. blood or other body fluids as well as why NO decontamination was performed:

This is to certify that this part or instrument has been prepared for shipment by me or someone under my supervision.

Signature

Name (Print)

Date _____ Part No.

Model No. _____ Serial No.

Nuclides Used

Biological Used

i.e. Human Serum, body fluids

Customer Contact Name

Institution

Phone or Fax #

**Enclose this sheet with the part or instrument being shipped
to another location or returned to the factory in such a
manner that it can be easily read on opening the package.**

14.9 Packing procedure

- **Apply this procedure only after the instrument has been decontaminated**

- (1) Drain the intermediate tanks using the “**Empty cans**” button locate in pipetor utilities” window
- (2) Drain the fluidic line using the “**view and controls**” window (switch on the PBS and H2O downstream pumps while the tip is in the washbowl)
- (3) Unplug the small peristaltic cartridges from their axis and fasten them to the floating sensors as shown on the picture here below (the internal surface of the tubing can become stuck if the cartridge is not used but remains plugged on its axis during a few weeks)

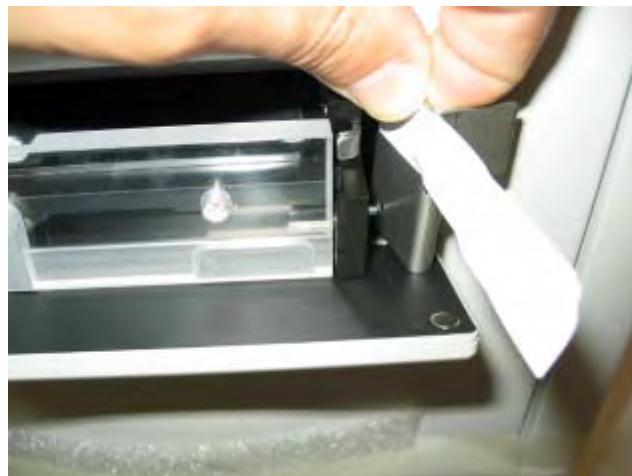


- (4) Switch off the instrument and the XPC
- (5) Disconnect the cable between the instrument and the mains
- (6) Disconnect the power cable between the reading and the pipeting module
- (7) Disconnect the serial cable between both module
- (8) Disconnect the USB cable between the XPC and the reading module.
- (9) Put these cables in a plastic bag
- (10) Disconnect the XPC and the monitor from the mains
- (11) Disconnect the keyboard and the mouse from the XPC
- (12) Put the monitor, the computer with its accessories in their original packaging.
- (13) Disconnect the tubings (pbs, water and waste from the instrument
- (14) Remove the caps + tubings from the bottle



- (15) Drain any remaining liquid
- (16) Put each cap + tubing an individual plastic bag
- (17) Open the fluidic hood and the carousel hood
- (18) Remove all the cassettes and put them in their original packages
- (19) Put the computer, the monitor, the bottles, the caps + tubings, the hand held scanner, the cables in the original accessories package.
- (20) Separate both modules
- (21) Turn the arm clockwise using the without end screw
- (22) Bring the tip above the draining hole in the drip pan
- (23) Move the arm down to the lowest position
- (24) Close the lower skin and the carousel hood
- (25) Put a piece of thin foam on top of the carousel hood (to prevent the fluidic hood from scratching the carousel hood)
- (26) Bring the fluidic hood at 90° regarding the rear of the reading module
- (27) Lock the position tightening the screw located on top of the fluidic hood in the green cover
- (28) Take the carriage retainer out of the retained clamp
- (29) Push the carriage to the left and insert the carriage pin into the retainer hole as shown here below





- (30) Push both carriage and retainer at the same time into the reaction area until the retainer is blocked by the frame



- (31) Close the reaction area door



- (32) Wrap some transparent film around the reader (or at least lock the reaction area door using a piece of adhesive tape stuck on the front skin in order to avoid having the carriage unloading during the shipment)



- (33) Wrap some transparent film around the pipetor
- (34) Put each module in its original packaging



- (35) Lock their position within the package using the bars
- (36) Close the packages



14.10 B·R·A·H·M·S KRYPTOR compact PLUS PM Checklist

B·R·A·H·M·S KRYPTOR compact PLUS S/N:	XPC SW version:		
Pipeting Module S/N:	Embedded SW version:		Tip S/N:
Reading Module S/N:	Embedded SW version:		Reader head S/N:

1/ Decontamination / cleaning:

	Done
- System Decontamination	
- Tip and washbowl	
- Clean peristaltic pumps' axis	
- Intermediate tanks	
- Clean dispensing hole	
- Protective window (silica window)	
- Reaction area and Reader head lens (only if necessary)	
- Barcodes reader windows	

4/ Fluidic path checks / replacements:

		Check ok	Replacement
- Syringe + syringe barrel			
- External tubings			
- Internal tubings			
- Tip			
- Tubings after 3 ports valve			
- Prime			
- Leakage			

2/ Mechanical checks / adjustments:

	Value before	Value After	Done
- Lubricate Y rail	diagonal	diagonal	
- Lubricate X rail	diagonal	diagonal	
- X belt tension (adjust if necessary)			diagonal
- Y belt tension (adjust if necessary)			diagonal
- Carrousel belt tension (adjust if necessary)			diagonal
- Lubricate arm axis	diagonal	diagonal	
- Z belt tension (adjust if necessary)	diagonal	diagonal	
- Lubricate distribution pump	diagonal	diagonal	
- Carrousel hood (hinges + locking system)	diagonal	diagonal	
- Fluidic hood	diagonal	diagonal	
- Fans (mechanically, noise)	diagonal	diagonal	
- Sample cassettes	diagonal	diagonal	
- Reagent cassettes (lid + fans)	diagonal	diagonal	

5/ Performances checks:

	Value before	Value After	Done
- Pipeting Module and Reading Module LVPS	diagonal	diagonal	
- PBS downstream pump flow rate			diagonal
- Pipeting Module positions settings		diagonal	
- Reading Module positions settings (matrix 5)		diagonal	
- Laser energy		diagonal	
- PMTTC			diagonal
- Ratio (adjust only if necessary)		diagonal	
- Level sense test			diagonal
- Field test		diagonal	
- Barcode Reader test		diagonal	
- Pipeting Module positions settings		diagonal	
- Reading Module positions settings (matrix 5)		diagonal	

3/ Parts replacement (PM kit):

	Done
- 3 Peristaltic cartridges	
- PBS & H ₂ O mufflers	
- 3 ports valve	
- Syringe seal	

6/ Comments and remarks:

--	--

Date:	
Customer name & signature	
FSE name & signature	

14.11PM spare parts kit

The Preventive Maintenance kit (C217012) is composed of:

- 3 peristaltic cartridges for 10/30 pumps.
- 2 mufflers.
- 1 syringe seal.
- 1 three ports valve.

14.12 Barcodes library for barcodes reader test



1281281281281
Code 128 resol 0.21mm
Ratio 2.8, 13 caracters



1281281281282
Code 128 resol 0.21mm
Ratio 2.8, 13 caracters



1281281281283
Code 128 resol 0.21mm
Ratio 2.8, 13 caracters



1281281281283
Code 128 resol 0.21mm
Ratio 2.8, 13 caracters



12811
Code 128 resol 0.21mm
Ratio 2.8, 5 caracters



12812
Code 128 resol 0.21mm
Ratio 2.8, 5 caracters



3939393911
Code 39 resol 0.21mm
Ratio 2.8, 10 caracters



3939393912
Code 39 resol 0.21mm
Ratio 2.8, 10 caracters



3939393913
Code 39 resol 0.21mm
Ratio 2.8, 10 caracters



3939393914
Code 39 resol 0.21mm
Ratio 2.8, 10 caracters



39391
Code 39 resol 0.21mm
Ratio 2.8, 5 caracters



39392
Code 39 resol 0.21mm
Ratio 2.8, 5 caracters



A99999999999A
Codabar resol 0.21mm
Ratio 2.8, 13 caracters



A999999999992A
Codabar resol 0.21mm
Ratio 2.8, 13 caracters



A999999999993A
Codabar resol 0.21mm
Ratio 2.8, 13 caracters



A999999999994A
Codabar resol 0.21mm
Ratio 2.8, 13 caracters



A99991A
Codabar resol 0.21mm
Ratio 2.8, 5 caracters



A99991A
Codabar resol 0.21mm
Ratio 2.8, 5 caracters



025252525251
2/5 Interleaved/ resol 0.21mm &
Ratio 2.8
13 caracters



025252525252
2/5 Interleaved resol 0.21mm &
Ratio 2.8
13 caracters



025252525253
2/5 Interleaved resol 0.21mm &
Ratio 2.8
13 caracters



02525252525254
2/5 Interleaved resol 0.21mm &
Ratio 2.8
13 caracters



025251
2/5 Interleaved resol 0.21mm &
Ratio 2.8
5 caracters



025252
2/5 Interleaved resol 0.21mm &
Ratio 2.8
5 caracters



1313131313116
EAN 13, resol 0.21mm
13 caracters



1313131313123
EAN 13, resol 0.21mm
13 caracters



1313131313130
EAN 13, resol 0.21mm
13 caracters



1313131313147
EAN 13, resol 0.21mm
13 caracters



1313131313154
EAN 13, resol 0.21mm
13 caracters



1313131313154
EAN 13, resol 0.21mm
13 caracters

14.13 Tests By Interventions

Please double click on the icon here below (for a better visualization under Microsoft Excel) or refer to the next page:



Tests by
Interventions KC PLUG

Tests By Interventions KC PLUS V1.00

		TEST TYPE	Backup	Sensors	Reading positions	Counting	Fluidic	Pipeting positions	BC	Troubleshooting	Validating		TIME FOR ALL TESTS (Hours & min)	Frequency						
		TESTS	Snapshot Before (time:1 min)	Sensors check under view & controls	Check XY BELT TENSIONS Readjust if needed	Matrix on source well & well 6 (1) Dispensing position	PMT TEST / CHECK RATIO Readjust if values are out of range	Prime & Check fluidic	Pump flow rate check Readjust if needed	Dot adjustment	Barcode readers calibration Barcode reader test	Run controls (4)	KC field test	IF HV values have been modified Calibrate all customer's parameters + run controls (2)	Backup	TIME FOR ALL TESTS (Hours & min)	Frequency of intervention (3)			
	INTERVENTIONS	Time(min)	1	10	15	10	20	20	15	30	10	10	5	15	20	15	15	50	1	
READER MODULE	<u>INSTALLATION (or interlab transfer)</u>	x	x			x	x	x	x				x	x		x	167	N.A.		
	<u>TRANSFERT (intra lab)</u>	x	x		x								Dispense Only	x		x	22	N.A.		
	<u>PREVENTIVE MAINTENANCE</u>	x	x	x		x	x	x	x	x	x	x		x	x	x	197	1		
	<u>REPLACEMENT OF READER MODULE</u>	x	x			x	x	x					Dispense Only	x	x		127	3		
	<u>REPLACEMENT or INTERVENTION ON TRANSLATOR (INCLUD. MOTORS & BELTS)</u>	x		x	x	x	x					x	x		x	87	2			
	<u>REPLACEMENT OF LASER</u>	x				x	x							x	x		47	2		
	<u>REPLACEMENT OF OPTICAL FIBER</u>	x				x	x							x	x		47	3		
	<u>REPLACEMENT or REMOVAL OF READER HEAD</u>	x		x	x	x	x					x	x		x	127	2			
	<u>REPLACEMENT OF RH PROTECTIVE WINDOW AND/OR DRAWER</u>	x	x				x							x		x	42	2		
	<u>REPLACEMENT OF HIGH VOLT. POWER SUPPLY</u>	x				x	x							x	x		47	2		
PIPETOR MODULE	<u>REPLACEMENT OF INCUBATOR HEATER</u>	x	x	x		x						x			x	37	3			
	<u>REPLACEMENT OF CEILING HEATER</u>	x	x	x		x						x			x	37	3			
	<u>REPLACEMENT OF PAN HEATER</u>	x	x			x	x					x			x	47	3			
	<u>REPLACEMENT OF ELECTRONIC BOX ASSY.</u>	x	x			x	x	x				x	x		x	127	3			
	<u>REPLACEMENT OF PIPETOR MODULE</u>	x	x					x	x		x	x		x		x	117	3		
	<u>SMALL PERISTALTIC PUMP REPLACEMENT</u>							x								10	1			
	<u>BIG PERISTALTIC PUMP REPLACEMENT</u>	x						x	x							x	22	1		
	<u>REPLACEMENT OF TIPBOARD ASSEMBLY</u>	x						x		x	x		x			x	27	1		
	<u>REPLACEMENT OF CLOT DETECTION BOARD</u>	x						x		x	x		x			x	12	2		
	<u>REPLACEMENT OF BOTH TUBINGS:3 WAYS VALVE TO TIP BOARD</u>							x								10	2			
	<u>REPLACEMENT OF SYRINGE PUMP ASSEMBLY</u>	x						x				x			x	x	12	2		
	<u>REPLACEMENT OF 3 PORT VALVES</u>	x						x				x			x		10	1		
	<u>REPLACEMENT OF CARROUSEL BELT</u>	x						x			x	x		x	x	x	52	3		
	<u>REPLACEMENT OF BARCODE READER(S)</u>	x						x	x		x	x		x		x	17	2		
	<u>REPLACEMENT OF INTERNAL TUBING KIT</u>							x	x		x	x		x			20	3		
	<u>REPLACEMENT OF PIPETTING ARM ASSEMBLY</u>	x						x	x	x	x	x	x	x		x	87	3		
	<u>REPLACEMENT OF CARROUSEL ASSEMBLY</u>	x	x					x	x	x	x	x	x	x		x	117	3		
	<u>REPLACEMENT OF ELECTRONIC BOX ASSY.</u>	x	x					x		x	x	x	x	x		x	107	3		
	<u>REPLACEMENT OF HOOD (CARROUSEL AND/OR FLUIDIC)</u>							x									10	3		

(1) If template result is failed readjust the whole reader positions settings and validate with matrix 5

(2) Calibrating all customer's parameters is mandatory

(3) Assessment of intervention frequency 1: 0 to 2 per year 2: 0 to 1 per year 3: 0 to 1 every 2 years

Hidden times : include the preparation time, the reconstitution and the preheating

(4) Run low and high level controls in duplicate on one analyte at least and make sure they are in the customer's range acceptance