
ABX Pentra 400

User Manual



P/n: RAB125EEN



HORIBA ABX
B.P. 7290
34184 MONTPELLIER Cedex 4 - FRANCE

HORIBAABX
Diagnostics

Revisions

Part number	Technical Note	Software version	Sections	Date
RAB125A	RAH 980 AA	1.0.0	All	07/07/03
RAB125B	RAH 994 AA	2.0.0	All	15/12/03
RAB125C	RAN 072 AA	3.0.0	All	11/06/04
RAB125EEN	RAN 225 AA	4.0.0	All	08/06/06

Latest version documents on www.horiba-abx.com.

Latest version of the CE declaration of conformity for this instrument is available on www.horiba-abx.com.

- ◆ This document applies to the latest software version as indicated above.
- ◆ When a subsequent software version changes the information in this document, a new section and/or sections will be released.

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▼ Potential hazards

To alert the operator of potentially hazardous conditions, one of the bold captioned headings which are described below is provided wherever necessary throughout this text.



Flags a procedure that if not followed properly, can prove to be extremely hazardous to either the operator or the environment or both.



Emphasizes an operating procedure that must be followed to avoid possible damage to the instrument or erroneous test results.



Emphasizes important information especially helpful to the operator before, during or after a specific operational function.

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This section provides some important information to get you started with the **Pentra 400**:

- ◆ **1. Warning and precautions**, page 1-3
- ◆ **2. Labels**, page 1-8
- ◆ **3. Operational conditions**, page 1-13
- ◆ **4. Software overview**, page 1-18
- ◆ **5. Printer**, page 1-41.

1. Warning and precautions

User manual must be entirely read and personnel trained by **HORIBA ABX** before attempting to operate instrument. Always refer to labeling and **HORIBA ABX** instructions in order to avoid to compromise system integrity. The user must always operate with full knowledge and appreciation of instrument warnings, alarms and flags.

The **Pentra 400** responds to the Standards and Directives named in the Declaration of Conformity added at the beginning of this manual.



- ◆ Disposal gloves, eyes protection and lab coat must be worn by the operator. Local or national regulations must be applied in all the operations.
- ◆ Portable/mobile should not be used in proximity of the instrument.
- ◆ All peripheral devices should be IEC compatible.

1.1. Limited guarantee

The duration of guarantee is stipulated in the Sales conditions associated with the purchase of this instrument. To validate the guarantee, ensure the following is adhered to:

- 1 - The system is operated under the instructions of this manual.
- 2 - Only software or hardware specified by **HORIBA ABX** is installed on the instrument.
- 3 - Services and repairs are provided by an **HORIBA ABX** authorized technician, using only **HORIBA ABX** approved spare parts.
- 4 - The electrical supply of the laboratory follows the national regulations.
- 5 - Specimens are collected and stored in normal conditions.
- 6 - Applications used are those specified in the **ABX Pentra** Reagent Document Binder.
- 7 - Proper tools are used when maintenance or troubleshooting operations are performed.



If this instrument has been supplied to you by anyone other than **HORIBA ABX** or an authorized representative, **HORIBA ABX** cannot guarantee this product in terms of specification, latest revision and latest documentation. Further information may be obtained from your authorized representative.

1.2. Safety precautions

1.2.1. Electronic and moving parts

The following parts must not be handled or checked by the user:

- ◆electrical power supply
- ◆electronic components.

Operator injury may occur from an electric shock. Electronic components can shock and injure the user. Do not tamper with the instrument and do not remove any components (covers, doors, panels and so on) unless otherwise instructed within this document.

Power supply: from 100 to 240 V ($\pm 10\%$), 50 to 60 Hz.

The user may replace the following:

- 2 fuses 6,3 A slow-blow 250 V.

Replace only with the same or equivalent type recommended by the manufacturer. Disconnect supply cable before proceeding.

Danger! The battery may explode if it is not replaced correctly! Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Moving parts:

It is strictly forbidden to disable sensors as it may cause operator injuries. Protection covers must not be opened during instrument operations.

1.2.2. Biological risk



Consider all Specimens, Reagents, Calibrators, Controls, etc... that contain human blood or serum as potentially infectious! Use established, good laboratory working practices when handling specimens. Wear protective gear, Gloves, Lab coats, Safety glasses and/or Face shields, and follow other bio-safety practices as specified in OSHA Blood borne Pathogens Rule (29 CFR part 1910. 1030) or equivalent bio-safety procedures.



Warning! All accessible surfaces of the instrument can be potentially contaminated by human blood or serum. Disposal gloves and white coat must be worn by the operator. Local and national regulations must be applied in all the operations.

HORIBA ABX uses disinfectant product for instrument decontamination (including touch screen) and highly recommends it to decontaminate your instrument. Refer to Section 9, [1.16. Instrument cleaning and decontamination](#), page 9-26 to perform the instrument cleaning and decontamination procedure.

1.2.3. Hot surface



Warning! Risk of personal injury due to hot surfaces within the instrument.
Allow the lamp to cool sufficiently before proceeding.

1.2.4. Laser



Warning! Barcode readers laser class 2.
Do not stare into beam directly or with optical instrument, as it may cause permanent eye damage.
Switch OFF the instrument before opening the barcode cover.

1.2.5. Electrostatic Sensitive Device



Caution! Electrostatic Sensitive Device (ESD).
The reagent and sample needles are susceptible to cause ESD damage to the instrument motherboard when they are handled without ESD safe handling tools.
Make contact with the instrument ground (cover screw for example) before proceeding on the needles in order to prevent electrostatic discharges.

1.2.6. Pinch point



1 - Reagent tray cover
Warning! Risk of personal injury during the reagent tray cover operation (hands/fingers).
Ensure that the reagent tray cover closure is done cautiously.

2 - Grabber of the cuvette changer
Warning! Risk of personal injury during the grabber operation (hands/fingers).
Switch OFF the instrument before any intervention.

3 - Flap door of the reaction tray
Warning! Risk of personal injury when the flap door is open (hands/fingers).
Be very careful when loading cuvette segments manually.

1.3. Graphics and symbols



Switch OFF position



Switch ON position



Alternating current



Manufacturer



In Vitro Diagnostic Medical Device



This product conforms to the EEC Standards and Directives named in the Declaration of Conformity.



Caution, consult accompanying documents



Biological risk



Hot surface



Laser



Electrostatic Sensitive Device



Pinch point!
Be careful not to trap your hands/fingers.



Low temperature



Up



Fragile, handle with care



Keep dry



Do not stack



Temperature limitation



Batch code



Catalogue number



Use by



Install before

Introduction

Warning and precautions

REAGENT

Reagent

BUFFER

Buffer

CAL

Calibrator

CONTROL

Control

CONT

Content



Single Use Only



Consult Instructions for Use



This product should be disposed of and recycled at the end of the useful life in accordance with the WEEE Directive (2002/96/CE).

2. Labels

2.1. Input/Output labels

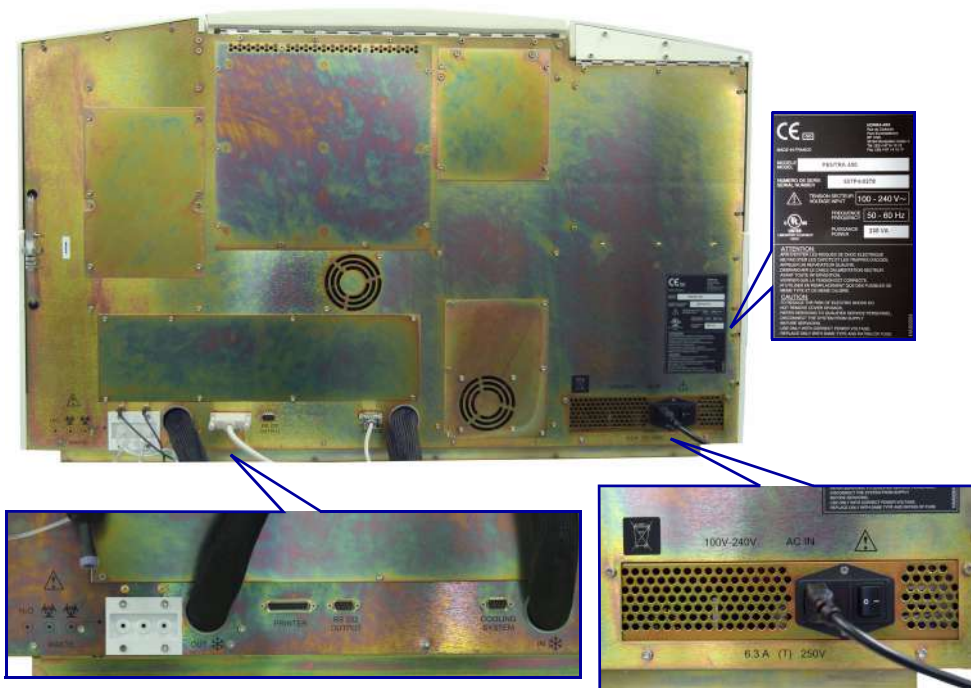


Fig. 1-1: Rear panel labels

2.1.1. Identification label



Fig. 1-2: Identification label

2.1.2. Distilled water and waste connections label

- ◆ **Distilled water input:** connection used for the distilled water input tube.
- ◆ **Distilled water level detection:** connection used for the distilled water level detector.
- ◆ **Waste output:** connection used for the waste output tube.
- ◆ **Waste level detection:** connection used for the waste level detector.
- ◆ **ISE waste output:** connection used for the ISE waste output tube.

The references of the distilled water and waste containers are provided in the following table:

Reference	Designation
LBH004A	Water Container
XEA783AS	Waste Container

Tab. 1–1: References of the water and waste containers

2.1.3. Printer connection label

Do not connect a printer which has not been recommended by an **HORIBA ABX** qualified engineer.

2.1.4. RS232 connection label

RS232 connection must be setup by an **HORIBA ABX** qualified engineer only.

2.1.5. Cooling unit connections label

- ◆ **Cooling liquid input:** connection used for the cooling liquid input tube.
- ◆ **Cooling liquid output:** connection used for the cooling liquid output tube.
- ◆ **Control cable:** connection used for the cooling unit control cable.

2.2. Rack labels

2.2.1. Reagent rack labels



- 1 - Reagent rack
- 2 - Calibrator reagent rack
- 3 - Control reagent rack

The references of the different reagent rack labels available are listed in the following table:

Reference	Designation
HAX0049	Reagent Rack Stickers - # 60 to 69
HAX0050	Reagent Rack Stickers - # 70 to 79
HAX0067	Reagent Rack Stickers - # 80 to 89
HAX0068	Reagent Rack Stickers - # 90 to 99
HAX0097	Calibrator Reagent Rack Stickers - # 01 to 15
HAX0099	Calibrator Reagent Rack Stickers - # 16 to 29
HAX0098	Control Reagent Rack Stickers - # 30 to 44
HAX0100	Control Reagent Rack Stickers - # 45 to 59

Tab. 1–2: References of the reagent rack labels

Reagent and calibrator/control stickers - **Ref. HAX0230** are also available in order to identify solutions, calibrators and controls on the reagent racks, calibrator/control reagent racks and calibrator/control sample racks.



Fig. 1–3: Reagent and calibrator/control stickers

2.2.2. Sample rack labels



- 1 - Sample rack
- 2 - Sample cup rack
- 3 - Calibrator sample rack
- 4 - Control sample rack

The two following tables list the references of the different sample rack labels available depending on the barcode type used:

♦ **Tab. 1–3: 2 of 5 interleaved with checkdigit, Code 39, Code 128, Codabar**, page 1-11

♦ **Tab. 1–4: 2 of 5 interleaved without checkdigit, Code 39, Code 128, Codabar**, page 1-12.

Reference	Designation
HAX0041	Sample Rack Stickers - # 01 to 10
HAX0043	Sample Rack Stickers - # 11 to 20
HAX0044	Sample Rack Stickers - # 21 to 30
HAX0045	Sample Rack Stickers - # 31 to 40
HAX0046	Sample Cup Rack Stickers - # 41 to 50
HAX0076	Sample Cup Rack Stickers - # 51 to 60
HAX0066	Sample Cup Rack Stickers - # 61 to 70
HAX0047	Calibrator Sample Rack Stickers - # 71 to 84
HAX0048	Control Sample Rack Stickers - # 85 to 99

Tab. 1–3: 2 of 5 interleaved with checkdigit, Code 39, Code 128, Codabar

Reference	Designation
HAX0085	Sample Rack Stickers - # 01 to 10
HAX0086	Sample Rack Stickers - # 11 to 20
HAX0087	Sample Rack Stickers - # 21 to 30
HAX0088	Sample Rack Stickers - # 31 to 40
HAX0089	Sample Cup Rack Stickers - # 41 to 50
HAX0090	Sample Cup Rack Stickers - # 51 to 60
HAX0091	Sample Cup Rack Stickers - # 61 to 70
HAX0092	Calibrator Sample Rack Stickers - # 71 to 84
HAX0093	Control Sample Rack Stickers - # 85 to 99

Tab. 1–4: 2 of 5 interleaved without checkdigit, Code 39, Code 128, Codabar

Reagent and calibrator/control stickers - **Ref. HAX0230** are also available in order to identify solutions, calibrators and controls on the reagent racks, calibrator/control reagent racks and calibrator/control sample racks.



Fig. 1–4: Calibrator/control stickers

3. Operational conditions

3.1. Environment

The operation of the **Pentra 400** should be restricted to indoor location use only! Operation of the instrument at altitudes of over 3000 meters (9800 feet) is not recommended.

The instrument is designed for safety from voltage surges according to INSTALLATION CATEGORY II and POLLUTION DEGREE 2 (IEC EN 61010-1).

Please contact your local **HORIBA ABX** representative for any information regarding the operation location when it does not comply with the recommended specifications.

3.2. Location

The **Pentra 400** should be placed on a clean and leveled table or workbench.

Please note that the **Pentra 400** and printer weigh approximately 120 kilograms (265 lbs).

Avoid direct exposure to sunlight.

Place your instrument where it is not exposed to water or vapor.

Place your instrument where it is free from vibration or shock.

Place your instrument where an independent power receptacle can be used. Use a receptacle different from the one used by a device that easily generates noise such as a centrifuge, etc...

Proper ventilation is required on the **Pentra 400**. Provide a space of at least 20 cm (8 inches) at the back of the instrument to prevent overheating of the power supply.



Fig. 1-5: ON/OFF switch and input voltage connection



The ON/OFF switch and the input voltage connection must always be accessible!
When positioning the system for operational use, leave the required amount of space for easy accessibility to these items.

3.3. Grounding

Proper grounding is required when connecting the **Pentra 400** to an electrical power outlet.

Check the wall outlet ground (earth) for proper grounding to the facilities electrical ground. If you are unsure of the outlet grounding, contact your facilities engineer to verify the proper outlet ground!

3.4. Humidity/Temperature conditions

The **Pentra 400** can operate in a temperature range between 15 and 32°C (59 and 90°F) with a temperature gradient not exceeding 2°C per hour.

Relative humidity must be between 20 and 85%.

If the instrument is kept at a temperature lower than 10°C (50°F), it should be allowed to sit for an hour at the correct room temperature before use.

3.5. Electromagnetic environment check

- ◆ The **Pentra 400** has been designed to produce less than the accepted level of electromagnetic interferences in order to operate in conformity with its destination, allowing the correct operation of other instruments also in conformity with their destination.
- ◆ In case of suspected electromagnetic noise, check that the instrument has not been placed in the proximity of electromagnetic fields or short wave emissions i.e. Radars, X-rays, Scanners, Cell phones, etc...

3.6. Environmental protection

▼ Disposal used accessories and consumables

Used accessories and consumables must be collected by a laboratory specialized in elimination and recycling of this kind of material according to the local legislation.

▼ Disposal Pentra 400 instrument

The **Pentra 400** instrument should be disposed of in accordance with local legislation and should be treated as being contaminated with blood. The appropriate biological precautions should be taken.



If any doubt, please contact your local **HORIBA ABX** representative.

▼ European Legislation



In accordance with the European Directive (2002/96/CE, known also as WEEE), instruments having this symbol, and sold into a European country by **HORIBA ABX** or an authorised representative must be disposed of and recycled correctly at the end of its useful life. Due to the local changing regulations in each country, please contact your local representative for detailed and upto date information on how to appropriately dispose of the instrument.

3.7. Transportation and storage conditions

The **Pentra 400** must be stored in a temperature range between -20 and 50°C (-4 and 122°F).



If the **Pentra 400** is switched OFF for one week at least:

- Remove the reagents from the reagent tray and place them in a refrigerated area.
- Then, switch OFF the cooling unit.



Prior to the shipping of an instrument by transporter, whatever the destination, an external decontamination of the instrument must be carried out.

3.8. Installation

An **HORIBA ABX** authorized representative must install your instrument, software, cooling unit and printer.



For further information concerning the cooling unit, please refer to the cooling unit's manual.

Pentra 400

▼ Package contents

The following is a general list providing details of what should be within the instrument delivery:

	Part number	Quantity	Designation
	-	1	Pentra 400 with or without ISE module
	XEA759D	1	Pentra 400 Installation kit
*	DZZ045D DZZ046D DZZ047D DZZ048D	1	Cooling unit 100 V 50-60 Hz Cooling unit 115 V 60 Hz Cooling unit 230 V 50-60 Hz Cooling unit 240 V 50 Hz
*	CBK043A CBK045A	1	Keyboard QWERTY Keyboard AZERTY
*	RAX039E	1	Pentra 400 User manual CD-Rom
*	RAB199DEN RAB199DFR RAB199DDE RAB199DES RAB199DIT RAB199DPT RAB199DDA RAB199DSV RAB199DEL RAB199DPL	1	Pentra 400 Daily guide English Pentra 400 Daily guide French Pentra 400 Daily guide German Pentra 400 Daily guide Spanish Pentra 400 Daily guide Italian Pentra 400 Daily guide Portuguese Pentra 400 Daily guide Danish Pentra 400 Daily guide Swedish Pentra 400 Daily guide Greek Pentra 400 Daily guide Polish
	LAY008A	2	Ethylene glycol 1 L
*	XAA551A XAA505A	1	Printer 220 V Printer 110 V
	XEA815B	1	Accessories and spare parts kit
	LBH004A	2	Tank 10 L
	GBM0418	1	External sample cover
	GBD072A	4	Lifting handles

Tab. 1–5: Package list table

* Depending on country and customer requirements.

3.9. Interconnections

3.9.1. PC connections



Fig. 1–6: PC connections

- 1 - VGA
- 2 - Mouse
- 3 - Keyboard
- 4 - LAN
- 5 - 2 x USB

3.9.2. Distilled water and waste connections

(see [2.1. Input/Output labels](#), page 1-8)

3.9.3. Printer connection

(see [2.1. Input/Output labels](#), page 1-8)

3.9.4. RS232 connection

(see [2.1. Input/Output labels](#), page 1-8)

3.9.5. Cooling unit connections

(see [2.1. Input/Output labels](#), page 1-8)

4. Software overview

The **Pentra 400** includes a control station which software, designed by **HORIBA ABX**, is installed on a loading PC with a twelve inch 800 x 600 touch screen.

Once the instrument has been powered ON, the initialization has taken place and the user name and password have been entered, the Main menu is displayed. The following characters are displayed on the Main menu:

- ◆ Generic toolbar (see [4.1. Generic toolbar description](#), page 1-19)
- ◆ Menu access buttons (see [4.2. Menu access buttons description](#), page 1-21)
- ◆ Reagent and sample tray representation (see [4.3. Description of the reagent and sample tray representation](#), page 1-22)
- ◆ Instrument status buttons (see [4.4. Instrument status buttons description](#), page 1-30).

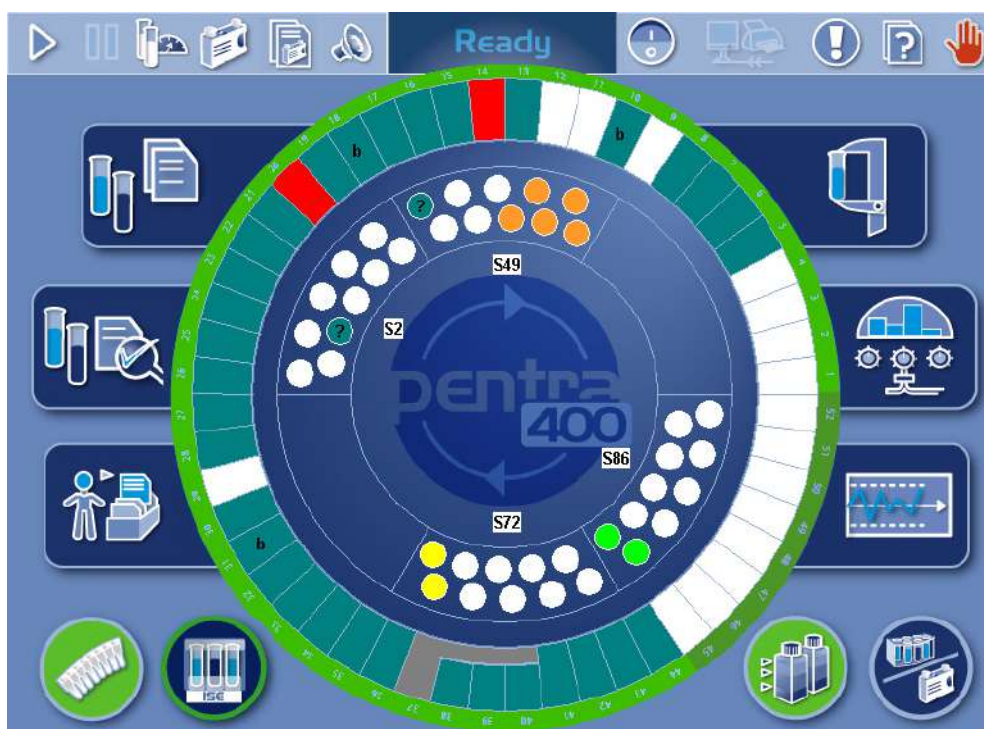


Fig. 1-7: Main menu

A status bar is constantly displayed at the bottom of the screen no matter what menu the operator is using at the time. The status bar displays:

- ◆ the current software version that is presently on the **Pentra 400**
- ◆ the current menu that is in use
- ◆ the current date and time.

In addition, contextual buttons are normally located at the bottom of most menus and windows (see [4.5. Contextual buttons](#), page 1-36).

4.1. Generic toolbar description

The generic toolbar is located at the top of the Main menu and is always displayed and accessible regardless of what menu is open.

Heading/Key	Name	Action	Description
	Start	Runs samples.	-
	Pause	Stops samplings on the sample tray . Then, the sample tray LED turns green.	The instrument turns to «Reagent processing» status, then «Analysing» status.
	Test Review	Opens «Test Review» menu (see 4. Test Review , page 2-81).	Red, until the user clicks, when a sampling alarm or a flag is triggered.
	Reagent Configuration	Opens «Reagent Configuration» menu (see 3. Reagent Configuration , page 4-9).	-
	Reagent Help	Opens the reagent help file.	ABX Pentra Reagent Document Binder + Material Safety Data Sheets.
	Sound Volume	Indicates the sound volume status (see Sound Volume , page 1-20).	-
	Instrument status	Indicates the instrument status (see Instrument status , page 1-20).	-
	Exit	Opens «Shutdown» window.	Displayed only on the Main menu.
	Close	Closes the menu you are working on and returns on the previous one.	Not displayed on the Main menu.
	Data Print/ Send to Host	Prints data/sends data to the Host.	-
	System Warnings	Opens «System Warnings» menu (see 3.1.1. Menu «System Warnings» , page 9-39).	Red , until the user clicks, when a system warning or alarm is triggered. Orange when a maintenance alert is triggered.
	Help	Opens the Pentra 400 help file.	Pentra 400 User manual + Pentra 400 Daily guide.
	Stop	Stops the instrument.	Stop occurs immediately after user confirmation.
	Analyser Initialization	Initializes the instrument.	Displayed only after a stop.

Tab. 1–6: Generic toolbar description

▼ Sound Volume

The «Sound Volume» button indicates the sound volume status:

- **Blue**, the sound is switched ON.
- **Red**, the sound is switched OFF.
- **Grayed**, sound alarms are disabled (see [3.6. Audible alarm](#), page 7-108).

This button also allows the user to manage the sound volume:

- **Simple-click**, stops the sound alarm in progress.
- **Double-click**, switches the sound ON/OFF.

▼ Instrument status

The different instrument status are described in the following table:

Heading/Key	Name	Description
	Start Up	The instrument initializes.
	Ready	The instrument is waiting for analyses.
	Sampling	The instrument performs samplings and analyses.
	Reagent processing	The instrument performs samplings <u>on the reagent tray only</u> and analyses.
	Analysing	The instrument only performs analyses.
	Emergency Stop	The instrument has been stopped by the user or a system alarm.
	Archive	A patient search in archive files is in process (see 2.4. Archive Search , page 3-8).

Tab. 1-7: Instrument status

4.2. Menu access buttons description

Menu access buttons are located on the left and right-hand side of the Main menu. These buttons allow the user to access the main functions of the system.

Heading/Key	Name	Action and Description
	Worklist	Launches «Worklist» menu (see 2. Worklist , page 2-7).
	Result Validation	Launches «Result Validation» menu (see 3. Result Validation , page 2-33).
	Archives	Launches «Archives» menu (see Section 3: Archives , page 3-1).
	Calibration/Control	Launches «Calibration/Control» menu (see Section 5: Calibration and Control , page 5-1).
	Services	Launches «Services» menu (see 1. Menu «Services» overview , page 7-5).
	Quality Control	Launches «Quality Control» menu (see Section 6: Quality Control , page 6-1).

Tab. 1–8: Menu access buttons

4.3. Description of the reagent and sample tray representation

4.3.1. Reagent tray representation

From the Main menu, the reagent tray representation allows the user to visualize the solutions present on the **Pentra 400** and the calibrators/controls configured on the reagent tray.



Fig. 1-8: Reagent tray representation

The 52 positions of the reagent tray are represented.

Each position has a specific color which indicates the solution status (see [Tab. 1-9: «Reagent Status Legend» window](#), page 1-22).

	OK	- For a cassette: indicates that the cassette is available for analyses with sufficient volume. - If «b» is displayed, the cassette will be used as a back-up. - For a reagent rack: indicates that a solution is located on that rack.
	Low volume	There remains less than 10% of the solution initial volume (only for cassette).
	To be checked	The solution is «To be checked» in the following cases: - the cassette is empty - the solution is unknown (bad barcode for example) - not enough solution for the pending analyses - the solution is inactive - the solution has reached its use limit date/has expired.
	Available	The position is empty.
	Control	The position is occupied by a control reagent rack.
	Calibrator	The position is occupied by a calibrator reagent rack.

Tab. 1-9: «Reagent Status Legend» window

The «Reagent Status Legend» window is opened by clicking the blue background outside the tray representation.



◆ Back-up cassette

If several cassettes of the same solution are installed on the reagent tray, then the first installed cassette is activated and the next cassettes are automatically inactivated.

If the automatic back-up cassette option in the «System Configuration» menu (see [3.1.10. Automatic back-up cassette](#), page 7-84) is enabled, the next cassettes are called back-up cassettes and are represented in green tagged with «b».

Back-up cassettes are automatically activated when the cassette in use is empty.

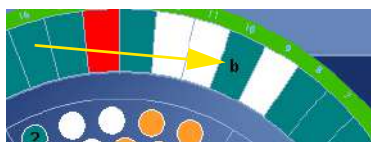


Fig. 1–9: Back-up cassette

By clicking a position on the reagent tray representation, the user visualizes:

- a solution on cassette or reagent rack
- a calibrator/control reagent rack.

Depending on the selected position, the following windows open:

- ◆ [Cassette window](#), page 1-24
- ◆ [Reagent rack window](#), page 1-25
- ◆ [Calibrator/control reagent rack window](#), page 1-26.

▼ Cassette window

This window is divided into two parts:

- the cassette representation (on the left)
- the solution characteristics (on the right).



Fig. 1-10: Cassette window

The solution characteristics fields are described in the following table:

Heading	Description	Format
Solution Name	Solution short name.	7 characters max.
Position	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Tests Available	Number of tests that can be performed with the solution volume remaining into the cassette.	-
Tests to be done	Number of tests to be performed on the samples present on the instrument.	-
Expiry Date	Expiry date before opening.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 1-10: Solution characteristics fields

▼ Reagent rack window

This window is divided into two parts:

- the rack representation (on the left)
- the solution characteristics (on the right).



Fig. 1–11: Reagent rack window

The solution characteristics fields are described in the following table:

Heading	Description	Format
Reagent Rack	Rack ID.	2 characters max.
Tray Position	First position number on the reagent tray.	2 numerical characters: from 1 to 41 and 45 to 49.
Solution Name	Solution short name.	7 characters max.
Position	Rack sector: A, B or C.	-
Tests to be done	Number of tests to be performed on the samples present on the instrument.	-

Tab. 1–11: Solution characteristics fields

▼ Calibrator/control reagent rack window

This window is divided into two parts:

- the rack representation (on the left)
- the calibrator/control characteristics (on the right).

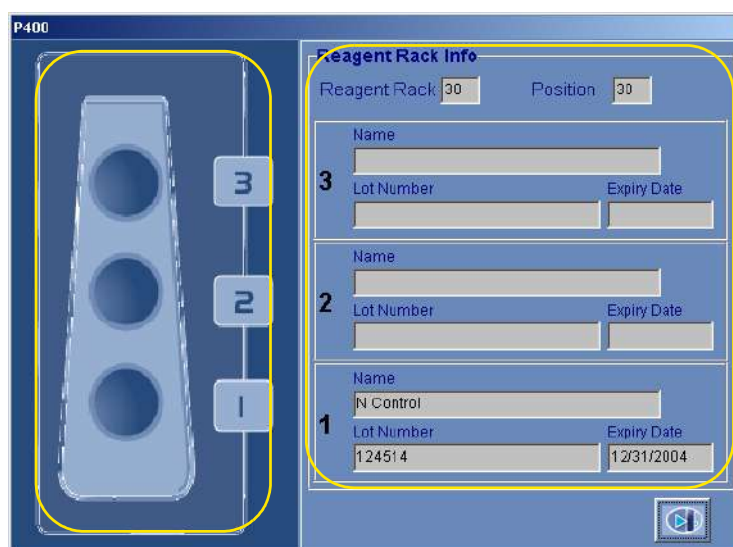


Fig. 1-12: Calibrator/control reagent rack window

The calibrator/control characteristics fields are described in the following table:

Heading	Description	Format
Reagent Rack	Rack ID.	2 characters max.
Position	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Name	Calibrator/control name.	20 characters max.
Lot Number	Calibrator/control lot number.	16 characters max.
Expiry Date	Calibrator/control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 1-12: Calibrator/control characteristics fields

4.3.2. Sample tray representation

From the Main menu, the sample tray representation allows the user to visualize the samples present on the **Pentra 400** and the calibrators/controls configured on the sample tray.



Fig. 1-13: Sample tray representation

Each position has a specific color which indicates the sample status (see [Tab. 1-13: «Sample Status Legend» window](#), page 1-27).

	Available	The sample is validated.
	In progress	The sample is pending, incomplete or for validation.
	For verification	The sample must be checked because of a sampling alarm.
	Empty	The position is available.
	Control	The position is occupied by a control.
	Calibrator	The position is occupied by a calibrator.

Tab. 1-13: «Sample Status Legend» window

The «Sample Status Legend» window can be opened by clicking the blue background inside the tray representation.



◆ Unknown

If a sample tube is physically detected but not yet associated to a request in the Worklist, the sample tube is unknown. Unknown positions are represented in dark green tagged with «?».



Fig. 1–14: Unknown

By clicking a rack on the sample tray representation, the user is able to visualize the samples present on the rack and the calibrators/controls configured on the rack.

The «Sample Rack Characteristics» window opens:

P400

Sample Rack Characteristics

Rack: 49

Position	Status	Run date	Sample ID	Patient ID
49.01	Ordered		1001	
49.02	Ordered		1002	
49.03	Ordered		1003	
49.04	Ordered		1004	
49.05	Ordered		1005	
49.10				

Navigation icons: Previous, Next, Play/Pause.

Fig. 1–15: Sample Rack Characteristics

Fields for this window are described in the following table:

Heading	Description	Format
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Status	Pending, Incomplete, For validation or Validated.	-
Run date	Date of sample run.	Depending on the date format chosen (see System Date and Time , page 7-87).
Sample ID	Sample ID.	16 characters max.
Patient ID	Patient ID.	25 characters max.
Last Name	Patient last name.	20 characters max.
Sample Type	Serum/plasma, Urine or Other	-

Tab. 1–14: Sample Rack Characteristics

4.4. Instrument status buttons description

Instrument status buttons are located at the bottom of the Main menu. These buttons inform the user about the status of the following parts of the instrument:

- ◆4.4.1. [Cuvette Status](#), page 1-30
- ◆4.4.2. [Tank Status](#), page 1-30
- ◆4.4.3. [ISE Module Status](#), page 1-31
- ◆4.4.4. [Work Balance](#), page 1-33.

4.4.1. Cuvette Status



By clicking the «Cuvette Status» button, the «Cuvettes» window opens.
This window shows the status of:

- the rack of new cuvettes (> 1 or < 1)
- the rack of used cuvettes (OK or Full).



Fig. 1-16: «Cuvettes» window

4.4.2. Tank Status



By clicking the «Tank Status» button, the «Tank Status» window opens.
This window shows the status of:

- the waste tank (Empty or Full)
- the distilled water tank (Empty or Full).



Fig. 1-17: «Tank Status» window

4.4.3. ISE Module Status



- The «ISE Module Status» button allows the user to check the ISE module status.
- When the button is blue with a green circle, the ISE module is available and the calibrations are finished.
 - When the button is blue with a blue circle, the ISE module is occupied (performing the calibrations for example).
 - When the button is blue with a red circle, this indicates an error on the calibrations.
 - When the button is red, this indicates an error on the ISE module.
 - When the button is disabled, the ISE module is disabled (see [3.1.9. ISE Module](#), page 7-84).

By clicking the «ISE Module Status» button, the ISE module status screen opens.

Calibration date: 08/29/2006 09:26:52					
Chloride Calibration					
Slope	Intercept	1 Point Cal Error	mV(1)	2 Point Cal Error	mV(2)
-47.77070	143.51840		48.0		39.6
Potassium Calibration					
Slope	Intercept	1 Point Cal Error	mV(1)	2 Point Cal Error	mV(2)
52.33749	-45.44630		-13.9		-1.2
Sodium Calibration					
Slope	Intercept	1 Point Cal Error	mV(1)	2 Point Cal Error	mV(2)
51.00070	-117.03990		-10.0		1.6
Calibrate					

Fig. 1-18: ISE module status screen

The ISE module status screen displays the last results of:

- Chloride Calibration
- Potassium Calibration
- Sodium Calibration

(see [Tab. 1-15: ISE calibration results](#), page 1-32).

Moreover, the «Calibrate» button allows the user to perform a 2-point calibration. This button is disabled if the ISE module is occupied.



- ◆ If an electrode is inactivated, then the calibration part corresponding to this electrode is disabled.
- ◆ The user is able to activate/inactivate the three electrodes from the «Customer Services» menu (see [4.2.1. Activated electrode](#), page 7-122).

Heading	Description	Format
Slope	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from -99.99999 to 99.99999.
Intercept	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.
1-point Cal Error	Calibration error for the low point of the calibration. (see Calibration errors , page 1-32).	-
mV(1)	Low value of the calibration in mV.	3 numerical characters max. + one decimal position.
2-point Cal Error	Calibration error for the high point of the calibration. (see Calibration errors , page 1-32).	-
mV(2)	High value of the calibration in mV.	3 numerical characters max. + one decimal position.

Tab. 1-15: ISE calibration results



Calibration errors

- ◆ Sensibility error (triggered by the ISE error code 050).
- ◆ Offset error (triggered by the ISE error code 051).
- ◆ Repeatability error (triggered by the ISE error code 052).
- ◆ Response error (triggered by the ISE error code 055).

The ISE error codes are described in [Tab. 7-100: ISE error codes](#), page 7-125.

The expected values of the slope and the sensitivity (= difference between the low and high standard values) for each electrode are given in the following table:

Electrode	Slope normal range (mV/dec)	Sensitivity normal range (mV)
Chloride	- 53.0 to - 23.0	5.0 - 9.4
Potassium	37.0 to 67.0	9.0 - 16.3
Sodium	38.0 to 59.0	8.5 - 14.4

Tab. 1-16: Slope and sensitivity normal range for each electrode

4.4.4. Work Balance

▼ Access to the «Work Balance» menu

Press the «Work Balance» button from the Main menu.

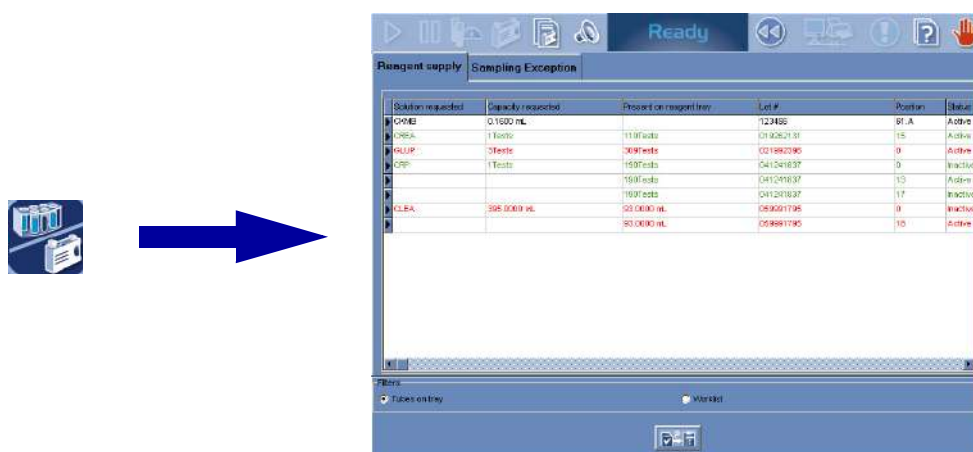


Fig. 1-19: «Work Balance» menu access button

The **Pentra 400** checks the patient samples and the calibrators/controls present on the sample tray as the solutions and the calibrators/controls present on the reagent tray.

Then, the «Work Balance» menu displays:

- the pending tests regarding the patient samples and the calibrators/controls present on the trays or in the Worklist
- the available tests regarding the solutions present on the reagent tray
- the tests that will be associated to sampling alarms.



ISE tests are not taken into account in the «Work Balance» menu.

This menu is divided into two tabs:

- ◆ **Reagent supply**, page 1-34
- ◆ **Sampling Exception**, page 1-35.

Click or press one of the tabs to access the various functions.

▼ Reagent supply

The «Reagent supply» tab displays the pending and available tests.

The user is able to display the pending tests either regarding the patient samples and the calibrators/controls present on the trays or regarding the patient samples and the calibrators/controls present in the Worklist by using the selective filter.

- Tubes on tray: only the patient samples and the calibrators/controls present on the trays are taken into account.
- Worklist: all patient samples and calibrators/controls present in the Worklist are taken into account.



The «Host request» button allows the user to manually ask the Host for supplementary tests on validated patient samples present on the sample tray.

This function is disabled if the Query mode is not configured (see 3.3.2. Query Mode, page 7-95).

Columns of the «Reagent supply» tab are described in the following table:

Heading	Description	Format
Solution requested	Solution short name.	7 characters max.
Capacity requested	- For solutions on cassette: Number of pending tests (in Tests). - For solutions on reagent rack: Solution volume needed to perform the pending tests (in mL).	
Present on reagent tray	Only for solutions on cassette. - For reagents: Number of available tests regarding the solution volume remaining into the cassette (in Tests). - For diluents or cleaners: Solution volume remaining into the cassette (in mL).	
Lot #	Solution lot number.	16 characters max.
Position	- For solutions on cassette: Position number on the reagent tray (from 1 to 52). - For solutions on reagent rack: Position number on the reagent tray (from 1 to 52) + Rack sector (A, B or C).	
Status	Solution status: Active or Inactive.	-
On tray	If checked, the solution is present on the reagent tray.	Check box

Tab. 1-17: «Reagent supply» tab description

Each item corresponds to a solution needed to perform the pending tests.

- ◆ The red color means that the solution will be missing.
- ◆ The green color means that the solution volume remaining into the cassette is sufficient.
- ◆ The Work Balance is effective only when working with solutions on cassette. The black color indicates that the solution is not packaged in cassette.

▼ Sampling Exception

The «Sampling Exception» tab displays the tests that will be associated to sampling alarms.

The user is able to display the tests either regarding the patient samples and the calibrators/controls present on the trays or regarding the patient samples and the calibrators/controls present in the Worklist by using the selective filter.

- Tubes on tray: only the patient samples and the calibrators/controls present on the trays are taken into account.
- Worklist: all patient samples and calibrators/controls present in the Worklist are taken into account.



The «Host request» button allows the user to manually ask the Host for supplementary tests on validated patient samples present on the sample tray.
This function is disabled if the Query mode is not configured (see 3.3.2. Query Mode, page 7-95).

Columns of the «Sampling Exception» tab are described in the following table:

Heading	Description	Format
Sample ID	Sample ID (see Sample ID , page 1-35).	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Test	Application short name.	7 characters max.
Sampling Alarms	Sampling alarm.	-
	Sampling alarm button. If available, displays additional information about the sampling alarm.	-
Sampling Alarm Date	Date and time of sampling alarm.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 1–18: «Sampling Exception» tab description

◆ Sample ID

- For calibration tests, the field is yellow and displays the calibrator name or BLANK for a reagent blank.
- For control tests, the field is green and displays the control name.



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

4.5. Contextual buttons

Contextual buttons are displayed at the bottom of most menus and windows of the **Pentra 400** software.

Heading/Key	Name	Description
	Edit	Allows the user to access modification function.
	OK	Validates an action.
	Cancel	Cancels an action.
	Close	Closes the active window.
	Add new	Adds data.
	Rerun	Reruns a sample.
	Delete	Deletes data.
	Erase	Erases data.
	Details	Details/displays supplementary information.
	Previous	Goes to previous file.
	Next	Goes to next file.

Tab. 1-19: Contextual buttons

4.6. Miscellaneous

4.6.1. Generic toolbar and buttons use

The generic toolbar and all buttons of the **Pentra 400** software are accessible either by pressing the screen with a finger or by clicking with the mouse.

They can be enabled or disabled according to the instrument or software status.



Enabled



Disabled

4.6.2. Hints

Hints can be displayed by moving and keeping the cursor on the generic toolbar or menu access buttons.

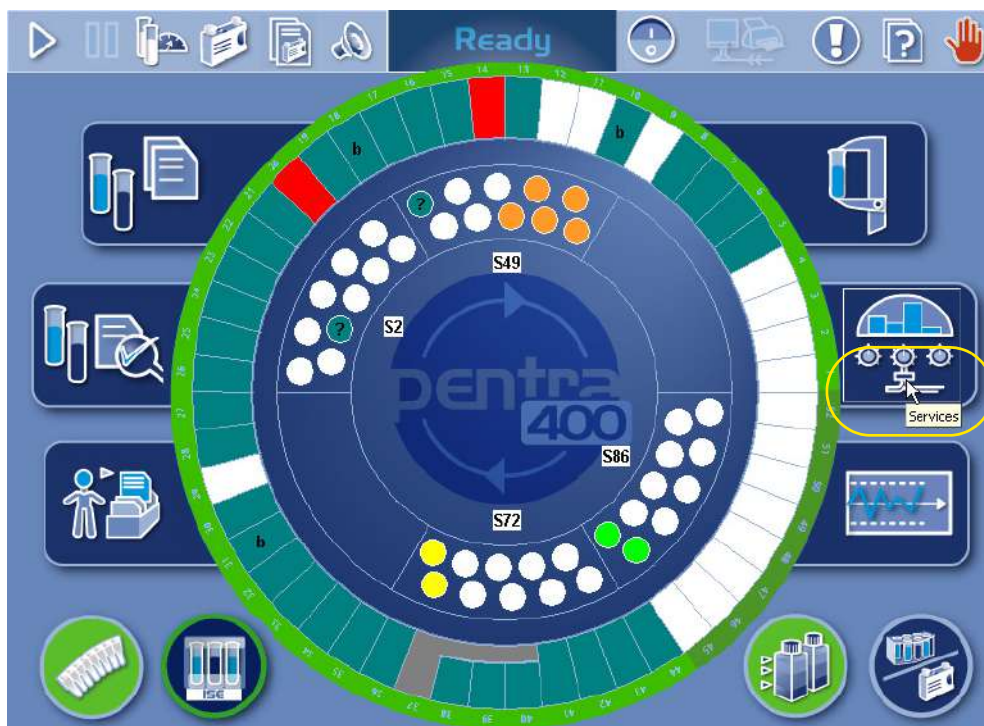


Fig. 1–20: Hints

4.6.3. Tabs description

Tabs are used to group miscellaneous functions in the same menu.

Click or press one of the tabs to access the various functions.

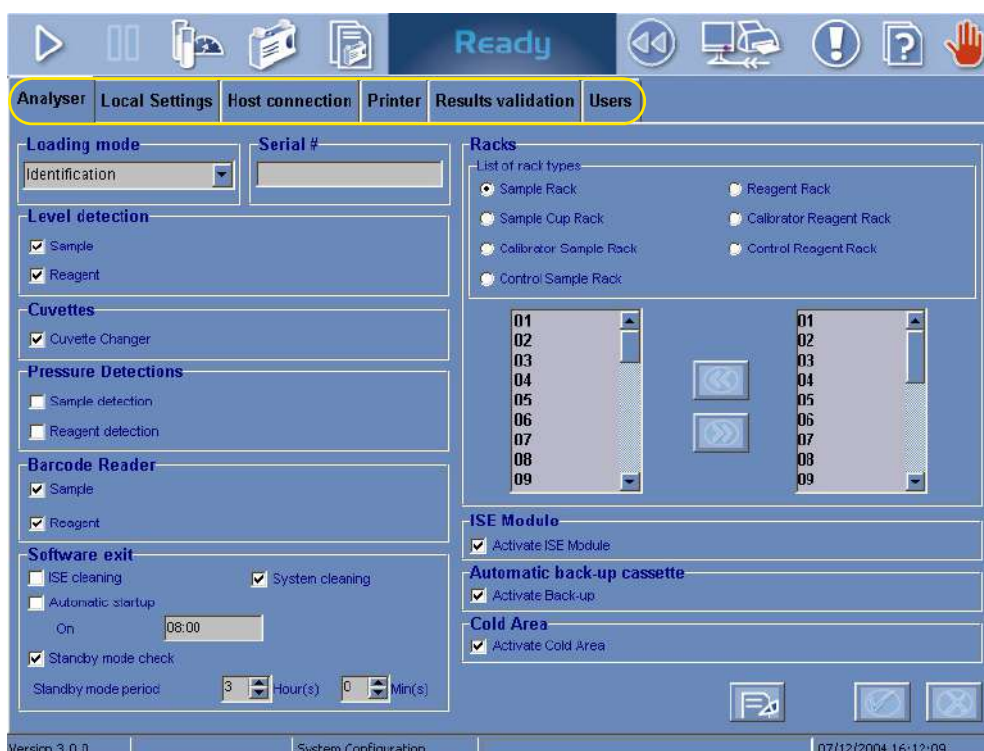


Fig. 1–21: Tabs

4.6.4. Scrolling list

It is a little menu including a list of options and sometimes a free field to edit new data.

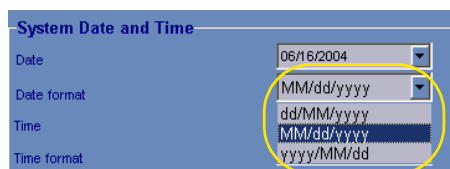


Fig. 1–22: Scrolling list

4.6.5. Check box

A check box enabled or disabled an option.



Fig. 1–23: Check box

4.6.6. Radio button

Selection between options excluding each other.

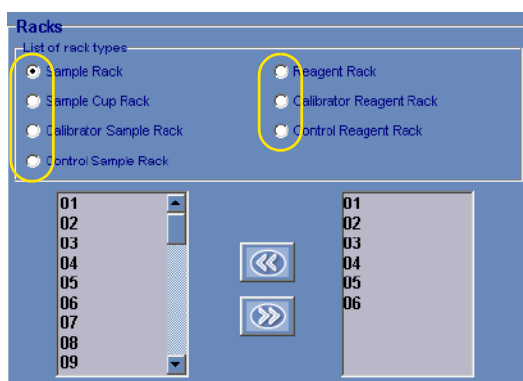


Fig. 1–24: Radio button

4.6.7. Fields

Rectangle area used to input or display data such as Name, Date ...

Some fields have predefined format: Date, Number, Text ...

The fields are modifiable when they appears in white.

The «Tab» key moves the cursor from one field to the next one.

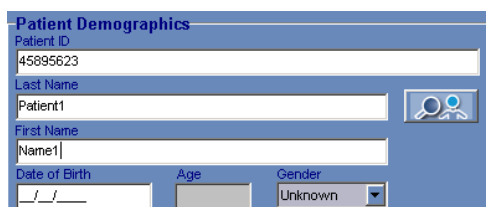


Fig. 1–25: Fields

4.6.8. Sliders

When data cannot be displayed in the same window, an horizontal or vertical slider appears. Drag it or click the arrows to display the other part of the window.

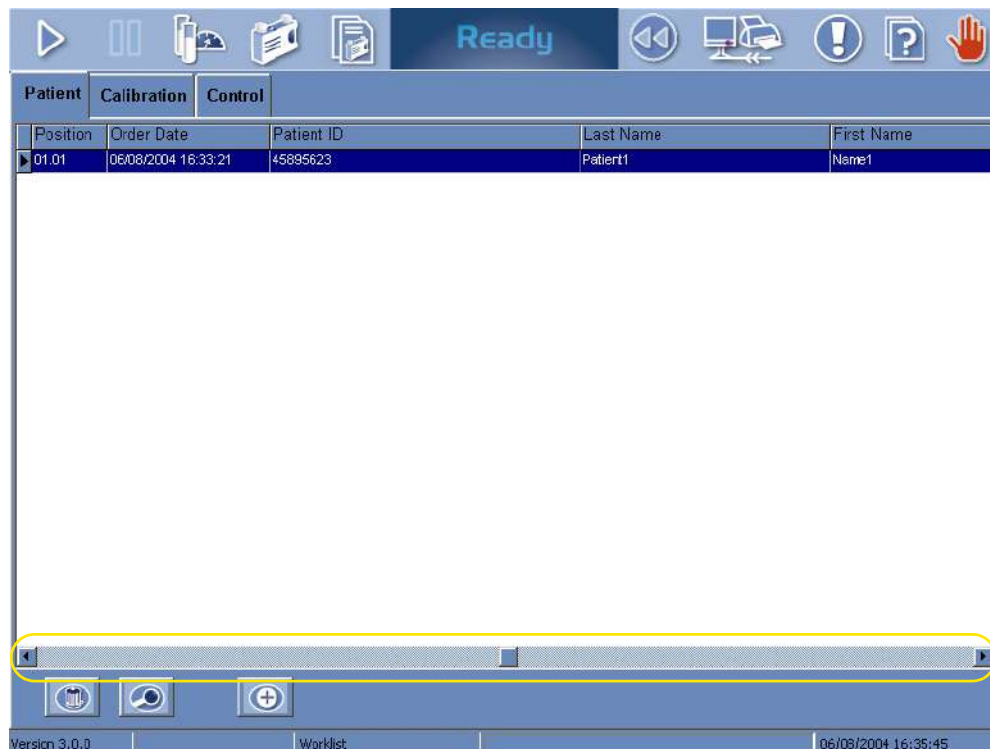


Fig. 1–26: Sliders

4.6.9. Column configuration

The column configuration (column order and size) is modifiable by the user in most lists of the **Pentra 400** software (Worklist, Result list). Moreover, this configuration is kept in memory by the instrument.

- ◆ Column order: Click and drag the column in order to move it.
- ◆ Column size: Move the cursor between two columns, and it will change into a double arrow. Click and drag the line between the two columns in order to change their size.

4.6.10. Scientific notation

All fields that display a concentration value have the following format:

"6 numerical characters max. +
decimal position configured (see [Result](#), page 7-16)
with 7 significant digits max."

If the concentration value is too high to be displayed with this format, the scientific notation is used. The value is then displayed as follows: «1.234567E+38» for example.

5. Printer

HORIBA ABX recommends to use the printer supplied with the instrument.

An alternative printer may also be installed. In this case, **HORIBA ABX** is not liable for the quality or layout of printouts.

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1. General points

1.1. Sample materials

Samples such as serum, plasma, urine, CSF, whole blood and homogeneous fluids are to be used on the **Pentra 400**. Standard Laboratory Collection Procedures must be applied.



Consider all Specimens, Reagents, Calibrators, Controls, etc... that contain human blood or serum as potentially infectious! Use established, good laboratory working practices when handling specimens. Wear protective gear, Gloves, Lab coats, Safety glasses and/or Face shields, and follow other bio-safety practices as specified in OSHA Blood borne Pathogens Rule (29 CFR part 1910. 1030) or equivalent bio-safety procedures.



Warning! All accessible surfaces of the instrument can be potentially contaminated by human blood or serum. Disposal gloves and white coat must be worn by the operator. Local and national regulations must be applied in all the operations.



Ensure that a sufficient sample volume without air bubbles or foam is placed on the instrument.

Refer to each reagent notice to determine the sample volume required (see the «Sample volume» part in the paragraph «Performance on ABX Pentra 400») and take into account the following dead volumes.

Dead volumes:

- Primary and secondary tubes: 1 mL.
- Sample cups: 100 µL.

For any further information or special care regarding samples such as pretreatment or sample stability, please refer to the corresponding reagent notice.

1.2. Sample status

In this section and the following ones, the notion of Sample status will be used. The different Sample status are described in the following table:

Sample status	Description
Ordered	The request is captured in the Worklist.
Pending	The sample is read on the sample tray.
Incomplete	At least one test of the sample is pipetted.
For validation	All tests of the sample are finished and for validation.
Validated	All tests of the sample are validated.
Archived	The sample is archived.

Tab. 2–1: Sample status description

1.3. Sample tray representation

From the Main menu, the sample tray representation allows the user to visualize the samples present on the **Pentra 400** and the calibrators/controls configured on the sample tray.

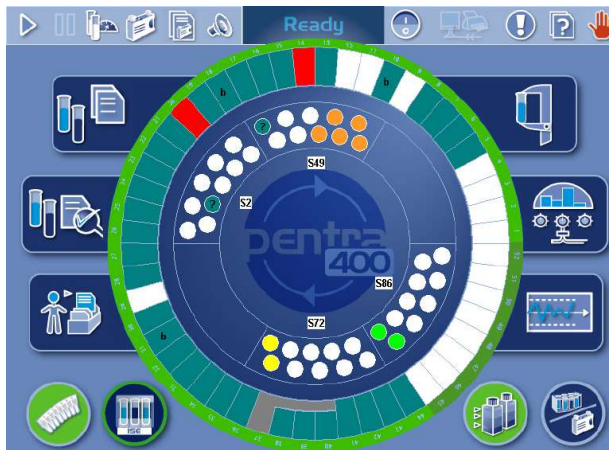


Fig. 2-1: Sample tray representation

Each position has a specific color which indicates the sample status (see [Tab. 2-2: «Sample Status Legend» window](#), page 2-4).

	Available	The sample is validated.
	In progress	The sample is pending, incomplete or for validation.
	For verification	The sample must be checked because of a sampling alarm.
	Empty	The position is available.
	Control	The position is occupied by a control.
	Calibrator	The position is occupied by a calibrator.

Tab. 2-2: «Sample Status Legend» window

The «Sample Status Legend» window can be opened by clicking the blue background inside the tray representation.



◆ Unknown

If a sample tube is physically detected but not yet associated to a request in the Worklist, the sample tube is unknown. Unknown positions are represented in dark green tagged with «?».

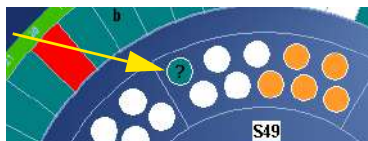


Fig. 2-2: Unknown

By clicking a rack on the sample tray representation, the user is able to visualize the samples present on the rack and the calibrators/controls configured on the rack.

The «Sample Rack Characteristics» window opens:

P400

Sample Rack Characteristics

Rack: 49

Position	Status	Run date	Sample ID	Patient ID
49.01	Ordered		1001	
49.02	Ordered		1002	
49.03	Ordered		1003	
49.04	Ordered		1004	
49.05	Ordered		1005	
49.10				

Fig. 2-3: Sample Rack Characteristics

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Fields for this window are described in the following table:

Heading	Description	Format
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Status	Pending, Incomplete, For validation or Validated.	-
Run date	Date of sample run.	Depending on the date format chosen (see System Date and Time , page 7-87).
Sample ID	Sample ID.	16 characters max.
Patient ID	Patient ID.	25 characters max.
Last Name	Patient last name.	20 characters max.
Sample Type	Serum/plasma, Urine or Other	-

Tab. 2-3: Sample Rack Characteristics

2. Worklist

2.1. Introduction

The Worklist is a list of requests corresponding to the daily work load. It groups all requests for patients, calibrations and controls. Each item of the Worklist corresponds to one request and each request is allocated to a specific sample.

The Worklist contains the requests of samples that are:

- ordered
- pending
- incomplete.

As soon as samplings of an incomplete sample are finished, the request is deleted from the Worklist. The file is then transferred to the Result list.

▼ Access to the «Worklist» menu

Press the «Worklist» button from the Main menu.

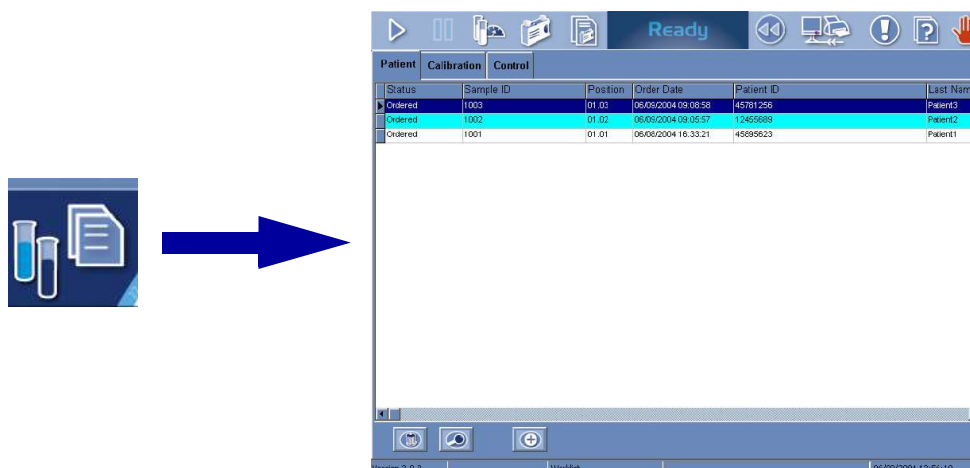


Fig. 2-4: «Worklist» menu access button

Worklist items are divided into three tabs:

- ◆ 2.2. Patient, page 2-8
- ◆ 2.3. Calibration, page 2-23
- ◆ 2.4. Control, page 2-27.

Click or press one of the tabs to access the various functions.

2.2. Patient

This section describes the **Pentra 400** management of patient samples and the Worklist functions in the following chapters:

- ◆ [2.2.1. Sample identification](#), page 2-8
- ◆ [2.2.2. Patient file](#), page 2-11
- ◆ [2.2.3. Loading Worklist from the Host](#), page 2-11
- ◆ [2.2.4. Worklist table](#), page 2-12
- ◆ [2.2.5. Request capture screen](#), page 2-14
- ◆ [2.2.6. Stat](#), page 2-21
- ◆ [2.2.7. New Worklist](#), page 2-21.

2.2.1. Sample identification

Requests in the Worklist are identified by a unique sample number named Sample ID. The Sample ID is either captured by the operator or automatically assigned by the instrument as follows: «AUTO_SIDXXXXXXX».

If the operator enters a Sample ID that already exists in the Worklist, all information about this Sample ID are then displayed (Patient Demographics, Sample Characteristics, Test selection).

As soon as the **Pentra 400** analysis process begins on a sample tube, an associated request is searched in the Worklist upon two criteria:

- ◆ the barcode Sample ID (see [Identification mode](#), page 2-9)
- ◆ the rack position of the sample tube (see [Position mode](#), page 2-10).



It is important to define the laboratory working method:

- ◆ systematic use of barcodes, then Identification mode has to be configured
- ◆ if barcodes are not used, then Position mode has to be configured (see [3.1.1. Loading Mode](#), page 7-79).

When the corresponding request is found, instrument automatically performs the analysis requested in the Worklist. Requests are deleted from the Worklist as soon as the analysis have been performed. The file is then transferred to the Result list.

The association between sample tube and request can be made only on the two following conditions.

- ◆ The sample tube must be present on the tray.
If a request exists in the Worklist but the associated sample tube is not found on the tray, sample tube and request are UNMATCHED and the sample request stays pending.
- ◆ The request must exist in the Worklist.
If a sample tube is read on the tray and no associated request is found in the Worklist, the sample tube is displayed as unknown on the Main menu (see [Unknown](#), page 2-5).

▼ Identification mode

The Identification mode is recommended on the **Pentra 400** as it ensures security and flexibility.

As soon as the **Pentra 400** reads the barcode label, the associated Sample ID is searched in the Worklist.

For example, the read barcode is «123» and the Sample ID «123» is found in the Worklist.

Sample tube and request are **MATCHED**.

In the Worklist, the rack position of the tube is filled by the instrument.

The Identification mode is made to use barcode Sample ID, however it is possible to force a rack position using the «Position» button (see [Patient Demographics and Sample Characteristics description](#), page 2-15). In that case, the following cases can occur.

- ◆ The rack position 01-01 has been forced in the Worklist and a tube (without barcode label) is found on position 01-01.
Sample tube and request are **MATCHED**.
- ◆ The rack position 01-01 has been forced in the Worklist and a tube (with barcode label) is found on position 01-01.
 - The «Sample ID» field has not been filled by the operator, it is then filled by the instrument. The «Sample ID» field is identical to the read barcode. Sample tube and request are **MATCHED**.
 - The «Sample ID» field has not been filled by the operator, it is then filled by the instrument. The «Sample ID» field is different from the read barcode. Sample tube and request are **MISMATCHED**.
 - The «Sample ID» field has been filled by the operator and it is identical to the read barcode. Sample tube and request are **MATCHED**.
 - The «Sample ID» field has been filled by the operator and it is different from the read barcode. Sample tube and request are **MISMATCHED**.



Forcing a rack position, the user must ensure that the sample tube is physically positioned as programmed in the Worklist.

▼ Position mode

The identifier is given by the rack position of the sample tube.

In this mode, the request must contain the rack position of the tube. The «Sample ID» field is available but not mandatory.



Using the Position mode, the user must ensure that the sample tube is physically positioned as programmed in the Worklist.

As soon as the **Pentra 400** reads a sample tube on the tray, the associated rack position is searched in the Worklist. The following cases can occur.

- ◆ The read tube is on position 01-01, the rack position 01-01 is found in the Worklist and there is no barcode label on the tube.
Sample tube and request are MATCHED.
- ◆ The read tube is on position 01-01, the rack position 01-01 is found in the Worklist and a barcode label is read on the tube.
 - The «Sample ID» field has not been filled by the operator, it is then filled by the instrument. The «Sample ID» field is identical to the read barcode. Sample tube and request are MATCHED.
 - The «Sample ID» field has not been filled by the operator, it is then filled by the instrument. The «Sample ID» field is different from the read barcode. Sample tube and request are MISMATCHED.
 - The «Sample ID» field has been filled by the operator and it is identical to the read barcode. Sample tube and request are MATCHED.
 - The «Sample ID» field has been filled by the operator and it is different from the read barcode. Sample tube and request are MISMATCHED.



Normally in this mode, barcode labels are not used. However if a barcode label is read on the tube, it has priority.

2.2.2. Patient file

Patient file groups demographic data of the patient. A patient file is identified by a unique patient number named Patient ID. The Patient ID is either captured by the operator or automatically assigned by the instrument as follows: «AUTO_PIDXXXXXXX».



At least one field of the Patient Demographics must be filled so that the instrument automatically assigns the Patient ID.

If the operator enters a Patient ID which already exists, demographic data linked to the Patient ID are displayed.

Demographic data of the patient are modifiable from the instrument only if they have been manually created from the instrument. If demographic data have been transmitted by the Host, they can be only modified from the Host. When a patient file is modified (by the operator or the Host), all validated and archived Sample ID for this patient are flagged with a «*».

2.2.3. Loading Worklist from the Host

Bidirectional connection allows loading of the Worklist from the Host.

Requests loaded from the Host are always identified by Identification mode.

Modification of requests loaded from the Host:

- ◆ Patient Demographics and Sample Characteristics, except the Priority parameter, cannot be manually modified from the instrument. They can be only modified from the Host.
- ◆ Requested tests/ratios can be manually modified from the instrument (addition, deletion of tests/ratios; modification of the number of replicates).

2.2.4. Worklist table

Patient samples which are ordered, pending or incomplete are displayed in the Worklist table. They are sorted by patients and then by creation dates. The separation between patients is materialized by the color of lines (alternation blank/blue).



Status	Sample ID	Position	Order Date	Patient ID	Last Name
Ordered	1003	01.03	06/09/2004 09:08:58	45781256	Patient3
Ordered	1002	01.02	06/09/2004 09:05:57	12455689	Patient2
Ordered	1001	01.01	06/08/2004 16:33:21	45895623	Patient1

Fig. 2-5: Worklist table

Item creation, in the Worklist table, occurs in the following cases:

- ◆ a request is manually created on the instrument
- ◆ a request is loaded from the Host
- ◆ a rerun or supplementary tests are requested from the «Result Validation» menu.

Item deletion, from the Worklist table, happens in the following cases:

- ◆ samplings of an incomplete sample are finished
- ◆ a request which sample is ordered or pending is deleted
- ◆ creation of a new Worklist (see [2.2.7. New Worklist](#), page 2-21).

Columns of the Worklist table are described in the following table:

Heading	Description	Format
Status	Sample status: Ordered, Pending or Incomplete.	-
Sample ID	Sample ID.	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Order Date	Date of request creation.	Depending on the date format chosen (see System Date and Time , page 7-87).
Patient ID	Patient ID.	25 characters max.
Last Name	Patient last name.	20 characters max.
First Name	Patient first name.	20 characters max.

Tab. 2–4: Worklist table description

▼ Worklist table functions

From the Worklist table, the user is able to create, delete or display a request using the following functions:

Heading/Key	Name	Function
	Add new	Creation of a request. Opens the request capture screen in Addition mode (see Addition mode , page 2-18).
	Delete	Deletion of the selected item (the sample must be ordered or pending). Disabled if no item is selected or if the sample is incomplete.
	Details	Display a request. Opens the request capture screen in Display mode (see Display mode , page 2-18). Function also accessible by double-clicking an item.

Tab. 2–5: Worklist table functions

2.2.5. Request capture screen

This chapter describes the request capture screen, its different use modes and functions in the following parts:

- ◆ [Description of the request capture screen](#), page 2-14
- ◆ [Addition mode](#), page 2-18
- ◆ [Display mode](#), page 2-18
- ◆ [Edition mode](#), page 2-19
- ◆ [Search patient](#), page 2-20
- ◆ [Forcing a rack position in Identification mode](#), page 2-20.

▼ Description of the request capture screen

The request capture screen is divided into the three following parts:

- Patient Demographics
- Sample Characteristics
- Test selection.

The screenshot shows the 'Request capture screen' of the Pentra 400 software. The interface is organized into three main panels: 'Patient Demographics', 'Samples Characteristics', and a 'Test' selection grid. The 'Patient Demographics' panel contains fields for Patient ID (45781212), Last Name (Patient4), First Name (Name4), Date of Birth, Age, and Gender (Unknown). The 'Samples Characteristics' panel includes fields for Sample ID (1004), Rack (1), Pos. (4), Sample type (Serum / Plasma), Priority (Normal), Department, Physician, Comment, and Collection Date (06/09/2004). The 'Test' selection grid displays a list of tests with checkboxes, where GluP, Trigly, and C_Chol are selected. The interface also features a top toolbar with navigation icons and a status bar at the bottom showing Version 3.0.0, Worklist, and the date/time 06/09/2004 13:58:25.

Fig. 2-6: Request capture screen

◆ Patient Demographics and Sample Characteristics are described in the following table:

	Heading	Description	Format
Patient Demographics	Patient ID	Patient ID (see Patient and Sample ID , page 2-16).	25 characters max.
		Search patient button (see Search patient , page 2-20).	-
	Last Name	Patient last name.	20 characters max.
	First Name	Patient first name.	20 characters max.
	Date of Birth	Patient date of birth.	Depending on the date format chosen (see System Date and Time , page 7-87).
	Age	Patient age. Field automatically calculated.	3 numerical characters max.
	Gender	Man, Woman or Unknown.	Scrolling list
Sample Characteristics		Displayed when Patient Demographics have been loaded or modified from the Host.	-
	Sample ID	Sample ID (see Patient and Sample ID , page 2-16).	16 characters max.
	Rack	Rack number in which the tube is placed.	2 numerical characters
	Pos.	Tube position in the rack.	2 numerical characters
		Position button (see Forcing a rack position in Identification mode , page 2-20).	-
	Sample type	Serum/plasma, Urine or Other.	Scrolling list
	Priority	Normal or High.	Scrolling list
		Displayed when Sample Characteristics have been loaded or modified from the Host.	-
	Department	Department requesting the tests.	20 characters max.
	Physician	Physician requesting the tests.	20 characters max.
	Comment	Comment about the sample.	50 characters max.
	Collection Date	Date and time of the sample collection.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2–6: Patient Demographics and Sample Characteristics description



◆ Patient and Sample ID

In order to ensure security of patient and sample identification, the character «Space» is allowed in the «Patient ID» and «Sample ID» fields only when this one is placed inside the data capture.

On the other hand, the character «Space» is not authorized and is systematically deleted when this one is the first or the last character of the capture.

This rule also applies to the Host connection and the sample barcodes of the following types: Code 39 and Code 128.

See also [3.3.3. Handling spaces](#), page 7-95.

◆ Test selection

The test selection part groups two tabs:

- Test
- Profile.

The «Test» tab displays the tests and ratios enabled according to the selected sample type.

Tests and ratios are requested by checking the corresponding boxes. A ratio choice leads to check all the tests defined for the ratio, so the tests linked to the ratio cannot be unchecked.

The number of replicates for each test is programmable by using the arrows indicated on the following figure (from 1 to 20 replicates).

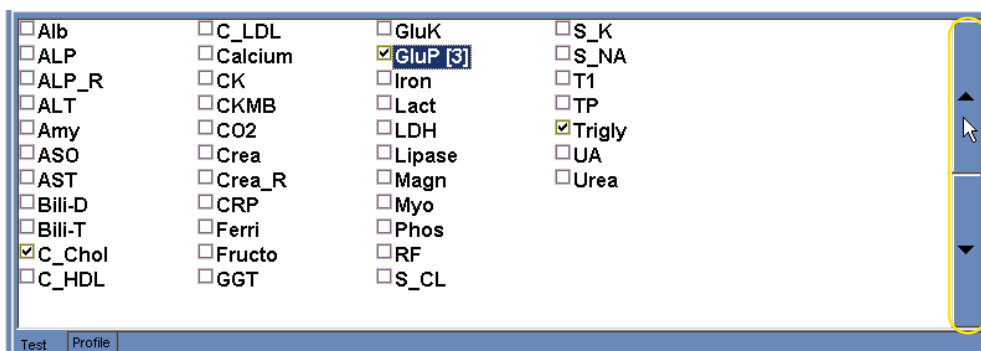


Fig. 2-7: Number of replicates programming

Requested tests and ratios can be cancelled either one after another by unchecking the corresponding boxes or all at the same time by using the «Erase» button (see [Tab. 2-8: Addition mode contextual buttons](#), page 2-18).

The display and meaning of check boxes are described in the following table.

	1- Test/ratio not requested and corresponding reagent enabled: The test/ratio can be requested. 2- Test/ratio not requested and corresponding reagent disabled: The test/ratio cannot be requested (except for requests loaded from the Host). 3- Test/ratio requested but not in progress: The test/ratio can be cancelled by unchecking the box. The number of replicates can be modified. 4- Test/ratio requested and in progress: The test/ratio cannot be cancelled. The number of replicates can be increased but not decreased. 5- Test/ratio requested but corresponding reagent disabled: The test/ratio cannot be cancelled. The number of replicates cannot be modified.

Tab. 2–7: Display and meaning of check boxes

When a test/ratio is requested and in progress for a sample, the test/ratio cannot be requested again until the previous result is validated.

The «Profile» tab displays the profiles, configured in the «Application Configuration» menu (see [2.7. Profiles](#), page 7-65), according to the selected sample type.

Profiles are requested by clicking the corresponding keys. A profile choice leads to check all the tests included in the profile, so the tests linked to the profile are automatically checked in the «Test» tab.

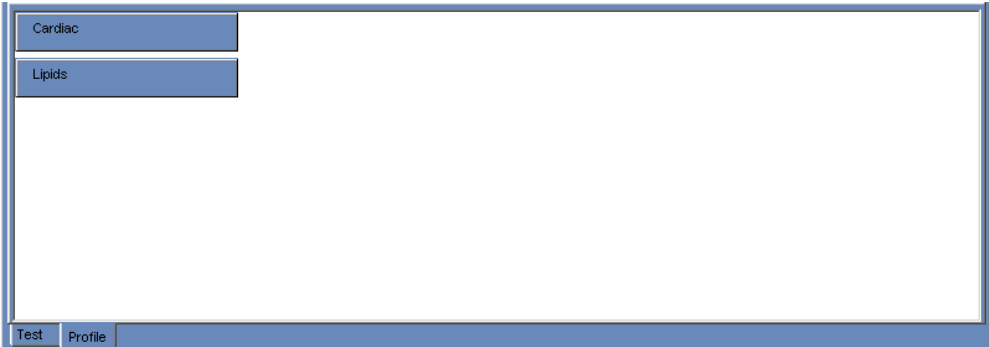


Fig. 2–8: «Profile» tab

▼ Addition mode

From the Worklist table, the user is able to create a request by pressing the «Add new» button (see [Tab. 2-5: Worklist table functions](#), page 2-13). The request capture screen opens in Addition mode. In this mode, the request capture screen opens with all fields blank.

To create the request, fill Patient Demographics and Sample Characteristics (see [Tab. 2-6: Patient Demographics and Sample Characteristics description](#), page 2-15).

Select the tests, ratios and/or profiles to be performed by checking the corresponding boxes (see [Test selection](#), page 2-16).

Then, press the «OK» button to validate the request.

The Addition mode contextual buttons are described in the following table:

Heading/Key	Name	Function
	OK	Validation of a new request.
	Cancel	Cancellation of a new request.
	Erase	Erases all requested tests, ratios and/or profiles at the same time.

Tab. 2-8: Addition mode contextual buttons

▼ Display mode

From the Worklist table, the user is able to display a request either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 2-5: Worklist table functions](#), page 2-13). The request capture screen opens in Display mode. In this mode, the user cannot modify the request. Press the «Edit» button to access modification function.

The Display mode functions are defined in the following table:

Heading/Key	Name	Function
	Previous	See the previous request.
	Next	See the next request.
	Edit	Modification of a request (see Edition mode , page 2-19). Disabled if the sample is incomplete.

Tab. 2-9: Display mode functions

▼ Edition mode

From the Display mode, the user is able to modify a request using the «Edit» button (see [Tab. 2-9: Display mode functions](#), page 2-18).

After modification of one or several parameters, press the «OK» button to validate the request modification.



The Edition mode is accessible only if the sample is ordered or pending. All parameters are modifiable except the Sample ID and the Sample type.

Modification of requests loaded from the Host:

- ◆ Patient Demographics and Sample Characteristics, except the Priority parameter, cannot be manually modified from the instrument. They can be only modified from the Host.
- ◆ Requested tests/ratios can be manually modified from the instrument (addition, deletion of tests/ratios; modification of the number of replicates).

The Edition mode contextual buttons are described in the following table:

Heading/Key	Name	Function
	OK	Validation of a request modification.
	Cancel	Cancellation of a request modification.
	Erase	Erasing all requested tests, ratios and/or profiles at the same time. Disabled for requests loaded from the Host.

Tab. 2-10: Edition mode contextual buttons

▼ Search patient

The user is able to select a patient file from the patient name by pressing the «Search patient» button (see [Tab. 2-6: Patient Demographics and Sample Characteristics description](#), page 2-15).

When it is pressed, the following window is opened:

Patient ID	Last Name	First Name	Gender
45895623	Patient1	Name1	Unknov
12455689	Patient2	Name2	Unknov
45781256	Patient3	Name3	Unknov
45781212	Patient4	Name4	Unknov

Fig. 2-9: Search patient window

The search is done on the «Last Name» field. As each letter is typed in the «Patient Name» field, the grid is refreshed to display the patients having names starting with the letters entered (see [Fig. 2-9: Search patient window](#), page 2-20).

When the patient name is found, press the «OK» button to quit this window and go back to the request capture screen.

▼ Forcing a rack position in Identification mode

When a barcode label cannot be read, the user is able to force a rack position for the sample tube by pressing the «Position» button (see [Tab. 2-6: Patient Demographics and Sample Characteristics description](#), page 2-15).

When it is pressed, the «Rack» and «Pos.» fields are enabled in order to allocate a rack position to the sample tube.

2.2.6. Stat

The **Pentra 400** is able to distinguish two sample priorities:

- Normal
- High.

To enter a sample of high priority, proceed as follows.

- ◆ From the Worklist table, press the «Add new» button (see [Tab. 2–5: Worklist table functions](#), page 2-13) in order to create a request. The request capture screen opens in Addition mode.
- ◆ Filling Sample Characteristics, the «Priority» field must be set on High.

2.2.7. New Worklist

The user is able to begin a new day of work by checking the «New Worklist» box in the «Start up» window (see [Fig. 2–10: «Start up» window](#), page 2-21).



Fig. 2–10: «Start up» window

A new Worklist is then created and the previous Worklist is archived.

For the new Worklist, sample identifiers are cleared:

- ◆ Sample ID for Identification mode
- ◆ positions of sample tubes for Position mode.



Patient ID are not cleared at the creation of a new Worklist.

Pentra 400

Samples of the previous Worklist are:

- ◆ deleted if they are ordered or pending
- ◆ archived if they are incomplete, for validation or validated.

The «Start up» window as the «New Worklist» box are accessible:

- at the **Pentra 400** start up
- by using the «Change User» option from the «Shutdown» window (see [Fig. 2-11: «Shutdown» window](#), page 2-22)
- after the instrument turns to standby mode.



Fig. 2-11: «Shutdown» window

The «Change User» option authorizes the change of user name and/or the creation of a new Worklist during the day of work without instrument reinitialization.

2.3. Calibration

This section describes the Calibration Worklist and its use in the following chapters:

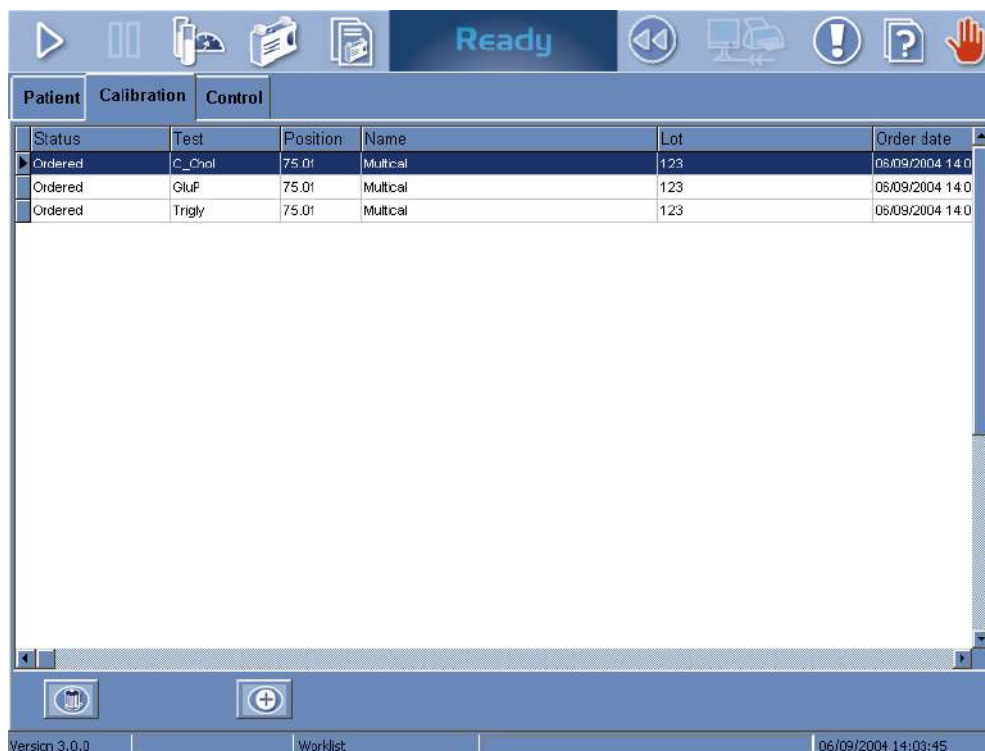
- ◆ 2.3.1. Calibration Worklist table, page 2-23
- ◆ 2.3.2. Creation of a calibration request, page 2-25.

From the «Worklist» menu, press the «Calibration» tab to access the Calibration Worklist.

The Calibration Worklist groups the calibration requests and allows the user to create or delete a calibration request.

2.3.1. Calibration Worklist table

The Calibration Worklist table shows the calibration requests sorted by creation dates. All ordered, pending, incomplete calibration requests are displayed in the Calibration Worklist table. As soon as samplings of an incomplete calibration are finished, the request is deleted from the table. It is then transferred to the Result list.



Status	Test	Position	Name	Lot	Order date
Ordered	C_Chol	75.01	Multical	123	06/09/2004 14:0
Ordered	Glucose	75.01	Multical	123	06/09/2004 14:0
Ordered	Trigly	75.01	Multical	123	06/09/2004 14:0

Fig. 2-12: Calibration Worklist table

Columns of the Calibration Worklist table are described in the following table:

Heading	Description	Format
Status	Sample status: Ordered, Pending or Incomplete.	-
Test	Name of the test to be calibrated.	-
Position	Rack position of the calibrator.	4 numerical characters: nn.nn
Name	Calibrator name.	-
Lot	Calibrator lot number.	16 characters max.
Order date	Date of request creation.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 2-11: Calibration Worklist table description

▼ Calibration Worklist table functions

Heading/Key	Name	Function
	Add new	Creation of a calibration request. Opens the calibration request capture screen (see 2.3.2. Creation of a calibration request , page 2-25).
	Delete	Deletion of the selected item (the sample must be ordered or pending). Disabled if no item is selected or if the sample is incomplete.

Tab. 2-12: Calibration Worklist table functions

2.3.2. Creation of a calibration request

From the Calibration Worklist table, press the «Add new» button (see [Tab. 2-12: Calibration Worklist table functions](#), page 2-24) in order to open the calibration request capture screen.

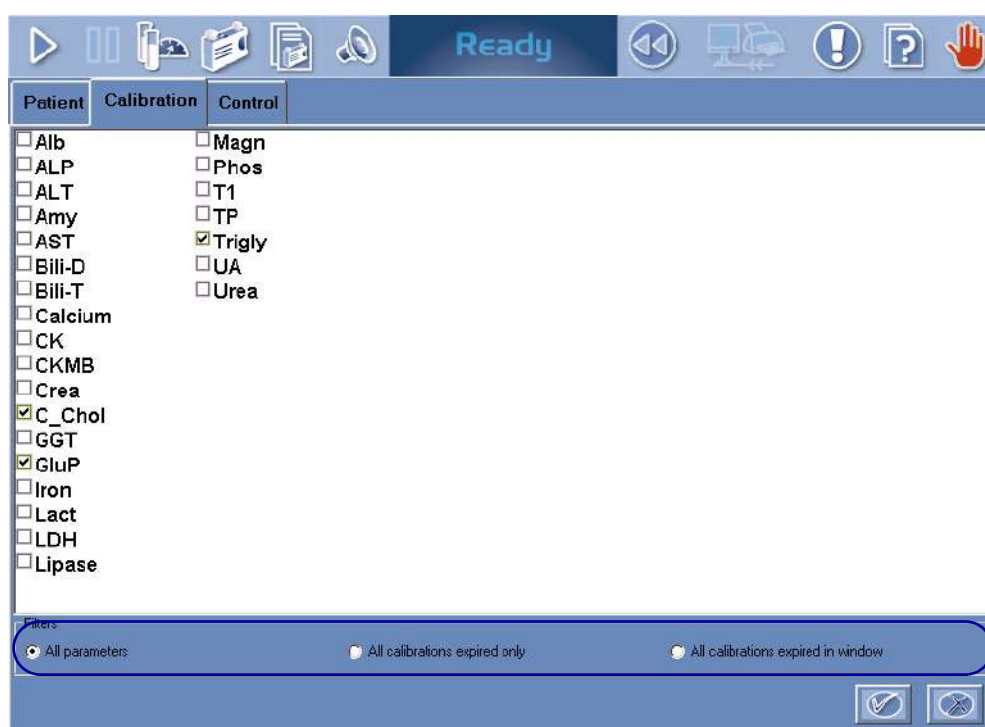


Fig. 2-13: Calibration request capture screen

The calibration request capture screen displays the tests that can be calibrated. The user is able to display either all the tests, only the expired calibrations or only the calibrations to be expired by using the selective filter (see [Fig. 2-13: Calibration request capture screen](#), page 2-25).

- All parameters: all the tests that can be calibrated are displayed.
- All calibrations expired only: only the expired calibrations are displayed.
- All calibrations expired in window: if configured (see [3.1.12. Calibrations expired time window](#), page 7-84), only the calibrations to be expired in the programmed time window are displayed.

Test names are displayed with associated check boxes. Select the tests to be calibrated by checking the corresponding boxes.

When using the selective filters «All calibrations expired only» and «All calibrations expired in window», the boxes corresponding to the tests to be calibrated are checked by default. If you do not wish to perform a calibration on a specific test, uncheck the corresponding box.

Then, press the «OK» button to validate the request.

The display and meaning of check boxes are described in the following table: [Tab. 2-7: Display and meaning of check boxes](#), page 2-17.



When a calibration is requested and in progress for a test, the calibration cannot be requested again until the previous result is validated.



- ◆ For tests using the Factor calibration mode, a reagent blank is carried out. For tests using the other calibration modes, a reagent blank can be added to the calibration (see [Blank](#), page 7-31).
- ◆ If the option «Control Required» is selected in the application and the required default controls are configured for this test, the default controls will be automatically performed with the calibration.

▼ Contextual buttons

The contextual buttons of the calibration request capture screen are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of a calibration request.
	Cancel	Cancellation of a calibration request.

Tab. 2-13: Contextual buttons

2.4. Control

This section describes the Control Worklist and its use in the following chapters:

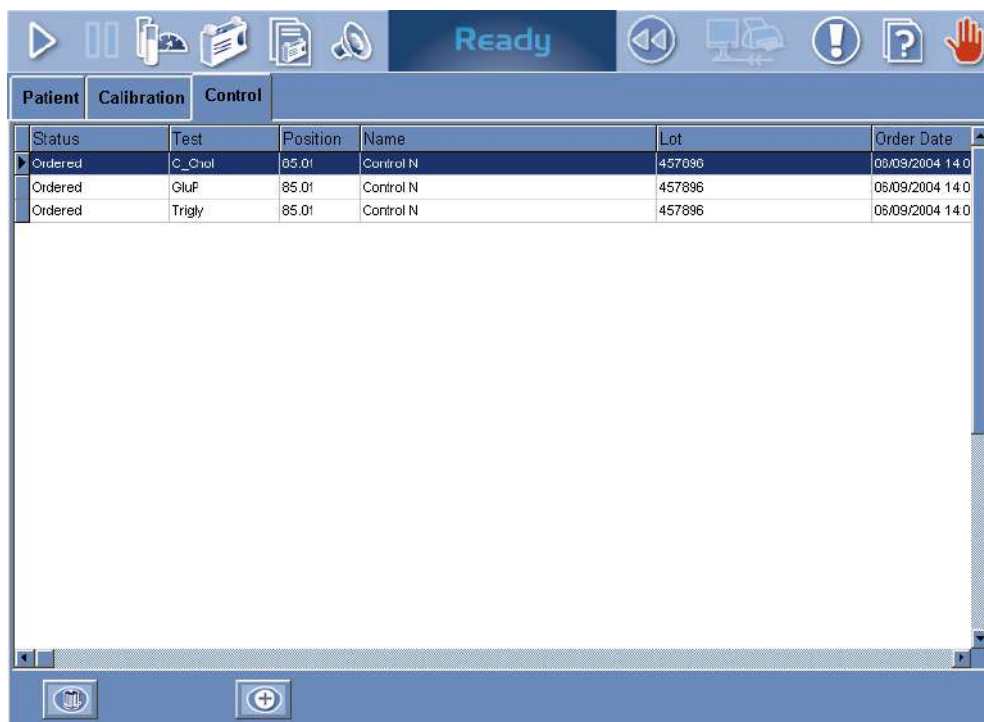
- ◆ 2.4.1. [Control Worklist table](#), page 2-27
- ◆ 2.4.2. [Creation of a control request](#), page 2-29.

From the «Worklist» menu, press the «Control» tab to access the Control Worklist.

The Control Worklist groups the control requests and allows the user to create or delete a control request.

2.4.1. Control Worklist table

The Control Worklist table shows the control requests sorted by creation dates. All ordered, pending, incomplete control requests are displayed in the Control Worklist table. As soon as samplings of an incomplete control are finished, the request is deleted from the table. It is then transferred to the Result list.



Status	Test	Position	Name	Lot	Order Date
Ordered	C_Oxal	85.01	Control N	457896	06/09/2004 14:0
Ordered	Glucose	85.01	Control N	457896	06/09/2004 14:0
Ordered	Trigly	85.01	Control N	457896	06/09/2004 14:0

Fig. 2-14: Control Worklist table

Columns of the Control Worklist table are described in the following table:

Heading	Description	Format
Status	Sample status: Ordered, Pending or Incomplete.	-
Test	Name of the test to be controlled.	-
Position	Rack position of the control.	4 numerical characters: nn.nn
Name	Control name.	-
Lot	Control lot number.	16 characters max.
Order Date	Date of request creation.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 2-14: Control Worklist table description

▼ Control Worklist table functions

Heading/Key	Name	Function
	Add new	Creation of a control request. Opens the control request capture screen (see 2.4.2. Creation of a control request , page 2-29).
	Delete	Deletion of the selected item (the sample must be ordered or pending). Disabled if no item is selected or if the sample is incomplete.

Tab. 2-15: Control Worklist table functions

2.4.2. Creation of a control request

From the Control Worklist table, the user is able to open the control request capture screen by pressing the «Add new» button (see [Tab. 2–15: Control Worklist table functions](#), page 2-28).

Fig. 2–15: Control request capture screen

The control request capture screen allows the user to create a control request using either the Control Selection (see [Control Selection](#), page 2-29) or the Default Control (see [Default Control](#), page 2-31).

▼ Control Selection

The Control Selection (see [Fig. 2–15: Control request capture screen](#), page 2-29) shows:

- the list of controls previously set up
- fields giving information about the selected control.

Controls are displayed eight by eight and sorted by alphabetical order. Press the «Next» button (see [Tab. 2–17: Contextual buttons](#), page 2-32) in order to display the next eight keys.

Select a control by pressing the corresponding key, the control data are then automatically updated.

Control data fields are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
Position	Rack position of the control.	4 numerical characters: nn.nn
Expiration Date	Control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 2-16: Control data fields



Control data fields cannot be captured.

The Tests Selection (see [Fig. 2-15: Control request capture screen](#), page 2-29) displays the tests which can be controlled with the selected control.

Test names are displayed with associated check boxes. Select the tests to be controlled by checking the corresponding boxes.

Define the number of replicates for each test by using the arrows indicated on the following figure (from 1 to 20 replicates).



Fig. 2-16: Number of replicates programming

Then, press the «OK» button (see [Tab. 2-17: Contextual buttons](#), page 2-32) to validate the request.

The display and meaning of check boxes are described in the following table: [Tab. 2-7: Display and meaning of check boxes](#), page 2-17.



When a control is requested and in progress for a test, the control cannot be requested again until the previous result is validated.

▼ Default Control

Check the «Default Control» box in order to use the Default Control (see [Fig. 2-17: «Default Control» box](#), page 2-31).

Fig. 2-17: «Default Control» box

The Control Selection is then disabled and the Tests Selection displays the tests which have default controls set up (up to three default controls can be configured for a test).

Test names are displayed with associated check boxes. Request the tests to be controlled by checking the corresponding boxes. If a test has several default controls set up (up to three), then all the default controls are requested.

The number of replicates function is disabled.

Then, press the «OK» button (see [Tab. 2-17: Contextual buttons](#), page 2-32) to validate the request.

The display and meaning of check boxes are described in the following table: [Tab. 2-7: Display and meaning of check boxes](#), page 2-17.



When a control is requested and in progress for a test, the control cannot be requested again until the previous result is validated.

▼ Contextual buttons

The contextual buttons available on the control request capture screen are defined in the following table:

Heading/Key	Name	Function
	Next	Displays the next eight controls.
	Select all	Selects all tests at the same time.
	Erase	Erases all tests at the same time.
	OK	Validation of a control request.
	Cancel	Cancellation of a control request.

Tab. 2-17: Contextual buttons

3. Result Validation

3.1. Introduction

The Result list displays the results as soon as the tests are finished. It groups results of patient samples, calibrations and controls.

The Result list contains the results of samples that are:

- ordered or pending with at least one test of the sample finished (only for patient samples)
- incomplete
- for validation
- validated.

▼ Access to the «Result Validation» menu

Press the «Result Validation» button from the Main menu.

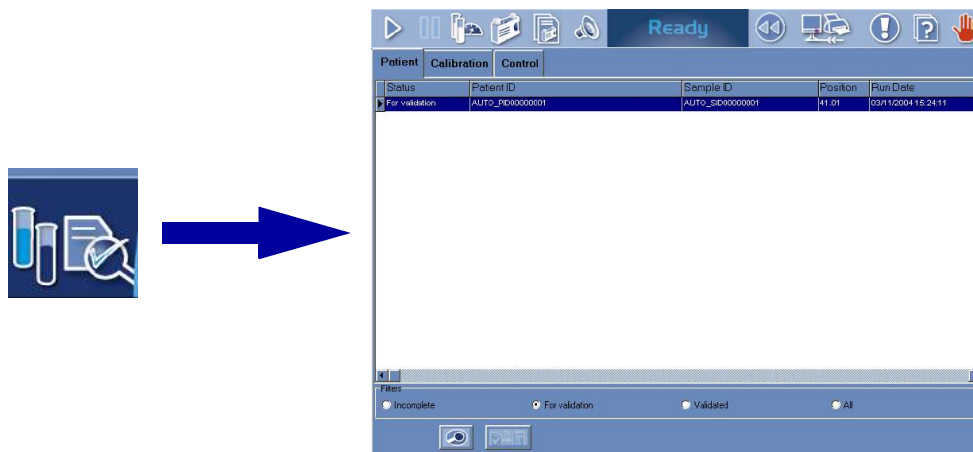


Fig. 2-18: «Result Validation» menu access button

Result list items are divided into three tabs:

- ◆ 3.2. Patient, page 2-34
- ◆ 3.3. Calibration, page 2-47
- ◆ 3.4. Control, page 2-70.

Click or press one of the tabs to access the various functions.

3.2. Patient

This section describes the Patient Result list and how to use it in the following chapters:

- ◆ [3.2.1. Patient Result list](#), page 2-34
- ◆ [3.2.2. Result validation screen](#), page 2-36.

3.2.1. Patient Result list

The Patient Result list groups the patient samples that are ordered or pending with at least one test of the sample finished, incomplete, for validation and validated. Patient samples are sorted by patients and then by creation dates. The separation between patients is materialized by the color of lines (alternation blank/blue).

The user is able to display either the incomplete patient samples, the patient samples for validation, the validated patient samples or all the patient samples by using the selective filter (see [Fig. 2-19: Patient Result list](#), page 2-34).

- Incomplete: the patient samples that are incomplete are displayed as the patient samples that are ordered or pending with at least one test of the sample finished.
- For validation: only the patient samples that are for validation are displayed.
- Validated: only the patient samples that are validated are displayed.
- All: all the patient samples are displayed.

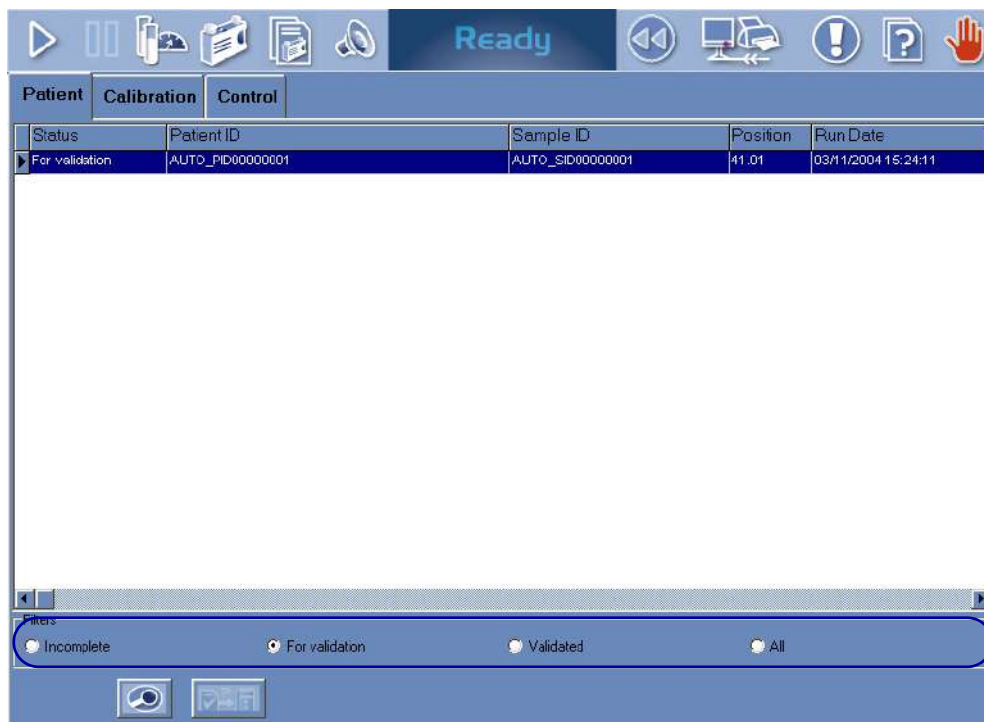


Fig. 2-19: Patient Result list

Item deletion, from the Patient Result list, occurs in the following cases:

- ◆ a rerun or supplementary tests are requested for the sample (the sample is then transferred to the Worklist)
- ◆ creation of a new Worklist (see [2.2.7. New Worklist](#), page 2-21).

Columns of the Patient Result list are described in the following table:

Heading	Description	Format
Status	Sample status: Incomplete, For validation or Validated.	15 characters max.
Patient ID	Patient ID.	25 characters max.
Sample ID	Sample ID.	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Run Date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Collection Date	Date and time of the sample collection.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2–18: Patient Result list description

▼ Patient Result list functions

From the Patient Result list, the user is able to display sample results either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 2–19: Patient Result list functions](#), page 2-35).

Heading/Key	Name	Function
	Details	Display results of the selected sample. Opens the result validation screen (see 3.2.2. Result validation screen , page 2-36). Function also accessible by double-clicking an item.
	Host request	Request to the Host for supplementary tests on the selected sample (<u>only for validated samples</u>). Disabled if the Query mode is not configured (see 3.3.2. Query Mode , page 7-95).

Tab. 2–19: Patient Result list functions

3.2.2. Result validation screen

Data displayed on the result validation screen are divided into three parts:

- Patient Demographics
- Sample Characteristics
- Analysis Result.

From the result validation screen, the user is able to make a decision relating to each test result using the «Decision» part.

Moreover, different functions are available on this screen.

Then, the result validation screen will be described in the following parts:

- ◆ [Patient Demographics](#), page 2-37
- ◆ [Sample Characteristics](#), page 2-37
- ◆ [Analysis Result](#), page 2-38
- ◆ [Decision](#), page 2-44
- ◆ [Functions](#), page 2-46.

Patient Demographics

Patient ID: AUTO_PID00000001

Last Name: DURANT

First Name: Bernard

Date of Birth: [] Age: [] Gender: Unknown

Sample Characteristics

Sample ID: AUTO_SID00000001

Position: 41.01

Collection Date: 03/11/2004 00:00

Sample Type: [] Priority: Normal

Serum / Plasma: [] Department: [] Physician: []

Comment: [] Run Date: 03/11/2004 15:24:11

Analysis Result

Pos	Test	Result(s)	GF	D/C	Analysis flag	DC	Dec	Unit	R
41.01	AST	103.36800			REF_RANGE_HIGH			U/L	03.
41.01	GGT	115.58130			REF_RANGE_HIGH			U/L	03.
41.01	GluP	13.51095			REF_RANGE_HIGH			mmol/L	03.

Decision

Accept

Re-run

Modify

Delete

Version 3.0.0 | Result Validation | 06/09/2004 14:09:57

Fig. 2-20: Result validation screen

▼ Patient Demographics

Fields for Patient Demographics are described in the following table:

Heading	Description	Format
Patient ID	Patient ID.	25 characters max.
Last Name	Patient last name.	20 characters max.
First Name	Patient first name.	20 characters max.
Date of Birth	Patient date of birth.	Depending on the date format chosen (see System Date and Time , page 7-87).
Age	Patient age.	3 numerical characters max.
Gender	Man, Woman or Unknown.	-

Tab. 2–20: Patient Demographics description

▼ Sample Characteristics

Fields for Sample Characteristics are described in the following table:

Heading	Description	Format
Sample ID	Sample ID.	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Collection Date	Date and time of the sample collection.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Sample Type	Serum/plasma, Urine or Other.	-
Priority	Normal or High.	-
Department	Department requesting the tests.	20 characters max.
Physician	Physician requesting the tests.	20 characters max.
Comment	Comment about the sample.	50 characters max.
Run Date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2–21: Sample Characteristics description



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

▼ Analysis Result

The «Analysis Result» part is divided into three tabs:

a – Result, page 2-38

b – O.D. Values, page 2-41

c – Control, page 2-42.

Click or press one of the tabs to access the various functions.

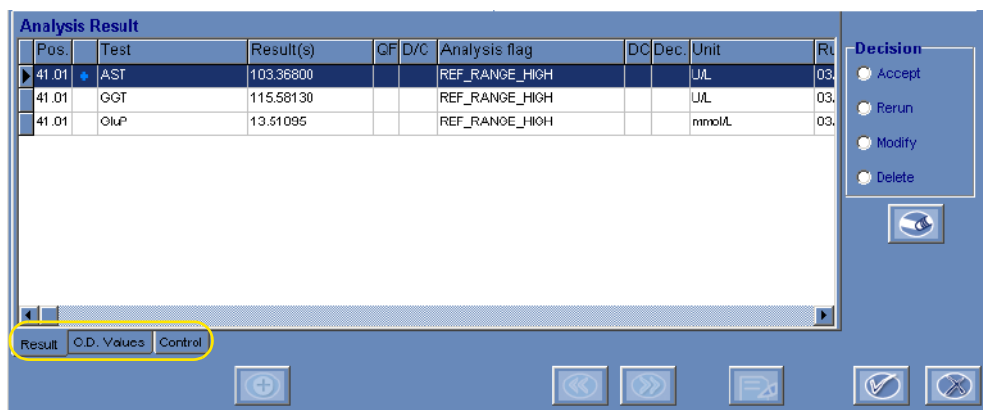


Fig. 2-21: Analysis Result

a – Result

For a patient file, the «Result» tab displays the samples that are pending, incomplete, for validation or validated. For each sample, all requested tests are listed regardless of samplings.

The slider (shown on the figure below) can be used to display all data associated to the test results.

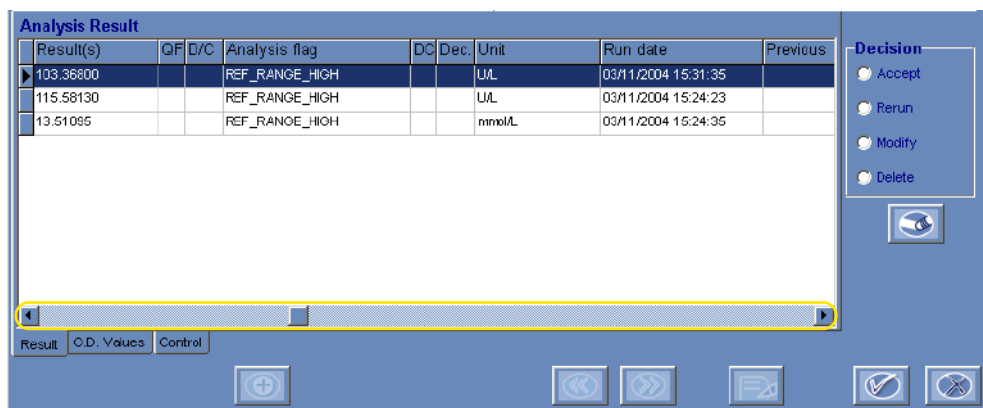


Fig. 2-22: «Result» tab

Columns of the «Result» tab are described in the following table:

Heading	Description	Format
Pos.	Rack position of the sample tube.	4 numerical characters: nn.nn
	Result values button (see Result values , page 2-40). Displayed only in case of rerun or result modification.	-
Test	Application short name.	7 characters max.
Result(s)	Final result (see Result(s) , page 2-39).	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
D/C	Sample post dilution/concentration (if there is one): Dil or Conc.	4 characters max.
Analysis flag	Sampling alarms or analytical flags. - If both exist, the sampling alarm is displayed. - If several analytical flags exist, the flag having priority is displayed.	15 characters max.
DC	Delta check flag (if triggered): D+ or D- (see Delta Check , page 7-18).	2 characters max.
Dec.	Decision: A, R, M or D (see Decision , page 2-44).	One character
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Run date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Previous	Previous result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Previous date	Date and time of previous sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Reference Range	Low and high limit value of the reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 2-22: «Result» tab description

◆ **Result(s)**

A not given result is displayed as follows: «---,-----». A result is not given in the following conditions:

- sampling alarm
- some analytical flags.

◆ Result values

In case of rerun or result modification, the user displays all values available for a result by clicking the «Result values» button (1).

Then, the user selects a value by double-clicking the corresponding item (2).



- If the item is green, this indicates the value is selected.
- If the item is orange, this indicates the value is selectable.
- If the item is red, this indicates the value is unselectable.

The selected value is then transferred in the «Result(s)» field (3).

1

Pos.	Test	Result(s)	QF	D/C	Analysis flag	DC	Dec.	Unit	Rt
41.01	AST	103.36800			REF_RANGE_HIGH			U/L	03.
41.01	GGT	115.58130			REF_RANGE_HIGH			U/L	03.
41.01	GluP	13.51095			REF_RANGE_HIGH			mmol/L	03.

2

Pos.	Test	Result(s)	QF	D/C	Analysis flag	DC	Dec.	Unit	Rt
41.01	AST	103.36800			REF_RANGE_HIGH			U/L	03.
	Run date	Result(s)			Analysis flag	DC			
	03/11/2004 15:31:35	103.36800			REF_RANGE_HIGH				
	03/11/2004 15:24:11	69.25464			REF_RANGE_HIGH				
41.01	GGT	115.58130			REF_RANGE_HIGH			U/L	03.
41.01	GluP	13.51095			REF_RANGE_HIGH			mmol/L	03.

3

Pos.	Test	Result(s)	QF	D/C	Analysis flag	DC	Dec.	Unit	Rt
41.01	AST	69.25464			REF_RANGE_HIGH			A	03.
41.01	GGT	115.58130			REF_RANGE_HIGH			U/L	03.
41.01	GluP	13.51095			REF_RANGE_HIGH			mmol/L	03.

Fig. 2-23: Result values



Ratio result

In this particular case, the ratio result is displayed on a first line and the test results linked to the ratio are displayed on the following lines (these lines are grayed).

b – O.D. Values

The «O.D. Values» tab shows the absorbance values corresponding to the test selected on the «Result» tab. The absorbance values are displayed in a table and on a graph.

The «O.D. Values» tab is divided into three parts (as shown on the figure below):

- the selected test data (1)
- the absorbance values table (2)
- the kinetic graph (3).



If analytical flags exist, then they are displayed in a table.

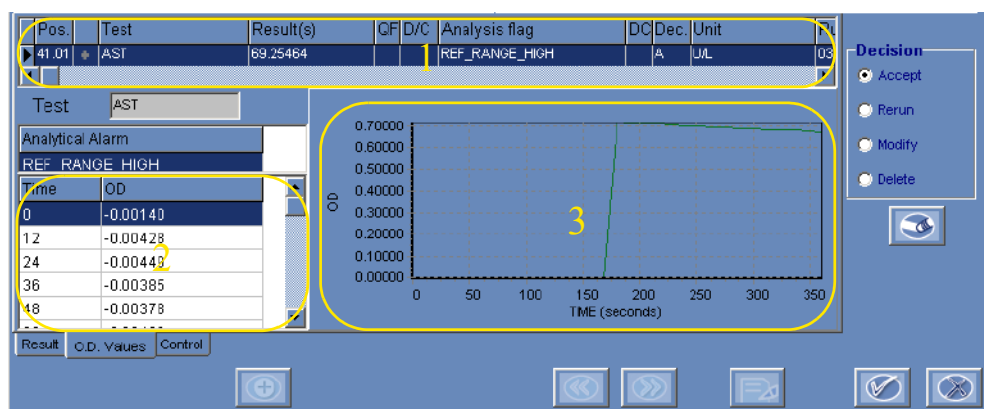


Fig. 2-24: «O.D. Values» tab



The «O.D. Values» tab is inaccessible in the following cases:

- ◆ the selected line is a value of rerun or result modification (see [Result values](#), page 2-40)
- ◆ the selected line is a ratio result
- ◆ the selected line is an ISE result.

c – Control

The «Control» tab shows the control values performed before and after the test selected on the «Result» tab. The «Control» tab is divided into two parts (as shown on the figure below):

- the selected test data (1)
- the control values (2).

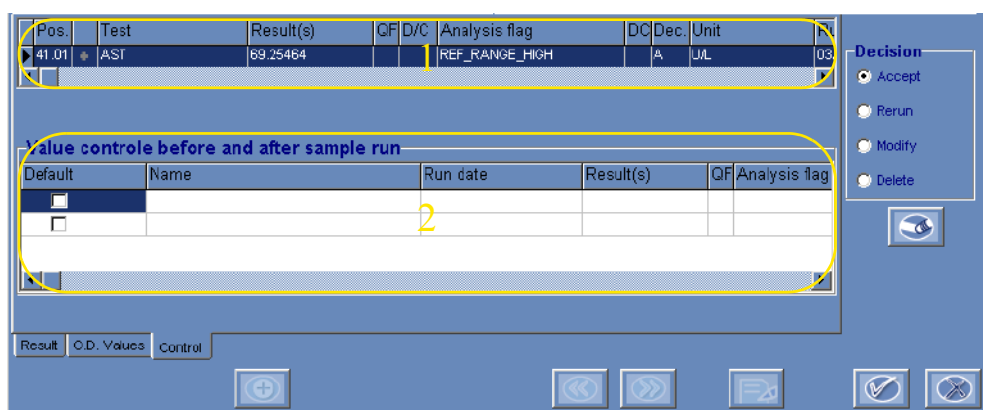


Fig. 2-25: «Control» tab

Columns of the «Control» tab are described in the following table:

Heading	Description	Format
Default	Default control for the test.	Check box
Name	Control name	20 characters max.
Run date	Date and time of control run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Result(s)	Control result (see Result(s) , page 2-43).	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Analysis flag	Sampling alarms or analytical flags. - If both exist, the sampling alarm is displayed. - If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Dec.	Decision: A or D.	One character
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Target Value	Control target value for the test.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Confidence Range	Low and high limit value of the confidence range.	

Tab. 2-23: «Control» tab description

◆ Result(s)

The field is red if the result is out of the programmed confidence range.

A not given result is displayed as follows: «--,------». A result is not given in the following conditions:

- sampling alarm
- some analytical flags.



The «Control» tab is inaccessible in the following cases:

- ◆ the selected line is a value of rerun or result modification (see [Result values](#), page 2-40)
- ◆ the selected line is a ratio result.

▼ Decision

From the «Decision» part, the user is able to make a decision relating to each test result. The «Decision» part is accessible by pressing the «Edit» button (see [Tab. 2-25: Functions](#), page 2-46), regardless of what tab is open («Result», «O.D. Values» or «Control» tabs).

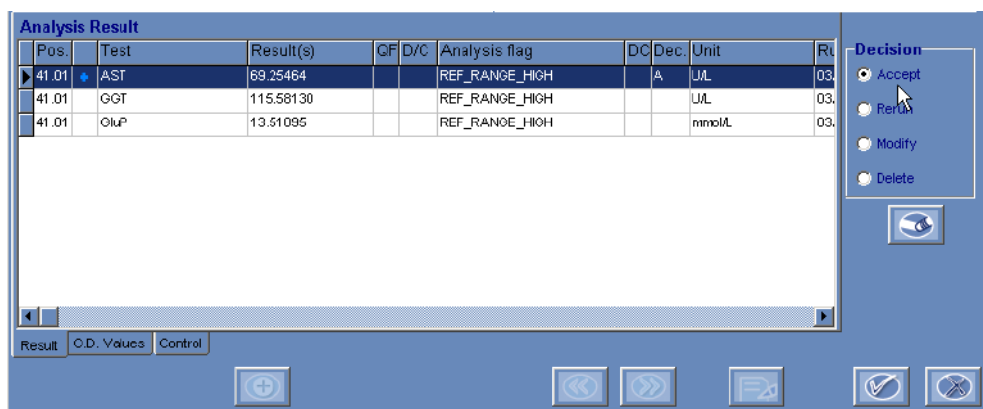


Fig. 2-26: «Decision» part

The four following decisions are authorized depending on some rules (see [Tab. 2-24: Decision rules](#), page 2-44):

- Accept
- Rerun
- Modify
- Delete.

Test situation	Accept	Rerun	Modify	Delete
The test is running.	NO	NO	NO	NO
Not given result.	NO	NO	NO	YES
Result without flag.	YES	YES	YES	YES
Invalid result (sampling alarm).	NO	NO	NO	YES
Invalid result (flag).	NO	YES	YES	YES
Result on the third rerun.	YES	NO	YES	YES
Validated result.	NO	NO	NO	NO

Tab. 2-24: Decision rules



Ratio result

In this particular case, the user is able to make a decision relating to the ratio result only. The user cannot make a decision relating to each test result linked to the ratio.

◆ Accept

- If neither rerun nor result modification have been performed, the result displayed in the «Result(s)» field is validated.
- In case of rerun or result modification, the user displays all values available for the result by clicking the «Result values» button. Then, the user selects a value by double-clicking the corresponding item. The selected value is then transferred in the «Result(s)» field (see [Result values](#), page 2-40).

◆ Rerun

The sample is transferred to the Worklist and a rerun will be performed.



- ◆ Only up to three reruns can be requested.
- ◆ A rerun can be automatically requested by the instrument (see [Automatic Rerun](#), page 7-17).

◆ Modify

By selecting this decision, the following window opens:



Fig. 2-27: «Modify Result» window

To modify the result, capture the corrected result in the «Final Result» field.
Then, press the «OK» button to validate.



A ratio result cannot be modified.

◆ Delete

The test is deleted and the corresponding item is grayed.

To make a decision relating to a test result, press the «Edit» button (see [Tab. 2-25: Functions](#), page 2-46).

Then, select the test result by clicking the corresponding item from the «Result» tab.

Choose the decision using the radio buttons from the «Decision» part. The decision is then automatically displayed in the corresponding field (see [Tab. 2-22: «Result» tab description](#), page 2-39).

Press the «OK» button (see [Tab. 2-25: Functions](#), page 2-46) to validate the decision.

▼ Functions

Different functions are available on the result validation screen, they are defined in the following table:

Heading/Key	Name	Function
	Add new	Addition of new tests. Opens the request capture screen in Edition mode (see 2.2.5. Request capture screen , page 2-14).
	Previous	See the previous patient results.
	Next	See the next patient results.
	Edit	Make a decision.
	Erase	Erase a decision.
	OK	Validation of a decision.
	Cancel	Cancellation of a decision.

Tab. 2-25: Functions

3.3. Calibration

This section describes the Calibration Result list and its use in the following chapters:

- ◆ 3.3.1. Calibration Result list, page 2-47
- ◆ 3.3.2. Calibration validation screen, page 2-50
- ◆ 3.3.3. Reagent blank validation screen, page 2-66.

3.3.1. Calibration Result list

The Calibration Result list groups the calibrations that are incomplete, for validation and validated. The user is able to display either the calibrations for validation, the current calibrations or all the calibrations by using the selective filter (see [Fig. 2-28: Calibration Result list](#), page 2-47).

- For validation: only the calibrations that are incomplete or for validation are displayed in the Calibration Result list. They are sorted by run dates.
- Current: only the calibrations that are validated are displayed in the Calibration Result list.
- All: the Calibration Result list shows the calibrations that are incomplete, for validation and validated.

Status	Test	Position	Name	Lot	Flag
For validation	CKMB	31	Blank	123456	
For validation	GLUP	71.01	Mutical	1351	

Fig. 2-28: Calibration Result list



For tests using the Factor calibration mode, a reagent blank is carried out as a calibration.

Columns of the Calibration Result list are described in the following table:

Heading	Description	Format
Status	Calibrator status: Incomplete, For validation or Validated.	15 characters max.
Test	Name of the calibrated test.	-
Position	Rack position of the calibrator or reagent position for a reagent blank.	4 numerical characters: nn.nn or from 1 to 52 for a reagent blank.
Name	Calibrator name or BLANK for a reagent blank.	-
Lot	Calibrator lot number or reagent lot number for a reagent blank.	16 characters max.
Flag	Calibration analytical flags.	15 characters max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Run Date	Date and time of calibration run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2-26: Calibration Result list description



An item is displayed in red if the corresponding calibration is associated to a blocking flag (the calibration cannot be calculated).

▼ Calibration Result list functions

From the Calibration Result list, the user is able to:

- display calibration results
- rerun a calibration to be validated
- delete a calibration to be validated.

Heading/Key	Name	Function
	Details	Display results of the selected calibration. Opens either the Calibration validation screen , page 2-50 or the Reagent blank validation screen , page 2-66 for a reagent blank. Function also accessible by double-clicking an item. See also « Details » button, page 2-49.
	Rerun	Rerun of the selected calibration (see Conditions of rerun , page 2-49).
	Delete	Deletion of the selected calibration (see Conditions of deletion , page 2-49).

Tab. 2-27: Calibration Result list functions

◆«Details» button

The function is disabled if:

- no item is selected
- the selected calibration is incomplete.

◆Conditions of rerun

The function is disabled if:

- no item is selected
- the selected calibration is incomplete or validated.



If the selected calibration is incomplete but flagged with a sampling alarm, then the function is enabled.

In case of rerun, the calibration is deleted and then the previous calibration will be the current calibration. Moreover, a new calibration will be automatically ordered.

If a default control is requested for the deleted calibration, the default control result is calculated using the current calibration. If no current calibration exists for this test, the default control is deleted.

◆Conditions of deletion

The function is disabled if:

- no item is selected
- the selected calibration is incomplete or validated
- a default control is running for the selected test.

In case the calibration is deleted, then the previous calibration will be the current calibration.

If a default control is requested for the deleted calibration, the default control result is calculated using the current calibration. If no current calibration exists for this test, the default control is deleted.

When a calibration is deleted, results of patient samples and controls performed after the deletion are flagged with C (see [3.3.5. Quality flags](#), page 9-74).

3.3.2. Calibration validation screen

Information displayed on the calibration validation screen are divided into three parts (see [Fig. 2-29: Calibration validation screen](#), page 2-50):

- the calibration data (1)
- the new calibration results (2)
- the current calibration results (3).

In addition, the user is able to display different graphs from the calibration validation screen.

The calibration validation screen allows the user to make a decision relating to results of the new calibration.

Moreover, different functions are available on this screen.

Then, the calibration validation screen will be described in the following parts:

- ◆ [Calibration data](#), page 2-51
- ◆ [New calibration results](#), page 2-51
- ◆ [Current calibration results](#), page 2-53
- ◆ [Graphs](#), page 2-54
- ◆ [Decision](#), page 2-59
- ◆ [Functions](#), page 2-61
- ◆ [CONV function](#), page 2-62.

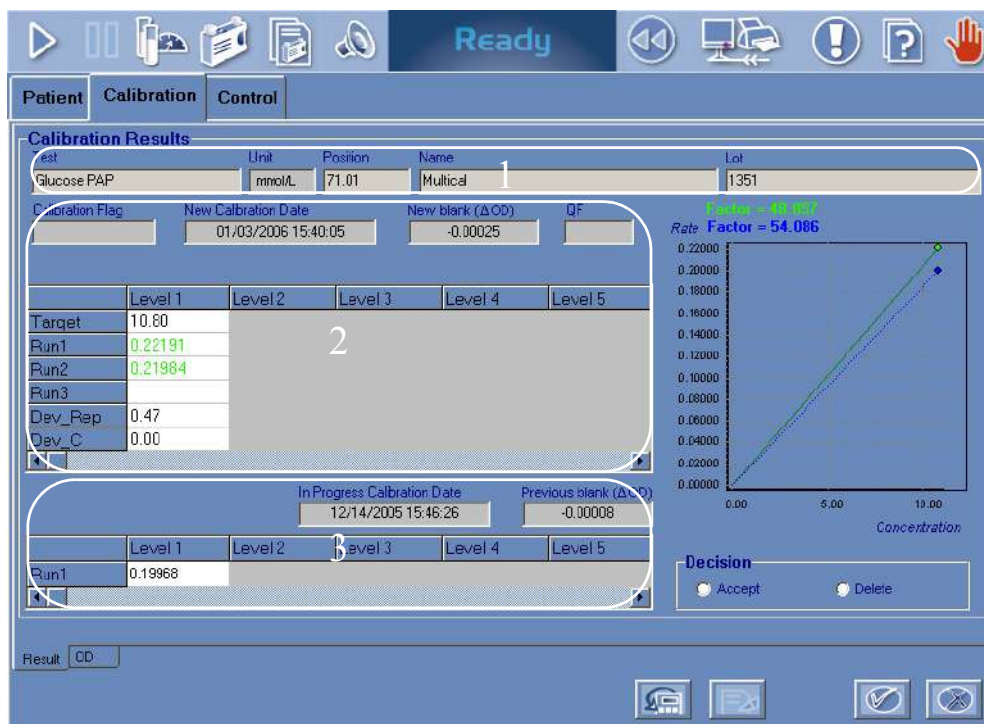


Fig. 2-29: Calibration validation screen

▼ Calibration data

The fields that display the calibration data are described in the following table:

Heading	Description	Format
Test	Name of the calibrated test.	-
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Position	Rack position of the calibrator.	4 numerical characters: nn.nn
Name	Calibrator name.	-
Lot	Calibrator lot number.	16 characters max.

Tab. 2-28: Calibration data

▼ New calibration results

Four fields and a table are used to display the new calibration results:

◆ [Tab. 2-29: Fields](#), page 2-51

◆ [Tab. 2-30: Table](#), page 2-52.

The fields are described in the following table:

Heading	Description	Format
Calibration Flag	Calibration analytical flags.	Displayed in red.
New Calibration Date	Date and time of new calibration run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
New Blank (Δ O.D.)	Value of the new reagent blank (if performed with the calibration).	Five decimal position number: from -3.50000 to 3.50000 Δ O.D.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.

Tab. 2-29: Fields



◆ New Blank

The new blank is displayed in red if its result is flagged.

The table items are described below:

Heading	Description	Unit
Target	Calibrator target value.	Test unit configured in the application (see Result , page 7-16).
Run 1	Result of the first run.	O.D.
Run 2	Result of the second run (if requested).	
Run 3	Result of the third run (if requested).	
Dev_Rep	Deviation concerning replicates.	%
Dev_C	Deviation to the curve.	%

Tab. 2-30: Table

The data described above are given for each calibrator level.



◆ Run 1 to 3

The result is displayed in red if it is flagged.

◆ Deviation

If Dev_Rep exceeds the authorized Dev_Rep (see [Tab. 7-14: Calibration](#), page 7-22), then Dev_Rep as the results are displayed in red.

If only one run has been performed, Dev_Rep is not calculated and displayed as follows «--.--».

If Dev_C exceeds the authorized Dev_C (see [Tab. 7-14: Calibration](#), page 7-22), then Dev_C is displayed in red.

If there is only one calibrator level, Dev_C is not calculated and displayed as follows «--.--».

From this table, the user is able to display different graphs.

- ◆ The calibration curves by clicking a field in the table (see [Calibration curves](#), page 2-54).
- ◆ The kinetic graphs for a level by clicking the corresponding level heading (see [Kinetic graphs for a level](#), page 2-56).
- ◆ The kinetic graphs for a run by clicking a point of the corresponding run (see [Kinetic graphs for a run](#), page 2-57).

▼ Current calibration results

Two fields and a table are used to display the current calibration results.

The fields are described in the following table:

Heading	Description	Format
In Progress Calibration Date	Date and time of current calibration run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Previous Blank (Δ O.D.)	Value of the previous reagent blank (if performed with the calibration).	Five decimal position number: from -3.50000 to 3.50000 Δ O.D.

Tab. 2–31: Fields



- ◆ Previous Blank
The previous blank is displayed in red if its result is flagged.

The table gives the average result in O.D. for each calibrator level.

▼ Graphs

a – Calibration curves

The user displays the calibration curves by clicking a field in the table of new calibration results (see [Fig. 2-30: Calibration curves](#), page 2-54).

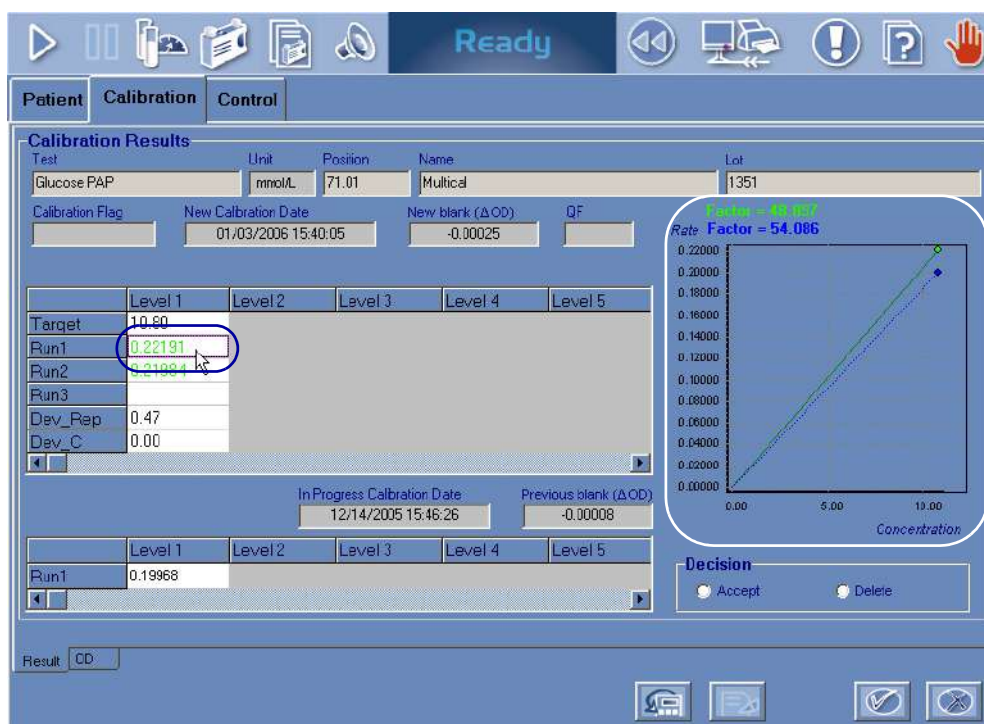


Fig. 2-30: Calibration curves

The new calibration curve (green continuous line) and/or the current calibration curve (blue dotted line) are displayed on the graph. Moreover, the calibration points are represented. The user displays the concentration and rate values of a point by clicking the corresponding point on the graph (see [Fig. 2-31: Display point values](#), page 2-55).

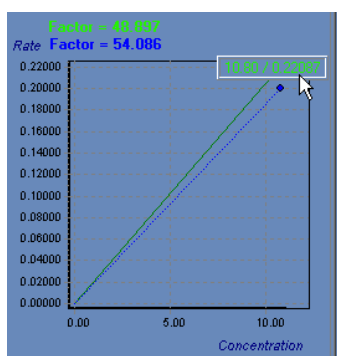


Fig. 2-31: Display point values



If several runs have been performed, the represented points are the average results for each calibrator level.

Several data are also displayed on the graph.

- Factor = target value/rate (displayed only for linear calibration modes).
- Y-intercept = rate for a concentration equal to 0 (displayed only for the Linear regression calibration mode).

◆Zoom in on the graph

To zoom in, click and drag the cursor from left to right (as shown on the figure below). Then, unclick to display the graph.

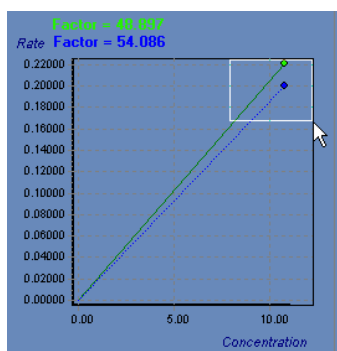


Fig. 2-32: Zoom in

To zoom out, click and drag the cursor from right to left. Then, unclick to display the graph.

b – Kinetic graphs for a level

The user displays the kinetic graphs for a level by clicking the corresponding level heading in the table of new calibration results (see [Fig. 2–33: Kinetic graphs for a level](#), page 2-56).

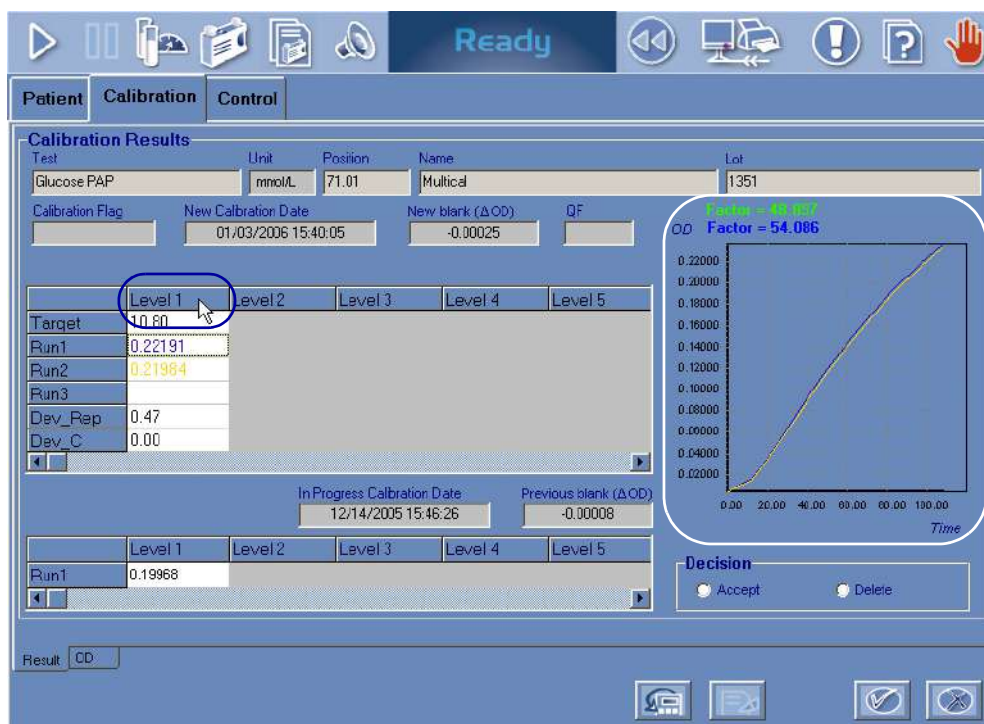


Fig. 2–33: Kinetic graphs for a level

For the selected level, the kinetic graph of each run is displayed.

The first run result and graph are colored in purple, the second ones in yellow and the third ones in dark green.

The user can zoom in on the graph (see [Zoom in on the graph](#), page 2-55).

c – Kinetic graphs for a run

The user displays the kinetic graphs for a run by clicking a point of the corresponding run in the table of new calibration results and pressing the «O.D.» tab (see Fig. 2–34: Kinetic graph for a run, page 2-57).

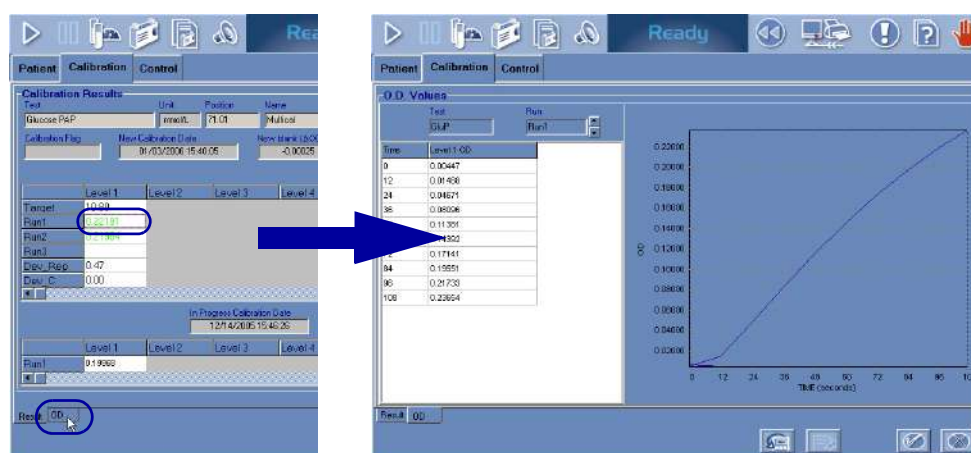


Fig. 2–34: Kinetic graph for a run

The «O.D.» tab displays the absorbance values corresponding to the selected run in a table and on a graph.

The «O.D.» tab is divided into three parts:

- the selected run data
- the absorbance values table
- the kinetic graphs.



If analytical flags exist, then a table displays the analytical flags of each level and reagent blank.

The fields that display the run data are described in the following table:

Heading	Description	Format
Test	Name of the calibrated test.	-
Run	Number of the selected run.	From 1 to 3.

Tab. 2–32: Fields

For the selected run, the table shows the absorbance values of each level as the reagent blank absorbance values (if a reagent blank is performed with the calibration).

The table items are described below:

Heading	Description	Format
Time	Time in seconds.	-
Level 1 to 8 O.D.	Absorbance values of each level.	Five decimal position number: from -3.50000 to 3.50000 O.D.
Reagent Blank O.D.	Absorbance values of the reagent blank (if performed with the calibration).	Five decimal position number: from -3.50000 to 3.50000 O.D.

Tab. 2-33: Table

Sliders can be used to display all data.

For the selected run, the kinetic graph of each level is displayed as the reagent blank kinetic graph (if a reagent blank is performed with the calibration).

The user can zoom in on the graph (see [Zoom in on the graph](#), page 2-55).

▼ Decision

From the «Decision» part, the user is able to make a decision relating to results of the new calibration. The «Decision» part is accessible by pressing the «Edit» button (see [Tab. 2-34: Functions](#), page 2-61).

The screenshot displays the 'Decision' part of the software interface. At the top, there is a toolbar with various icons and a 'Ready' status indicator. Below this, the 'Calibration Results' section is visible, containing a table with columns for 'Level 1' through 'Level 5'. The table includes fields for 'Target', 'Run1', 'Run2', 'Run3', 'Dev_Rep', and 'Dev_C'. To the right of the table, there is a graph showing the calibration curve with 'Rate' on the y-axis and 'Concentration' on the x-axis. The graph includes a linear regression line and data points. Below the graph, the 'Decision' section has two radio buttons: 'Accept' (selected) and 'Delete'. The interface also shows various status indicators and a 'Result' field at the bottom.

Fig. 2-35: «Decision» part

For each level, the user can enable or disable a result by double-clicking the corresponding field in the table of new calibration results. If the field is grayed, then the corresponding result is disabled. If not, the result is enabled. The new calibration curve and its associated data are automatically updated (see [Calibration curves](#), page 2-54).



For each level, at least one result must be enabled.

The two following decisions are authorized:

- Accept
- Delete.

◆Accept

Results of the new calibration are transferred to the table of current calibration results (see [Current calibration results](#), page 2-53).



The calibration cannot be validated if the calibration cannot be calculated (see [3.3.2. Calibration analytical flags](#), page 9-66). In case several runs have been performed, the calibration will be calculated if the user disables the defective results.

◆Delete

Results of the new calibration are deleted.

In case the calibration is deleted, then the previous calibration will be the current calibration.

If a default control is requested for the deleted calibration, the default control result is calculated using the current calibration. If no current calibration exists for this test, the default control is deleted.

When a calibration is deleted, results of patient samples and controls performed after the deletion are flagged with C (see [3.3.5. Quality flags](#), page 9-74).

To make a decision relating to results of the new calibration, press the «Edit» button (see [Tab. 2-34: Functions](#), page 2-61).

Choose the decision using the radio buttons from the «Decision» part.

Press the «OK» button (see [Tab. 2-34: Functions](#), page 2-61) to validate the decision.



The decision cannot be validated if a default control is running for the same test.

▼ Functions

Different functions are available on the calibration validation screen, they are defined in the following table:

Heading/Key	Name	Function
	Edit	Make a decision.
	OK	Validation of a decision.
	Cancel	Cancellation of a decision.
	CONV	Conversion of results (see CONV function , page 2-62). Enabled only for the current calibrations.

Tab. 2–34: Functions

▼ CONV function

From the calibration validation screen, the CONV function is accessible by pressing the «CONV» button (see [Tab. 2-34: Functions](#), page 2-61).



The CONV function is accessible only for the current calibrations.

The CONV function allows the user to modify some application parameters in order to convert the current calibration results as patient and control results associated to this calibration.

The CONV menu is divided into three tabs:

- [Application Parameters](#), page 2-62
- [Calibration](#), page 2-63
- [Patients and Controls](#), page 2-64.

Click or press one of the tabs to access the various functions.

a – Application Parameters

This tab displays the application capture screen (see [2.2. Absorbance applications](#), page 7-11) and allows the user to modify some application parameters. The application capture screen is divided into five tabs but the «Analysis Parameters» and «Unit Parameters» tabs are not displayed here.

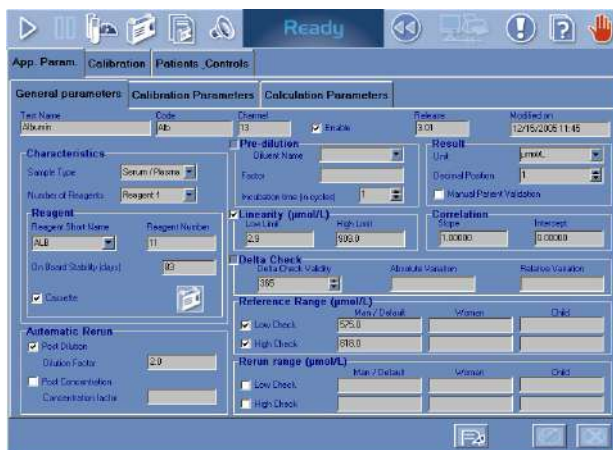


Fig. 2-36: «Application Parameters» tab

On the «General Parameters» tab, only the following parameters are modifiable:

- Correlation (see [Correlation](#), page 7-16)
- Linearity (see [Linearity](#), page 7-17)
- Reference Range (see [Reference Range](#), page 7-19)
- Rerun range (see [Rerun range](#), page 7-20).

On the «Calibration Parameters» tab, only the following parameters are modifiable:

- Calibration mode (see [Calibration](#), page 7-22)
- Checks (see [Checks](#), page 7-28).



The «Level» field is not modifiable. Then, the calibration mode modification is restricted by the level number (see [Tab. 7-15: Calibration modes](#), page 7-23).

On the «Calculation Parameters» tab, all parameters are modifiable (see [2.2.4. Calculation Parameters](#), page 7-33).



The modified last reading must be lower than the configured last reading.

To modify some parameters in the application, press the «Edit» button.

After one or several modifications, press the «OK» button to validate.

b – Calibration

The current calibration results are converted using the CONV application configured in the «Application Parameters» tab (see [Application Parameters](#), page 2-62). The CONV calibration is then displayed in the «Calibration» tab.

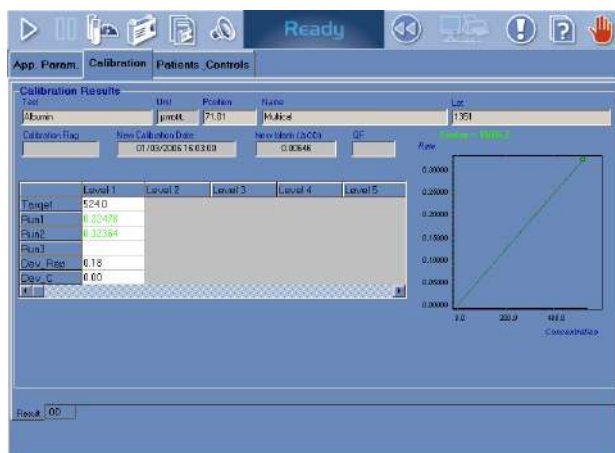


Fig. 2-37: «Calibration» tab

This tab is identical to the calibration validation screen (see [3.3.2. Calibration validation screen](#), page 2-50) except that no decision can be made.

c – Patients and Controls

The patient and control results associated to the current calibration are converted using the CONV calibration (see [Calibration](#), page 2-63). These results are then listed in the «Patients and Controls» tab.



- ◆ Only the patient and control results that are for validation are displayed.
- ◆ The ratio results and the test results linked to these ratios are not displayed.

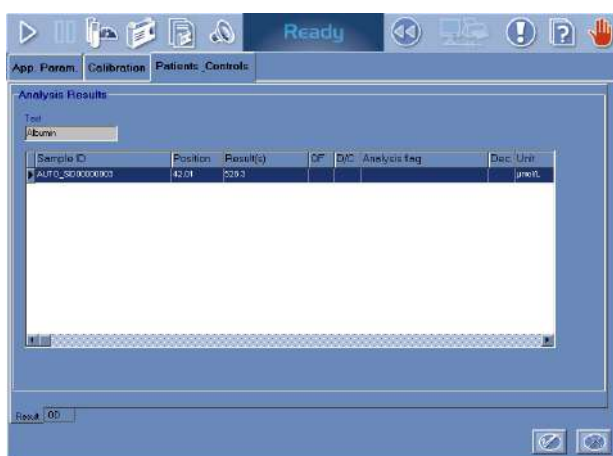


Fig. 2–38: «Patients and Controls» tab

From the «Patients and Controls» tab, the user is able to change a patient or control result by the corresponding converted result by selecting the corresponding item and pressing the «OK» button. The converted result is then flagged with R (see [3.3.5. Quality flags](#), page 9-74).



If the CONV calibration cannot be calculated:

- ◆ the patient and control results are not converted and then not given
- ◆ the «OK» button is disabled.

Columns of the «Patients and Controls» tab are described in the following table:

Heading	Description	Format
Sample ID	Sample ID (see Sample ID , page 2-65).	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Result(s)	Converted result (see Result(s) , page 2-65).	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
D/C	Sample post dilution/concentration (if there is one): Dil or Conc.	4 characters max.
Analysis flag	Sampling alarms or analytical flags. - If both exist, the sampling alarm is displayed. - If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Dec.	Decision: A, R, M or D (see Decision , page 2-65).	One character
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.

Tab. 2–35: «Patients and Controls» tab description

◆ Sample ID

For control tests, the field is green and displays the control name.



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

◆ Result(s)

For control tests, the field is red if the result is out of the programmed confidence range.

A not given result is displayed as follows: «---.-----». A result is not given in the following conditions:

- sampling alarm
- some analytical flags.

◆ Decision

- Patient results: Accept, Rerun, Modify or Delete.
- Control results: Accept or Delete.

3.3.3. Reagent blank validation screen

For tests using the Factor calibration mode, a reagent blank is carried out as a calibration. Results of the reagent blank are displayed on the reagent blank validation screen.

This screen is divided into two tabs:

- Result
- O.D. (see [Fig. 2-39: Reagent blank validation screen](#), page 2-66).

Click or press one of the tabs to access the various functions.

The reagent blank validation screen allows the user to make a decision relating to results of the reagent blank.

Moreover, different functions are available on this screen.

Then, the reagent blank validation screen will be described in the following parts:

- ◆ [Result](#), page 2-67
- ◆ [O.D.](#), page 2-68
- ◆ [Decision](#), page 2-69
- ◆ [Functions](#), page 2-69.

The screenshot shows the 'Reagent blank validation screen' with the following details:

- Top Toolbar:** Includes icons for play, stop, calibration, patient, control, and status (Ready).
- Tabs:** Patient, Calibration, Control.
- Blank Results Section:**
 - Test: CKMB
 - Unit: Δ OD
 - Run Date: 01/03/2006 15:45:31
 - Expiration date: (empty)
 - Position: 31
 - Lot: 123456
 - Flag: (empty)
 - QF: (empty)
 - Report: 0.00002
 - Previous Report: (empty)
 - Decision: ☒ Accept, ☐ Delete
- Bottom:** A 'Result' field with 'CD' is highlighted. Three icons (printer, checkmark, cross) are at the bottom right.

Fig. 2-39: Reagent blank validation screen

▼ Result

The fields displayed on the «Result» tab are described in the following table:

Heading	Description	Format
Test	Name of the calibrated test.	-
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Run date	Date and time of reagent blank run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Expiration date	Reagent expiry date. Displayed only for cassette.	Depending on the date format chosen (see System Date and Time , page 7-87).
Position	Reagent position.	From 1 to 52.
Lot	Reagent lot number.	16 characters max.
Flag	Calibration analytical flags.	15 characters max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Report	Result of the new reagent blank.	Five decimal position number: from -3.50000 to 3.50000 O.D.
Previous Report	Result of the previous reagent blank.	Five decimal position number: from -3.50000 to 3.50000 O.D.

Tab. 2–36: «Result» tab fields

Pentra 400

▼ O.D.

The «O.D.» tab shows the absorbance values of the reagent blank in a table and on a graph. This tab is so divided into two parts (as shown on the figure below):

- the absorbance values table (1)
- the kinetic graph (2).



If analytical flags exist, then a table displays the analytical flags of the reagent blank.

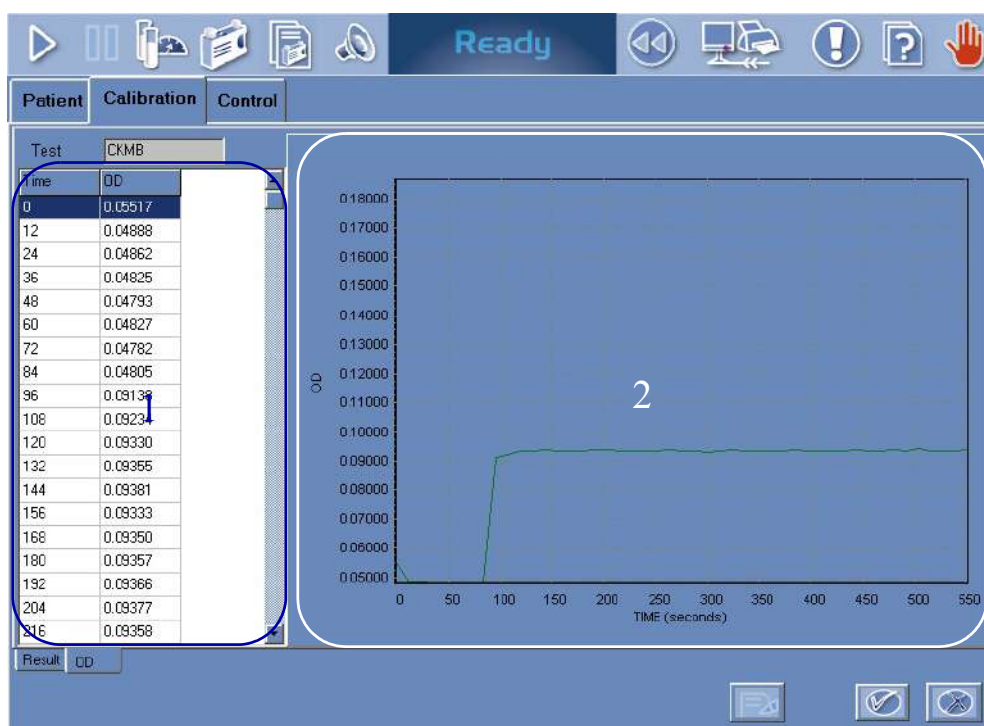


Fig. 2-40: «O.D.» tab

▼ Decision

From the «Decision» part, the user is able to make a decision relating to a reagent blank result. The «Decision» part is accessible by pressing the «Edit» button (see [Tab. 2-37: Functions](#), page 2-69).

The two following decisions are authorized:

- Accept
- Delete.

◆ Accept

The result of the new reagent blank is validated.



The reagent blank cannot be validated in the two following cases.

- ◆ The reagent blank is flagged with HIGH_ABS.
- ◆ A default control is running for the same test.

◆ Delete

The result of the new reagent blank is deleted.

In case the reagent blank is deleted, then the previous reagent blank will be the current reagent blank.



The reagent blank cannot be deleted if a default control is running for the same test.

To make a decision relating to a reagent blank result, press the «Edit» button (see [Tab. 2-37: Functions](#), page 2-69).

Choose the decision using the radio buttons from the «Decision» part.

Press the «OK» button (see [Tab. 2-37: Functions](#), page 2-69) to validate the decision.

▼ Functions

Different functions are available on the reagent blank validation screen, they are defined in the following table:

Heading/Key	Name	Function
	Edit	Make a decision.
	OK	Validation of a decision.
	Cancel	Cancellation of a decision.

Tab. 2-37: Functions

3.4. Control

This section describes the Control Result list and its use in the following chapters:

- ◆ [3.4.1. Control Result list](#), page 2-70
- ◆ [3.4.2. Control validation screen](#), page 2-73.

3.4.1. Control Result list

The Control Result list groups the controls that are incomplete, for validation and validated. Controls are sorted by blocks. A control block groups all the required default controls for a test (up to three default controls can be configured for a test). For a control not configured as default control for a test, the control block contains only this control. The separation between control blocks is materialized by the color of lines (alternation blank/blue).

The user is able to display either the control blocks for validation or the current control blocks by using the selective filter (see [Fig. 2-41: Control Result list](#), page 2-70).

- Block for validation: only the control blocks that are incomplete or for validation are displayed in the Control Result list. They are sorted by run dates.
- Current block: only the control blocks that are validated are displayed in the Control Result list. They are sorted by alphabetical order of tests.

Status	Test	Name	Run date	Lot	P
For validation	UA	N controle	01/26/2006 11:27:04	32131	88
For validation	UA	P controle	01/26/2006 11:28:04	131	88

☒ Block for validation
 ☐ Current block

Fig. 2-41: Control Result list

Columns of the Control Result list are described in the following table:

Heading	Description	Format
Status	Control status: Incomplete, For validation or Validated.	15 characters max.
Test	Name of the controlled test.	7 characters max.
Name	Control name.	20 characters max.
Run date	Date and time of control run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Lot	Control lot number.	16 characters max.
Position	Rack position of the control.	4 numerical characters: nn.nn
Flag	Analytical flags. If several analytical flags exist, the flag having priority is displayed.	15 characters max.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.

Tab. 2–38: Control Result list description



An item is displayed in red if the corresponding control cannot be automatically validated i.e. the corresponding control is associated to an analytical flag (except the flags CONF_RANGE_HIGH_W and CONF_RANGE_LOW_W) or a quality flag.

▼ Control Result list functions

From the Control Result list, the user is able to:

- display control results
- rerun a control
- delete a control.

Heading/Key	Name	Function
	Details	Display results of the selected control. Opens the control validation screen (see 3.4.2. Control validation screen , page 2-73). Function also accessible by double-clicking an item. See also «Details» button, page 2-72.
	Rerun	Rerun of the selected control (see Conditions of rerun , page 2-72).
	Delete	Deletion of the selected control (see Conditions of deletion , page 2-72).

Tab. 2–39: Control Result list functions

◆«Details» button

This function is disabled if:

- no item is selected
- the selected control is incomplete.

For control blocks:

The «Details» button is disabled for the selected control block if the Westgard rules are enabled and at least one of the default controls of the block is incomplete.

◆Conditions of rerun

This function is enabled if the selected control is:

- incomplete and associated to a sampling alarm
- incomplete and the instrument status is «Ready» or «Emergency Stop»
- for validation and with a calculated result.

Moreover, this function is disabled if the selected control has replicates.

◆Conditions of deletion

This function is enabled if the selected control is:

- incomplete and associated to a sampling alarm
- incomplete and the instrument status is «Ready» or «Emergency Stop»
- for validation and with a calculated result.

3.4.2. Control validation screen

The control results are displayed on the control validation screen.

This screen is divided into two tabs:

- Result
- O.D. (see [Fig. 2-42: Control validation screen](#), page 2-73).

Click or press one of the tabs to access the various functions.

The control validation screen allows the user to make a decision relating to the control results.

Moreover, different functions are available on this screen.

Then, the control validation screen will be described in the following parts:

- ◆ [Result](#), page 2-74
- ◆ [O.D.](#), page 2-75
- ◆ [Decision](#), page 2-76
- ◆ [Functions](#), page 2-76.

The screenshot displays the 'Control validation screen' with a blue background. At the top, there is a toolbar with icons for navigation and a 'Ready' status indicator. Below the toolbar are three tabs: 'Patient', 'Calibration', and 'Control', with 'Control' being the active tab. The main area is titled 'Control Results' and contains several input fields for data entry. A 'Decision' section on the right offers 'Accept' and 'Delete' options. At the bottom, there are 'Result' and 'O.D.' tabs, with 'O.D.' being the active tab. Three icons are visible in the bottom right corner.

Control Results			
Name N controle		Lot 32131	
Test UA	Unit µmol/L	Position 85.01	Run Date 01/26/2006 11:27:04
Report 276	Target Value 255	Confidence Range 216 - 294	
Flag	Quality Flag	Decision	Decision ☒ Accept ☐ Delete

Result O.D.

Fig. 2-42: Control validation screen

▼ Result

The fields displayed on the «Result» tab are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
Test	Name of the controlled test.	7 characters max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Position	Rack position of the control.	4 numerical characters: nn.nn
Run date	Date and time of control run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Report	Final result (see Report , page 2-74).	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Target Value	Control target value for the test.	with 7 significant digits max.
Confidence Range	Low and high limit value of the confidence range.	
Flag	Analytical flags. If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Quality Flag	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Decision	A or D (see Decision , page 2-76).	One character

Tab. 2-40: «Result» tab fields

◆ Report

The field is red if the result is out of the programmed confidence range.

A not given result is displayed as follows: «--.-----». A result is not given in the following cases:

- sampling alarm
- some analytical flags.

▼ O.D.

The «O.D.» tab shows the absorbance values of the control in a table and on a graph. This tab is so divided into two parts (as shown on the figure below):

- the absorbance values table (1)
- the kinetic graph (2).



If analytical flags exist, then they are displayed in a table.

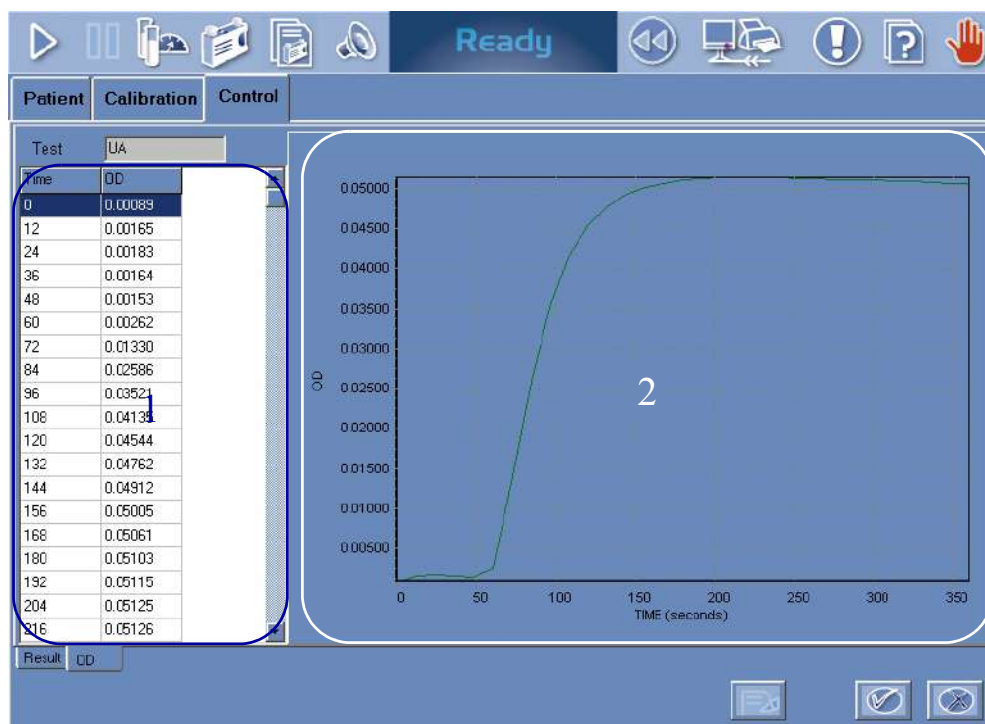


Fig. 2-43: «O.D.» tab

▼ Decision

From the «Decision» part, the user is able to make a decision relating to a control result. The «Decision» part is accessible by pressing the «Edit» button (see [Tab. 2-41: Functions](#), page 2-76).

The two following decisions are authorized:

- Accept
- Delete.

◆Accept

The control result is validated.



The control cannot be accepted if no result can be calculated.

◆Delete

The control result is deleted.

To make a decision relating to a control result, press the «Edit» button (see [Tab. 2-41: Functions](#), page 2-76).

Choose the decision using the radio buttons from the «Decision» part.

Press the «OK» button (see [Tab. 2-41: Functions](#), page 2-76) to validate the decision.

▼ Functions

Different functions are available on the control validation screen, they are defined in the following table:

Heading/Key	Name	Function
	Edit	Make a decision.
	OK	Validation of a decision.
	Cancel	Cancellation of a decision.

Tab. 2-41: Functions

3.5. Print results/Send results to the Host

3.5.1. Access to the «Print» window

Press the «Data Print/Send to Host» button from the generic toolbar.

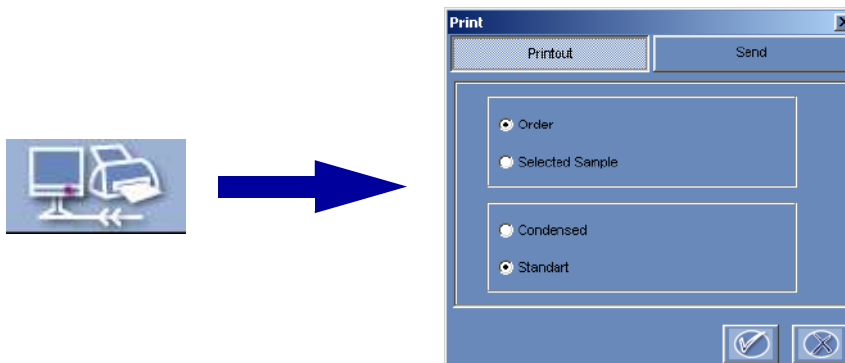


Fig. 2-44: «Print» window access button



Results can be printed and/or send to the Host from the following screens:

- ◆ Result lists (Patient, Calibration and Control)
- ◆ Result validation screens (Patient, Calibration, Reagent blank and Control)
- ◆ Archives (Worklist/Sample ID search mode)
- ◆ Quality Control.

The «Print» window allows the user to:

- ◆ [3.5.2. Print results](#), page 2-78
- ◆ [3.5.3. Send results to the Host](#), page 2-80.

Click or press the corresponding key to access Printout or Send function.

3.5.2. Print results

The Printout function is available for patient, calibration and control results.

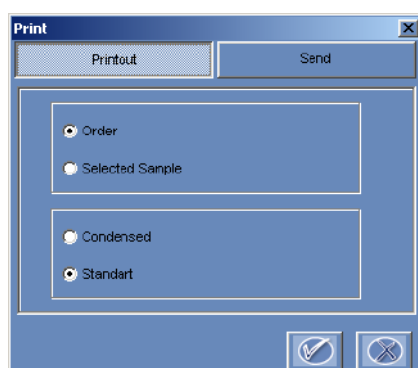


Fig. 2-45: Printout function

▼ Patient results

The user is able to select the printout type by using the corresponding radio buttons.

- ◆ Order: all sample results of the patient are printed.
- ◆ Selected Sample: only results of the selected sample are printed.

Then, different printout formats are available:

- Condensed
- Standard
- Detailed (only for Selected Sample printout type)
- Portrait (only for Selected Sample printout type).



For a selected sample, O.D. values can also be printed from the «O.D. Values» tab.

Condensed list printout type:

From the «Archives» menu (Worklist/Sample ID search mode), the user can print all patient results of an archived Worklist in a condensed print (Condensed list printout type).

This printout type allows the user to print, at the end of the day for example, all patient results of the day of work in a condensed print.

▼ Calibration results

The user is able to select the printout format by using the corresponding radio buttons:

- Standard
- Detailed.



For a selected calibration or reagent blank, O.D. values can also be printed from the «O.D.» tab.

▼ Control results

The user is able to select the printout format by using the corresponding radio buttons:

- Condensed
- Standard
- Detailed.



For a selected control, O.D. values can also be printed from the «O.D.» tab.

▼ Quality Control results

The user is able to print:

- ◆ The results and statistical analyses of a selected control for each test controlled with this control either over the current Worklist, a month or a year.
- ◆ The results and statistical analyses of all controls used for a selected test either over the current Worklist, a month or a year.

The user can select the printout format by using the corresponding radio buttons:

- Standard
- Detailed (only for Quality Control results over the current Worklist).



The **Pentra 400** can automatically print results if configured in the «System Configuration» menu (see [3.4. Printer](#), page 7-98).

3.5.3. Send results to the Host

The Send function is available for patient and control results.

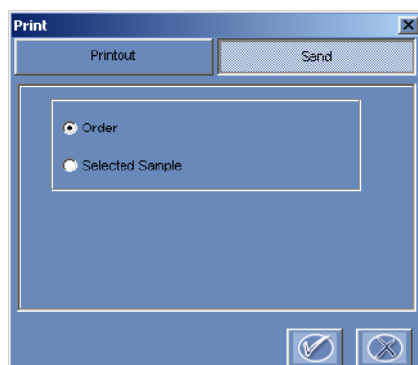


Fig. 2-46: Send function

▼ Patient results

The user is able to select the transmission type by using the corresponding radio buttons (see [Fig. 2-46: Send function](#), page 2-80).

- ◆ Order: all sample results of the patient are sent.
- ◆ Selected Sample: only results of the selected sample are sent.

▼ Control results

The user is able to send the control results test by test.



The **Pentra 400** can automatically send results to the Host if configured in the «System Configuration» menu (see [3.3. Host Connection](#), page 7-94).

4. Test Review

▼ Access to the «Test Review» menu

Press the «Test Review» button from the generic toolbar.

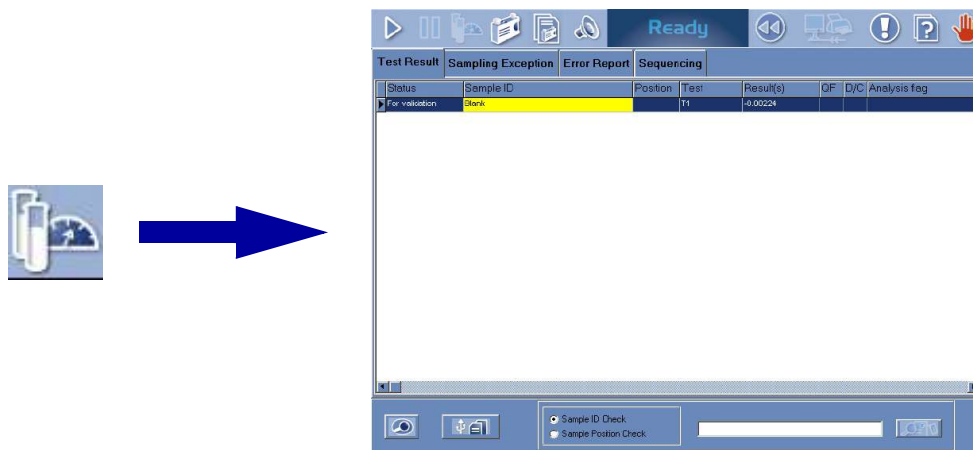


Fig. 2-47: «Test Review» menu access button



When a sampling alarm or a flag is triggered, the «Test Review» button becomes red until the user clicks it to check the corresponding sampling alarm or flag.

The «Test Review» menu is divided into four tabs:

- Test Result
- Sampling Exception
- Error Report
- Sequencing.

Click or press one of the tabs to access the various functions.

Moreover, this menu allows the user to search a sample using the search function.

Then, the «Test Review» menu will be described in the following parts:

- ◆4.1. [Test Result](#), page 2-82
- ◆4.2. [Sampling Exception](#), page 2-85
- ◆4.3. [Error Report](#), page 2-87
- ◆4.4. [Sequencing](#), page 2-90
- ◆4.5. [Search function](#), page 2-92.

4.1. Test Result

The «Test Result» tab displays patient, calibration and control tests as soon as they are pipetted by the instrument. They are sorted by run dates.

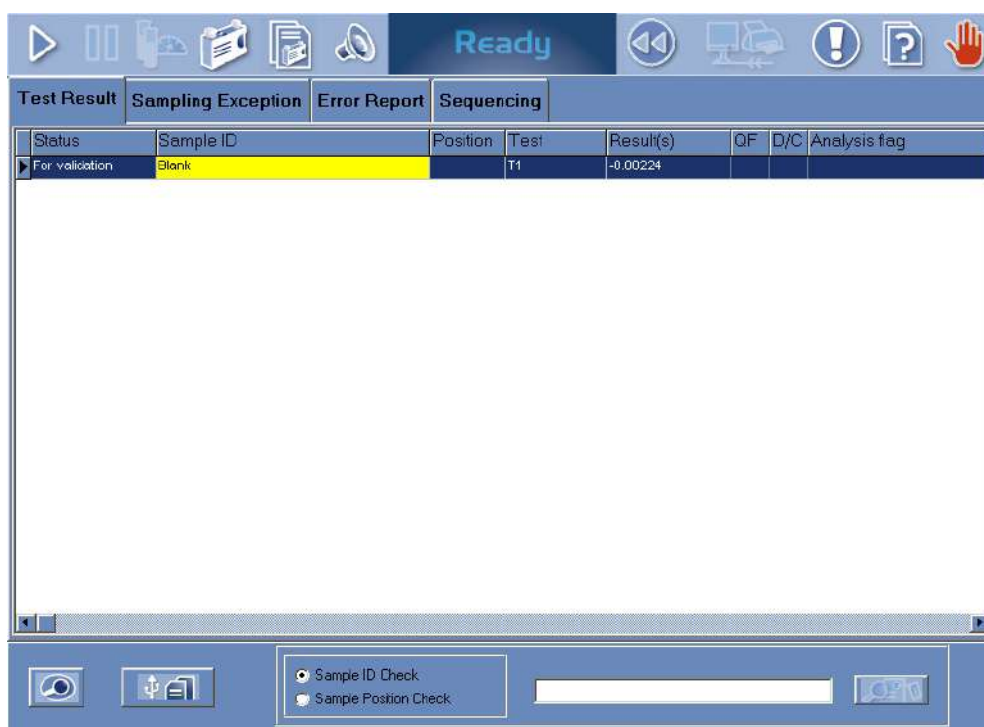


Fig. 2-48: «Test Result» tab



- ◆ The «Test Result» tab is initialized at each start, **Pentra 400** start up or creation of a new Worklist.
- ◆ Up to 200 items are displayed on the «Test Result» tab. Beyond this number, the oldest are suppressed.

Columns of the «Test Result» tab are described in the following table:

Heading	Description	Format
Status	Sample status: Ordered or Pending (with at least one test of the sample finished), Incomplete, For validation or Validated.	15 characters max.
Sample ID	Sample ID (see Sample ID , page 2-83).	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Test	Application short name.	7 characters max.
Result(s)	(1) Patient and control tests: final result (see Result(s) , page 2-83). (2) Calibration tests: absorbance value.	(1) 6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max. (2) Five decimal position number: from -3.50000 to 3.50000 O.D.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
D/C	Sample post dilution/concentration (if there is one): Dil or Conc.	4 characters max.
Analysis flag	Sampling alarms or analytical flags. - If both exist, the sampling alarm is displayed. - If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Dec.	Decision: A, R, M or D (see Decision , page 2-84).	One character
Unit	Test unit configured in the application (see Result , page 7-16) or O.D. for a reagent blank.	10 characters max.
Run date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2-42: «Test Result» tab description

◆ Sample ID

- For calibration tests, the field is yellow and displays the calibrator name or BLANK for a reagent blank.
- For control tests, the field is green and displays the control name.



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

◆ Result(s)

For control tests, the field is red if the result is out of the programmed confidence range.

A not given result is displayed as follows: «---,-----». A result is not given in the following conditions:

- sampling alarm
- some analytical flags.

◆Decision

- Patient results: Accept, Rerun, Modify or Delete.
- Calibration results: not displayed except for a reagent blank (Accept or Delete).
- Control results: Accept or Delete.

▼ «Test Result» tab functions

From the «Test Result» tab, the user is able to display the details of a test result either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 2-43: «Test Result» tab functions](#), page 2-84).

Heading/Key	Name	Function
	Details	Display details of the selected test result. Opens the corresponding validation screen (see 3. Result Validation , page 2-33). Function also accessible by double-clicking an item.
	Export	At the end of run, all the finished test results are saved in a file on USB key (see 3.1.13. Export of the results on USB key , page 7-85). Enabled only if the instrument status is «Ready» or «Emergency Stop».

Tab. 2-43: «Test Result» tab functions

4.2. Sampling Exception

The «Sampling Exception» tab displays the patient, calibration and control tests that are associated to sampling alarms. The item is displayed as soon as the sampling alarm is triggered.

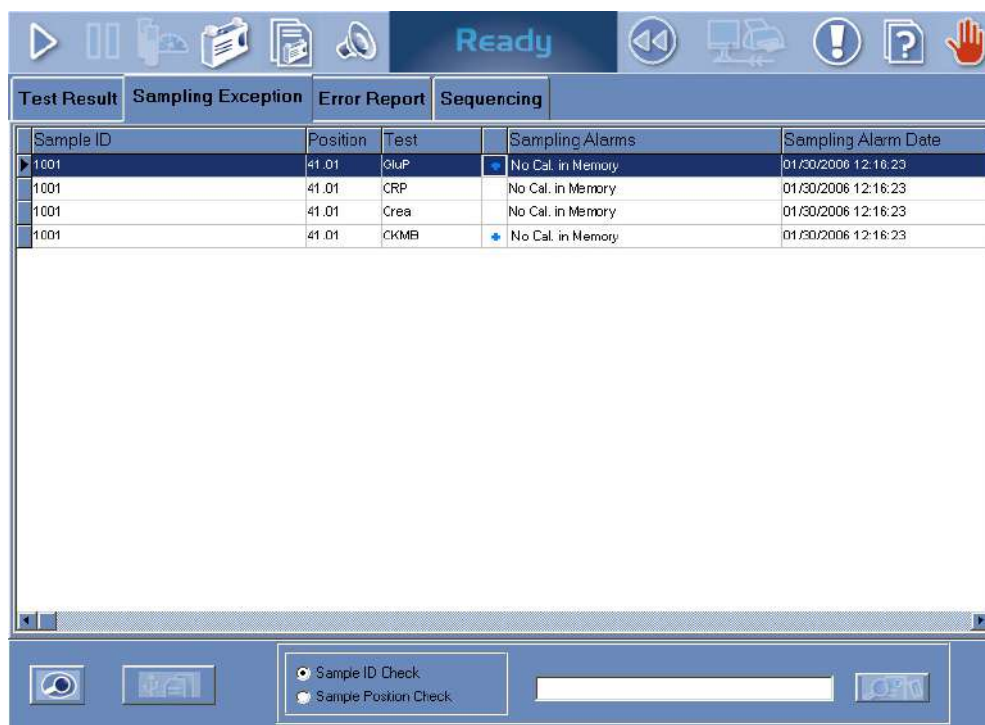


Fig. 2-49: «Sampling Exception» tab



The «Sampling Exception» tab is initialized at each start or **Pentra 400** start up.

Columns of the «Sampling Exception» tab are described in the following table:

Heading	Description	Format
Sample ID	Sample ID (see Sample ID , page 2-86).	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Test	Application short name.	7 characters max.
Sampling Alarms	Sampling alarm.	-
	Sampling alarm button. If available, displays additional information about the sampling alarm.	-
Sampling Alarm Date	Date and time of sampling alarm.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Run date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2-44: «Sampling Exception» tab description

◆ Sample ID

- For calibration tests, the field is yellow and displays the calibrator name or BLANK for a reagent blank.
- For control tests, the field is green and displays the control name.



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

▼ «Sampling Exception» tab functions

Heading/Key	Name	Function
	Details	- If the selected sample is pending, returns to the corresponding request capture screen (see 2. Worklist, page 2-7). - If the selected sample is incomplete or for validation, returns to the corresponding validation screen (see 3. Result Validation, page 2-33). Function also accessible by double-clicking an item.

Tab. 2-45: Details button

4.3. Error Report

The «Error Report» tab displays the patient, calibration and control tests that are associated to analytical and quality flags blocking the automatic validation. They are sorted by run dates.



Fig. 2-50: «Error Report» tab



The items are deleted from the «Error Report» tab as soon as a decision relating to the test is made.

Columns of the «Error Report» tab are described in the following table:

Heading	Description	Format
Sample ID	Sample ID (see Sample ID , page 2-88).	16 characters max.
Position	Rack position of the sample tube.	4 numerical characters: nn.nn
Test	Application short name.	7 characters max.
Result(s)	(1) Patient and control tests: final result (see Result(s) , page 2-88). (2) Calibration tests: absorbance value.	(1) 6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max. (2) Five decimal position number: from -3.50000 to 3.50000 O.D.
QF	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
D/C	Sample post dilution/concentration (if there is one): Dil or Conc.	4 characters max.
Analysis flag	Analytical flags. If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Unit	Test unit configured in the application (see Result , page 7-16) or O.D. for a reagent blank.	10 characters max.
Run date	Date and time of sample run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 2-46: «Error Report» tab description

◆ **Sample ID**

- For calibration tests, the field is yellow and displays the calibrator name or BLANK for a reagent blank.
- For control tests, the field is green and displays the control name.



When a patient file is modified, all validated and archived Sample ID for this patient are flagged with a «*».

◆ **Result(s)**

For control tests, the field is red if the result is out of the programmed confidence range.

A not given result is displayed as follows: «-.-.-.-». A result is not given in the following conditions:

- sampling alarm
- some analytical flags.

▼ «Error Report» tab functions

From the «Error Report» tab, the user is able to display the details of a test result either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 2-47: Details button](#), page 2-89).

Heading/Key	Name	Function
	Details	Display details of the selected test result. Opens the corresponding validation screen (see 3. Result Validation , page 2-33). Function also accessible by double-clicking an item.

Tab. 2-47: Details button

4.4. Sequencing

The «Sequencing» tab displays all samplings of the reagent and sample needles as soon as they are performed by the instrument. They are sorted by dates.



Reagent Arm						
Date	Nature	Reagent need	Volume	Sampling	Type	Dispensing posit
10:43:58	UA	R1	190.0	R.40.1	Cassette	C.1.4
10:44:10	UA	R1	190.0	R.40.1	Cassette	C.1.5
10:44:22	UA	R1	190.0	R.40.1	Cassette	C.1.6
10:44:34	-	-	-	-	-	-
10:44:46	-	-	-	-	-	-
10:44:58	-	-	-	-	-	-

Sample Arm						
Date	Nature	Sample need	Volume	H2O	Sampling	Dispensing posit
10:43:58	UA	H2O	-	15.0	-	C.1.4
10:44:10	UA	SAMPLE	5.0	10.0	R.44.1 01	C.1.5
10:44:22	UA	SAMPLE	5.0	10.0	R.44.1 01	C.1.6
10:44:34	-	-	-	-	-	-
10:44:46	UA	R2	50.0	-	R.40.2	C.1.4
10:44:58	UA	R2	50.0	-	R.40.2	C.1.5

Other		
Date	Mixing speed	Cuvette loader
10:43:58	70	-
10:44:10	70	-
10:44:22	70	-
10:44:34	-	-
10:44:46	70	-
10:44:58	70	-

Fig. 2-51: «Sequencing» tab



- ◆ The «Sequencing» tab is initialized at each start, **Pentra 400** start up or creation of a new Worklist.
- ◆ Up to 200 items are displayed on the «Sequencing» tab. Beyond this number, the oldest are suppressed.

Columns of the «Sequencing» tab are described in the following table:

Heading	Description	Format
Reagent Arm		
Date	Time of the reagent needle sampling.	Depending on the time format chosen (see System Date and Time , page 7-87).
Nature	Nature of the reagent needle sampling. - For a test sampling: corresponding application code (or short name). - For an ISE test sampling: ISE. - For a dilution sampling: Dilution. - For a cleaning sampling: Cleaner.	

Tab. 2-48: «Sequencing» tab description

Heading	Description	Format
Reagent needle	Solution pipetted by the reagent needle.	-
Volume	Volume pipetted by the reagent needle (µL).	From 15.0 to 600.0 µL.
Sampling position	Position of the reagent needle pipetting. - On the reagent tray: R (for reagent tray) + position on the tray + position on the cassette/rack.	
Type	Container type where the reagent needle pipetting is performed. - For cassettes: Cassette. - For reagent racks: rack ID + position on the rack.	
Dispensing position	Position of the reagent needle dispensing. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment.	
Sample Arm		
Date	Time of the sample needle sampling.	Depending on the time format chosen (see System Date and Time , page 7-87).
Nature	Nature of the sample needle sampling. - For a test sampling: corresponding application code (or short name). - For an ISE test sampling: ISE. - For a dilution sampling: Dilution. - For a cleaning sampling: Cleaner.	
Sample needle	Solution pipetted by the sample needle.	-
Volume	Volume pipetted by the sample needle (µL).	From 2.0 to 95.0 µL.
H ₂ O	Distilled water volume pipetted by the sample needle (µL) to push the sample volume.	From 0.0 to 95.0 µL.
Sampling position	Position of the sample needle pipetting. - On the sample tray: S (for sample tray) + rack number + position on the rack. - On the reagent tray: R (for reagent tray) + position on the tray + position on the cassette/rack. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment.	
Type	Container type where the sample needle pipetting is performed. - For sample tubes: Tube. - For sample cups: Sample cup. - For cassettes: Cassette. - For reagent racks: rack ID + position on the rack. - For calibrator/control reagent racks: rack ID. - For cuvettes: Cuvette.	
Dispensing position	Position of the sample needle dispensing. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment. - In the ISE module sample cup: ISE bowl.	
Other		
Date	Time of the mixing or the loading/unloading of a cuvette segment.	Depending on the time format chosen (see System Date and Time , page 7-87).
Mixing speed	Mixing speed of solutions into the cuvette.	From 1 to 100%.
Cuvette loader	Loading/unloading of a cuvette segment.	Loading/Unloading + position on the tray.

Tab. 2-48: «Sequencing» tab description

4.5. Search function

Each tab of the «Test Review» menu (except the «Sequencing» tab) gives access to the search function (see [Fig. 2-52: Search function](#), page 2-92).

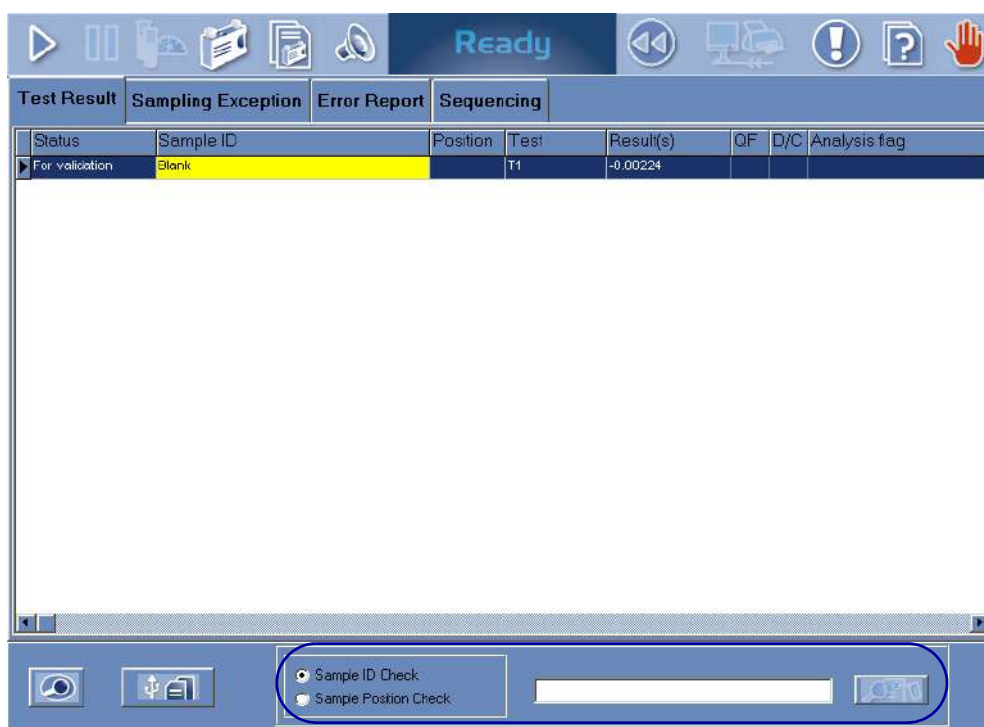


Fig. 2-52: Search function

The search is done either on the Sample ID or on the rack position. Select the corresponding radio button in order to choose the search mode. Then, type the Sample ID or the rack position and launch the search by pressing the «Search» button (see [Tab. 2–49: Search criteria fields](#), page 2-93).

Heading/Key	Description	Format
Sample ID Check	If selected, the search is done on the Sample ID.	Radio button
	Sample ID.	16 characters max.
Sample Position Check	If selected, the search is done on the rack position.	Radio button
	Rack position of the sample tube.	4 numerical characters: nn.nn
	Search. - If the selected sample is ordered or pending, returns to the corresponding request capture screen (see 2. Worklist , page 2-7). - If the selected sample is incomplete, for validation or validated, returns to the corresponding validation screen (see 3. Result Validation , page 2-33).	-

Tab. 2–49: Search criteria fields

Pentra 400

Pentra 400

Archives

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Results are archived at the creation of a new Worklist (see [2.2.7. New Worklist](#), page 2-21).

Archived results can be reviewed using the «Archives» menu.

▼ Access to the «Archives» menu

Press the «Archives» button from the Main menu.

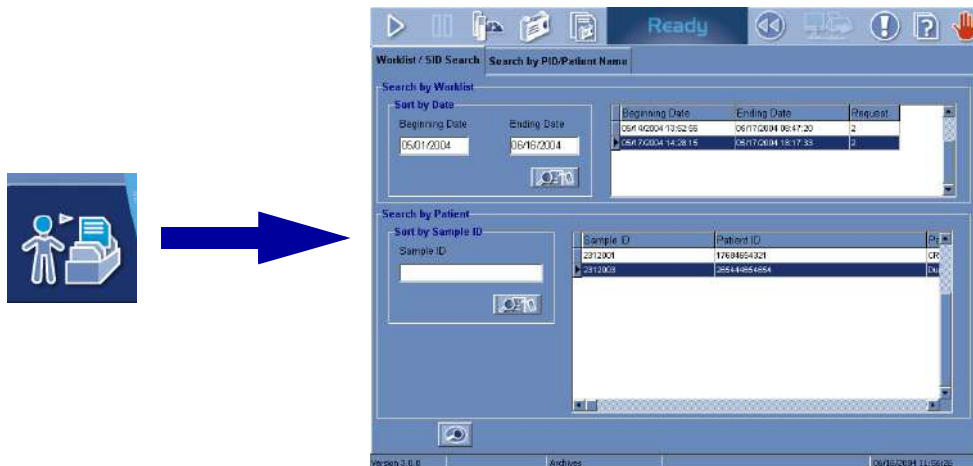


Fig. 3-1: «Archives» menu access button

Two modes of reviewing Archives are available:

- ◆1. [Worklist/Sample ID Search](#), page 3-3
- ◆2. [Patient ID/Patient Name Search](#), page 3-6.

Select a search mode by pressing one of the tabs.

1. Worklist/Sample ID Search

To review an archived result, use the Worklist/Sample ID search mode as follows:

- select the Worklist using the search tool of Worklist (see [1.1. Search tool of Worklist](#), page 3-3)
- as soon as the Worklist is selected, search the Sample ID using the search tool of Sample ID (see [1.2. Search tool of Sample ID](#), page 3-4)
- when the Sample ID is found, review the test results (see [1.3. Test results screen](#), page 3-5) using the «Details» function.

1.1. Search tool of Worklist

The user is able to search a Worklist using the search tool of Worklist.

The search tool of Worklist is divided into two parts:

- one to enter the search criteria (on the left)
- the other to display the search results (on the right).

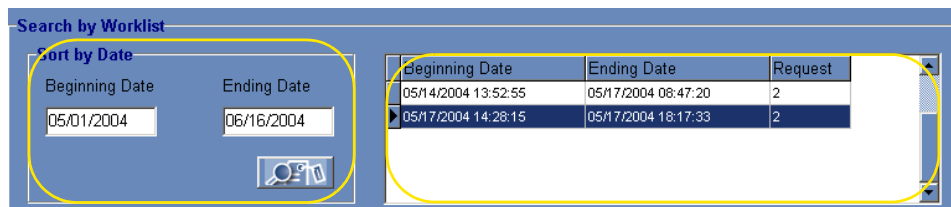


Fig. 3-2: Search tool of Worklist

The search is done on the Worklist date. Type the beginning and ending dates in the corresponding fields. Then, launch the Worklist search by pressing the «Search» button (see [Tab. 3-1: Search criteria fields](#), page 3-3).

Heading/Key	Description	Format
Beginning Date	Lower limit for the Worklist search.	Depending on the date format chosen (see System Date and Time , page 7-87).
Ending Date	Upper limit for the Worklist search.	Depending on the date format chosen (see System Date and Time , page 7-87).
	Search. Launches the Worklist search.	Key

Tab. 3-1: Search criteria fields

The search results are displayed in the grid (see [Tab. 3-2: Grid description](#), page 3-4). Select the searched Worklist by clicking the corresponding item. As soon as the Worklist is selected, the search tool of Sample ID is accessible.

Heading	Description	Format
Beginning Date	Date and hour of the Worklist beginning.	Depending on the date format chosen (see System Date and Time , page 7-87).
Ending Date	Date and hour of the Worklist end.	Depending on the date format chosen (see System Date and Time , page 7-87).
Request	Number of samples pipetted during the Worklist.	-

Tab. 3-2: Grid description

1.2. Search tool of Sample ID

As soon as the Worklist is selected, the user is able to search a Sample ID using the search tool of Sample ID.

The search tool of Sample ID is divided into two parts:

- one to enter the search criteria (on the left)
- the other to display the search results (on the right).

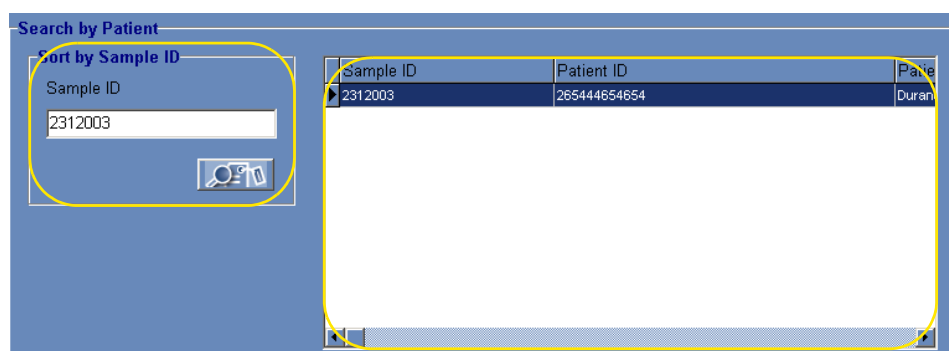


Fig. 3-3: Search tool of Sample ID

The search is done on the «Sample ID» field. Type the first characters of the searched Sample ID. Then, launch the Sample ID search by pressing the «Search» button (see [Tab. 3-3: Search criteria fields](#), page 3-4).

Heading/Key	Description	Format
Sample ID	Sample ID.	16 characters max.
	Search. Launches the Sample ID search.	Key

Tab. 3-3: Search criteria fields

The search results are displayed in the grid. Columns of the grid are described in the following table:

Heading	Description	Format
Sample ID	Sample ID.	16 characters max.
Patient ID	Patient ID.	25 characters max.
Patient Name	Patient name.	20 characters max.
First Name	Patient first name.	20 characters max.

Tab. 3–4: Grid description



The character «*» is displayed near the Sample ID when the patient file, attached to this Sample ID, has been modified.

When the Sample ID is found, review the test results (see [1.3. Test results screen](#), page 3-5) either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item.

1.3. Test results screen

The test results screen is identical to the result validation screen except that only the Display mode is available (see [3.2.2. Result validation screen](#), page 2-36).

2. Patient ID/Patient Name Search

To review an archived result, use the Patient ID/Patient Name search mode as follows:

- select the patient using the search tool of patient (see [2.1. Search tool of patient](#), page 3-6)
- as soon as the patient is selected, the patient history is displayed (see [2.2. Patient history](#), page 3-7)
- review the test results (see [2.3. Test results screen](#), page 3-8) using the «Details» function.

Up to 100 000 results are saved in the database. Beyond this number, the oldest are suppressed and saved in an archive file.

Archive files are automatically created at the **Pentra 400** start up every six months or if 100 000 results at least are saved in the database. Each archive file saves up to 100 000 results. Archive files can be consulted using the Patient ID/Patient Name search mode (see [2.4. Archive Search](#), page 3-8).

2.1. Search tool of patient

The user is able to search a patient using the search tool of patient.

The search tool of patient is divided into two parts:

- one to enter the search criteria
- the other to display the search results.

Patient ID	Patient Name	Patient First Name	Bind
265444654654	Durand	alice	12/02/2012

Fig. 3-4: Search tool of patient

The search is done either on the Patient ID, on the Patient Name or on the both. Type the Patient ID, Patient Name or both and launch the search by pressing the «Search» button (see [Tab. 3-5: Search criteria fields](#), page 3-7).



You can type the first characters of the Patient ID or Patient Name followed by the character «*» to search the patients having Patient ID or Patient Name starting with the characters entered.

Heading/Key	Description	Format
Patient ID	Patient ID.	25 characters max.
Patient Name	Patient name.	20 characters max.
	Search. Launches the patient search.	Key
	Archive Search. Launches the patient search in archive files (see 2.4. Archive Search , page 3-8).	Key

Tab. 3-5: Search criteria fields

The search results are shown in the grid (see [Tab. 3-6: Grid description](#), page 3-7). Select the searched patient by clicking the corresponding item. As soon as the patient is selected, the patient history is displayed (see [2.2. Patient history](#), page 3-7).

Heading	Description	Format
Patient ID	Patient ID.	25 characters max.
Patient Name	Patient name.	20 characters max.
Patient First Name	Patient first name.	20 characters max.
Birthdate	Patient birthdate.	Depending on the date format chosen (see System Date and Time , page 7-87).
Gender	Man, Woman or Unknown.	-

Tab. 3-6: Grid description

2.2. Patient history

As soon as the patient is selected, the patient history is displayed.

The patient history is divided into two parts:

- one to remind the Patient Demographics
- the other to display the patient tests (Tests History).

Patient Demographics

Patient Name

Durand

Patient First Name

alice

Patient ID

265444654654

Date of Birth

12/02/1965

Age

38 y

Gender

Unknown

Tests History

	05/17/2004
▶ AST (U/L)	20.69654 [3]
Iron (µmol/L)	0.34016 [1]
Glucose (mmol/L)	2.23678 [2]
GGT (U/L)	31.46204 [2]
ALT (U/L)	11.57006 [2]
S. N/A (mmol/L)	138.2 [1]

Fig. 3-5: Patient history

The patient tests are sorted by run dates and displayed in a table:

- each line corresponds to a test (with its unit)
- each column corresponds to a run date
- table cells show the test results (with the number of replicates).

The user is able to review the test results for a run date (see [2.3. Test results screen](#), page 3-8) either by selecting the corresponding column and pressing the «Details» button or by double-clicking the corresponding column.

2.3. Test results screen

The test results screen is identical to the result validation screen except that only the Display mode is available (see [3.2.2. Result validation screen](#), page 2-36).

2.4. Archive Search

The user is able to search a patient in archive files using the search tool of patient (see [2.1. Search tool of patient](#), page 3-6) as follows.

The search is done either on the Patient ID, on the Patient Name or on the both. Type the Patient ID, Patient Name or both and launch the search in archive files by pressing the «Archive Search» button (see [Tab. 3-5: Search criteria fields](#), page 3-7).



You can type the first characters of the Patient ID or Patient Name followed by the character «*» to search the patients having Patient ID or Patient Name starting with the characters entered.

The following window is displayed:



Fig. 3-6: Hard disk/USB key

Select hard disk or USB key by using the corresponding radio button and press the «OK» button.

The Archive Search screen is then displayed.

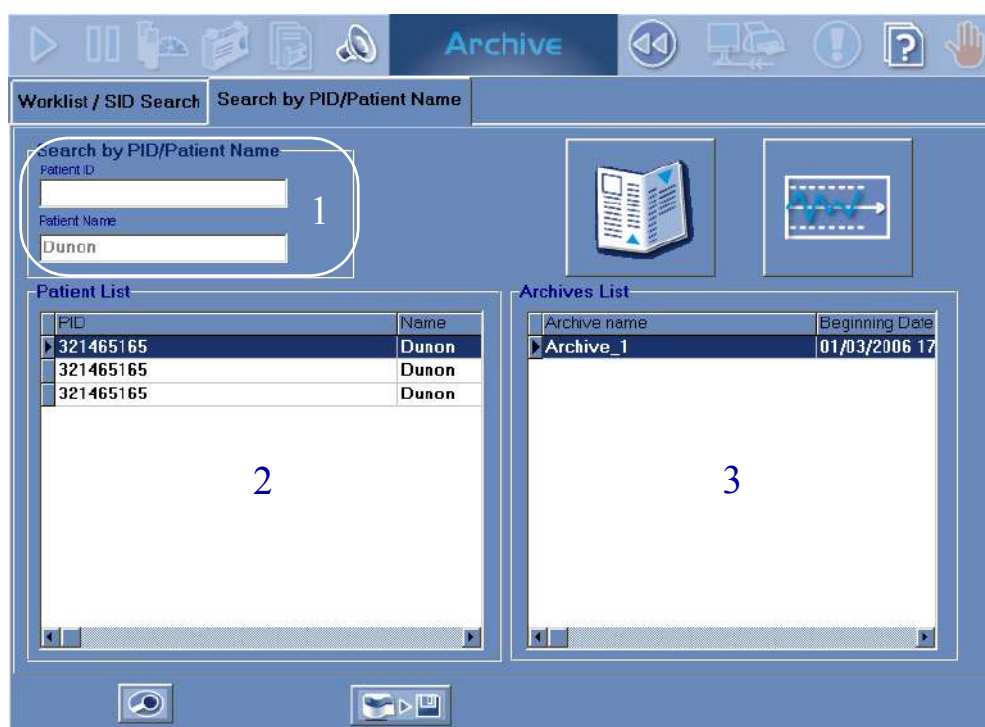


Fig. 3-7: Archive Search screen

This screen shows:

- (1) the search criteria
- (2) the patients found in archive files (Patient list)
- (3) the archive files found for the selected patient (Archives list).

The Patient list displays the found patients (see [Tab. 3-7: Patient list description](#), page 3-9). Select the searched patient by clicking the corresponding item. As soon as the patient is selected, the Archives list is updated.

Heading	Description	Format
Patient ID	Patient ID.	25 characters max.
Patient Name	Patient name.	20 characters max.
First Name	Patient first name.	20 characters max.
Sample ID	Sample ID.	16 characters max.

Tab. 3-7: Patient list description

The Archives list displays the found archive files for the selected patient (see [Tab. 3–8: Archives list description](#), page 3-10). Select an archive file by clicking the corresponding item and press the «Details» button in order to review the patient results saved in the selected archive file (see [Tab. 3–9: Archive Search screen functions](#), page 3-10).

Heading	Description	Format
Archive name	Archive file name.	Archive_N
Beginning Date	Date of the archive file beginning.	Depending on the date format chosen (see System Date and Time , page 7-87).
Ending Date	Date of the archive file end.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 3–8: Archives list description



If the Patient list is empty, then the Archives list displays all found archive files.

The Archive Search screen functions are defined in the following table:

Heading/Key	Name	Function
	Details	Displays the patient results* saved in the selected archive file. * If a patient is selected in the Patient list, this patient results are displayed (see 2.2. Patient history , page 3-7). If the Patient list is empty, Worklists of the selected archive file are displayed (see 1.1. Search tool of Worklist , page 3-3).
	Save	Saves the archive files on a USB key. Disabled if the archive files are already saved on the USB key.
	Logs	Displays Logs of the selected archive file.
	Quality Control	Displays Quality Control of the selected archive file.

Tab. 3–9: Archive Search screen functions

Pentra 400

Reagent Management

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1. Introduction

Three types of solutions are programmable on the **Pentra 400**:

- reagents
- diluents
- cleaners.

Reagents mean the reagents that are programmed in the application as R1, R2 and R3. These reagents are directly linked to the application by the reagent short name (see [Characteristics](#), page 7-14).

Diluents and cleaners are shared between several applications.

52 positions are available on the reagent tray, 44 refrigerated and 8 at room temperature.

The user is able to manage the required solutions using:

- ◆ the reagent tray representation from the Main menu (see [2. Reagent tray representation](#), page 4-4)
- ◆ the «Reagent Configuration» menu (see [3. Reagent Configuration](#), page 4-9).

On the **Pentra 400** reagent tray, the user can accommodate:

- Cassettes which occupy one position per cassette on the reagent tray. The cassettes are either single compartment or twin compartment containers. Some reagents and diluents are packaged in cassettes.
- Reagent racks which occupy four positions on the tray. The reagent racks hold three sectors and can accommodate either three reagents, diluents or cleaners or a combination of the above (for example: one reagent and two diluents).
- Calibrator reagent racks which occupy one position per rack. These racks can accommodate up to three different calibrators.
- Control reagent racks which occupy one position per rack. These racks can accommodate up to three different controls.



Temperature of the refrigerated positions 1, 2, 43 and 44 may be higher than required depending on the room temperature. It is recommended to use these positions for diluents, cleaners, calibrators or controls.

Using reagent racks or calibrator/control reagent racks, the user must ensure that the solutions are physically positioned as configured in the «Reagent Configuration» menu.

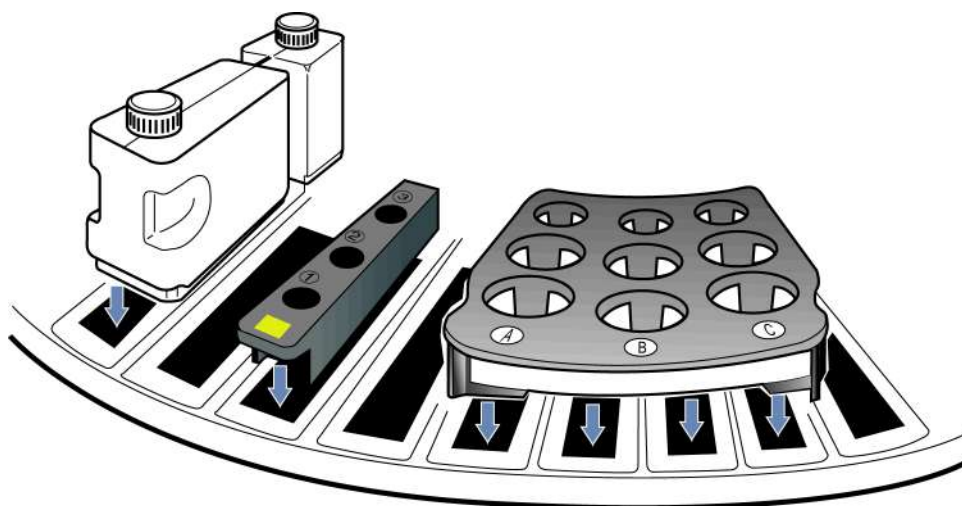


Fig. 4-1: Cassette/racks

On the Main menu, the colored circle (shown on the figure below) indicates the reagent tray status.



Fig. 4-2: Reagent tray accessibility

The circle is:

- green when the reagent tray is accessible
- blue when the reagent tray cover is locked.

2. Reagent tray representation

From the Main menu, the reagent tray representation allows the user to visualize the solutions present on the **Pentra 400** and the calibrators/controls configured on the reagent tray.



Fig. 4-3: Reagent tray representation

The 52 positions of the reagent tray are represented.

Each position has a specific color which indicates the solution status (see [Tab. 4-1: «Reagent Status Legend» window](#), page 4-4).

	OK	- For a cassette: indicates that the cassette is available for analyses with sufficient volume. If «b» is displayed, the cassette will be used as a back-up. - For a reagent rack: indicates that a solution is located on that rack.
	Low volume	There remains less than 10% of the solution initial volume (only for cassette).
	To be checked	The solution is «To be checked» in the following cases: - the cassette is empty - the solution is unknown (bad barcode for example) - not enough solution for the pending analyses - the solution is inactive - the solution has reached its use limit date/has expired.
	Available	The position is empty.
	Control	The position is occupied by a control reagent rack.
	Calibrator	The position is occupied by a calibrator reagent rack.

Tab. 4-1: «Reagent Status Legend» window

The «Reagent Status Legend» window is opened by clicking the blue background outside the tray representation.



◆ Back-up cassette

If several cassettes of the same solution are installed on the reagent tray, then the first installed cassette is activated and the next cassettes are automatically inactivated.

If the automatic back-up cassette option in the «System Configuration» menu (see [3.1.10. Automatic back-up cassette](#), page 7-84) is enabled, the next cassettes are called back-up cassettes and are represented in green tagged with «b».

Back-up cassettes are automatically activated when the cassette in use is empty.

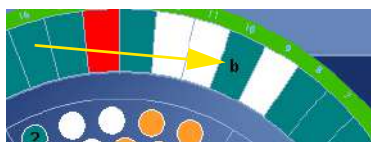


Fig. 4-4: Back-up cassette

By clicking a position on the reagent tray representation, the user visualizes:

- a solution on cassette or reagent rack
- a calibrator/control reagent rack.

Depending on the selected position, the following windows open:

- ◆ [Cassette window](#), page 4-6
- ◆ [Reagent rack window](#), page 4-7
- ◆ [Calibrator/control reagent rack window](#), page 4-8.

▼ Cassette window

This window is divided into two parts:

- the cassette representation (on the left)
- the solution characteristics (on the right).



Fig. 4-5: Cassette window

The solution characteristics fields are described in the following table:

Heading	Description	Format
Solution Name	Solution short name.	7 characters max.
Position	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Tests Available	Number of tests that can be performed with the solution volume remaining into the cassette.	-
Tests to be done	Number of tests to be performed on the samples present on the instrument.	-
Expiry Date	Expiry date before opening.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 4-2: Solution characteristics fields

▼ Reagent rack window

This window is divided into two parts:

- the rack representation (on the left)
- the solution characteristics (on the right).



Fig. 4–6: Reagent rack window

The solution characteristics fields are described in the following table:

Heading	Description	Format
Reagent Rack	Rack ID.	2 characters max.
Tray Position	First position number on the reagent tray.	2 numerical characters: from 1 to 41 and 45 to 49.
Solution Name	Solution short name.	7 characters max.
Position	Rack sector: A, B or C.	-
Tests to be done	Number of tests to be performed on the samples present on the instrument.	-

Tab. 4–3: Solution characteristics fields

▼ Calibrator/control reagent rack window

This window is divided into two parts:

- the rack representation (on the left)
- the calibrator/control characteristics (on the right).

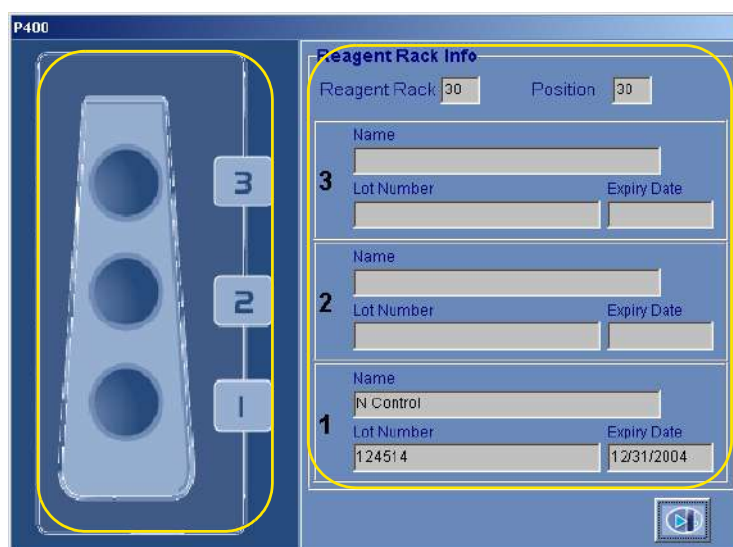


Fig. 4-7: Calibrator/control reagent rack window

The calibrator/control characteristics fields are described in the following table:

Heading	Description	Format
Reagent Rack	Rack ID.	2 characters max.
Position	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Name	Calibrator/control name.	20 characters max.
Lot Number	Calibrator/control lot number.	16 characters max.
Expiry Date	Calibrator/control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 4-4: Calibrator/control characteristics fields

3. Reagent Configuration

▼ Access to the «Reagent Configuration» menu

Press the «Reagent Configuration» button from the generic toolbar.

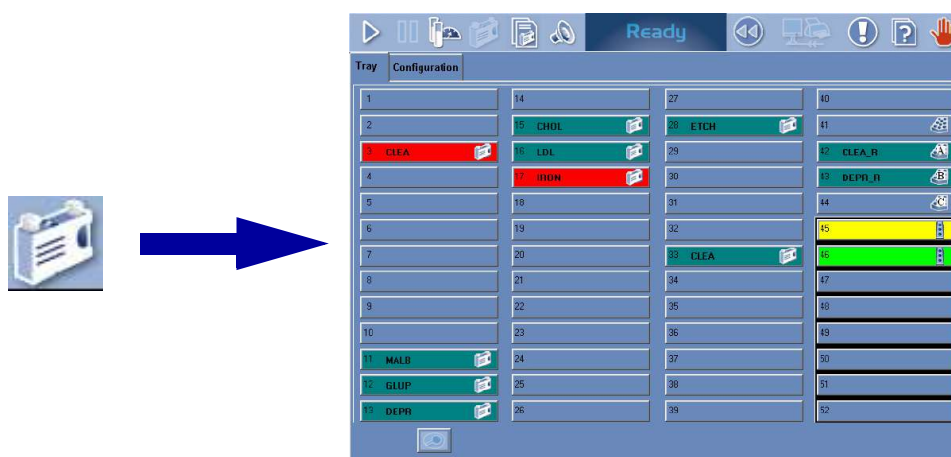


Fig. 4–8: «Reagent Configuration» menu access button

The «Reagent Configuration» menu allows the user to:

- visualize the solutions present on the **Pentra 400** and the calibrators/controls configured on the reagent tray
- configure solutions on the instrument.

This menu is divided into two tabs:

- ◆ **3.1. Tray**, page 4-10
- ◆ **3.2. Configuration**, page 4-11.

Click or press one of the tabs to access the various functions.

3.1. Tray

The «Tray» tab allows the user to visualize the solutions present on the instrument and the calibrators/controls configured on the reagent tray.



The **Pentra 400** checks the cassettes and racks present on the reagent tray:

- ◆ at instrument start up
- ◆ after closing of the reagent tray cover.



Fig. 4-9: «Tray» tab

The 52 positions of the reagent tray are represented with their position number.

Each occupied position is displayed with the solution short name. The short name color indicates the solution status (see [Tab. 4-1: «Reagent Status Legend» window](#), page 4-4). The «Reagent Status Legend» window can be opened by clicking the blue background of the tab.

By clicking a position on the «Tray» tab, the user visualizes:

- a solution on cassette or reagent rack
- a calibrator/control reagent rack.

Depending on the selected position, the following screens open in Display mode:

- ◆ [3.2.2. Cassette screen](#), page 4-14
- ◆ [3.2.3. Reagent rack screen](#), page 4-18
- ◆ [3.2.4. Calibrator/control reagent rack screen](#), page 4-21.

3.2. Configuration

The «Configuration» tab opens on the list of solutions configured on the **Pentra 400** (see [3.2.1. Solutions list](#), page 4-11).



Two ways are used to configured solutions on the instrument:

- ◆ automatic configuration after installation on board (only for cassettes)
- ◆ manual configuration on reagent racks.

3.2.1. Solutions list

The Solutions list groups the solutions configured on the instrument. The user is able to display either the solutions currently configured on the instrument (all, active, inactive) or the expired solutions on cassette by using the selective filter (see [Fig. 4-10: Solutions list](#), page 4-11).

- Current: the Solutions list displays all solutions currently configured on the instrument.
- Active current: the Solutions list displays the active solutions currently configured on the instrument.
- Inactive current: the Solutions list displays the inactive solutions currently configured on the instrument.
- ABX cassettes run out: the Solutions list displays the expired solutions on cassette.

Tray	Position	Solution	Rack ID	Rack Type	Status	Reagent Short Name	Lot #
25		Application	4015320003042850	Cassette	Active	FERR	042401532
		Application	6209120350008027	Cassette	Inactive	GGT	008620912
		Application	6209740112008546	Cassette	Inactive	GGT	008620974
		Application	6209740790008466	Cassette	Inactive	GGT	008620974
		Application	6209740109008833	Cassette	Inactive	GGT	008620974
		Application	6209741123006550	Cassette	Inactive	GGT	008620974
		Application	6209740117008440	Cassette	Inactive	GGT	008620974
14		Application	6209740187008661	Cassette	Inactive	GGT	008620974
		Application	6209740791008750	Cassette	Inactive	GGT	008620974
16		Application	6015300103022850	Cassette	Active	GLUH	022601530
		Application	9916671797021027	Cassette	Inactive	GLUP	021991667
22		Application	9917821185021355	Cassette	Active	GLUP	021991782
		Application	9917821124021833	Cassette	Inactive	GLUP	021991782
		Application	9915100107021001	Cassette	Inactive	GLUP	021991516
		Application	9916671795021262	Cassette	Inactive	GLUP	021991667
		Application	9916671798021300	Cassette	Inactive	GLUP	021991667
10		Application	9915160264021441	Cassette	Inactive	GLUP	021991516
		Application	9916671096021371	Cassette	Inactive	GLUP	021991667
		Application	9916671362021736	Cassette	Inactive	GLUP	021991667

Filters: ☒ Current ☐ Active current ☐ Inactive current ☐ ABX cassettes run out

Fig. 4-10: Solutions list

Columns of the Solutions list are described in the following table:

Heading	Description	Format
Position	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Solution	Solution type: Reagent, Diluent or Cleaner.	-
Rack ID	Cassette or rack ID.	16 characters max.
Rack Type	Cassette or Reagent rack.	-
Status	Solution status: Active or Inactive.	-
Reagent Short Name	Solution short name.	7 characters max.
Lot #	Solution lot number.	16 characters max.
Configuration	Reagent 1, Reagent 2 or Reagent 3.	-
Filling Volume	R1 initial volume (only for cassette).	6 to 105 mL.
Expiration Date	Expiry date before opening.	Depending on the date format chosen (see System Date and Time , page 7-87).
Installation Date	Date and time of installation on board.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Use Limit Date	Expiry date after installation on board.	Depending on the date format chosen (see System Date and Time , page 7-87).
Available Tests	Number of tests that can be performed with the solution volume remaining into the cassette. Only for reagents on cassette.	-

Tab. 4-5: Solutions list description

▼ Solutions list functions

From the Solutions list, the user is able to:

- add or delete a solution on reagent rack
- visualize or modify a solution on cassette or reagent rack.

Heading/Key	Name	Function
	Add new	Addition of a solution on reagent rack. Opens the reagent rack screen in Addition mode (see Addition mode , page 4-19).
	Delete	Deletion of a solution on reagent rack (see Conditions of deletion , page 4-13).
	Details	Depending on the selected solution, opens in Display mode the: - 3.2.2. Cassette screen, page 4-14 - 3.2.3. Reagent rack screen, page 4-18. Function also accessible by double-clicking an item.

Tab. 4–6: Solutions list functions

◆ Conditions of deletion

The solution cannot be deleted if patient or control tests associated to this solution are ordered, pending, incomplete or for validation.

In case:

- calibration tests associated to this solution are ordered, pending, incomplete or for validation
- a current calibration, performed with this solution, is in memory

a message informs the user that all calibrations linked to this solution will be lost if the solution is deleted.



For solutions on cassette, the item is automatically deleted from the current filters when the cassette is empty or the solution is definitively inactivated.

3.2.2. Cassette screen

Cassettes are automatically configured on the **Pentra 400** after installation on board.

The cassette screen allows the user to:

- visualize the solution characteristics
- modify only the solution status (see [Tab. 4-7: Solution characteristics fields](#), page 4-15).

This chapter describes the cassette screen, its different use modes and functions in the following parts:

- ◆ [Description of the cassette screen](#), page 4-14
- ◆ [Display mode](#), page 4-16
- ◆ [Edition mode](#), page 4-17.

▼ Description of the cassette screen

This screen is divided into two parts:

- the cassette representation (on the left)
- the solution characteristics (on the right).

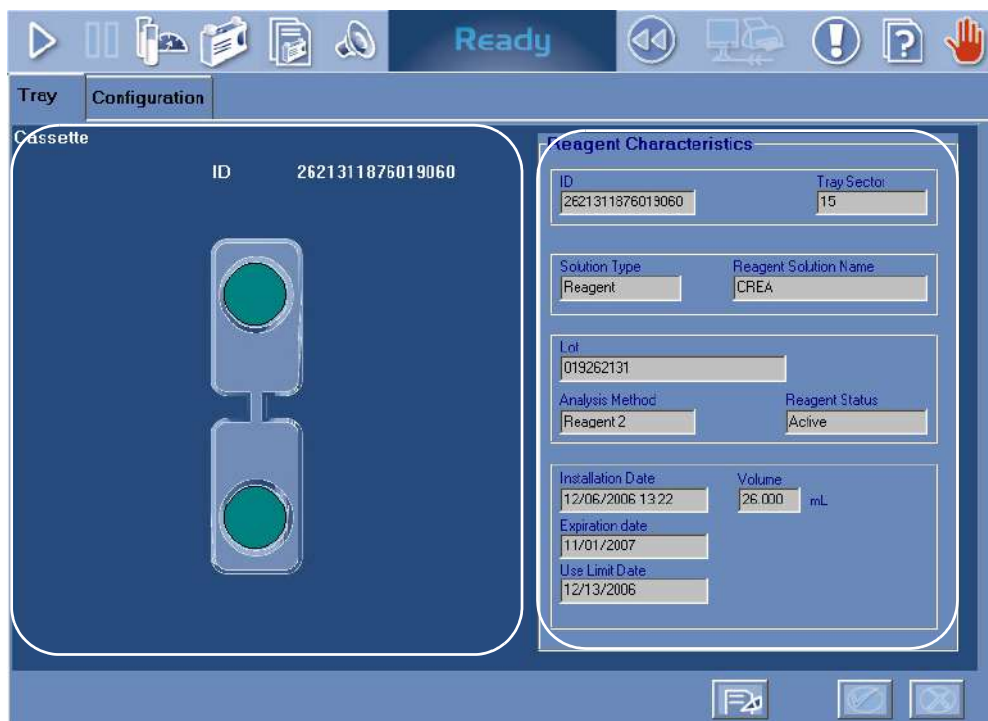


Fig. 4-11: Cassette screen

The cassette representation shows:

- the cassette ID (cassette barcode)
- the solution level (see [Tab. 4–1: «Reagent Status Legend» window](#), page 4-4).

The solution characteristics fields are described in the following table:

Heading	Description	Format
ID	Cassette ID.	16 characters
Tray Sector	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Solution Type	Solution type: Reagent, Diluent or Cleaner.	-
Reagent Solution Name	Solution short name.	7 characters max.
Lot	Solution lot number.	16 characters max.
Analysis Method	Reagent 1 or Reagent 2.	-
Reagent Status	Solution status: Active or Inactive (see Solution status , page 4-15).	Scrolling list
Installation Date	Date and time of installation on board.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Expiration Date	Expiry date before opening.	Depending on the date format chosen (see System Date and Time , page 7-87).
Use Limit Date	Expiry date after installation on board.	Depending on the date format chosen (see System Date and Time , page 7-87).
Volume	R1 initial volume.	6 to 105 mL.

Tab. 4–7: Solution characteristics fields

◆Solution status

- Several solutions with the same solution short name cannot be active simultaneously on the reagent tray. If several solutions with the same solution short name are installed on the reagent tray, then the first installed solution is activated and the next solutions are automatically inactivated.
- When a solution is empty, it is automatically inactivated.

For solutions on cassette only:

When a new cassette is activated (manually or automatically), before resuming analyses on this new cassette, several checks are performed and then the following cases can occur:

- 1) If the new cassette has a different lot number from the previous one, then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.
- 2) If the new cassette has the same lot number as the previous one, then the following checks are done.
 - a) If the back-up time frame is not configured (see [Validity Back-up](#), page 7-26), then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.

b) If the back-up time frame is configured (see [Validity Back-up](#), page 7-26):

- If Activation date of cassette (n+1) - Installation date of cassette (n) > Back-up time frame, then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.
- If Activation date of cassette (n+1) - Installation date of cassette (n) ≤ Back-up time frame, then the installation date of cassette (n+1) is checked.
 - If Installation date of cassette (n+1) < Installation date of cassette (n), then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.
 - If Installation date of cassette (n+1) ≥ Installation date of cassette (n), then the current calibration stays valid and the default controls configured in the application must be performed.



- ◆ If the back-up time frame is configured, then it is mandatory to configure at least one default control in the application.
- ◆ For a new cassette with the same lot number as the previous one, in case a calibration or a default control is ordered, pending or incomplete, then no check described above is done and a new calibration must be performed with the default controls configured in the application.

Automatic back-up cassette:

- The automatic back-up cassette can be enabled or disabled from the «System Configuration» menu (see [3.1.10. Automatic back-up cassette](#), page 7-84).
- When a solution on cassette is empty (ie the available tests have been done), the cassette is automatically inactivated. If a second cassette of the same solution is installed on the reagent tray, then the second cassette is automatically activated.
- Before resuming analyses on this new cassette, the checks described above are performed and if necessary, calibration and/or default controls are automatically run.

▼ Display mode

From the Solutions list, the user is able to visualize a solution on cassette either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 4-6: Solutions list functions](#), page 4-13). The cassette screen opens in Display mode. In this mode, the user cannot modify the solution characteristics. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of solution characteristics (see Edition mode , page 4-17).

Tab. 4-8: Display mode functions

▼ Edition mode

From the Display mode, the user is able to access modification function using the «Edit» button (see [Tab. 4–8: Display mode functions](#), page 4-16).

Only the «Status» field is modifiable (see [Tab. 4–7: Solution characteristics fields](#), page 4-15).

After modification, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of status modification.
	Cancel	Cancellation of status modification.

Tab. 4–9: Edition mode functions

3.2.3. Reagent rack screen

The reagent rack screen allows the user to visualize and modify the solution characteristics.

This chapter describes the reagent rack screen, its different use modes and functions in the following parts:

- ◆ [Description of the reagent rack screen](#), page 4-18
- ◆ [Addition mode](#), page 4-19
- ◆ [Display mode](#), page 4-20
- ◆ [Edition mode](#), page 4-20.

▼ Description of the reagent rack screen

This screen is divided into two parts:

- the rack representation (on the left)
- the solution characteristics (on the right).

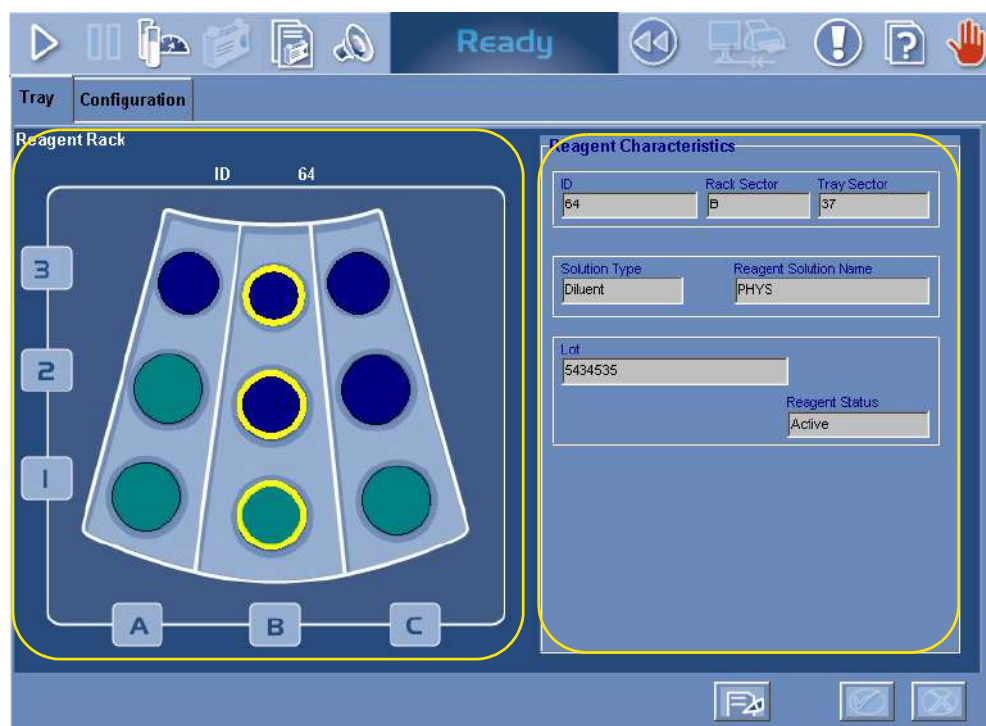


Fig. 4-12: Reagent rack screen

The rack representation shows:

- the rack ID
- the solution status (see [Tab. 4-1: «Reagent Status Legend» window](#), page 4-4).

The solution characteristics fields are described in the following table:

Heading	Description	Format
ID	Rack ID.	2 characters
Rack Sector	Rack sector: A, B or C.	-
Tray Sector	Position number on the reagent tray.	2 numerical characters: from 1 to 41 and 45 to 49.
Solution Type	Solution type: Reagent, Diluent or Cleaner.	Scrolling list
Reagent Solution Name	Solution short name (see Solution name , page 4-19).	7 characters max. Scrolling list
Lot	Solution lot number.	16 characters max.
Analysis Method	Reagent 1, Reagent 2 or Reagent 3.	Scrolling list
Reagent Status	Solution status: Active or Inactive (see Solution status , page 4-15).	Scrolling list

Tab. 4-10: Solution characteristics fields

◆ Solution name

- Depending on the solution type chosen, either reagents, diluents or cleaners are displayed in the scrolling list.
- Moreover, only the solutions not configured on cassettes are displayed.

▼ Addition mode

From the Solutions list, the user is able to add a solution on reagent rack by pressing the «Add new» button (see [Tab. 4-6: Solutions list functions](#), page 4-13). The reagent rack screen opens in Addition mode.

To add a solution, fill the solution characteristics fields (see [Tab. 4-10: Solution characteristics fields](#), page 4-19). Then, press the «OK» button to validate.

The Addition mode functions are described in the following table:

Heading/Key	Name	Function
	OK	Validation of new entry.
	Cancel	Cancellation of new entry.

Tab. 4-11: Addition mode functions

▼ Display mode

From the Solutions list, the user is able to visualize a solution on reagent rack either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 4-6: Solutions list functions](#), page 4-13). The reagent rack screen opens in Display mode. In this mode, the user cannot modify the solution characteristics. Press the «Edit» button to access modification function.

The Display mode functions are described in the following table:

Heading/Key	Name	Function
	Edit	Modification of solution characteristics (see Edition mode , page 4-20).

Tab. 4-12: Display mode functions

▼ Edition mode

From the Display mode, the user is able to access modification function using the «Edit» button (see [Tab. 4-12: Display mode functions](#), page 4-20).

After modification of one or several parameters, press the «OK» button to validate.

The Edition mode functions are described in the following table:

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 4-13: Edition mode functions

3.2.4. Calibrator/control reagent rack screen

The calibrator/control reagent rack screen allows the user to visualize the calibrator/control characteristics.

▼ Description of the calibrator/control reagent rack screen

This screen is divided into two parts:

- the rack representation (on the left)
- the reagent characteristics (on the right).



Fig. 4–13: Calibrator/control reagent rack screen

The rack representation shows the rack ID.

The calibrator/control characteristics fields are described in the following table:

Heading	Description	Format
ID	Rack ID.	2 characters
Tray sector	Position number on the reagent tray.	2 numerical characters: 1 to 52.
Name	Calibrator/control name.	20 characters max.
Lot	Calibrator/control lot number.	16 characters max.
Expiration date	Calibrator/control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 4-14: Calibrator/control characteristics fields

▼ Display mode

From the «Tray» tab, the user is able to visualize a calibrator/control reagent rack by clicking the corresponding position (see [3.1. Tray](#), page 4-10). The calibrator/control reagent rack screen opens in Display mode. For this screen, only the Display mode is accessible.

Pentra 400

Calibration and Control

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The «Calibration/Control» menu is accessible by pressing the «Calibration/Control» button from the Main menu.

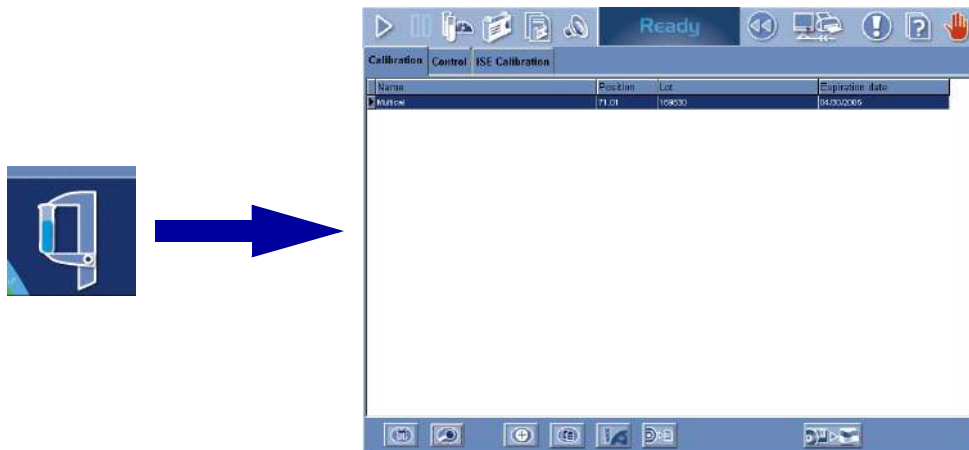


Fig. 5-1: «Calibration/Control» menu access menu

The «Calibration/Control» menu allows the user to:

- configure calibrators and controls on the **Pentra 400**
- configure the ISE calibrations.

This menu is divided into the three following tabs:

- ◆ **1. Calibration**, page 5-3
- ◆ **2. Control**, page 5-20
- ◆ **3. ISE Calibration**, page 5-36.

Click or press one of the tabs to access the various functions.

1. Calibration

The «Calibration» tab gives access to the list of calibrators configured on the instrument (see [1.1. Calibrators list](#), page 5-3).

To configure a calibrator, it is necessary to specify three types of information:

- ◆ the characteristics of the calibrator (see [1.2. Calibrator Selection](#), page 5-5)
- ◆ the tests that the calibrator can calibrate and their associated target values (see [1.3. Target values list](#), page 5-8)
- ◆ the calibrator position on the **Pentra 400** (see [1.4. Position selection](#), page 5-14).



Configuring a calibrator, the user must ensure that the tests and target values captured correspond to the calibrator name and lot number used.

The «Calibration» tab also allows the user to change the lot number of a calibrator (see [1.5. Change of lot number](#), page 5-17).

Moreover, the calibrators configuration provided by **HORIBA ABX** can be imported on the **Pentra 400** from a floppy disk or USB key (see [1.6. Import the calibrators configuration](#), page 5-18).

1.1. Calibrators list

The Calibrators list groups the calibrators configured on the **Pentra 400**.

Columns of the Calibrators list are described in the following table:

Heading	Description	Format
Name	Calibrator name.	20 characters max.
Position	Rack position of the calibrator.	4 numerical characters: nn.nn
Lot	Calibrator lot number.	16 characters max.
Expiration date	Calibrator expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 5-1: Calibrators list description

▼ Calibrators list functions

From the Calibrators list, the user is able to:

- add or delete a calibrator
- display the different types of information regarding the calibrator configuration
- change the lot number of a calibrator
- import the calibrators configuration provided by **HORIBA ABX**.

Heading/Key	Name	Function
	Add new	Addition of a calibrator. Opens the «Calibrator Selection» screen in Addition mode (see 1.2.2. Addition mode , page 5-6).
	Delete	Deletion of the selected calibrator (see Conditions of deletion , page 5-4).
	Details	Displays the selected calibrator characteristics. Opens the «Calibrator Selection» screen in Display mode (see 1.2.3. Display mode , page 5-6). Function also accessible by double-clicking an item.
	Target values	Displays the list of configured target values for the selected calibrator (see 1.3. Target values list , page 5-8).
	Position	Position selection. Opens the «Position selection» screen in Display mode (see 1.4. Position selection , page 5-14). Disabled if no target values are configured for the selected calibrator.
	Change lot	Changes the lot number of the selected calibrator (see 1.5. Change of lot number , page 5-17) Disabled if tests associated to this calibrator are ordered, pending, incomplete or for validation.
	Import	Imports the calibrators configuration provided by HORIBA ABX (see 1.6. Import the calibrators configuration , page 5-18).

Tab. 5-2: Calibrators list functions

◆Conditions of deletion

The calibrator cannot be deleted if tests associated to this calibrator are ordered, pending, incomplete or for validation.

In case a current calibration exists for this calibrator, a message informs the user that the current calibration will be lost if the calibrator is deleted.

1.2. Calibrator Selection

This chapter describes the «Calibrator Selection» screen, its different use modes and functions in the following parts:

- ◆ **1.2.1. Description of the «Calibrator Selection» screen**, page 5-5
- ◆ **1.2.2. Addition mode**, page 5-6
- ◆ **1.2.3. Display mode**, page 5-6
- ◆ **1.2.4. Edition mode**, page 5-7.

1.2.1. Description of the «Calibrator Selection» screen

The «Calibrator Selection» screen is composed of three fields:

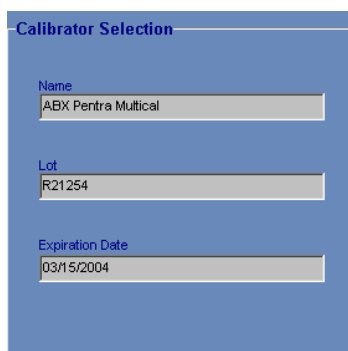


Fig. 5-2: «Calibrator Selection» screen

These fields are described in the following table:

Heading	Description	Format
Name	Calibrator name.	20 characters max.
Lot	Calibrator lot number.	16 characters max.
Expiration Date	Calibrator expiry date. Not mandatory.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 5-3: Calibrator Selection description



- ◆ For a given calibrator, only one lot number can be configured and used on the **Pen-tra 400**.
- ◆ The instrument manages the calibration expiry date only if a valid date is captured in the corresponding field.

1.2.2. Addition mode

From the Calibrators list, the user is able to add a calibrator by pressing the «Add new» button (see [Tab. 5-2: Calibrators list functions](#), page 5-4). The «Calibrator Selection» screen opens in Addition mode. In this mode, the «Calibrator Selection» screen opens with all fields blank.

To add a calibrator, specify the calibrator characteristics (see [Tab. 5-3: Calibrator Selection description](#), page 5-5). Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of new entry.
	Cancel	Cancellation of new entry.

Tab. 5-4: Addition mode contextual buttons

1.2.3. Display mode

From the Calibrators list, calibrator characteristics are displayed either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 5-2: Calibrators list functions](#), page 5-4). The «Calibrator Selection» screen opens in Display mode. In this mode, the user cannot modify the calibrator characteristics. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of calibrator characteristics (see 1.2.4. Edition mode , page 5-7). Disabled if a test associated to this calibrator was requested.

Tab. 5-5: Edit button

1.2.4. Edition mode

From the Display mode, the user is able to modify the calibrator characteristics by pressing the «Edit» button (see [Tab. 5–5: Edit button](#), page 5-6).



The calibrator characteristics cannot be modified if an associated test was requested.

After modification of one or several parameters, press the «OK» button to validate the modifications.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 5–6: Edition mode contextual buttons

1.3. Target values list

From the Calibrators list, select a calibrator and press the «Target values» button (see [Tab. 5-2: Calibrators list functions](#), page 5-4) to open the Target values list. This list displays the tests that the selected calibrator can calibrate and their associated target values.

This chapter describes the Target values list and its use in the following parts:

- ◆ [1.3.1. Target values list](#), page 5-8
- ◆ [1.3.2. «Target Values Entry» screen](#), page 5-10.

1.3.1. Target values list



Test	Level 1	Unit
Alb	530.00000	μmol/L
ALP	251.00000	U/L
ALT	91.00000	U/L
Amy	172.00000	U/L
AST	92.10000	U/L
Bil-D	41.00000	μmol/L
Bil-T	87.90000	μmol/L
C-Chol	4.11000	mmol/L
Calcium	2.35000	mmol/L
CK	253.00000	U/L
Crea	316.00000	μmol/L
GGT	95.90000	U/L
GluP	10.60000	mmol/L
Iron	37.00000	μmol/L
Lact	3.26000	mmol/L
LDH	451.00000	U/L
Lipase	80.80000	U/L
Magn	1.17000	mmol/L
Phos	1.65000	mmol/L

Fig. 5-3: Target values list

Columns of the Target values list are described in the following table:

Heading	Description	Format
Test	Test name.	7 characters max.
Level 1 to 8	Calibrator target value level 1 to 8. There are as many «Target value» columns as levels configured in the application (see Calibration , page 7-22).	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.

Tab. 5–7: Target values list description

▼ Target values list functions

From the Target values list, the user is able to:

- add or delete a Target value item
- display Target value information.

Heading/Key	Name	Function
	Add new	Addition of a Target value item. Opens the «Target Values Entry» screen in Addition mode (see Addition mode , page 5-12).
	Delete	Deletion of the selected Target value item (see Conditions of deletion , page 5-9).
	Details	Display the selected Target value information. Opens the «Target Values Entry» screen in Display mode (see Display mode , page 5-12). Function also accessible by double-clicking an item.

Tab. 5–8: Target values list functions

◆ Conditions of deletion

The Target value item cannot be deleted if associated tests are ordered, pending, incomplete or for validation.

In case a current calibration exists for this Target value item, a message informs the user that the current calibration will be lost if the Target value item is deleted.

1.3.2. «Target Values Entry» screen

▼ Description of the «Target Values Entry» screen

The «Target Values Entry» screen is used to capture Target value information.

Fig. 5–4: «Target Values Entry» screen

Fields for this screen are described in the following table:

Heading	Description	Format
Test	Test selection.	Scrolling list.
Number	Channel number of the selected test. Defined in the application (see Application identification , page 7-13).	3 numerical characters.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Main Standard	Main standard value.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Level 1 to 8	Target value level 1 to 8. There are as many «Level» fields as levels configured in the application (see Calibration , page 7-22).	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Standard Correction	Performs a recalibration with only one level (see Conditions of recalibration , page 5-11).	Check box.
Standard Correction Value	Level chosen for the recalibration.	One numerical character: 1 to 8.

Tab. 5–9: Target Values Entry description

◆ «Main Standard» and «Level» fields

Depending on the calibration pre-dilution configured in the application (see [Calibration pre-dilution](#), page 7-26), the two following cases can occur.

Case 1: Either the application does not feature a calibration pre-dilution or the application features a calibration pre-dilution with the Factor diluent dilution type.

The «Main Standard» field is disabled.

The levels must be captured by the user in the corresponding fields. They must be increasing or decreasing.

Case 2: The application features a calibration pre-dilution with the Main direct or Main indirect dilution type.

The main standard value must be captured by the user in the corresponding field.

The levels are automatically calculated depending on the main standard value and the dilution factors configured in the application.



When a sample pre-dilution is programmed in an application (see [Pre-dilution](#), page 7-15), the calibrator target values entered in this screen have to be multiplied by the pre-dilution factor as the pre-dilution affects only patient samples and controls. This calculation does not apply when a calibration pre-dilution with Factor diluent dilution type is configured in the same application.

Example: If for an application, a sample pre-dilution of 1/21 is programmed (then, the pre-dilution factor is 21) and the calibrator target value mentions 2.22 g/L, the value that must be entered is $2.22 \times 21 = 46.62$ g/L.

Except if a calibration pre-dilution with Factor diluent dilution type is configured, in this case the value that must be entered is 2.22 g/L.

◆ Conditions of recalibration

The Standard Correction function is disabled if:

- the calibration mode configured for the test is Factor or Slope average
- a calibration pre-dilution with Main direct or Main indirect mode is configured for the test
- no calibration has been previously performed for the test.

▼ Addition mode

From the Target values list, the user adds a Target value item by pressing the «Add new» button (see [Tab. 5–8: Target values list functions](#), page 5-9). The «Target Values Entry» screen opens in Addition mode.

To add a Target value item, select the test using the scrolling list.



A test cannot be associated to several calibrators. So, only the unassociated tests are suggested in the scrolling list.

In addition, all tests associated to the same calibrator must have the same level number and the same calibration pre-dilution configuration.

Fields of «Target Values Entry» screen (see [Tab. 5–9: Target Values Entry description](#), page 5-10) are updated according to the selected test.

Depending on the calibration pre-dilution configured in the application (see [«Main Standard» and «Level» fields](#), page 5-11), capture the main standard value or the levels.

If necessary, check the «Correction standard» box and choose the level used for the recalibration.

Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of new entry.
	Cancel	Cancellation of new entry.

Tab. 5–10: Addition mode contextual buttons

▼ Display mode

From the Target values list, the user is able to display Target value information either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 5–8: Target values list functions](#), page 5-9). The «Target Values Entry» screen opens in Display mode. In this mode, the user cannot modify the Target value information. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of Target value information (see Edition mode , page 5-13).

Tab. 5–11: Edit button

▼ Edition mode

From the Display mode, the user is able to modify the Target value information by pressing the «Edit» button (see [Tab. 5–11: Edit button](#), page 5-12).



- ◆ The Target value information cannot be modified if associated tests are ordered, pending, incomplete or for validation.
- ◆ In case a current calibration exists for this Target value item, a message informs the user that the current calibration will be lost if the Target value information is modified.

After modification of one or several parameters, press the «OK» button to validate.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 5–12: Edition mode contextual buttons

1.4. Position selection

From the Calibrators list, select a calibrator and press the «Position» button (see [Tab. 5-2: Calibrators list functions](#), page 5-4) to open the «Position selection» screen. This screen allows the user to specify the calibrator position on the **Pentra 400**.

This chapter describes the «Position selection» screen and its different use modes in the following parts:

- ◆ [1.4.1. Description of the «Position selection» screen](#), page 5-14
- ◆ [1.4.2. Display mode](#), page 5-15
- ◆ [1.4.3. Edition mode](#), page 5-16.

1.4.1. Description of the «Position selection» screen

The «Position selection» screen is used to define:

- the rack number where the tube is to be placed
- the tube position in the rack.

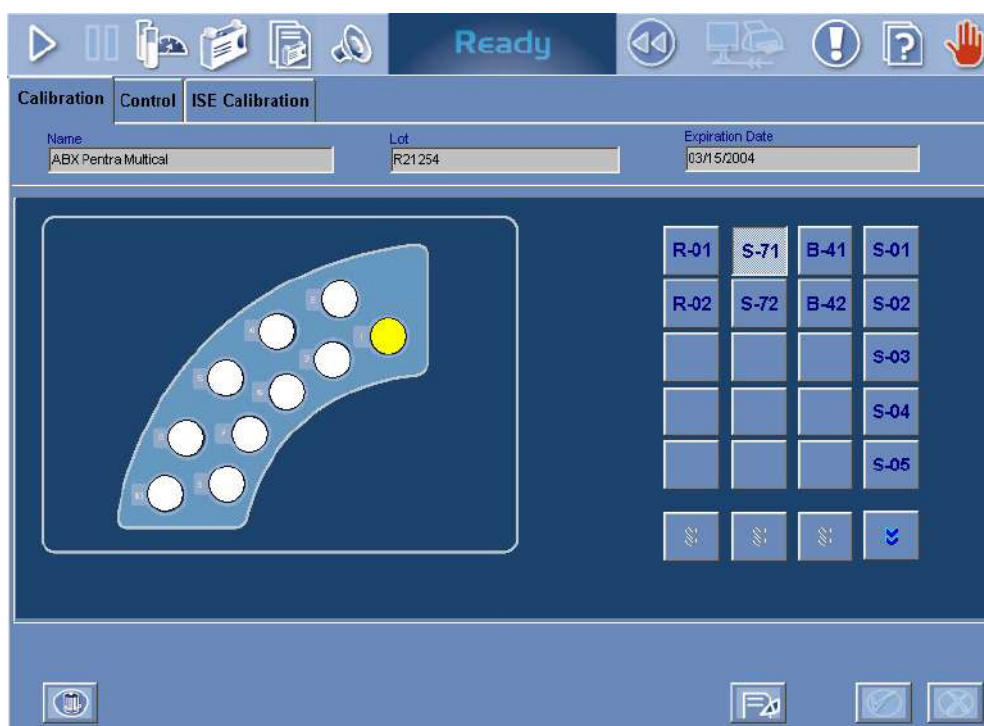


Fig. 5-5: «Position selection» screen

The screen is divided into two parts:

- ◆ a group of keys, on the right, used to select the rack
- ◆ a representation of the selected rack used to choose the tube position in the rack.

▼ Keys of rack selection

Four types of keys are available:

- up to five keys corresponding to sample racks (S-1 to S-40 max.)
- up to five keys corresponding to sample cup racks (B-41 to B-70 max.)
- up to five keys corresponding to calibrator sample racks (S-71 to S-84 max.)
- up to five keys corresponding to calibrator reagent racks (R-01 to R-29 max.).

For each type of keys, the user displays the next five racks by selecting the type of keys and pressing the «Next» button (see [Tab. 5-13: Display mode contextual buttons](#), page 5-15).

▼ Representation of the selected rack

The representation of the selected rack shows:

- available positions in white
- occupied positions in grey
- the calibrator position in yellow.

Moreover, unknown positions are represented in dark green tagged with «?».

Unknown positions can be used as available positions to place the calibrator.

1.4.2. Display mode

From the Calibrators list, the user opens the «Position selection» screen in Display mode by selecting a calibrator and pressing the «Position» button (see [Tab. 5-2: Calibrators list functions](#), page 5-4).

In this mode, the different available racks are displayed using the keys of rack selection. The representation of the selected rack shows the position status. A window showing the tube characteristics opens when clicking an occupied position.

In Display mode, the user cannot define or modify the calibrator position. Press the «Edit» button to access the position selection function (see [Tab. 5-13: Display mode contextual buttons](#), page 5-15).

The Display mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	Next	Display the next racks.
	Edit	Definition or modification of the calibrator position (see 1.4.3. Edition mode , page 5-16).
	Delete	Deletion of the calibrator position.

Tab. 5-13: Display mode contextual buttons

1.4.3. Edition mode

From the Display mode, the user is able to define or modify the calibrator position by pressing the «Edit» button (see [Tab. 5-13: Display mode contextual buttons](#), page 5-15).

In this mode, the different available racks are displayed using the keys of rack selection. The representation of the selected rack shows the position status. A window showing the tube characteristics opens when clicking an occupied position.

To define or modify the calibrator position, select a rack using the corresponding keys.

Then, choose the calibrator position in the rack.

- ◆ In case only one position is needed for the calibrator, click an available position. The selected position is assigned to the calibrator and displayed as shown:

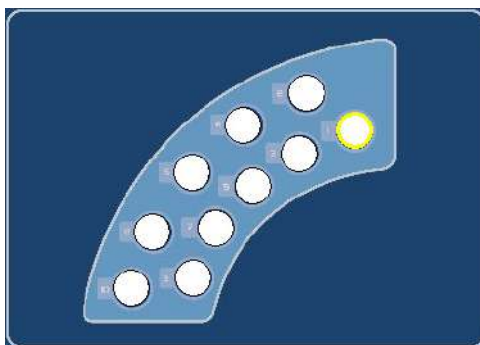


Fig. 5-6: Position selection

Press the «OK» button to validate.

- ◆ In case several positions are needed for the calibrator, click an available position or a position already occupied by the calibrator (for a modification of calibrator position). The selected position is assigned to the first level. The next positions are assigned to the next levels automatically (as many positions as levels).

Press the «OK» button to validate.



The calibrator position cannot be modified if associated tests are ordered, pending or incomplete.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the calibrator position.
	Cancel	Cancellation of the calibrator position.
	Delete	Deletion of the calibrator position.

Tab. 5–14: Edition mode contextual buttons

1.5. Change of lot number

From the Calibrators list, the user is able to change the lot number of a calibrator.

Select a calibrator and press the «Change lot» button (see [Tab. 5–2: Calibrators list functions](#), page 5-4).



The «Change lot» button is disabled if tests associated to this calibrator are ordered, pending, incomplete or for validation.

The «Calibrator Selection» screen opens (see [1.2. Calibrator Selection](#), page 5-5) and allows the user to modify the calibrator lot number and expiry date.

After modification of the calibrator lot number and expiry date, press the «OK» button to validate.

Then, the user is able to modify the tests that the selected calibrator can calibrate and their associated target values (see [1.3. Target values list](#), page 5-8).

1.6. Import the calibrators configuration

From the Calibrators list, the user can import the calibrators configuration provided by **HORIBA ABX** by pressing the «Import» button (see [Tab. 5-2: Calibrators list functions](#), page 5-4).

The following window is displayed:



Fig. 5-7: Floppy disk/USB key

Select floppy disk or USB key by using the corresponding radio button and press the «OK» button.

A screen showing the calibrators list saved on the floppy disk/USB key is then displayed:

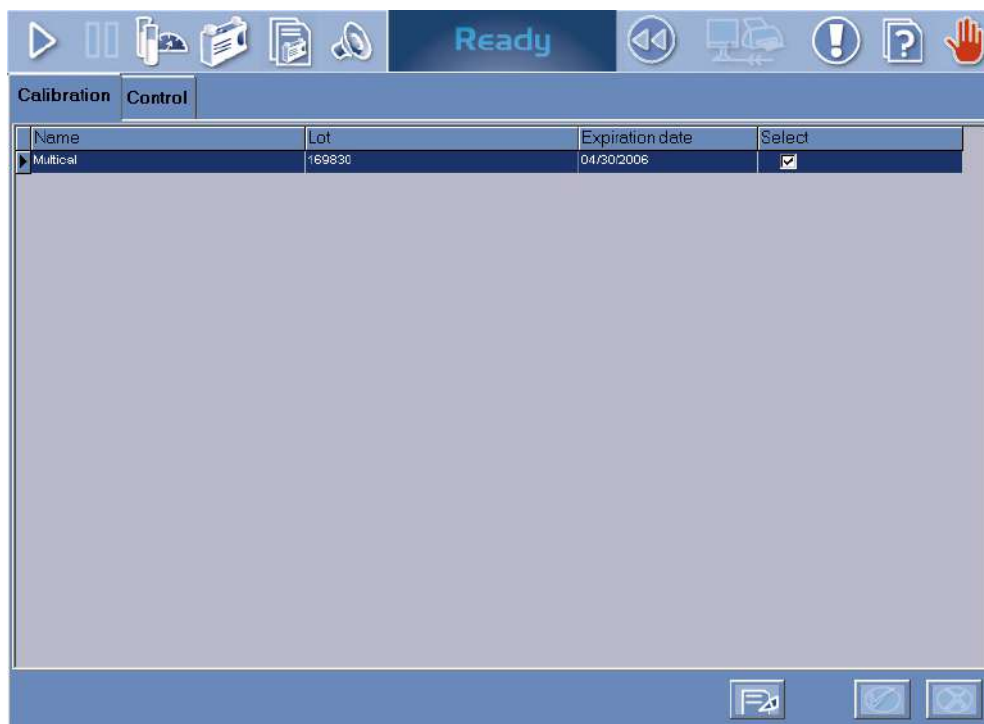


Fig. 5-8: Importation screen

Columns of the importation screen are described in the following table:

Heading	Description	Format
Name	Calibrator name.	20 characters max.
Lot	Calibrator lot number.	16 characters max.
Expiration date	Calibrator expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).
Select	If checked, the calibrator will be imported.	Check box

Tab. 5–15: Importation screen description

Functions of the importation screen are defined in the following table:

Heading/Key	Name	Function
	Edit	Screen access. Disabled if calibrations are ordered, pending, incomplete or for validation.
	OK	Imports the selected calibrators.
	Cancel	Cancels the importation.

Tab. 5–16: Importation screen functions

By default, all calibrators are selected and then will be imported. If necessary, some calibrators can be unselected by using the corresponding «Select» check boxes.

The following rules are applied when importing a calibrator:

- 1- If a calibrator to be imported does not exist on the **Pentra 400**, then the calibrator will be imported.
- 2- If a calibrator to be imported already exists on the **Pentra 400** with the same lot number, then the calibrator cannot be imported.
- 3- If a calibrator to be imported already exists on the **Pentra 400** with a different lot number, then the calibrator will be imported and will replace the previous one.
- 4- If a calibrator to be imported has expired, then the calibrator cannot be imported.

The following rules are applied when importing the target values:

- 1- Target values for a test will be imported only if:
 - the corresponding application is configured on the **Pentra 400**
 - these target values are in conformity with the corresponding application configuration.
- 2- Target values for a test must be unique (a test cannot be associated to several calibrators). So, if target values to be imported are not unique, then these target values cannot be imported.
- 3- In case a current calibration exists for target values, a message informs the user that the current calibration will be lost.

2. Control

The «Control» tab opens the list of controls configured on the instrument (see [2.1. Controls list](#), page 5-20).

To configure a control, it is necessary to specify three types of information:

- ◆ the characteristics of the control (see [2.2. Control Selection](#), page 5-22)
- ◆ the tests to use with this control and their associated target values (see [2.3. Target values list](#), page 5-25)
- ◆ the control position on the **Pentra 400** (see [2.4. Position selection](#), page 5-30).



Configuring a control, the user must ensure that the tests and target values captured correspond to the control name and lot number used.

The «Control» tab also allows the user to change the lot number of a control (see [2.5. Change of lot number](#), page 5-33).

Moreover, the controls configuration provided by **HORIBA ABX** can be imported on the **Pentra 400** from a floppy disk or USB key (see [2.6. Import the controls configuration](#), page 5-34).

2.1. Controls list

The Controls list groups the controls configured on the **Pentra 400**.

Columns of the Controls list are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Position	Rack position of the control.	4 numerical characters: nn.nn
Lot	Control lot number.	16 characters max.
Expiration date	Control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 5-17: Controls list description

▼ Controls list functions

From the Controls list, the user is able to:

- add or close a control
- display the different types of information regarding the control configuration
- change the lot number of a control
- import the controls configuration provided by **HORIBA ABX**.

Heading/Key	Name	Function
	Add new	Addition of a control. Opens the «Control Selection» screen in Addition mode (see 2.2.2. Addition mode , page 5-23).
	Closing	Closing of the selected control (see Control closing , page 5-21). Disabled if tests associated to this control are ordered, pending, incomplete or for validation.
	Details	Displays the selected control characteristics. Opens the «Control Selection» screen in Display mode (see 2.2.3. Display mode , page 5-23). Function also accessible by double-clicking an item.
	Target values	Displays the list of configured target values for the selected control (see 2.3. Target values list , page 5-25).
	Position	Position selection. Opens the «Position selection» screen in Display mode (see 2.4. Position selection , page 5-30). Disabled if no target values are configured for the selected control.
	Change lot	Changes the lot number of the selected control (see 2.5. Change of lot number , page 5-33). Disabled if tests associated to this control are ordered, pending, incomplete or for validation.
	Import	Imports the controls configuration provided by HORIBA ABX (see 2.6. Import the controls configuration , page 5-34).

Tab. 5-18: Controls list functions

◆ Control closing

The user is able to close a control by selecting the corresponding item and pressing the «Closing» button (see [Tab. 5-18: Controls list functions](#), page 5-21).

The control is then deleted from the Controls list.



If a default control is closed, the default control configuration is then lost for the associated tests. It is then necessary to reconfigure a control as default for these tests.

2.2. Control Selection

This chapter describes the «Control Selection» screen, its different use modes and functions in the following parts:

- ◆ **2.2.1. Description of the «Control Selection» screen**, page 5-22
- ◆ **2.2.2. Addition mode**, page 5-23
- ◆ **2.2.3. Display mode**, page 5-23
- ◆ **2.2.4. Edition mode**, page 5-24.

2.2.1. Description of the «Control Selection» screen

The «Control Selection» screen is composed of three fields:

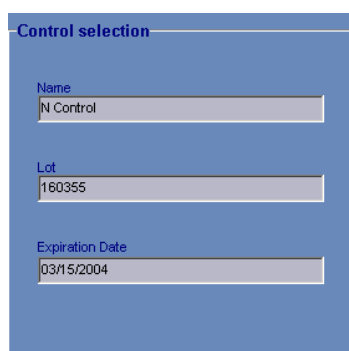


Fig. 5-9: «Control Selection» screen

These fields are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
Expiration Date	Control expiry date. Not mandatory.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 5-19: Control Selection description



- ◆ For a current given control, only one lot number can be configured and used on the **Pentra 400**.
- ◆ The instrument manages the control expiry date only if a valid date is captured in the corresponding field.

2.2.2. Addition mode

From the Controls list, the user is able to add a control by pressing the «Add new» button (see [Tab. 5-18: Controls list functions](#), page 5-21). The «Control Selection» screen opens in Addition mode. In this mode, the «Control Selection» screen opens with all fields blank.

To add a control, specify the control characteristics (see [Tab. 5-19: Control Selection description](#), page 5-22). Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of new entry.
	Cancel	Cancellation of new entry.

Tab. 5-20: Addition mode contextual buttons

2.2.3. Display mode

From the Controls list, the user is able to display the control characteristics either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 5-18: Controls list functions](#), page 5-21). The «Control Selection» screen opens in Display mode. In this mode, the user cannot modify the control characteristics. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of control characteristics (see 2.2.4. Edition mode , page 5-24). Disabled if a test associated to this control was requested.

Tab. 5-21: Edit button

2.2.4. Edition mode

From the Display mode, the user is able to modify the control characteristics by pressing the «Edit» button (see [Tab. 5–21: Edit button](#), page 5-23).



The control characteristics cannot be modified if an associated test was requested.

After modification of one or several parameters, press the «OK» button to validate the modifications.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 5–22: Edition mode contextual buttons

2.3. Target values list

From the Controls list, select a control and press the «Target values» button (see [Tab. 5–18: Controls list functions](#), page 5-21) to open the Target values list. This list displays the tests that can be controlled by the selected control and their associated target values.

This chapter describes the Target values list and its use in the following parts:

- ◆ [2.3.1. Target values list](#), page 5-25
- ◆ [2.3.2. «Target Values Entry» screen](#), page 5-27.

2.3.1. Target values list

Default	Test	Unit	Target Value	Confidence Range
☒	c_Chol	mmol/L	2.67000	2.26000 - 3.08000
☐	Trigly	mmol/L	1.46000	1.23000 - 1.69000
☐	GluP	mmol/L	5.52000	4.71000 - 6.33000

Fig. 5–10: Target values list

Columns of the Target values list are described in the following table:

Heading	Description	Format
Default	Default control for the test.	Check box.
Test	Test name.	7 characters max.
Unit	Test unit configured (see Result , page 7-16).	10 characters max.
Target Value	Control target value for the test.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Confidence Range	Low and high confidence range value.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 5-23: Target values list description

▼ Target values list functions

From the Target values list, the user is able to:

- add or close a Target value item
- display Target value information.

Heading/Key	Name	Function
	Add new	Addition of a Target value item. Opens the «Target Values Entry» screen in Addition mode (see Addition mode , page 5-28).
	Closing	Closing of the selected Target value item (see Target value item closing , page 5-26). Disabled if tests associated to this Target value item are ordered, pending, incomplete or for validation.
	Details	Display the selected Target value information. Opens the «Target Values Entry» screen in Display mode (see Display mode , page 5-28). Function also accessible by double-clicking an item.

Tab. 5-24: Target values list functions

◆ Target value item closing

The user is able to close a Target value item by selecting the corresponding item and pressing the «Closing» button (see [Tab. 5-24: Target values list functions](#), page 5-26).

The Target value item is then deleted from the Target values list.



If a default control for a test is closed, the default control configuration is then lost for this test. It is then necessary to reconfigure a control as default for this test.

2.3.2. «Target Values Entry» screen

▼ Description of the «Target Values Entry» screen

The «Target Values Entry» screen is used to capture Target value information.

Fig. 5–11: «Target Values Entry» screen

Fields for this screen are described in the following table:

Heading	Description	Format
Test	Test selection.	Scrolling list.
Number	Channel number of the selected test. Defined in the application (see Application identification , page 7-13).	3 numerical characters.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
Target Value	Control target value for the test.	
Min. Value	Low confidence range value. Must be lower than the target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Max. Value	High confidence range value. Must be higher than the target value.	with 7 significant digits max.
Default Control	Default control for the test. Up to three default controls can be configured for the test.	Check box.
Default Control	Name of the default controls used for the test.	List.

Tab. 5–25: Target Values Entry description

▼ Addition mode

From the Target values list, the user is able to add a Target value item by pressing the «Add new» button (see [Tab. 5-24: Target values list functions](#), page 5-26). The «Target Values Entry» screen opens in Addition mode.

To add a Target value item, select the test using the scrolling list.

Then, specify the control target value and confidence range for the test.

If necessary, check the «Default Control» box.



The «Default Control» box is disabled if:

- ◆ the «Control Required» box is unchecked in the application
- ◆ the test has already all the required default controls set up.

Press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of new entry.
	Cancel	Cancellation of new entry.

Tab. 5-26: Addition mode contextual buttons

▼ Display mode

From the Target values list, the user displays Target value information either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 5-24: Target values list functions](#), page 5-26). The «Target Values Entry» screen opens in Display mode. In this mode, the user cannot modify the Target value information. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of Target value information (see Edition mode , page 5-29).

Tab. 5-27: Edit button

▼ Edition mode

From the Display mode, the user is able to modify the Target value information by pressing the «Edit» button (see [Tab. 5-27: Edit button](#), page 5-28).



The Target value information cannot be modified if associated tests are ordered, pending, incomplete or for validation.

After modification of one or several parameters, press the «OK» button to validate.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 5-28: Edition mode contextual buttons

2.4. Position selection

From the Controls list, select a control and press the «Position» button (see [Tab. 5–18: Controls list functions](#), page 5-21) to open the «Position selection» screen. This screen allows the user to specify the control position on the **Pentra 400**.

This chapter describes the «Position selection» screen and its different use modes in the following parts:

- ◆ [2.4.1. Description of the «Position selection» screen](#), page 5-30
- ◆ [2.4.2. Display mode](#), page 5-31
- ◆ [2.2.4. Edition mode](#), page 5-24.

2.4.1. Description of the «Position selection» screen

The «Position selection» screen is used to define:

- the rack number where the tube is to be placed
- the tube position in the rack.

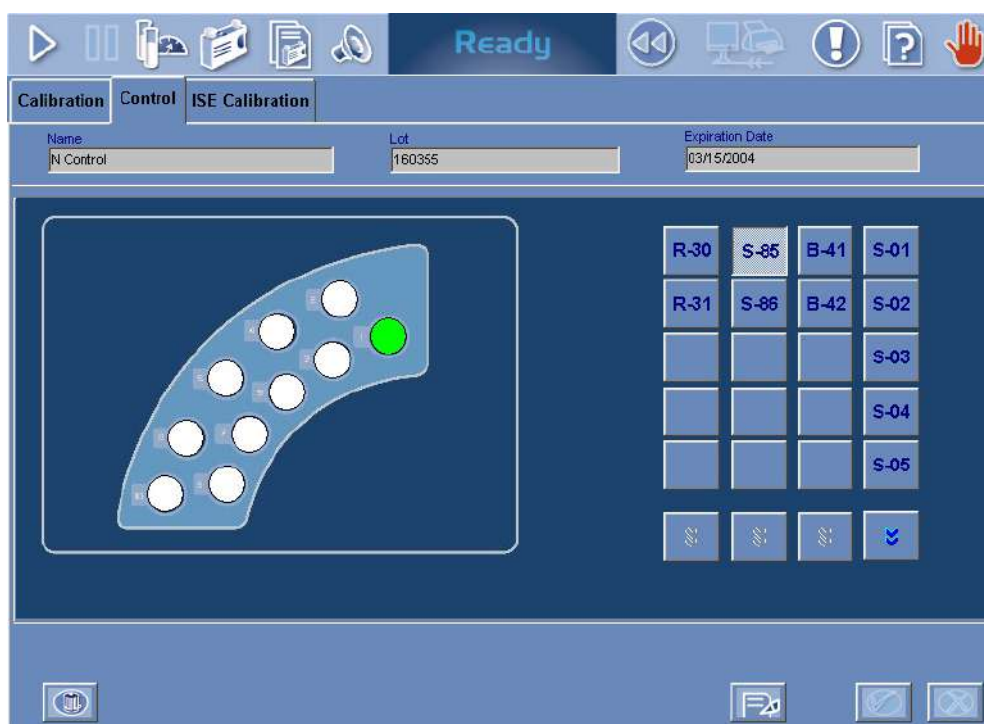


Fig. 5–12: «Position selection» screen

The screen is divided into two parts:

- ◆ a group of keys, on the right, used to select the rack
- ◆ a representation of the selected rack used to choose the tube position in the rack.

▼ Keys of rack selection

Four types of keys are available:

- up to five keys corresponding to sample racks (S-1 to S-40 max.)
- up to five keys corresponding to sample cup racks (B-41 to B-70 max.)
- up to five keys corresponding to control sample racks (S-85 to S-99 max.)
- up to five keys corresponding to control reagent racks (R-30 to R-59 max.).

For each type of keys, the user displays the next five racks by selecting the type of keys and pressing the «Next» button (see [Tab. 5–29: Display mode contextual buttons](#), page 5-31).

▼ Representation of the selected rack

The representation of the selected rack shows:

- available positions in white
- occupied positions in grey
- the control position in green.

Moreover, unknown positions are represented in dark green tagged with «?».

Unknown positions can be used as available positions to place the control.

2.4.2. Display mode

From the Controls list, the user opens the «Position selection» screen in Display mode by selecting a control and pressing the «Position» button (see [Tab. 5–18: Controls list functions](#), page 5-21).

In this mode, the different available racks are displayed using the keys of rack selection. The representation of the selected rack shows the position status. A window showing the tube characteristics opens when clicking an occupied position.

In Display mode, the user cannot define or modify the control position. Press the «Edit» button to access the position selection function (see [Tab. 5–29: Display mode contextual buttons](#), page 5-31).

The Display mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	Next	Display the next racks.
	Edit	Definition or modification of the control position (see 2.4.3. Edition mode , page 5-32).
	Delete	Deletion of the control position.

Tab. 5–29: Display mode contextual buttons

2.4.3. Edition mode

From the Display mode, the user is able to define or modify the control position by pressing the «Edit» button (see [Tab. 5-29: Display mode contextual buttons](#), page 5-31).

In this mode, the different available racks are displayed using the keys of rack selection. The representation of the selected rack shows the position status. A window showing the tube characteristics opens when clicking an occupied position.

To define or modify the control position, select a rack using the corresponding keys.

Then, choose the control position in the rack.

The selected position is assigned to the control and displayed as shown:

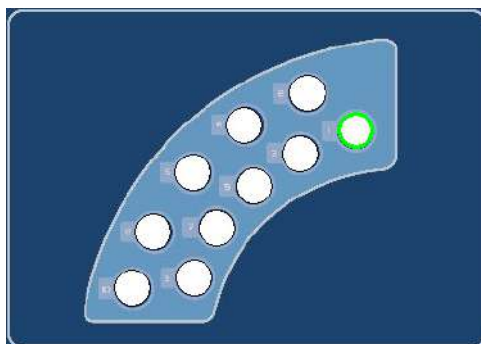


Fig. 5-13: Position selection

Press the «OK» button to validate.



The control position cannot be modified if associated tests are ordered, pending or incomplete.

The Edition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the control position.
	Cancel	Cancellation of the control position.
	Delete	Deletion of the control position.

Tab. 5-30: Edition mode contextual buttons

2.5. Change of lot number

From the Controls list, the user is able to change the lot number of a control.

Select a control and press the «Change lot» button (see [Tab. 5–18: Controls list functions](#), page 5-21).



The «Change lot» button is disabled if tests associated to this calibrator are ordered, pending, incomplete or for validation.

The «Control Selection» screen opens (see [2.2. Control Selection](#), page 5-22) and allows the user to modify the control lot number and expiry date.

After modification of the control lot number and expiry date, press the «OK» button to validate.



The previous control is then closed and deleted from the Controls list.

Then, the user is able to modify the tests that can be controlled by the selected control and their associated target values (see [2.3. Target values list](#), page 5-25).

2.6. Import the controls configuration

From the Controls list, the user can import the controls configuration provided by **HORIBA ABX** by pressing the «Import» button (see [Tab. 5-18: Controls list functions](#), page 5-21).

The following window is displayed:



Fig. 5-14: Floppy disk/USB key

Select floppy disk or USB key by using the corresponding radio button and press the «OK» button.

A screen showing the controls list saved on the floppy disk/USB key is then displayed:

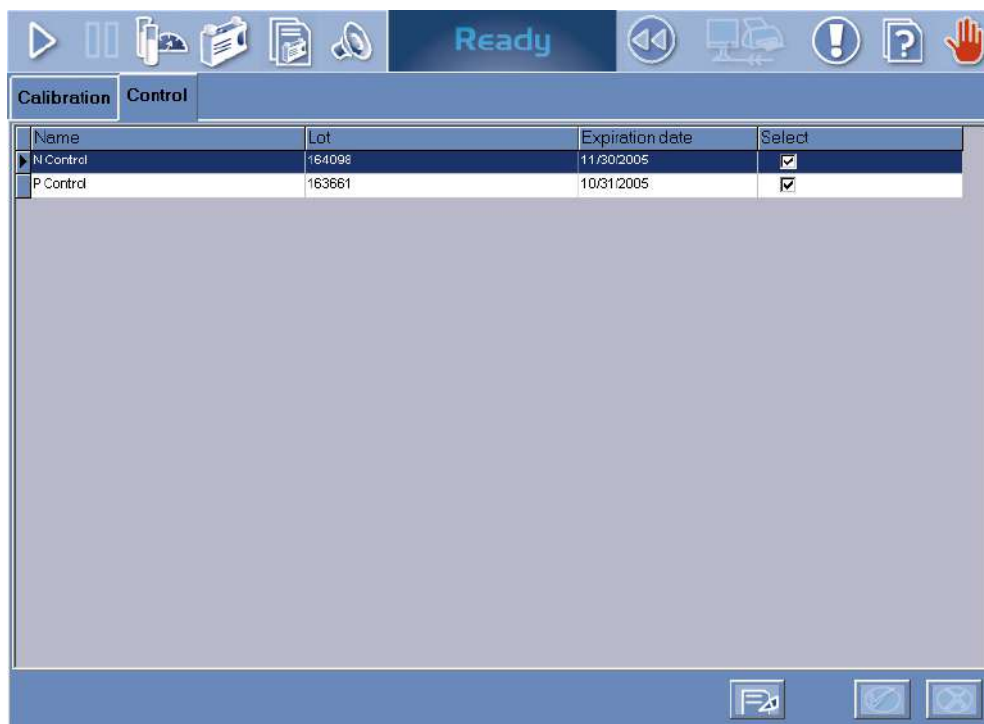


Fig. 5-15: Importation screen

Columns of the importation screen are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
Expiration date	Control expiry date.	Depending on the date format chosen (see System Date and Time , page 7-87).
Select	If checked, the control will be imported.	Check box

Tab. 5–31: Importation screen description

Functions of the importation screen are defined in the following table:

Heading/Key	Name	Function
	Edit	Screen access. Disabled if controls are ordered, pending, incomplete or for validation.
	OK	Imports the selected controls.
	Cancel	Cancels the importation.

Tab. 5–32: Importation screen functions

By default, all controls are selected and then will be imported. If necessary, some controls can be unselected by using the corresponding «Select» check boxes.

The following rules are applied when importing a control:

- 1- If a control to be imported does not exist on the **Pentra 400**, then the control will be imported.
- 2- If a control to be imported already exists on the **Pentra 400** with the same lot number, then the control cannot be imported.
- 3- If a control to be imported already exists on the **Pentra 400** with a different lot number, then the control will be imported and will replace the previous one (the previous control will be closed).
- 4- If a control to be imported has expired, then the control cannot be imported.

The following rule is applied when importing the target values:

- 1- Target values for a test will be imported only if the corresponding application is configured on the **Pentra 400**.

3. ISE Calibration

In order to operate correctly, the ISE module has to be calibrated regularly even if the **Pentra 400** is working or shutdown. So, the ISE module performs automatically and regularly 2-point and 1-point calibrations.

◆2-point calibration

The 2-point calibration determines a slope and an intercept using the low and high standards (of known concentrations). The determined slope and intercept are then used to calculate the concentrations of patient samples.

The 2-point calibration should be performed every 2 hours even if the **Pentra 400** is working or shutdown.

◆1-point calibration

The 1-point calibration checks the electrode stability using the low standard.

This calibration should be performed every 15 minutes only when the **Pentra 400** is working.

When the **Pentra 400** is shutdown, the ISE module circulates reagent through the electrodes in order to ensure the electrode stability. This function is named Keep Ready and should be performed every 15 minutes.

The «ISE Calibration» tab allows the user to configure the 2-point and 1-point calibrations as the Keep Ready function.

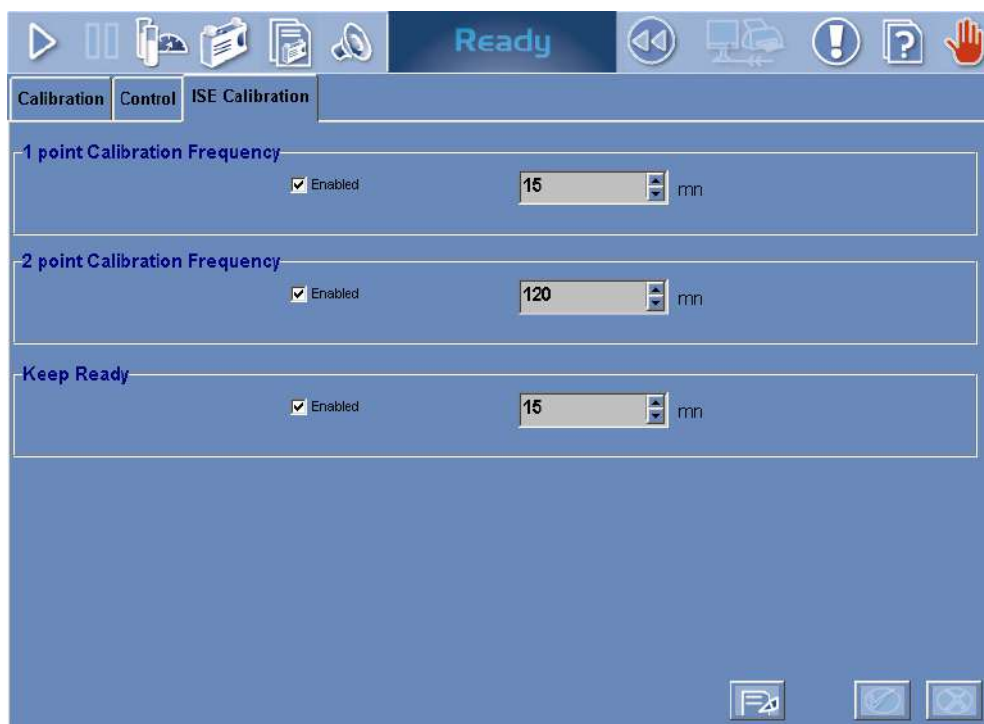


Fig. 5–16: «ISE Calibration» tab

The «ISE Calibration» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

From the «ISE Calibration» tab, the user can enable or disable the 2-point and 1-point calibrations as the Keep Ready function by checking or unchecking the corresponding boxes. He can also configure their frequencies by using the corresponding fields.

Pentra 400

Pentra 400

Quality Control

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1. Introduction

The Quality Control allows the user to check the quality of measurements performed by the instrument.

Statistical analyses of the control results are performed. These statistical analyses consist in calculating the average, the standard deviation and the coefficient of variation of the measurement over a defined period. They can be carried out over the following periods:

- the current Worklist
- a specific month
- a specific year.

The Quality Control is done by reviewing either the results and statistical analyses of a selected control for each test controlled with this control (see [2. Quality Control by control](#), page 6-3) or the results and statistical analyses of all controls used for a selected test (see [3. Quality Control by test](#), page 6-20).

▼ Access to the «Quality Control» menu

Press the «Quality Control» button from the Main menu.

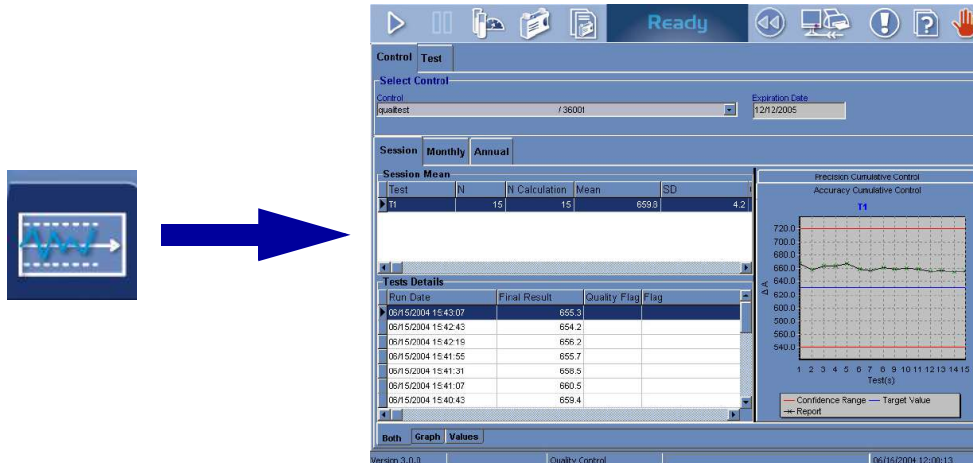


Fig. 6-1: «Quality Control» menu access button

The «Quality Control» menu is divided into two tabs:

- ◆Control (see [2. Quality Control by control](#), page 6-3)
- ◆Test (see [3. Quality Control by test](#), page 6-20).

Click or press one of the tabs to access the various functions.

2. Quality Control by control

The «Control» tab allows the user to review the results and statistical analyses of a selected control for each test controlled with this control.

To review the results and statistical analyses of a control, select this control by using the «Select Control» part (see [2.1. Select Control](#), page 6-4).

The results and statistical analyses for each test controlled with this control can be displayed over the three following periods:

- ◆ the current Worklist (see [2.2. Session](#), page 6-4)
- ◆ a specific month (see [2.3. Monthly](#), page 6-10)
- ◆ a specific year (see [2.4. Annual](#), page 6-15).

Choose the desired period by pressing the corresponding tab (see [Fig. 6-2: Quality Control by control](#), page 6-3).

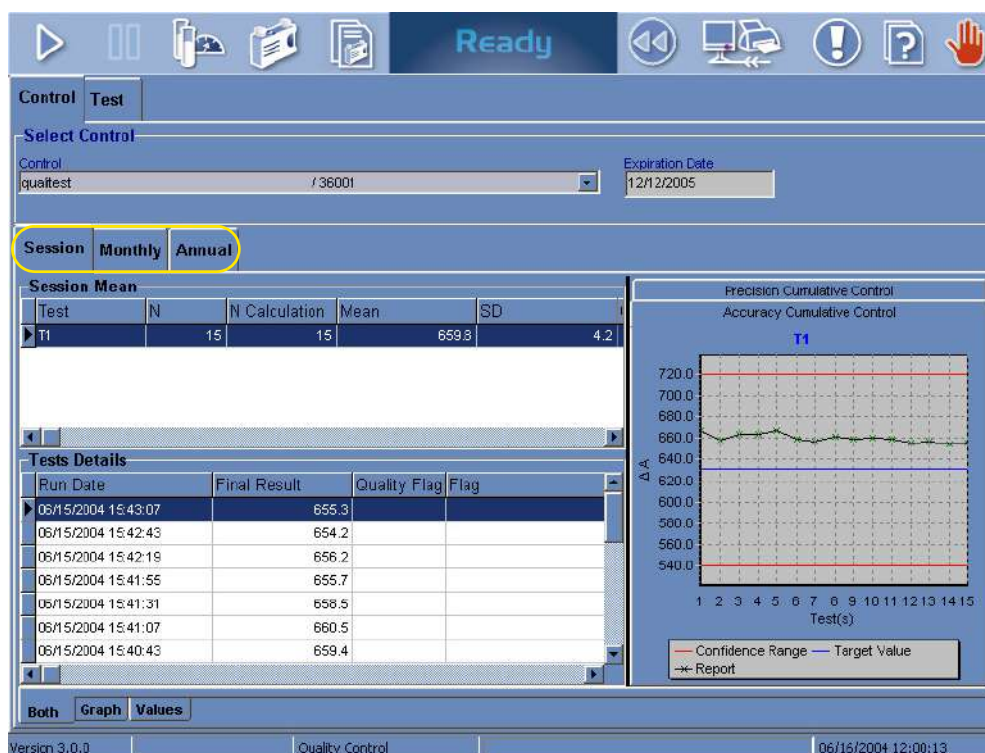


Fig. 6-2: Quality Control by control

2.1. Select Control

The fields of the «Select Control» part are described in the following table:

Heading	Description	Format
Control	Control name / Control lot number.	Scrolling list
Expiration Date	Control expiry date. Only displayed.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 6-1: «Select Control» part description

The user selects a control by using the «Control» scrolling list.

2.2. Session

The «Session» tab displays the results and statistical analyses for each test controlled with the selected control over the current Worklist.

This tab is divided into three parts:

- ◆ [Session Mean](#), page 6-5
- ◆ [Tests Details](#), page 6-6
- ◆ [Graphs](#), page 6-7.

The user is able to display either the three parts, only the graphs or only the «Session Mean» and «Tests Details» parts by using the corresponding tabs (see [Fig. 6-3: «Session» tab](#), page 6-4).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Session Mean» and «Tests Details» parts are displayed.

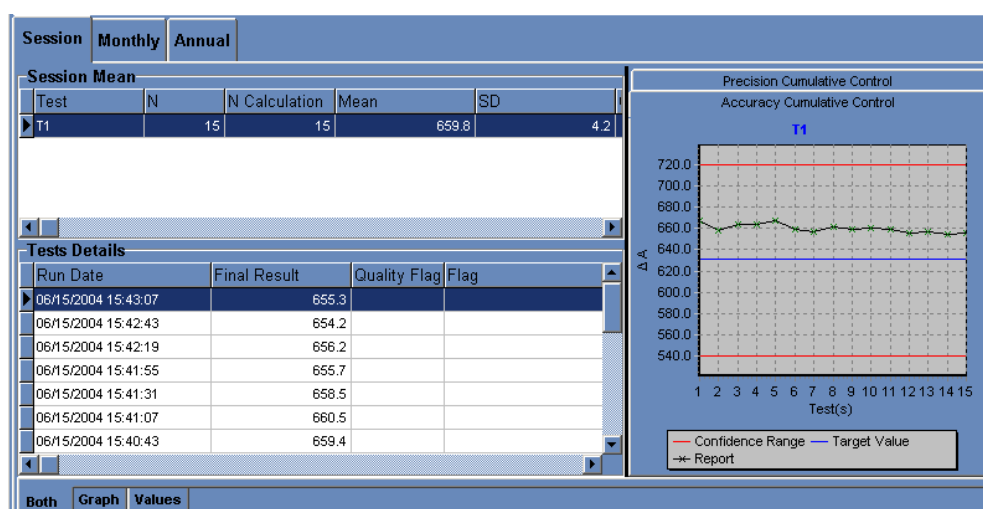


Fig. 6-3: «Session» tab

▼ Session Mean

This part displays the statistical analyses for each test controlled with the selected control over the current Worklist.

Columns of the «Session Mean» part are described in the following table:

Heading	Description	Format
Test	Name of the controlled test.	7 characters max.
N	Total number of controls performed over the day.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Session mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Session standard deviation of control results.	with 7 significant digits max.
CV	Session coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6–2: «Session Mean» part description

By clicking an item, the user is able to display:

- the control results over the current Worklist for the selected test (see [Tests Details](#), page 6-6)
- the graphs corresponding to the control results over the current Worklist for the selected test (see [Graphs](#), page 6-7).

▼ Tests Details

This part displays the control results over the current Worklist for the test selected in the «Session Mean» part (see [Session Mean](#), page 6-5). The control results are sorted by run dates.

Columns of the «Tests Details» part are described in the following table:

Heading	Description	Format
Run Date	Date and time of control run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Final Result	Final result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Quality Flag	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Flag	Analytical flags. If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Decision	A or D (Accept or Delete).	One character
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.

Tab. 6-3: «Tests Details» part description



The control results deleted from the Control Result list or the control validation screen (see [3.4. Control](#), page 2-70) are grayed.

▼ Graphs

This part displays the graphs corresponding to the control results over the current Worklist for the test selected in the «Session Mean» part (see [Session Mean](#), page 6-5).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-7
- [Precision Cumulative Control](#), page 6-8.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6-4: Accuracy Cumulative Control](#), page 6-7).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Control values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

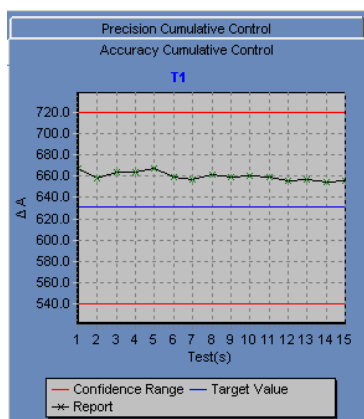


Fig. 6-4: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–5: Precision Cumulative Control](#), page 6-8).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm$ 1SD: two yellow lines.
- ◆ Mean value $\pm$ 2SD: two red lines.
- ◆ Control values displayed:
 - in green when they are included into the range «Mean value $\pm$ 1SD»
 - in yellow when they are included into the range «Mean value $\pm$ 2SD»
 - in red when they are out of the range «Mean value $\pm$ 2SD».

These values are linked with a dark line.

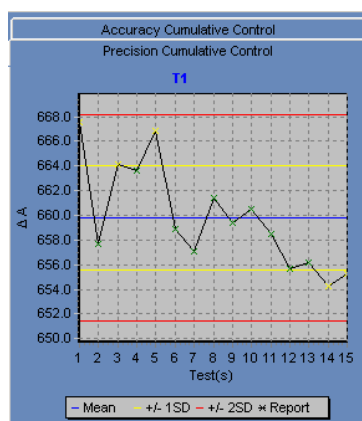


Fig. 6–5: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

c – Zoom in on the graph

To zoom in, click and drag the cursor from left to right. Then, unclick to display the graph.

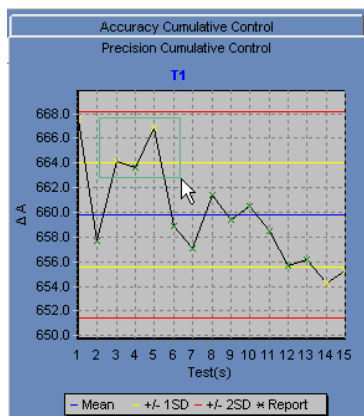


Fig. 6-6: Zoom in

To zoom out, click and drag the cursor from right to left. Then, unclick to display the graph.

2.3. Monthly

The «Monthly» tab displays the results and statistical analyses for each test controlled with the selected control over a month.

The user selects a month by using the fields described in the following table:

Heading	Description	Format
Month	Month.	Scrolling list
Year	Year.	Scrolling list

Tab. 6–4: Month selection

The «Monthly» tab is divided into three parts:

- ◆ [Monthly Mean](#), page 6-11
- ◆ [Daily Detail](#), page 6-12
- ◆ [Graphs](#), page 6-13.

The user is able to display either the three parts, only the graphs or only the «Monthly Mean» and «Daily Detail» parts by using the corresponding tabs (see [Fig. 6–7: «Monthly» tab](#), page 6-10).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Monthly Mean» and «Daily Detail» parts are displayed.

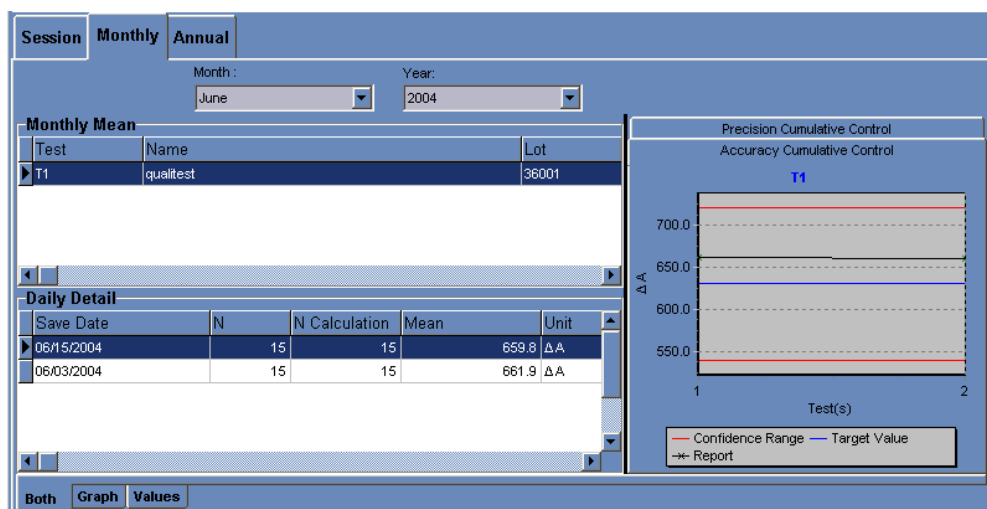


Fig. 6–7: «Monthly» tab

▼ Monthly Mean

This part displays the statistical analyses for each test controlled with the selected control over a month.

Columns of the «Monthly Mean» part are described in the following table:

Heading	Description	Format
Test	Name of the controlled test.	7 characters max.
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
N	Total number of controls performed over the month.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Monthly mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Monthly standard deviation of control results.	with 7 significant digits max.
CV	Monthly coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6–5: «Monthly Mean» part description

By clicking an item, the user is able to display:

- the session statistical analyses over the month for the selected test (see [Daily Detail](#), page 6-12)
- the graphs corresponding to the session statistical analyses over the month for the selected test (see [Graphs](#), page 6-13).

▼ Daily Detail

This part displays the session statistical analyses over the month for the test selected in the «Monthly Mean» part (see [Monthly Mean](#), page 6-11).

Columns of the «Daily Detail» part are described in the following table:

Heading	Description	Format
Save Date	Date of the Worklist.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
N	Total number of controls performed over the day.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Session mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
SD	Session standard deviation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
CV	Session coefficient of variation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 6–6: «Daily Detail» part description

▼ Graphs

This part displays the graphs corresponding to the session statistical analyses over the month for the test selected in the «Monthly Mean» part (see [Monthly Mean](#), page 6-11).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-13
- [Precision Cumulative Control](#), page 6-14.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6–8: Accuracy Cumulative Control](#), page 6-13).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Daily mean values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

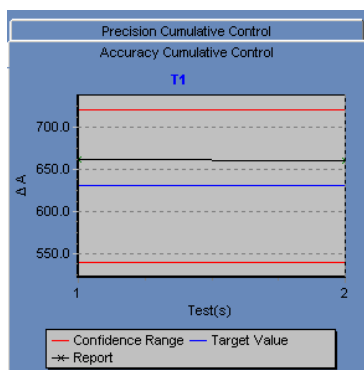


Fig. 6–8: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–9: Precision Cumulative Control](#), page 6-14).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm$ 1SD: two yellow lines.
- ◆ Mean value $\pm$ 2SD: two red lines.
- ◆ Daily mean values displayed:
 - in green when they are included into the range «Mean value $\pm$ 1SD»
 - in yellow when they are included into the range «Mean value $\pm$ 2SD»
 - in red when they are out of the range «Mean value $\pm$ 2SD».

These values are linked with a dark line.

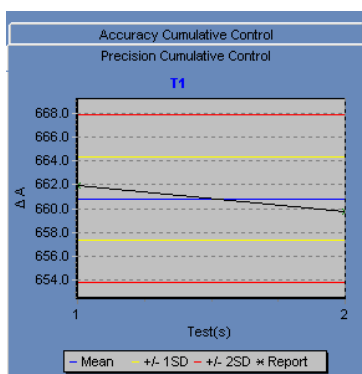


Fig. 6–9: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

2.4. Annual

The «Annual» tab displays the results and statistical analyses for each test controlled with the selected control over a year.

The user selects a year by using the field described in the following table:

Heading	Description	Format
Year	Year.	Scrolling list

Tab. 6–7: Year selection

The «Annual» tab is divided into three parts:

- ◆ **Year Mean**, page 6-16
- ◆ **Monthly Detail**, page 6-17
- ◆ **Graphs**, page 6-18.

The user is able to display either the three parts, only the graphs or only the «Year Mean» and «Monthly Detail» parts by using the corresponding tabs (see [Fig. 6–10: «Annual» tab](#), page 6-15).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Year Mean» and «Monthly Detail» parts are displayed.

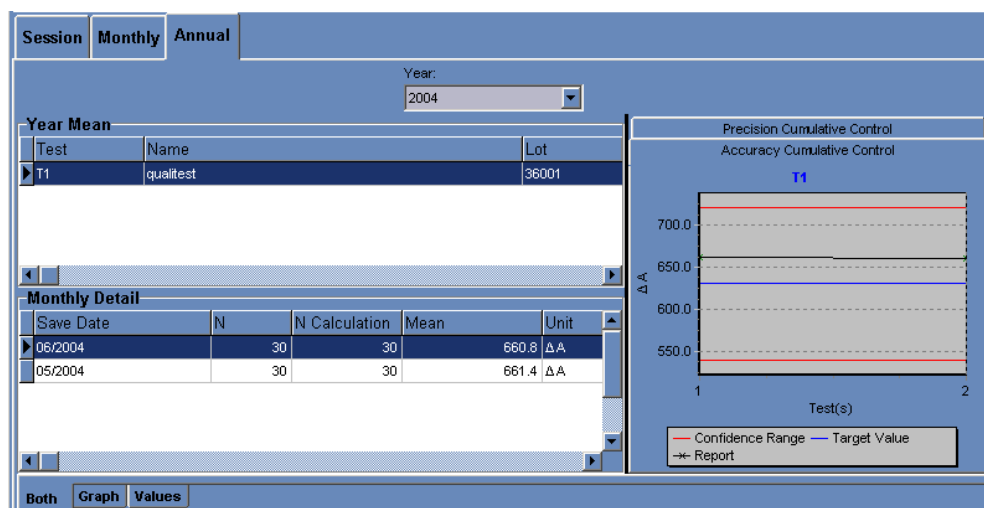


Fig. 6–10: «Annual» tab

▼ Year Mean

This part displays the statistical analyses for each test controlled with the selected control over a year.

Columns of the «Year Mean» part are described in the following table:

Heading	Description	Format
Test	Name of the controlled test.	7 characters max.
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
N	Total number of controls performed over the year.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Annual mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Annual standard deviation of control results.	with 7 significant digits max.
CV	Annual coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6–8: «Year Mean» part description

By clicking an item, the user is able to display:

- the monthly statistical analyses over the year for the selected test (see [Monthly Detail](#), page 6-17)
- the graphs corresponding to the monthly statistical analyses over the year for the selected test (see [Graphs](#), page 6-18).

▼ Monthly Detail

This part displays the monthly statistical analyses over the year for the test selected in the «Year Mean» part (see [Year Mean](#), page 6-16).

Columns of the «Monthly Detail» part are described in the following table:

Heading	Description	Format
Save date	Month.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
N	Total number of controls performed over the month.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Monthly mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
SD	Monthly standard deviation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
CV	Monthly coefficient of variation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 6–9: «Monthly Detail» part description

▼ Graphs

This part displays the graphs corresponding to the monthly statistical analyses over the year for the test selected in the «Year Mean» part (see [Year Mean](#), page 6-16).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-18
- [Precision Cumulative Control](#), page 6-19.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6-11: Accuracy Cumulative Control](#), page 6-18).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Monthly mean values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

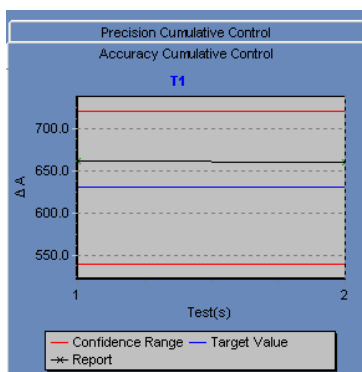


Fig. 6-11: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–12: Precision Cumulative Control](#), page 6-19).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm$ 1SD: two yellow lines.
- ◆ Mean value $\pm$ 2SD: two red lines.
- ◆ Monthly mean values displayed:
 - in green when they are included into the range «Mean value $\pm$ 1SD»
 - in yellow when they are included into the range «Mean value $\pm$ 2SD»
 - in red when they are out of the range «Mean value $\pm$ 2SD».

These values are linked with a dark line.

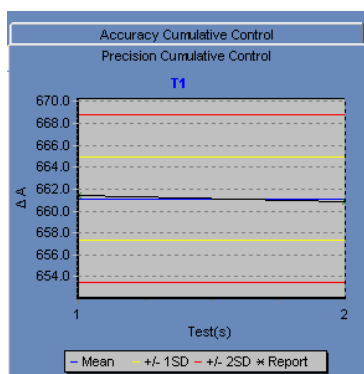


Fig. 6–12: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

3. Quality Control by test

The «Test» tab allows the user to review the results and statistical analyses of all controls used for a selected test.

To review the results and statistical analyses for a test, select this test by using the «Select Test» part (see [3.1. Select Test](#), page 6-21).

The results and statistical analyses of all controls used for this test can be displayed over the three following periods:

- ◆ the current Worklist (see [3.2. Session](#), page 6-21)
- ◆ a specific month (see [3.3. Monthly](#), page 6-26)
- ◆ a specific year (see [3.4. Annual](#), page 6-31).

Choose the desired period by pressing the corresponding tab (see [Fig. 6-13: Quality Control by test](#), page 6-20).

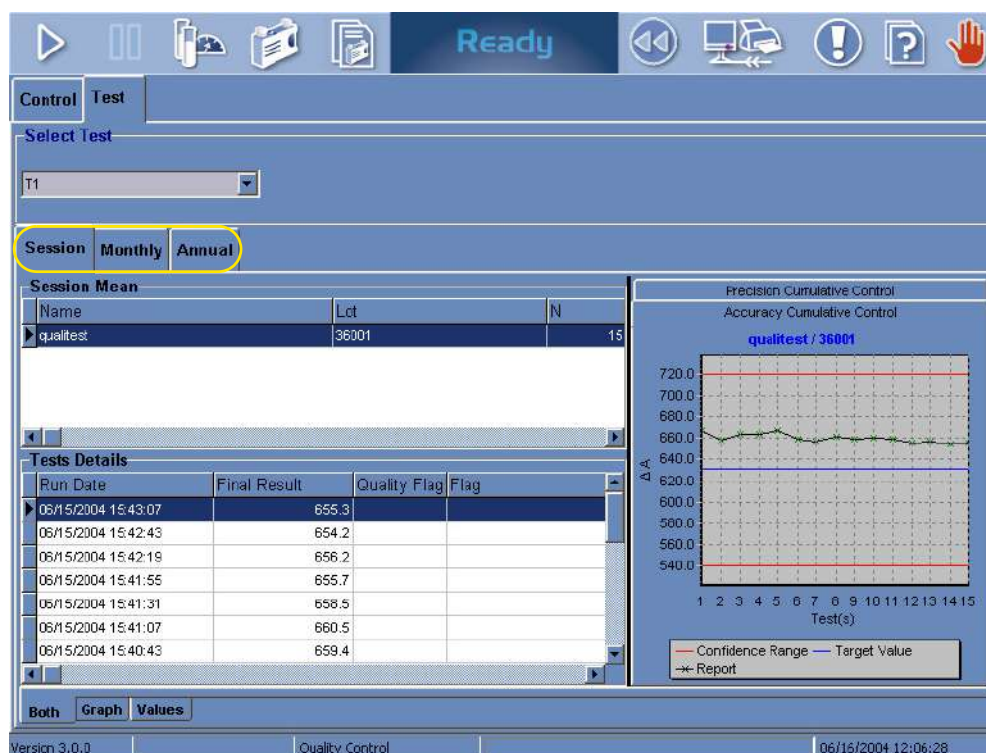


Fig. 6-13: Quality Control by test

3.1. Select Test

The user selects a test by using the field described in the following table:

Heading	Description	Format
Test	Test name.	Scrolling list

Tab. 6–10: «Select Test» part description

3.2. Session

The «Session» tab displays the results and statistical analyses of all controls used for the selected test over the current Worklist.

This tab is divided into three parts:

- ◆ [Session Mean](#), page 6-22
- ◆ [Tests Details](#), page 6-23
- ◆ [Graphs](#), page 6-24.

The user is able to display either the three parts, only the graphs or only the «Session Mean» and «Tests Details» parts by using the corresponding tabs (see [Fig. 6–14: «Session» tab](#), page 6-21).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Session Mean» and «Tests Details» parts are displayed.

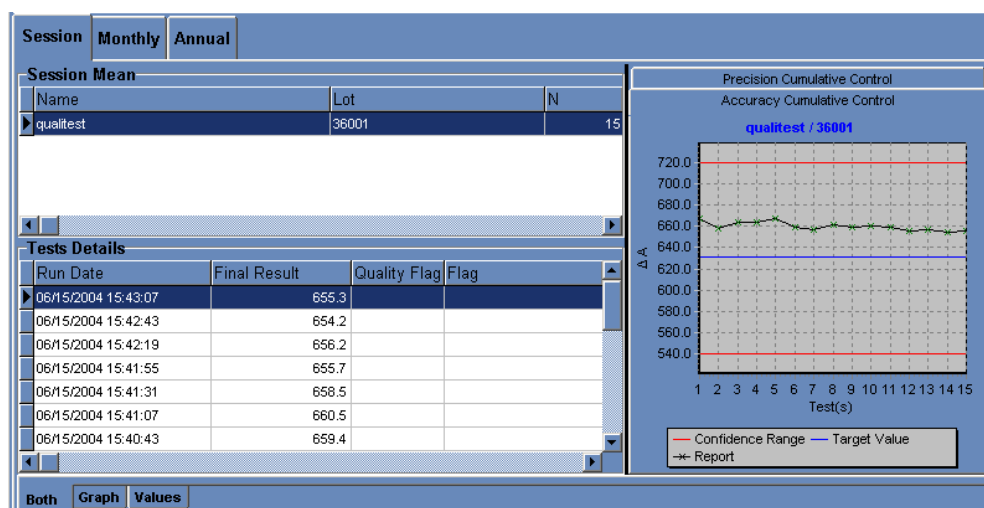


Fig. 6–14: «Session» tab

▼ Session Mean

This part displays the statistical analyses of all controls used for the selected test over the current Worklist.

Columns of the «Session Mean» part are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
N	Total number of controls performed over the day.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Session mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Session standard deviation of control results.	with 7 significant digits max.
CV	Session coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6-11: «Session Mean» part description

By clicking an item, the user is able to display:

- the selected control results over the current Worklist (see [Tests Details](#), page 6-23)
- the graphs corresponding to the selected control results over the current Worklist (see [Graphs](#), page 6-24).

▼ Tests Details

This part displays the results over the current Worklist of the control selected in the «Session Mean» part (see [Session Mean](#), page 6-22). The control results are sorted by run dates.

Columns of the «Tests Details» part are described in the following table:

Heading	Description	Format
Run Date	Date and time of control run.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Final Result	Final result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Quality Flag	Quality flag (see 3.3.5. Quality flags , page 9-74).	2 characters max.
Flag	Analytical flags. If several analytical flags exist, the flag having priority is displayed.	15 characters max.
Decision	A or D (Accept or Delete).	One character
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.

Tab. 6–12: «Tests Details» part description



The control results deleted from the Control Result list or the control validation screen (see [3.4. Control](#), page 2-70) are grayed.

▼ Graphs

This part displays the graphs corresponding to the results over the current Worklist of the control selected in the «Session Mean» part (see [Session Mean](#), page 6-22).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-24
- [Precision Cumulative Control](#), page 6-25.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6-15: Accuracy Cumulative Control](#), page 6-24).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Control values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

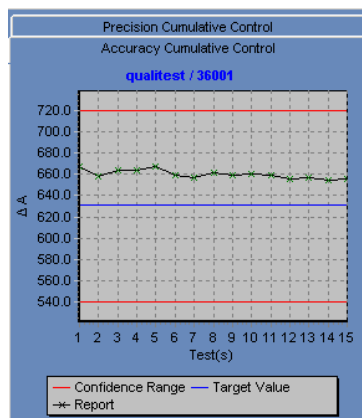


Fig. 6-15: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–16: Precision Cumulative Control](#), page 6-25).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm 1SD$: two yellow lines.
- ◆ Mean value $\pm 2SD$: two red lines.
- ◆ Control values displayed:
 - in green when they are included into the range «Mean value $\pm 1SD$ »
 - in yellow when they are included into the range «Mean value $\pm 2SD$ »
 - in red when they are out of the range «Mean value $\pm 2SD$ ».

These values are linked with a dark line.

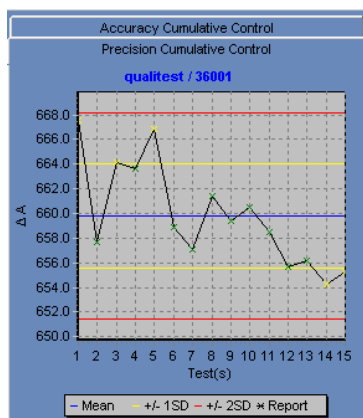


Fig. 6–16: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

3.3. Monthly

The «Monthly» tab displays the results and statistical analyses of all controls used for the selected test over a month.

The user selects a month by using the fields described in the following table:

Heading	Description	Format
Month	Month.	Scrolling list
Year	Year.	Scrolling list

Tab. 6-13: Month selection

The «Monthly» tab is divided into three parts:

- ◆ [Monthly Mean](#), page 6-27
- ◆ [Daily Detail](#), page 6-28
- ◆ [Graphs](#), page 6-29.

The user is able to display either the three parts, only the graphs or only the «Monthly Mean» and «Daily Detail» parts by using the corresponding tabs (see [Fig. 6-17: «Monthly» tab](#), page 6-26).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Monthly Mean» and «Daily Detail» parts are displayed.

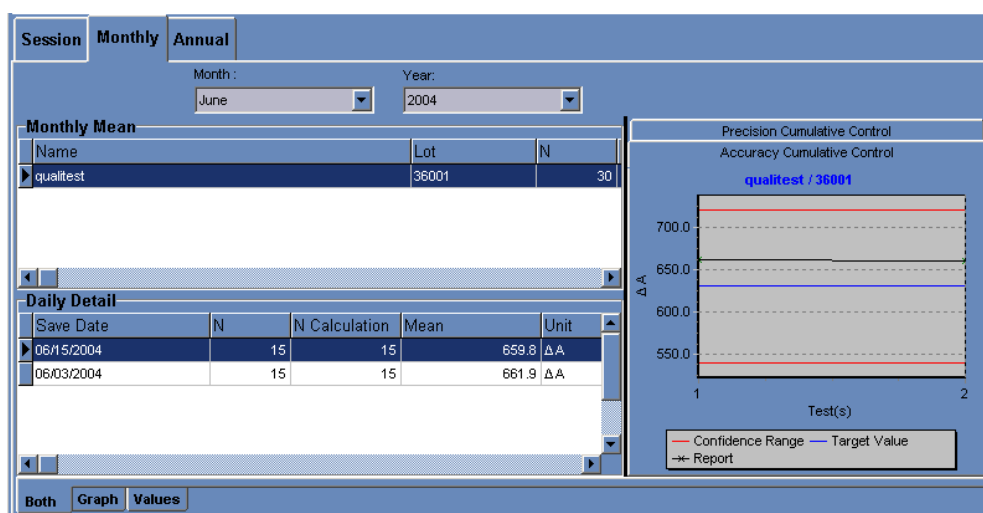


Fig. 6-17: «Monthly» tab

▼ Monthly Mean

This part displays the statistical analyses of all controls used for the selected test over a month.

Columns of the «Monthly Mean» part are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
N	Total number of controls performed over the month.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Monthly mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Monthly standard deviation of control results.	with 7 significant digits max.
CV	Monthly coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6–14: «Monthly Mean» part description

By clicking an item, the user is able to display:

- the session statistical analyses over the month for the selected control (see [Daily Detail](#), page 6-28)
- the graphs corresponding to the session statistical analyses over the month for the selected control (see [Graphs](#), page 6-29).

▼ Daily Detail

This part displays the session statistical analyses over the month for the control selected in the «Monthly Mean» part (see [Monthly Mean](#), page 6-27).

Columns of the «Daily Detail» part are described in the following table:

Heading	Description	Format
Save Date	Date of the Worklist.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
N	Total number of controls performed over the day.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Session mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
SD	Session standard deviation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
CV	Session coefficient of variation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 6-15: «Daily Detail» part description

▼ Graphs

This part displays the graphs corresponding to the session statistical analyses over the month for the control selected in the «Monthly Mean» part (see [Monthly Mean](#), page 6-27).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-29
- [Precision Cumulative Control](#), page 6-30.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6-18: Accuracy Cumulative Control](#), page 6-29).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Daily mean values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

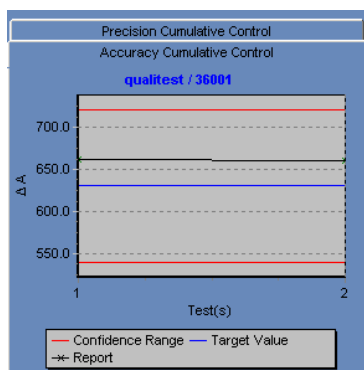


Fig. 6-18: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–19: Precision Cumulative Control](#), page 6-30).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm$ 1SD: two yellow lines.
- ◆ Mean value $\pm$ 2SD: two red lines.
- ◆ Daily mean values displayed:
 - in green when they are included into the range «Mean value $\pm$ 1SD»
 - in yellow when they are included into the range «Mean value $\pm$ 2SD»
 - in red when they are out of the range «Mean value $\pm$ 2SD».

These values are linked with a dark line.

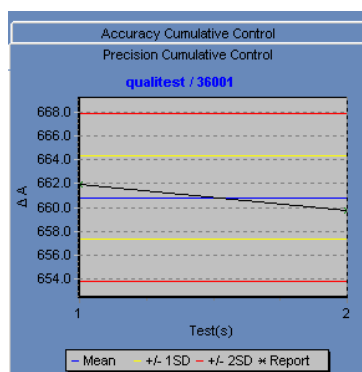


Fig. 6–19: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

3.4. Annual

The «Annual» tab displays the results and statistical analyses of all controls used for the selected test over a year.

The user selects a year by using the field described in the following table:

Heading	Description	Format
Year	Year.	Scrolling list

Tab. 6–16: Year selection

The «Annual» tab is divided into three parts:

- ◆ [Year Mean](#), page 6-32
- ◆ [Monthly Detail](#), page 6-33
- ◆ [Graphs](#), page 6-34.

The user is able to display either the three parts, only the graphs or only the «Year Mean» and «Monthly Detail» parts by using the corresponding tabs (see [Fig. 6–20: «Annual» tab](#), page 6-31).

- Both: all information of the «Graph» and «Values» tabs is displayed.
- Graph: only the graphs are displayed.
- Values: only the «Year Mean» and «Monthly Detail» parts are displayed.

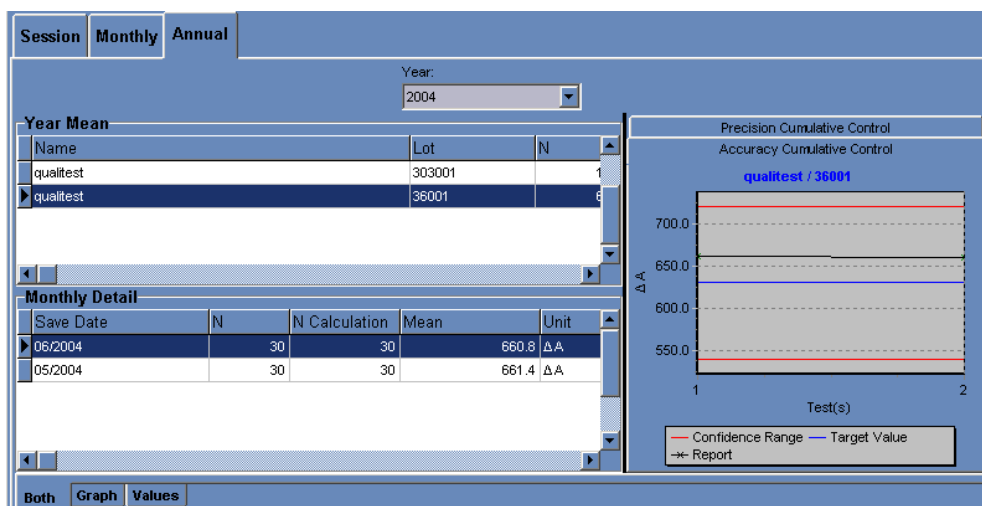


Fig. 6–20: «Annual» tab

▼ Year Mean

This part displays the statistical analyses of all controls used for the selected test over a year.

Columns of the «Year Mean» part are described in the following table:

Heading	Description	Format
Name	Control name.	20 characters max.
Lot	Control lot number.	16 characters max.
N	Total number of controls performed over the year.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Annual mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
SD	Annual standard deviation of control results.	with 7 significant digits max.
CV	Annual coefficient of variation of control results.	
Target Value	Control target value.	6 numerical characters max. + decimal position configured (see Result , page 7-16)
Confidence Range	Low and high limit value of the confidence range.	with 7 significant digits max.

Tab. 6-17: «Year Mean» part description

By clicking an item, the user is able to display:

- the monthly statistical analyses over the year for the selected control (see [Monthly Detail](#), page 6-33)
- the graphs corresponding to the monthly statistical analyses over the year for the selected control (see [Graphs](#), page 6-34).

▼ Monthly Detail

This part displays the monthly statistical analyses over the year for the control selected in the «Year Mean» part (see [Year Mean](#), page 6-32).

Columns of the «Monthly Detail» part are described in the following table:

Heading	Description	Format
Save date	Month.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
N	Total number of controls performed over the month.	Numerical characters
N Calculation	Number of controls used for the statistical analyses.	Numerical characters
Mean	Monthly mean value of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Unit	Test unit configured in the application (see Result , page 7-16).	10 characters max.
SD	Monthly standard deviation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
CV	Monthly coefficient of variation of control results.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 6–18: «Monthly Detail» part description

▼ Graphs

This part displays graphs corresponding to the monthly statistical analyses over the year for the control selected in the «Year Mean» part (see [Year Mean](#), page 6-32).

Two type of graphs can be displayed:

- [Accuracy Cumulative Control](#), page 6-34
- [Precision Cumulative Control](#), page 6-35.

Choose the desired graph by pressing the corresponding tab.

a – Accuracy Cumulative Control

This graph shows several data (see [Fig. 6-21: Accuracy Cumulative Control](#), page 6-34).

- ◆ Target value: blue line.
- ◆ Low and high limit value of the confidence range: two red lines.
- ◆ Monthly mean values displayed:
 - in green when they are into the confidence range
 - in red when they are out of the confidence range.

These values are linked with a dark line.

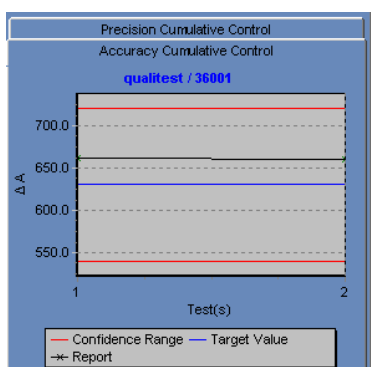


Fig. 6-21: Accuracy Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

b – Precision Cumulative Control

This graph shows several data (see [Fig. 6–22: Precision Cumulative Control](#), page 6-35).

- ◆ Mean value: blue line.
- ◆ Mean value $\pm 1SD$: two yellow lines.
- ◆ Mean value $\pm 2SD$: two red lines.
- ◆ Monthly mean values displayed:
 - in green when they are included into the range «Mean value $\pm 1SD$ »
 - in yellow when they are included into the range «Mean value $\pm 2SD$ »
 - in red when they are out of the range «Mean value $\pm 2SD$ ».

These values are linked with a dark line.

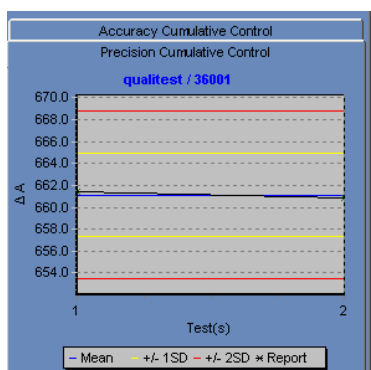


Fig. 6–22: Precision Cumulative Control

The user can zoom in on the graph (see [Zoom in on the graph](#), page 6-9).

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1. Menu «Services» overview

1.1. Access to the «Services» menu

Press the «Services» button from the Main menu.

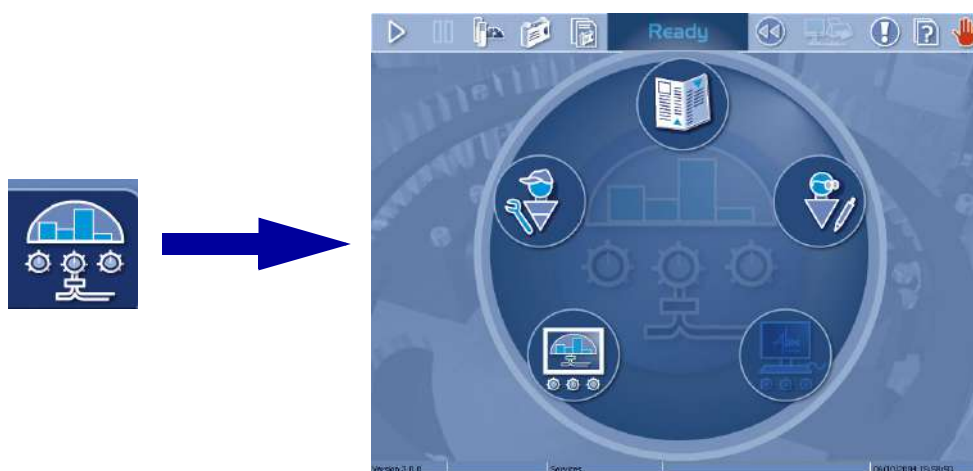


Fig. 7-1: «Services» menu access button

1.2. «Services» menu functions

Heading/Key	Name	Action and Description
	Application Configuration	Launches «Application Configuration» menu (see 2. Application Configuration , page 7-7).
	Diagnostics	Launches «Diagnostics» menu. Only for HORIBA ABX technician.
	System Configuration	Launches «System Configuration» menu (see 3. System Configuration , page 7-77).
	Customer Services	Launches «Customer Services» menu (see 4. Customer Services , page 7-114).
	Logs	Launches «Logs» menu (see 5. Logs , page 7-139).

Tab. 7-1: «Services» menu functions

2. Application Configuration

▼ Access to the «Application Configuration» menu

Press the «Application Configuration» button from the «Services» menu.

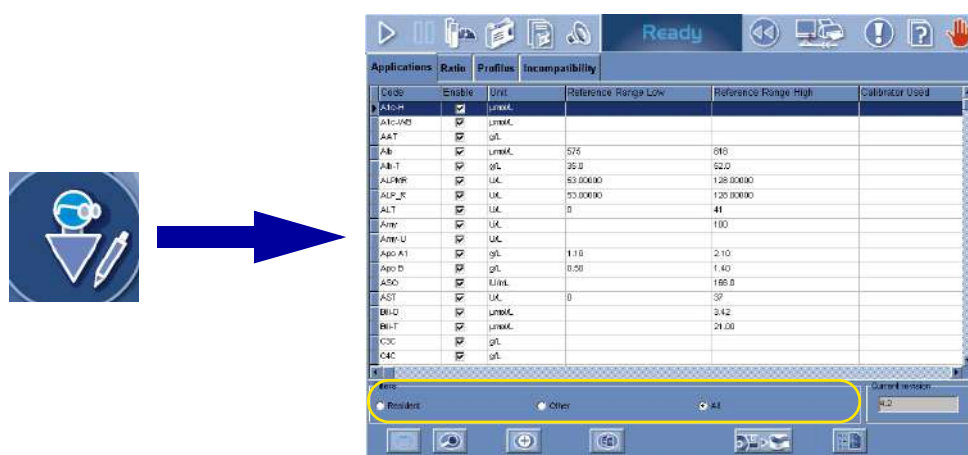


Fig. 7-2: «Application Configuration» menu access button

The «Application Configuration» menu is divided into four tabs:

- ◆ Applications
- ◆ Ratio
- ◆ Profiles
- ◆ Incompatibility.

Click or press one of the tabs to access the various functions.

The «Applications» tab opens on the list of applications configured on the instrument (see [2.1. Applications list](#), page 7-9).

The two following types of applications can be configured on the **Pentra 400**:

- ◆ absorbance applications (see [2.2. Absorbance applications](#), page 7-11)
- ◆ ISE applications (see [2.3. ISE applications](#), page 7-42).

These applications can be configured on the instrument in a specific order from the application order screen (see [2.4. Application order](#), page 7-50).

Many applications are provided by **HORIBA ABX**. These applications are maintained and updated by **HORIBA ABX** with a floppy or CD-Rom (see [2.5. Update function](#), page 7-52). Some applications can also be provided by your distributor.

The applications provided by **HORIBA ABX** or your distributor are configured on reserved channels. For these applications, only a few parameters (listed in the chapter [2.2.9. Edition mode](#), page 7-40) are modifiable by the user.

Some applications can be added by the user on user channels. All parameters of these applications are modifiable by the user. The number of user channels is limited and defined by **HORIBA ABX** and/or your distributor.

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Ratios and profiles can be configured respectively from the «Ratio» tab (see [2.6. Ratio](#), page 7-55) and the «Profiles» tab (see [2.7. Profiles](#), page 7-65).

Some test samplings are said incompatible because they can pose contamination problems if they are performed one after the other. These incompatibilities are configurable from the «Incompatibility» tab (see [2.8. Incompatibility](#), page 7-70). Then, the **Pentra 400** organizes test samplings in order not to perform incompatible test samplings one after the other.

2.1. Applications list

The Applications list groups the applications configured on the instrument. The user is able to display either the resident applications, the other applications or all the applications by using the selective filter (see [Fig. 7-2: «Application Configuration» menu access button](#), page 7-7).

- Resident: only the applications provided by **HORIBA ABX** or your distributor are displayed in the Applications list.
- Other: only the applications added by the user are displayed in the Applications list.
- All: the Applications list shows all the applications configured on the instrument.

Columns of the Applications list are described in the following table:

Heading	Description	Format
Code	Application short name.	7 characters max.
Enable	If checked, the application is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box
Unit	Unit used to display the results.	10 characters max.
Reference Range Low	Low limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Reference Range High	High limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Calibrator Used	Name of the calibrator used.	20 characters max.
Control required	If checked, a default control is required to validate the calibration. Up to three default controls can be configured.	Check box
Control Used	Name of the default controls used.	-
Reagent Short Name	Short name of the reagent used for this test. For more information on reagent short name, see ABX Pentra Reagent Document Binder.	7 characters max.
Cassette	If checked, the reagent is on cassette.	Check box
Release	Application version number.	4 numerical characters: nn.nn
Modified on	Application modification date and time.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 7-2: Applications list description



- ◆ The «Current revision» field displays the revision number of the last update floppy or CD-Rom (see [2.5. Update function](#), page 7-52).
- ◆ If an application has not been updated at the last update, then the corresponding line in the Applications list is grayed.

▼ Applications list functions

From the Applications list, the user is able to:

- add, duplicate or delete applications
- display and modify application parameters
- modify the application order
- update the applications provided by **HORIBA ABX**.

Heading/Key	Name	Function
	Add new	Addition of an absorbance application. Opens the application capture screen in Addition mode (see 2.2.6. Addition mode , page 7-39). Disabled if all user channels are used.
	Duplicate	Duplication of an absorbance application (see 2.2.7. Duplicate function , page 7-39). Disabled if all user channels are used.
	Delete	Deletion of the selected application (see Conditions of deletion , page 7-10). Disabled for ISE applications.
	Details	Displays parameters of the selected application. Opens either the application capture screen in Display mode (see 2.2.8. Display mode , page 7-40) or the ISE application screen in Display mode (see 2.3.2. Display mode , page 7-49). Function also accessible by double-clicking an item.
	Application order	Modification of the application order. Opens the application order screen (see 2.4. Application order , page 7-50).
	Update	Updates the applications provided by HORIBA ABX (see 2.5. Update function , page 7-52).

Tab. 7-3: Applications list functions

◆ Conditions of deletion

An application cannot be deleted if tests associated to this application are ordered, pending, incomplete or for validation.

In case a current calibration exists for this application, a message informs the user that the current calibration will be lost if the application is deleted.

The application cannot be deleted if it is linked to ratios, profiles or calibrator/control target values.

For the applications added by the user, the application cannot be deleted if the associated solution is still configured on the instrument.

2.2. Absorbance applications

This section describes the application capture screen, its different use modes and functions in the following chapters:

- ◆ [2.2.1. General Parameters](#), page 7-12
- ◆ [2.2.2. Calibration Parameters](#), page 7-21
- ◆ [2.2.3. Analysis Parameters](#), page 7-29
- ◆ [2.2.4. Calculation Parameters](#), page 7-33
- ◆ [2.2.5. Unit Parameters](#), page 7-37
- ◆ [2.2.6. Addition mode](#), page 7-39
- ◆ [2.2.7. Duplicate function](#), page 7-39
- ◆ [2.2.8. Display mode](#), page 7-40
- ◆ [2.2.9. Edition mode](#), page 7-40.

The application capture screen allows the user to configure absorbance applications on the instrument. This screen is divided into five tabs:

- General Parameters
- Calibration Parameters
- Analysis Parameters
- Calculation Parameters
- Unit Parameters.

Click or press one of the tabs to access the various parameters.

2.2.1. General Parameters

This chapter describes the «General Parameters» tab in the following parts:

- ◆ [Application identification](#), page 7-13
- ◆ [Characteristics](#), page 7-14
- ◆ [Pre-dilution](#), page 7-15
- ◆ [Result](#), page 7-16
- ◆ [Correlation](#), page 7-16
- ◆ [Linearity](#), page 7-17
- ◆ [Automatic Rerun](#), page 7-17
- ◆ [Delta Check](#), page 7-18
- ◆ [Reference Range](#), page 7-19
- ◆ [Rerun range](#), page 7-20.

The screenshot displays the 'General Parameters' tab for the 'Albumin' test. The interface is organized into several sections:

- Test Information:** Test Name (Albumin), Code (Alb), Channel (13), Release (3.01), and Modified on (12/15/2005 11:45).
- Characteristics:** Sample Type (Serum / Plasma), Number of Reagents (Reagent 1), and Reagent details (Short Name: ALB, Number: 11, On Board Stability: 93 days, Cassette checked).
- Pre-dilution:** Diluent Name, Factor, and Incubation time (1 cycle).
- Result:** Unit (µmol/L), Decimal Position (1), and Manual Patient Validation (unchecked).
- Correlation:** Slope (1.00000) and Intercept (0.00000).
- Linearity (µmol/L):** Checked, with Low Limit (2.9) and High Limit (909.0).
- Delta Check:** Delta Check Validity (365), Absolute Variation, and Relative Variation.
- Reference Range (µmol/L):** Checked, with Low Check (575.0) and High Check (818.0) for Man / Default, Woman, and Child.
- Rerun range (µmol/L):** Checked, with Low Check and High Check for Man / Default, Woman, and Child.
- Automatic Rerun:** Post Dilution (checked, Dilution Factor 2.0), Post Concentration (unchecked, Concentration factor).

Fig. 7-3: General Parameters

▼ Application identification

This part groups fields that allows the user to identify the application.

Heading	Description	Format
Test Name	Test name corresponding to the application. The name must be unique.	15 characters max.
Code	Application short name. The short name must be unique.	7 characters max.
Channel	Application channel number. The channel number must be unique.	3 numerical characters max. From 1 to 999.
Enable	If checked, the application is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box
Release	Application version number.	4 numerical characters: nn.nn
Modified on	Application modification date and time.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 7–4: Application identification

◆ Channel

The channels 1 to 815 are reserved for the applications provided by **HORIBA ABX** or your distributor.

The user can add some applications on channels 999 to "1000 - X" (X = number of user channels).

The number of user channels is limited and defined by **HORIBA ABX** and/or your distributor.



The fields «Test Name», «Code» and «Channel» are displayed on the five tabs of the application capture screen.

▼ Characteristics

Heading	Description	Format
Sample Type	Serum/plasma, Urine or Other.	Scrolling list
Number of Reagents	Reagent 1, Reagent 2 or Reagent 3.	Scrolling list
REAGENT		
Reagent Short Name	Reagent short name. Not to be configured by the user.	7 characters max.
Reagent Number	Reagent number. Not to be configured by the user.	3 numerical characters max.
On Board Stability	Reagent on board stability in days. Only for cassette. This will be used to calculate the use limit date on the Pentra 400. Not to be configured by the user.	From 0 to 365 days.
Cassette	If checked, the reagent is provided in cassette. Not to be configured by the user.	Check box

Tab. 7-5: Characteristics

The reagents available on the instrument are configured by **HORIBA ABX**.

For the applications added by the user, one reagent is configured for each application. This reagent can be used only with this application.

The «Reagent Short Name» and «Reagent Number» fields are automatically filled by the instrument. The reagent short name assigned is the application code (or short name) and the reagent number is the application channel (or channel number).

The «Sample Type» and the «Number of Reagents» fields must be filled by the user.

▼ Pre-dilution

Heading	Description	Format
Pre-dilution	If checked: - enables the «Pre-dilution» part - patient samples and controls will be pre-diluted.	Check box
Diluent Name	Pre-dilution diluent.	Scrolling list
Factor	Pre-dilution factor.	From 2.0 to 22500.0.
Incubation time (in cycles)	Incubation time of the pre-diluted sample (number of cycles).	From 1 to 99 cycles.

Tab. 7-6: Pre-dilution

◆ Factor

If a pre-dilution is programmed, it follows the dilution procedure with $F_D = F_{\text{Pre-dil}}$ (see [2.2.3. Dilutions](#), page 8-16).



If the pre-dilution factor is higher than 150, two cycles are needed to perform the pre-dilution and two cuvettes will be used in series.

If a post dilution has to be configured, the multiplication of pre-dilution factor and post dilution factor must be lower than 22500.0.

◆ Incubation time

For applications not linked to a ratio, this incubation time represents the minimum time of delay between the dilution and its use in the analysis sequence. For applications linked to a ratio, this time is fixed. The analysis sequence cycles and cleaning cycles (if a needle cleaning is required) must be taken into account for the incubation time configuration. That is illustrated by the example below.

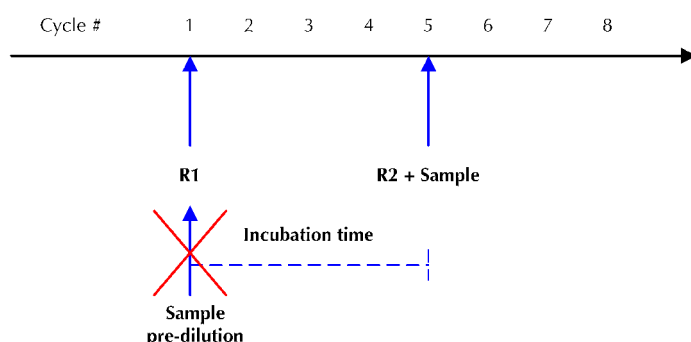


Fig. 7-4: Analysis sequence example

Cycle 1: R1 is pipetted by the reagent needle.

Cycle 5: R2 and Sample are pipetted respectively by the reagent and sample needles.

If the programmed incubation time of the pre-diluted sample is 4, the pre-dilution must be performed during the cycle 1.

The cycle 1 is already used, so the pre-dilution cannot be performed. In that case, a message informs the user that the incubation time of the pre-diluted sample and the analysis sequence cycles are incompatible.

▼ Result

Heading	Description	Format
Unit	Unit used to display the results.	Scrolling list
Decimal Position	Decimal position used to display the results.	One numerical character: from 0 to 5.
Manual Patient Validation	If checked, all patient samples for this application must be validated manually.	Check box

Tab. 7-7: Result

◆ Unit

The units, displayed in the scrolling list, are configured in the «Unit Parameters» tab (see [2.2.5. Unit Parameters](#), page 7-37).

◆ Manual patient validation

- If checked, all patient samples for this application must be validated manually.
- If unchecked, only patient samples that are not validated automatically must be validated manually. It then depends on the configuration of the patient sample validation (see [3.5. Results Validation](#), page 7-101).

▼ Correlation

This part allows the user to convert results in order to correlate them with an alternative method or another temperature (see [Result correlation](#), page 8-45).

Heading	Description	Format	Default value
Slope	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from 0.00001 to 99.99999.	1
Intercept	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.	0

Tab. 7-8: Correlation



The intercept is always expressed in the reference unit.

If an alternative unit is chosen to display results and when configuring an intercept, it is necessary to make the following calculation before programming the intercept:

$$B = b / F_U$$

- B is the intercept to be programmed in the application.
- b is the intercept to be applied to the final result.
- F_U is the unit conversion factor. The unit conversion factor is provided in the «Unit Parameters» tab (see [2.2.5. Unit Parameters](#), page 7-37).

For example, in an application, the reference unit is g/L and an alternative unit is used: mmol/L.

1 g/L converts to 10 mmol/L, so in this example $F_U = 10$.

The user wishes to add an intercept of 20 mmol/L to all results. In this case, $B = b / F_U = 20 / 10 = 2$.

2 is to be programmed in the intercept field.

▼ Linearity

Heading	Description	Format
Linearity	If checked, enables the linearity range check.	Check box
Low Limit	Low limit value of the linearity range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
High Limit	High limit value of the linearity range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 7–9: Linearity

◆ Linearity range check

The sample result is checked to see that it is in the programmed linearity range (see [Tab. 7–9: Linearity](#), page 7-17).

If not, an analytical flag is triggered and an automatic rerun is performed if configured (see [Automatic Rerun](#), page 7-17).

▼ Automatic Rerun

Heading	Description	Format
Post Dilution	If checked, enables the rerun post dilution.	Check box
Dilution Factor	Post dilution factor (see a – Post dilution , page 7-17).	From 2.0 to 22500.0.
Post Concentration	If checked, enables the rerun post concentration.	Check box
Concentration Factor	Post concentration factor (see b – Post concentration , page 7-18).	From 2.0 to 10.0.

Tab. 7–10: Automatic Rerun

a – Post dilution

◆ Post dilution with pre-dilution

The dilution procedure applies with $F_D = F_{\text{Pre-dil}} \cdot F_{\text{Post dil}}$ (see [2.2.3. Dilutions](#), page 8-16).

The multiplication of pre-dilution factor and post dilution factor must be lower than 22500.0.

◆ Post dilution without pre-dilution and no pushing H₂O volume

The dilution procedure applies with $F_D = F_{\text{Post dil}}$ (see [2.2.3. Dilutions](#), page 8-16).

◆ Post dilution without pre-dilution and with pushing H₂O volume (see [2.2.3. Dilutions](#), page 8-16)

If $F_{\text{Post dil}} \leq \text{SVA}/2.0$, then no cuvette is used for the dilution.

SVA and H₂OA are modified to perform the dilution as follows:

$$\text{New SVA} = \text{Previous SVA} / F_{\text{Post dil}}$$

$$\text{New H}_2\text{OA} = \text{Previous H}_2\text{OA} + (\text{SVA} - \text{SVA} / F_{\text{Post dil}})$$

If not, the dilution procedure applies with $F_D = F_{\text{Post dil}}$

b – Post concentration

An automatic rerun with post concentration is programmable only if a pre-dilution and/or a pushing H₂O volume are configured.

- ◆ Post concentration with pre-dilution and no pushing H₂O volume
Post concentration factor $\leq$ Pre-dilution factor
- ◆ Post concentration with pushing H₂O volume and without pre-dilution
Post concentration factor $\leq$ (Sample volume + H₂O volume) / Sample volume
- ◆ Post concentration with pre-dilution and pushing H₂O volume
Post concentration factor $\leq$ Pre-dilution factor . [(Sample volume + H₂O volume) / Sample volume]

▼ Delta Check

Heading	Description	Format
Delta Check	If checked, enables the delta check.	Check box
Delta Check Validity	Time in days which determines if the delta check must be performed.	From 0 to 999 days.
Absolute Variation	Authorized absolute variation expressed in the unit chosen to display the result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Relative Variation	Authorized relative variation (%).	From 0.01 to 99.99%.

Tab. 7-11: Delta Check

The delta check consists in checking the variation between the current result and the previous result to ensure that it is not higher than the authorized absolute and/or relative variations.

If not, the delta check flag is triggered.

The delta check is performed only if:

$$\text{Run date of the current result} - \text{Run date of the previous result} \leq \text{Delta Check Validity}$$



The previous result is a result for the test for the same patient but for a different sample, previously run and validated.

▼ Reference Range

Heading	Description	Format
Low Check	If checked, enables the low reference value check.	Check box
Man/Default	Low limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman reference range.	
Child (<12 years)	Low limit value of the Child reference range.	
High Check	If checked, enables the high reference value check.	Check box
Man/Default	High limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman reference range.	
Child (<12 years)	High limit value of the Child reference range.	

Tab. 7–12: Reference Range

◆ Low reference value check

The sample result is checked to ensure that it is not lower than the low limit value of the reference range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default reference range must be programmed.

◆ High reference value check

The sample result is checked to ensure that it is not higher than the high limit value of the reference range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default reference range must be programmed.

▼ Rerun range

Heading	Description	Format
Low Check	If checked, enables the low critical value check.	Check box
Man/Default	Low limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman critical range.	
Child (< 12 years)	Low limit value of the Child critical range.	
High Check	If checked, enables the high critical value check.	Check box
Man/Default	High limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman critical range.	
Child (< 12 years)	High limit value of the Child critical range.	

Tab. 7-13: Rerun range

◆ Low critical value check

The sample result is checked to ensure that it is not lower than the low limit value of the critical range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default critical range must be programmed.

◆ High critical value check

The sample result is checked to ensure that it is not higher than the high limit value of the critical range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default critical range must be programmed.

2.2.2. Calibration Parameters

This chapter describes the «Calibration Parameters» tab in the following parts:

- ◆ [Calibration](#), page 7-22
- ◆ [Validity](#), page 7-24
- ◆ [Factor calibration](#), page 7-24
- ◆ [Control Required](#), page 7-25
- ◆ [Validity Back-up](#), page 7-26
- ◆ [Calibration pre-dilution](#), page 7-26
- ◆ [Checks](#), page 7-28.

The screenshot displays the 'Calibration Parameters' tab within a software interface. The top bar includes navigation icons and a 'Ready' status. Below the tab bar, the 'Calibration Parameters' section is active, showing fields for 'Test Name' (Albumin), 'Code' (Alb), and 'Channel' (13). The interface is divided into several sub-sections:

- Pre-dilution:** Includes 'Type' and 'Calibrator Diluent' dropdowns, and a grid of 'Factor' fields (Factor 1 through Factor 8).
- Calibration:** Features 'Calibration mode' (Slope Average), 'Level' (1), 'Calibration Factor' (1616.2), 'Run(s)' (2), and checkboxes for 'Dev_Rep (%)' (5.0) and 'Dev_C (%)'.
- Validity:** Includes 'On Request' and 'Time Validity' radio buttons, 'Interval' (14), 'Time Unit' (Days), and checkboxes for 'Low limit check', 'High limit check', and 'Relative variation check'.
- Checks:** Contains checkboxes for 'Reagent Limit Absorbance Check' and 'Reagent Blank Limit Absorbance Check', with corresponding 'Reagent Range Low/High' and 'Blank Range - Low/High Limit' fields.
- Control required:** Includes checkboxes for 'Control 1', 'Control 2', and 'Control 3', with 'Control 1' set to 'N controle'.
- Validity Backup:** Features a checkbox for 'Backup time frame without calibration required', 'Interval' (0), and 'Time Unit' (Days).

The bottom of the window shows a toolbar with icons for saving, printing, and other functions.

Fig. 7-5: Calibration Parameters

▼ Calibration

Heading	Description	Format
Calibration Mode	Calibration mode (see Tab. 7-15: Calibration modes , page 7-23).	Scrolling list
Level	Number of levels. Restrictions apply depending on the calibration mode chosen (see Tab. 7-15: Calibration modes , page 7-23).	Scrolling list
Calibration Factor	Available only for Factor and Slope average calibration modes. - Factor: theoretical factor to be captured. From 0.01 to 99999. - Slope average: displays the calculated factor. Not to be captured in this case.	5 significant digits max.
Run(s)	Number of desired runs.	One numerical character: from 1 to 3.
Dev_Rep	If required, the deviation concerning replicates is checked (see Deviation , page 7-22).	Check box
Dev_Rep (%)	Authorized Dev_Rep (%).	From 0.1 to 99.9%.
Dev_C	If required, the deviation to the curve is checked (see Deviation , page 7-22).	Check box
Dev_C (%)	Authorized Dev_C (%).	From 0.1 to 99.9%.
Calibrator Used	Name of the calibrator used. Displayed when configured through calibrator configuration (see 1. Calibration , page 5-3).	20 characters max.

Tab. 7-14: Calibration



If the Factor mode is selected:

- ◆ The «Level» field and the «Calibration pre-dilution» part (see [Calibration pre-dilution](#), page 7-26) are disabled.
- ◆ The «Calibration Factor» field is enabled and must be filled.
- ◆ The number of runs («Run(s)» field) is 1 and cannot be modified.
- ◆ The reagent blank must be programmed in the «Analysis Parameters» tab (see [Blank](#), page 7-31).

◆ Deviation

Two types of deviation are checked.

- Deviation concerning replicates (Dev_Rep):

For each level, the absorbance values of the replicates are compared with the mean value. The maximum deviation is calculated (Dev_Rep) and then checked to ensure that it is not higher than the authorized Dev_Rep. If not, an analytical flag is triggered.

- Deviation to the curve (Dev_C):

For each level, the concentration of the mean value is compared with the theoretical value. The deviation is calculated (Dev_C) and then checked to ensure that it is not higher than the authorized Dev_C. If not, an analytical flag is triggered.

The different calibration modes, available on the **Pentra 400**, and their associated level number are described in the following table:

Calibration mode	Comments	Level number
Factor	Theoretical factor which defines the relationship between the measured absorbance change and the selected concentration unit (see Factor , page 8-39).	0
Slope average	A factor is derived from a calibration. For linear calibration curves using from 1 to 3 standards (see Slope average , page 8-40).	1 - 3
Linear regression	The curve parameters are derived from a linear regression. For linear calibration curves using from 2 to 8 standards (see Linear regression , page 8-41).	2 - 8
Linear interpolation	Linear interpolation from point to point. For non-linear calibration curves using from 3 to 8 standards (see Linear interpolation , page 8-42).	3 - 8
LOGIT/LOG4	The curve parameters are derived from the four parameter logit/log algorithm. For non-linear calibration curves using from 4 to 8 standards (see Multiparameter mathematical algorithms , page 8-43).	4 - 8
LOGIT/LOG5	The curve parameters are derived from the five parameter logit/log algorithm. For non-linear calibration curves using from 5 to 8 standards (see Multiparameter mathematical algorithms , page 8-43).	5 - 8
EXPONENT5	The curve parameters are derived from the five parameter exponential algorithm. For non-linear calibration curves using from 5 to 8 standards (see Multiparameter mathematical algorithms , page 8-43).	5 - 8

Tab. 7-15: Calibration modes

▼ Validity

This part allows the user to configure the calibration validity. The user is able to select either «On Request» or «Time Validity».

◆ On Request

The current calibration is valid until a new calibration is requested.

◆ Time Validity

The current calibration is valid for the defined period of time.

When the defined period of time has expired, the current calibration is disabled. As soon as a test for this application is required, a calibration is automatically ordered.

Heading	Description	Format
On Request	If selected: - the current calibration is valid until a new calibration is requested - disables «Interval» and «Time Unit» fields.	Radio button
Time Validity	If selected: - the current calibration is valid for the defined period of time - enables «Interval» and «Time Unit» fields.	Radio button
Interval	Validity duration of the current calibration.	- From 0 to 23 hours. - From 0 to 365 days.
Time Unit	Time unit: Hours or Days.	Scrolling list

Tab. 7-16: Validity

▼ Factor calibration

This part allows the user to configure the calibration factor checks. These checks apply to the calculated calibration factor and are available only for Slope average and Linear regression calibration modes.

Heading	Description	Format
Low limit check	If checked, enables the low limit check.	Check box
Low limit check	Authorized low limit value.	5 significant digits max.
High limit check	If checked, enables the high limit check.	Check box
High limit check	Authorized high limit value.	5 significant digits max.
Relative variation check	If checked, enables the relative variation check.	Check box
Relative variation check	Authorized relative variation (%).	From 0.1 to 100.0%.

Tab. 7-17: Factor calibration

◆ Low limit check

The calculated calibration factor is checked to ensure that it is not lower than the authorized low limit value.

If not, an analytical flag is triggered.

◆ High limit check

The calculated calibration factor is checked to ensure that it is not higher than the authorized high limit value.

If not, an analytical flag is triggered.

◆ Relative variation check

The relative variation check consists in checking the variation between the calculated calibration factor and the previous validated calibration factor to ensure that it is not higher than the authorized relative variation.

▼ Control Required

Heading	Description	Format
Control Required	If checked, a default control is required to validate the calibration. Up to three default controls can be configured.	Check box
Control 1	If checked, the first default control is required to validate the calibration.	Check box
Control Used 1	Name of the first control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.
Control 2	If checked, the second default control is required to validate the calibration.	Check box
Control Used 2	Name of the second control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.
Control 3	If checked, the third default control is required to validate the calibration.	Check box
Control Used 3	Name of the third control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.

Tab. 7-18: Control Required

If the «Control Required» box is checked, the required default controls (Controls 1, 2 and 3) must be configured for this test through control configuration (see [2.3.2. «Target Values Entry» screen](#), page 5-27).

The default controls are automatically performed with the calibration. Ordered sample tests are not carried out until the calibration and the default controls are validated.

In order to unchecked the required default controls (Controls 1, 2 and 3), the user must previously inactivate the default controls for this test through control configuration (see [2.3.2. «Target Values Entry» screen](#), page 5-27).

▼ Validity Back-up

This part allows the user to configure a period of time while the current calibration stays valid when a new cassette, with the same lot number as the previous one, is activated (manually or automatically). This period of time is called back-up time frame.

If the back-up time frame is configured:

- If Activation date of cassette (n+1) - Installation date of cassette (n) > Back-up time frame, then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.
- If Activation date of cassette (n+1) - Installation date of cassette (n) ≤ Back-up time frame, then the installation date of cassette (n+1) is checked.
 - If Installation date of cassette (n+1) < Installation date of cassette (n), then the current calibration is disabled and a new calibration must be performed with the default controls configured in the application.
 - If Installation date of cassette (n+1) ≥ Installation date of cassette (n), then the current calibration stays valid and the default controls configured in the application must be performed.

Heading	Description	Format
Back-up time frame without calibration required	If checked: - the back-up time frame is taken into account when a new cassette, with the same lot number as the previous one, is activated (manually or automatically) - enables «Interval» and «Time Unit» fields.	Check box
Interval	Back-up time frame.	- From 0 to 23 hours. - From 0 to 365 days.
Time Unit	Time unit: Hours or Days.	Scrolling list

Tab. 7-19: Validity Back-up



- ◆ The back-up time frame is configurable for solutions on cassette [only](#).
- ◆ If the back-up time frame is configured, then it is mandatory to configure at least one default control in the application.

▼ Calibration pre-dilution

Heading	Description	Format
Pre-dilution	If checked: - enables the «Calibration pre-dilution» part - calibrators will be pre-diluted.	Check box
Type	Main direct, Main indirect or Factor diluent.	Scrolling list
Calibrator Diluent	Pre-dilution diluent.	Scrolling list
Factor 1 to 8	Dilution factors.	- 0 or 1. - From 2.0 to 150.0.

Tab. 7-20: Calibration pre-dilution

Three dilution types are available for the calibration pre-dilution.

◆ Main direct

The main standard is diluted in order to obtain a series of standards. Each dilution is performed starting from the main standard. Dilution factors must be captured by the user.

◆ Main indirect

The main standard is diluted in order to obtain a series of standards. Each dilution is performed starting from the previous one. Dilution factors must be captured by the user.

◆ Factor diluent

This dilution type is available only if a sample pre-dilution has been configured (see [Pre-dilution](#), page 7-15). The series of standards is pre-diluted as patient samples and controls (with the same dilution factor and incubation time). Factor fields are disabled.

For Main direct and Main indirect dilution types, the number of dilution factors to be captured equals to the number of levels selected (see «Level» field, [Tab. 7-14: Calibration](#), page 7-22).

Factors can be configured as follows:

- 0: This means that no dilution has to be performed for this level, pure diluent is dispensed.
- 1: This means that no dilution has to be performed for this level, pure main standard is dispensed.
- 2.0 to 150.0: The corresponding dilution is performed with the configured dilution factor, the associated concentration is calculated accordingly.

Using the Main direct dilution type, dilution factors must be increasing or decreasing.

- If they are increasing, only the first factor can be equal to 1 and only the last factor can be equal to 0.
- If they are decreasing, only the first factor can be equal to 0 and only the last factor can be equal to 1.

Using the Main indirect dilution type, the only restrictions on dilution factors are that only the first factor can be equal to 1 and only the last factor can be equal to 0.

▼ Checks

Heading	Description	Format
Reagent Limit Absorbance Check	If checked, enables the reagent range check.	Check box
Reagent Range Low	Low limit value of the reagent range.	Five decimal position number: from -3.00000 to 3.00000 O.D.
Reagent Range High	High limit value of the reagent range.	Five decimal position number: from -3.00000 to 3.00000 O.D.
Reagent Blank Limit Absorbance Check	If checked, enables the blank range check.	Check box
Blank Range - Low Limit	Low limit value of the blank range.	Five decimal position number: from -3.00000 to 3.00000 ΔO.D.
Blank Range - High Limit	High limit value of the blank range.	Five decimal position number: from -3.00000 to 3.00000 ΔO.D.

Tab. 7-21: Checks

◆ Reagent range check

All reagent blank absorbance values used for calculations are checked to ensure that they are not out of the programmed reagent range.

If not, an analytical flag is triggered.

◆ Blank range check

The absorbance variation of the reagent blank is checked to ensure that it is not out of the programmed blank range.

If not, an analytical flag is triggered.

2.2.3. Analysis Parameters

This chapter describes the «Analysis Parameters» tab in the following parts:

- ◆ [Cleaner](#), page 7-30
- ◆ [Wavelength](#), page 7-30
- ◆ [Blank](#), page 7-31
- ◆ [Analysis Sequence](#), page 7-31
- ◆ [Mixing Speed](#), page 7-32.

The screenshot shows the 'Analysis Parameters' tab of a software interface. At the top, there is a toolbar with icons for play, pause, print, save, and help, along with a 'Ready' status indicator. Below the toolbar are tabs for 'Applications', 'Ratio', 'Profiles', 'Incompatibility', 'General parameters', 'Calibration Parameters', 'Analysis Parameters' (selected), 'Calculation Parameters', and 'Unit Parameters'.

Under the 'Analysis Parameters' tab, the following settings are visible:

- Test Name:** Albumin
- Code:** Alb
- Channel:** 13
- Cleaner:** Checked. Cleaner Solution: [dropdown], H2O: ☒. Before: ☐. After: ☒.
- Wavelength (nm):** Primary Wavelength: 600, Secondary Wavelength: 700.
- Blank:** Reagent Blank: ☒. Diluent: H2O.
- Analysis Sequence:** A table with 6 columns: Cycle, Reagent Needle, Volume (μL), Sample Needle, Volume (μL), and H2O Vol (μL). The first row is populated with Cycle 1, Reagent Needle R1, Volume 290.0, Sample Needle SAMPLE, Volume 2.0, and H2O Vol 10.0. The next three rows have Cycle 1 but the other fields are empty.
- Mixing Speed:** 70.

At the bottom right, there are three icons: a magnifying glass, a circular arrow, and a square with an 'X'.

Fig. 7-6: Analysis Parameters

▼ Cleaner

This part allows the user to configure the needle cleaning.

If a needle cleaning is required, the user is able to select either «Before» or «After» (see [Tab. 7-22: Cleaner](#), page 7-30). Moreover, a cleaning cycle with distilled water can be added.

Heading	Description	Format
Cleaner	If checked, enables: - the «Cleaner» part - the needle cleaning.	Check box
Cleaner Solution	Cleaner name.	Scrolling list
Before/After	- Before: the cleaning cycle is carried out before the analysis sequence sampling. - After: the cleaning cycle is carried out after R1 is dispensed.	Radio button
H ₂ O	If checked, a cleaning cycle with distilled water is added.	Check box

Tab. 7-22: Cleaner

If a needle cleaning is required, the cleaning cycles must be taken into account for the analysis sequence configuration. Moreover, if a sample pre-dilution is required, the cleaning cycles must be also taken into account for the incubation time configuration (see [Fig. 7-4: Analysis sequence example](#), page 7-15).

▼ Wavelength

Heading	Description	Format
Primary Wavelength	Wavelength used to measure the component absorbance.	Scrolling list From 340 to 700 nm.
Secondary Wavelength	Wavelength used to measure an absorbance due to a cuvette defect, a variation of lamp intensity or some sample interferences.	Scrolling list From 340 to 700 nm.

Tab. 7-23: Wavelength



Primary and secondary wavelengths must be different.

▼ Blank

Heading	Description	Format
Reagent Blank	If checked, a reagent blank is performed during the calibration (one reagent blank regardless of the number of calibration runs).	Check box
Diluent	Diluent used for the reagent blank.	Scrolling list.

Tab. 7–24: Blank



If the «Reagent Blank» box is unchecked, the «Checks» part of the «Calibration Parameters» tab is disabled (see [Checks](#), page 7-28).

▼ Analysis Sequence

An analysis sequence consists of up to four analysis lines. Each line is composed of six fields that are described in the following table:

Heading	Description	Format
Cycle	Sampling cycle number.	From 1 to 99.
Reagent Needle	Solution pipetted by the reagent needle.	Scrolling list
RN Volume	Volume pipetted by the reagent needle (μL).	From 15.0 to 600.0 μL.
Sample Needle	Solution pipetted by the sample needle.	Scrolling list
SN Volume	Volume pipetted by the sample needle (μL).	From 2.0 to 95.0 μL.
H ₂ O Volume	Distilled water volume pipetted by the sample needle (μL) to push the sample volume.	From 0.0 to 95.0 μL.

Tab. 7–25: Analysis Sequence fields

◆ Cycle

For the first analysis line, the cycle number is 1 and cannot be modified.

For the other analysis lines, the cycle numbers must be captured increasingly from the first line to the last one.

If sample pre-dilution and needle cleaning are required, the incubation time of the pre-diluted sample and the cleaning cycles must be taken into account for the analysis sequence configuration (see [Fig. 7–4: Analysis sequence example](#), page 7-15).

Moreover, if the needle cleaning required is carried out after R1 is dispensed (see [Cleaner](#), page 7-30), then the cycle of the analysis line following the R1 dispensing analysis line must be:

- ≥ the cycle of the R1 dispensing analysis line + 2 if one cleaning cycle is performed
- ≥ the cycle of the R1 dispensing analysis line + 3 if two cleaning cycles are performed.

◆ Needles

The scrolling lists display the solutions that can be pipetted by the respective needles. Depending on the number of reagents configured, R2 and R3 are displayed or not.

R1 must be pipetted in the analysis sequence.

R1, R2 or R3 can only be pipetted once in the analysis sequence.

A solution cannot be pipetted twice in the same analysis line.

For the first analysis line, the «Reagent needle» field cannot be empty.

On the other hand, if no sample is pipetted in the analysis sequence, the following parts must be disabled:

- Pre-dilution (see [Pre-dilution](#), page 7-15)
- Automatic Rerun (see [Automatic Rerun](#), page 7-17)
- Calibration pre-dilution (see [Calibration pre-dilution](#), page 7-26).

◆ Volumes

For the first analysis line, RN volume must be higher or equal to 95.0 µL.

For an analysis line, SN volume plus H₂O volume must not exceed 95.0 µL.

A sample step can be programmed at each analysis line. In this case, the total maximum sample volume is 4 x 95 µL = 380 µL.

If the Main direct dilution type is used for the calibration pre-dilution (see [Calibration pre-dilution](#), page 7-26), the addition of all sample volumes pipetted in the analysis sequence must be:

- ≤120 µL if the number of calibration runs equals to 1
- ≤60 µL if the number of calibration runs equals to 2
- ≤40 µL if the number of calibration runs equals to 3.

If the Main indirect dilution type is used for the calibration pre-dilution (see [Calibration pre-dilution](#), page 7-26), the addition of all sample volumes pipetted in the analysis sequence must be:

- ≤30 µL if the number of calibration runs equals to 1
- ≤15 µL if the number of calibration runs equals to 2
- ≤10 µL if the number of calibration runs equals to 3.

The addition of all volumes pipetted in the analysis sequence must be between 150.0 and 600.0 µL.

▼ Mixing Speed

Heading	Description	Format	Default value
Mixing Speed	Mixing speed of solutions into the cuvette.	From 1 to 100%.	40%

Tab. 7-26: Mixing Speed



HORIBA ABX recommends not to use mixing speeds lower than 40%.

2.2.4. Calculation Parameters

This chapter describes the «Calculation Parameters» tab in the following parts:

- ◆ [Correlation Factor](#), page 7-33
- ◆ [Reaction Direction](#), page 7-34
- ◆ [Sample Limit Check](#), page 7-34
- ◆ [Definition, Steps, Formula](#), page 7-34.

Fig. 7-7: Calculation Parameters

▼ Correlation Factor

This part corresponds to the manufacturer result correlation (see [Result correlation](#), page 8-45).

Heading	Description	Format	Default value
Slope	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from 0.00001 to 99.99999.	1
Intercept	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.	0

Tab. 7-27: Correlation factor

▼ Reaction Direction

Heading	Description	Format
Reaction Direction Check	If checked, enables the reaction direction check.	Check box
Reaction Direction	Expected reaction direction: Increase or Decrease.	Scrolling list

Tab. 7-28: Reaction Direction

The reaction direction is checked to ensure that it is the expected reaction direction. If not, an analytical flag is triggered.

▼ Sample Limit Check

Heading	Description	Format
Sample Limit Check	If checked, enables the sample limit check.	Check box
Sample Limit ($\Delta O.D.$)	Sample limit value.	Five decimal position number: from -3.00000 to 3.00000 $\Delta O.D.$
Sample Limit Cycle	Cycle number for measuring the sample limit value. This cycle number must be lower than the last reading cycle (see Definition , Steps , Formula , page 7-34).	From 1 to 99.

Tab. 7-29: Sample Limit Check

The sample limit value is used to determine the sample-specific absorbance. The reagent blank absorbance is subtracted from the sample absorbance, both measured at the defined cycle.

The calculated value is checked to ensure that it is not higher than the programmed sample limit value. If not, an analytical flag is triggered.

▼ Definition, Steps, Formula

These three parts allow the user to configure the reaction rate calculation.

The reaction can be divided in a maximum of four calculation steps (see [a – Steps](#), page 7-34). For each calculation step, the step rate is calculated as configured in the «Definition» part (see [b – Definition](#), page 7-35). Then, the reaction rate is calculated taking into account the different step rates by using the defined formula (see [c – Formula](#), page 7-36).

a – Steps

Up to four calculation steps can be used for the reaction rate calculation. The steps A, B, C and D are successively activated by checking the corresponding boxes.

b – Definition

The «Definition» part is divided into four tabs in order to configure each calculation step (Steps A, B, C and D). Click or press one of the tabs to access the different steps (see [Fig. 7-7: Calculation Parameters](#), page 7-33).

The parameters described in the following table are configurable for each calculation step.

Heading	Description	Format
Calculation Type	Calculation type: Endpoint, Kinetic or Kinsearch (see 3.1.2. Calculation types , page 8-30).	Scrolling list
First Reading	Cycle number corresponding to the first point used for calculation.	From 0 to 99.
Last Reading	Cycle number corresponding to the last point used for calculation.	From 1 to 99.
Reaction Limit Check	If checked, enables the reaction limit check. Disabled for Endpoint calculation type.	Check box
Reaction Limit Absorbance	Reaction limit value.	Five decimal position number: from -3.00000 to 3.00000 Δ 0.D.
Cycle	Cycle number for measuring the reaction limit value. This cycle number must be lower than the last reading one.	From 1 to 99.

Tab. 7-30: Definition

◆ First reading

In order to read correctly, the volume must be greater than 150 μ L.

- If the addition of volumes pipetted in the first analysis line is lower than 150 μ L, then the First reading must be ≥ 2 .
- If the addition of volumes pipetted in the first analysis line is greater than 150 μ L and the RN volume in the first analysis line is lower than 150 μ L, then the First reading must be ≥ 1 .
- If the RN volume is greater than 150 μ L in the first analysis line then the First reading could be 0. This means that the First reading happens after RN dispensing and before SN dispensing at the first analysis line.

◆ Last reading

The last reading should answer to the three following criteria:

- Last reading > First reading
- Last reading $\geq$ Last cycle of the analysis sequence
- For Kinetic and Kinsearch calculation types, Last reading - First reading ≥ 4 .

◆Reaction limit check

The reaction limit value is used to determine substrate depletion.

- For Kinetic calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first reading point.

- For Kinsearch calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first point within the linear range.

The calculated value is checked to ensure that it is not higher than the programmed reaction limit value.

If not, an analytical flag is triggered and an automatic rerun with post dilution is performed if configured (see [Automatic Rerun](#), page 7-17).

c – Formula

This part allows the user to define the formula used to calculate the reaction rate taking into account the different step rates.



The formula is mandatory if at least two calculation steps are configured.

The user can capture the formula using the proposed keys and the keyboard.

The following symbols can be used:

- ◆+, -, *, /, (,)

- ◆A, B, C, D

- ◆numerical characters from 0 to 9.

2.2.5. Unit Parameters

This chapter describes the «Unit Parameters» tab.

Fig. 7–8: Unit Parameters

For the applications provided by **HORIBA ABX** or your distributor, the reference unit and up to five other units are configured. These units are not modifiable by the user.

For the applications added by the user, the reference unit and only one other unit are programmable by the user.

Heading	Description	Format
Unit 1	Reference unit for the application.	Scrolling list
Conversion Factor 1	For the reference unit, the conversion factor is 1 and cannot be modified.	-
Unit 2 to 6	Other unit used for the application.	Scrolling list
Conversion Factor 2 to 6	Conversion factor between the reference unit and the selected unit. This multiplication factor is used to display the result in the desired unit.	From 10^{-6} to 10^7 .
Modified on	Modification date.	Depending on the date format chosen (see System Date and Time , page 7-87).

Tab. 7–31: Unit Parameters

Pentra 400

The units available on the **Pentra 400** system are listed in the following table:

Units			
Unit	g/dL	nkatal	mIU/mL
mol/L	mg/L	U/L	mval/L
mol/dL	mg/dL	U/dL	mEq/L
mmol/L	µg/L	mU/L	%
mmol/dL	µg/dL	mU/dL	s
µmol/L	ng/L	U/mL	kU/L
µmol/dL	ng/dL	mU/mL	kIU/L
nmol/L	mg/mL	IU/L	g/mol
nmol/dL	µg/mL	IU/dL	mg/g
pmol/L	ng/mL	IU/mL	ΔA
pmol/dL	pg/mL	mIU/L	ΔA/min
g/L	µkat/L	mIU/dL	Δ%

Tab. 7-32: Units

2.2.6. Addition mode

From the Applications list, the user adds an absorbance application by pressing the «Add new» button (see [Tab. 7-3: Applications list functions](#), page 7-10). The application capture screen opens in Addition mode. In this mode, the application capture screen opens with all fields blank.

Specify the application parameters on the five tabs of the application capture screen:

- ◆ [2.2.1. General Parameters](#), page 7-12
- ◆ [2.2.2. Calibration Parameters](#), page 7-21
- ◆ [2.2.3. Analysis Parameters](#), page 7-29
- ◆ [2.2.4. Calculation Parameters](#), page 7-33
- ◆ [2.2.5. Unit Parameters](#), page 7-37.

Then, press the «OK» button to validate the application.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the new application.
	Cancel	Cancellation of the new application.

Tab. 7-33: Addition mode contextual buttons

2.2.7. Duplicate function

From the Applications list, the user is able to duplicate an absorbance application by pressing the «Duplicate» button (see [Tab. 7-3: Applications list functions](#), page 7-10).

The application capture screen opens with parameters of the selected application except the fields «Test name», «Code» and «Channel» that are blank.

The application parameters can be modified on the five tabs. After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of the new application.
	Cancel	Cancellation of the new application.

Tab. 7-34: Contextual buttons

2.2.8. Display mode

From the Applications list, the user is able to visualize application parameters either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 7-3: Applications list functions](#), page 7-10). The application capture screen opens in Display mode. In this mode, the user cannot modify the application parameters. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of the application parameters (see Conditions of modification , page 7-40). The application capture screen turns to Edition mode (see 2.2.9. Edition mode , page 7-40).

Tab. 7-35: Edit button

◆ Conditions of modification

The application cannot be modified if tests associated to this application are ordered, pending, incomplete or for validation.

An application linked to ratios cannot be modified without deleting the ratio first.

2.2.9. Edition mode

From the Display mode, the user is able to modify the application parameters by pressing the «Edit» button (see [Tab. 7-35: Edit button](#), page 7-40).

After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 7-36: Edition mode contextual buttons

For the applications provided by **HORIBA ABX** or your distributor, only the following parameters are modifiable by the user:

- ◆ Enable (see [Application identification](#), page 7-13)
- ◆ Result (see [Result](#), page 7-16)
- ◆ Correlation (see [Correlation](#), page 7-16)
- ◆ Delta Check (see [Delta Check](#), page 7-18)
- ◆ Reference Range (see [Reference Range](#), page 7-19)
- ◆ Rerun range (see [Rerun range](#), page 7-20)
- ◆ Control Required (see [Control Required](#), page 7-25)
- ◆ «Back-up time frame without calibration required» check box (see [Validity Back-up](#), page 7-26).

For the applications added by the user:

In case a current calibration exists for the application, a message informs the user that the current calibration will be lost if a major modification is done i.e. if one of the following parameters is modified:

- ◆the «Test Name» and «Code» fields (see [Application identification](#), page 7-13)
- ◆the «Number of Reagents» field (see [Characteristics](#), page 7-14)
- ◆the «Pre-dilution» part (see [Pre-dilution](#), page 7-15)
- ◆the «Calibration» part (see [Calibration](#), page 7-22)
- ◆the «Calibration pre-dilution» part (see [Calibration pre-dilution](#), page 7-26)
- ◆the «Checks» part (see [Checks](#), page 7-28)
- ◆the «Analysis Parameters» tab (see [2.2.3. Analysis Parameters](#), page 7-29)
- ◆the «Calculation Parameters» tab except the «Sample Limit Check» and «Reaction Limit Check» parts (see [2.2.4. Calculation Parameters](#), page 7-33).

Some fields are not modifiable if the application is linked to calibrator target values:

- ◆the «Level» field (see [Calibration](#), page 7-22)
- ◆the «Calibration pre-dilution» part (see [Calibration pre-dilution](#), page 7-26).

Moreover, the «Sample Type» field (see [Characteristics](#), page 7-14) is not modifiable if the application is linked to profiles.

2.3. ISE applications

This section describes the ISE application screen, its different use modes and functions in the following chapters:

- ◆ [2.3.1. ISE application screen](#), page 7-42
- ◆ [2.3.2. Display mode](#), page 7-49
- ◆ [2.3.3. Edition mode](#), page 7-49.

2.3.1. ISE application screen

This chapter describes the ISE application screen in the following parts:

- ◆ [ISE application identification](#), page 7-43
- ◆ [Characteristics](#), page 7-43
- ◆ [Result](#), page 7-44
- ◆ [Correlation](#), page 7-44
- ◆ [Reference Range](#), page 7-45
- ◆ [Rerun range](#), page 7-46
- ◆ [Delta Check](#), page 7-47
- ◆ [Control Required](#), page 7-47
- ◆ [Linearity](#), page 7-48.

The screenshot displays the ISE application screen for the test 'CHLORIDE_SERUM'. The interface includes a top toolbar with navigation icons and a status bar showing 'Ready'. The main area is divided into several sections:

- Applications:** Tabs for Ratio, Profiles, and Incompatibility.
- Test Information:** Test Name (CHLORIDE_SERUM), Short Name (CL_S), Number (100), and a checked 'Enable' box.
- Reference Range (UNIT):** Fields for Man / Default, Woman, and Child, with checkboxes for Low Check and High Check.
- Rerun range (UNIT):** Similar fields and checkboxes for rerun ranges.
- Delta Check:** A section with a 'Delta Check Validity' field set to 365, and options for Absolute Variation and Relative Variation.
- Control required:** Checkboxes for Control 1, Control 2, and Control 3.
- Linearity (UNIT):** Fields for Low Limit and High Limit.
- Characteristics:** A 'Sample Type' dropdown menu set to 'Serum / Plasma'.
- Result:** Fields for Reference Unit (UNIT), Decimal Position (1), Manual Patient Validation (unchecked), Unit (UNIT), and Conversion Factor (1.000000).
- Correlation:** Fields for Slope (1.00000) and Intercept (0.00000).

Fig. 7-9: ISE application screen

▼ ISE application identification

This part groups fields that allows the user to identify the ISE application.

Heading	Description	Format
Test Name	Test name corresponding to the ISE application. The name must be unique.	15 characters max.
Short Name	ISE application short name. The short name must be unique.	5 characters max.
Number	ISE application channel number. The channel number must be unique.	3 numerical characters max. From 100 to 105.
Enable	If checked, the ISE application is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box
Release	ISE application version number.	4 numerical characters: nn.nn
Modified on	ISE application modification date and time.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 7-37: ISE application identification

▼ Characteristics

Heading	Description	Format
Sample Type	Serum/plasma, Urine or Other.	-

Tab. 7-38: Characteristics

▼ Result

Heading	Description	Format
Reference Unit	Reference unit for the ISE application.	Scrolling list
Unit	Unit used to display the results.	Scrolling list
Conversion Factor	Conversion factor between the reference unit and the selected unit. This multiplication factor is used to display the result in the desired unit.	From 10^{-6} to 10^7 .
Decimal Position	Decimal position used to display the results.	One numerical character: from 0 to 5.
Manual Patient Validation	If checked, all patient samples for this ISE application must be validated manually.	Check box

Tab. 7-39: Result

◆ Manual patient validation

- If checked, all patient samples for this ISE application must be validated manually.
- If unchecked, only patient samples that are not validated automatically must be validated manually. It then depends on the configuration of the patient sample validation (see [3.5. Results Validation](#), page 7-101).

▼ Correlation

This part allows the user to convert results in order to correlate them with an alternative method or another temperature (see [Result correlation](#), page 8-49).

Heading	Description	Format	Default value
Slope	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from 0.00001 to 99.99999.	1
Intercept	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.	0

Tab. 7-40: Correlation



The intercept is always expressed in the reference unit.

If an alternative unit is chosen to display results and when configuring an intercept, it is necessary to make the following calculation before programming the intercept:

$$B = b / F_U$$

- B is the intercept to be programmed in the application.
- b is the intercept to be applied to the final result.
- F_U is the unit conversion factor.

For example, in an application, the reference unit is g/L and an alternative unit is used: mmol/L.

1 g/L converts to 10 mmol/L, so in this example $F_U = 10$.

The user wishes to add an intercept of 20 mmol/L to all results.

In this case, $B = b / F_U = 20 / 10 = 2$. So, 2 is to be programmed in the intercept field.

▼ Reference Range

Heading	Description	Format
Low Check	If checked, enables the low reference value check.	Check box
Man/Default	Low limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman reference range.	
Child (< 12 years)	Low limit value of the Child reference range.	
High Check	If checked, enables the high reference value check.	Check box
Man/Default	High limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman reference range.	
Child (< 12 years)	High limit value of the Child reference range.	

Tab. 7–41: Reference Range

◆ Low reference value check

The sample result is checked to ensure that it is not lower than the low limit value of the reference range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default reference range must be programmed.

◆ High reference value check

The sample result is checked to ensure that it is not higher than the high limit value of the reference range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default reference range must be programmed.

▼ Rerun range

Heading	Description	Format
Low Check	If checked, enables the low critical value check.	Check box
Man/Default	Low limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman critical range.	
Child (< 12 years)	Low limit value of the Child critical range.	
High Check	If checked, enables the high critical value check.	Check box
Man/Default	High limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman critical range.	
Child (< 12 years)	High limit value of the Child critical range.	

Tab. 7-42: Rerun range

◆ Low critical value check

The sample result is checked to ensure that it is not lower than the low limit value of the critical range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default critical range must be programmed.

◆ High critical value check

The sample result is checked to ensure that it is not higher than the high limit value of the critical range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default critical range must be programmed.

▼ Delta Check

Heading	Description	Format
Delta Check	If checked, enables the delta check.	Check box
Delta Check Validity	Time in days which determines if the delta check must be performed.	From 0 to 999 days.
Absolute Variation	Authorized absolute variation expressed in the unit chosen to display the result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Relative Variation	Authorized relative variation (%).	From 0.01 to 99.99%.

Tab. 7-43: Delta Check

The delta check consists in checking the variation between the current result and the previous result to ensure that it is not higher than the authorized absolute and/or relative variations.

If not, the delta check flag is triggered.

The delta check is performed only if:

$$\text{Run date of the current result} - \text{Run date of the previous result} \leq \text{Delta Check Validity}$$



The previous result is a result for the test for the same patient but for a different sample, previously run and validated.

▼ Control Required

Heading	Description	Format
Control Required	If checked, a default control is required to validate the calibration. Up to three default controls can be configured.	Check box
Control 1	If checked, the first default control is required to validate the calibration.	Check box
Control Used 1	Name of the first control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.
Control 2	If checked, the second default control is required to validate the calibration.	Check box
Control Used 2	Name of the second control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.

Tab. 7-44: Control Required

Heading	Description	Format
Control 3	If checked, the third default control is required to validate the calibration.	Check box
Control Used 3	Name of the third control used. Displayed when configured through control configuration (see 2. Control , page 5-20).	20 characters max.

Tab. 7-44: Control Required

If the «Control Required» box is checked, the required default controls (Controls 1, 2 and 3) must be configured for this test through control configuration (see [2.3.2. «Target Values Entry» screen](#), page 5-27).

Ordered sample tests are not carried out until the default controls are validated.

In order to uncheck the required default controls (Controls 1, 2 and 3), the user must previously inactivate the default controls for this test through control configuration (see [2.3.2. «Target Values Entry» screen](#), page 5-27).

▼ Linearity

Heading	Description	Format
Linearity	If checked, enables the linearity range check.	Check box
Low Limit	Low limit value of the linearity range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
High Limit	High limit value of the linearity range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.

Tab. 7-45: Linearity

◆ Linearity range check

The sample result is checked to see that it is in the programmed linearity range (see [Tab. 7-45: Linearity](#), page 7-48).

If not, an analytical flag is triggered.

2.3.2. Display mode

From the Applications list, the user is able to visualize ISE application parameters either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 7-3: Applications list functions](#), page 7-10). The ISE application screen opens in Display mode. In this mode, the user cannot modify the ISE application parameters. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of the ISE application parameters (see Conditions of modification , page 7-49). The ISE application screen turns to Edition mode (see 2.3.3. Edition mode , page 7-49).

Tab. 7-46: Edit button

◆ Conditions of modification

The ISE application cannot be modified if tests associated to this application are ordered, pending, incomplete or for validation.

2.3.3. Edition mode

From the Display mode, the user is able to modify the ISE application parameters by pressing the «Edit» button (see [Tab. 7-46: Edit button](#), page 7-49).

After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 7-47: Edition mode contextual buttons



Only the following parameters are modifiable by the user:

- ◆ Enable (see [ISE application identification](#), page 7-43)
- ◆ Result (see [Result](#), page 7-44)
- ◆ Correlation (see [Correlation](#), page 7-44)
- ◆ Reference Range (see [Reference Range](#), page 7-45)
- ◆ Rerun range (see [Rerun range](#), page 7-46)
- ◆ Delta Check (see [Delta Check](#), page 7-47)
- ◆ Control Required (see [Control Required](#), page 7-47).

2.4. Application order

From the Applications list, the user is able to modify the application order by pressing the «Application order» button (see [Tab. 7-3: Applications list functions](#), page 7-10). The application order screen is then displayed.

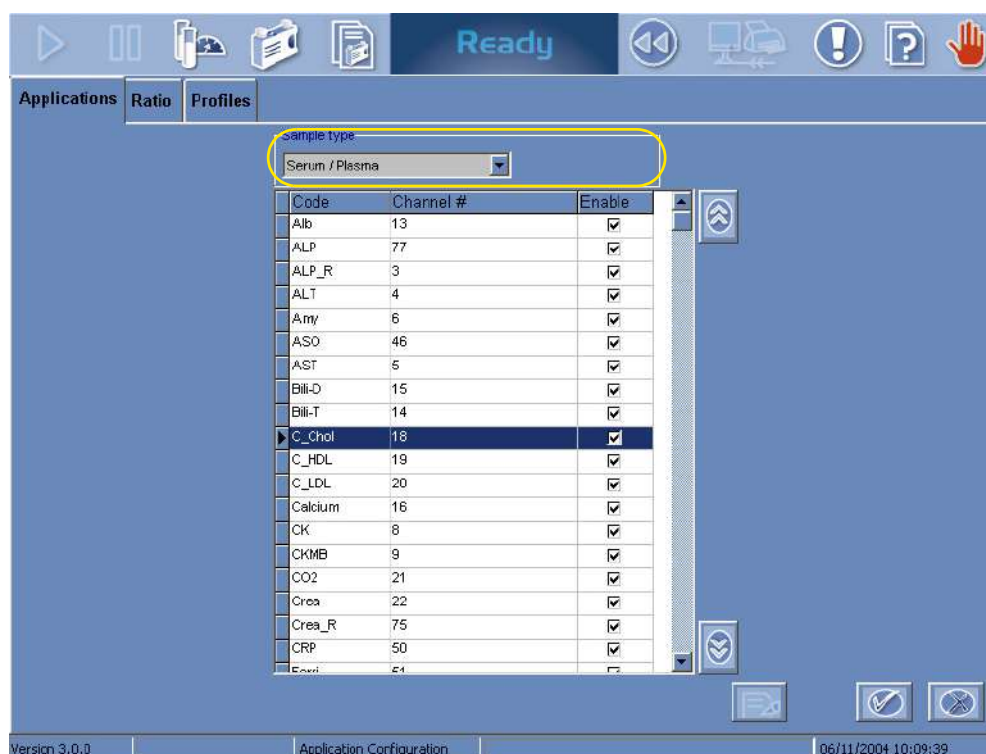


Fig. 7-10: Application order screen

The application order screen displays the applications configured on the instrument in a specific order. This order is then used to display the tests on the patient request capture screen in the Worklist (see [2.2.5. Request capture screen](#), page 2-14), display the results on the patient result validation screen (see [3.2.2. Result validation screen](#), page 2-36) and print the patient results.

The user is able to display the applications according to their sample type by using the «Sample type» scrolling list (see [Fig. 7-10: Application order screen](#), page 7-50).

- Serum/plasma: only the applications for the serum/plasma sample type are displayed on the application order screen.
- Urine: only the applications for the urine sample type are displayed on the application order screen.
- Other: only the applications for the other sample type are displayed on the application order screen.

Columns of the application order screen are described in the following table:

Heading	Description	Format
Code	Application short name.	7 characters max.
Channel #	Application channel number.	3 numerical characters max.
Enable	If checked, the application is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box

Tab. 7–48: Application order screen description

The application order screen functions are defined in the following table:

Heading/Key	Name	Function
	Edit	Modification of the application order.
	Up	Increases the selected application.
	Down	Decreases the selected application.
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 7–49: Application order screen functions

In order to modify the application order, select a sample type by using the «Sample type» scrolling list (see [Fig. 7–10: Application order screen](#), page 7-50).

Press the «Edit» button (see [Tab. 7–49: Application order screen functions](#), page 7-51).

Modify the application order by selecting the applications and pressing the «Up» and/or «Down» buttons (see [Tab. 7–49: Application order screen functions](#), page 7-51).

Press the «OK» button to validate the new application order.



When an application is added on the instrument, this one takes the last place in the application order.

2.5. Update function

The applications provided by **HORIBA ABX** are maintained and updated by **HORIBA ABX** with a floppy or CD-Rom.

A revision number is allocated to the update floppy or CD-Rom.

Moreover, a version number is assigned to each application.

Version numbers are composed of two indices: 2.03 for example. The first and the second indices are respectively called major and minor indices. These indices are assigned by **HORIBA ABX** depending on the application modifications.

Two update types are applied: major updates and minor updates.

- ◆ Major update

Updating this application requires to perform a new calibration. The previous calibrator configuration and target values are lost for this test.

- ◆ Minor update

The changes in the parameters do not require to recalibrate the application. The current calibration is kept in memory.



Once configured, the following parameters are never affected by an update:

- ◆ Enable
- ◆ Result
- ◆ Correlation
- ◆ Delta Check
- ◆ Reference Range
- ◆ Rerun range
- ◆ Control Required
- ◆ «Back-up time frame without calibration required» check box (see [Validity Back-up](#), page 7-26).

From the Applications list, the user is able to update the applications provided by **HORIBA ABX** by pressing the «Update» button (see [Tab. 7-3: Applications list functions](#), page 7-10).



The «Update» button is disabled if tests are ordered, pending, incomplete or for validation.

The following window is displayed:



Fig. 7-11: Floppy/CD-Rom

Select floppy or CD-Rom by using the corresponding radio button and press the «OK» button.

The update screen is then displayed.

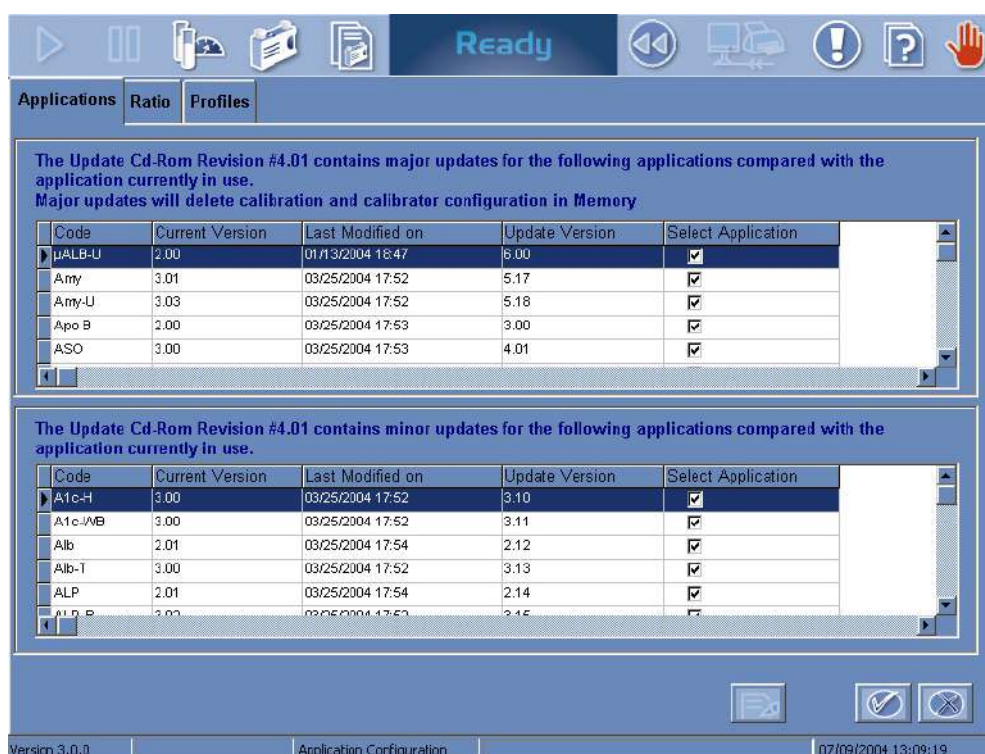


Fig. 7-12: Update screen

This screen shows two tables:

- one for the major updates
- the other for the minor updates.

Columns of the update screen are described in the following table:

Heading	Description	Format
Code	Application short name.	7 characters max.
Current Version	Version number of the current application.	4 numerical characters: nn.nn
Last Modified on	Application modification date.	Depending on the date format chosen (see System Date and Time , page 7-87).
Update Version	Version number of the update application.	4 numerical characters: nn.nn
Select Application	If checked, the application will be updated.	Check box

Tab. 7-50: Update screen description

The update screen functions are defined in the following table:

Heading/Key	Name	Function
	Edit	Screen access.
	OK	Updates the selected applications.
	Cancel	Cancels the update.

Tab. 7-51: Update screen functions

In order to update applications, press the «Edit» button (see [Tab. 7-51: Update screen functions](#), page 7-54).

By default, all applications are selected and then will be updated. If necessary, some applications can be unselected by using the corresponding «Select Application» check boxes.



The reagents, configured on the instrument by **HORIBA ABX**, are automatically updated when the applications are updated.
If a selected application uses a reagent which configuration is modified, then all applications using this reagent are selected.

An application linked to ratios cannot be updated. To update the application, the user must delete the ratio.

When an application is linked to profiles, the «Sample Type» field is not modifiable. So, an application with modification of the «Sample Type» field cannot be updated if it is linked to profiles.

The incompatibilities, configured by **HORIBA ABX**, are automatically updated when the applications are updated.

Press the «OK» button to update the selected applications.

Once the update is finished, a window informs the user that the restore is completed.



When the update media is a CD-Rom, the notices corresponding to the updated applications are also present on the CD-Rom on pdf format. If you choose to update at least one application, all pdf files present on the CD-Rom will be updated.

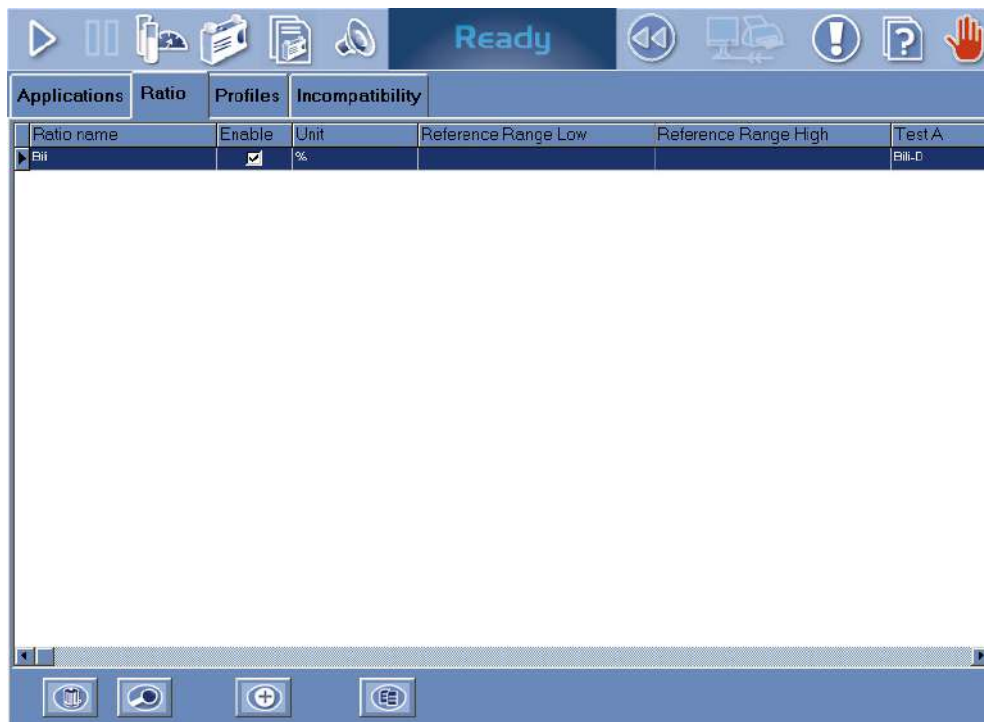
2.6. Ratio

The «Ratio» tab opens on the list of ratios configured on the instrument (see [2.6.1. Ratios list](#), page 7-55). Ratios are configured on the **Pentra 400** from the ratio capture screen, described in the following chapters:

- ◆ [2.6.2. Description of the ratio capture screen](#), page 7-57
- ◆ [2.6.3. Addition mode](#), page 7-62
- ◆ [2.6.4. Duplicate function](#), page 7-63
- ◆ [2.6.5. Display mode](#), page 7-64
- ◆ [2.6.6. Edition mode](#), page 7-64.

2.6.1. Ratios list

The Ratios list groups the ratios configured on the instrument.



Ratio name	Enable	Unit	Reference Range Low	Reference Range High	Test A
Eni	☒	%			Eni-D

Fig. 7-13: Ratios list

Columns of the Ratios list are described in the following table:

Heading	Description	Format
Ratio name	Ratio name.	7 characters max.
Enable	If checked, the ratio is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box
Unit	Unit used to display the results.	10 characters max.
Reference Range Low	Low limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Reference Range High	High limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Test A to D	Tests used in the ratio.	-

Tab. 7-52: Ratios list description

▼ Ratios list functions

From the Ratios list, the user is able to:

- add, duplicate or delete ratios
- display and modify ratio parameters.

Heading/Key	Name	Function
	Add new	Addition of a ratio. Opens the ratio capture screen in Addition mode (see 2.6.3. Addition mode , page 7-62).
	Duplicate	Duplication of a ratio (see 2.6.4. Duplicate function , page 7-63).
	Delete	Deletion of the selected ratio. Disabled if tests associated to this ratio are ordered, pending, incomplete or for validation.
	Details	Displays parameters of the selected ratio. Opens the ratio capture screen in Display mode (see 2.6.5. Display mode , page 7-64). Function also accessible by double-clicking an item.

Tab. 7-53: Ratios list functions

2.6.2. Description of the ratio capture screen

The ratio capture screen allows the user to configure ratios using the following parts:

- ◆ [Definition](#), page 7-58
- ◆ [Result](#), page 7-58
- ◆ [Formula](#), page 7-59
- ◆ [Reference Range](#), page 7-59
- ◆ [Rerun range](#), page 7-60
- ◆ [Delta Check](#), page 7-61.

The screenshot shows the 'Ratio' tab in the application configuration software. The interface includes a toolbar at the top with various icons and a status bar showing 'Ready'. The main area is divided into several sections:

- Definition:** Contains fields for 'Ratio name' (Bilirub), 'Ratio' (1000), and 'Sample Type' (Serum / Plasma). There are also checkboxes for 'Test A', 'Test B', 'Test C', and 'Test D', each with a corresponding dropdown menu.
- Formula:** A calculator interface with buttons for variables (A, B, C, D), mathematical operators (+, -, *, /), and parentheses. The formula entered is $(A/B) * 100$.
- Result:** Includes fields for 'Reference Unit' (µmol/L), 'Decimal Number' (1), 'Unit' (%), and 'Conversion Factor' (1.000000).
- Reference Range (%):** Features checkboxes for 'Low Check' and 'High Check', and input fields for 'Main / Default', 'Woman', and 'Child'.
- Rerun range (%):** Similar to the Reference Range section, with checkboxes for 'Low Check' and 'High Check', and input fields for 'Main / Default', 'Woman', and 'Child'.
- Delta Check:** Includes a checkbox for 'Delta Check', a 'Delta Check Validity' field (365), and input fields for 'Absolute Variation' and 'Relative Variation'.

Fig. 7-14: Ratio capture screen

▼ Definition

Heading	Description	Format
Ratio name	Ratio name. The name must be unique.	7 characters max.
Ratio	Ratio number. The number must be unique.	4 numerical characters. From 1000 to 1200.
Enable	If checked, the ratio is enabled and then selectable in the request capture screen (see 2.2.5. Request capture screen , page 2-14).	Check box
Sample Type	Serum/plasma, Urine or Other.	Scrolling list
Test A to D	If checked: - the test scrolling list is enabled - a test must be selected.	Check box
Test A to D	Test selection.	Scrolling list

Tab. 7-54: Definition

◆ Ratio name

The ratio name must be unique. Moreover, it must be different from the test names and application short names configured on the instrument.

◆ Enable

The ratio is disabled when an application linked to this ratio is disabled.

◆ Sample Type

The applications linked to a ratio must have the same sample type configured. So, after the sample type selection, the test scrolling lists are automatically updated.

▼ Result

Heading	Description	Format
Reference Unit	Reference unit for the ratio.	Scrolling list
Unit	Unit used to display the results.	Scrolling list
Conversion Factor	Conversion factor between the reference unit and the selected unit. This multiplication factor is used to display the result in the desired unit.	From 10^{-6} to 10^7 .
Decimal Number	Decimal position used to display the results.	One numerical character: from 0 to 5.

Tab. 7-55: Result

▼ Formula

This part allows the user to capture the formula using the proposed keys and the keyboard.

The following symbols can be used:

- ◆ +, -, *, /, (,)
- ◆ A, B, C, D
- ◆ numerical characters from 0 to 9.

▼ Reference Range

Heading	Description	Format
Low Check	If checked, enables the low reference value check.	Check box
Man/Default	Low limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman reference range.	
Child (< 12 years)	Low limit value of the Child reference range.	
High Check	If checked, enables the high reference value check.	Check box
Man/Default	High limit value of the Man/default reference range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman reference range.	
Child (< 12 years)	High limit value of the Child reference range.	

Tab. 7–56: Reference Range

◆ Low reference value check

The sample result is checked to ensure that it is not lower than the low limit value of the reference range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default reference range must be programmed.

◆ High reference value check

The sample result is checked to ensure that it is not higher than the high limit value of the reference range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default reference range must be programmed.

▼ Rerun range

Heading	Description	Format
Low Check	If checked, enables the low critical value check.	Check box
Man/Default	Low limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	Low limit value of the Woman critical range.	
Child (< 12 years)	Low limit value of the Child critical range.	
High Check	If checked, enables the high critical value check.	Check box
Man/Default	High limit value of the Man/default critical range.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Woman	High limit value of the Woman critical range.	
Child (< 12 years)	High limit value of the Child critical range.	

Tab. 7-57: Rerun range

◆ Low critical value check

The sample result is checked to ensure that it is not lower than the low limit value of the critical range.

If not, an analytical flag is triggered.



If the «Low Check» box is checked, at least the low limit value of the Man/default critical range must be programmed.

◆ High critical value check

The sample result is checked to ensure that it is not higher than the high limit value of the critical range.

If not, an analytical flag is triggered.



If the «High Check» box is checked, at least the high limit value of the Man/default critical range must be programmed.

▼ Delta Check

Heading	Description	Format
Delta Check	If checked, enables the delta check.	Check box
Delta Check Validity	Time in days which determines if the delta check must be performed.	From 0 to 999 days.
Absolute Variation	Authorized absolute variation expressed in the unit chosen to display the result.	6 numerical characters max. + decimal position configured (see Result , page 7-16) with 7 significant digits max.
Relative Variation	Authorized relative variation (%).	From 0.01 to 99.99%.

Tab. 7–58: Delta Check

The delta check consists in checking the variation between the current result and the previous result to ensure that it is not higher than the authorized absolute and/or relative variations.

If not, the delta check flag is triggered.

The delta check is performed only if:

$$\text{Run date of the current result} - \text{Run date of the previous result} \leq \text{Delta Check Validity}$$



The previous result is a result for the test for the same patient but for a different sample, previously run and validated.

2.6.3. Addition mode

From the Ratios list, the user adds a ratio by pressing the «Add new» button (see [Tab. 7-53: Ratios list functions](#), page 7-56). The ratio capture screen opens in Addition mode. In this mode, the ratio capture screen opens with all fields blank.

Specify the ratio parameters using the following parts:

- ◆ [Definition](#), page 7-58
- ◆ [Result](#), page 7-58
- ◆ [Formula](#), page 7-59
- ◆ [Reference Range](#), page 7-59
- ◆ [Rerun range](#), page 7-60
- ◆ [Delta Check](#), page 7-61.

Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the new ratio.
	Cancel	Cancellation of the new ratio.
	Erase	Erases the formula.

Tab. 7-59: Addition mode contextual buttons



When validating a ratio, a check is performed on the cycles involved in pre-dilutions on all the applications linked to that ratio. If the pre-dilution cycles are incompatible (see [Fig. 7-4: Analysis sequence example](#), page 7-15), a message informs the user.

2.6.4. Duplicate function

From the Ratios list, the user is able to duplicate a ratio by pressing the «Duplicate» button (see [Tab. 7-53: Ratios list functions](#), page 7-56).

The ratio capture screen opens with parameters of the selected ratio except the fields «Ratio name» and «Ratio» that are blank.

The ratio parameters can be modified. After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of the new ratio.
	Cancel	Cancellation of the new ratio.
	Erase	Erases the formula.

Tab. 7-60: Contextual buttons



When validating a ratio, a check is performed on the cycles involved in pre-dilutions on all the applications linked to that ratio. If the pre-dilution cycles are incompatible (see [Fig. 7-4: Analysis sequence example](#), page 7-15), a message informs the user.

2.6.5. Display mode

From the Ratios list, the user is able to visualize ratio parameters either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 7-53: Ratios list functions](#), page 7-56). The ratio capture screen opens in Display mode. In this mode, the user cannot modify the ratio parameters. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of the ratio parameters. The ratio capture screen turns to Edition mode (see 2.6.6. Edition mode , page 7-64). Disabled if tests associated to this ratio are ordered, pending, incomplete or for validation.

Tab. 7-61: Edit button

2.6.6. Edition mode

From the Display mode, the user is able to modify the ratio parameters by pressing the «Edit» button (see [Tab. 7-61: Edit button](#), page 7-64).

After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.
	Erase	Erases the formula.

Tab. 7-62: Edition mode contextual buttons



Some fields are not modifiable if the ratio exists in the «Worklist», «Result Validation» or «Archives» menus:

- ◆ the «Sample Type» field
 - ◆ the «Test A to D» fields
- (see [Definition](#), page 7-58).

When validating a ratio, a check is performed on the cycles involved in pre-dilutions on all the applications linked to that ratio. If the pre-dilution cycles are incompatible (see [Fig. 7-4: Analysis sequence example](#), page 7-15), a message informs the user.

2.7. Profiles

The «Profiles» tab opens on the list of profiles configured on the instrument (see [2.7.1. Profiles list](#), page 7-65). Profiles are configured on the **Pentra 400** from the profile capture screen, described in the following chapters:

- ◆ [2.7.2. Description of the profile capture screen](#), page 7-67
- ◆ [2.7.3. Addition mode](#), page 7-68
- ◆ [2.7.4. Display mode](#), page 7-68
- ◆ [2.7.5. Edition mode](#), page 7-69.

2.7.1. Profiles list

The Profiles list groups the profiles configured on the instrument.

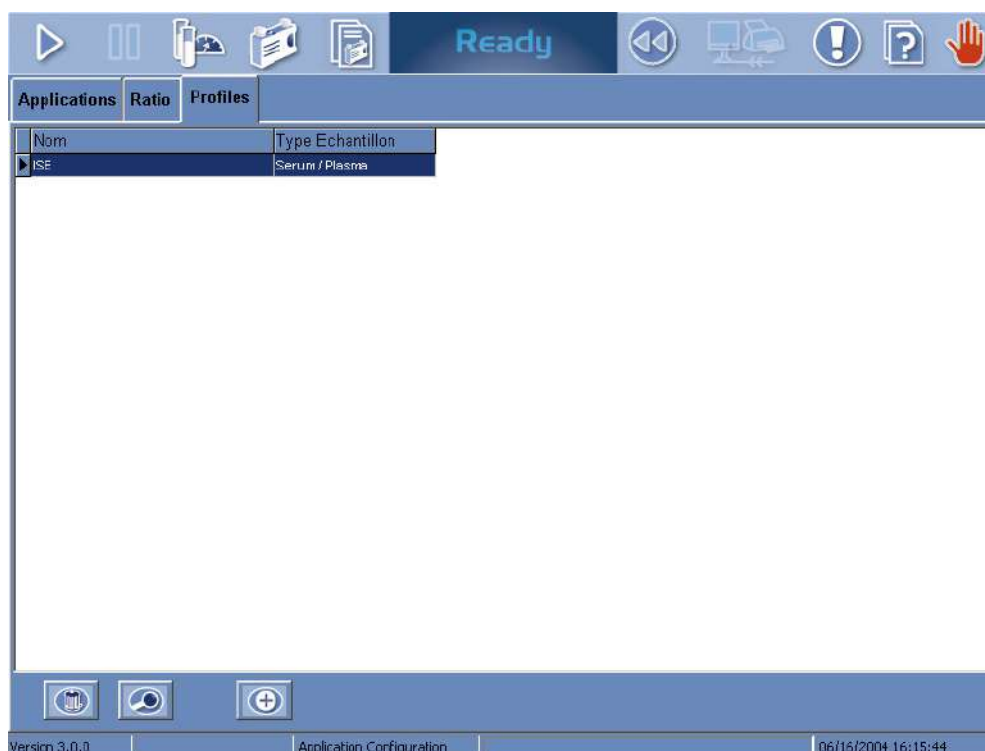


Fig. 7-15: Profiles list

Columns of the Profiles list are described in the following table:

Heading	Description	Format
Profile Name	Profile name.	15 characters max.
Sample Type	Serum/plasma, Urine or Other.	-

Tab. 7-63: Profiles list description

▼ Profiles list functions

From the Profiles list, the user is able to:

- add or delete profiles
- display and modify profile parameters.

Heading/Key	Name	Function
	Add new	Addition of a profile. Opens the profile capture screen in Addition mode (see 2.7.3. Addition mode , page 7-68).
	Delete	Deletion of the selected profile.
	Details	Displays parameters of the selected profile. Opens the profile capture screen in Display mode (see 2.7.4. Display mode , page 7-68). Function also accessible by double-clicking an item.

Tab. 7-64: Profiles list functions

2.7.2. Description of the profile capture screen

The profile capture screen allows the user to configure profiles using the two following parts:

- ◆ [Profile name and sample type](#), page 7-67
- ◆ [Test selection](#), page 7-67.

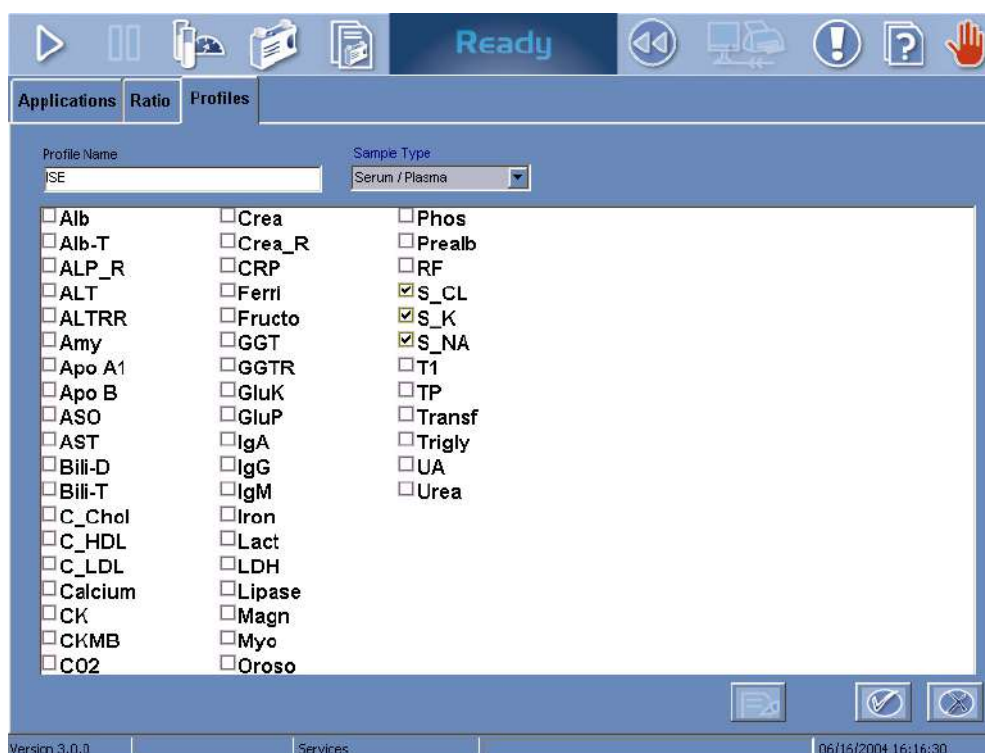


Fig. 7-16: Profile capture screen

▼ Profile name and sample type

Heading	Description	Format
Profile Name	Profile name. The name must be unique.	15 characters max.
Sample Type	Serum/plasma, Urine or Other.	Scrolling list

Tab. 7-65: Profile name and sample type

◆ Sample Type

The tests included in a profile must have the same sample type configured. So, after the sample type selection, the tests displayed in the test selection part are automatically updated.

▼ Test selection

The test selection part displays the tests according to the selected sample type.

Test names are displayed with associated check boxes. Tests are included in a profile by checking the corresponding boxes.

2.7.3. Addition mode

From the Profiles list, the user adds a profile by pressing the «Add new» button (see [Tab. 7-64: Profiles list functions](#), page 7-66). The profile capture screen opens in Addition mode.

To create the profile, fill the «Profile Name» field.

Then, select the sample type by using the corresponding scrolling list.

Select the tests to be included in the profile by checking the corresponding boxes.

Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the new profile.
	Cancel	Cancellation of the new profile.

Tab. 7-66: Addition mode contextual buttons

2.7.4. Display mode

From the Profiles list, the user is able to visualize profile parameters either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 7-64: Profiles list functions](#), page 7-66). The profile capture screen opens in Display mode. In this mode, the user cannot modify the profile parameters. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of the profile parameters. The profile capture screen turns to Edition mode (see 2.7.5. Edition mode , page 7-69).

Tab. 7-67: Edit button

2.7.5. Edition mode

From the Display mode, the user is able to modify the profile parameters by pressing the «Edit» button (see [Tab. 7–61: Edit button](#), page 7-64).

After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 7–68: Edition mode contextual buttons



The «Sample Type» field is not modifiable.

2.8. Incompatibility

The «Incompatibility» tab opens on the list of incompatibilities (i.e. incompatible test samplings) configured on the instrument (see [2.8.1. Incompatibility list](#), page 7-71).

Test samplings are said incompatible when they can pose contamination problems if they are performed one after the other.

If incompatibilities are configured on the instrument, the **Pentra 400** organizes test samplings in order not to perform incompatible test samplings one after the other.

In case of incompatibility, a sampling is inserted between the two incompatible test samplings. This inserted sampling can be, by order of priority:

- a compatible test sampling
- a cleaning.



In case the cleaning cannot be performed:

- 1- The second incompatible test sampling is not carried out and the corresponding sampling alarm will be triggered.
- 2- If the tests of the two incompatible test samplings are already in process, the second test will be flagged with I (see [3.3.5. Quality flags](#), page 9-74).

Incompatibilities are configured on the **Pentra 400** from the incompatibility capture screen described in the following chapters:

- ◆ [2.8.2. Description of the incompatibility capture screen](#), page 7-73
- ◆ [2.8.3. Addition mode](#), page 7-75
- ◆ [2.8.4. Display mode](#), page 7-75
- ◆ [2.8.5. Edition mode](#), page 7-76.

Incompatibilities are either configured by **HORIBA ABX** or added by the user. The incompatibilities configured by **HORIBA ABX** are maintained and updated at the same time as the applications by **HORIBA ABX** with a floppy or CD-Rom (see [2.5. Update function](#), page 7-52).

2.8.1. Incompatibility list

The Incompatibility list groups the incompatibilities (i.e. incompatible test samplings) configured on the instrument.

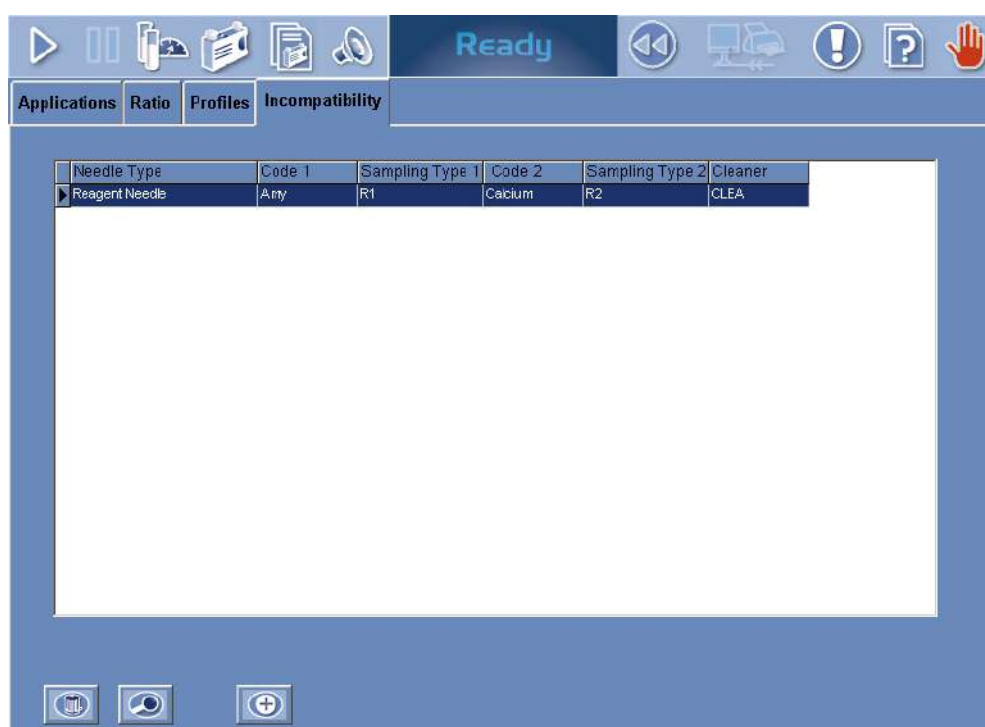


Fig. 7-17: Incompatibility list

Columns of the Incompatibility list are described in the following table:

Heading	Description	Format
Needle Type	Needle that performs the two incompatible test samplings: Reagent Needle or Sample Needle.	-
Code 1	First incompatible test sampling: application code.	7 characters max.
Sampling Type 1	First incompatible test sampling: solution pipetted.	-
Code 2	Second incompatible test sampling: application code.	7 characters max.
Sampling Type 2	Second incompatible test sampling: solution pipetted.	-
Cleaner	Cleaner short name.	7 characters max.

Tab. 7-69: Incompatibility list description



If an incompatibility is inactive, then the corresponding line in the Incompatibility list is red.

▼ Incompatibility list functions

From the Incompatibility list, the user is able to:

- add or delete incompatibilities
- display and modify incompatibility parameters.

Heading/Key	Name	Function
	Add new	Addition of an incompatibility. Opens the incompatibility capture screen in Addition mode (see 2.8.3. Addition mode , page 7-75).
	Delete	Deletion of the selected incompatibility. Disabled for the incompatibilities configured by HORIBA ABX.
	Details	Displays parameters of the selected incompatibility. Opens the incompatibility capture screen in Display mode (see 2.8.4. Display mode , page 7-75). Function also accessible by double-clicking an item.

Tab. 7-70: Incompatibility list functions

2.8.2. Description of the incompatibility capture screen

The incompatibility capture screen allows the user to configure incompatibilities using the following parameters:

- ◆ [Active and Needle Type](#), page 7-73
- ◆ [First Sequence Incompatibility](#), page 7-74
- ◆ [Following Sequence Incompatibility](#), page 7-74
- ◆ [Cleaner](#), page 7-74.

Fig. 7-18: Incompatibility capture screen

▼ Active and Needle Type

Heading	Description	Format
Active	If checked, the incompatibility is active.	Check box
Needle Type	Needle that performs the two incompatible test samplings: Reagent Needle or Sample Needle.	Scrolling list

Tab. 7-71: Active and Needle Type

▼ First Sequence Incompatibility

This part allows the user to define the first incompatible test sampling by the application code and the solution pipetted.

Heading	Description	Format
Abbreviation	Application code (or short name).	Scrolling list
Sampling	Solution pipetted.	Scrolling list

Tab. 7-72: First Sequence Incompatibility

After the application code selection, the «Sampling» scrolling list is updated and displays the solutions pipetted by the selected needle for the selected application.

▼ Following Sequence Incompatibility

This part allows the user to define the second incompatible test sampling by the application code and the solution pipetted.

Heading	Description	Format
Abbreviation	Application code (or short name).	Scrolling list
Sampling	Solution pipetted.	Scrolling list

Tab. 7-73: Following Sequence Incompatibility

After the application code selection, the «Sampling» scrolling list is updated and displays the solutions pipetted by the selected needle for the selected application.



An incompatibility is defined by:

- ◆ its first incompatible test sampling (application code + solution pipetted)
- ◆ its second incompatible test sampling (application code + solution pipetted).

- 1- The two applications that define an incompatibility must be different.
- 2- The two applications that define an incompatibility must not be linked to the same ratio.
- 3- Two ISE applications for the same sample type cannot define an incompatibility.
- 4- An incompatibility must be unique.

▼ Cleaner

Sometimes, a cleaning is inserted between the two incompatible test samplings. This part is used to configure the cleaner.

Heading	Description	Format
Cleaner	Cleaner short name.	Scrolling list

Tab. 7-74: Cleaner

2.8.3. Addition mode

From the Incompatibility list, the user adds an incompatibility by pressing the «Add new» button (see [Tab. 7–70: Incompatibility list functions](#), page 7-72). The incompatibility capture screen opens in Addition mode. In this mode, the incompatibility capture screen opens with all fields blank.

Specify the incompatibility parameters using the following parts:

- ◆ [Active and Needle Type](#), page 7-73
- ◆ [First Sequence Incompatibility](#), page 7-74
- ◆ [Following Sequence Incompatibility](#), page 7-74
- ◆ [Cleaner](#), page 7-74.

Then, press the «OK» button to validate.

The Addition mode contextual buttons are defined in the following table:

Heading/Key	Name	Function
	OK	Validation of the new incompatibility.
	Cancel	Cancellation of the new incompatibility.

Tab. 7–75: Addition mode contextual buttons

2.8.4. Display mode

From the Incompatibility list, the user is able to visualize incompatibility parameters either by selecting the corresponding item and pressing the «Details» button or by double-clicking the corresponding item (see [Tab. 7–70: Incompatibility list functions](#), page 7-72). The incompatibility capture screen opens in Display mode. In this mode, the user cannot modify the incompatibility parameters. Press the «Edit» button to access modification function.

Heading/Key	Name	Function
	Edit	Modification of the incompatibility parameters. The incompatibility capture screen turns to Edition mode (see 2.8.5. Edition mode , page 7-76). Disabled for the incompatibilities configured by HORIBA ABX.

Tab. 7–76: Edit button

2.8.5. Edition mode

From the Display mode, the user is able to modify the incompatibility parameters by pressing the «Edit» button (see [Tab. 7-76: Edit button](#), page 7-75).

After modification of one or several parameters, press the «OK» button to validate.

Heading/Key	Name	Function
	OK	Validation of modifications.
	Cancel	Cancellation of modifications.

Tab. 7-77: Edition mode contextual buttons

3. System Configuration

▼ Access to the «System Configuration» menu

Press the «System Configuration» button from the «Services» menu.

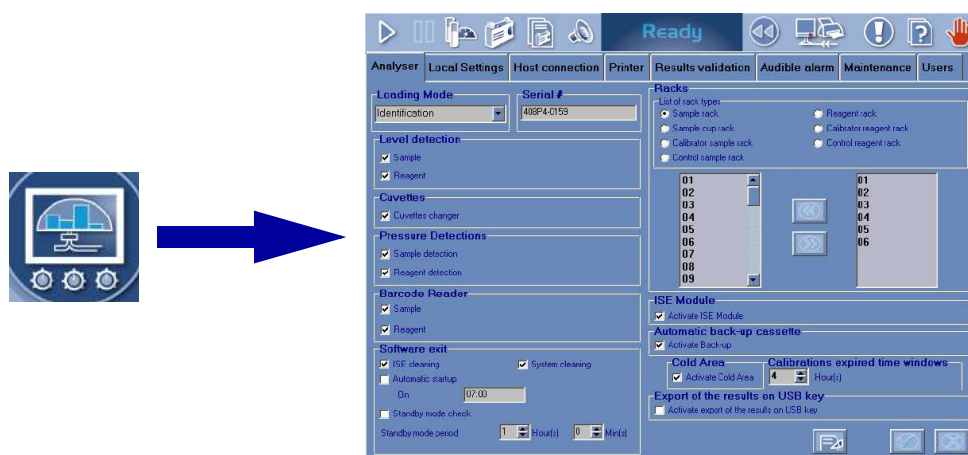


Fig. 7-19: «System Configuration» menu access button

The «System Configuration» menu groups eight tabs:

- ◆ 3.1. [Analyser](#), page 7-78
- ◆ 3.2. [Local Settings](#), page 7-86
- ◆ 3.3. [Host Connection](#), page 7-94
- ◆ 3.4. [Printer](#), page 7-98
- ◆ 3.5. [Results Validation](#), page 7-101
- ◆ 3.6. [Audible alarm](#), page 7-108
- ◆ 3.7. [Maintenance](#), page 7-110
- ◆ 3.8. [Users](#), page 7-112.

Click or press one of the tabs to access the various functions.

3.1. Analyser

The «Analyser» tab allows the user to configure, enable or disable different parts of the instrument:

- ◆ **3.1.1. Loading Mode**, page 7-79
- ◆ **3.1.2. Serial #**, page 7-79
- ◆ **3.1.3. Level detection**, page 7-79
- ◆ **3.1.4. Cuvettes**, page 7-80
- ◆ **3.1.5. Pressure Detections**, page 7-80
- ◆ **3.1.6. Barcode Reader**, page 7-80
- ◆ **3.1.7. Software exit**, page 7-82
- ◆ **3.1.8. Racks**, page 7-83
- ◆ **3.1.9. ISE Module**, page 7-84
- ◆ **3.1.10. Automatic back-up cassette**, page 7-84
- ◆ **3.1.11. Cold Area**, page 7-84
- ◆ **3.1.12. Calibrations expired time window**, page 7-84
- ◆ **3.1.13. Export of the results on USB key**, page 7-85.

The «Analyser» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

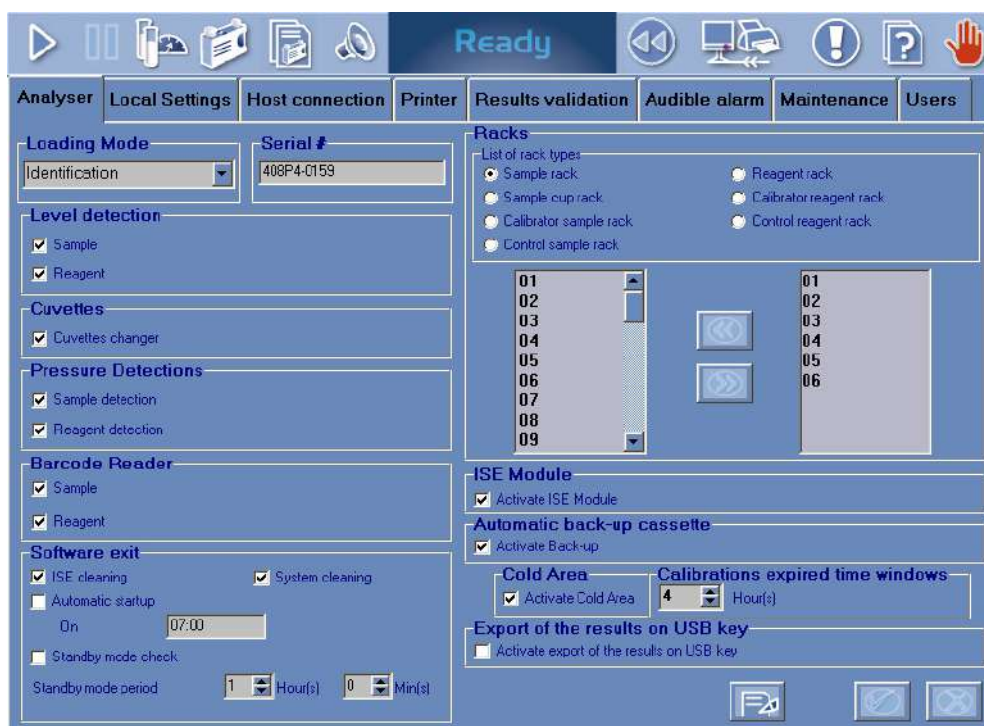


Fig. 7-20: «Analyser» tab

3.1.1. Loading Mode

This part allows the user to configure the loading mode according to the laboratory working method.

- ◆ Identification: select this mode if all tubes are identified by barcode labels.
- ◆ Position: select this mode if tubes without barcode and with barcodes are used on the instrument.

The user is able to select the loading mode by using the corresponding scrolling list (as shown on the figure below).

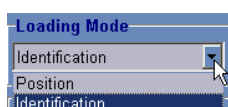


Fig. 7-21: Loading Mode



The loading mode is modifiable only if the Worklist is empty.

3.1.2. Serial

This field allows the user to enter the instrument serial number.

3.1.3. Level detection

This part allows the user to enable or disable the sample and reagent level detections.

Heading	Description	Format
Sample	If checked, enables the sample level detection.	Check box
Reagent	If checked, enables the reagent level detection.	Check box

Tab. 7-78: Level detection



- ◆ If the sample level detection is disabled, only sample cups must be used.
- ◆ Please note that working with the reagent level detection disabled can pose important contamination problems and then erroneous test results.

3.1.4. Cuvettes

This part allows the user to enable or disable the cuvette changer by using the «Cuvette changer» box.

The cuvette changer is:

- enabled if the box is checked
- disabled if the box is unchecked.



If the cuvette changer is disabled, cuvette segments must be loaded and unloaded manually by the user (see [Manual loading of cuvette segments](#), page 8-21).

3.1.5. Pressure Detections

This part allows the user to enable or disable the pressure detections of sample and reagent needles.

Heading	Description	Format
Sample	If checked, enables the pressure detection of sample needle.	Check box
Reagent	If checked, enables the pressure detection of reagent needle.	Check box

Tab. 7-79: Pressure Detections

3.1.6. Barcode Reader

This part allows the user to enable or disable the sample and reagent barcode readers.

Heading	Description	Format
Sample	If checked, enables the sample barcode reader.	Check box
Reagent	If checked, enables the reagent barcode reader.	Check box

Tab. 7-80: Barcode Reader

▼ Sample

If the sample barcode reader is disabled:

- The samples must be systematically identified by Position mode.



If the sample barcode reader is not used, the user must ensure that the sample tube is physically positioned as programmed in the Worklist.

- Only the sample racks from 01 to 06 can be used and must be placed respectively on the numbered positions from 1 to 6.
- No more than 60 requests can be entered in the Worklist.
- Calibrators and controls must be also configured on the sample racks from 01 to 06.



The sample barcode reader can be enabled or disabled only if the Worklist is empty.

▼ Reagent

If the reagent barcode reader is disabled, the reagent configuration is fixed and cannot be modified.



If the reagent barcode reader is not used, the user must ensure that the solutions are physically positioned as configured in the «Reagent Configuration» menu.

3.1.7. Software exit

This part allows the user to configure:

- automatic ISE module and/or system cleaning
- automatic start up
- automatic standby mode.

Heading	Description	Format
ISE cleaning	If checked, the ISE module is automatically cleaned: - when the instrument turns to standby mode - at the instrument shutdown.	Check box
System cleaning	If checked, the system is automatically cleaned: - when the instrument turns to standby mode - at the instrument shutdown.	Check box
Automatic start up	If checked, enables the instrument automatic start up.	Check box
On	Time of the instrument automatic start up.	Depending on the time format chosen (see System Date and Time , page 7-87).
Standby mode check	If checked, the instrument turns to standby mode after the defined time.	Check box
Standby mode period	Defined time between the last operation on the instrument and the standby mode.	Depending on the time format chosen (see System Date and Time , page 7-87).

Tab. 7-81: Software exit



- ◆ The automatic ISE module cleaning will be performed with the last solution configured in the «ISE Cleaning Solution» scrolling list from the «Customer Services» menu (see [Cleaning](#), page 7-119).
- ◆ The automatic system cleaning will be performed with the last configuration done from the «Customer Services» menu (see [Cleaning](#), page 7-119).

3.1.8. Racks

From the «Racks» part, the user is able to define the racks that are then used for the configuration of patient samples, calibrators/controls and solutions.

The «Racks» part is divided into three lists (see [Fig. 7-22: Racks](#), page 7-83):

- list of rack types (1)
- list of available racks (2)
- list of used racks (3).

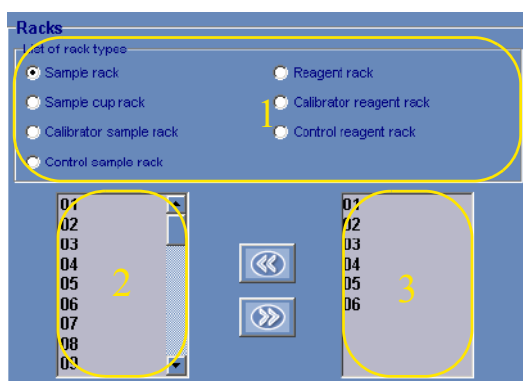


Fig. 7-22: Racks

By selecting a rack type in the corresponding list, the list of available racks and the list of used racks are updated (see [Tab. 7-82: Racks](#), page 7-83). The user adds or removes racks in the list of used racks by pressing the «Next» and «Previous» buttons.

Rack type	Available racks	Used racks - Default value
Sample rack	01 - 40	01 - 06
Sample cup rack	41 - 70	41 - 42
Calibrator sample rack	71 - 84	71 - 72
Control sample rack	85 - 99	85 - 86
Reagent rack	60 - 99	60 - 65
Calibrator reagent rack	01 - 29	01 - 02
Control reagent rack	30 - 59	30 - 31

Tab. 7-82: Racks



A rack cannot be removed from the list of used racks if a sample, calibrator/control or solution is configured on this rack.

3.1.9. ISE Module

This part allows the user to enable or disable the ISE module by using the «Activate ISE Module» box.

The ISE module is:

- enabled if the box is checked
- disabled if the box is unchecked.



The ISE module cannot be disabled if there are ISE tests in the Worklist or for validation.

If the ISE module is disabled, then:

- on the Main menu, the «ISE Module Status» button is disabled
- the ISE tests are not displayed in the request capture screen (see [2.2.5. Request capture screen](#), page 2-14)
- the ISE applications are not displayed in the Applications list (see [2.1. Applications list](#), page 7-9)
- in the «Customer Services» menu, the ISE functions are disabled.

3.1.10. Automatic back-up cassette

This part allows the user to enable or disable the automatic back-up cassette by using the «Activate Back-up» box.

The automatic back-up cassette is:

- enabled if the box is checked
- disabled if the box is unchecked.

3.1.11. Cold Area

This part allows the user to enable or disable the cooling unit by using the «Activate Cold Area» box.

The cooling unit is:

- enabled if the box is checked
- disabled if the box is unchecked.

3.1.12. Calibrations expired time window

In the calibration request capture screen, the selective filter «All calibrations expired in window» informs the user about the calibrations to be expired in a programmed time window (see [2.3.2. Creation of a calibration request](#), page 2-25).

The «Calibrations expired time window» field allows the user to program this time window from 0 to 96 hours.

3.1.13. Export of the results on USB key

This part allows the user to enable or disable the automatic export of results on USB key by using the «Activate export of the results on USB key» box.

The automatic export of results on USB key is:

- enabled if the box is checked
- disabled if the box is unchecked.

If the automatic export of results on USB key is enabled, then at each end of run, all the finished test results are automatically saved in a file on USB key (except the ISE test and ratio results).



The user can manually export results on USB key by using the corresponding function in the «Test Review» menu.

3.2. Local Settings

The «Local Settings» tab allows the user to configure the following parameters:

- ◆ [3.2.1. System Date and Time](#), page 7-87
- ◆ [3.2.2. Software language](#), page 7-88
- ◆ [3.2.3. Keyboard](#), page 7-88
- ◆ [3.2.4. Barcode reader configuration](#), page 7-88
- ◆ [3.2.5. Restore database](#), page 7-89
- ◆ [3.2.6. Save/Restore client parameters](#), page 7-90.

This tab also allows the user to update the **Pentra 400** help on-screen (see [3.2.7. Update of the Pen- tra 400 help on-screen](#), page 7-92).

The «Local Settings» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

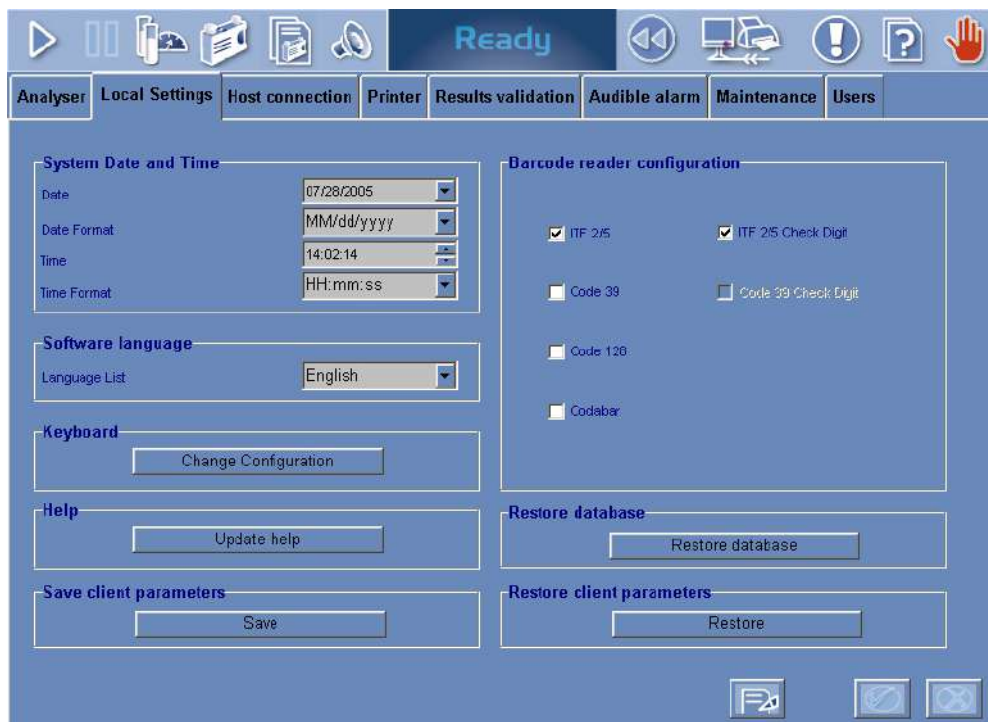


Fig. 7-23: «Local Settings» tab

3.2.1. System Date and Time

▼ Date and time format

Select the date or time format by using the «Date Format» or «Time Format» scrolling list.

◆The date format is as follows:

- MM/dd/yyyy
- dd/MM/yyyy
- yyyy/MM/dd.

◆The time format options in the scrolling list are as follows:

- hh:mm:ss ampm
- HH:mm:ss.

Then, press the «OK» button to validate your choice.

PC and software will restart after user confirmation.

▼ Current date and time

Click the «Date» field arrow to open the date window. The current date of the PC can be changed.

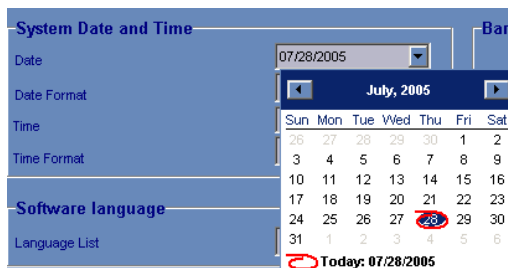


Fig. 7-24: Date window

Click the «Time» field so that the current time of the PC can be modified.



The current date and time cannot be modified if tests are ordered, pending, incomplete or for validation.

3.2.2. Software language

The available languages are:

- English
- Spanish
- French
- Portuguese
- German
- Greek
- Italian
- Polish.

Click the «Language List» field arrow and select the language.

Then, press the «OK» button to validate your choice.

PC and software will restart after user confirmation.

3.2.3. Keyboard

Press the «Change Configuration» button to modify the local keyboard configuration.

3.2.4. Barcode reader configuration

This part allows the user to configure the working barcode type.

The following barcode types are available:

- 2 of 5 interleaved (ITF 2/5) with or without checkdigit
- Code 39 with or without checkdigit
- Code 128
- Codabar.



In order to work with the barcode type «2 of 5 interleaved without checkdigit», specific rack labels must be used: Ref. HAX0085 to HAX0093 (see [Tab. 1–4: 2 of 5 interleaved without checkdigit, Code 39, Code 128, Codabar](#), page 1-12).

3.2.5. Restore database

This part allows the user to restore a database as follows:

- ◆ Press the «Restore database» button.
- ◆ The following window will appear:

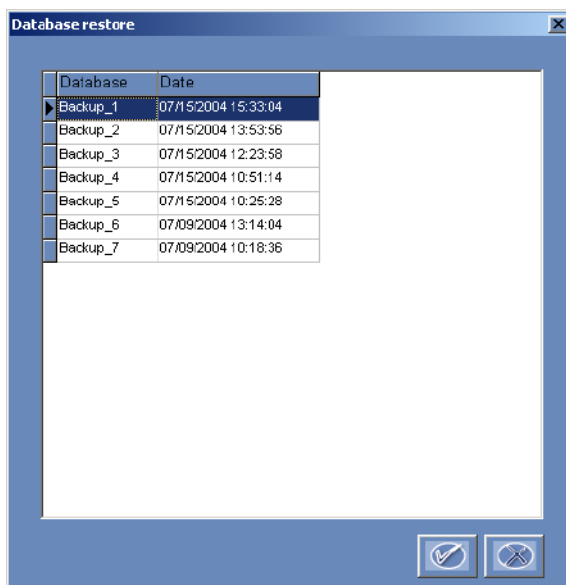


Fig. 7-25: Database choice

This window lists the saved databases (the backup database name and date are displayed).



At each creation of a new Worklist, the database is automatically saved.
Up to 8 databases are saved and numbered from the most recent to the oldest.

- ◆ Choose a database by clicking the corresponding item.
- ◆ Then, press the «OK» button.
- ◆ PC and software will restart after user confirmation.
- ◆ The database is then restored and the following system warning is triggered:
628\Restore database saved on [%s] by [%s].

3.2.6. Save/Restore client parameters

▼ Save client parameters

The user can save the current client parameters as follows:



- ◆ The current client parameters include database, system configuration, parameters of «Customer Services» menu and column configuration.
- ◆ Parameters configured by your distributor and default printer configuration are not included.

◆ Press the «Save» button (see [Fig. 7-23: «Local Settings» tab](#), page 7-86).

◆ The following window is displayed:

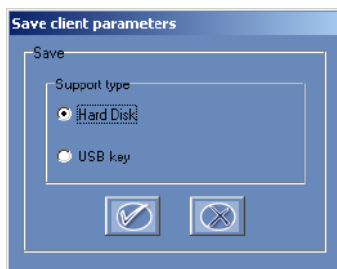


Fig. 7-26: Hard disk/USB key

◆ Select hard disk or USB key by using the corresponding radio button and press the «OK» button.

◆ The current client parameters are saved in a file, named as follows: Date/Time/Serial #.



The «Serial #» field, in the «Analyser» tab, is mandatory.

▼ Restore client parameters

The user can restore the client parameters as follows:

◆ Press the «Restore» button (see [Fig. 7-23: «Local Settings» tab](#), page 7-86).

◆ The following window is displayed:

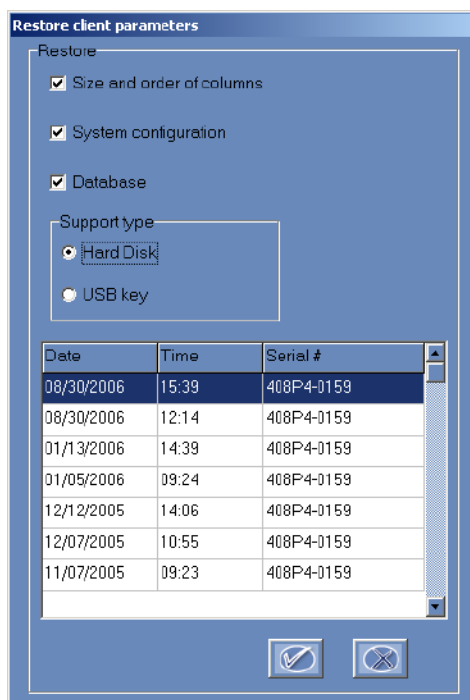


Fig. 7-27: Restore client parameters

This window lists the saved files, named as follows: Date/Time/Serial #.

- ◆ Choose a file by clicking the corresponding item.
- ◆ The following client parameters can be restored by checking the corresponding boxes:
 - **database:** if checked, then the database will be updated (if necessary) and restored, and the following system warning will be triggered: 628\Restore database saved on [%s] by [%s]
 - **system configuration:** if checked, then the system configuration including parameters of «Customer Services» menu will be restored and the following system warning will be triggered: 634\Restore system configuration the [%s] by [%s]



System configuration cannot be restored if tests are ordered, pending, incomplete or for validation.

- **column configuration:** if checked, then the column configuration will be restored and the following system warning will be triggered: 635\Restore column configuration the [%s] by [%s].
- ◆ Select hard disk or USB key by using the corresponding radio button.
- ◆ Then, press the «OK» button.
- ◆ PC and software will restart after user confirmation.

3.2.7. Update of the Pentra 400 help on-screen

The **Pentra 400** User manual CD-Rom, available under the following part number **RAX039E**, includes:

- the **Pentra 400** user manuals and daily guides on pdf format for reviewing and printing operations
- the **Pentra 400** help files that can be consulted from the CD-Rom.

The user manuals, daily guides and help files are available for the following languages: French, English, German, Spanish, Italian, Portuguese, Swedish, Danish, Greek and Polish.

Moreover, the **Pentra 400** help files in all languages except Swedish and Danish can easily be installed on your instrument as follows:

- ◆ Insert the CD-Rom into the CD-Rom drive.
- ◆ From the «Local Settings» tab, press the «Update help» button.
- ◆ The following screen will appear:



Fig. 7-28: Language choice

- ◆ Choose your language.

◆The following screen will be displayed:



Fig. 7-29: Function choice

- (1) The «PDF» key opens the user manual and daily guide on pdf format in order to be consulted or printed.
- (2) The «HTML» key opens the help file recorded on the CD-Rom in order to be consulted.
- (3) The «INSTALL» key will install the new help file (from the CD-Rom) on your instrument and erase the previous one.



The contents of this CD-Rom can also be viewed on any PC with the «Acrobat Reader» software installed (version 5.0 or higher).

3.3. Host Connection

This tab allows the user to configure the Host connection and also perform some operations regarding the Host connection in the following parts:

- ◆ [3.3.1. RS232 Configuration](#), page 7-95
- ◆ [3.3.2. Query Mode](#), page 7-95
- ◆ [3.3.3. Handling spaces](#), page 7-95
- ◆ [3.3.4. Automatic Transmission to Host](#), page 7-96
- ◆ [3.3.5. Analyser Id](#), page 7-96
- ◆ [3.3.6. Host Tools](#), page 7-96.

The «Host Connection» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

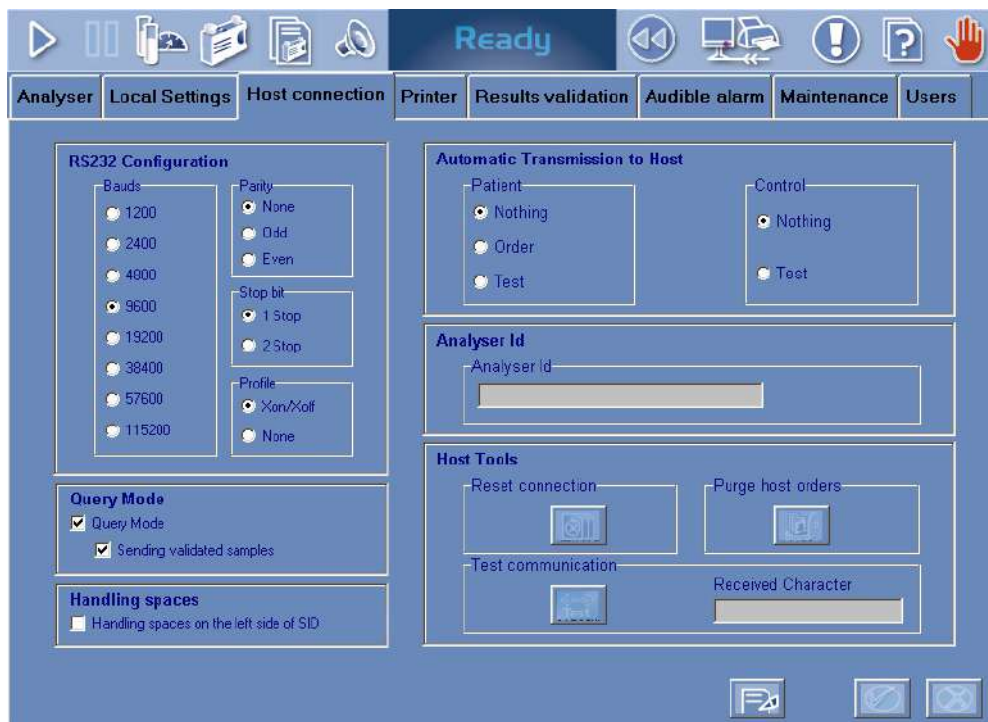


Fig. 7-30: «Host Connection» tab

3.3.1. RS232 Configuration

Heading	Description	Format	Default value
Bauds	Speed selection: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	Radio button	9600
Parity	Parity selection: None, Odd, Even	Radio button	None
Stop bit	Stop bit selection: 1 Stop, 2 Stop	Radio button	1 Stop
Profile	Protocol selection: Xon/Xoff, None	Radio button	Xon/Xoff

Tab. 7–83: RS232 Configuration

3.3.2. Query Mode

This part allows the user to enable or disable the Query mode by using the «Query Mode» box.

The Query mode is:

- enabled if the box is checked
- disabled if the box is unchecked.

When the Query mode is enabled, if after a sample tray reading there are missing requests (i.e. a sample tube is read on the tray and no associated request is found in the Worklist), the instrument automatically asks the Host for the missing requests.



The Query mode is automatically disabled when the instrument operates in Position mode (see [3.1.1. Loading Mode](#), page 7-79).

Moreover, if the «Sending validated samples» box is checked, the user can manually ask the Host for supplementary tests on validated patient samples by using the corresponding function in the «Work Balance» menu or the Patient Result list.

3.3.3. Handling spaces

This part allows the user to authorize the character «Space» on the left side of the «Sample ID» field by using the «Handling spaces on the left side of SID» box.

- If the box is checked, then the character «Space» is allowed on the left side of the «Sample ID» field when manually captured from the instrument as when loaded from the Host. On prints, the character «Space» is materialized by a rectangle.
- If the box is unchecked, then the character «Space» is not authorized on the left side of the «Sample ID» field and is systematically deleted.

3.3.4. Automatic Transmission to Host

The **Pentra 400** can automatically send patient and/or control results to the Host.

Three options of transmission are available:

- ◆ Nothing: no transmission.
- ◆ Order: transmission request by request after manual or automatic validation of the results (only for patient results).
- ◆ Test: transmission test by test after manual or automatic validation of the results.

The user selects an option of transmission by using the radio buttons.

3.3.5. Analyser Id

This field allows the user to enter the identification number of the instrument by the Host.

3.3.6. Host Tools

This part allows the user to perform some operations regarding the Host connection by using the following functions:

- ◆ **Reset connection**, page 7-96
- ◆ **Purge Host orders**, page 7-96
- ◆ **Test communication**, page 7-97.

▼ Reset connection

This function allows the user to reset the Host process.

- Press the «Reset connection» button.
- If the Host process does not work, the reset is performed after user confirmation.



If the Host process is OK, a message informs the user that the Host process is OK and then the reset is not performed.

▼ Purge Host orders

This function allows the user to purge all pending messages from/to the Host.

- Press the «Purge Host orders» button.
- The purge is performed after user confirmation.

▼ Test communication

This function allows the user to test the communication between the instrument and the Host.

- Press the «Test communication» button.
- The communication test is performed.
- Then, a message is displayed in the «Received Character» field:

Message	Description
ACK	The message «ACK» has been received. The communication test is OK.
XXX	An other message has been received instead of the message «ACK». The communication test has failed.
Time out	The message «ACK» has not been received in the expected time. The communication test has failed.
Process NOK	The Host process does not work. The communication test has failed.

Tab. 7–84: «Received Character» field



This function is enabled only if no message is in progress.

3.4. Printer

The «Printer» tab allows the user to configure printer settings in the following parts:

- ◆3.4.1. [Header](#), page 7-99
- ◆3.4.2. [Printer](#), page 7-99
- ◆3.4.3. [Automatic Printout](#), page 7-100.

The «Printer» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

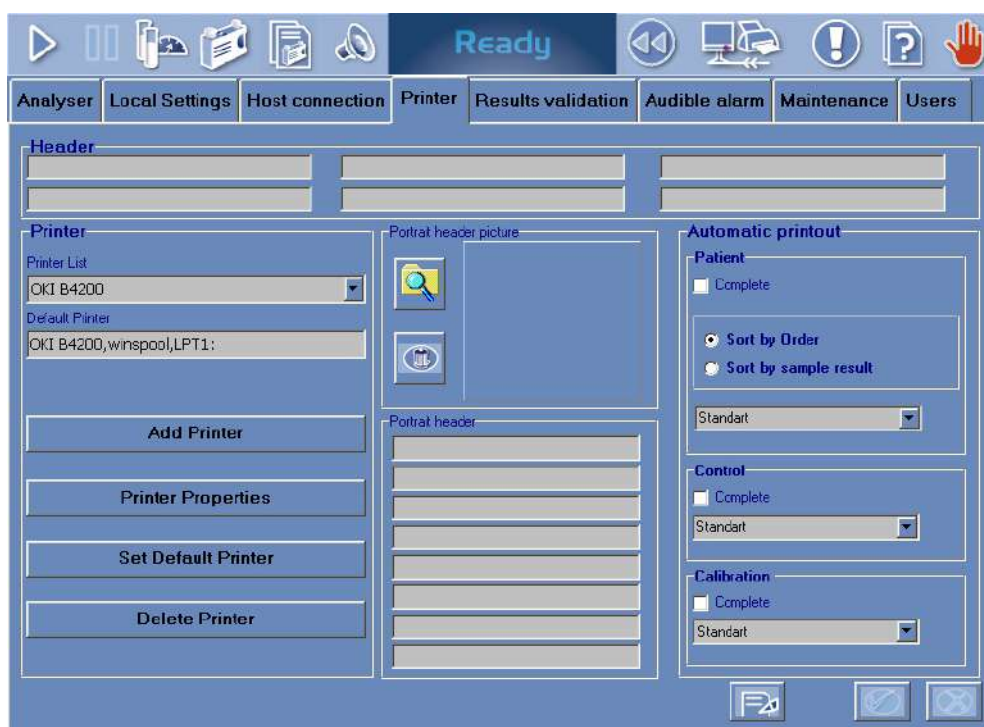


Fig. 7-31: «Printer» tab

3.4.1. Header

Heading/Key	Description	Format
Header	Report header.	Six fields of 20 characters max. each
Portrait Header Picture	Report header picture for Portrait printout format.	- Size: 55 mm x 45 mm - Format: JPEG
	Loads the Portrait Header Picture.	Key
	Removes the Portrait Header Picture.	Key
Portrait Header	Report header for Portrait printout format.	Eight fields of 40 characters max. each

Tab. 7–85: Header

3.4.2. Printer

Heading/Key	Description	Format
Printer List	List of installed printers.	Scrolling list
Default Printer	Printer used by the software.	-
Add Printer	Calls the «Add Printer Wizard» window for adding a printer.	Key
Printer Properties	Calls the printer properties screen.	Key
Set Default Printer	The printer displayed into the «Printer List» field becomes the default printer.	Key
Delete Printer	The printer displayed into the «Printer List» field is removed.	Key

Tab. 7–86: Printer

3.4.3. Automatic Printout

Heading	Description	Format
PATIENT		
Complete	If checked, patient results are automatically printed when validated.	Check box
Sort by Order	If selected, sample results are printed sorted by patients.	Radio button
Sort by sample result	If selected, sample results are printed sorted by run dates.	Radio button
Format	Condensed, Standard, Detailed or Portrait. Detailed and Portrait printout formats are not available if sample results are printed sorted by patients (Sort by Order).	Scrolling list
CONTROL		
Complete	If checked, control results are automatically printed when validated.	Check box
Format	Condensed, Standard or Detailed.	Scrolling list
CALIBRATION		
Complete	If checked, calibration results are automatically printed when validated.	Check box
Format	Standard or Detailed.	Scrolling list

Tab. 7–87: Automatic Printout

3.5. Results Validation

This tab allows the user to configure the validation of calibrations, controls and patient samples:

- ◆ 3.5.1. [Validation of calibrations](#), page 7-102
- ◆ 3.5.2. [Validation of controls](#), page 7-102
- ◆ 3.5.3. [Validation of patient samples](#), page 7-107.

The «Results Validation» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

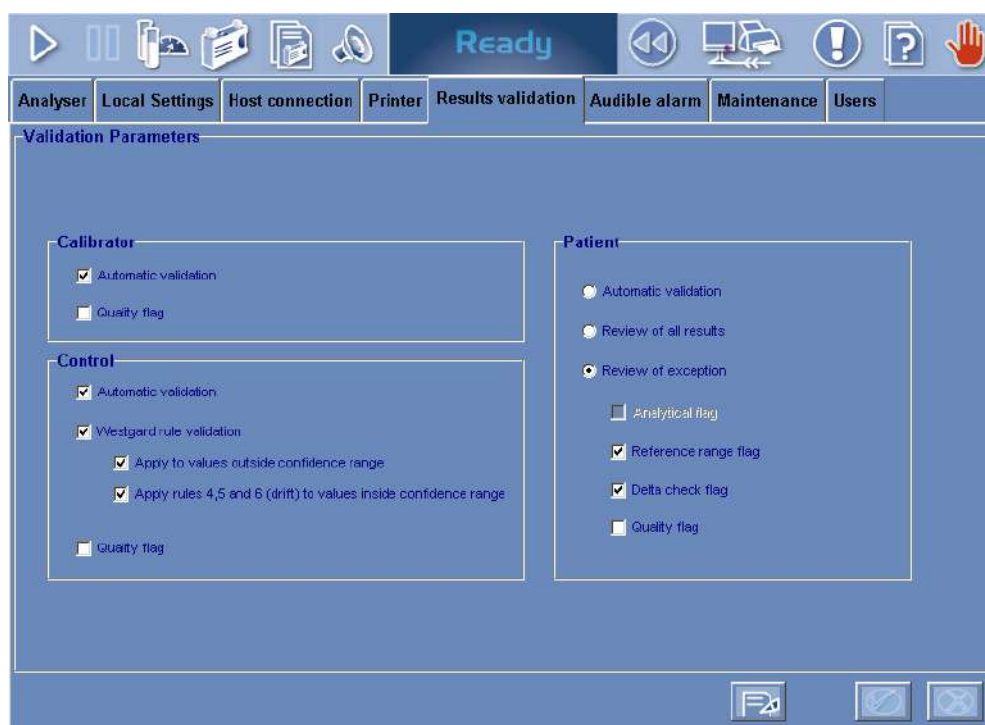


Fig. 7-32: «Results Validation» tab

3.5.1. Validation of calibrations

The user can enable or disable the automatic validation of calibrations by using the corresponding «Automatic validation» check box.

If the corresponding «Automatic validation» box is checked, then the calibrations are automatically validated if:

- no point used for calculation is associated to an analytical flag (except the flags CALC_RANGE_HIGH and CALC_RANGE_LOW)
- the deviations (Dev_Rep and/or Dev_C) calculated for each level do not exceed the authorized deviations (see [Tab. 7-14: Calibration](#), page 7-22)
- the calibration factor is not out of the programmed range (see [Factor calibration](#), page 7-24).

Moreover, if the «Quality flag» box is checked, then the calibrations associated to a quality flag (CE for example, see [3.3.5. Quality flags](#), page 9-74) are not automatically validated.

3.5.2. Validation of controls

The user can enable or disable the automatic validation of controls by using the corresponding «Automatic validation» check box.

If the corresponding «Automatic validation» box is checked, then the controls are automatically validated if they are not associated to an analytical flag (except the flags CONF_RANGE_HIGH_W and CONF_RANGE_LOW_W).

Moreover, if the «Quality flag» box is checked, then the controls associated to a quality flag are not automatically validated.

▼ Westgard rules

Westgard rules apply to all [default controls](#) for validation (manually or automatically).

The user can enable or disable the Westgard rules by using the «Westgard rule validation» check box. If the «Westgard rule validation» box is checked, then the Westgard rules are applied using one of the following algorithms or both.

- ◆ Apply to values outside confidence range (see [Starting Rule, 1_{2s} Rule](#), page 7-103):

The Westgard rules 1 to 6 are applied to control results outside confidence range.

If the Westgard rules are enabled, then this algorithm is always selected.

- ◆ Apply rules 4, 5 and 6 (suspicion of drift) to values inside confidence range:

If selected, the Westgard rules 4, 5 and 6 are applied to control results inside confidence range.

If not selected, the control results are checked to ensure that they are not outside the programmed low and high confidence range values. If not, the corresponding analytical flag is triggered (CONF_RANGE_HIGH or CONF_RANGE_LOW).*

* In most cases, the target value is the medium of the confidence range, then the high and low limits of confidence range are equal to + 2SD and - 2SD.

Sometimes, the target value is not strictly centered in the confidence range. In this case, the high and low limits of confidence range are lightly different from + 2SD and - 2SD. That's why this complementary check is done.



Configuration of Westgard rules cannot be modified if tests are ordered, pending, incomplete or for validation.

Definitions

When configuring a control for an application, the following data are systematically entered:

- target value
- high limit of confidence range
- low limit of confidence range.

The high and low limits of confidence range are used to calculate 1SD (Standard Deviation):

$$1SD = (\text{high limit} - \text{low limit}) / 4.$$

Target value and thresholds $\pm 1SD$, $\pm 2SD$, $\pm 3SD$ are used to apply the Westgard rules.

Control level: Up to three default controls can be configured for an application. Each default control is a control level for the application.

Intra-control rule: This rule applies to the last results of one specific control level for an application.

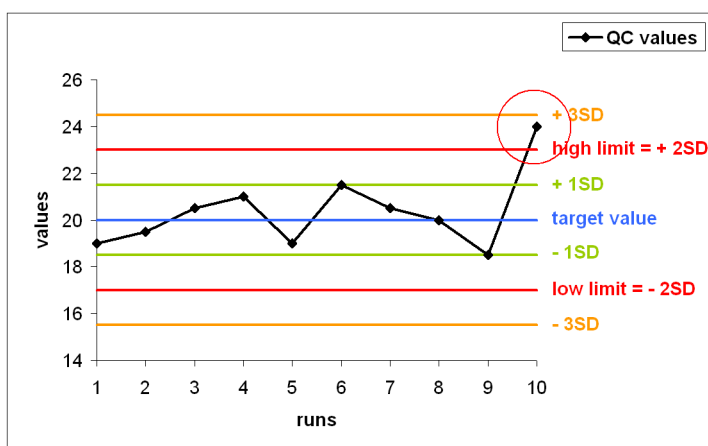
Inter-control rule: This rule applies to the last results of all control levels for an application.

Westgard rules

If enabled, the Westgard rules are applied as follows.

◆ Starting Rule, 1_{2S} Rule:

The last control result is higher than $+ 2SD$ or lower than $- 2SD$. The rule 1 is applied.



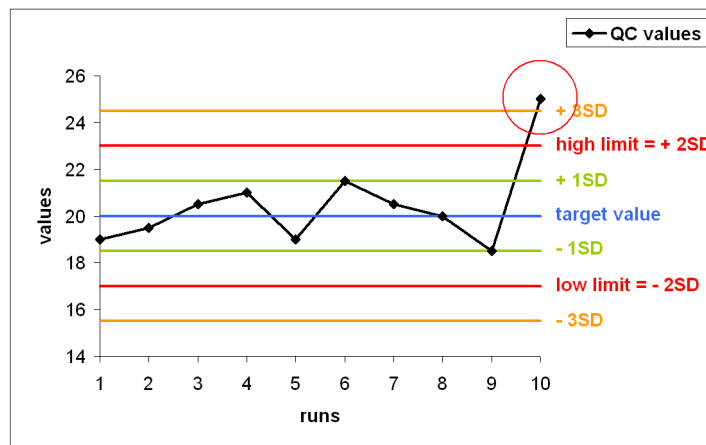
The Westgard algorithm enables the user to characterize if the value is a random error non specific to the system or if it is due to a problem on the system.

- If this value is outside the confidence range and is acceptable by Westgard means, it is automatically validated with the corresponding flag (CONF_RANGE_HIGH_W or CONF_RANGE_LOW_W).
- If one of the 6 rules is triggered, then the run is rejected with the corresponding flag (CONF_RANGE_HIGH_W1 to 6 or CONF_RANGE_LOW_W1 to 6).

◆ Rule 1, 1_{3S} Rule:

The last control result is higher than + 3SD or lower than - 3SD. The flags CONF_RANGE_HIGH_W1 or CONF_RANGE_LOW_W1 will be triggered.

If not, the rule 2 is applied.



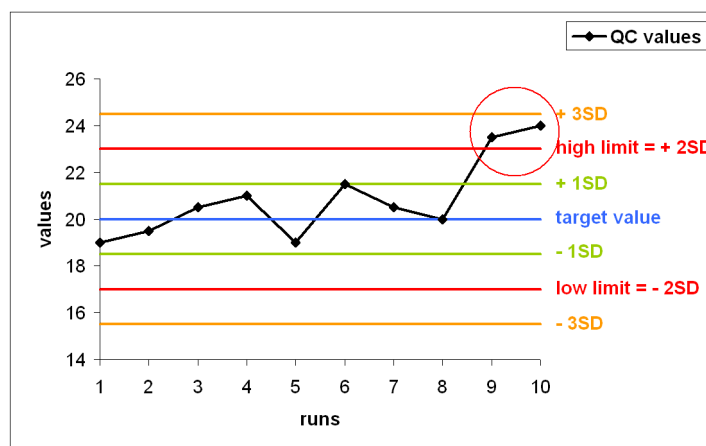
◆ Rule 2, 2_{2S} Rule:

Intra-control rule: The 2 last control results are higher than + 2SD or lower than - 2SD.

Inter-control rule: The last results of 2 different control levels are higher than + 2SD or lower than - 2SD.

The flags CONF_RANGE_HIGH_W2 or CONF_RANGE_LOW_W2 will be triggered.

If not, the rule 3 is applied.



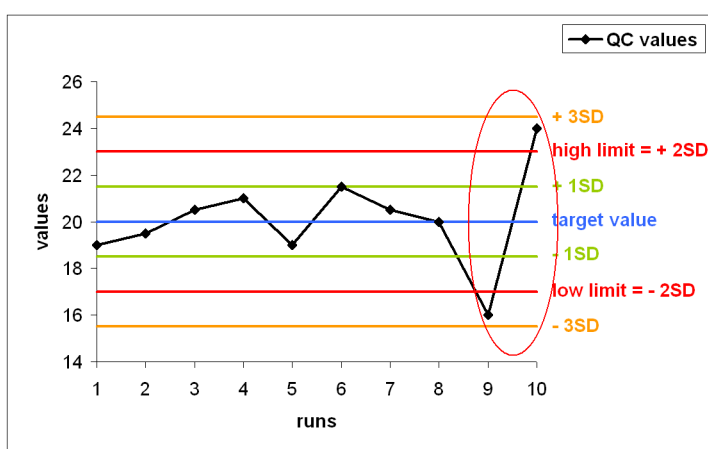
◆ Rule 3, R_{4S} rule:

Intra-control rule: The difference between the 2 last control results is higher than 4SD.

Inter-control rule: The difference between the last results of 2 different control levels is higher than 4SD.

The flags CONF_RANGE_HIGH_W3 or CONF_RANGE_LOW_W3 will be triggered.

If not, the rule 4 is applied.



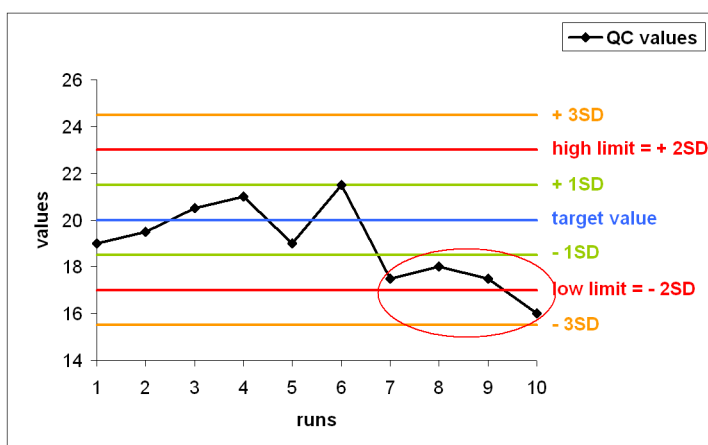
◆ Rule 4, 4_{1S} rule:

Intra-control rule: The 4 last control results are higher than + 1SD or lower than - 1SD.

Inter-control rule: The 4 last control results, regardless of control level, are higher than + 1SD or lower than - 1SD.

The flags CONF_RANGE_HIGH_W4, CONF_RANGE_LOW_W4 or WESTGARD_RULE_4 will be triggered.

If not, the rule 5 is applied.

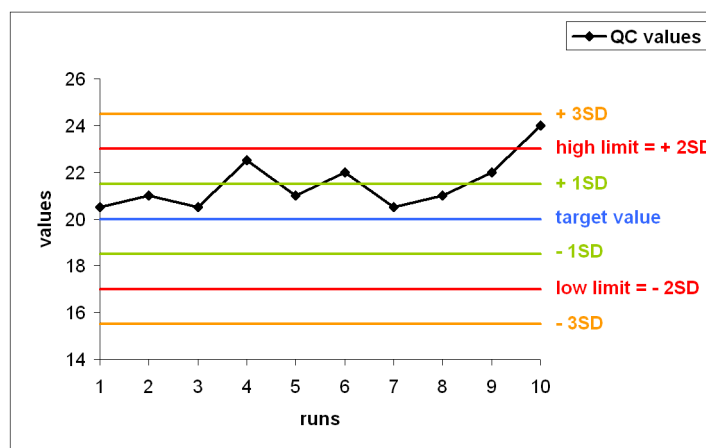


◆ Rule 5, 10x rule:

Intra-control rule: The 10 last control results are all higher than the target value or all lower than the target value.

Inter-control rule: The 10 last control results, regardless of control level, are all higher than the target value or all lower than the target value.

The flags CONF_RANGE_HIGH_W5, CONF_RANGE_LOW_W5 or WESTGARD_RULE_5 will be triggered. If not, the rule 6 is applied.



◆ Rule 6, 7T Rule:

The 7 last control results are strictly increasing or strictly decreasing.

The flags CONF_RANGE_HIGH_W6, CONF_RANGE_LOW_W6 or WESTGARD_RULE_6 will be triggered.

If not, the flags CONF_RANGE_HIGH_W or CONF_RANGE_LOW_W will be triggered that means no Westgard rule has been validated.



For flag details, refer to [Confidence range](#), page 9-70.

3.5.3. Validation of patient samples

The user configures the validation of patient samples by selecting one of the three following options:

- Automatic validation: all patient results are automatically validated.
- Review of all results: all patient results are manually validated.
- Review of exception: patient results are automatically validated on criteria (see [Criteria of automatic validation](#), page 7-107).

▼ Criteria of automatic validation

If the option «Review of exception» is selected, patient results are automatically validated on criteria. The user defines the criteria of automatic validation by using the check boxes described in the following table:

Heading	Description	Format
Analytical flag	The patient results associated to an analytical flag (except the flags REF_RANGE_HIGH and REF_RANGE_LOW) are manually validated. This box is always checked.	Check box
Reference range flag	If checked, the patient results associated to the analytical flags REF_RANGE_HIGH or REF_RANGE_LOW are manually validated.	Check box
Delta check flag	If checked, the patient results associated to the delta check flag are manually validated.	Check box
Quality flag	If checked, the patient results associated to a quality flag are manually validated.	Check box

Tab. 7–88: Criteria of automatic validation

3.6. Audible alarm

This tab allows the user to configure the sound alarms in the following parts:

- ◆3.6.1. Sound group, page 7-108
- ◆3.6.2. Sound alarms, page 7-109
- ◆3.6.3. Sound volume, page 7-109.

The «Audible alarm» tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.

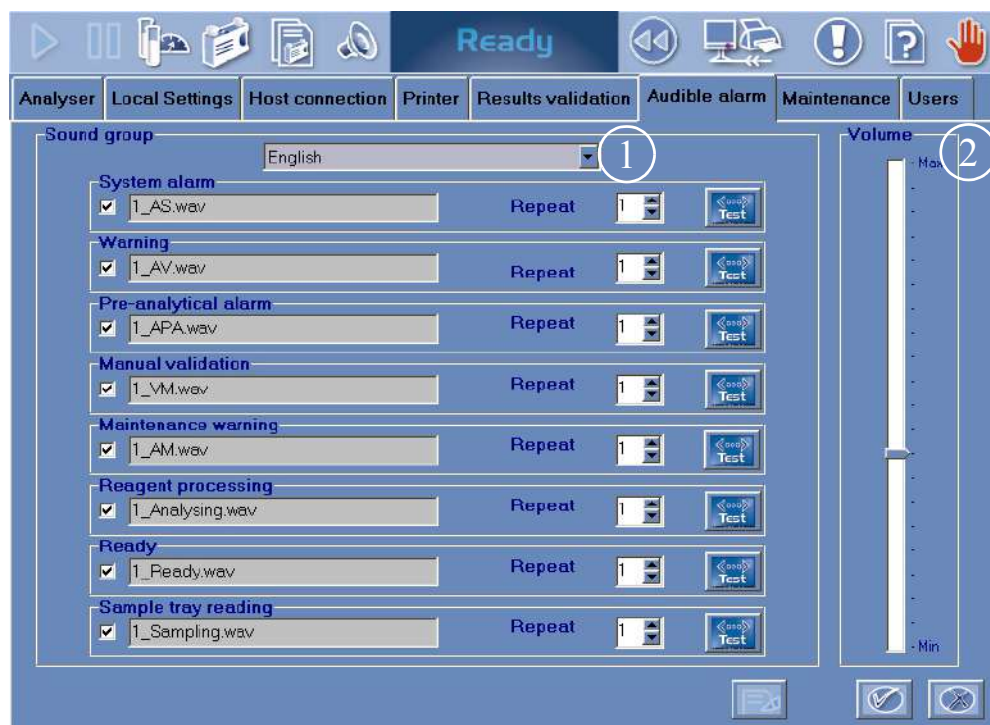


Fig. 7-33: «Audible alarm» tab

3.6.1. Sound group

The selected sound group predefines the sounds used for each sound alarm.

The available sound groups are:

- English	- Spanish
- French	- Portuguese
- German	- Greek
- Italian	- Polish.

The user can select a sound group by using the corresponding scrolling list (see 1, Fig. 7-33: «Audible alarm» tab, page 7-108).

3.6.2. Sound alarms

If configured, a sound alarm is triggered when the corresponding event occurs. The following table lists the configurable sound alarms and their corresponding events.

Sound alarms	Events
System alarm	A system alarm is triggered.
Warning	A system warning is triggered.
Pre-analytical alarm	A sampling alarm is triggered.
Manual validation	A manual validation is required.
Maintenance warning	A maintenance alert is triggered.
Reagent processing	The instrument turns to «Reagent processing» status.
Ready	The instrument turns to «Ready» status.
Sample tray reading	The instrument turns to sample tray reading. The sample tray is not accessible any more.

Tab. 7–89: Sound alarms and corresponding events

For each sound alarms, the following parameters are configurable:

Heading	Description	Format
Enable	If checked, the sound alarm is enabled and then triggered when the corresponding event occurs.	Check box
Name	Name of the sound.	-
Repeat	Number of times that the sound alarm is repeated when the corresponding event occurs.	From 1 to 5.
Test	Allows the user to test the sound alarm.	Key

Tab. 7–90: Sound alarms



If several sound alarms are triggered simultaneously, only one is in progress with the following order of priority (decreasing): System alarm, Warning, Pre-analytical alarm, Manual validation, Maintenance warning, Reagent processing, Ready, Sample tray reading.

3.6.3. Sound volume

The user can increase/decrease the sound volume by using the corresponding slider (see 2, [Fig. 7–33: «Audible alarm» tab](#), page 7-108).

3.7. Maintenance

The «Maintenance» tab allows the user to configure the **Pentra 400** maintenance schedule.

This tab opens in Display mode. In this mode, the user cannot modify the different parameters of the tab. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.



Fig. 7-34: «Maintenance» tab

The recommended maintenance procedures are configurable using the two following parameters:

- ◆ **Active**, page 7-110
- ◆ **Occurrence**, page 7-111.

▼ Active

If the «Active» box is checked, then the corresponding maintenance procedure will be managed by the instrument i.e. the **Pentra 400** will check that the maintenance procedure is performed when necessary. If the maintenance procedure is not done when necessary, then a maintenance alert will be triggered in the «System Warnings» menu (see [3.1.5. Maintenance alerts](#), page 9-57).

▼ Occurrence

Use the «Occurrence» scrolling list to program the frequency of the corresponding maintenance procedure.

The following frequencies are selectable:

- On request
- Daily
- Weekly
- Monthly
- Every 2 months
- Every 6 months
- Annually.

Here is a table listing the configurable maintenance procedures and their frequencies programmed by default.

This table also gives how the maintenance procedures are notified in the Maintenance log (see [5.7. Maintenance](#), page 7-150).

Most of the maintenance procedures use a software function of the «Customer Services» menu (see [4.1. Cycles](#), page 7-115). These maintenance procedures are automatically notified in the Maintenance log when they are done.

Some maintenance procedures are manually done by the user and do not use software functions. These maintenance procedures must be manually notified in the Maintenance log when they are done (see [5.7. Maintenance](#), page 7-150).

Designation	Occurrence (programmed by default)	Notification in the Maintenance log
Syringes replacement	Every 6 months	Automatic
Sample needle replacement	Annually	Automatic
Reagent needle replacement	Annually	Automatic
Mixer paddle replacement	On request	Automatic
Lamp replacement	On request	Automatic
Instrument cleaning and decontamination	On request	Manual
Filter replacement	Every 2 months	Manual
Glycol level checking	Every 2 months	Manual
ISE module activation	Daily	Automatic
ISE module cleaning	Daily	Automatic
ISE module etching	Daily	Automatic
Needle deproteinization (with mixer)	Weekly	Automatic
Wash tower cleaning	Monthly	Automatic
Syringe plunger tips	Monthly	Automatic
Qualitest	Monthly	Manual

Tab. 7-91: Configurable maintenance procedures

3.8. Users

In the **Pentra 400** software, four user levels (or groups of user profiles) are available.

- ◆The «User» level which allows daily working operations.
- ◆The «Admin» level which gives access to configuration functions (user profiles, system and applications).
- ◆The «Sales» level which gives access to specific functionalities reserved to your distributor.
- ◆The «Tech» level which gives access to the «Diagnostics» menu reserved to **HORIBA ABX** technician.

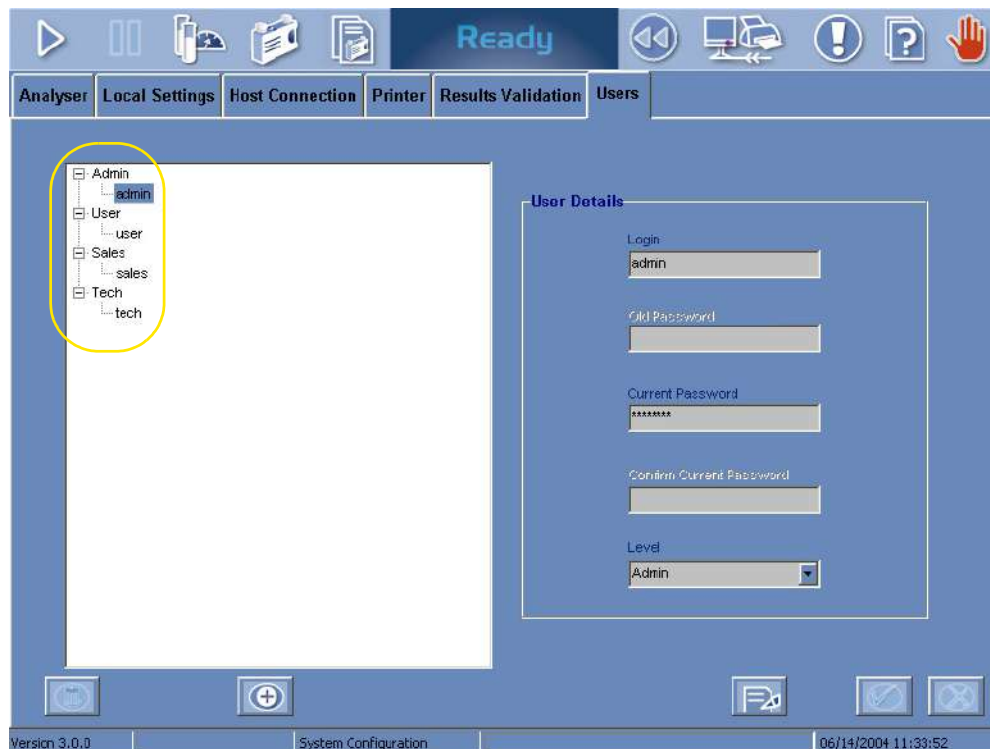


Fig. 7-35: «Users» tab

The «Users» tab allows the administrator to configure user profiles.

Three parameters are necessary to configure a user profile:

- the user name or login (from 3 to 10 characters)
- the user password (10 characters max.)
- the user level (scrolling list: Admin or User).

From the «Users» tab, the administrator can create or delete a user profile, but also modify a user password or level.

▼ Contextual buttons

The contextual buttons of the «Users» tab are defined in the following table:

Heading/Key	Name	Function
	Add new	Creation of a user profile (see 3.8.1. Creation of a user profile , page 7-113).
	Delete	Deletion of a user profile (see 3.8.2. Deletion of a user profile , page 7-113).
	Edit	Modification of a user profile (see 3.8.3. Modification of a user profile , page 7-113).
	OK	Validation of user profile creation, deletion or modification.
	Cancel	Cancellation of user profile creation, deletion or modification.

Tab. 7-92: Contextual buttons

3.8.1. Creation of a user profile

Press the «Add new» button.

In the «Login» field, enter the user name or login.

Then, enter the user password in the «Current Password» field and confirm this password in the corresponding field.

Select the user level by using the corresponding scrolling list.

Then, press the «OK» button to validate. The user profile is added in the user profile list.

3.8.2. Deletion of a user profile

Select a user profile in the user profile list and press the «Delete» button.

Enter the user password in the «Current Password» field.

Then, press the «OK» button to validate. The user profile is deleted from the user profile list.

3.8.3. Modification of a user profile

Select a user profile in the user profile list and press the «Edit» button.

In the «Old Password» field, enter the user password. Then, enter the new user password in the «Current Password» field and confirm the new password in the corresponding field.

Select the user level by using the corresponding scrolling list.

Then, press the «OK» button to validate. The user profile is modified.

4. Customer Services

▼ Access to the «Customer Services» menu

Press the «Customer Services» button from the «Services» menu.

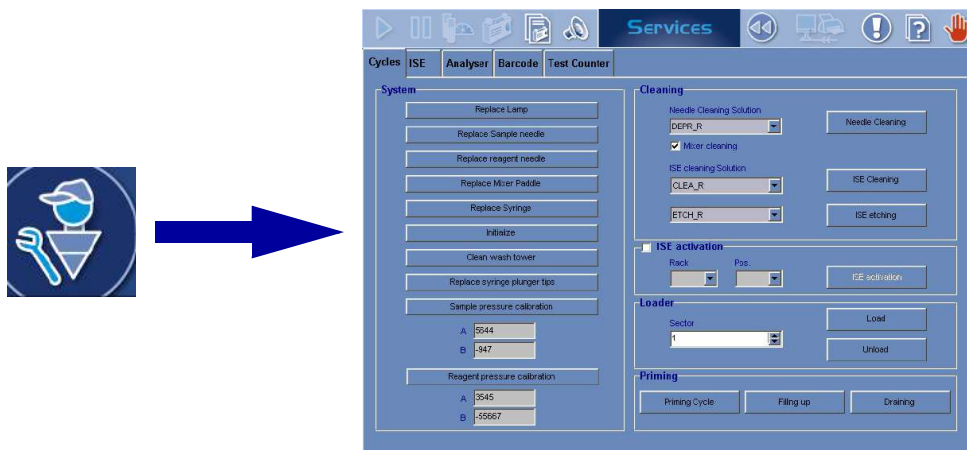


Fig. 7–36: «Customer Services» menu access button

The «Customer Services» menu groups five tabs:

- ◆ 4.1. [Cycles](#), page 7-115
- ◆ 4.2. [ISE](#), page 7-121
- ◆ 4.3. [Analyser](#), page 7-129
- ◆ 4.4. [Barcode](#), page 7-131
- ◆ 4.5. [Test Counter \(Available on request\)](#), page 7-133.

Click or press one of the tabs to access the various functions.



Closing the «Customer Services» menu, the **Pentra 400** turns to «Emergency Stop» status in the following cases:

- ◆ a used function has turned the instrument to «Emergency Stop» status
- ◆ a function in progress has been stopped
- ◆ an alarm has been triggered.

Then, the user must initialize the instrument by pressing the «Analyser Initialization» button from the generic toolbar.

4.1. Cycles

This section describes the «Cycles» tab and how to use it in the following chapters:

- ◆ 4.1.1. [System](#), page 7-116
- ◆ 4.1.2. [Cleaning](#), page 7-119
- ◆ 4.1.3. [ISE activation](#), page 7-119
- ◆ 4.1.4. [Loader](#), page 7-120
- ◆ 4.1.5. [Priming](#), page 7-120.



Fig. 7-37: «Cycles» tab

4.1.1. System

This part allows the user to perform some maintenance operations by using the following functions:

- ◆ [Replace Lamp](#), page 7-116
- ◆ [Replace Sample needle](#), page 7-116
- ◆ [Replace Reagent needle](#), page 7-116
- ◆ [Replace Mixer paddle](#), page 7-117
- ◆ [Replace Syringe](#), page 7-117
- ◆ [Initialize](#), page 7-117
- ◆ [Clean wash tower](#), page 7-117
- ◆ [Replace syringe plunger tips](#), page 7-117
- ◆ [Sample pressure calibration](#), page 7-118
- ◆ [Reagent pressure calibration](#), page 7-118.

▼ Replace Lamp

This function helps the user to replace the lamp.

- Press the «Replace Lamp» key.
- The lamp is switched OFF. Then, a message informs the user that the lamp can be replaced.
- Follow the lamp replacement procedure (see [1.13. Lamp replacement](#), page 9-22) and press the «OK» button when finished.

Closing the «Customer Services» menu, the **Pentra 400** turns to «Emergency Stop» status.

Then, the user must initialize the instrument by pressing the «Analyser Initialization» button from the generic toolbar.

▼ Replace Sample needle

This function helps the user to replace the sample needle.

- Press the «Replace Sample needle» key.
- The sample arm is positioned so as to make the sample needle replacement easier. Then, a message informs the user that the sample needle can be replaced.
- Replace the sample needle and press the «OK» button when finished.
- The instrument checks that the sample needle is correctly positioned. Then, a message informs the user that the sample needle replacement is finished.
- Press the «OK» button.

▼ Replace Reagent needle

This function helps the user to replace the reagent needle.

- Press the «Replace Reagent needle» key.
- The reagent needle heating is switched OFF and the reagent arm is positioned so as to make the reagent needle replacement easier. Then, a message informs the user that the reagent needle can be replaced.
- Replace the reagent needle and press the «OK» button when finished.
- The instrument checks that the reagent needle is correctly positioned. Then, a message informs the user that the reagent needle replacement is finished.
- Press the «OK» button.

▼ Replace Mixer paddle

This function helps the user to replace the mixer paddle.

- Press the «Replace Mixer paddle» key.
- The mixer as the sample and reagent arms are positioned so as to make the mixer paddle replacement easier. Then, a message informs the user that the mixer paddle can be replaced.
- Replace the mixer paddle and press the «OK» button when finished.

▼ Replace Syringe

This function helps the user to replace the syringes.

- Press the «Replace Syringes» key.
- The syringes are positioned halfway down so as to make their replacement easier. Then, a message informs the user that the syringes can be replaced.
- Follow the syringes replacement procedure (see [1.10. Syringes replacement](#), page 9-16) and press the «OK» button when finished.

▼ Initialize

This function allows the user to perform the instrument mechanical initialization.

- Press the «Initialize» key.
- Then, the instrument mechanical initialization is performed.

▼ Clean wash tower

This function helps the user to clean the three wash towers.

- Press the «Clean wash tower» key.
- The sample and reagent arms as the mixer are positioned so as to make the wash tower cleaning easier. Then, a message informs the user that the wash tower cleaning can be performed.
- Follow the wash tower cleaning procedure (see [1.4. Wash tower cleaning](#), page 9-9) and press the «OK» button when finished.

▼ Replace syringe plunger tips

This function helps the user to replace the syringe plunger tips.

- Press the «Replace syringe plunger tips» key.
- The syringes are positioned halfway down so as to make the syringe plunger tips replacement easier. Then, a message informs the user that the syringe plunger tips can be replaced.
- Follow the syringe plunger tips replacement procedure (see [1.5. Syringe plunger tips replacement](#), page 9-10) and press the «OK» button when finished.

▼ Sample pressure calibration

This function allows the user to perform the calibration of the sample pressure detector.

- Press the «Sample pressure calibration» key.
- Then, the calibration of the sample pressure detector is performed.
- Once the calibration is finished, the slope (A) and the intercept (B) of the regression line are displayed in the corresponding fields.

If the calibration is OK, the new slope and intercept are automatically validated.

If the calibration has failed, the slope and intercept are displayed in red and the following system warning is triggered: 626\Pressure Sample calibration failed.

Heading/Key	Description	Format
Sample pressure calibration	Performs the calibration of the sample pressure detector.	Key
A	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from 0.00001 to 99.99999.
B	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.

Tab. 7-93: Sample pressure calibration

This function is enabled only if the pressure detection of sample needle is enabled (see [3.1.5. Pressure Detections](#), page 7-80).

▼ Reagent pressure calibration

This function allows the user to perform the calibration of the reagent pressure detector.

- Press the «Reagent pressure calibration» key.
- Then, the calibration of the reagent pressure detector is performed.
- Once the calibration is finished, the slope (A) and the intercept (B) of the regression line are displayed in the corresponding fields.

If the calibration is OK, the new slope and intercept are automatically validated.

If the calibration has failed, the slope and intercept are displayed in red and the following system warning is triggered: 627\Pressure Reagent calibration failed.

Heading/Key	Description	Format
Reagent pressure calibration	Performs the calibration of the reagent pressure detector.	Key
A	Slope (A) of the regression line $y = A \cdot x + B$.	2 numerical characters max. + five decimal position: from 0.00001 to 99.99999.
B	Intercept (B) of the regression line $y = A \cdot x + B$.	4 numerical characters max. + five decimal position: from -9999.99999 to 9999.99999.

Tab. 7-94: Reagent pressure calibration

This function is enabled only if the pressure detection of reagent needle is enabled (see [3.1.5. Pressure Detections](#), page 7-80).

4.1.2. Cleaning

This part allows the user to perform cleaning of needles, mixer and ISE module.

Heading/Key	Description	Format
Needle Cleaning Solution	Name of the cleaner used to perform the needle (and mixer) cleaning.	Scrolling list
Mixer cleaning	If checked, the mixer cleaning is performed with the needle cleaning.	Check box
Needle Cleaning	Performs the needle (and mixer) cleaning. Enabled only if: - the instrument status is «Ready» - the selected cleaner is positioned on the reagent tray.	Key

Tab. 7-95: Needle and mixer cleaning



- ◆ If the selected cleaner is distilled water, the mixer cleaning is automatically performed with the needle cleaning and then, the «Mixer cleaning» box is disabled.
- ◆ If the selected cleaner is distilled water, the «Needle Cleaning» key is always enabled.

Heading/Key	Description	Format
ISE Cleaning Solution	Name of the cleaner used to perform the ISE cleaning.	Scrolling list
ISE Cleaning	Performs the ISE cleaning. Enabled only if: - the ISE module is not occupied and its status ≥ 4 - the selected cleaner is positioned on the reagent tray.	Key
ISE Etching Solution	Name of the cleaner used to perform the ISE etching.	Scrolling list
ISE Etching	Performs the ISE etching. Enabled only if: - the ISE module is not occupied and its status ≥ 4 - the selected cleaner is positioned on the reagent tray.	Key

Tab. 7-96: ISE module cleaning

4.1.3. ISE activation

This part allows the user to perform the ISE module activation.

The ISE module activation consists in running one serum or plasma sample in order to condition the electrodes. This function should be used after the ISE module cleaning and/or etching.

- Check the «ISE activation» box.
- Select the rack position of the sample tube by using the corresponding scrolling lists.
- Then, press the «ISE activation» key and follow the instructions given by the instrument.

This function is disabled if the ISE module is occupied.

4.1.4. Loader

This part allows the user to load or unload a cuvette segment from the reaction tray.

This function is used to check that the cuvette changer is operating correctly.

Heading/Key	Description	Format
Sector	Sector number on the reaction tray.	One numerical character: 1 to 6.
Load	Loads a new cuvette segment in the defined sector. Disabled if the rack of new cuvettes is empty.	Key
Unload	Unloads a used cuvette segment from the defined sector. Disabled if the rack of used cuvettes is full.	Key

Tab. 7-97: Loader

4.1.5. Priming

This part allows the user to check the instrument hydraulic circuit by using the following functions:

- ◆ **Priming Cycle**, page 7-120
- ◆ **Filling up**, page 7-120
- ◆ **Draining**, page 7-120.

▼ Priming Cycle

This function should be used to:

- check the hydraulic circuit after the needles or syringes replacement
- eliminate air bubbles in the syringes or tubing.

Press the «Priming Cycle» key and check that the needles correctly dispense distilled water in their respective wash towers for a few seconds.

▼ Filling up

This function should be used after:

- the replacement of the distilled water tank
- draining the hydraulic circuit.

Press the «Filling up» key in order to fill up the hydraulic circuit.

▼ Draining

Press the «Draining» key.

Disconnect the distilled water tank and press the «OK» button in order to drain the hydraulic circuit.

4.2. ISE

This section describes the «ISE» tab and how to use it in the following chapters:

- ◆ 4.2.1. [Activated electrode](#), page 7-122
- ◆ 4.2.2. [Cycles](#), page 7-123
- ◆ 4.2.3. [ISE module status](#), page 7-125.

Moreover, this section provides ISE module shutdown procedures (see [4.2.4. ISE module shutdown procedures](#), page 7-127).

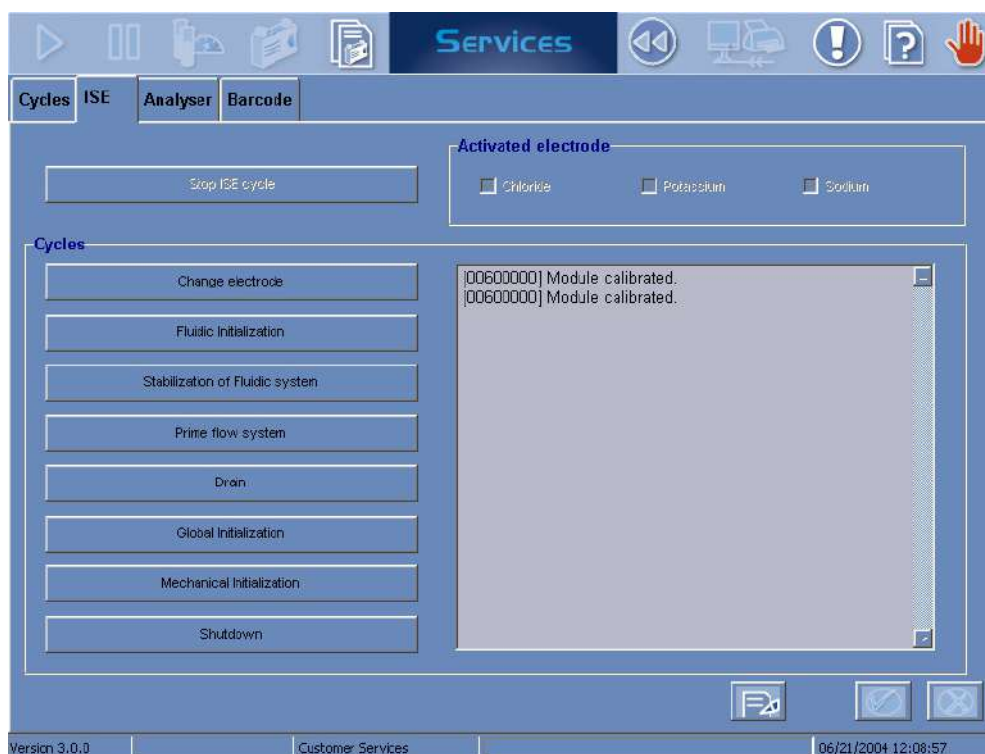


Fig. 7-38: «ISE» tab

4.2.1. Activated electrode

This part allows the user to activate/inactivate the three electrodes: Chloride, Potassium, Sodium.

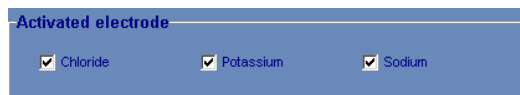


Fig. 7-39: Activated electrode

Heading	Description	Format
Chloride	If checked, the chloride electrode is activated.	Check box
Potassium	If checked, the potassium electrode is activated.	Check box
Sodium	If checked, the sodium electrode is activated.	Check box

Tab. 7-98: Activated electrode



An electrode cannot be inactivated if there are ISE tests for this electrode in the Worklist or for validation.

If an electrode is inactivated, then:

- on the ISE module status screen (see [ISE Module Status](#), page 1-31), the calibration part corresponding to this electrode is disabled
- the ISE tests for this electrode are not displayed in the request capture screen (see [2.2.5. Request capture screen](#), page 2-14).

The «ISE» tab opens in Display mode. In this mode, the user cannot modify the «Activated electrode» part. Press the «Edit» button to access modification function. After modification of one or several parameters, press the «OK» button to validate.



The «Edit» button is enabled only if the ISE module is not occupied.

4.2.2. Cycles

This part allows the user to perform some maintenance operations by using the following functions:

- ◆ [Stop ISE cycle](#), page 7-123
- ◆ [Change electrode](#), page 7-123
- ◆ [Fluidic Initialization](#), page 7-123
- ◆ [Stabilization of Fluidic system](#), page 7-123
- ◆ [Prime flow system](#), page 7-124
- ◆ [Drain](#), page 7-124
- ◆ [Global Initialization](#), page 7-124
- ◆ [Mechanical Initialization](#), page 7-124
- ◆ [Shutdown](#), page 7-124.

▼ Stop ISE cycle

This function allows the user to stop immediately the ISE module.

- Press the «Stop ISE cycle» key.
- The ISE module is immediately stopped (without user confirmation).
- Then, the user must initialize the ISE module by pressing the «Global Initialization» key (see [Global Initialization](#), page 7-124).

The «Stop ISE cycle» key is enabled only if the ISE module is occupied.

▼ Change electrode

This function helps the user to replace an electrode.

- Press the «Change electrode» key.
- The ISE module drains the reagents from the electrodes to allow the user to replace the electrode.

The «Change electrode» key is enabled only if the ISE module is not occupied and its status ≥ 3 .

▼ Fluidic Initialization

This function should be used after the ISE reagents replacement or an ISE shutdown (complete stop of the ISE module) exceeding three days.

- Press the «Fluidic Initialization» key.
- The ISE module primes the reagents into the fluidic system.

The «Fluidic Initialization» key is enabled only if the ISE module is not occupied and its status ≥ 3 .

▼ Stabilization of Fluidic system

This function should be used to rinse the fluidic system out or eliminate air bubbles in the fluidic system.

- Press the «Stabilization of Fluidic system» key.
- The ISE module rinses the fluidic system out.

The «Stabilization of Fluidic system» key is enabled only if the ISE module is not occupied and its status ≥ 4 .

▼ Prime flow system

This function should be used to prime the reagents into the fluidic system at the ISE module installation.

- Press the «Prime flow system» key.
- The ISE module primes the reagents into the fluidic system.

The «Prime flow system» key is enabled only if the ISE module is not occupied and its status ≥ 5 .

▼ Drain

This function should be used for an ISE shutdown (complete stop of the ISE module) exceeding three days or the system transportation.

- Press the «Drain» key.
- The ISE module drains the reagents from the fluidic system.

The «Drain» key is enabled only if the ISE module is not occupied and its status ≥ 3 .

▼ Global Initialization

This function allows the user to initialize the ISE module.

- Press the «Global Initialization» key.
- The ISE module initialization is performed.

The «Global Initialization» key is enabled only if the ISE module is not occupied.

▼ Mechanical Initialization

This function should be used to check the syringe movement and set the syringes to their initial position.

- Press the «Mechanical Initialization» key.
- The ISE module checks the syringe movement and sets the syringes to their initial position.

The «Mechanical Initialization» key is enabled only if the ISE module is not occupied and its status ≥ 2 .

▼ Shutdown

This function should be used for an ISE shutdown (complete stop of the ISE module) exceeding three days.

- Press the «Shutdown» key.
- The ISE module fills the electrodes with low standard and air in order to prevent the contamination of the reference solution.

The «Shutdown» key is enabled only if the ISE module is not occupied and its status ≥ 3 .

4.2.3. ISE module status

The «ISE» tab informs the user about the ISE module status by displaying:

- the current ISE module status
(see [Tab. 7-99: ISE module status](#), page 7-125)
- the last ISE error code
(see [Tab. 7-100: ISE error codes](#), page 7-125).

Code	Description
0	Module not initialized.
1	Module initialized.
2	Module configured.
3	Mechanical part initialized.
4	Module sleeping.
5	Fluidic part initialized.
6	Module calibrated.

Tab. 7-99: ISE module status

Code	Error type	Cycle to be run	Warning/Error/Flag triggered on the Pentra 400
001	Timeout error on ISE syringe 1.	Global Initialization.	Warning 318
002	Position error on ISE syringe 1.	Global Initialization.	Warning 319
011	Timeout error on ISE syringe 2.	Global Initialization.	Warning 320
012	Position error on ISE syringe 2.	Global Initialization.	Warning 321
021	Can't detect ISE low solution (detected by the air sensor).	Global Initialization.	Warning 322
022	Can't detect ISE low solution inlet (detected by the electrode measurement).	Global Initialization.	Warning 323
023	Too much ISE low solution inlet (detected by the air sensor).	Global Initialization.	Warning 324
024	ISE low solution inlet excess on timeout (detected by the air sensor).	Global Initialization.	Warning 325
025	ISE low solution inlet excess on start of measuring (detected by the electrode measurement).	Global Initialization.	Warning 326
031	Can't detect ISE high solution (detected by the air sensor).	Global Initialization.	Warning 327
032	Can't detect ISE high solution inlet (detected by the electrode measurement).	Global Initialization.	Warning 328
033	Too much ISE high solution inlet (detected by the air sensor).	Global Initialization.	Warning 329

Tab. 7-100: ISE error codes

Code	Error type	Cycle to be run	Warning/Error/Flag triggered on the Pentra 400
034	ISE high solution inlet excess on timeout (detected by the air sensor).	Global Initialization.	Warning 330
041	Can't detect ISE sample (detected by the air sensor).	-	Warning 331
042	Can't detect ISE sample inlet (detected by the air sensor).	-	Warning 332
043	Too much ISE sample inlet (detected by the air sensor).	Global Initialization.	Warning 333
044	ISE sample inlet excess on timeout (detected by the air sensor).	Global Initialization.	Warning 334
050	ISE electrode sensibility error.	2-point calibration.	- Warning 335 - Calibration error
051	ISE electrode offset error.	2-point calibration.	- Warning 336 - Calibration error
052	ISE electrode repeatability error.	2-point calibration.	- Warning 337 - Calibration error - Control, Patient sample: flag ISE_ERROR
055	ISE electrode response error.	-	- Warning 338 - Calibration error - Control, Patient sample: flag ISE_ERROR
091	ISE LB check response error	Global Initialization.	Warning 339
101	ADC error.	Shutdown the instrument. Switch OFF/ON the instrument.	Warning 060

Tab. 7-100: ISE error codes

4.2.4. ISE module shutdown procedures

▼ Shutdown within 3 days

- ◆ First, check that the ISE module status is ≥ 3 .
If not, run a «Global Initialization» (see [Global Initialization](#), page 7-124).
- ◆ Run a «Shutdown» (see [Shutdown](#), page 7-124).
- ◆ Now, switch the **Pentra 400** off.

▼ Shutdown over 3 days

- ◆ First, check that the ISE module status is ≥ 3 .
If not, run a «Global Initialization» (see [Global Initialization](#), page 7-124).
- ◆ Remove the straws from the reagent bottles and wrap them into absorbant paper.
- ◆ Close the reagent bottles with caps.



Once opened, the ISE reagents are stable for 1 month if stored at 5-30°C and protected from light.

- ◆ Run a «Drain» (see [Drain](#), page 7-124).
- ◆ Plunge the straws into a distilled water bottle, then run a «Fluidic Initialization» (see [Fluidic Initialization](#), page 7-123).
- ◆ Remove the straws from the distilled water bottle and wrap them into absorbant paper.
- ◆ Run a «Drain» (see [Drain](#), page 7-124).
- ◆ Now, switch the **Pentra 400** off.
- ◆ Remove the electrodes and the air sensor from the cage.
 - For the sodium, chloride and potassium electrodes as for the air sensor, ensure there is no liquid into the inner tube.
 - For the reference electrode, put a tubing filled with reference solution between the 2 connectors and seal the inner tube with a cellophane tape.



Store the electrodes in a dry and clean area.

▼ Electrodes reinstallation after a shutdown over 3 days

- ◆ Reinstall the electrodes and the air sensor into the cage.
 - For the reference electrode, remove the tubing between the 2 connectors and remove the cellophane tape from the inner tube.
 - For all electrodes, check that the O-ring is well-positioned on one side of the electrode and make sure that the electrode is clean.
 - Install the electrodes (see [Fig. 7-40: Electrodes installation](#), page 7-128).



Fig. 7-40: Electrodes installation

When facing the ISE module, the electrodes have to be positioned from left to right as shown on the following diagram:

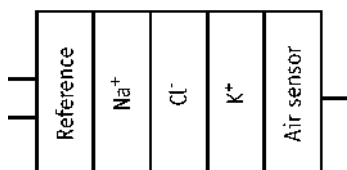


Fig. 7-41: Electrodes diagram

- ◆ Close the ISE door and tighten the screw.
- ◆ Plunge the straws into the reagent bottles.
Check that the tubing corresponds to the reagent:
 - L for Standard 1
 - H for Standard 2
 - R for Reference.
- ◆ Now, switch the **Pentra 400** on.

4.3. Analyser

This section describes the «Analyser» tab and how to use it in the following chapters:

- ◆ 4.3.1. [Sample Tray](#), page 7-129
- ◆ 4.3.2. [Temperatures](#), page 7-130
- ◆ 4.3.3. [Spectro Gain](#), page 7-130.

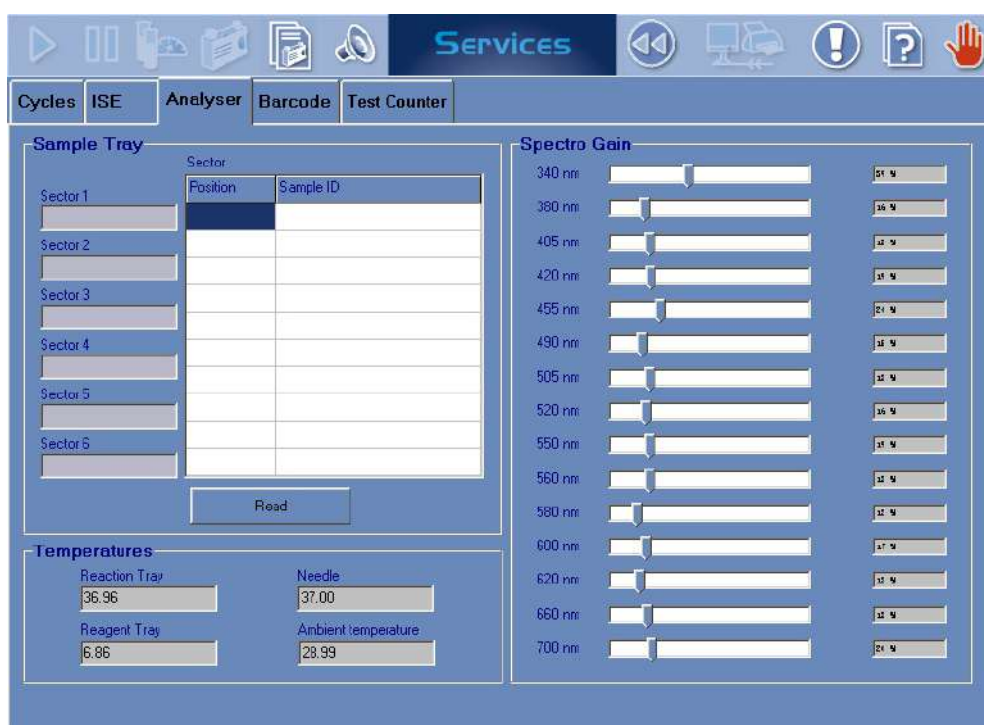


Fig. 7-42: «Analyser» tab

4.3.1. Sample Tray

This part allows the user to check that the barcode reader reads correctly racks and tubes present on the sample tray.

Press the «Read» key to perform a sample tray reading.

The rack ID read for each tray sector is then displayed in the table 1 (see [Fig. 7-43: Sample Tray](#), page 7-130).

Then, select a tray sector in the table 1 in order to display the Sample ID read for each rack position in the table 2 (see [Fig. 7-43: Sample Tray](#), page 7-130).



In case the tube is detected and no barcode label is read, then NO is displayed instead of the Sample ID.

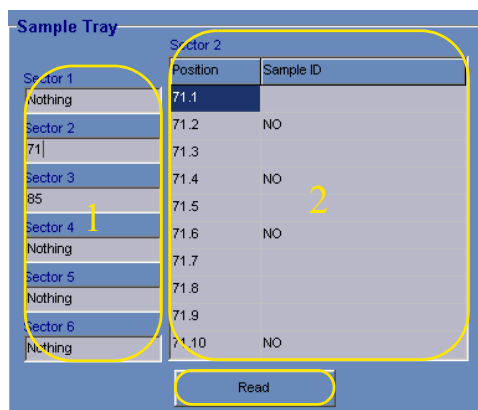


Fig. 7-43: Sample Tray

4.3.2. Temperatures

This part allows the user to check the following temperatures:

Heading	Description	Format	Expected values
Reaction Tray	Temperature in the reaction chamber.	##.## °C	37°C (± 0.2°C)
Needle	Temperature in the reagent needle.	##.## °C	37°C (± 0.5°C)
Reagent Tray	Temperature of the cooled area in the reagent tray.	##.## °C	4-10°C
Ambient temperature	Ambient temperature in the instrument.	##.## °C	-

Tab. 7-101: Temperatures

4.3.3. Spectro Gain

This part allows the user to check the spectrophotometer gain for each wavelength.

The spectrophotometer gains are automatically adjusted and checked every time that the instrument is:

- turned on
- initialized
- waken up after a «stand-by».

The gains are expressed in % and, are adjusted and checked for all 15 wavelengths.

All gains should be included between 1 and 95%.

If one of the gains is > 95% but ≤ 98%, the lamp is still operational but dying and a warning is triggered (# 629). See [Tab. 9-7: Warnings](#), page 9-43.

If one of the gains is < 1% or > 98%, the lamp needs to be replaced at once and an alarm is triggered (# 520). See [Tab. 9-8: Alarms](#), page 9-50.

4.4. Barcode

The «Barcode» tab allows the user to check:

- a barcode label and its barcode type
- that the barcode reader is working properly.

This tab is divided into the two following parts:

◆4.4.1. [Position](#), page 7-132

◆4.4.2. [Sample tray/reading tests](#), page 7-132.

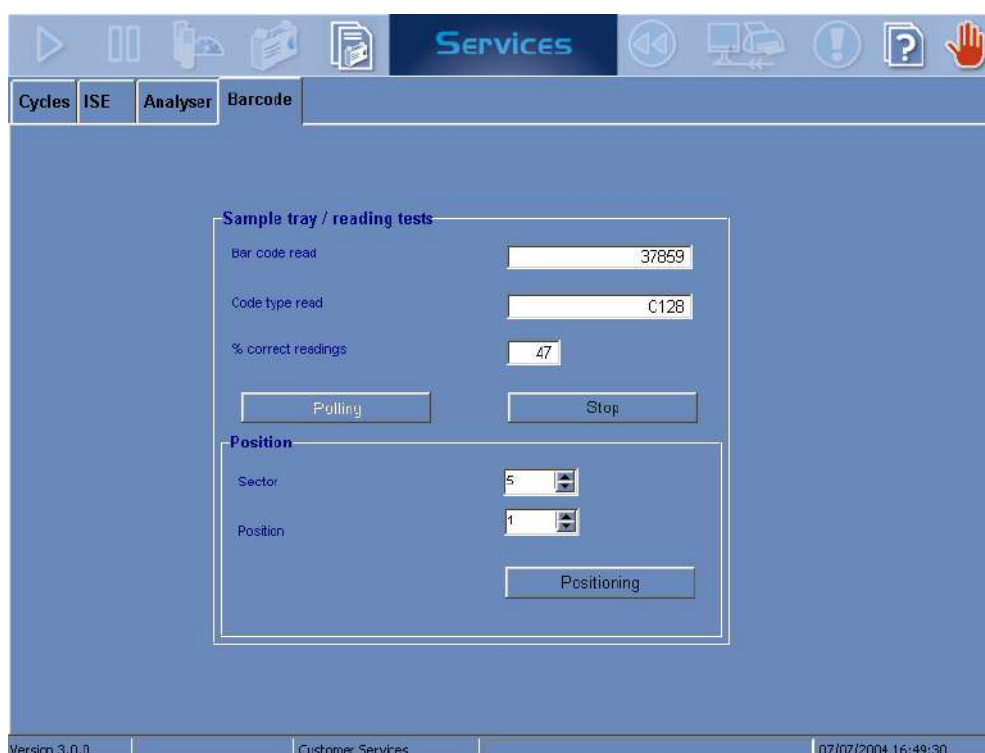


Fig. 7-44: «Barcode» tab

4.4.1. Position

Heading/Key	Description	Format
Sector	Position number on the sample tray where the barcode label to read is placed.	1 numerical character. From 1 to 6.
Position	Position number on the rack where the barcode label to read is placed.	2 numerical characters max. From 1 to 10.
Positioning	Places the position defined above in front of the barcode reader.	Key

Tab. 7-102: Position

4.4.2. Sample tray/reading tests

Heading/Key	Description	Format
Barcode read	Displays the barcode read or «No code» if no reading is possible.	-
Code type read	Displays the barcode type read: 2-5 Interleaved, Codabar, Code 39, Code 93, Code 128, EAN, EAN 128, UPC.	-
% correct readings	Displays the number of correct readings in %.	From 0 to 100%
Polling	Turns the barcode reader to «Polling» mode.	Key
Stop	Stops continuous reading and replaces the barcode reader in its initial configuration.	Key

Tab. 7-103: Sample tray/reading tests

The «Polling» mode:

- places the defined position in front of the barcode reader
- configures the barcode reader in order to read all the barcode types mentioned above (see [Tab. 7-103: Sample tray/reading tests](#), page 7-132)
- allows continuous reading of the positioned barcode label
- displays continuously the barcode read, the barcode type read and the number of correct readings (in %).

4.5. Test Counter (Available on request)

The «Test Counter» tab counts and sorts the tests performed on the **Pentra 400** in order to give statistical analyses of these tests.

The tests are listed by applications. The user is able to display the tests either for the resident applications, for the other applications or for all the applications by using the selective filter (see [4.5.1. Selective filter](#), page 7-133).

The user is able to display the tests over a defined time period (see [4.5.2. Time period](#), page 7-134).

Then, the test counter gives statistical analyses of these tests (see [4.5.3. Test counter](#), page 7-134).

Moreover, detailed data and graphs for an application are given in the detailed test counter screen (see [4.5.4. Detailed test counter screen](#), page 7-136).

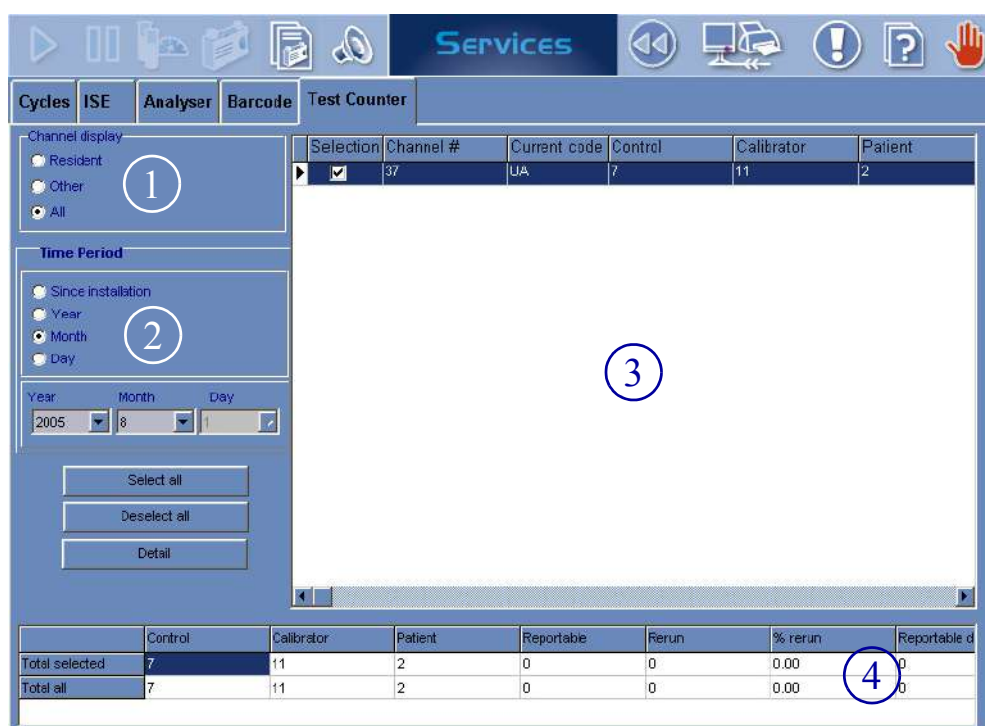


Fig. 7-45: «Test Counter» tab

4.5.1. Selective filter

The user is able to display the tests either for the resident applications, for the other applications or for all the applications by using the selective filter (see 1, [Fig. 7-45: «Test Counter» tab](#), page 7-133).

- Resident: only the tests for the applications provided by **HORIBA ABX** or your distributor are displayed.
- Other: only the tests for the applications added by the user are displayed.
- All: the tests for all the applications configured on the instrument are displayed.

4.5.2. Time period

The user is able to display the tests over a defined time period by using the «Time Period» part (see 2, [Fig. 7-45: «Test Counter» tab](#), page 7-133).

First, choose between the different options:

- Since installation: the tests performed on the **Pentra 400** since its installation are displayed.
- Year: the tests performed over a year are displayed.
- Month: the tests performed over a month are displayed.
- Day: the tests performed over a day are displayed.

Then, according to the option chosen, select the year, month and/or day by using the corresponding scrolling lists.

4.5.3. Test counter

The test counter gives statistical analyses of the tests that are displayed according to the selected applications (see [4.5.1. Selective filter](#), page 7-133) and the defined time period (see [4.5.2. Time period](#), page 7-134).

See 3, [Fig. 7-45: «Test Counter» tab](#), page 7-133.

The test counter lists the tests and gives statistical analyses of these tests by applications. Columns of the test counter are described in the following table:

Heading	Description	Format
Selection	If checked, the tests for this application are taken into account in the cumulative test counter (see Cumulative test counter , page 7-135).	Check box
Channel #	Application channel number.	3 numerical characters max. From 1 to 999.
Current code	Current application short name.	7 characters max.
Control	Number of control tests performed.	8 numerical characters max.
Calibrator	Number of calibration tests performed.	8 numerical characters max.
Patient	Number of patient tests performed.	8 numerical characters max.
Reportable	Number of patient test results with the decision Accept or Modify.	8 numerical characters max.
Rerun	Number of patient tests with a rerun performed (manually or automatically).	8 numerical characters max.
% rerun	Percentage of reruns compared with the number of patient test results with the decision Accept or Modify (Reportable column).	From 0.01 to 99.99%.
Reportable deleted	Number of patient test results with the decision Delete.	8 numerical characters max.

Tab. 7-104: Test counter description

Heading	Description	Format
Failure	Number of patient tests failed (see Failure , page 7-135).	8 numerical characters max.
Total	Total number of patient, calibration and control tests.	8 numerical characters max.

Tab. 7–104: Test counter description

◆ Failure

The number of patient tests failed is calculated as follows:

Failure column = Patient column - (Reportable + Rerun + Reportable deleted) columns.



If an application is deleted, then the corresponding line in the test counter is grayed.

▼ Cumulative test counter

The cumulative test counter gives statistical analyses of all of the tests:

- for the applications checked in the test counter (see Selection, [Tab. 7–104: Test counter description](#), page 7-134)
- for all the applications displayed in the test counter.



The buttons «Select all» and «Deselect all» allow the user to check or uncheck all the applications displayed in the test counter.

Columns of the cumulative test counter are described in the following table:

Heading	Description	Format
Control	Number of control tests performed.	8 numerical characters max.
Calibrator	Number of calibration tests performed.	8 numerical characters max.
Patient	Number of patient tests performed.	8 numerical characters max.
Reportable	Number of patient test results with the decision Accept or Modify.	8 numerical characters max.
Rerun	Number of patient tests with a rerun performed (manually or automatically).	8 numerical characters max.
% rerun	Percentage of reruns compared with the number of patient test results with the decision Accept or Modify (Reportable column).	From 0.01 to 99.99%.
Reportable deleted	Number of patient test results with the decision Delete.	8 numerical characters max.
Failure	Number of patient tests failed (see Failure , page 7-135).	8 numerical characters max.
Total	Total number of patient, calibration and control tests.	8 numerical characters max.

Tab. 7–105: Cumulative test counter description

4.5.4. Detailed test counter screen

Detailed data and graphs for an application are given in the detailed test counter screen. The user is able to visualize the detailed test counter screen for an application either by selecting the corresponding line in the test counter and pressing the «Detail» button or by double-clicking the corresponding line in the test counter.



The detailed test counter screen is not accessible if the option chosen in the «Time Period» part is Day (see 4.5.2. Time period, page 7-134).

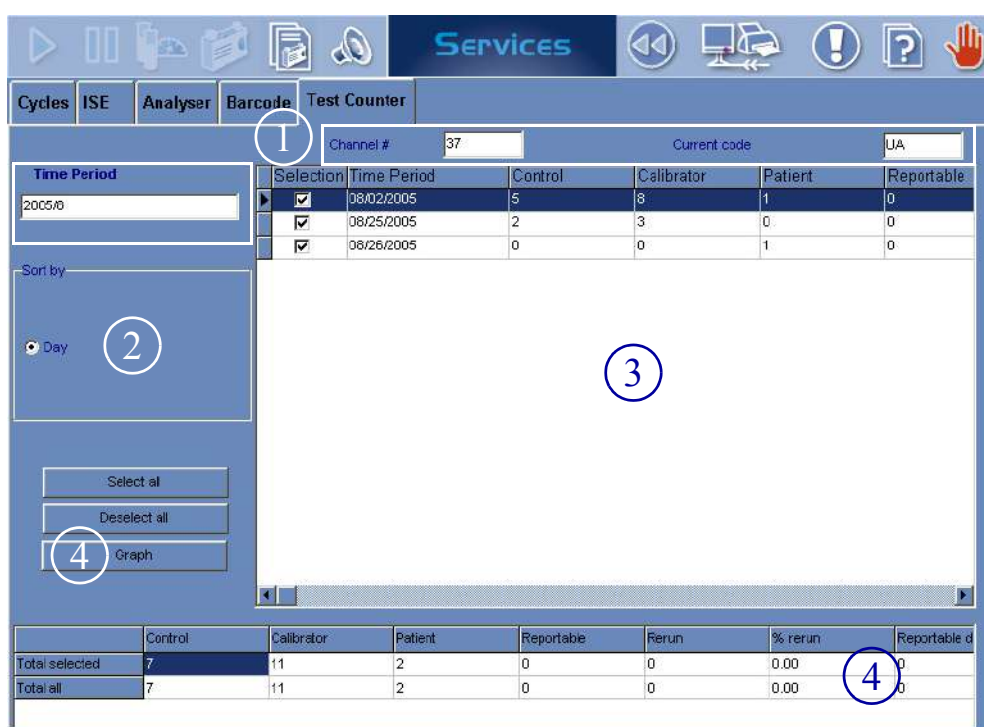


Fig. 7-46: Detailed test counter screen

The detailed test counter screen gives statistical analyses of the tests for the application selected in the test counter and over the defined time period (see 4.5.2. Time period, page 7-134). The selected application and the defined time period are respectively displayed at the top and on the left-hand side of the screen (see 1, Fig. 7-46: Detailed test counter screen, page 7-136).

The user is able to display the tests sorted by years, months or days by using the corresponding radio buttons (see 2, Fig. 7-46: Detailed test counter screen, page 7-136).

Statistical analyses of the tests are given in the two following tables and on a graph:

- ◆ Detailed test counter, page 7-137
- ◆ Cumulative detailed test counter, page 7-137
- ◆ Graph, page 7-138.

▼ Detailed test counter

See 3, [Fig. 7–46: Detailed test counter screen](#), page 7-136.

The detailed test counter lists the tests and gives statistical analyses of these tests by time periods. Columns of the detailed test counter are described in the following table:

Heading	Description	Format
Selection	If checked, the tests for this time period are taken into account in the cumulative detailed test counter (see Cumulative detailed test counter , page 7-137) and on the graph (see Graph , page 7-138).	Check box
Time Period	Time period.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Control	Number of control tests performed.	8 numerical characters max.
Calibrator	Number of calibration tests performed.	8 numerical characters max.
Patient	Number of patient tests performed.	8 numerical characters max.
Reportable	Number of patient test results with the decision Accept or Modify.	8 numerical characters max.
Rerun	Number of patient tests with a rerun performed (manually or automatically).	8 numerical characters max.
% rerun	Percentage of reruns compared with the number of patient test results with the decision Accept or Modify (Reportable column).	From 0.01 to 99.99%.
Reportable deleted	Number of patient test results with the decision Delete.	8 numerical characters max.
Failure	Number of patient tests failed (see Failure , page 7-137).	8 numerical characters max.
Total	Total number of patient, calibration and control tests.	8 numerical characters max.

Tab. 7–106: Detailed test counter description

◆ Failure

The number of patient tests failed is calculated as follows:

Failure column = Patient column - (Reportable + Rerun + Reportable deleted) columns.

▼ Cumulative detailed test counter

The cumulative detailed test counter gives statistical analyses of all of the tests:

- for the time periods checked in the detailed test counter (see Selection, [Tab. 7–106: Detailed test counter description](#), page 7-137)
- for all the time periods displayed in the detailed test counter.



The buttons «Select all» and «Deselect all» allow the user to check or uncheck all the time periods displayed in the detailed test counter.

Columns of the cumulative detailed test counter are described in the [Tab. 7–105: Cumulative test counter description](#), page 7-135.

▼ Graph

Statistical analyses of the tests for the time periods checked in the detailed test counter (see Selection, [Tab. 7-106: Detailed test counter description](#), page 7-137) can be displayed on a graph.



The buttons «Select all» and «Deselect all» allow the user to check or uncheck all the time periods displayed in the detailed test counter.

The user is able to visualize the graph by pressing the «Graph» button (see 4, [Fig. 7-46: Detailed test counter screen](#), page 7-136).



The maximum of time periods selectable is 100.

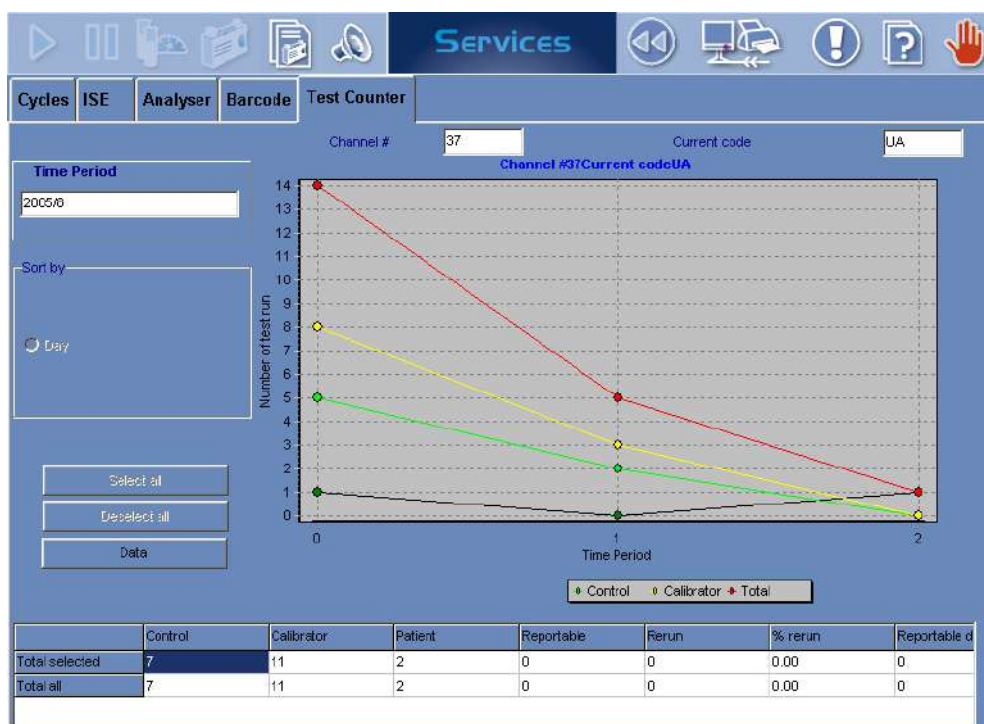


Fig. 7-47: Graph

This graph displays the following data:

- ◆Control tests performed: green line.
- ◆Calibration tests performed: yellow line.
- ◆Patient tests performed: dark line.
- ◆Total patient, calibration and control tests: red line.

5. Logs

These are the event logs for the **Pentra 400**. They contains all the notifications made automatically by the software while the instrument is operating.

The events are divided into seven different logs:

- Calibration
- Reagent
- Error
- System configuration
- Applications
- Sequencing
- Maintenance.

For each log (except for the Sequencing log), the events of the six last months are notified from the most recent to the oldest. For the Sequencing log, only the events of the seven last days are notified from the oldest to the most recent.

▼ Access to the «Logs» menu

Press the «Logs» button from the «Services» menu.

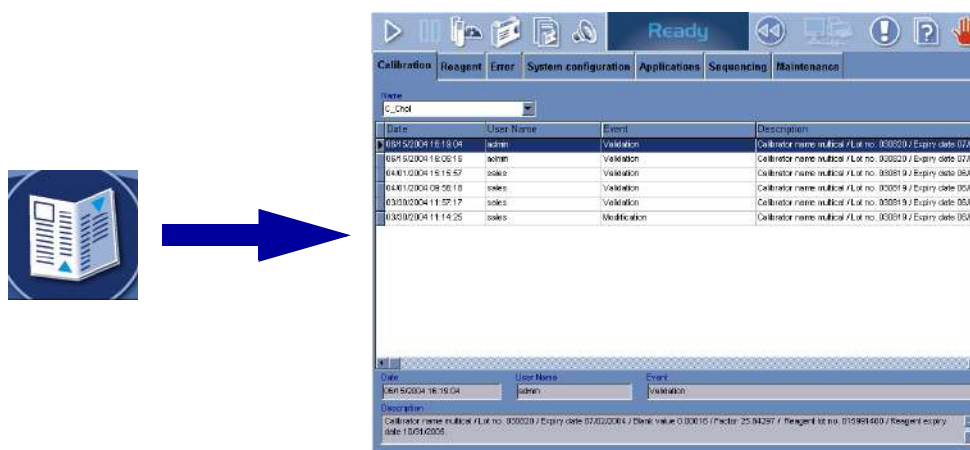


Fig. 7-48: «Logs» menu access button

The «Logs» menu groups seven tabs:

- ◆ **5.1. Calibration**, page 7-141
- ◆ **5.2. Reagent**, page 7-142
- ◆ **5.3. Error**, page 7-143
- ◆ **5.4. System configuration**, page 7-144
- ◆ **5.5. Applications**, page 7-146
- ◆ **5.6. Sequencing**, page 7-148
- ◆ **5.7. Maintenance**, page 7-150.

Click or press one of the tabs to access the various logs.

5.1. Calibration

The following events are notified in the Calibration log:

- ◆every calibration validation (automatic and manual validation)
- ◆every calibration cancellation
- ◆every target value modification.

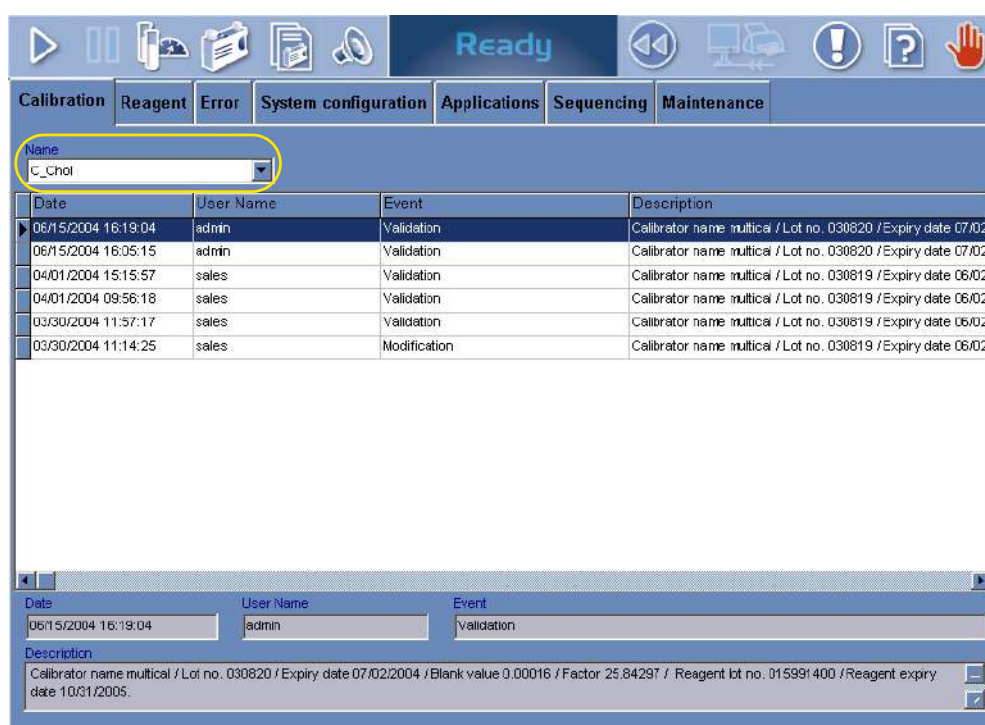


Fig. 7-49: Calibration log

The events notified in the Calibration log are listed test by test. The user selects the test by using the «Name» scrolling list (see [Fig. 7-49: Calibration log](#), page 7-141).

Columns of the Calibration log are described in the following table:

Heading	Description	Format
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User Name	User name or login used at the time of the event.	10 characters max.
Event	Name of the event.	50 characters max.
Description	Description of the event.	255 characters max.

Tab. 7-107: Calibration log description

5.2. Reagent

The following events are notified in the Reagent log:

- ◆every cassette/rack addition
- ◆every cassette/rack removal
- ◆every solution activation (automatic and manual activation)
- ◆every solution desactivation (automatic and manual desactivation)
- ◆every cassette deletion.

Date	User Name	Event	Description
05/10/2004 17:16:37	admin	Add	Solution type Method / ABX cassette ID 6209120146004307
05/10/2004 17:16:37	admin	Add	Solution type Method / ABX cassette ID 99090805740305
05/10/2004 16:30:15	admin	Activation	Solution type Method / ABX cassette ID 60153001290226
05/10/2004 16:30:00	admin	Desactivation	Solution type Method / ABX cassette ID 60153001150220
05/10/2004 16:28:28	admin	Activation	Solution type Method / ABX cassette ID 62121604610323
05/10/2004 16:28:12	admin	Desactivation	Solution type Method / ABX cassette ID 62121605510323
05/10/2004 16:27:41	admin	Activation	Solution type Method / ABX cassette ID 62091200790037
05/10/2004 16:27:27	admin	Desactivation	Solution type Method / ABX cassette ID 62091203750032
05/10/2004 16:17:53	admin	Desactivation	Solution type Method / Rack ID 69 / Position 40 - A / Name
05/10/2004 15:26:47	admin	Add	Solution type Method / ABX cassette ID 60153001290226
05/10/2004 15:26:47	admin	Add	Solution type Method / ABX cassette ID 60073000010280
05/10/2004 15:26:47	admin	Add	Solution type Method / ABX cassette ID 62121604610323
05/10/2004 15:26:47	admin	Add	Solution type Method / ABX cassette ID 62091200790037
05/10/2004 15:03:31	admin	Desactivation	Solution type Method / Rack ID 69 / Position 40 - A / Name
05/10/2004 14:37:55	admin	Desactivation	Solution type Cleaner / Rack ID 61 / Position VIDE / Name
05/10/2004 14:31:15	admin	Add	Rack ID 69
05/05/2004 18:19:36	tech	Add	Rack ID 64
05/05/2004 18:19:36	tech	Add	Rack ID 62

Date	User Name	Event	Description
05/10/2004 17:16:37	admin	Add	Solution type Method / ABX cassette ID 6209120146004307 / Rack sector position 4 / Name AST / Status Inactive / Lot no. 004620912 / Installation date 03/25/2004 / Use-by date 04/22/2004 / Expiry date 06/30/2004 / Initial volume 62 (ml) / Remaining volume 100.00 %

Fig. 7-50: Reagent log

Columns of the Reagent log are described in the following table:

Heading	Description	Format
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User Name	User name or login used at the time of the event.	10 characters max.
Event	Name of the event.	50 characters max.
Description	Description of the event.	255 characters max.

Tab. 7-108: Reagent log description

5.3. Error

All the system warnings and alarms triggered while the instrument is operating are notified in the Error log.

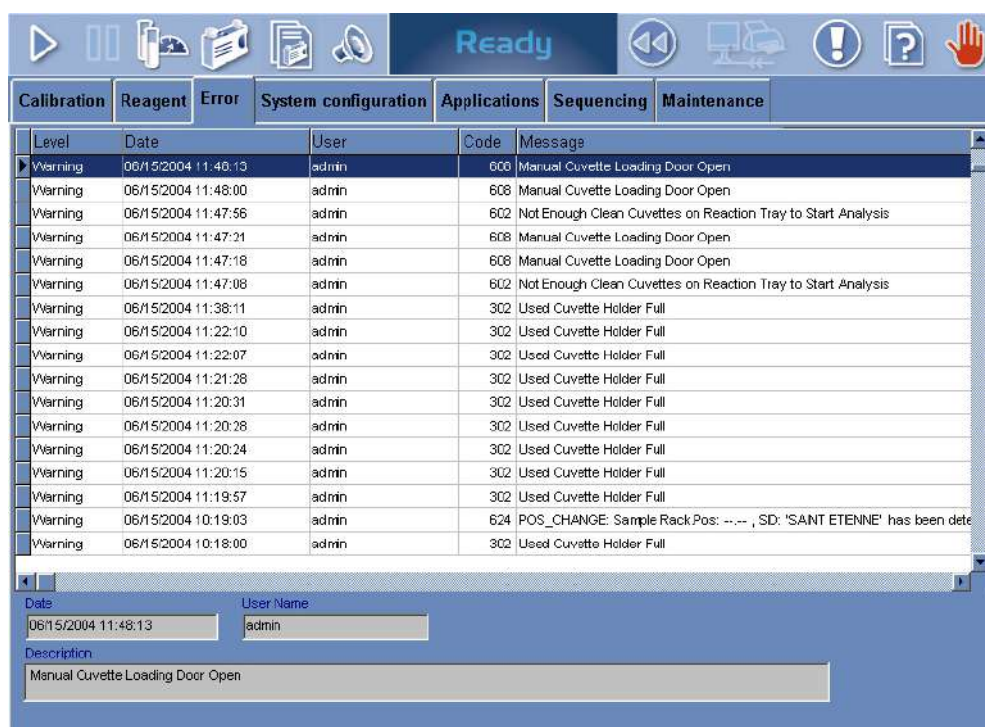


Fig. 7-51: Error log

Columns of the Error log are described in the following table:

Heading	Description	Format
Level	Warning or Alarm.	-
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User Name	User name or login used at the time of the event.	10 characters max.
Code	Warning/alarm code.	3 numerical characters.
Message	Warning/alarm description.	100 characters max.

Tab. 7-109: Error log description

For more information on system warnings and alarms, see [3.1. System warnings and alarms](#), page 9-39.

5.4. System configuration

The following events are notified in the System configuration log.

- ◆ Every parameter modification in the following tabs of the «System Configuration» menu:
 - Analyser (except «Racks» part)
 - Local Settings
 - Results Validation.
- ◆ Every modification of the rack configuration («Racks» part).
- ◆ Every modification of the Host connection configuration.
- ◆ Every modification of the printer settings.
- ◆ Every modification of the configuration of sound alarms.
- ◆ Every modification of the maintenance configuration.
- ◆ Every user profile addition.
- ◆ Every user profile deletion.
- ◆ Every user profile modification.
- ◆ Every modification of the number of user channels.

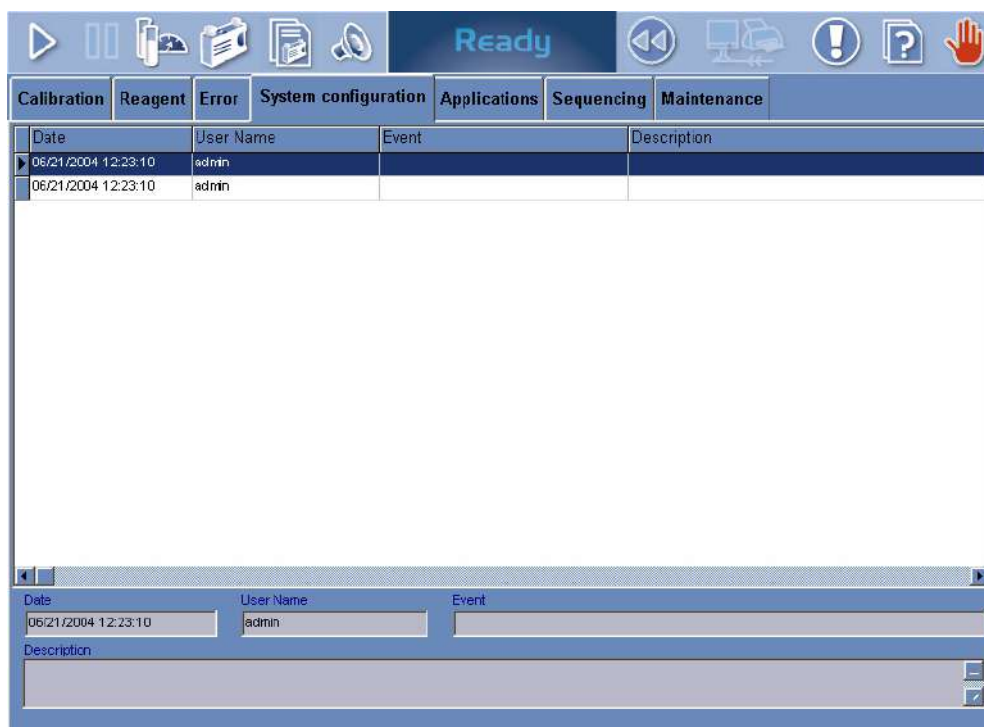


Fig. 7-52: System configuration log

Columns of the System configuration log are described in the following table:

Heading	Description	Format
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User Name	User name or login used at the time of the event.	10 characters max.
Event	Name of the event.	50 characters max.
Description	Description of the event.	255 characters max.

Tab. 7-110: System configuration log description

5.5. Applications

The following events are notified in the Applications log.

- For the applications provided by **HORIBA ABX** or your distributor:

- ◆ every application addition
- ◆ every application deletion
- ◆ every modification of the application version number
- ◆ every application modification (except change of the application version number).

- For the applications added by the user:

- ◆ every application addition
- ◆ every application deletion
- ◆ every application modification.

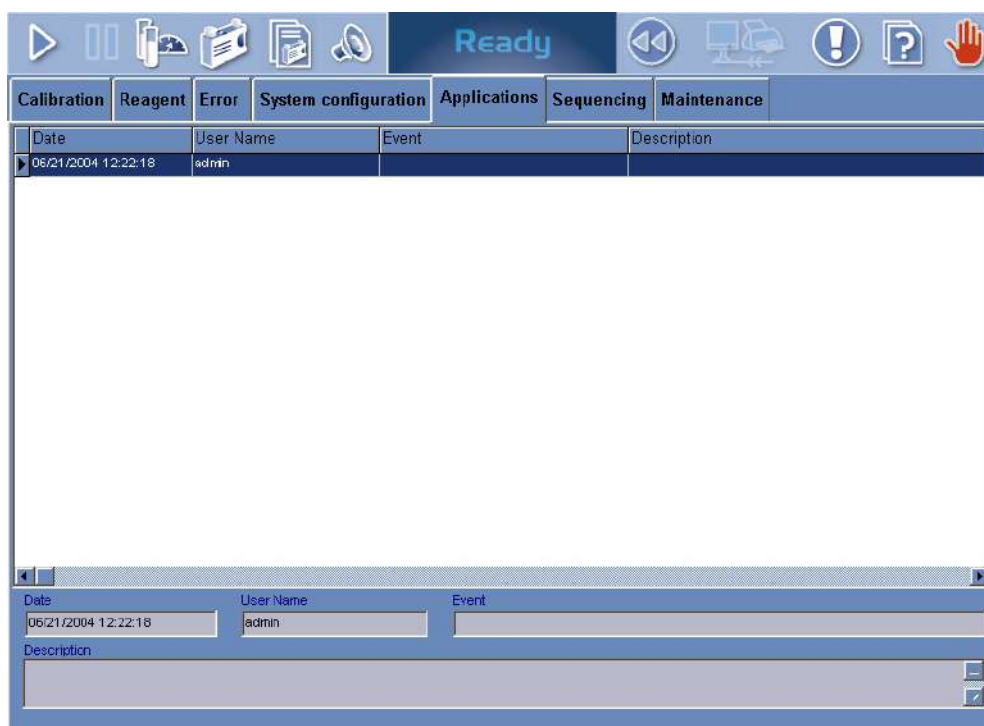


Fig. 7-53: Applications log

Columns of the Applications log are described in the following table:

Heading	Description	Format
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User Name	User name or login used at the time of the event.	10 characters max.
Event	Name of the event.	50 characters max.
Description	Description of the event.	255 characters max.

Tab. 7-111: Applications log description

5.6. Sequencing

The following events are notified in the Sequencing log:

- ◆ every sampling of the reagent needle
- ◆ every sampling of the sample needle
- ◆ every mixing
- ◆ every loading/unloading of a cuvette segment.

Reagent Arm						
Date	Nature	Reagent needle	Volume	Sampling position	Type	Dispenser
01/25/2006 15:46:43	T1	R1	400.0	R.31.4	61 B.1	C.6.1
01/25/2006 15:46:55	-	-	-	-	-	-
01/25/2006 15:53:17	T1	R1	400.0	R.31.4	61 B.1	C.3.2
01/25/2006 15:53:29	-	-	-	-	-	-
01/25/2006 15:53:41	-	-	-	-	-	-

Sample Arm					
Date	Nature	Sample needle	Volume	H2O	Sampling position
01/25/2006 15:46:43	T1	SAMPLE	2.5	92.5	S.41.3
01/25/2006 15:46:55	T1	R2	95.0	-	R.31.5
01/25/2006 15:53:17	T1	SAMPLE	2.5	92.5	S.41.4
01/25/2006 15:53:29	T1	R2	95.0	-	R.31.5
01/25/2006 15:53:41	-	-	-	-	-

Other		
Date	Mixing speed	Cuvette loader
01/25/2006 15:46:43	60	-
01/25/2006 15:46:55	60	-
01/25/2006 15:53:17	60	-
01/25/2006 15:53:29	60	UNLOADING 6
01/25/2006 15:53:41	-	LOADING 6
01/25/2006 15:55:55	60	-

Fig. 7-54: Sequencing log

Columns of the Sequencing log are described in the following table:

Heading	Description	Format
Reagent Arm		
Date	Date and time of the reagent needle sampling.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Nature	Nature of the reagent needle sampling. - For a test sampling: corresponding application code (or short name). - For an ISE test sampling: ISE. - For a dilution sampling: Dilution. - For a cleaning sampling: Cleaner.	

Tab. 7-112: Sequencing log description

Heading	Description	Format
Reagent needle	Solution pipetted by the reagent needle.	-
Volume	Volume pipetted by the reagent needle (μL).	From 15.0 to 600.0 μL.
Sampling position	Position of the reagent needle pipetting. - On the reagent tray: R (for reagent tray) + position on the tray + position on the cassette/rack.	
Type	Container type where the reagent needle pipetting is performed. - For cassettes: Cassette. - For reagent racks: rack ID + position on the rack.	
Dispensing position	Position of the reagent needle dispensing. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment.	
Sample Arm		
Date	Date and time of the sample needle sampling.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Nature	Nature of the sample needle sampling. - For a test sampling: corresponding application code (or short name). - For an ISE test sampling: ISE. - For a dilution sampling: Dilution. - For a cleaning sampling: Cleaner.	
Sample needle	Solution pipetted by the sample needle.	-
Volume	Volume pipetted by the sample needle (μL).	From 2.0 to 95.0 μL.
H ₂ O	Distilled water volume pipetted by the sample needle (μL) to push the sample volume.	From 0.0 to 95.0 μL.
Sampling position	Position of the sample needle pipetting. - On the sample tray: S (for sample tray) + rack number + position on the rack. - On the reagent tray: R (for reagent tray) + position on the tray + position on the cassette/rack. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment.	
Type	Container type where the sample needle pipetting is performed. - For sample tubes: Tube. - For sample cups: Sample cup. - For cassettes: Cassette. - For reagent racks: rack ID + position on the rack. - For calibrator/control reagent racks: rack ID. - For cuvettes: Cuvette.	
Dispensing position	Position of the sample needle dispensing. - On the reaction tray: C (for cuvette) + position on the tray + position on the cuvette segment. - In the ISE module sample cup: ISE bowl.	
Other		
Date	Date and time of the mixing or the loading/unloading of a cuvette segment.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Mixing speed	Mixing speed of solutions into the cuvette.	From 1 to 100%.
Cuvette loader	Loading/unloading of a cuvette segment.	Loading/Unloading + position on the tray.

Tab. 7-112: Sequencing log description

5.7. Maintenance

The maintenance procedures, configured in the «System Configuration» menu (see [3.7. Maintenance](#), page 7-110), are notified in the Maintenance log when they are done.

- ◆ Most of the maintenance procedures use a software function of the «Customer Services» menu (see [4.1. Cycles](#), page 7-115). These maintenance procedures are **automatically** notified in the Maintenance log when they are done.
- ◆ Some maintenance procedures are manually done by the user and do not use software functions. These maintenance procedures must be **manually** notified in the Maintenance log when they are done (see [Manually notify a maintenance procedure](#), page 7-151).



Fig. 7-55: Maintenance log

The user is able to display all the notified maintenance procedures or the notified maintenance procedures by frequencies by using the «Occurrence» scrolling list (see [Fig. 7-55: Maintenance log](#), page 7-150).



If a maintenance procedure is done 2 hours at least after the maintenance alert has been triggered, then the corresponding event in the Maintenance log is red.

Columns of the Maintenance log are described in the following table:

Heading	Description	Format
Date	Date and time of the event.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
User type	User level used at the time of the event (see 3.8. Users , page 7-112).	-
User name	User name or login used at the time of the event.	10 characters max.
Event	Name of the event.	50 characters max.
Description	Description of the event.	255 characters max.
Comment	Comment added by the user (see Add a comment , page 7-151).	255 characters max.

Tab. 7-113: Maintenance log description

▼ Manually notify a maintenance procedure

Press the «Add new» button.

The Maintenance log capture screen opens.

Select the maintenance procedure by using the «Event» scrolling list.

Enter the description of the event and a comment if necessary.

Then, press the «OK» button to validate.

▼ Add a comment

Press the «Details» button.

The Maintenance log capture screen opens.

Press the «Edit» button.

Enter a comment.

Then, press the «OK» button to validate.

Pentra 400

Pentra 400

Description and Technology

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Pentra 400

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1. Pentra 400 overview

1.1. Front view

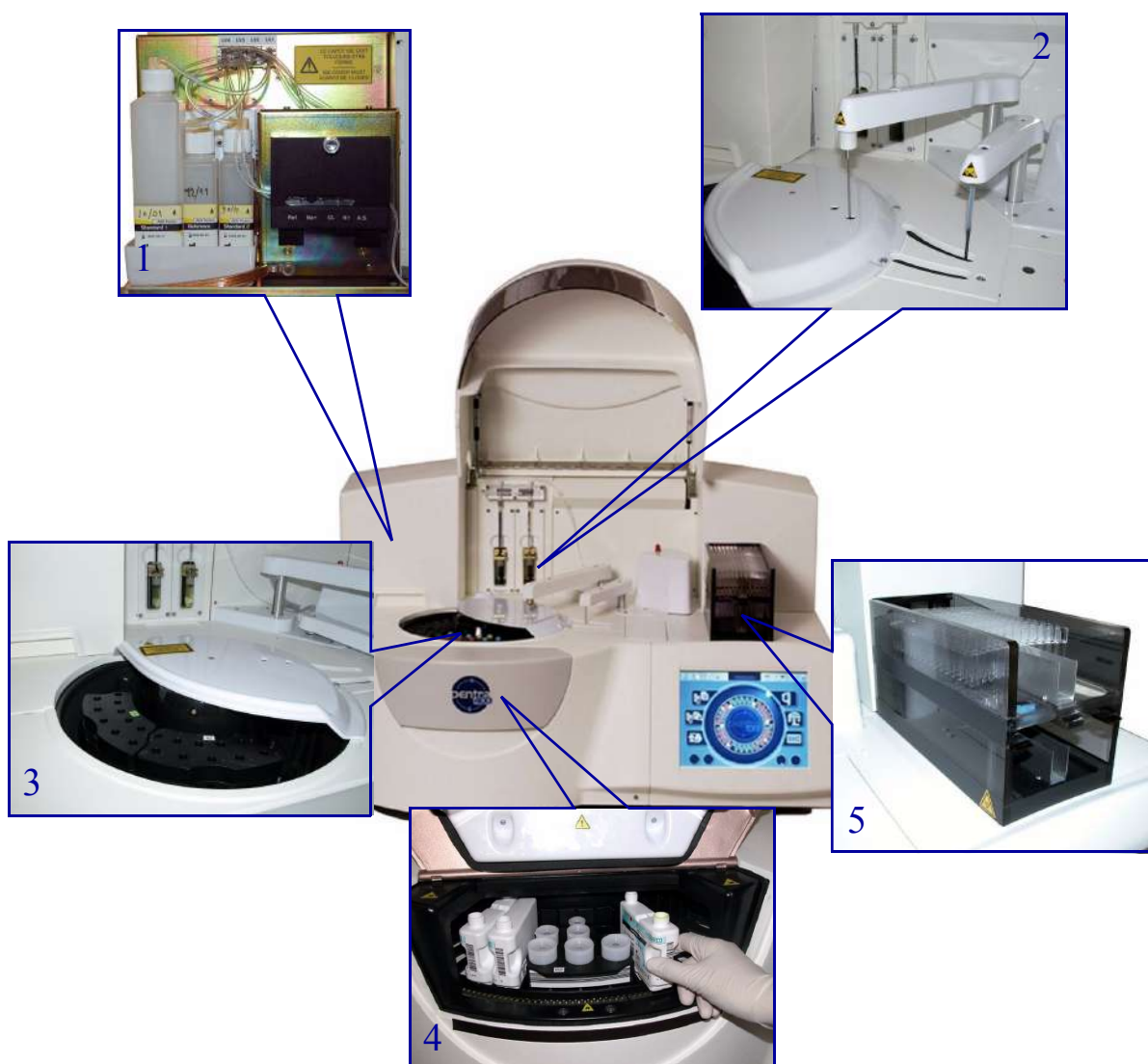


Fig. 8-1: Front view

- 1 - ISE module
- 2 - Sampling system
- 3 - Sample tray access
- 4 - Reagent tray access
- 5 - Cuvette changer

1.2. Right hand side view

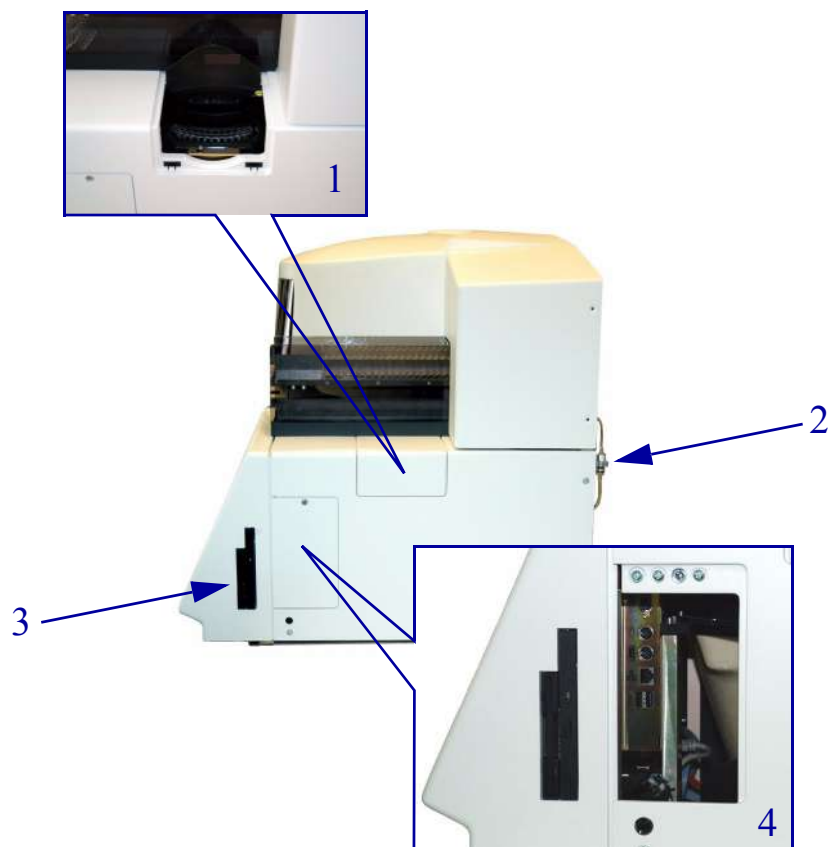


Fig. 8-2: Right hand side view

- 1 - Reaction tray access
- 2 - Filter for fluids
- 3 - Floppy and CD-Rom drives
- 4 - PC connections

1.3. Rear view

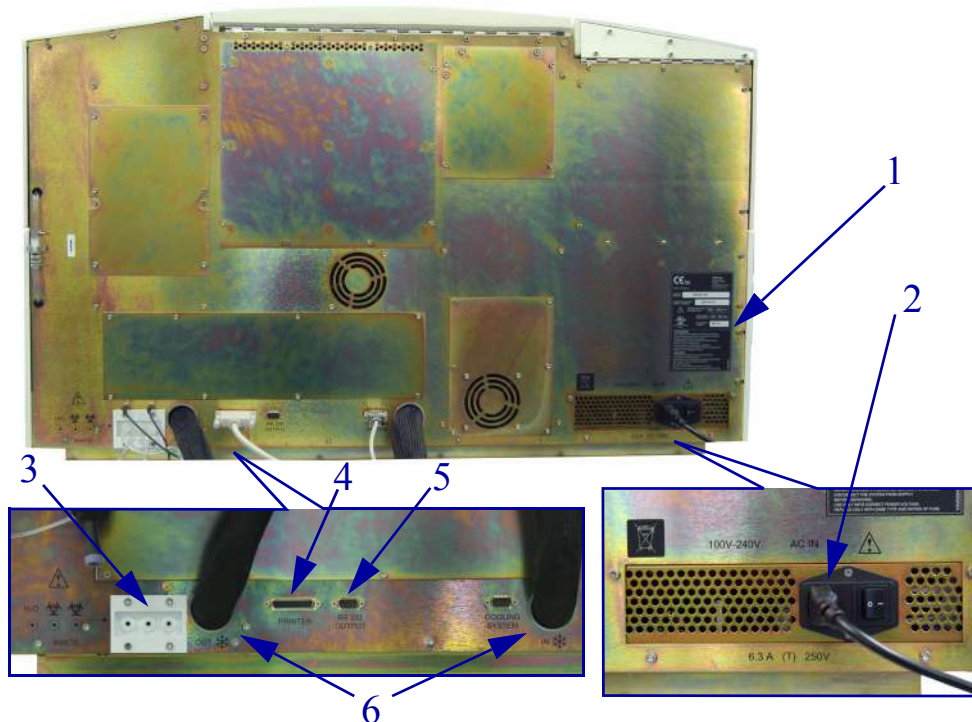


Fig. 8-3: Rear view

- 1 - Identification label
- 2 - Main supply cable
- 3 - Distilled water and waste connections
- 4 - Printer connection
- 5 - RS232 connection
- 6 - Cooling unit connections

1.3.1. Distilled water and waste connections

- ◆ **Distilled water input:** connection used for the distilled water input tube.
- ◆ **Distilled water level detection:** connection used for the distilled water level detector.
- ◆ **Waste output:** connection used for the waste output tube.
- ◆ **Waste level detection:** connection used for the waste level detector.
- ◆ **ISE waste output:** connection used for the ISE waste output tube.

The references of the distilled water and waste containers are provided in the following table:

Reference	Designation
LBH004A	Water Container
XEA783AS	Waste Container

Tab. 8–1: References of the water and waste containers

1.3.2. Printer connection

Do not connect a printer which has not been recommended by an **HORIBA ABX** qualified engineer.

1.3.3. RS232 connection

RS232 connection must be setup by an **HORIBA ABX** qualified engineer only.

1.3.4. Cooling unit connections

- ◆ **Cooling liquid input:** connection used for the cooling liquid input tube.
- ◆ **Cooling liquid output:** connection used for the cooling liquid output tube.
- ◆ **Control cable:** connection used for the cooling unit control cable.

2. Instrument description



Sample cups, vials, cuvette segments identified in this User manual have been validated by **HORIBA ABX**. The use of components other than those identified is not recommended.

2.1. Reagent and sample trays

2.1.1. Reagent tray description

The reagent tray is composed of 52 numbered positions, 44 refrigerated and 8 at room temperature.

This tray is mobile around its axis whose rotation allows clockwise and anti-clockwise direction. The cooled area of the reagent tray is refrigerated at 4-10°C 24 hours a day using a cooling unit with glycol circulation. The cooling unit must be placed under the bench.

The reagent tray cover allows the user to load/unload reagents.



Fig. 8-4: Reagent tray cover



- ◆ Warning! Reagents, diluents and cleaners should be handled cautiously according to the corresponding notice.
- ◆ Warning! Risk of personal injury during the reagent tray cover operation (hands/fingers). Ensure that the reagent tray cover closure is done cautiously.

The reagent tray is equipped with a barcode reader which allows the reading of cassettes, reagent racks and calibrator/control reagent racks. The **Pentra 400** checks the cassettes and racks present on the reagent tray:

- ◆ at instrument start up
- ◆ after closing of the reagent tray cover.

The reagent tray positions accept:

- ◆ **Cassettes**, page 8-8
- ◆ **Reagent racks**, page 8-8
- ◆ **Calibrator/control reagent racks**, page 8-9.



- 1 - Cassette
- 2 - Reagent rack
- 3 - Calibrator reagent rack
- 4 - Control reagent rack

▼ Cassettes

Cassettes occupy one position per cassette on the reagent tray. They are either single compartment or twin compartment containers. Some reagents and diluents are packaged in cassettes.

The cassettes are identified by a single barcode. The reading of this barcode leads to the automatic record of the solution characteristics in the «Reagent Configuration» menu.

▼ Reagent racks

Reagent racks occupy four positions on the tray. They hold three sectors and can accommodate either three reagents, diluents or cleaners or a combination of the above (for example: one reagent and two diluents). They accept vials of 4, 10 and 15 mL.

The references of the reagent racks, adaptors and vials available are listed in the following table:

Reference	Designation
XDA849A	Reagent Rack + Adaptors
XEA780AS	4 mL Vial Adaptors
XEA781AS	10 mL Vial Adaptors
B1034634	4 mL Reag Cup
B1034626	10 mL Reag Cup
B1037307	15 mL Reag Cup

Tab. 8-2: References of reagent racks, adaptors and vials

The reagent racks are identified by specific barcodes. The barcode reading informs the instrument of the rack ID. Informations about the reagents, diluents or cleaners located on the rack must be entered by the user in the «Reagent Configuration» menu.

▼ Calibrator/control reagent racks

Calibrator/control reagent racks occupy one position per rack. They can accommodate up to three different calibrators or controls. They hold sample cups by using adaptors.



Calibrators and controls must not be placed on the same rack.

Racks with yellow label are dedicated to calibrators and those with green label to controls.

The references of the calibrator/control reagent racks and adaptors available are listed in the following table:

Reference	Designation
XDA850A	Cal/Ctrl Reagent Rack + Adaptors
XEA782AS	Sample Cup Adaptors

Tab. 8–3: References of calibrator/control reagent racks and adaptors

The calibrator/control reagent racks are identified by specific barcodes. The barcode reading informs the instrument of the rack ID and also that the rack is dedicated to calibrators or controls. Informations about the calibrators or controls located on the rack must be entered by the user in the «Calibration/Control» menu.

2.1.2. Sample tray description



Fig. 8-5: Sample tray

The sample tray is composed of 6 numbered positions. Each position can hold a rack of 10 sample positions.

This tray is mobile around its axis whose rotation allows clockwise and anti-clockwise direction. The sample tray rotation is independent from the reagent tray rotation.

The sample tray is equipped with a tube presence detector.

It is also equipped with a barcode reader which allows the reading of racks and samples.



Warning! Barcode readers laser class 2.

Do not stare into beam directly or with optical instrument, as it may cause permanent eye damage.

Switch OFF the instrument before opening the barcode cover.

This barcode reader can read barcodes of the following types:

- 2 of 5 interleaved (ITF 2/5) with or without checkdigit
- Code 39 with or without checkdigit
- Code 128
- Codabar.

Barcodes are from 2 to 16 digits.

Description and Technology

Instrument description



- ◆ In order to work with the barcode type «2 of 5 interleaved without checkdigit», specific rack labels must be used: Ref. HAX0085 to HAX0093 (see [Tab. 1–4: 2 of 5 interleaved without checkdigit, Code 39, Code 128, Codabar](#), page 1-12).
- ◆ Patient and Sample ID
In order to ensure security of patient and sample identification, the character «Space» is allowed in the «Patient ID» and «Sample ID» fields only when this one is placed inside the data capture.
On the other hand, the character «Space» is not authorized and is systematically deleted when this one is the first or the last character of the capture.
This rule also applies to the Host connection and the sample barcodes of the following types: Code 39 and Code 128.
See also [3.3.3. Handling spaces](#), page 7-95.

The sample tray positions accept the following rack types:

- ◆ [Sample racks](#), page 8-12
- ◆ [Sample cup racks](#), page 8-12
- ◆ [Calibrator/control sample racks](#), page 8-13.



- 1 - Sample rack
- 2 - Sample cup rack
- 3 - Calibrator sample rack
- 4 - Control sample rack

The references of the different sample racks, adaptors and sample cups available are listed in the following table:

Reference	Designation
XEA778AS	Sample Rack + Adaptors
XEA779AS	Tube Adaptors
XDA805A	Sample Cup Rack
A11A01765	Sample Cup - Blue
A11A01766	Sample Cup - Green
A11A01767	Sample Cup - White
A11A01768	Sample Cup - Yellow

Tab. 8–4: References of sample racks, adaptors and sample cups



- ◆ Do not wash and re-use sample cups. They are designed for single use only.
- ◆ When filling sample cups, dispense the sample slowly in order to avoid the formation of air bubbles in the sample.
- ◆ Sample cups must always be opened before being positioned on the sample or reagent tray.



Dispose of used sample cups according to your local/national guidelines for biohazard waste disposal.

▼ Sample racks

Sample racks are composed of 10 sample positions. These positions are divided into the two following parts.

- ◆ Five external positions which accept:
 - primary and secondary tubes of 7, 10 mL (diameter: 16 mm)
 - after addition of adaptors, primary and secondary tubes of 2, 3, 4 and 5 mL (diameter: 13 mm).
- ◆ Five internal positions which accept primary and secondary tubes of 2, 3, 4 and 5 mL (diameter: 13 mm).

The sample racks are identified by specific barcodes. The barcode reading informs the instrument of the rack ID. For samples identified by Identification mode, the barcode reading leads to the automatic association of the barcode with the corresponding Sample ID in the Worklist.

▼ Sample cup racks

Sample cup racks are composed of 10 sample positions which only accept sample cups.

The sample cup racks are identified by specific barcodes. The barcode reading informs the instrument of the rack ID.

▼ Calibrator/control sample racks

Calibrator/control sample racks are composed of 10 sample positions which only accept sample cups. These racks are dedicated to calibrators or controls.



Calibrators and controls must not be placed on the same rack.
Racks with yellow label are dedicated to calibrators and those with green label to controls.

The calibrator/control sample racks are identified by specific barcodes. The barcode reading informs the instrument of the rack ID and also that the rack is dedicated to calibrators or controls.



Calibrators and controls can be also positioned on sample racks or sample cup racks.

2.2. Sampling system

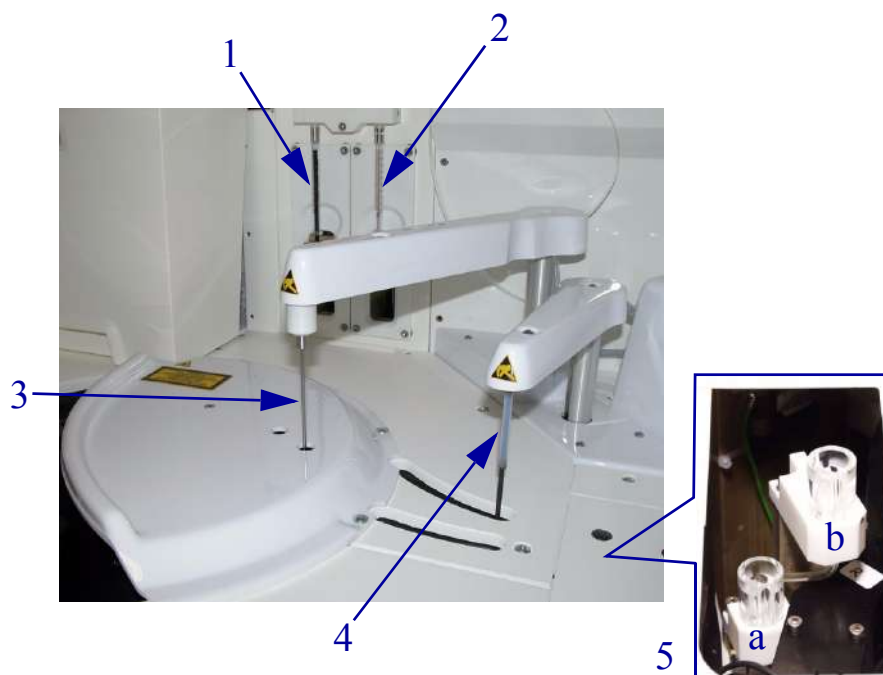


Fig. 8-6: Sampling system

- 1 - Reagent syringe
- 2 - Sample syringe
- 3 - Sample needle
- 4 - Reagent needle
- 5 - Wash towers of:
 - ◆a - reagent needle
 - ◆b - sample needle



Caution! Electrostatic Sensitive Device (ESD).

The reagent and sample needles are susceptible to cause ESD damage to the instrument motherboard when they are handled without ESD safe handling tools.

Make contact with the instrument ground (cover screw for example) before proceeding on the needles in order to prevent electrostatic discharges.

2.2.1. Syringes

Each syringe assembly consists of a glass barrel, a metal plunger fitted with a teflon tip, a valve and a screw fitting to hold the syringe head.

▼ Reagent syringe

This 1000 µL gas-tight syringe controls the reagent volume. It must be filled with water at all times and no air space should be visible in the syringe or tubing.

This syringe performs samplings from 15 to 600 µL by step of 0.1 µL (± 0.05 µL).

▼ Sample syringe

This 100 µL gas-tight syringe controls the volume of sample, distilled water and additional reagents. It must be filled with water at all times and no air space should be visible in the syringe or tubing.

This syringe performs samplings from 2 to 95 µL by step of 0.1 µL (± 0.02 µL).

2.2.2. Needles



Needles are sharp and may contain biohazardous material. When opening the arm cover, wait for the arm mechanical stops before proceeding.

▼ Reagent needle

The reagent needle is a stainless steel needle with an external teflon coating and an internal sleeving made up, from one end to another, by a teflon capillary tube.

The reagent needle preheats the reagent before dispensing it into the cuvette. The preheated temperature is 37°C ($\pm 0.5^\circ\text{C}$).

The reagent arm is equipped with level detection and detection of insufficient volume.

The reagent needle is decontaminated between each reagent sampling in its wash tower.

▼ Sample needle

The sample needle is a stainless steel needle with an external and internal teflon coating.

The sample arm is equipped with shock detection, the sample needle does not pierce primary and secondary tubes or sample cups.



Primary and secondary tubes, sample cups must be always open.

The sample arm is also equipped with level detection and detection of clogging or insufficient sampling.

The sample needle is decontaminated between each sampling in its wash tower.

2.2.3. Dilutions

▼ Definition

All volumes are in micro-litres (μL).

F_D	Dilution factor ($2.0 \leq F_D \leq 22500.0$)
$F_{\text{Pre-dil}}$	Pre-dilution factor
$F_{\text{Post dil}}$	Post dilution factor
SVA	Sample volume programmed in the application
$H_2O A$	H_2O volume programmed in the application

The sample needle is able to aspirate from 2.0 to 95.0 μL .

When possible, 300 μL of diluted material are prepared when using a cuvette (see [Example 1](#), page 8-16). In some cases, this is not possible due to the limitations of pipetting volumes (see [Example 2](#), page 8-16).

◆ Example 1

If $F_D = 10.0$, 30 μL of sample are pipetted and mixed with 270 μL of diluent. The total volume is 300 μL .

◆ Example 2

If $F_D = 2.0$, 95 μL of sample are pipetted and mixed with 95 μL of diluent. The total volume is not 300 μL but 190 μL . This exception is true when $2.0 \leq F_D \leq 3.1$.

a – Dilution in one cuvette

If only one cuvette is required, the sample volume and diluent volume are simply mixed in a cuvette like shown on the figure below.

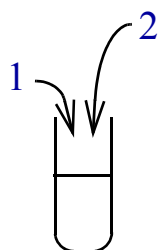


Fig. 8-7: Dilution in one cuvette

- 1 - SV: Sample volume
- 2 - DV: Diluent volume

b – Dilution in two cuvettes

If two cuvettes are required, the first one is performed like above. For the second one, SV2 is pipetted in the first cuvette and then mixed with DV2 in the second like shown on the figure below.

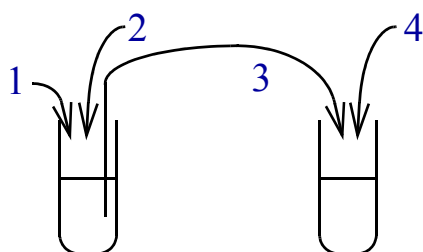


Fig. 8–8: Dilution in two cuvettes

- 1 - SV1: Sample volume 1
- 2 - DV1: Diluent volume 1
- 3 - SV2: Sample volume 2
- 4 - DV2: Diluent volume 2

▼ Dilution procedure

One or two cuvettes are used to perform dilution depending on F_D .

- ◆ If $2.0 \leq F_D \leq 3.1$, then one cuvette is used for dilution and:

$$SV = 95$$

$$DV = 95 \cdot (F_D - 1.0)$$

The total volume in the cuvette is then: $95 \cdot F_D$

- ◆ If $3.2 \leq F_D \leq 150.0$, then one cuvette is used for dilution and:

$$SV = 300/F_D$$

$$DV = 300 - 300/F_D$$

The total volume in the cuvette is then 300 μL .

- ◆ If $150.1 \leq F_D \leq 22500.0$, then two cuvettes are used in series for dilution and:

$$SV1 = SV2 = 300/\sqrt{F_D}$$

$$DV1 = DV2 = 300 - 300/\sqrt{F_D}$$

The total volume in the cuvette is then 300 μL .

▼ Post dilution with no cuvette required

For a post dilution, the sample and H₂O volumes are adapted when possible in order to not use cuvettes. In this case, the new sample volume and the new H₂O volume are calculated as follows:

$$\text{New SVA} = \text{Previous SVA} / F_{\text{Post dil}}$$

$$\text{New H}_2\text{OA} = \text{Previous H}_2\text{OA} + (\text{SVA} - \text{SVA} / F_{\text{Post dil}})$$

This works only if New SVA $\geq$ 2 μ L.

If New SVA < 2 μ L, one or two cuvettes might be required for the dilution.

2.3. Analytical module

2.3.1. Cuvette changer

The cuvette changer consists of two parts:

- ◆the racks
- ◆the grabber.

The racks can hold up to 30 new cuvette segments and 30 used cuvette segments. The cuvette segments are loaded and unloaded by the grabber located behind the racks. If the cuvette changer is OFF, cuvette segments must be loaded and unloaded manually (see [Manual loading of cuvette segments](#), page 8-21).

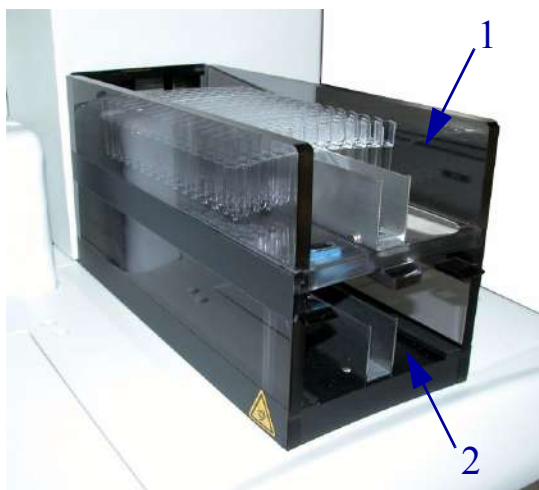


Fig. 8-9: Cuvette racks

- 1 - Rack of used cuvettes
- 2 - Rack of new cuvettes



Warning! Risk of personal injury during the grabber operation (hands/fingers).
Switch OFF the instrument before any intervention behind the racks.

▼ Cuvette segments

Each disposable cuvette segment is composed of 12 identically moulded cuvettes. The total volume in a cuvette must be included between 150 µL to 600 µL.

Care should be taken in the storage and handling of the segments in order to prevent breakage, damage or contamination. Cuvette segments should be left in the plastic wrapping until use to prevent dust contamination. Segments should be handled only by the upper part.



- ◆ Cuvette segments with at least one used cuvette must never be loaded in the reaction tray.
- ◆ Do not wash and re-use cuvette segments. They are designed for single use only.



- ◆ Dispose of used cuvette segments according to your local/national guidelines for biohazard waste disposal.

▼ Fill the rack of new cuvettes

Cassettes containing 15 cuvette segments are used to fill the rack.

◆Cuvette Segments - Ref. B1039865

Remove the plastic cover from the cassette. Place the open end of the cassette against the end of the rack and push the segments forward into the rack.

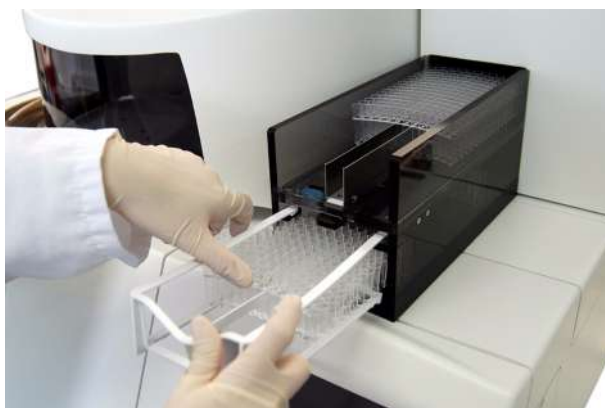


Fig. 8-10: Fill the rack of new cuvettes

▼ Empty the rack of used cuvettes

Press the clip and pull out the rack. Discard used cuvette segments and reinstall the rack.



Fig. 8-11: Empty the rack of used cuvettes

▼ Manual loading of cuvette segments

If the cuvette changer is OFF, cuvette segments must be loaded and unloaded manually.

Remove the cuvette hatch and open the flap door of the reaction tray to load and unload cuvette segments.



Warning! Risk of personal injury when the flap door is open (hands/fingers).
Be very careful when loading cuvette segments manually.



Fig. 8-12: Manual loading of cuvette segments



In order to properly load a cuvette segment, it is necessary to press the cuvette segment completely down into the reaction tray.

2.3.2. Reaction tray

The reaction tray can hold up to 6 cuvette segments, each with 12 cuvettes (see [Cuvette segments](#), page 8-20). It is mobile around its axis whose rotation allows clockwise and anti-clockwise direction. The cuvette reading is performed when rotation is clockwise.

The reaction tray is located in a chamber heated at 37°C ($\pm 0.2^\circ\text{C}$) by circulating air. A temperature sensor located within the chamber controls the temperature at 37°C. Another temperature sensor is located outside the chamber to be used as reference. If the reaction tray temperature is out of range or not stabilised, a system alarm is triggered and displayed in the «System Warnings» menu.

2.3.3. Mixer

The mixer is made up of a stainless steel with an external teflon coating.

Once the reagents and the sample have been dispensed into the cuvette, the mixer homogenizes the reaction mix. The mixing speed varies according to the application.

The mixer is cleaned between each mixing in its wash tower.



Fig. 8-13: Mixer

2.3.4. Spectrophotometer

The **Pentra 400** spectrophotometer disposes of 15 wavelengths: 340, 380, 405, 420, 455, 490, 505, 520, 550, 560, 580, 600, 620, 660, 700 nm.

The half band width is 7 nm.

▼ Principle

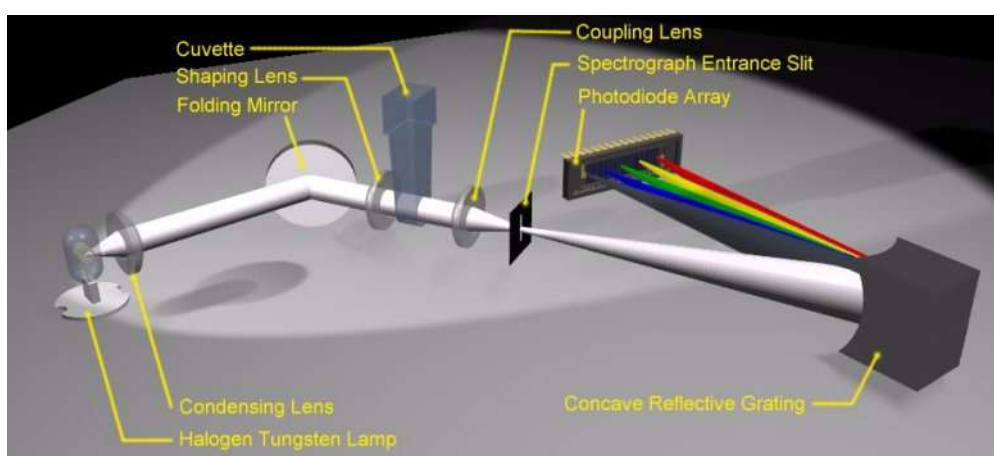


Fig. 8-14: Spectrophotometer

White light from the halogen tungsten lamp is collected by the condensing lens. Once reflected by the folding mirror and shaped by a second lens, the white light beam passes through the measuring cuvette where it interacts with the reaction mixture. Light emerging from the cuvette is then coupled with the spectrograph entrance slit by a third lens. The concave reflective grating spreads incoming white light into monochromatic radiations and reflects them onto the PDA (Pixel Digital Analogical) detector pixels.

2.4. ISE module

The ISE module is designed to determine sodium, potassium and chloride concentrations in serum, plasma or urine samples. It uses three Ion Selective Electrodes (ISE) for the measurement of sodium, potassium and chloride concentrations and one reference electrode.

The sodium electrode consists of a glass membrane selective to Na^+ ions. The potassium electrode consists of a PVC crown ether membrane which is selective to K^+ ions. The chloride electrode is a plastic membrane electrode selective to Cl^- ions. The reference electrode consists of an open liquid junction.

The four electrodes are compact and located in a Faraday cage to minimize the influence of electro-magnetic fields. The electrodes are supplied ready to use and no assembly is required.



Fig. 8-15: ISE module



In order to minimize environment interferences, the ISE module cover must be always closed during the ISE module operation.

▼ ISE module consumables

The following table lists the references of the ISE module consumables:

Reference	Designation
A11A01717	ABX Pentra Standard 1
A11A01718	ABX Pentra Standard 2
A11A01719	ABX Pentra Reference
A11A01769	ABX Pentra Etching CP
A11A01738	ABX Pentra Sodium Electrode
A11A01739	ABX Pentra Chloride Electrode
A11A01740	ABX Pentra Potassium Electrode
A11A01741	ABX Pentra Reference Electrode

Tab. 8-5: ISE module consumables

Reference	Designation
A11A01851	ABX Pentra Dummy Electrode
XEA935AS	Cleaning kit for ABX Pentra Chloride-E

Tab. 8–5: ISE module consumables

▼ Principle

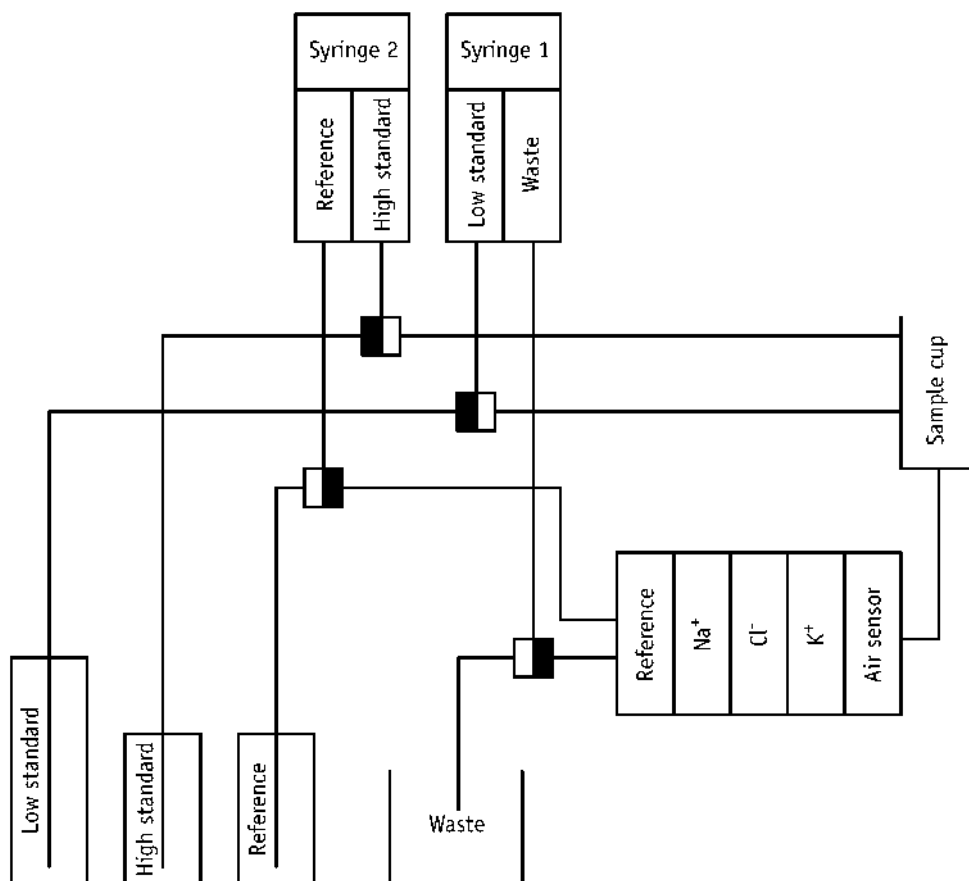


Fig. 8–16: ISE module flow diagram

Sodium, potassium and chloride are measured on:

- undiluted serum and plasma samples
- diluted urine samples.

For serum and plasma samples, 60 µL of sample are pipetted by the sample needle and 50 µL are dispensed into the ISE module sample cup. For urine samples, 20 µL of sample are pipetted by the sample needle and 10 µL are dispensed and diluted with 60 µL of low standard directly into the ISE module sample cup.

The sample flows through the air sensor to reach the ISE block. The air detection by air sensor indicates the end of sample transfer from the sample cup to the ISE block. The reference solution flows through the reference electrode and merges with the sample downstream of the ISE block.

The electrical potential is measured between each ion selective electrode and the reference electrode. This measured potential is function of the ion concentration.

2.5. Analysis cycle diagram

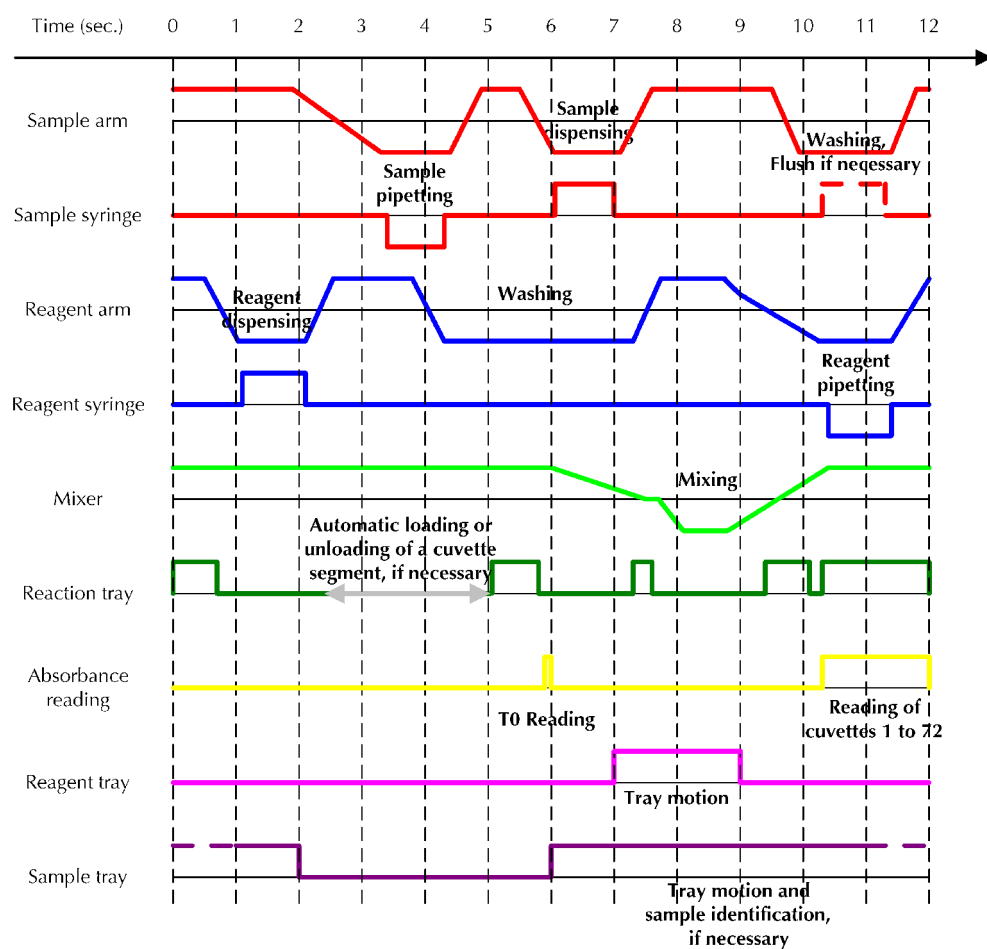


Fig. 8-17: Cycle Reagent-Sample for example

3. Data analysis

3.1. Absorbance measurements

3.1.1. Absorbance values

▼ Absorbance

$$A = \log \left[\frac{(I_0 - I_B)}{(I - I_B)} \right]$$

A Absorbance

I_0 Reference intensity

The reference intensity is measured for each wavelength during the instrument initialization, it corresponds to the lamp intensity measured through a water-filled cuvette.

I_B Black intensity

The black intensity is measured for each wavelength during the analyzer initialization, it corresponds to the residual intensity measured in the black (the lamp is masked).

I Intensity measured

▼ Bichromatism

The **Pentra 400** measures absorbance at two wavelengths.

◆ Primary wavelength: λ_1 .

The primary wavelength is used to measure the component absorbance.

◆ Secondary wavelength: λ_2 .

The secondary wavelength is used to measure an absorbance due to a cuvette defect, a variation of lamp intensity or some sample interferences.

$$A_{\text{Meas}} = A_{\lambda_1} - A_{\lambda_2}$$

A_{Meas} Measured absorbance

A_{λ_1} Absorbance measured at the primary wavelength

A_{λ_2} Absorbance measured at the secondary wavelength

▼ Volume correction

Absorbance values are corrected for volume differences if more than one pipetting step is performed in a cuvette.

$$A_{\text{End}} = A_{\text{Meas}} \cdot (V_{\text{Meas}}/V_{\text{End}})$$

A_{End}	Absorbance based on end volume
A_{Meas}	Measured absorbance
V_{Meas}	Volume at time of measurement
V_{End}	Total final volume in the cuvette

▼ Checks

The three following checks are performed after the volume correction:

- ◆ High absorbance
- ◆ Sample limit
- ◆ Reagent range.

3.1.2. Calculation types

▼ End point

Two absorbance readings are used to determine the rate (ΔA) of the reaction.

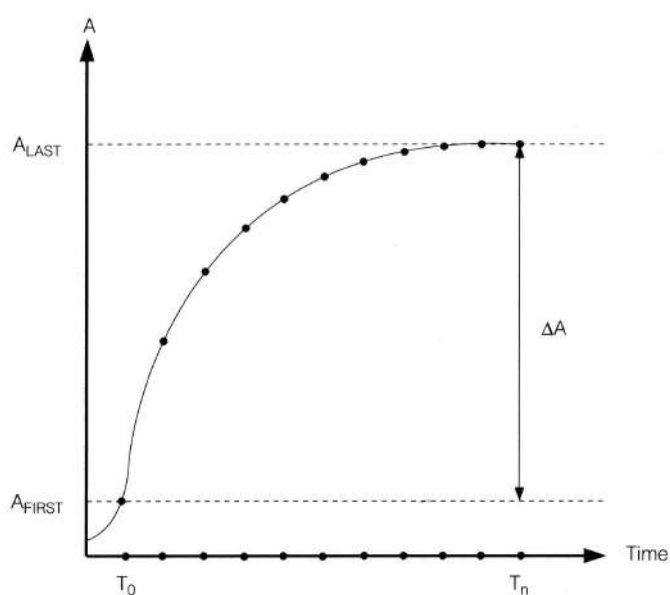


Fig. 8-18: End point

$$\Delta A = A_{LAST} - A_{FIRST}$$

ΔA	Absorbance difference or rate of the reaction
A_{LAST}	Last absorbance reading
A_{FIRST}	First absorbance reading

▼ Kinetic

Linear regression analysis is performed on all the measurement points included between first and last absorbance readings. The slope of the regression line is the rate ($\Delta A/\text{min}$) of the reaction.

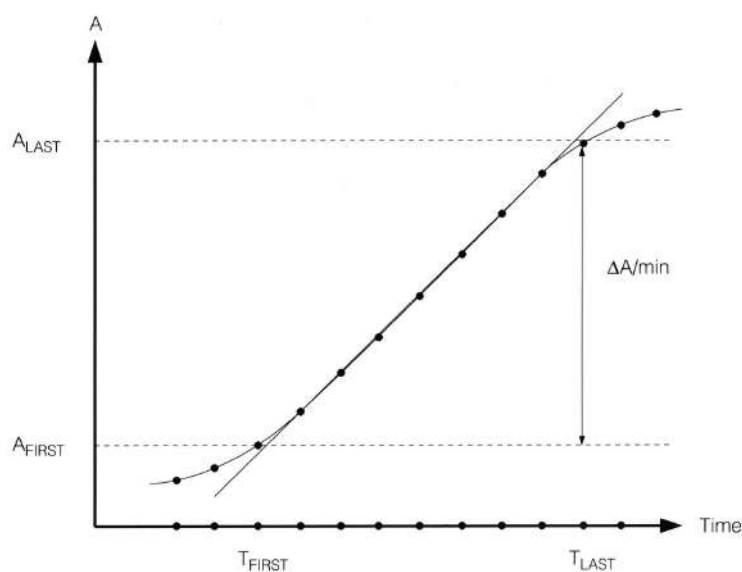


Fig. 8-19: Kinetic

$$\Delta A/\text{min} = \text{slope of the regression line of } A_{\text{FIRST}} \text{ to } A_{\text{LAST}}$$

$\Delta A/\text{min}$	Rate of the reaction
A_{FIRST}	First absorbance reading
A_{LAST}	Last absorbance reading



Check made for Kinetic calculation type:

- ◆ Reaction limit.

▼ Kinsearch

For the determination of enzymatic activities, a linear search is performed on each cuvette to find the linear range. Linear regression is then done on all the measurement points within this linear range. The slope of the regression line is the rate ($\Delta A/\text{min}$) of the reaction.



If the change in absorbance between the first and last absorbance readings is less than 0.002 absorbance units, a linear regression (Kinetic calculation type) will be performed instead of a linear search (Kinsearch calculation type) to determine the $\Delta A/\text{min}$.

The following abbreviations are used:

A_0	Absorbance value at time of first reading
$A_1, A_2, \dots$	Absorbance value at each time interval
A_n	Absorbance value at time of last reading
Δa	Absorbance difference of $A_1 - A_0$
Δb	Absorbance difference of $A_2 - A_1$
Δc	Absorbance difference of $A_3 - A_2$
Δd	Absorbance difference of $A_4 - A_3$
T_0	First reading cycle
$T_1, T_2, \dots$	Each reading cycle
T_n	Last reading cycle

Two linear search programs exist: special and normal.

The special program is applied if the curve responds to the following conditions:

◆decreasing curve: $A_0 > A_1$

and

◆non-linear beginning of curve: $0.9 \cdot \Delta a > \Delta b$.

For all other curves, the normal program is used.

a – Special program

◆ End of the linear range (see Fig. 8–20: Special case, end of the linear range, page 8-33)

The consecutive absorbance changes are compared until the following absorbance change becomes greater than or equal to the previous one.

$$\Delta a > \Delta b$$

$$\Delta b > \Delta c$$

$$\Delta c \leq \Delta d$$

The measurement point used in both the intervals is established as the point I.

An auxiliary point end (APE) is set 12 seconds prior to I in time and at the same absorbance as I.

To find the end of the linear range, straight lines are drawn from the point APE to each absorbance point, in sequence starting with A_n . The tangents of the angles formed by each of these lines are sequentially compared.

$$\text{Tangent of angle} = \Delta \text{Absorbance} / \Delta \text{Time}$$

$$\text{Example: } \tan \alpha_n = (A_n - A_3) / (T_n - T_3 + 12 \text{ sec})$$

$$\tan \alpha_n < \tan \alpha_{n-1}$$

$$\tan \alpha_{n-1} < \tan \alpha_{n-2}$$

$$\tan \alpha_{n-2} < \tan \alpha_{n-3}$$

$$\tan \alpha_{n-3} < \tan \alpha_{n-4}$$

$$\tan \alpha_{n-4} \geq \tan \alpha_{n-5}$$

When the tangent of the compared angle becomes less than or equal to the previous tangent, the point used to draw the associated line is defined to be the end (E) of the linear range.

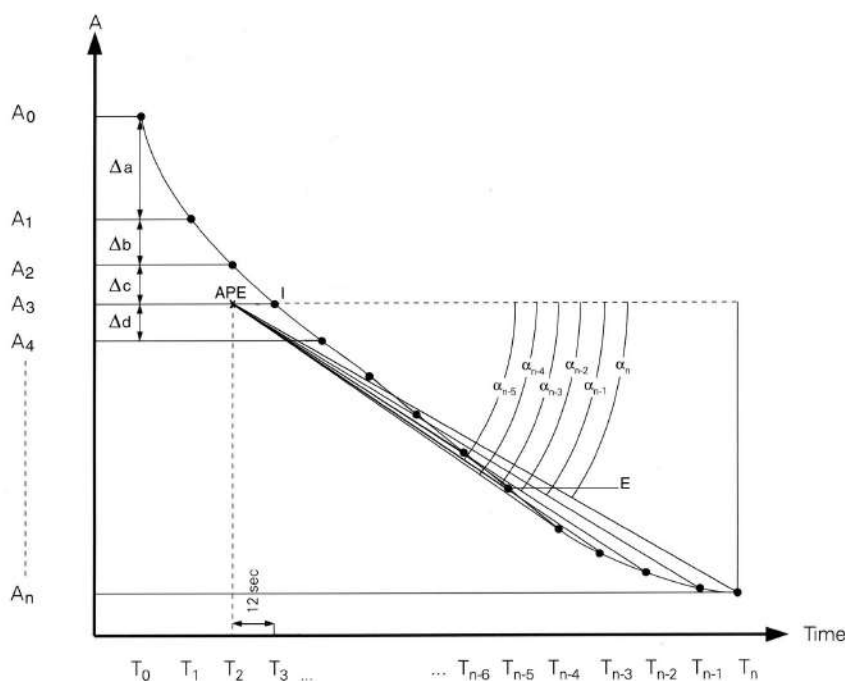


Fig. 8–20: Special case, end of the linear range

- ◆ Beginning of the linear range (see [Fig. 8-21: Special case, beginning of the linear range](#), page 8-34)

To find the beginning of the linear range, an auxiliary point beginning (APB) is set 12 seconds prior to E in time and at the same absorbance as E.

Straight lines are drawn from the point APB to each absorbance point, in sequence starting with A_0 . The tangents of the angles formed by each of these lines are sequentially compared.

Tangent of angle = $\Delta \text{Absorbance} / \Delta \text{Time}$

Example: $\tan \alpha_0 = (A_{n-5} - A_0) / (T_{n-5} - T_0 - 12 \text{ sec})$

$\tan \alpha_0 > \tan \alpha_1$

$\tan \alpha_1 \leq \tan \alpha_2$

When the tangent of the compared angle becomes greater than or equal to the previous tangent, the point used to draw the associated line is defined to be the beginning (B) of the linear range.

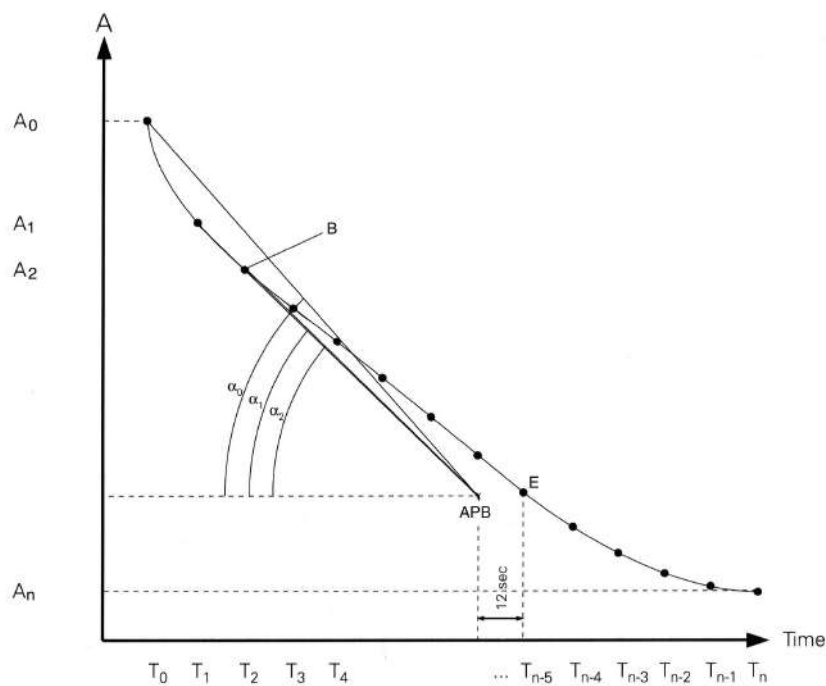


Fig. 8-21: Special case, beginning of the linear range

b – Normal program

◆ End of the linear range (see Fig. 8-22: Normal case, end of the linear range, page 8-35)

To find the end of the linear range, an auxiliary point end (APE) is set 12 seconds prior to A_0 in time and at the same absorbance as A_0 .

Straight lines are drawn from the point APE to each absorbance point, in sequence starting with A_n . The tangents of the angles formed by each of these lines are sequentially compared.

Tangent of angle = $\Delta\text{Absorbance}/\Delta\text{Time}$

Example: $\tan \alpha_n = (A_n - A_0)/(T_n - T_0 + 12 \text{ sec})$

$\tan \alpha_n < \tan \alpha_{n-1}$

$\tan \alpha_{n-1} < \tan \alpha_{n-2}$

$\tan \alpha_{n-2} \geq \tan \alpha_{n-3}$

When the tangent of the compared angle becomes less than or equal to the previous tangent, the point used to draw the associated line is defined to be the end (E) of the linear range.

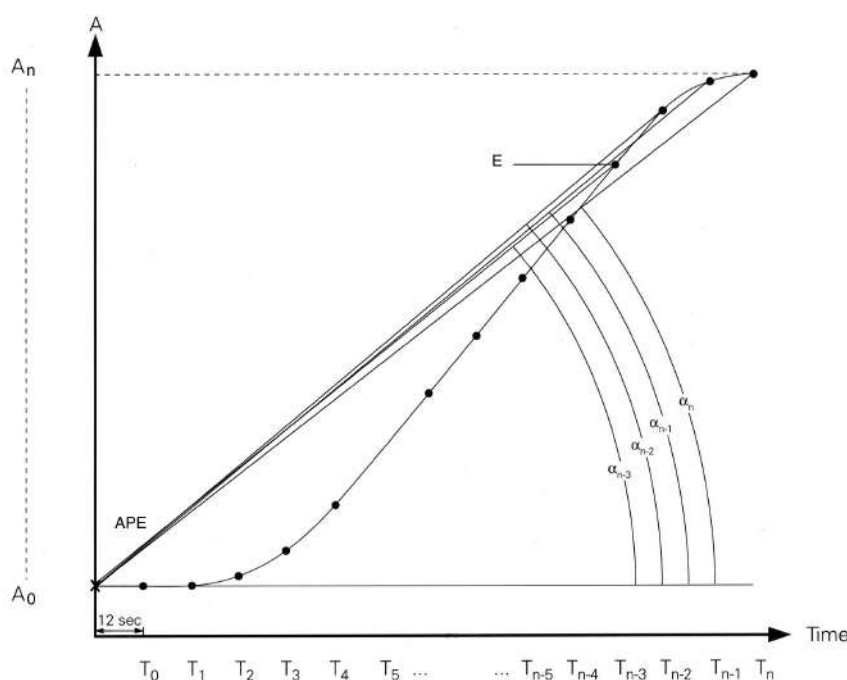


Fig. 8-22: Normal case, end of the linear range

- ◆ Beginning of the linear range (see [Fig. 8-23: Normal case, beginning of the linear range](#), page 8-36)

To find the beginning of the linear range, an auxiliary point beginning (APB) is set 12 seconds after A_n in time and at the same absorbance as A_n .

Straight lines are drawn from the point APB to each absorbance point, in sequence starting with A_0 . The tangents of the angles formed by each of these lines are sequentially compared.

Tangent of angle = $\Delta\text{Absorbance}/\Delta\text{Time}$

Example: $\tan \alpha_0 = (A_n - A_0)/(T_n - T_0 + 12 \text{ sec})$

$\tan \alpha_0 < \tan \alpha_1$

$\tan \alpha_1 < \tan \alpha_2$

$\tan \alpha_2 < \tan \alpha_3$

$\tan \alpha_3 \geq \tan \alpha_4$

When the tangent of the compared angle becomes less than or equal to the previous tangent, the point used to draw the associated line is defined to be the beginning (B) of the linear range.

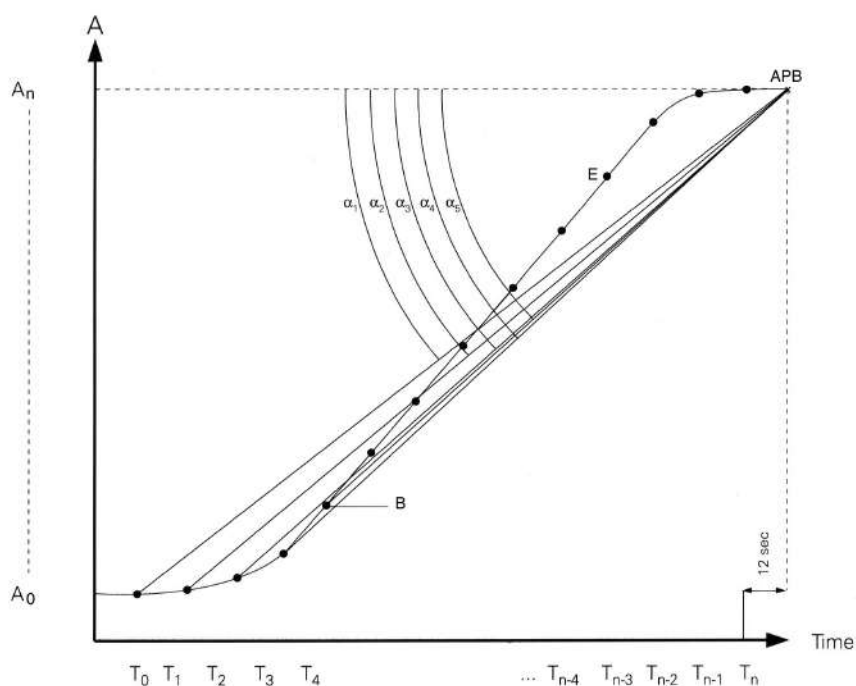


Fig. 8-23: Normal case, beginning of the linear range



Checks made for Kinsearch calculation type:

- ◆ Non linear
- ◆ Reaction limit
- ◆ Noise.

3.1.3. Rates

▼ Reagent blank correction

If a reagent blank has been indicated in the application, all rates (ΔA or $\Delta A/\text{min}$) will be corrected for the reagent blank absorbance change.

This correction applies to calibrator, control and sample rates.

$$R = \Delta A - \Delta A_{\text{RB}}$$

R	Corrected rate of calibrator, control or sample
ΔA	Absorbance difference or rate of calibrator, control or sample
ΔA_{RB}	Absorbance difference of reagent blank



The reagent blank absorbance change is stored in memory until another calibration is performed.

▼ Sign correction

If the reaction direction has been programmed as decreasing in the application, the calculated rate is multiplied by (- 1) to make the rate a positive number.

This correction applies to calibrator, control and sample rates and occurs before the reaction direction check.

$$R' = R \cdot (- 1)$$

R'	Corrected rate of calibrator, control or sample
R	Rate of calibrator, control or sample

▼ Rate correction factor for recalibrations

For linear regression and non-linear calibration modes, if a recalibration with only one standard was performed, the calculated rate correction factor is applied to control and sample rates.

$$R'' = R' \cdot F_{RC}$$

R'' Corrected rate of calibrator, control or sample

R' Rate of control or sample

F_{RC} Rate correction factor

The rate correction factor is calculated based on the ratio of the old rate and the new rate.

$$F_{RC} = R_{Old}/R_{New}$$

R_{Old} Old standard rate

R_{New} New standard rate

▼ Checks

After rate corrections, the three following checks are performed:

- ◆ Blank range
- ◆ Sign
- ◆ High activity.

3.1.4. Calibration modes

▼ Calculation of mean rate

When using calibration modes with one or more standards, every standard can be run one, two or three times. The replicate rates will be averaged to provide a mean rate for the standard.

The example below shows the use of three replicates:

$$R_{Std-n} = 1/3 \cdot (R_{Std-n1} + R_{Std-n2} + R_{Std-n3})$$

R_{Std-n}	Mean rate of the standard n
R_{Std-n1}	First analysis rate of the standard n
R_{Std-n2}	Second analysis rate of the standard n
R_{Std-n3}	Third analysis rate of the standard n

▼ Calibration modes

a – Factor

A theoretical factor can be entered in the application to multiply the calculated rate to obtain test results.

◆For enzyme activities:

$$U/L = \Delta A/min \cdot F$$

U/L	Result
$\Delta A/min$	Rate
F	Theoretical factor

◆For concentration:

$$C = \Delta A \cdot F$$

C	Concentration (= result)
ΔA	Rate
F	Theoretical factor

b – Slope average

This calibration mode is used for assays when the observed change in absorbance and the concentration of the analyte have a linear relationship.

From 1 to 3 standards can be programmed to derive the factor required in order to calculate the test results.

The example below illustrates the use of three standards.

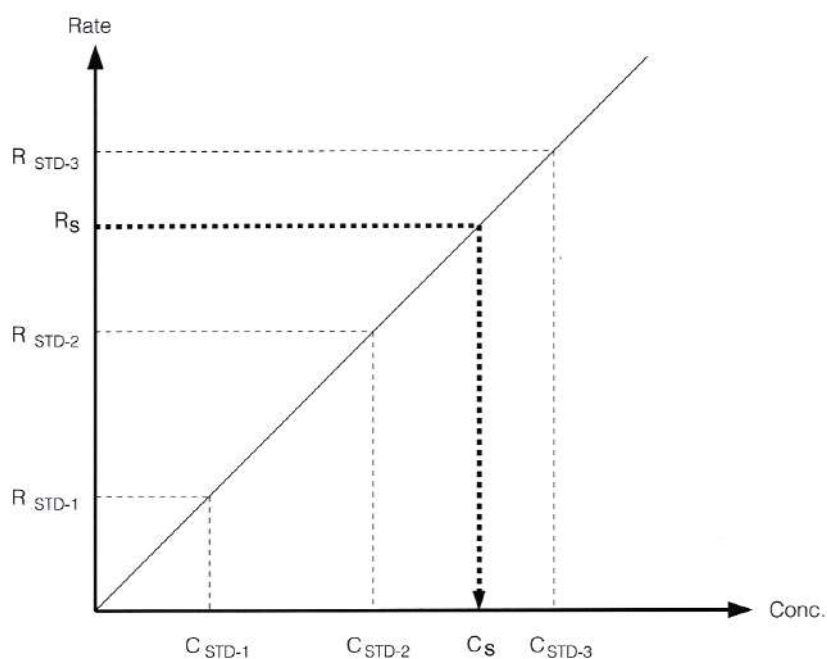


Fig. 8-24: Slope average

$$F = 1/3 \cdot [(C_{\text{Std-1}}/R_{\text{Std-1}}) + (C_{\text{Std-2}}/R_{\text{Std-2}}) + (C_{\text{Std-3}}/R_{\text{Std-3}})]$$

$$C_S = R_S \cdot F$$

F	Calculated factor
C _{Std-1, 2, 3}	Known concentration of standard 1, 2 or 3
R _{Std-1, 2, 3}	Rate of standard 1, 2 or 3
C _S	Concentration of sample
R _S	Rate of sample

c – Linear regression

For linear calibration curves, from 2 to 8 standards can be programmed to derive the curve parameters required in order to calculate test results.

Linear regression is performed through all data points to find the most corrected line.

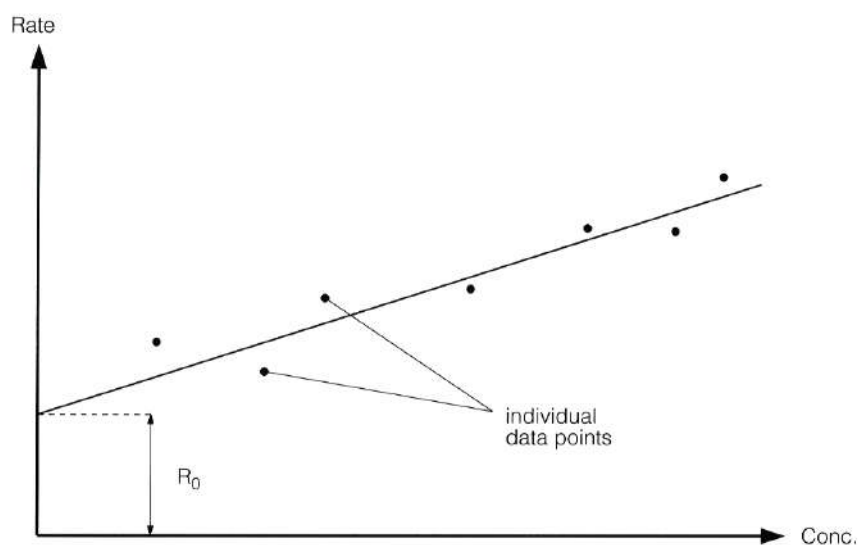


Fig. 8-25: Linear regression

$$R = a \cdot C + R_0$$

$$C = (R - R_0)/a$$

R	Rate
a	Slope of the regression line
C	Concentration (= result)
R ₀	Y-intercept of the regression line

d – Linear interpolation

For non-linear calibration curves, from 3 to 8 standards can be programmed to derive the curve parameters required in order to calculate test results.

Linear interpolation amounts to draw a straight line from standard to standard.

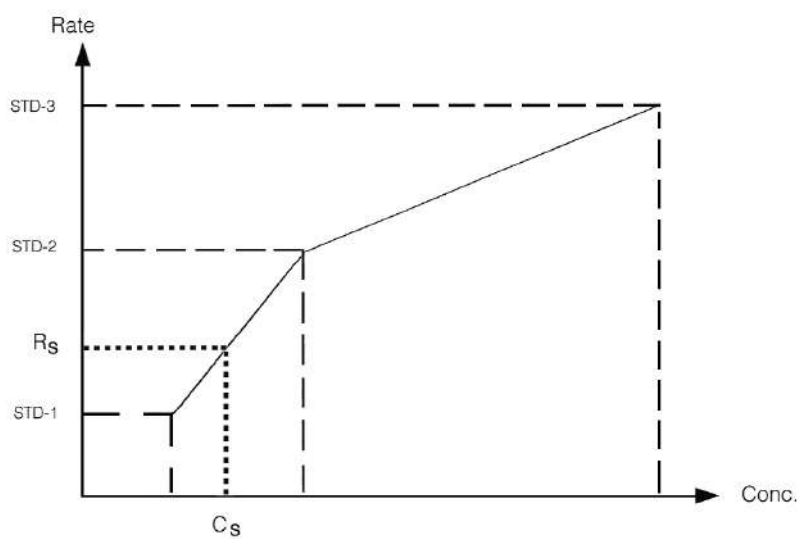


Fig. 8–26: Linear interpolation

$$C_S = [(R_{Std-L} - R_S) \cdot (C_{Std-H} - C_{Std-L}) / (R_{Std-L} - R_{Std-H})] + C_{Std-L}$$

C_S	Concentration of sample
C_{Std-L}	Concentration of previous lower standard
C_{Std-H}	Concentration of next higher standard
R_S	Rate of sample
R_{Std-L}	Rate of previous lower standard
R_{Std-H}	Rate of next higher standard

e – Multiparameter mathematical algorithms

◆ LOGIT/LOG4

◆ LOGIT/LOG5

◆ EXPONENT5

These calibration modes are used for assays when the observed change in absorbance and the concentration of the analyte does not follow a linear relationship.

Algorithm	Standard number	Function	Parameters
LOGIT/LOG4	4 to 8	$R = R_0 + K_C / \{ 1 + \exp [- (a + b \cdot \ln C)] \}$	R_0, K_C, a, b
LOGIT/LOG5	5 to 8	$R = R_0 + K_C / \{ 1 + \exp [- (a + b \cdot \ln C + c \cdot C)] \}$	R_0, K_C, a, b, c
EXPONENT5	5 to 8	$R = R_0 + K \cdot \exp [a \cdot \ln C + b \cdot (\ln C)^2 + c \cdot (\ln C)^3]$	R_0, K, a, b, c

Tab. 8–6: Multiparameter mathematical algorithms

R	Rate of sample
R_0	Predicted rate for a standard with zero concentration
K_C	Scale parameter for LOGIT/LOG4 and LOGIT/LOG5 (= difference between the predicted rate for a standard with infinite concentration and R_0)
K	Scale parameter for EXPONENT5
a, b, c	Various parameters which define the non-linear elements of each mathematical function
C	Concentration of sample

▼ Calculation of the rate correction factor for recalibrations

For linear regression and non-linear calibration modes, a recalibration with only one standard can be performed. A correction factor will be calculated based on the ratio of the old rate and the new rate.

$F_{RC} = R_{Old}/R_{New}$	
R_{Old}	Old standard rate
R_{New}	New standard rate
F_{RC}	Rate correction factor



The correction standard may be run one, two or three times.

The rate correction factor will be applied to all subsequent control and sample rates.

▼ Checks for linear regression and non-linear calibration modes

The three following checks are made:

- ◆ Test range (only for non-linear calibration modes)
- ◆ Calculation range (only for non-linear calibration modes)
- ◆ Result calculation error.

3.1.5. Results

▼ Calculation of concentrations

The conversion of rates to concentrations is based on a function which depends on the calibration mode programmed. The function parameters are derived from the standard rates and concentrations except for the factor calibration mode.

Calibration mode	Function
Factor	$C = R \cdot F$ (see a – Factor , page 8-39)
Slope average	$C = R \cdot F$ (see b – Slope average , page 8-40)
Linear regression	$C = (R - R_0)/a$ (see c – Linear regression , page 8-41)
Linear interpolation	$C = [(R_{Std-L} - R) \cdot (C_{Std-H} - C_{Std-L}) / (R_{Std-L} - R_{Std-H})] + C_{Std-L}$ (see d – Linear interpolation , page 8-42)
LOGIT/LOG4	$R = R_0 + K_C / \{ 1 + \exp [- (a + b \cdot \ln C)] \}$ (see e – Multiparameter mathematical algorithms , page 8-43)
LOGIT/LOG5	$R = R_0 + K_C / \{ 1 + \exp [- (a + b \cdot \ln C + c \cdot C)] \}$ (see e – Multiparameter mathematical algorithms , page 8-43)
EXPONENT5	$R = R_0 + K \cdot \exp [a \cdot \ln C + b \cdot (\ln C)^2 + c \cdot (\ln C)^3]$ (see e – Multiparameter mathematical algorithms , page 8-43)

Tab. 8–7: Function used according to the calibration mode

▼ Result correlation

A correlation factor and an offset can be entered in the application to convert results in order to correlate them with an alternative method or another temperature. The correlation factor and the offset correspond respectively to the slope (A) and the y-intercept (B) of the regression line determined by a correlation study between the two methods.

$y = A \cdot x + B$	
y	Correlated concentration of calibrator, control or sample
x	Concentration of calibrator, control or sample
A	Correlation factor (Slope)
B	Offset (Intercept)



Two result correlations can be entered in the application:

- ◆ the user correlation
- ◆ the manufacturer correlation.

▼ Unit conversion factor

The unit conversion factor is the conversion factor between the unit chosen in the application and the application reference unit.

It is applied to the results in order to expressing them in the concentration unit chosen by the user.

$$C' = C \cdot F_U$$

C'	Converted concentration of calibrator, control or sample
C	Concentration of calibrator, control or sample
F _U	Unit conversion factor

▼ Checks

After unit conversion, the four following checks are made:

- ◆ Deviation
- ◆ Linearity range
- ◆ Confidence range
- ◆ Critical range
- ◆ Reference range.

3.2. Electrolyte measurements

3.2.1. Principle

The potential of an ion selective electrode depends on the logarithm of the activity of this ion. This relationship is described by the Nernst equation:

$$E = E_0 + S \cdot \log a_i$$

E	Measured potential between ion selective electrode and reference electrode
E_0	Standard potential of electrode assembly
S	Electrode slope (Nernst factor)
a_i	Activity of measured ion

$$S = (2.303 \cdot R \cdot T) / (n \cdot F)$$

2.303	Conversion factor for ln to log
R	Gas constant
T	Absolute temperature (°K)
n	Valency of the ion
F	Faraday's constant

If the ionic strength of the calibrating solution is equal to that of the sample, the electrode system can be calibrated with accuracy using concentration instead of activity.

$$E = E_0 + S \cdot \log C$$

C	Concentration of measured ion

Relative measurements are performed to eliminate temperature influence.

3.2.2. Calibration

▼ Slope calculation

The slope of the measuring system is defined as being the variation in voltage obtained when the ion concentration is multiplied by 10. It is determined by measuring two different standard solutions. Taking into account the logarithm relationship between concentration and voltage in the Nernst equation, the slope is calculated as follows.

$$S = (E_{STD-1} - E_{STD-2}) / \log (C_{STD-1} / C_{STD-2})$$

S	Slope
$E_{STD-1, 2}$	Measured potential of standard 1 or 2
$C_{STD-1, 2}$	Known concentration of standard 1 or 2

▼ Check

The following check is performed after the slope calculation:

- ◆ Slope range.

3.2.3. Results

▼ Calculation of concentration

The unknown concentration is calculated by comparing the measured potential with the potential of standard solution which has a known concentration.

$$C = C_{STD-1} \cdot 10^{[(E - E_{STD-1}) / S]}$$

C	Unknown concentration of control or sample
C_{STD-1}	Known concentration of standard 1
E	Measured potential of control or sample
E_{STD-1}	Measured potential of standard 1
S	Slope

▼ Result correlation

A correlation factor and an offset can be entered in the application to convert results in order to correlate them with an alternative method or another temperature. The correlation factor and the offset correspond respectively to the slope (A) and the y-intercept (B) of the regression line determined by a correlation study between the two methods.

$$y = A \cdot x + B$$

y	Correlated concentration of control or sample
x	Concentration of control or sample
A	Correlation factor (Slope)
B	Offset (Intercept)

▼ Unit conversion factor

The unit conversion factor is the conversion factor between the unit chosen in the application and the application reference unit.

It is applied to the results in order to expressing them in the concentration unit chosen by the user.

$$C' = C \cdot F_U$$

C'	Converted concentration of calibrator, control or sample
C	Concentration of calibrator, control or sample
F _U	Unit conversion factor

▼ Checks

The three following checks are performed after unit conversion:

- ◆Linearity range
- ◆Confidence range
- ◆Critical range
- ◆Reference range.

Pentra 400

Pentra 400

Maintenance and Troubleshooting

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This section provides information regarding the following:

- ◆ **1. Maintenance**, page 9-3
- ◆ **2. Troubleshooting**, page 9-29
- ◆ **3. Warnings, Alarms and Flags**, page 9-39.

1. Maintenance

One of the main factor contributing to accurate and reliable results is a well-maintained instrument. This chapter describes the recommended maintenance procedures, their frequencies are given in the following table:

Maintenance procedures	Frequencies
1.1. ISE module etching , page 9-4 1.2.1. Needle deproteinization without mixer , page 9-5	Daily
1.2.2. Needle deproteinization with mixer , page 9-6 1.3. ISE module cleaning , page 9-7	Weekly
1.4. Wash tower cleaning , page 9-9 1.5. Syringe plunger tips replacement , page 9-10 1.6. Qualitest , page 9-12 1.7. Cooling unit filter cleaning , page 9-13	Monthly
1.8. Filter replacement , page 9-14 1.9. Glycol level checking , page 9-15	Bimonthly (every two months)

Tab. 9-1: Maintenance procedures



HORIBA ABX recommends to perform maintenance procedures at the end of the day.

Instructions for changing different parts of the instrument, cleaning and decontaminating the instrument are also provided in this chapter:

- ◆ **1.10. Syringes replacement**, page 9-16
- ◆ **1.11. Needles replacement**, page 9-17
- ◆ **1.12. Mixer paddle replacement**, page 9-21
- ◆ **1.13. Lamp replacement**, page 9-22
- ◆ **1.14. ISE reagents replacement**, page 9-24
- ◆ **1.15. Electrodes replacement**, page 9-25
- ◆ **1.16. Instrument cleaning and decontamination**, page 9-26.

Moreover, a sheet of **Pentra 400** maintenance schedule is provided at the end of this chapter (see **1.17. Pentra 400 maintenance schedule**, page 9-27).

1.1. ISE module etching

To ensure reliable functioning of the electrodes, perform the ISE module etching procedure on a daily basis. This procedure consists in cleaning the ISE module with **ABX Pentra Etching CP - Ref. A11A01769**.



- ◆ The ISE module etching procedure must be performed on a daily basis only if more than 20 samples are run daily.
- ◆ If less than 20 samples are run daily, the procedure should be performed once a week only (see [1.3. ISE module cleaning](#), page 9-7).

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «Cycles» tab, select the **ABX Pentra Etching CP** in the «ISE Etching Solution» scrolling list.



The **ABX Pentra Etching CP** must be previously:

- ◆ configured in the «Reagent Configuration» menu (see [3.2. Configuration](#), page 4-11)
- ◆ positioned on the reagent tray.

Then, press the «ISE Etching» key.



The «ISE Etching» key is enabled only if:

- ◆ the ISE module is not occupied and its status ≥ 4
- ◆ the **ABX Pentra Etching CP** is positioned on the reagent tray.



Fig. 9-1: ISE module etching

The ISE module etching procedure can be automatically performed at the shutdown if:

- from the «Customer Services» menu, the **ABX Pentra Etching CP** is configured in the «ISE Cleaning Solution» scrolling list
- the ISE module cleaning is programmed in the «System Configuration» menu (see [3.1.7. Software exit](#), page 7-82).

After the ISE module etching procedure, perform the ISE module activation* (see [4.1.3. ISE activation](#), page 7-119) and check the ISE calibration results.

* It is recommended to perform the ISE module activation:

- ◆ either immediately after the ISE module etching procedure if it has been performed during the day of work
- ◆ or at the instrument start up, before running samples if the ISE module etching procedure has been performed at the end of the day.

1.2. Needle deproteinization

1.2.1. Needle deproteinization without mixer

To keep the needles in optimal condition, perform the needle deproteinization procedure on a daily basis without the mixer cleaning. This procedure consists in cleaning the sample and reagent needles with **ABX Pentra Deproteinizer CP - Ref. A11A01754**.

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «Cycles» tab, select the **ABX Pentra Deproteinizer CP** in the «Needle Cleaning Solution» scrolling list. The «Mixer cleaning» box must be unchecked.



The **ABX Pentra Deproteinizer CP** must be previously:

- ◆ configured in the «Reagent Configuration» menu (see [3.2. Configuration](#), page 4-11)
- ◆ positioned on the reagent tray.

Then, press the «Needle Cleaning» key.



The «Needle Cleaning» key is enabled only if:

- ◆ the instrument status is «Ready»
- ◆ the **ABX Pentra Deproteinizer CP** is positioned on the reagent tray.



Fig. 9-2: Needle cleaning

The needle deproteinization procedure without the mixer cleaning can be automatically performed at the shutdown if:

- the «Customer Services» menu is configured as described above
- the system cleaning is programmed in the «System Configuration» menu (see [3.1.7. Software exit](#), page 7-82).

1.2.2. Needle deproteinization with mixer

To keep the needles in optimal condition, perform the needle deproteinization procedure on a weekly basis with the mixer cleaning. This procedure consists in cleaning the sample and reagent needles as the mixer with **ABX Pentra Deproteinizer CP - Ref. A11A01754**.

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «Cycles» tab, select the **ABX Pentra Deproteinizer CP** in the «Needle Cleaning Solution» scrolling list and check the «Mixer cleaning» box in order to clean the mixer as the sample and reagent needles.



The **ABX Pentra Deproteinizer CP** must be previously:

- ◆ configured in the «Reagent Configuration» menu (see [3.2. Configuration](#), page 4-11)
- ◆ positioned on the reagent tray.

Then, press the «Needle Cleaning» key.



The «Needle Cleaning» key is enabled only if:

- ◆ the instrument status is «Ready»
- ◆ the **ABX Pentra Deproteinizer CP** is positioned on the reagent tray.

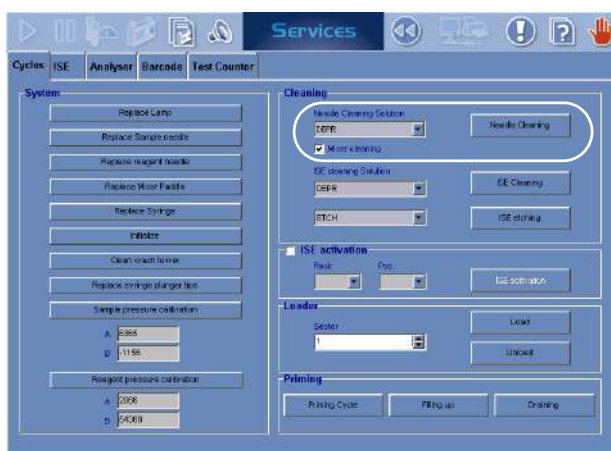


Fig. 9-3: Needle cleaning



At the end of the cycle, uncheck the «Mixer cleaning» box and press the «Needle Cleaning» key in order to reconfigure the «Customer Services» menu for the needle deproteinization procedure without the mixer cleaning.

1.3. ISE module cleaning

To ensure removal of protein residues from the tubing and electrodes, perform the ISE module cleaning procedure on a weekly basis.

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «ISE» tab, press the «Change electrode» key.

At the end of the cycle, remove the chloride electrode from the measuring chamber and install the **ABX Pentra Dummy Electrode - Ref. A11A01851** in place of the chloride electrode.

From the «Cycles» tab, select the **ABX Pentra Deproteinizer CP - Ref. A11A01754** in the «ISE Cleaning Solution» scrolling list.



The **ABX Pentra Deproteinizer CP** must be previously:

- ◆ configured in the «Reagent Configuration» menu (see [3.2. Configuration](#), page 4-11)
- ◆ positioned on the reagent tray.

Then, press the «ISE Cleaning» key.



The «ISE Cleaning» key is enabled only if:

- ◆ the ISE module is not occupied and its status ≥ 4
- ◆ the **ABX Pentra Deproteinizer CP** is positioned on the reagent tray.



Fig. 9-4: ISE module cleaning

During the cycle, clean the chloride electrode as follows:

- ◆ Use threads provided in the **Cleaning kit for ABX Pentra Chloride-E - Ref. XEA935AS**.
- ◆ Pull one thread one time slowly and carefully through the sample channel of the electrode in the direction of the arrow (see [Fig. 9-5: Chloride electrode cleaning](#), page 9-8).

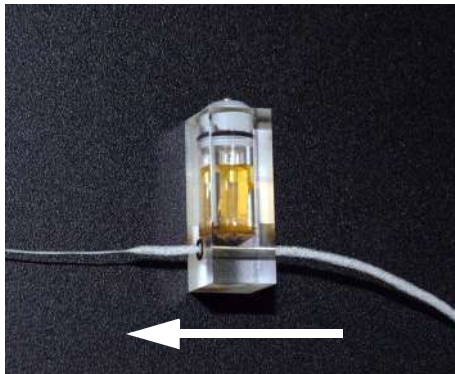


Fig. 9-5: Chloride electrode cleaning



Do not wash and re-use threads. They are designed for single use only.

Check that the O-ring is well-positioned on one side of the electrode and reinstall the chloride electrode into the measuring chamber.

Perform the ISE module etching procedure (see [1.1. ISE module etching](#), page 9-4).



Be careful not to clean the ISE module with the **ABX Pentra Deproteinizer CP - Ref. A11A01754** more than once a week because it could damage the electrodes. So, performing this ISE module etching procedure, please select the **ABX Pentra Etching CP - Ref. A11A01769** in the «ISE Cleaning Solution» scrolling list and press the «ISE Cleaning» key in order to reconfigure the «Customer Services» menu for the ISE module etching procedure.

Perform the ISE module activation (see [4.1.3. ISE activation](#), page 7-119).

From the «ISE» tab, press the «Stabilization of Fluidic system» key.

After the ISE module cleaning procedure, verify that the ISE module is functioning properly as follows:

- ◆ Check the ISE calibration results.
- ◆ Run controls using the usual procedure (see [2.4.2. Creation of a control request](#), page 2-29).

1.4. Wash tower cleaning

The wash tower cleaning procedure should be performed on a monthly basis.

Press the «Services» button from the Main menu. Then, press the «Customer Services» button from the «Services» menu. From the «Cycles» tab, press the «Clean wash tower» key.

The sample and reagent arms as the mixer are positioned so as to make the wash tower cleaning easier. Then, a message informs the user that the wash tower cleaning can be performed.

Press the front of the optic hatch (1) to open it and lift the mixer up (2) by pressing the red button (see [Fig. 9-6: Optic hatch and mixer](#), page 9-9).

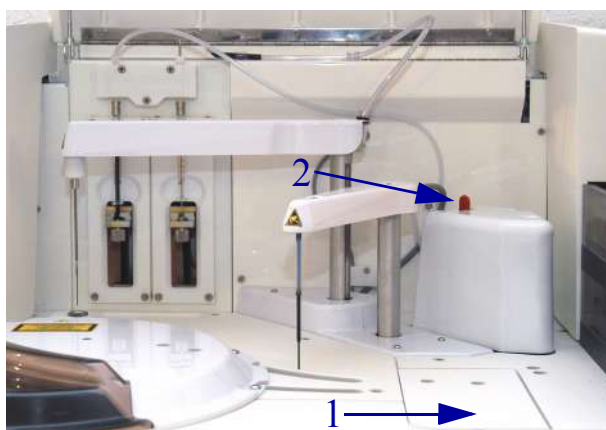


Fig. 9-6: Optic hatch and mixer

Clean the wash towers (sample, reagent and mixer wash towers) with a cotton swab dipped in the **ABX Pentra Deproteinizer CP** - Ref. A11A01754 (see [Fig. 9-7: Wash tower cleaning](#), page 9-9).

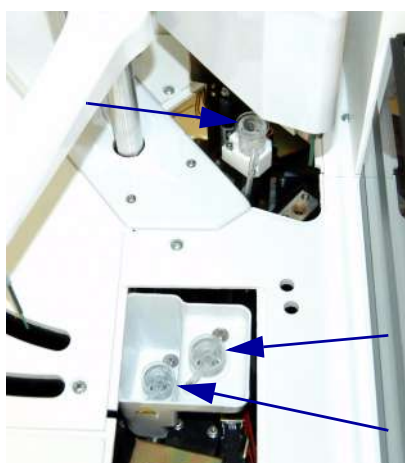


Fig. 9-7: Wash tower cleaning

Reassemble in reverse order and press the «OK» button when finished.

Then, perform a priming cycle (see [Priming Cycle](#), page 7-120).

1.5. Syringe plunger tips replacement

To ensure good pipetting precision, perform the syringe plunger tips replacement procedure on a monthly basis.

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «Cycles» tab, press the «Replace syringe plunger tips» key.

The syringes are positioned halfway down so as to make the syringe plunger tips replacement. Then, a message informs the user that the syringe plunger tips can be replaced.

To remove the reagent/sample syringe, loosen the screw. Then, carefully unscrew and remove the glass barrel (see [Fig. 9–8: Syringes halfway down](#), page 9-10).



Fig. 9–8: Syringes halfway down

Replace the syringe plunger tips as described in the following procedures:

- ◆1.5.1. [Replacement of the reagent syringe plunger tip](#), page 9-11

- ◆1.5.2. [Replacement of the sample syringe plunger tip](#), page 9-11.

Manually fill and empty the syringes several times using a container of distilled water in order to ensure that the barrel is filled with water and no air bubbles are visible in the syringe.

Reassemble in reverse order and press the «OK» button when finished.

Then, perform a priming cycle (see [Priming Cycle](#), page 7-120).

After the priming cycle, run a reagent pressure calibration (see [Reagent pressure calibration](#), page 7-118) and a sample pressure calibration (see [Sample pressure calibration](#), page 7-118).

1.5.1. Replacement of the reagent syringe plunger tip

Remove the plunger from the glass barrel. Pull off the old tip and O-ring.

Position the new O-ring and tip (see [Fig. 9-9: Position new O-ring and tip](#), page 9-11).

◆ 1000 µL Teflon Seal - Ref. B8086605

◆ 1000 µL + 500 µL O'Rings - Ref. B8086583

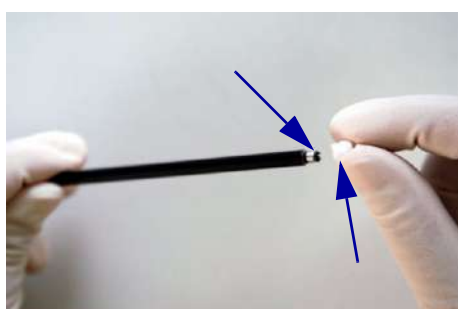


Fig. 9-9: Position new O-ring and tip

Carefully replace the plunger in the glass barrel.

1.5.2. Replacement of the sample syringe plunger tip

Remove the plunger from the glass barrel. Pull off the old tip.

Position the new tip using the replacement tool (see [Fig. 9-10: Position new tip](#), page 9-11).

◆ 100 µL Teflon Seal - Ref. B8086648

◆ Seal Replacement Tool - Ref. B8088454

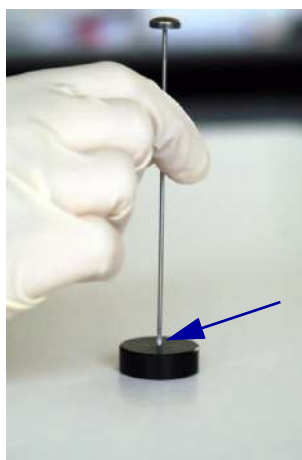


Fig. 9-10: Position new tip

Carefully replace the plunger in the glass barrel.

1.6. Qualitest

To verify that the instrument is functioning properly, perform the Qualitest procedure on a monthly basis. This procedure consists in checking the pipetting accuracy and precision with the **ABX Pentra Qualitest Solution - Ref. A11A01758**.

1.6.1. Preliminary operations

The **ABX Pentra Qualitest Solution** must be previously:

- ◆ configured as a control for the test T1 in the «Calibration/Control» menu (see [2. Control](#), page 5-20)
- ◆ physically positioned on the sample or reagent tray.

Moreover, two vials of distilled water (15 mL and 10 mL) must be previously:

- ◆ configured on a reagent rack in the «Reagent Configuration» menu (see [3.2. Configuration](#), page 4-11)
- ◆ physically positioned on the reagent tray.

1.6.2. Calibration

Press the «Worklist» button from the Main menu.

Then, press the «Calibration» tab from the «Worklist» menu.

Create the calibration request for the test T1 (see [2.3.2. Creation of a calibration request](#), page 2-25):

- ◆ select the test T1 by checking the corresponding box
- ◆ press the «OK» button to validate.

Press the «Start» button from the generic toolbar.

1.6.3. Control

Once the calibration is validated, perform the control as explained below.

Press the «Worklist» button from the Main menu.

Then, press the «Control» tab from the «Worklist» menu.

Create the control request (see [2.4.2. Creation of a control request](#), page 2-29):

- ◆ select the **ABX Pentra Qualitest Solution** by pressing the corresponding key
- ◆ request 15 replicates for the test T1 by checking the corresponding box and using the arrows
- ◆ press the «OK» button to validate.

Press the «Start» button from the generic toolbar.

1.6.4. Check results

Once the control is validated, check the results as explained below.

Press the «Quality Control» button from the Main menu.

Check results of the test T1: the expected coefficient of variation (CV) is $\leq 1.0\%$.

If the expected coefficient of variation is not obtained, please refer to the Troubleshooting chapter (see [2.4. Problem of reproducibility](#), page 9-33).

1.7. Cooling unit filter cleaning

Clean the cooling unit filter on a monthly basis.



Fig. 9-11: Cooling unit filter

Remove the filter metallic support from the cooling unit grid.

Remove the filter from its metallic support.

Clean the filter with water and let it dry.

Once the filter is **dry**, put the filter back into its metallic support.

Put the filter metallic support back on the cooling unit grid by fitting the 2 metallic pieces in grid holes (see [Fig. 9-12: Cooling unit filter installation](#), page 9-14).

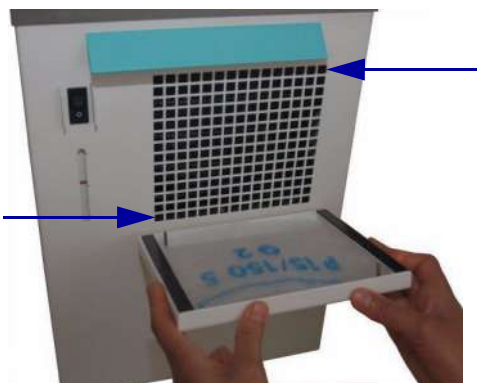


Fig. 9-12: Cooling unit filter installation

1.8. Filter replacement

The filter replacement procedure should be performed on a bimonthly basis (every two months).



Fig. 9-13: Filter

Unscrew the 2 clamp tubes (see [Fig. 9-13: Filter](#), page 9-14).



Fig. 9-14: Filter replacement

Then, tighten both parts of the filter assembly and unscrew to open it.

Replace the rings and the filter (see [Fig. 9-14: Filter replacement](#), page 9-15).

◆ **Liq. Elem + Gasket Ring Filter - Ref. B8089078**

Reassemble in reverse order and perform a priming cycle (see [Priming Cycle](#), page 7-120).

1.9. Glycol level checking

Check the glycol level in the cooling unit on a bimonthly basis (every two months).

The level must be between the high and middle marks. Add distilled water if necessary (see [Fig. 9-15: Glycol level](#), page 9-15).



Fig. 9-15: Glycol level

1.10. Syringes replacement

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «Cycles» tab, press the «Replace Syringes» key.

The syringes are positioned halfway down so as to make their replacement easier. Then, a message informs the user that the syringes can be replaced.

To remove the reagent/sample syringe, loosen the screw. Then, carefully unscrew and remove the glass barrel (see [Fig. 9-8: Syringes halfway down](#), page 9-10).



Fig. 9-16: Syringes halfway down

Manually fill and empty the new syringes several times using a container of distilled water in order to ensure that the barrel is filled with water and no air bubbles are visible in the syringe.

◆ **Reagent Syringe (1000 µL) - Ref. B8078955**

◆ **Sample Syringe (100 µL) - Ref. B8076812**

Reassemble in reverse order and press the «OK» button when finished.

Then, perform a priming cycle (see [Priming Cycle](#), page 7-120).

After the priming cycle, run a reagent pressure calibration (see [Reagent pressure calibration](#), page 7-118) and a sample pressure calibration (see [Sample pressure calibration](#), page 7-118).

1.11. Needles replacement

1.11.1. Reagent needle replacement

Press the «Services» button from the Main menu. Then, press the «Customer Services» button from the «Services» menu. From the «Cycles» tab, press the «Replace Reagent needle» key.

The reagent needle heating is switched OFF and the reagent arm is positioned so as to make the reagent needle replacement easier. Then, a message informs the user that the reagent needle can be replaced.

Remove the reagent arm cover by unscrewing the 2 screws.

Disconnect the teflon tubing of the reagent needle from the syringe block (see [Fig. 9-17: Teflon tubing of the reagent needle](#), page 9-17).

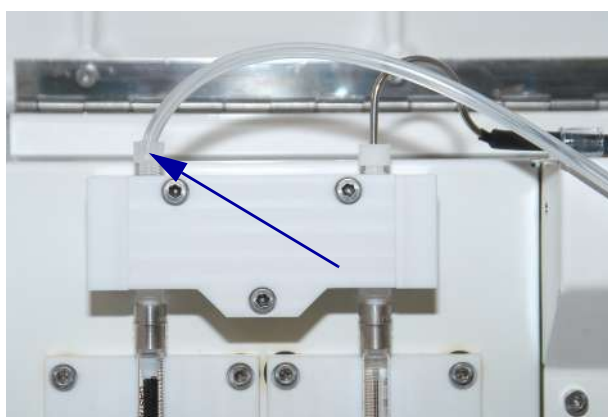


Fig. 9-17: Teflon tubing of the reagent needle

Unscrew the 2 plastic collars maintaining the teflon tubing of the reagent needle (see [Fig. 9-18: Plastic collars of the reagent needle](#), page 9-18).



Caution! While reassembling, take care that the plastic collars are positioned in the right way and the teflon tubing is passing in front of the electrical wire (see [Fig. 9-18: Plastic collars of the reagent needle](#), page 9-18).

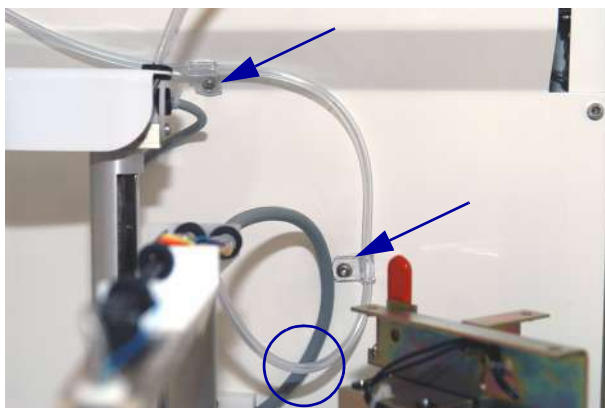


Fig. 9-18: Plastic collars of the reagent needle

Disconnect the blue wire (1) and loosen the 2 screws (2) to free the needle. Then, disconnect the connector (3) and remove the reagent needle (see [Fig. 9-19: Reagent needle dismantling](#), page 9-18).

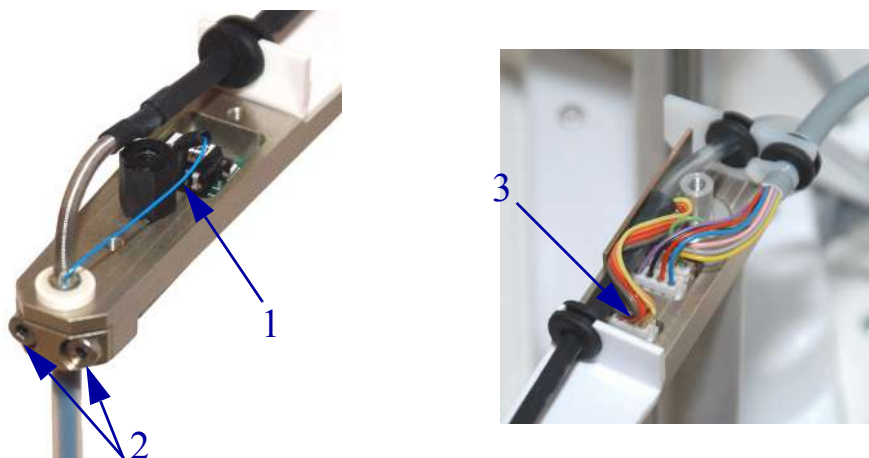


Fig. 9-19: Reagent needle dismantling

Replace the reagent needle and reassemble in reverse order.

◆ **Reagent Needle - Ref. XBA564B**

Press the «OK» button when finished.

The instrument checks that the reagent needle is correctly positioned. Then, a message informs the user that the reagent needle replacement is finished. Press the «OK» button.

Then, perform a priming cycle (see [Priming Cycle](#), page 7-120).

After the priming cycle, run a reagent pressure calibration (see [Reagent pressure calibration](#), page 7-118).2

1.11.2. Sample needle replacement

Press the «Services» button from the Main menu. Then, press the «Customer Services» button from the «Services» menu. From the «Cycles» tab, press the «Replace Sample needle» key.

The sample arm is positioned so as to make the sample needle replacement easier. Then, a message informs the user that the sample needle can be replaced.

Remove the sample arm cover by unscrewing the 2 screws.

Disconnect the teflon tubing of the sample needle from the syringe block (see [Fig. 9-20: Teflon tubing of the sample needle](#), page 9-19).

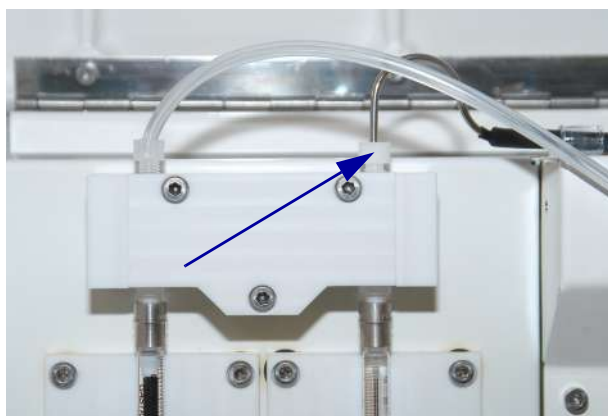


Fig. 9-20: Teflon tubing of the sample needle

Unscrew the 2 plastic collars maintaining the teflon tubing of the sample needle (see [Fig. 9-21: Plastic collars of the sample needle](#), page 9-19).



Caution! While reassembling, take care that the plastic collars are positioned in the right way (see [Fig. 9-21: Plastic collars of the sample needle](#), page 9-19).

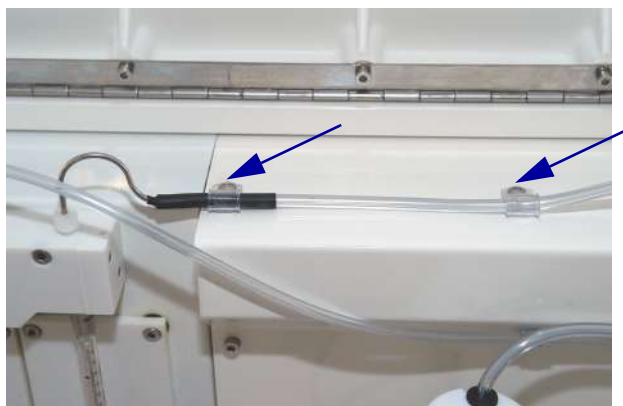


Fig. 9-21: Plastic collars of the sample needle

Disconnect the white wire (1) and loosen the screw (2) to release the needle (see [Fig. 9-22: Sample needle dismantling](#), page 9-20). Then, remove the sample needle.

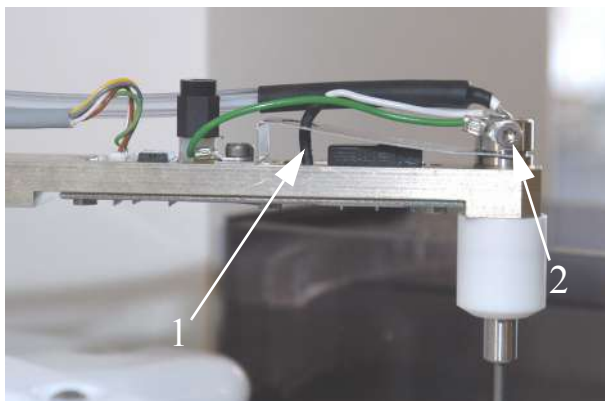


Fig. 9-22: Sample needle dismantling

Replace the sample needle taking care not to clamp the tubing and reassemble in reverse order.

◆ **Sample Needle - Ref. XBA563B**

Press the «OK» button when finished.

The instrument checks that the sample needle is correctly positioned. Then, a message informs the user that the sample needle replacement is finished. Press the «OK» button.

Then, perform a priming cycle (see [Priming Cycle](#), page 7-120).

After the priming cycle, run a sample pressure calibration (see [Sample pressure calibration](#), page 7-118).

1.12. Mixer paddle replacement

Press the «Services» button from the Main menu. Then, press the «Customer Services» button from the «Services» menu. From the «Cycles» tab, press the «Replace Mixer paddle» key.

The mixer as the sample and reagent arms are positioned so as to make the mixer paddle replacement easier. Then, a message informs the user that the mixer paddle can be replaced.

Remove the mixer cover by unscrewing the 3 screws (see [Fig. 9-23: Mixer cover](#), page 9-21).



Fig. 9-23: Mixer cover

Lift the mixer up by pressing the red button.

Loosen the screw and remove the mixer paddle by pulling it down (see [Fig. 9-24: Mixer paddle dismantling](#), page 9-21).

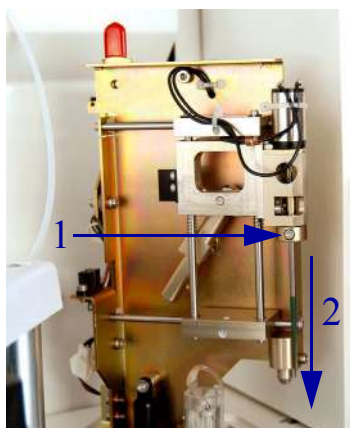


Fig. 9-24: Mixer paddle dismantling

Replace the mixer paddle and reassemble in reverse order.

◆Mixer Paddle - Ref. GBM0134



Make sure that the mixer paddle is pushed up at the maximum in its support.

Press the «OK» button when finished.

1.13. Lamp replacement

Press the «Services» button from the Main menu. Then, press the «Customer Services» button from the «Services» menu. From the «Cycles» tab, press the «Replace Lamp» key.

The lamp is switched OFF. Then, a message informs the user that the lamp can be replaced.

Press the front of the optic hatch to open it (see [Fig. 9-25: Optic hatch](#), page 9-22).

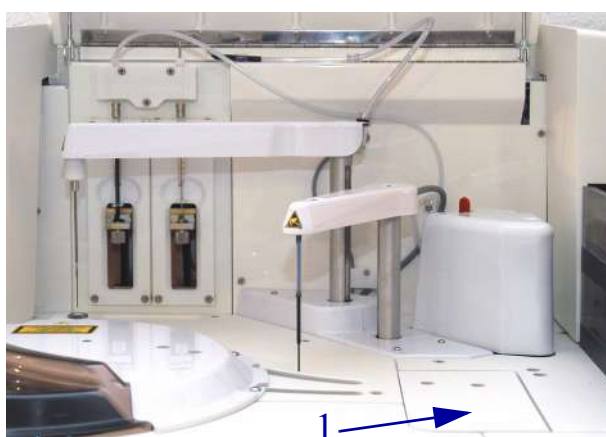


Fig. 9-25: Optic hatch

◆Light Bulb Dismantling Allen Key - Ref. MAB086A

◆Lamp - Ref. GBM0738

Disconnect the lamp supply cable and loosen the 2 screws using the recommended key (see [Fig. 9-26: Lamp dismantling](#), page 9-22). Then, turn the light lock and remove the lamp.



Warning! Risk of personal injury due to hot surfaces within the instrument.
Allow the lamp to cool sufficiently before proceeding.

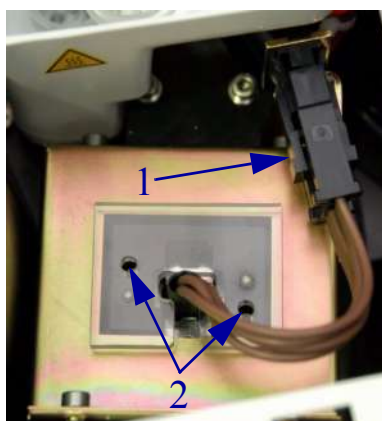


Fig. 9-26: Lamp dismantling

Replace the lamp and reassemble in reverse order.



Ensure that the lamp is correctly positioned (see [Fig. 9–27: Lamp assembly](#), page 9-23).

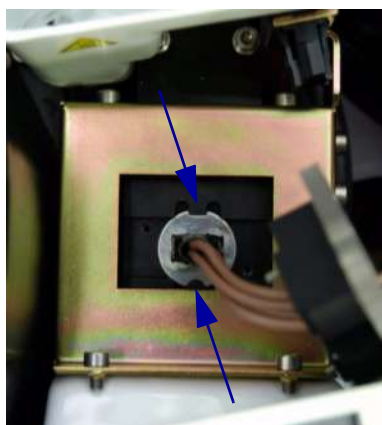


Fig. 9–27: Lamp assembly

Press the «OK» button when finished.

Closing the «Customer Services» menu, the **Pentra 400** turns to «Emergency Stop» status.

Then, initialize the instrument by pressing the «Analyser Initialization» button from the generic tool-bar.

1.14. ISE reagents replacement



Fig. 9-28: Module ISE

Unscrew the cap of the empty reagent bottle.

Replace the reagent bottle by a new one.

Close the new reagent bottle with the cap.

Check that the tubing corresponds to the reagent:

- ◆ L for Standard 1
- ◆ H for Standard 2
- ◆ R for Reference.



If the reagent bottle was completely empty, perform a global initialization (see [Global Initialization](#), page 7-124).

1.15. Electrodes replacement

Press the «Services» button from the Main menu.

Then, press the «Customer Services» button from the «Services» menu.

From the «ISE» tab, press the «Change electrode» key.

The ISE module drains the reagents from the electrodes to allow the user to replace the electrode.

Loosen the screw and open the ISE door.

Remove the used electrode.

Unpack the new electrode.

Please note that the electrodes can be installed up to the date mentioned on the packaging label and that, after opening, the electrodes are stable for the following durations:

◆ABX Pentra Sodium Electrode - Ref. A11A01738	12 months
◆ABX Pentra Chloride Electrode - Ref. A11A01739	4 months
◆ABX Pentra Potassium Electrode - Ref. A11A01740	6 months
◆ABX Pentra Reference Electrode - Ref. A11A01741	12 months

Remove the protections from each side of the electrode and check that the O-ring is well-positioned on one side of the electrode.

Make sure that the electrode is clean.

Install the new electrode (see [Fig. 9-29: Electrodes replacement](#), page 9-25).



Fig. 9-29: Electrodes replacement

When facing the ISE module, the electrodes have to be positioned from left to right as shown on the following diagram:

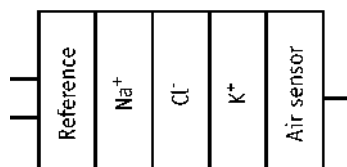


Fig. 9-30: Electrodes diagram

Close the ISE door and tighten the screw.

Then, perform a global initialization (see [Global Initialization](#), page 7-124).

1.16. Instrument cleaning and decontamination

1.16.1. External cleaning and decontamination

The external surfaces of the instrument must be decontaminated considering the biological environment.



- 1 - Never spill liquid on the instrument.
- 2 - Never use disinfectant product that contains alcohol.

▼ Touch screen

Use a soft cloth, slightly wet with disinfectant product*. Wipe gently the screen and dry to remove any trace of moisture.

▼ All contaminated surfaces (covers, trays, ...)

Slightly wet a sponge with disinfectant product* and wipe the dirty surfaces.

▼ Stainless steel parts

Slightly wet a sponge with disinfectant product* and wipe the dirty surfaces. Dry with a soft cloth.

* Product having the following microbiological properties:

- ◆ Bactericidal
- ◆ Fungicidal
- ◆ Active on *Aspergillus fumigatus*
- ◆ Active on *Mycobacterium tuberculosis* (BK)
- ◆ Antiviral (VIH, HBV and rotavirus).

Product example validated by **HORIBA ABX**:

- ANIOS detergent disinfectant, WIP'ANIOS - Ref. 1316.424.



For further information, please refer to the WHO (World Health Organization) guidelines: «Laboratory Biosafety Manual, 2nd edition».

1.16.2. Internal cleaning and decontamination

▼ Needles

Perform the Needle deproteinization procedure (see [1.2. Needle deproteinization](#), page 9-5) in order to decontaminate the sample and reagent needles as the mixer.

▼ ISE module

Perform the ISE module cleaning procedure (see [1.3. ISE module cleaning](#), page 9-7) in order to decontaminate the tubing and electrodes.



For further information, please refer to the WHO (World Health Organization) guidelines: «Laboratory Biosafety Manual, 2nd edition».

1.17. Pentra 400 maintenance schedule

To help the user maintaining the instrument properly, a sheet of **Pentra 400** maintenance schedule is provided on the next page.

Pentra 400 maintenance schedule

MONTH:

DAILY

DAY:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ISE module activation (Beginning of the day)																															
ISE module etching (End of the day)																															
Needle deproteinization without mixer (Shutdown)																															

WEEKLY

WEEK:																															
Needle deproteinization with mixer																															
ISE module cleaning																															

MONTHLY

Wash tower cleaning	DATE	
Syringe plunger tips replacement		
Qualitest	CV (%):	
Cooling unit filter cleaning		

BIMONTHLY

Filter replacement	DATE
Glycol level checking	

ON REQUEST

Syringes replacement	DATE
Needles replacement	
Mixer paddle replacement	
Lamp replacement	
Instrument cleaning and decontamination	DATE
Application update	VERSION
Software update	

ISE reagents replacement	DATE
Standard 1	
Standard 2	
Reference	
Electrodes replacement	DATE
Reference	LOT #
Sodium	
Chloride	
Potassium	

2. Troubleshooting

This chapter provides instructions for solving problem situations, that may occur when using the **Pen-tra 400** system, in the following parts:

- ◆ [2.1. Reagent tray](#), page 9-29
- ◆ [2.2. Sample tray](#), page 9-31
- ◆ [2.3. Reagent and sample arms](#), page 9-32
- ◆ [2.4. Problem of reproducibility](#), page 9-33
- ◆ [2.5. Cuvette changer](#), page 9-33
- ◆ [2.6. Reaction tray](#), page 9-35
- ◆ [2.7. Spectrophotometer](#), page 9-35
- ◆ [2.8. ISE module](#), page 9-36
- ◆ [2.9. Water and wastes](#), page 9-38
- ◆ [2.10. Cooling unit](#), page 9-38.

2.1. Reagent tray

▼ A reagent rack appearing totally in red

On the Main menu, the reagent tray representation displays a reagent rack totally in red.

- ◆ The reagent rack was newly placed on the instrument:
 - Press the «Services» button from the Main menu.
 - Then, press the «System Configuration» button.
 - From the «Analyser» tab, use the «Racks» part in order to add the new reagent rack in the list of used racks (see [3.1.8. Racks](#), page 7-83).
- ◆ Two reagent racks are identical in terms of identification:
 - Unload one of the two racks from the reagent tray.

▼ A position appearing in red

On the Main menu, the reagent tray representation displays a position in red.

a – Cassette

- ◆ The cassette is inactive:
 - An identical cassette is already active on the reagent tray.



In order to use the new cassette, proceed as follows:

- Press the «Reagent Configuration» button from the generic toolbar.
- Use the «Reagent Configuration» menu to first inactivate the old cassette and then activate the new cassette (see [3. Reagent Configuration](#), page 4-9).

- ◆ The cassette is empty:
 - Physically check the cassette and replace it if necessary.
- ◆ The cassette has expired:
 - Replace the cassette.

b – Reagent rack sector

- ◆ The reagent rack sector is inactive:
 - Press the «Reagent Configuration» button from the generic toolbar.
 - Use the «Reagent Configuration» menu to activate the reagent rack sector (see [3. Reagent Configuration](#), page 4-9).
- ◆ The reagent rack sector is empty:
 - Physically check the reagent rack sector and fill it if necessary.

c – Calibrator/control reagent rack

- ◆ The calibrator/control reagent rack was newly placed on the instrument:
 - Press the «Services» button from the Main menu.
 - Then, press the «System Configuration» button.
 - From the «Analyser» tab, use the «Racks» part in order to add the new calibrator/control reagent rack in the list of used racks (see [3.1.8. Racks](#), page 7-83).
- ◆ The calibrator/control is absent or empty:
 - Physically check the calibrator/control.
 - Place or replace the calibrator/control if necessary.
- ◆ The calibrator/control has expired:
 - Replace the calibrator/control.
- ◆ Two calibrator/control reagent racks are identical in terms of identification:
 - Unload one of the two racks from the reagent tray.

▼ Cassette or rack not displayed

On the Main menu, the reagent tray representation does not display a cassette or rack whereas the cassette or rack is present on the reagent tray.

- ◆ The cassette or rack label is dirty or not properly positioned:
 - Check the cassette or rack label.
- ◆ The reagent barcode reader is out of service:
 - Call your **HORIBA ABX** representative.

▼ Reagent tray cover open

The system warning or alarm «Reagent Door Open» is triggered and displayed in the «System Warnings» menu.

- ◆ The reagent tray cover is open or not properly closed:
 - Close properly the reagent tray cover.
 - If the system warning or alarm is repeated, call your **HORIBA ABX** representative.

▼ Problem with the reagent tray temperature

One of the following system warnings and alarms is triggered and displayed in the «System Warnings» menu:

- system warning «Reagent tray temperature exceeds limits»
- system alarm «Temperature regulation of the refrigerated compartment broken down».
- ◆ The temperature of the cooled area in the reagent tray is out of range or the temperature regulation is out of service:
 - Press the «Services» button from the Main menu.
 - Then, press the «Customer Services» button.
 - From the «Analyser» tab, check the reagent tray temperature using the «Temperatures» part (see [4.3.2. Temperatures](#), page 7-130).
 - Check the glycol level in the cooling unit by following the corresponding maintenance procedure (see [1.9. Glycol level checking](#), page 9-15).

2.2. Sample tray

▼ A rack appearing totally in red

On the Main menu, the sample tray representation displays a rack totally in red.

- ◆ Two racks are identical in terms of identification:
 - Unload one of the two racks from the sample tray.

▼ A position appearing in red

On the Main menu, the sample tray representation displays a position in red.

- ◆ Sample empty:
 - Physically check the sample and replace it if necessary.
- ◆ Sample shock detection:
 - The sample tube may be capped. Physically check the sample tube.
- ◆ Sample needle clogged:
 - Physically check the sample.
 - Clean the sample needle by following the corresponding maintenance procedure (see [1.2. Needle deproteinization](#), page 9-5).
- ◆ Calibrator/control missing or expired:
 - Place or replace the calibrator/control.

▼ Rack not displayed

On the Main menu, the sample tray representation does not display a rack whereas the rack is present on the sample tray.

- ◆ The rack was newly placed on the instrument:
 - Press the «Services» button from the Main menu.
 - Then, press the «System Configuration» button.
 - From the «Analyser» tab, use the «Racks» part in order to add the new rack in the list of used racks (see [3.1.8. Racks](#), page 7-83).
- ◆ The rack label is dirty or not properly positioned:
 - Check the rack label.
- ◆ The sample barcode reader is out of service:
 - Call your **HORIBA ABX** representative.

▼ Rack displayed full instead of empty

On the Main menu, the sample tray representation displays a rack full whereas the rack is empty.

- ◆ The sample tray is not correctly adjusted:
 - Call your **HORIBA ABX** representative.
- ◆ The sample barcode reader is not correctly adjusted:
 - Call your **HORIBA ABX** representative.

2.3. Reagent and sample arms

▼ Syringes problem

There is a problem with the reagent or sample syringe.

- ◆ Air bubbles are visible in the syringe:
 - Perform a priming cycle (see [Priming Cycle](#), page 7-120).
- ◆ The syringe is damaged:
 - Replace the syringe by following the corresponding procedure (see [1.10. Syringes replacement](#), page 9-16).

▼ Needles problem

There is a problem with the reagent or sample needle.

- ◆ The needle is damaged:
 - Replace the needle by following the corresponding procedure (see [1.11. Needles replacement](#), page 9-17).

▼ Problem with the heating needle temperature

One of the following system warnings and alarms is triggered and displayed in the «System Warnings» menu:

- system warning «Heating needle temperature exceeds limits»
- system alarm «Temperature regulation of the heating needle broken down».
- ◆ The temperature of the heating needle is out of range or the temperature regulation is out of service:
 - Press the «Services» button from the Main menu.
 - Then, press the «Customer Services» button.
 - From the «Analyser» tab, check the heating needle temperature using the «Temperatures» part (see [4.3.2. Temperatures](#), page 7-130).
 - Call your **HORIBA ABX** representative.

2.4. Problem of reproducibility

There is a problem of result reproducibility.

- ◆ Air bubbles are visible in the reagent/sample syringe:
 - Perform a priming cycle (see [Priming Cycle](#), page 7-120).
- ◆ The reagent/sample syringe plunger tips must be replaced:
 - Replace the reagent/sample syringe plunger tip by following the corresponding procedure (see [1.5. Syringe plunger tips replacement](#), page 9-10).
- ◆ The reagent/sample syringe must be replaced:
 - Replace the reagent/sample syringe by following the corresponding procedure (see [1.10. Syringes replacement](#), page 9-16).

Perform the Qualitest procedure (see [1.6. Qualitest](#), page 9-12) to check the pipetting accuracy and precision.

If the problem is repeated, call your **HORIBA ABX** representative.

2.5. Cuvette changer

▼ Rack of used cuvettes missing

The system warning or alarm «Used Cuvette Holder Missing» is triggered and displayed in the «System Warnings» menu.

- ◆ The rack of used cuvettes is absent:
 - Reinstall the rack of used cuvettes.

▼ Rack of used cuvettes full

The system warning or alarm «Used Cuvette Holder Full» is triggered and displayed in the «System Warnings» menu.

- ◆ The rack of used cuvettes is full:
 - Empty the rack of used cuvettes (see [Empty the rack of used cuvettes](#), page 8-21).
- ◆ Problem with the detector of used cuvettes:
 - Physically check the detector of used cuvettes and clean it if necessary.
 - If the system warning or alarm is repeated, call your **HORIBA ABX** representative.

Follow the procedure below to disable the cuvette changer:

- Press the «Services» button from the Main menu.
- Then, press the «System Configuration» button.
- From the «Analyser» tab, use the «Cuvettes» part to disable the cuvette changer (see [3.1.4. Cuvettes](#), page 7-80).
- Cuvette segments should then be loaded and unloaded manually (see [Manual loading of cuvette segments](#), page 8-21).

▼ Rack of new cuvettes empty

The system warning «Cuvette Holder Empty» is triggered and displayed in the «System Warnings» menu.

- ◆ The rack of new cuvettes is empty:
 - Fill the rack of new cuvettes (see [Fill the rack of new cuvettes](#), page 8-20).
- ◆ Problem with the detector of new cuvettes:
 - Call your **HORIBA ABX** representative.

Follow the procedure below to disable the cuvette changer:

- Press the «Services» button from the Main menu.
- Then, press the «System Configuration» button.
- From the «Analyser» tab, use the «Cuvettes» part to disable the cuvette changer (see [3.1.4. Cuvettes](#), page 7-80).
- Cuvette segments should then be loaded and unloaded manually (see [Manual loading of cuvette segments](#), page 8-21).

▼ Manual loading of cuvette segments

After a cuvette segment has been loaded manually, the reaction tray makes noise and system warnings and/or alarms are triggered and displayed in the «System Warnings» menu.

- ◆ A cuvette segment is not correctly loaded:
 - Open the flap door of the reaction tray.
 - Press the cuvette segment completely down into the reaction tray.

2.6. Reaction tray

▼ Flap door of the reaction tray open

The system warning or alarm «Manual Cuvette Loading Door Open» is triggered and displayed in the «System Warnings» menu.

- ◆ The flap door of the reaction tray is open or not properly closed:
 - Close properly the flap door of the reaction tray.
- ◆ Bad contact:
 - Call your **HORIBA ABX** representative.

▼ Problem with the reaction tray temperature

One of the following system warnings and alarms is triggered and displayed in the «System Warnings» menu:

- system warning «Reaction tray temperature exceeds limits»
- system alarm «Temperature regulation of the reaction tray broken down».
- ◆ The temperature in the reaction tray is out of range or the temperature regulation is out of service:
 - Press the «Services» button from the Main menu.
 - Then, press the «Customer Services» button.
 - From the «Analyser» tab, check the reaction tray temperature using the «Temperatures» part (see [4.3.2. Temperatures](#), page 7-130).
 - Check also the room temperature.
 - Call your **HORIBA ABX** representative.

2.7. Spectrophotometer

▼ Light stability

The light stability check has failed. The system alarm «Light stability» is triggered and displayed in the «System Warnings» menu.

- ◆ Problem with the lamp:
 - Physically check if the lamp is ON and replace it if necessary by following the corresponding procedure (see [1.13. Lamp replacement](#), page 9-22).
- ◆ Other problem:
 - Call your **HORIBA ABX** representative.

2.8. ISE module

▼ «ISE Module Status» button appearing disabled

On the Main menu, the «ISE Module Status» button is disabled. This indicates that the ISE module is disabled.

◆The ISE module is disabled:

- Press the «Services» button from the Main menu.
- Then, press the «System Configuration» button.
- From the «Analyser» tab, use the «ISE Module» part to enable the ISE module (see [3.1.9. ISE Module](#), page 7-84).

▼ «ISE Module Status» button appearing in red

On the Main menu, the «ISE Module Status» button is red. This indicates an error on the ISE module (mechanical or reagent/fluidic error).

a – Reagent/fluidic error

◆A reagent bottle is empty:

- Replace the reagent bottle by following the corresponding procedure (see [1.14. ISE reagents replacement](#), page 9-24).
- Then, perform a global initialization (see [Global Initialization](#), page 7-124).

◆When replacing an electrode, the protections of each side of the electrode have not been removed:

- Remove the protections of each side of the electrode by following the procedure [1.15. Electrodes replacement](#), page 9-25.
- Then, perform a global initialization (see [Global Initialization](#), page 7-124).

◆When replacing an electrode, the electrode has not been well-positioned:

- Position correctly the electrode by following the procedure [1.15. Electrodes replacement](#), page 9-25.
- Then, perform a global initialization (see [Global Initialization](#), page 7-124).

◆If the ISE module has been shutdown for a long period, presence of salt-crystals:

- Remove the electrodes by following the procedure [1.15. Electrodes replacement](#), page 9-25.
- Clean the electrodes with distilled water.
- Reinstall the electrodes by following the procedure [1.15. Electrodes replacement](#), page 9-25.
- Then, perform a global initialization (see [Global Initialization](#), page 7-124).

b – Mechanical error

◆A mechanical error occurs:

- Perform a global initialization (see [Global Initialization](#), page 7-124).

In all cases, if the «ISE Module Status» button is still red after several global initializations, call your HORIBA ABX representative.

▼ «ISE Module Status» button appearing in blue with a red circle

On the Main menu, the «ISE Module Status» button is blue with a red circle.

This indicates an error on the calibrations.

- ◆ The ISE module maintenance has not been correctly performed:
 - Perform the ISE module cleaning and etching by following the corresponding procedures (see [1.3. ISE module cleaning](#), page 9-7 and [1.1. ISE module etching](#), page 9-4).
- ◆ The reference reagent bottle is empty:
 - Replace the reagent bottle by following the corresponding procedure (see [1.14. ISE reagents replacement](#), page 9-24).
 - Then, perform a global initialization (see [Global Initialization](#), page 7-124).
- ◆ The reference and high standard reagent bottles are positioned in reverse order:
 - Position correctly the reagent bottles by following the procedure [1.14. ISE reagents replacement](#), page 9-24.
 - Then, perform a global initialization (see [Global Initialization](#), page 7-124).
- ◆ An electrode has expired:
 - From the Main menu, press the «ISE Module Status» button.
 - The ISE module status screen opens and shows the ISE calibration results.
 - Check the slope and the sensitivity (= difference between the low and high standard values) for each electrode.

Electrode	Slope normal range (mV/dec)	Sensitivity normal range (mV)
Chloride	- 53.0 to - 23.0	5.0 - 9.4
Potassium	37.0 to 67.0	9.0 - 16.3
Sodium	38.0 to 59.0	8.5 - 14.4

Tab. 9-2: Slope and sensitivity normal range for each electrode

- If the calibration results are bad for only one electrode, this electrode may have expired. Replace the electrode by following the corresponding procedure (see [1.15. Electrodes replacement](#), page 9-25).
- If the calibration results are bad for all the electrodes, the reference electrode may have expired. Replace the reference electrode by following the corresponding procedure (see [1.15. Electrodes replacement](#), page 9-25).
- Then, perform a global initialization (see [Global Initialization](#), page 7-124).
- ◆ The electrodes have just been replaced:
 - From the Main menu, press the «ISE Module Status» button.
 - Then, run successively five 2-point calibrations to let the electrodes stabilize themselves with the ISE reagents.

2.9. Water and wastes

▼ Water tank empty

The system warning «Water Tank Empty» is triggered and displayed in the «System Warnings» menu.

- ◆The water tank is empty:
 - Physically check the water tank and fill it if necessary.
- ◆The water tank is physically full:
 - Physically check the water tank sensor.
 - Call your **HORIBA ABX** representative.

▼ Waste tank full

The system warning «Waste Tank Full» is triggered and displayed in the «System Warnings» menu.

- ◆The waste tank is full:
 - Physically check the waste tank and empty it if necessary.
- ◆The waste tank is physically empty:
 - Physically check the waste tank sensor.
 - Call your **HORIBA ABX** representative.

▼ No level detection

No detection whereas the water tank is empty or the waste tank is full.

- ◆The level sensor is out of service:
 - Physically check the level sensor and clean it if necessary.
 - Call your **HORIBA ABX** representative.

2.10. Cooling unit

▼ Glycol level

Check the glycol level by following the corresponding procedure (see [1.9. Glycol level checking](#), page 9-15).

▼ Compressor overload

The system alarm «Compressor overload» is triggered and displayed in the «System Warnings» menu.

- ◆The cooling unit is switch OFF:
 - Switch ON the cooling unit.
- ◆Connection problem:
 - Physically check the cooling unit connections.

3. Warnings, Alarms and Flags

This section describes warnings, alarms and flags in the following chapters:

- ◆ [3.1. System warnings and alarms](#), page 9-39
- ◆ [3.2. Sampling alarms](#), page 9-58
- ◆ [3.3. Analytical and quality flags](#), page 9-61.

3.1. System warnings and alarms

This chapter describes the system warnings and alarms as the maintenance alerts in the following parts:

- ◆ [3.1.1. Menu «System Warnings»](#), page 9-39
- ◆ [3.1.2. Warnings](#), page 9-43
- ◆ [3.1.3. Alarms](#), page 9-50
- ◆ [3.1.4. Management of temperature warnings and alarms](#), page 9-56
- ◆ [3.1.5. Maintenance alerts](#), page 9-57.

3.1.1. Menu «System Warnings»

The «System Warnings» menu displays the system warnings and alarms as the maintenance alerts.

▼ Access to the «System Warnings» menu

Press the «System Warnings» button from the generic toolbar.

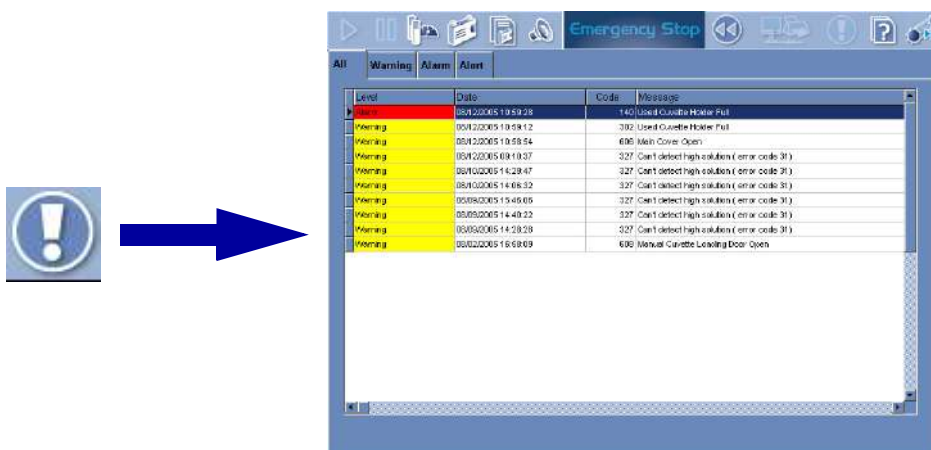


Fig. 9-31: «System Warnings» menu access button



The «System Warnings» button is:

- ◆ **red**, until the user clicks, when a system warning or alarm is triggered
- ◆ **orange** when a maintenance alert is triggered.

The «System Warnings» menu is divided into the four following tabs:

- ◆ **All**, page 9-40
- ◆ **Warning**, page 9-40
- ◆ **Alarm**, page 9-41
- ◆ **Alert**, page 9-41.

Click or press one of the tabs to access the various functions.

▼ All

This tab displays all the system warnings and alarms sorted by dates.

Columns of the «All» tab are described in the following table:

Heading	Description	Format
Level	Warning or alarm.	- Warning: the field is colored in yellow. - Alarm: the field is colored in red.
Date	Date and hour of the warning/alarm.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Code	Warning/alarm code.	3 numerical characters.
Message	Warning/alarm description.	100 characters max.

Tab. 9-3: «All» tab description

▼ Warning

This tab only displays the system warnings sorted by dates.

Columns of the «Warning» tab are described in the following table:

Heading	Description	Format
Date	Date and hour of the warning.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Code	Warning code.	3 numerical characters.
Message	Warning description (see 3.1.2. Warnings , page 9-43).	100 characters max.

Tab. 9-4: «Warning» tab description

The user is able to delete the system warnings by pressing the «Delete» button.

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▼ Alarm

This tab only displays the system alarms sorted by dates.

Columns of the «Alarm» tab are described in the following table:

Heading	Description	Format
Date	Date and hour of the alarm.	Depending on the date and time format chosen (see System Date and Time , page 7-87).
Code	Alarm code.	3 numerical characters.
Message	Alarm description (see 3.1.3. Alarms , page 9-50).	100 characters max.

Tab. 9-5: «Alarm» tab description

▼ Alert

This tab displays the maintenance procedures to be done on the instrument sorted by frequencies.

The **Pentra 400** maintenance schedule is configurable in the «System Configuration» menu (see [3.7. Maintenance](#), page 7-110). The maintenance procedures done on request are not displayed on the «Alert» tab.

If the maintenance procedure is not done when necessary, then the corresponding maintenance alert is triggered:

- on the Main menu, the «System Warnings» button is orange
- on the «Alert» tab of the «System Warnings» menu, the Alert flag is displayed.

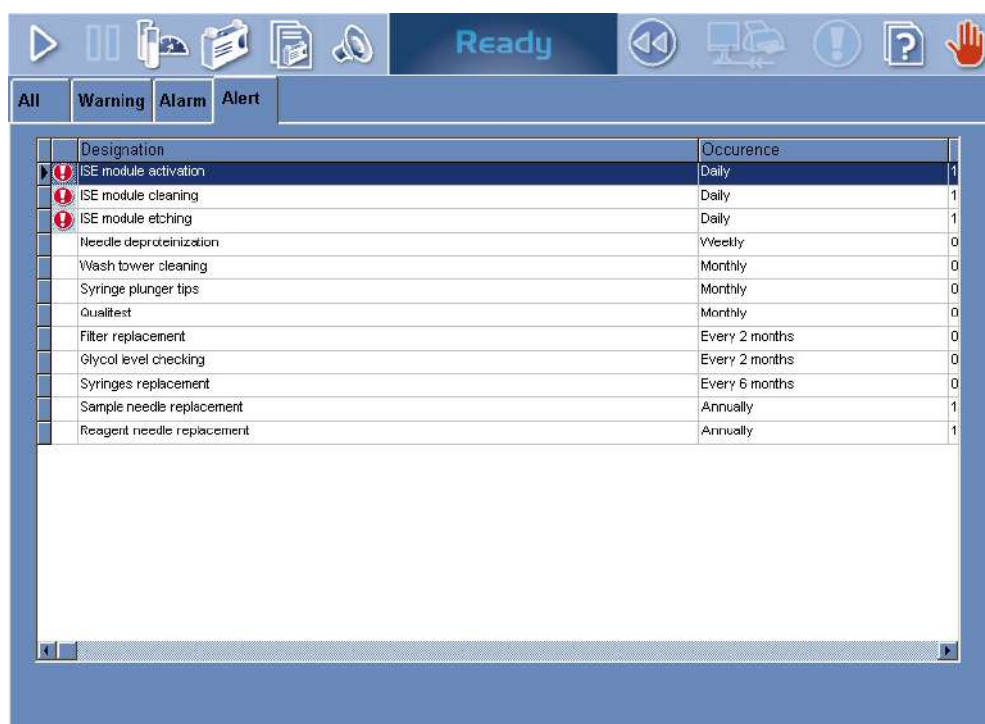


Fig. 9-32: «Alert» tab

Columns of the «Alert» tab are described in the following table:

Heading/Key	Description	Format
	Alert flag: displayed when the corresponding maintenance alert is triggered.	-
Designation	Maintenance procedure (or alert) (see 3.1.5. Maintenance alerts , page 9-57).	50 characters max.
Occurrence	Frequency of the maintenance procedure.	20 characters max.
Expected date	Expected date and hour of the maintenance procedure.	Depending on the date and time format chosen (see System Date and Time , page 7-87).

Tab. 9-6: «Alert» tab description

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3.1.2. Warnings

The warnings listed below are not blocking the instrument and are displayed to warn the user.

System warnings are displayed on the «Warning» tab of the «System Warnings» menu (see [3.1.1. Menu «System Warnings»](#), page 9-39).

When a system warning is triggered, the **Pentra 400** is not stopped and turns to «Ready» status.

If a system warning occurs, follow the instructions given in the following table (see [Tab. 9–7: Warnings](#), page 9-43). If the warning is repeated, call your **HORIBA ABX** representative.

Code	Message	Error type	Action
001	ISE Module Initialization Problem	ISE module initialization failed.	Shutdown the instrument. Switch OFF/ON the instrument.
060	Non recoverable material error on the ISE module	Non recoverable material error on the ISE module.	Shutdown the instrument. Switch OFF/ON the instrument.
061	ISE command invalid	The used ISE function cannot be performed.	-
123	Reaction tray temperature exceeds limits	Temperature in reaction tray out of range (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Run an initialization.
124	Heating needle temperature exceeds limits	Temperature of heating needle out of range (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Run an initialization.
301	Cuvette Holder Empty	Rack of new cuvettes empty.	Fill the rack of new cuvettes.
302	Used Cuvette Holder Full	Rack of used cuvettes full.	Empty the rack of used cuvettes.
303	Water Tank Low Level	Water tank low level.	Physically check the water tank.
304	Waste Tank Full	Waste tank full.	Physically check the waste tank.
305	Reagent tray temperature exceeds limits	Temperature of cooled area in reagent tray out of range (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Physically check the cooling unit and glycol level.
307	Water level of the cold group is insufficient	Glycol level in the cooling unit insufficient.	Physically check the glycol level.
308	Power supply problem	Power supply problem.	-
309	SOLUTION_EMPTY/SN on liquid [%s]	The sampling alarm SOLUTION_EMPTY/SN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
310	SOLUTION_EMPTY/RN on liquid [%s]	The sampling alarm SOLUTION_EMPTY/RN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.

Tab. 9–7: Warnings

Code	Message	Error type	Action
311	SOLUTION_FOAM/SN on liquid [%s]	The sampling alarm SOLUTION_FOAM/SN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
312	SOLUTION_FOAM/RN on liquid [%s]	The sampling alarm SOLUTION_FOAM/RN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
313	SOLUTION_CLOGGING/SN on liquid [%s]	The sampling alarm SOLUTION_CLOGGING/SN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the sample needle and tubing. Run a sample pressure calibration. Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
314	SOLUTION_CLOGGING/RN on liquid [%s]	The sampling alarm SOLUTION_CLOGGING/RN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the reagent needle and tubing. Run a reagent pressure calibration. Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
315	SOLUTION_SHOCK on liquid [%s]	The sampling alarm SOLUTION_SHOCK has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution, remove the caps and activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
316	INC_SOLUTION_PIPET/SN on liquid [%s]	The sampling alarm INC_SOLUTION_PIPET/SN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
317	INC_SOLUTION_PIPET/RN on liquid [%s]	The sampling alarm INC_SOLUTION_PIPET/RN has been triggered on the solution [%s] during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the shutdown.
318	Timeout error on ISE syringe 1 (error code 1)	ISE module mechanical error.	Run an ISE global initialization (see Global Initialization , page 7-124).
319	Position error on ISE syringe 1 (error code 2)	ISE module mechanical error.	Run an ISE global initialization (see Global Initialization , page 7-124).
320	Timeout error on ISE syringe 2 (error code 11)	ISE module mechanical error.	Run an ISE global initialization (see Global Initialization , page 7-124).

Tab. 9–7: Warnings

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Warnings, Alarms and Flags

Code	Message	Error type	Action
321	Position error on ISE syringe 2 (error code 12)	ISE module mechanical error.	Run an ISE global initialization (see Global Initialization , page 7-124).
322	Can't detect ISE low solution (error code 21)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
323	Can't detect ISE low solution inlet (error code 22)	ISE module reagent/fluidic error (detected by the electrode measurement).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
324	Too much ISE low solution inlet (error code 23)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
325	ISE low solution inlet excess on timeout (error code 24)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
326	ISE low solution inlet excess on start of measuring (error code 25)	ISE module reagent/fluidic error (detected by the electrode measurement).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
327	Can't detect ISE high solution (error code 31)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
328	Can't detect ISE high solution inlet (error code 32)	ISE module reagent/fluidic error (detected by the electrode measurement).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
329	Too much ISE high solution inlet (error code 33)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
330	ISE high solution inlet excess on timeout (error code 34)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).

Tab. 9–7: Warnings

Code	Message	Error type	Action
331	Can't detect ISE sample (error code 41)	ISE module reagent/fluidic error (detected by the air sensor).	-
332	Can't detect ISE sample inlet (error code 42)	ISE module reagent/fluidic error (detected by the air sensor).	-
333	Too much ISE sample inlet (error code 43)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
334	ISE sample inlet excess on time-out (error code 44)	ISE module reagent/fluidic error (detected by the air sensor).	Physically check the ISE reagents and hydraulic circuit. Run an ISE global initialization (see Global Initialization , page 7-124).
335	ISE electrode [%s1] sensibility error for [%s2] point (error code 50)	Sensitive electrode error. [%s1]: electrode name [%s2]: low/high point of the calibration	Run a 2-point calibration.
336	ISE electrode [%s1] offset error for [%s2] point (error code 51)	Offset electrode error. [%s1]: electrode name [%s2]: low/high point of the calibration	Run a 2-point calibration.
337	ISE electrode [%s1] repeatability error for [%s2] point (error code 52)	Repeatability electrode error. [%s1]: electrode name [%s2]: low/high point of the calibration	Run a 2-point calibration.
338	ISE electrode [%s1] response error for [%s2] point (error code 55)	Response electrode error. [%s1]: electrode name [%s2]: low/high point of the calibration	-
339	ISE LB check response error (error code 91)	ISE module mechanical error.	Run an ISE global initialization (see Global Initialization , page 7-124).
600	Loading Module [%s]: Not OK	Module loading failed. [%s]: module name.	Check the module connections. Run an initialization.
601	Language database version [%s] Not OK, Version Required [%s]	Bad language database version. [%s]: language database version number.	Run an initialization.
602	Not Enough Clean Cuvettes on Reaction Tray to Start Analysis	Less than 4 new cuvettes on the reaction tray.	Fill the rack of new cuvettes.
603	No Ordered Sample on Sample Tray	No ordered sample tube on the sample tray.	Position sample tubes on the sample tray.
604	This Sample ID [%s] is a reserved code	The Sample ID [%s], loaded from the Host, contains AUTO_SID prefix. [%s]: Sample ID.	Modify the Sample ID from the Host.

Tab. 9-7: Warnings

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Warnings, Alarms and Flags

Code	Message	Error type	Action
605	This Patient ID [%s] is a reserved code	The Patient ID [%s], loaded from the Host, contains AUTO_SID prefix. [%s]: Patient ID.	Modify the Patient ID from the Host.
606	Main Cover Open	Main cover open.	Close the main cover.
607	Reagent Door Open	Reagent tray cover open.	Close the reagent tray cover.
608	Manual Cuvette Loading Door Open	Flap door of the reaction tray open.	Close the flap door of the reaction tray.
609	Used Cuvette Holder Missing	Rack of used cuvettes absent.	Reinstall the rack of used cuvettes.
610	Water Tank Empty	Water tank empty.	Physically check the water tank.
611	Waste Tank Full	Waste tank full.	Physically check the waste tank.
612	Mixer Missing	Mixer absent.	Manually push the mixer down.
613	System cleaning failed	System cleaning failed.	Check that the cleaning solution is positioned on the reagent tray.
614	ISE cleaning failed	ISE module cleaning failed.	Check that the cleaning solution is positioned on the reagent tray.
616	ISE Module busy	ISE module busy.	-
617	Sample Rack Duplicate Detected	At least 2 sample racks with the same barcode.	Check the ID of sample racks.
618	Database save Not OK	Database save failed.	-
619	Sample Rack Duplicate Detected	At least 2 sample racks with the same barcode.	Check the ID of sample racks.
620	L.I.S. order cannot be performed: incorrect value [%s] in field [%s]	A request loading from the Host has failed.	Check the request from the Host.
621	Write error on the electronic key	Serial number recording on the electronic key has failed.	-
622	Serial ## on the electronic key is incompatible with serial ## on memory	Serial number on the instrument is different from serial number on the electronic key.	Check the serial number entered in «System Configuration» menu (see 3.1.2. Serial #, page 7-79).
623	Access to electronic key is impossible	Instrument/key communication has failed.	-
624	[%s1]: Sample [%s2] has been detected instead of ordered sample [%s2]	One of the following sampling alarms [%s1] occurs: - MISMATCH - POS_CHANGE - BARCODE_DUPLICATE. [%s2]: rack position or Sample ID.	(see 3.2. Sampling alarms, page 9-58)
625	Completed Sample [%s] is now detected on Rack.Pos [%s]	The sample tube has been moved (for a sample that is for validation or validated). [%s]: rack position or Sample ID.	Replace the sample tube to its previous position.

Tab. 9–7: Warnings

Code	Message	Error type	Action
626	Pressure Sample calibration failed	The calibration of the sample pressure detector has failed.	Check the sample needle and clean it if necessary. Check the sample syringe and the hydraulic circuit. Rerun a sample pressure calibration.
627	Pressure Reagent calibration failed	The calibration of the reagent pressure detector has failed.	Check the reagent needle and clean it if necessary. Check the reagent syringe and the hydraulic circuit. Rerun a reagent pressure calibration.
628	Restore database saved on [%s] by [%s]	The database saved on [date and time] has been restored by [user name].	-
629	The lamp is dying, it is still operational but you will need to change it soon. [%s1 nm / %s2 Gain].	Spectrophotometer gains reaching limits. [%s1]: wavelength. [%s2]: gain.	The lamp will need to be replaced soon.
630	Rack label not read on sector [%s]	The sample rack barcode, position [%s] on the sample tray, is not read. [%s]: position number on the sample tray.	Check the sample rack label.
631	Rack label not read on sector [%s1] for SID: [%s2]	The sample rack barcode, position [%s1] on the sample tray, is not read for the Sample ID [%s2]. [%s1]: position number on the sample tray. [%s2]: Sample ID.	Check the sample rack label.
632	SID [%s1] on position [%s2] disappear	The sample tube has been removed during the analysis. [%s1]: Sample ID. [%s2]: rack position.	Replace the sample tube to its previous position.
633	SID [%s1] on position [%s2] not read	The sample barcode is not read. [%s1]: Sample ID. [%s2]: rack position.	Check the sample barcode.
634	Restore system configuration the [%s] by [%s].	The system configuration has been restored the [date and time] by [user name].	-
635	Restore column configuration the [%s] by [%s].	The column configuration has been restored the [date and time] by [user name].	-
636	Rack [%s1] on sector [%s2] not configured	The sample rack [%s1], position [%s2] on the sample tray, is not configured. [%s1]: rack number. [%s2]: position number on the sample tray.	Configure the sample rack in «System Configuration» menu (see 3.1.8. Racks , page 7-83).

Tab. 9-7: Warnings

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Warnings, Alarms and Flags

Code	Message	Error type	Action
637	Not enough cleaner solution [%s]	Not enough solution [%s] to perform the cleaning required from the «Customer Services» menu or during the shutdown. [%s]: solution short name.	Check the solution and replace it if necessary. Activate the solution in «Reagent Configuration» menu. Rerun the cleaning from the «Customer Services» menu or rerun the shutdown.
638	Unable to save results onto USB stick	Saving results on the USB key failed.	Check the USB key.
639	Saving archive database failed	Saving archive database failed.	-
640	Position changed for the rack [%s]	The sample rack [%s] has been moved during the analysis. [%s]: rack number.	Replace the sample rack to its previous position.
641	Position changed rack [%s1] for SID: [%s2]	The sample rack [%s1] has been moved during the analysis for the Sample ID [%s2]. [%s1]: rack number. [%s2]: Sample ID.	Replace the sample rack to its previous position.

Tab. 9–7: Warnings

3.1.3. Alarms

The alarms listed below are blocking the instrument.

System alarms are displayed on the «Alarm» tab of the «System Warnings» menu (see [3.1.1. Menu «System Warnings»](#), page 9-39).

When a system alarm is triggered, the **Pentra 400** is stopped and turns to «Emergency Stop» status.

If a system alarm occurs, follow the instructions given in the following table (see [Tab. 9–8: Alarms](#), page 9-50). If the alarm is repeated, call your **HORIBA ABX** representative.

Code	Message	Error type	Action
002	Sample Barcode Reader Initialization Problem	Sample barcode reader initialization failed.	Run an initialization.
003	Reagent Barcode Reader Initialization Problem	Reagent barcode reader initialization failed.	Run an initialization.
004	Temperature Regulation Initialization Problem	Temperature regulation initialization failed.	Run an initialization.
005	Measurement Module Initialization Problem	Measurement module initialization failed.	Run an initialization.
006	Sample Vertical Motor Initialization Problem	Sample vertical motor initialization failed.	Run an initialization.
007	Sample Rotation Motor Initialization Problem	Sample rotation motor initialization failed.	Run an initialization.
008	Reagent Vertical Motor Initialization Problem	Reagent vertical motor initialization failed.	Run an initialization.
009	Reagent Rotation Motor Initialization Problem	Reagent rotation motor initialization failed.	Run an initialization.
010	Sample Tray Motor Initialization Problem	Sample tray motor initialization failed.	Run an initialization.
011	Reagent Tray Motor Initialization Problem	Reagent tray motor initialization failed.	Run an initialization.
012	Reaction Tray Motor Initialization Problem	Reaction tray motor initialization failed.	Run an initialization.
013	Mixer Initialization Problem	Mixer initialization failed.	Run an initialization.
014	Sample Syringe Motor Initialization Problem	Sample syringe motor initialization failed.	Run an initialization.
015	Reagent Syringe Motor Initialization Problem	Reagent syringe motor initialization failed.	Run an initialization.
016	Cuvette Vertical Motor Initialization Problem	Cuvette vertical motor initialization failed.	Run an initialization.
017	Cuvette Horizontal 1 Motor Initialization Problem	Cuvette horizontal 1 motor initialization failed.	Run an initialization.
018	Cuvette Horizontal 2 Motor Initialization Problem	Cuvette horizontal 2 motor initialization failed.	Run an initialization.

Tab. 9–8: Alarms

Maintenance and Troubleshooting

Warnings, Alarms and Flags

Code	Message	Error type	Action
019	Sample Vertical Motor Reference Position Error	Sample vertical motor reference position search failed.	Run an initialization.
020	Sample Rotation Motor Reference Position Error	Sample rotation motor reference position search failed.	Run an initialization.
021	Reagent Vertical Motor Reference Position Error	Reagent vertical motor reference position search failed.	Run an initialization.
022	Reagent Rotation Motor Reference Position Error	Reagent rotation motor reference position search failed.	Run an initialization.
023	Sample Tray Motor Reference Position Error	Sample tray motor reference position search failed.	Run an initialization.
024	Reagent Tray Motor Reference Position Error	Reagent tray motor reference position search failed.	Run an initialization.
025	Reaction Tray Motor Reference Position Error	Reaction tray motor reference position search failed.	Run an initialization.
026	Mixer Initialization Problem	Mixer initialization failed.	Run an initialization.
027	Sample Syringe Motor Reference Position Error	Sample syringe motor reference position search failed.	Run an initialization.
028	Reagent Syringe Reference Position Error	Reagent syringe motor reference position search failed.	Run an initialization.
029	Cuvette Vertical Motor Reference Position Error	Cuvette vertical motor reference position search failed.	Run an initialization.
030	Cuvette Horizontal 1 Reference Position Error	Cuvette horizontal 1 motor reference position search failed.	Run an initialization.
031	Cuvette Horizontal 2 Reference Position Error	Cuvette horizontal 2 motor reference position search failed.	Run an initialization.
032	Sample Vertical Position Error	Sample vertical motor position error.	Run an initialization.
033	Sample Rotation Position Error	Sample rotation motor position error.	Run an initialization.
034	Reagent Vertical Motor Position Error	Reagent vertical motor position error.	Run an initialization.
035	Reagent Rotation Motor Position Error	Reagent rotation motor position error.	Run an initialization.
036	Sample Tray Position Error	Sample tray position error.	Run an initialization.
037	Reagent Tray Position Error	Reagent tray position error.	Run an initialization.
038	Reaction Tray Position Error	Reaction tray position error.	Run an initialization.
039	Mixer Position Error	Mixer position error.	Run an initialization.
040	Sample Syringe Position Error	Sample syringe position error.	Run an initialization.
041	Reagent Syringe Position Error	Reagent syringe position error.	Run an initialization.
042	Cuvette Changer Position Problem: Vertical Motion	Cuvette vertical position error.	Run an initialization.

Tab. 9–8: Alarms

Code	Message	Error type	Action
043	Cuvette Changer Position Problem: Horizontal Motion	Cuvette horizontal 1 position error.	Run an initialization.
044	Cuvette Changer Position Problem: Cuvette Motion	Cuvette horizontal 2 position error.	Run an initialization.
045	Shock Detection Stop	Shock detection stop.	Run an initialization.
046	Shock Detection Out of Service	Shock detection out of service.	Run an initialization.
047	Sample Level Detection Error	Sample level detection error.	Run an initialization.
048	Reagent Level Detection Error	Reagent level detection error.	Run an initialization.
053	Reaction Tray Temperature regulation failed	Temperature regulation in reaction tray failed (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Run an initialization.
054	Heating Needle Temperature regulation failed	Temperature regulation of heating needle failed (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Run an initialization.
055	Refrigerated Compartment Temperature regulation failed	Temperature regulation of cooled area in reagent tray failed (see 3.1.4. Management of temperature warnings and alarms , page 9-56).	Check the cooling unit and the glycol level. Run an initialization.
056	Measurement Module Out of Service	Measurement module out of service.	Run an initialization.
057	Measurement Module Out of Service	Measurement module out of service.	Run an initialization.
058	Sample Tray Identification Failure	Sample tray identification failed.	Run an initialization.
059	Reagent Tray Identification Failure	Reagent tray identification failed.	Run an initialization.
062	Main Cover Open	Main cover open.	Close main cover. Run an initialization.
063	Reagent Door Open	Reagent tray cover open.	Close reagent tray cover. Run an initialization.
065	Mixer not Positioned	Mixer not positioned.	Manually put the mixer down. Run an initialization.
066	Problem with Water Supply	Water supply failed.	Physically check water tank and hydraulic circuit. Run an initialization.
067	No Clean Cuvettes Present	Rack of new cuvettes empty.	Fill rack of new cuvettes. Run an initialization.
101	Sample Vertical Position Error	Sample vertical position error.	Run an initialization.
102	Sample Rotation Position Error	Sample rotation position error.	Run an initialization.
103	Reagent Vertical Position Error	Reagent vertical position error.	Run an initialization.

Tab. 9–8: Alarms

Maintenance and Troubleshooting

Warnings, Alarms and Flags

Code	Message	Error type	Action
104	Reagent Rotation Position Error	Reagent rotation position error.	Run an initialization.
105	Sample Tray Position Error	Sample tray position error.	Run an initialization.
106	Reagent Tray Position Error	Reagent tray position error.	Run an initialization.
107	Reaction Tray Position Error	Reaction tray position error.	Run an initialization.
108	Mixer Position Error	Mixer position error.	Run an initialization.
109	Sample Syringe Position Error	Sample syringe position error.	Run an initialization.
110	Reagent Syringe Position Error	Reagent syringe position error.	Run an initialization.
111	Cuvette Vertical 2 Motion Error	Cuvette vertical position error.	Run an initialization.
112	Cuvette Horizontal 1 Motion Error	Cuvette horizontal 1 position error.	Run an initialization.
113	Cuvette Changer Problem: Moving Forward	Cuvette horizontal 2 position error.	Run an initialization.
114	Problem with Water Supply	Water supply failed.	Physically check water tank and hydraulic circuit. Run an initialization.
115	Main Cover Open	Main cover open.	Close main cover. Run an initialization.
116	Manual Cuvette Loading Door Open	Flap door of reaction tray open.	Close flap door of reaction tray. Run an initialization.
117	Used Cuvette Holder Missing	Rack of used cuvettes absent.	Reinstall rack of used cuvettes. Run an initialization.
118	Sample Identification Failure	Sample identification failed.	Physically check the sample tubes and sample racks. Run an initialization.
119	Reagent Identification Failure	Reagent identification failed.	Physically check the cassettes and racks. Run an initialization.
122	Measurement Module Out of Service	Measurement module out of service.	Run an initialization.
125	Shock Detection Out of Service	Shock detection out of service.	Run an initialization.
126	Sample Level Detection Out of Service	Sample level detection out of service.	Run an initialization.
127	Sample Level Detection Out of Service	Sample level detection out of service.	Run an initialization.
128	Reagent Level Detection Out of Service	Reagent level detection out of service.	Run an initialization.
129	Reagent Level Detection Out of Service	Reagent level detection out of service.	Run an initialization.
130	Over pressure on the sample hydraulic system	Over pressure on sample hydraulic circuit.	Physically check the sample needle and clean it if necessary. Run an initialization.

Tab. 9–8: Alarms

Code	Message	Error type	Action
131	Over pressure on the reagent hydraulic system	Over pressure on reagent hydraulic circuit.	Physically check the reagent needle and clean it if necessary. Run an initialization.
132	Sample Needle Clogged	Sample needle clogged.	Physically check the sample needle and clean it if necessary. Run an initialization. If necessary run a sample pressure calibration and rerun an initialization.
133	Reagent Needle Clogged	Reagent needle clogged.	Physically check the reagent needle and clean it if necessary. Run an initialization. If necessary run a reagent pressure calibration and rerun an initialization.
134	Shock Detection Out of Service	Shock detection out of service.	Run an initialization.
135	Maximum quantity of cycles exceeded	Maximum quantity of cycles exceeded.	-
136	Peripheral busy [%s]	Peripheral busy.	Run an initialization.
137	Unknown Cycle	Unknown cycle.	-
138	Manual Cuvette Loading Door Open	Flap door of reaction tray open.	Close flap door of reaction tray. Run an initialization.
139	Used Cuvette Holder Missing	Rack of used cuvettes absent.	Reinstall rack of used cuvettes. Run an initialization.
140	Used Cuvette Holder Full	Rack of used cuvettes full.	Empty rack of used cuvettes. Run an initialization.
141	Reaction Tray Temperature Sensor Out of Order	Reaction tray temperature sensor out of order.	Run an initialization.
142	Reagent Needle Temperature Sensor Out of Order	Reagent needle temperature sensor out of order.	Run an initialization.
145	Reagent Tray Temperature Sensor Out of Order	Reagent tray temperature sensor out of order.	Check the cooling unit and the glycol level. Run an initialization.
146	Shock Detection on dispensing	Shock detection on dispensing.	Run an initialization.
147	Compressor overload	Compressor overload.	Check the cooling unit. Run an initialization.
148	Reagent Door Open	Reagent tray cover open.	Close reagent tray cover.
149	Over pressure on the sample hydraulic system	Over pressure on sample hydraulic circuit.	Physically check the sample needle and clean it if necessary. Run an initialization.
150	Over pressure on the reagent hydraulic system	Over pressure on reagent hydraulic circuit.	Physically check the reagent needle and clean it if necessary. Run an initialization.

Tab. 9–8: Alarms

Maintenance and Troubleshooting

Warnings, Alarms and Flags

Code	Message	Error type	Action
151	Pressure controller initialization error	Pressure controller initialization failed.	Run an initialization.
152	Water Tank Low Level	Water tank low level.	Physically check water tank. Run an initialization.
153	Pressure controller of sample arm out of order	Pressure controller of sample arm out of order.	Run an initialization.
154	Pressure controller of reagent arm out of order	Pressure controller of reagent arm out of order.	Run an initialization.
156	Mixer not Positioned	Mixer not positioned.	Manually put the mixer down. Run an initialization.
501	Database version [%s] Not OK, Version Required [%s]	Bad database version.	Run an initialization.
502	Compacting Database [%s]	Database compacting failed.	Run an initialization.
503	Bad Embedded Software Version Required [%s], Current [%s]	Bad embedded software version.	Run an initialization.
504	Bad CPLD Version Required [%s], Current [%s]	Bad CPLD version.	Run an initialization.
505	Light stability [%s]	Light stability check failed.	Check the lamp and replace it if necessary. Run an initialization.
506	Bad Embedded exchange table: Version Required [%s], Current [%s]	Bad embedded exchange table version.	Run an initialization.
507	Bad PC exchange table: Version Required [%s], Current [%s]	Bad PC exchange table version.	Run an initialization.
508	Bad Embedded exchange table size: Version Required [%s], Current [%s]	Bad embedded exchange table size.	Run an initialization.
509	Bad PC exchange table size: Version Required [%s], Current [%s]	Bad PC exchange table size.	Run an initialization.
510	Loading Module [%s]:[%s]	Module loading failed.	Run an initialization.
511	Unable to found empty cuvette on the reaction tray	No new cuvettes on the reaction tray.	Fill rack of new cuvettes. Run an initialization.
513	Communication Problem	Internal communication failed.	Run an initialization.
514	At least 2 identical Barcodes detected	At least 2 identical reagent barcodes.	Check the reagent barcodes. Run an initialization.
515	Problem when configuring the Sample Barcode Reader	Sample barcode reader configuration failed.	Shutdown the instrument. Switch OFF/ON the instrument.
516	Problem when configuring the Reagent Barcode Reader	Reagent barcode reader configuration failed.	Shutdown the instrument. Switch OFF/ON the instrument.
517	Light intensity out of range	Light intensity out of range.	Check the lamp and replace it if necessary. Run an initialization.

Tab. 9–8: Alarms

Code	Message	Error type	Action
518	Motor [%s], function position [%s], value [%s] has changed	Motor offset value out of range.	-
519	Bad ISE Version Required [%s], Current [%s]	Bad ISE module version.	Run an initialization.
520	The lamp has failed the gain check. [%s1 nm / %s2 Gain]. Please change the lamp.	Spectrophotometer gain check failed. [%s1]: wavelength. [%s2]: gain.	Replace the lamp. Run an initialization.

Tab. 9–8: Alarms

3.1.4. Management of temperature warnings and alarms

This table will help you to understand how the temperature warnings and alarms are triggered.

Code	Type	Message	Acceptable range	Time of stabilization
The stability was not reached during the instrument initialization.				
053	ALARM	Reaction Tray Temperature regulation failed	37°C (+/- 0.25°C)	< 15 min.
054	ALARM	Heating Needle Temperature regulation failed	37°C (+/- 1.5°C)	< 10 min.
055	ALARM	Refrigerated Compartment Temperature regulation failed	4-10°C	< 4 hours
The stability was reached during the instrument initialization but the temperature is now out of range.				
123	WARNING	Reaction tray temperature exceeds limits	37°C (+/- 0.25°C)	< 2 min.
053	ALARM	Reaction Tray Temperature regulation failed	37°C (+/- 0.5°C)	None
124	WARNING	Heating needle temperature exceeds limits	37°C (+/- 1.5°C)	< 24 sec.
054	ALARM	Heating Needle Temperature regulation failed	37°C (+/- 3°C)	None
305	WARNING	Reagent tray temperature exceeds limits	4-10°C	< 30 min.
055	ALARM	Refrigerated Compartment Temperature regulation failed	2-12°C	None

Tab. 9–9: Management of temperature warnings and alarms

3.1.5. Maintenance alerts

The maintenance alerts listed below are triggered when the corresponding maintenance procedure is not done when necessary (if configured in the «System Configuration» menu).

If a maintenance alert is triggered, then:

- on the Main menu, the «System Warnings» button is orange
- on the «Alert» tab of the «System Warnings» menu, the Alert flag is displayed.

The **Pentra 400** maintenance schedule is configurable in the «System Configuration» menu (see [3.7. Maintenance](#), page 7-110). The maintenance procedures done on request do not trigger maintenance alerts.

Maintenance alerts are displayed on the «Alert» tab of the «System Warnings» menu (see [3.1.1. Menu «System Warnings»](#), page 9-39).

Alert flag	Designation	Occurrence (programmed by default)
	ISE module activation	Daily
	ISE module cleaning	Daily
	ISE module etching	Daily
	Needle deproteinization	Weekly
	Wash tower cleaning	Monthly
	Syringe plunger tips	Monthly
	Qualitest	Monthly
	Filter replacement	Every 2 months
	Glycol level checking	Every 2 months
	Syringes replacement	Every 6 months
	Sample needle replacement	Annually
	Reagent needle replacement	Annually

Tab. 9–10: Maintenance alerts

3.2. Sampling alarms

Sampling alarms are displayed on the «Sampling Exception» tab of the «Test Review» menu (see [4. Test Review](#), page 2-81).

If a sampling alarm occurs, follow the instructions given in the following table (see [Tab. 9–11: Sampling alarms](#), page 9-58). If the sampling alarm is repeated, call your **HORIBA ABX** representative.

Message	Error type	Action
INTERRUPT	A sampling alarm has interrupted the tests in progress.	The tests not completed will be performed at the next start.
SPLE_EMPTY	Insufficient volume (detected by the sample needle). Tests in progress for this sample are interrupted.	Check the sample.
SOLUTION_EMPTY/SN	Insufficient volume (detected by the sample needle). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SOLUTION_EMPTY/RN	Insufficient volume (detected by the reagent needle). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SAMPLE_FOAM	Air bubbles or insufficient volume (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample.
SOLUTION_FOAM/SN	Air bubbles or insufficient volume (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SOLUTION_FOAM/RN	Air bubbles or insufficient volume (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SAMPLE_FIBRIN	Sample needle may be clogged (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample needle and clean it if necessary. Run a sample pressure calibration. Check the sample.
SOLUTION_CLOGGING/SN	Sample needle may be clogged (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the sample needle and tubing. Run a sample pressure calibration. Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.

Tab. 9–11: Sampling alarms

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Message	Error type	Action
SOLUTION_CLOGGING/RN	Reagent needle may be clogged (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent needle and tubing. Run a reagent pressure calibration. Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SPL_SHOCK_DETECT	Sample tube may be capped. Tests in progress for this sample are interrupted.	Check the sample tube.
SOLUTION_SHOCK	Reagent may be capped. The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent, remove the caps and activate the reagent in «Reagent Configuration» menu.
INC_SAMPLE_PIPET	Air bubbles or insufficient volume (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample.
INC_SOLUTION_PIPET/SN	Air bubbles or insufficient volume (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
INC_SOLUTION_PIPET/RN	Air bubbles or insufficient volume (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
REAG_MISSING	The reagent is missing.	Place the reagent on reagent tray.
DIL_MISSING	The diluent is missing.	Place the diluent on reagent tray.
CLEANER_MISSING	The cleaner is missing.	Place the cleaner on reagent tray.
REAG_LOCKED	The reagent is inactivated. It then cannot be used for the pending analyses.	Activate the reagent in «Reagent Configuration» menu.
DIL_LOCKED	The diluent is inactivated. It then cannot be used for the pending analyses.	Activate the diluent in «Reagent Configuration» menu.
CLEANER_LOCKED	The cleaner is inactivated. It then cannot be used for the pending analyses.	Activate the cleaner in «Reagent Configuration» menu.
REAG_EXPIRED	The reagent has expired. It then cannot be used for the pending analyses.	Replace the reagent.
DIL_EXPIRED	The diluent has expired. It then cannot be used for the pending analyses.	Replace the diluent.
CLEANER_EXPIRED	The cleaner has expired. It then cannot be used for the pending analyses.	Replace the cleaner.
NOT_ENOUGH_REAG	Not enough reagent.	Replace the reagent.
NOT_ENOUGH_DIL	Not enough diluent.	Replace the diluent.

Tab. 9–11: Sampling alarms

Message	Error type	Action
NOT_ENOUGH_CLEANER	Not enough cleaner.	Replace the cleaner.
CALIBRATOR_EXPIRED	The calibrator has expired.	Replace the calibrator.
CTRL_EXPIRED	The control has expired.	Replace the control.
POS_NOT_SET	The calibrator or control position is not configured.	Configure the calibrator or control position in «Calibration/Control» menu.
CALIBRATOR_MISSING	The calibrator is missing.	Place the calibrator.
CTRL_MISSING	The control is missing.	Place the control.
NO_CAL_IN_MEMORY	No current valid calibration for this test.	Run a calibration for this test.
NO_CTRL_IN_MEMORY	No current valid control for this test.	Run a control for this test.
NOT_ENOUGH_CUV	Not enough cuvettes in the cuvette changer.	Fill the rack of new cuvettes.
MISMATCH	For a rack position, the Sample ID in the Worklist is different from the barcode label read on the sample tube.	Check the sample tube. Modify the Sample ID in the Worklist or place correctly the sample tube.
POS_CHANGE	The sample tube has been moved during the analysis. Warning! This manipulation is strictly forbidden.	Replace the sample tube to its previous position.
BARCODE_DUPLICATE	At least 2 identical sample barcodes.	Check the sample barcodes.
TUBE_LABEL_NOT_READ	The sample barcode is not read.	Check the sample barcode.
TUBE_DISAPPEAR	The sample tube has been removed during the analysis.	Replace the sample tube to its previous position.
TUBE_NOT_PRESENT	The sample tube has been removed whereas all the tests of the sample are not finished.	Replace the sample tube to its previous position.
POS_CHANGE_RACK	The sample rack has been moved during the analysis.	Replace the sample rack to its previous position.
RACK_NOT_READ	The sample rack barcode is not read.	Check the sample rack label.
ACTIVE_REAG_ABX_CASSETTE_MISSING	No active cassette for this reagent.	Activate the cassette in «Reagent Configuration» menu.
ACTIVE_DIL_ABX_CASSETTE_MISSING	No active cassette for this diluent.	Activate the cassette in «Reagent Configuration» menu.
ACTIVE_CLEANER_ABX_CASSETTE_MISSING	No active cassette for this cleaner.	Activate the cassette in «Reagent Configuration» menu.
ELECTRODE_DISABLED	One electrode is inactivated.	Activate the electrode in «Customer Services» menu.

Tab. 9–11: Sampling alarms

3.3. Analytical and quality flags

This chapter describes the analytical and quality flags in the following parts:

- ◆ [3.3.1. Kinetic analytical flags](#), page 9-61
- ◆ [3.3.2. Calibration analytical flags](#), page 9-66
- ◆ [3.3.3. Result analytical flags](#), page 9-68
- ◆ [3.3.4. Analytical flags priority](#), page 9-73
- ◆ [3.3.5. Quality flags](#), page 9-74
- ◆ [3.3.6. ISE analytical flags](#), page 9-75.

Analytical and quality flags are displayed on the «Error Report» tab of the «Test Review» menu (see [4. Test Review](#), page 2-81).

3.3.1. Kinetic analytical flags

The following flags apply only to kinetic curves for all cuvettes (Blank, Calibrator, Control, Patient sample):

- ◆ [High absorbance](#), page 9-61
- ◆ [Sample limit](#), page 9-62
- ◆ [Reagent range](#), page 9-62
- ◆ [Blank range](#), page 9-62
- ◆ [Non linear](#), page 9-63
- ◆ [Noise](#), page 9-63
- ◆ [High activity](#), page 9-64
- ◆ [Reaction limit](#), page 9-64
- ◆ [Sign](#), page 9-65.

▼ High absorbance

Message	HIGH_ABS
Definition	At least one absorbance point used in the calculation has exceeded 3.0 A if wavelength is 340 nm or 3.5 A for other wavelengths.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is not displayed. - For blank and calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page 9-66). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and re-assay.

Tab. 9–12: High absorbance

▼ Sample limit

Message	SAMPLE_LIMIT
Definition	The sample limit value is used to determine the sample-specific absorbance. The reagent blank absorbance is subtracted from the sample absorbance, both measured at the defined cycle. The calculated value is checked to ensure that it is not higher than the programmed sample limit value.
Applies on	Patient sample
Implications	The result is displayed and flagged.
Actions	Check the sample visually; it may be icteric, hemolytic or lipemic. Dilute it manually and reassay.

Tab. 9–13: Sample limit

▼ Reagent range

Message	REAG_RANGE_HIGH REAG_RANGE_LOW
Definition	All reagent blank absorbance values used for calculations are checked to ensure that they are not out of the programmed reagent range.
Applies on	Blank
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag , page 9-66).
Actions	Reassay with fresh reagents.

Tab. 9–14: Reagent range

▼ Blank range

Message	BLK_RANGE
Definition	The absorbance variation of the reagent blank is checked to ensure that it is not out of the programmed blank range.
Applies on	Blank
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag , page 9-66).
Actions	Reassay with fresh reagents.

Tab. 9–15: Blank range

Maintenance and Troubleshooting

Warnings, Alarms and Flags

▼ Non linear

Message	NON_LIN_A, NON_LIN_B, NON_LIN_C, NON_LIN_D
Definition	The Kinsearch calculation type failed to find a linear portion of the reaction curve or less than 5 data points are within the linear portion. This flag applies to each calculation step (Steps A, B, C and D); see Definition, Steps, Formula , page 7-34.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is not displayed. - For blank and calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page 9-66). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and re-assay. Check sample cup for fibrin clots or air bubbles. Check the water stream from the sample needle. Use fresh calibrators, controls, patient samples and/or reagents if necessary.

Tab. 9–16: Non linear

▼ Noise

Message	NOISE_A, NOISE_B, NOISE_C, NOISE_D
Definition	One or more data points within the linear portion of the reaction curve exceed a calculated difference from the regression line (only for the kinsearch calculation type). This flag applies to each calculation step (Steps A, B, C and D); see Definition, Steps, Formula , page 7-34.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is displayed. - For blank and calibrator: Does not flag nor block the calibration calculation. - For control: The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74). - For patient sample: The result is flagged.
Actions	If more than one sample is flagged, it may be necessary to provide fresh reagents.

Tab. 9–17: Noise

▼ High activity

Message	HIGH_ACTIV
Definition	This flag occurs if the two following checks fail simultaneously: reaction limit and sign.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error, page 9-66). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and re-assay.

Tab. 9–18: High activity

▼ Reaction limit

Message	REAC_LIMIT_A, REAC_LIMIT_B, REAC_LIMIT_C, REAC_LIMIT_D
Definition	The reaction limit value is used to determine substrate depletion. - For Kinetic calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first reading point. - For Kinsearch calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first point within the linear range. The calculated value is checked to ensure that it is not higher than the programmed reaction limit value. This flag applies to each calculation step (Steps A, B, C and D); see Definition, Steps, Formula, page 7-34.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error, page 9-66). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and re-assay.

Tab. 9–19: Reaction limit

Maintenance and Troubleshooting

Warnings, Alarms and Flags

▼ Sign

Message	SIGN
Definition	The absorbance change for the flagged sample minus the absorbance change of the reagent blank does not agree with the reaction direction programmed in the application.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page 9-66). - For control: The control cannot be validated. - For patient sample: The sample is flagged.
Actions	Check sample cup for fibrin clots or air bubbles. If more than one sample is flagged, it may be necessary to provide fresh reagents.

Tab. 9–20: Sign

3.3.2. Calibration analytical flags

The following flags apply only when calculating a calibration curve:

- ◆ [Calibration check flag](#), page 9-66
- ◆ [Calibration check error](#), page 9-66
- ◆ [Calculation error](#), page 9-66
- ◆ [Calibration not optimised](#), page 9-67
- ◆ [Calibration factor flag](#), page 9-67.

▼ Calibration check flag

Message	CALCHK_FLAG
Definition	At least one calibrator is flagged with REAG_RANGE, BLK_RANGE or DEVIATION.
Implications	The calibration is calculated and flagged. It cannot be automatically validated. If manually validated, all following results are flagged with CAL_ERROR (see 3.3.5. Quality flags , page 9-74).

Tab. 9-21: Calibration check flag

▼ Calibration check error

Message	CALCHK_ERROR
Definition	At least one calibrator is flagged with HIGH_ABS, NON_LIN, HIGH_ACTIV, REAC_LIMIT or SIGN.
Implications	The calibration is not calculated. It must be deleted. Then, the previous calibration will be the current calibration and all following results are flagged with CAL_ERROR (see 3.3.5. Quality flags , page 9-74).

Tab. 9-22: Calibration check error

▼ Calculation error

Message	CALC_ERROR
Definition	Three cases: - For non-linear calibration modes, the calculation algorithm cannot generate an acceptable standard non-linear curve fit. - For mathematical algorithms (LOGIT/LOG4, LOGIT/LOG5, EXPONENT5), the curve fit is not monotonic. - For linear calibration modes (Slope average, Linear regression), the calculated calibration factor is negative.
Implications	The calibration is not calculated. It must be deleted. Then, the previous calibration will be the current calibration and all following results are flagged with CAL_ERROR (see 3.3.5. Quality flags , page 9-74).

Tab. 9-23: Calculation error

▼ Calibration not optimised

Message	CAL_NOT_OPTIMISED
Definition	For non-linear calibration modes, a maximum of 150 iterations will be performed to optimise the curve fit. If the number of 150 iterations is reached, the calibration is flagged. This flag means that the calibration has been calculated but not with the best optimisation.
Implications	The calibration automatic validation is not blocked but all following results are flagged with CAL_ERROR (see 3.3.5. Quality flags , page 9-74).

Tab. 9–24: Calibration not optimised

▼ Calibration factor flag

Message	FACTOR_FLAG
Definition	For linear calibration modes (Slope average, Linear regression), the calculated calibration factor failed one of the three calibration factor checks (see Factor calibration , page 7-24).
Implications	The calibration is calculated and flagged. It cannot be automatically validated. If manually validated, all following results are flagged with CAL_ERROR (see 3.3.5. Quality flags , page 9-74).

Tab. 9–25: Calibration factor flag

3.3.3. Result analytical flags

- ◆ [Deviation](#), page 9-68
- ◆ [Result calculation error](#), page 9-68
- ◆ [Linearity range](#), page 9-69
- ◆ [Calculation range](#), page 9-69
- ◆ [Test range](#), page 9-70
- ◆ [Confidence range](#), page 9-70
- ◆ [Reference range](#), page 9-72
- ◆ [Critical range](#), page 9-72

▼ Deviation

Message	DEVIATION
Definition	Two types of deviation are checked. - Deviation concerning replicates (Dev_Rep): For each level, the absorbance values of the replicates are compared with the mean value. The maximum deviation is calculated (Dev_Rep) and then checked to ensure that it is not higher than the authorized Dev_Rep. - Deviation to the curve (Dev_C): For each level, the concentration of the mean value is compared with the theoretical value. The deviation is calculated (Dev_C) and then checked to ensure that it is not higher than the authorized Dev_C.
Applies on	Calibrator
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag, page 9-66).
Actions	It may be necessary to use fresh calibrators and/or reagents. Perform the Qualitest procedure in order to check the pipetting accuracy and precision (see 1.6. Qualitest, page 9-12).

Tab. 9-26: Deviation

▼ Result calculation error

Message	RESULT_CALC_ERR
Definition	For linear regression and non-linear calibration modes, at least one result could not be calculated using the selected algorithm.
Applies on	Control, Patient sample
Implications	The result is not displayed. - For control: The control cannot be validated. - For patient sample: The sample is flagged.
Actions	It may be necessary to use fresh calibrators and/or reagents.

Tab. 9-27: Result calculation error

Maintenance and Troubleshooting

Warnings, Alarms and Flags

▼ Linearity range

Message	LINEARITY_HIGH LINEARITY_LOW
Definition	The calculated result is not within the linearity range programmed in the application.
Applies on	Control, Patient sample
Implications	The result is displayed and flagged. - For control: The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74). - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of LINEARITY_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Tab. 9–28: Linearity

▼ Calculation range

Message	CALC_RANGE_HIGH CALC_RANGE_LOW
Definition	This check is performed for non-linear calibration modes. - For calibrator: If, for the highest calibrator point, one absorbance value is higher than the theoretical value, then CALC_RANGE_HIGH is triggered. If, for the lowest calibrator point, one absorbance value is lower than the theoretical value, then CALC_RANGE_LOW is triggered. - For control and patient sample: If the absorbance value is between the calculated mean value and the theoretical value of the highest calibrator point, then CALC_RANGE_HIGH is triggered. If the absorbance value is between the calculated mean value and the theoretical value of the lowest calibrator point, then CALC_RANGE_LOW is triggered.
Applies on	Calibrator, Control, Patient sample
Implications	In case of CALC_RANGE_HIGH flag, the result equals to the highest calibrator point concentration. In case of CALC_RANGE_LOW flag, the result equals to the lowest calibrator point concentration. - For calibrator: Does not flag nor block the calibration calculation. - For control: The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74). - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of CALC_RANGE_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Tab. 9–29: Calculation range

▼ Test range

Message	TEST_RANGE_HIGH TEST_RANGE_LOW
Definition	This check is performed for non-linear calibration modes. If the absorbance value is higher than the calculated mean value of the highest calibrator point, then TEST_RANGE_HIGH is triggered. If the absorbance value is lower than the calculated mean value of the lowest calibrator point, then TEST_RANGE_LOW is triggered.
Applies on	Control, Patient sample
Implications	The result is not displayed. - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of TEST_RANGE_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Tab. 9–30: Test range

▼ Confidence range

a – Westgard rules disabled

Message	CONF_RANGE_HIGH CONF_RANGE_LOW
Definition	The calculated result of a control is outside the programmed low and high confidence range values.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74).
Actions	Reassay with fresh controls and/or reagents.

Tab. 9–31: Confidence range, Westgard rules disabled

b – Westgard rules enabled (see [Westgard rules](#), page 7-102)



Westgard rules apply to [default controls only](#).

Message	CONF_RANGE_HIGH_W CONF_RANGE_LOW_W
Definition	The calculated result of a control is outside the confidence range and no Westgard rule has been validated.
Applies on	Control
Implications	The result is displayed and flagged.
Actions	-

Tab. 9-32: Confidence range, Westgard rules enabled

Message	CONF_RANGE_HIGH_W1, CONF_RANGE_HIGH_W2, CONF_RANGE_HIGH_W3, CONF_RANGE_HIGH_W4, CONF_RANGE_HIGH_W5, CONF_RANGE_HIGH_W6 CONF_RANGE_LOW_W1, CONF_RANGE_LOW_W2, CONF_RANGE_LOW_W3, CONF_RANGE_LOW_W4, CONF_RANGE_LOW_W5, CONF_RANGE_LOW_W6
Definition	The calculated result of a control is outside the confidence range and the Westgard rule 1, 2, 3, 4, 5 or 6 has been validated.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74).
Actions	Reassay with fresh controls and/or reagents.

Tab. 9-33: Confidence range, Westgard rules apply to values outside confidence range

Message	WESTGARD_RULE_4, WESTGARD_RULE_5, WESTGARD_RULE_6
Definition	The calculated result of a control is inside the confidence range and the Westgard rule 4, 5 or 6 has been validated.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 3.3.5. Quality flags , page 9-74).
Actions	Reassay with fresh controls and/or reagents.

Tab. 9-34: Confidence range, Westgard rules 4, 5 and 6 apply to values inside confidence range

▼ Reference range

Message	REF_RANGE_HIGH REF_RANGE_LOW
Definition	The calculated result of a sample is outside the programmed reference range.
Applies on	Patient sample
Implications	The result is displayed and flagged.
Actions	Patient diagnostic.

Tab. 9–35: Reference range

▼ Critical range

Message	CRITICAL_HIGH CRITICAL_LOW
Definition	The calculated result of a sample is outside the programmed critical range (see Rerun range , page 7-20).
Applies on	Patient sample
Implications	The result is displayed and flagged. The sample will be automatically rerun without post dilution or post concentration.
Actions	-

Tab. 9–36: Critical range

3.3.4. Analytical flags priority

When several analytical flags occur on the same result, only one is displayed with the order of priority described in the following table:

Priority	Message	Flag and description
+	HIGH_ABS	High absorbance (see High absorbance , page 9-61).
	SAMPLE_LIMIT	Sample limit (see Sample limit , page 9-62).
	REAG_RANGE_HIGH REAG_RANGE_LOW	Reagent range (see Reagent range , page 9-62).
	NON_LIN	Non linear (see Non linear , page 9-63).
	HIGH_ACTIV	High activity (see High activity , page 9-64).
	REAC_LIMIT	Reaction limit (see Reaction limit , page 9-64).
	NOISE	Noise (see Noise , page 9-63).
	BLK_RANGE	Blank range (see Blank range , page 9-62).
	SIGN	Sign (see Sign , page 9-65).
	TEST_RANGE_HIGH TEST_RANGE_LOW	Test range (see Test range , page 9-70).
	RESULT_CALC_ERR	Result calculation error (see Result calculation error , page 9-68).
	DEVIATION	Deviation (see Deviation , page 9-68).
	LINEARITY_HIGH LINEARITY_LOW	Linearity range (see Linearity range , page 9-69).
	CONF_RANGE_HIGH CONF_RANGE_LOW	Confidence range (see Confidence range , page 9-70).
	CRITICAL_HIGH CRITICAL_LOW	Critical range (see Critical range , page 9-72).
-	REF_RANGE_HIGH REF_RANGE_LOW	Reference range (see Reference range , page 9-72).
	CALC_RANGE_HIGH CALC_RANGE_LOW	Calculation range (see Calculation range , page 9-69).

Tab. 9-37: Analytical flags priority

3.3.5. Quality flags

Flag	Message	Definition and Implications
CAL_CONV	R	Results converted using the CONV function are flagged with R.
CAL_ERROR	C	- If the calibration is flagged with CALCHK_FLAG, CAL_NOT_OPTIMISED or FACTOR_FLAG and validated, all following results are flagged with C. - In case the calibration is deleted, then the previous calibration will be the current calibration and all following results are flagged with C.
CTRL_ERROR	Q	If a default control is flagged (except with CONF_RANGE_HIGH_W and CONF_RANGE_LOW_W) and validated, all following results are flagged with Q.
CAL_EXPIRED	KE	If the current calibration used is expired, the calibration is flagged with KE and all following results (Control, Patient sample) are flagged with C.
CALIBRATOR_EXPIRED	CE	If the calibrator used is expired, the calibration is flagged with CE and all following results (Control, Patient sample) are flagged with C.
CTRL_EXPIRED	QE	If the control used is expired, the control is flagged with QE. In case a default control is flagged with QE, all following results (Patient sample) are flagged with Q.
SOL_EXPIRED	SE	- If the solution used is expired, the result (Calibrator, Control, Patient sample) is flagged with SE. - In case a calibration is flagged with SE, all following results (Control, Patient sample) are flagged with C. - In case a default control is flagged with SE, all following results (Patient sample) are flagged with Q.
INCOMPATIBILITY	I	- If two incompatible test samplings are performed one after the other without the programmed cleaning, the second test result (Calibrator, Control, Patient sample) is flagged with I. - In case a calibration is flagged with I, all following results (Control, Patient sample) are flagged with C. - In case a default control is flagged with I, all following results (Patient sample) are flagged with Q.

Tab. 9–38: Quality flags



- ◆ When several quality flags occur on the same result, only one is displayed with the following order of priority: R, C, Q, KE, CE, QE, SE, I.
- ◆ Expired current calibrations, calibrators, controls and solutions can be used only if configured by your distributor.

3.3.6. ISE analytical flags

Message	ISE_ERROR
Definition	For ISE tests, this flag is triggered by the ISE error codes 052 and/or 055 (see Tab. 7–100: ISE error codes , page 7-125).
Applies on	Control, Patient sample
Implications	The result is not displayed.
Actions	Reassay with fresh controls and/or patient samples.

Tab. 9–39: ISE_ERROR

Pentra 400

Pentra 400

Specifications

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1. Technical specifications

1.1. Intended use

The **Pentra 400** system is a fully automated chemistry analyser using colorimetry, turbidimetry and potentiometry technologies. It is mostly dedicated to in vitro diagnostic analyses based on homogeneous samples such as serum, plasma, urine and even whole blood.

1.2. Analysis method types

- ◆ Colorimetry.
- ◆ Turbidimetry.
- ◆ Potentiometry:
 - Direct (serum and plasma)
 - Indirect (urine).

1.3. Throughput

Up to 300 tests/hour without ISE.

Up to 400 tests/hour with ISE.

1.4. Reagent Handling

▼ Reagent capacity

- ◆ 52 cassettes positions: 44 in a closed refrigerated area and 8 at room temperature.
- ◆ 39 tests positions with reagent racks.

▼ Reagent management with cassettes

- ◆ Automated reagent on board stability check.
- ◆ Test countdown.
- ◆ Back-up of same reagent.

▼ Positive reagent identification

- ◆ Integrated barcode reader.

▼ Reagent needle

- ◆ Capacitive level detection.
- ◆ Reagent preheating at 37°C ($\pm$ 0.5°C).

▼ Reagent volume

- ◆ Minimum: 2 µL with sample needle and 15 µL with reagent needle.
- ◆ Maximum: 600 µL.

1.5. Sample Handling

▼ Specimen

- ◆ Serum.
- ◆ Plasma.
- ◆ Urine.
- ◆ CSF.
- ◆ Whole blood.
- ◆ Homogeneous fluids.

▼ Sample capacity

- ◆ 60 samples on board: 6 racks with 10 samples positions.
- ◆ Continuous loading.

▼ Sample collection format

- ◆ Primary and secondary tubes:
 - 2, 3, 4 and 5 mL (diameter: 13 mm).
 - 7 and 10 mL (diameter: 16 mm).
- ◆ Specific racks for sample cups.

▼ Positive sample identification

- ◆ Integrated barcode reader (see [2.2.1. Sample identification](#), page 2-8).
- ◆ Tube presence detector.

▼ Sample needle

- ◆ Capacitive level detection.
- ◆ Shock detection.
- ◆ Clot detection.

▼ Sample volume

- ◆ Photometric mode
 - Minimum: 2 µL/test.
 - Maximum: from 95 µL/test for one step to 380 µL/test for 4 steps (see [Analysis Sequence](#), page 7-31).
- ◆ ISE mode
 - Direct: 50 µL/test (60 µL pipetted).
 - Indirect: 10 µL/test (20 µL pipetted).

▼ Automatic sample dilution

- ◆ From 1/2 to 1/22500.

▼ Automatic post concentration

- ◆ From x 2.0 to x 10.0.

1.6. Calibrator/Control Handling

▼ Calibrator/Control positioning

- ◆ Sample tray or reagent tray.

▼ Automatic standard dilution series

- ◆ Dilution ratio: main direct 1/2 - 1/150.
- ◆ Dilution ratio: main indirect..... 1/2 - 1/150⁸.

1.7. Measurement

▼ Reaction system

- ◆ Reaction temperature: temperature controlled air bath at 37°C ($\pm 0.2^\circ\text{C}$).
- ◆ Photometer reaction cycle: 12 seconds.
- ◆ Mixing: performed by teflon coated stirrer.
- ◆ Reaction time: 1 to 100 cycles (12 seconds to 20 minutes).
- ◆ Reaction cuvettes
 - Disposable acrylic cuvettes.
 - Cuvette volume: Min. 150 μL - Max. 600 μL .
- ◆ Automatic cuvette changer (see [2.3.1. Cuvette changer](#), page 8-19)
 - Continuous loading and unloading of cuvette segments.
 - Holder capacity: 30 segments (360 cuvettes).

▼ Optical system

- ◆ Measurement principle: parallel Bichromatic or Monochromatic measurement of light absorbed at selected wavelengths.
- ◆ Light source: tungsten-halogen lamp.
- ◆ Diffraction: concave reflective grating spectrograph.
- ◆ Detector: photodiode array.
- ◆ Wavelengths: 15 selectable from 340 to 700 nm.
- ◆ Optical linearity:

Wavelength	Linearity	Wavelength	Linearity	Wavelength	Linearity
340 nm	2.95	490 nm	2.5	580 nm	2.5
380 nm	2	505 nm	2.5	600 nm	2.5
405 nm	2.5	520 nm	2.5	620 nm	2.5
420 nm	3.5	550 nm	2.5	660 nm	2
455 nm	2	560 nm	2.5	700 nm	2

Tab. 10-1: Optical linearity

Pentra 400

▼ Algorithms supported

- ◆ Factor.
- ◆ Slope average.
- ◆ Linear regression and interpolation.
- ◆ LOGIT/LOG4.
- ◆ LOGIT/LOG5.
- ◆ Exponential.

2. Physical specifications

2.1. Power requirements

▼ Power supply

◆ **Pentra 400:** from 100 to 240 V ($\pm 10\%$), 50 to 60 Hz.

◆ Cooling unit:

- 100 V ($\pm 10\%$), 50 to 60 Hz.

- 115 V ($\pm 10\%$), 60 Hz.

- 230 V ($\pm 10\%$), 50 to 60 Hz.

- 240 V ($\pm 10\%$), 50 Hz.

▼ Power consumption

◆ **Pentra 400** with out printer 250 VA.

◆ Cooling unit 600 W.

▼ Printer

◆ Depends on printer
(see printer's manual).

2.2. Dimensions and weight

▼ Dimensions

◆ **Pentra 400** 101 x 71 x 63 cm.

◆ Cooling unit 29 x 42 x 40 cm.

▼ Weight

◆ **Pentra 400** 120 kg (265 lbs).

◆ Cooling unit 35 kg (77 lbs).

2.3. Operating temperature and humidity

◆ Temperature range between 15 and 32°C (59 and 90°F) with a temperature gradient not exceeding 2°C per hour.

◆ Relative humidity must be between 20% and 85%.

2.4. Water requirement

- ◆ De-ionized/distilled water.
- ◆ Water specifications: Resistivity > 5 MegOhms; Conductivity < 0.2 μ S/cm.

2.5. Internal computer/Software

- ◆ Color LCD touch screen 12 inches.
- ◆ Industrial PC board Windows XP.
- ◆ Processor frequency CPU 850 MHz.
- ◆ Memory capacity 256 MB.
- ◆ Hard disk 20 GB min.
- ◆ Floppy disk.
- ◆ CD-Rom drive.
- ◆ RS232C.
- ◆ Keyboard.
- ◆ Mouse.

3. Reagent specifications

In order for the instrument to operate correctly, high-quality reagents must be used.

HORIBA ABX provides a full range of reagents.

These reagents are used for in vitro diagnostic.

All these reagents are manufactured by:

HORIBA ABX

B.P. 7290

34184 MONTPELLIER Cedex 4 - FRANCE

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Refer to the **ABX Pentra** Reagent Document Binder (also available in electronic format on the **Pentra 400** reagent help or on www.horiba-abx.com) for all reagent specifications.



- ◆ The reagents and accessories stipulated by **HORIBA ABX** have been validated in accordance with the European Directive for in vitro diagnostic medical devices (98/79/CE).
- ◆ The use of any other reagents and accessories may place at risk the performance of the instrument, engaging the users responsibility. In this case, **HORIBA ABX** takes no responsibility for the device nor for the results rendered.

▼ Waste handling precautions



- ◆ When disposing of wastes, protective clothing must be worn (gloves, eyes protection, lab coat, etc...). Follow your local/national guidelines for biohazard waste disposal.
- ◆ If required, wastes can be neutralized before being discarded. Follow your laboratory's protocol when neutralizing and disposing of wastes.
- ◆ Dispose of the waste container according to the local/national regulatory requirements.

4. Performance data

For any information on reagent's performance data such as Accuracy, Precision, Linearity, etc..., please refer to the **ABX Pentra** Reagent Document Binder (also available in electronic format on the **Pentra 400** reagent help or on www.abx.com).

5. Limitations

5.1. Maintenance

Specific maintenance procedures are listed in [Section 9: Maintenance and Troubleshooting](#), page 9-1. The maintenance procedures identified are mandatory for proper use and operation of the **Pentra 400**.



Failure to execute any of these recommended procedures may result in poor reliability of the system.

5.2. Interferences

The reagent notices list the known interfering substances for each reagent (see the «Interferences» part in the paragraph «Performance on ABX Pentra 400»).

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Daily Guide
P/n: RAB199DEN

Revisions

Part number	Technical Note	Software version	Pages	Date
RAB199A	RAH 993 AA	2.0.0	All	07/11/03
RAB199B	RAN 013 AA	2.0.0	Daily Guide-25, 28-40	27/01/04
RAB199C	RAN 077 AA	3.0.0	All	25/06/04
RAB199DEN	RAN 225 AA	4.0.0	All	08/06/06

Latest version documents on www.horiba-abx.com.



CAUTION

- ◆ This instrument is intended for professional use only.
- ◆ The User Manual (P/n: RAB125EEN) must be consulted before attempting to operate instrument.
- ◆ Please refer to the User Manual (P/n: RAB125EEN) for potential hazards and risks, technical specifications and performance data.
- ◆ This document is only a guide for daily usual operations and cannot replace the instrument User or Technical Manuals.

IMPORTANT

- ◆ If a problem occurs during the instrument operation, refer to User Manual (P/n: RAB125EEN) instructions for recommendations.
- ◆ When the problem still persists, please contact your **HORIBA ABX** representative.

HORIBA ABX B.P. 7290 34184 MONTPELLIER Cedex 4 - FRANCE Tel: (33) (0)4 67 14 15 16 Fax: (33) (0)4 67 14 15 17	Your Local Representative

Contents

This section describes basic daily operations, including:

- ♦ **1. Instrument start up**, page Daily Guide-5
- ♦ **2. Calibration and control**, page Daily Guide-10
- ♦ **3. Running samples**, page Daily Guide-17
- ♦ **4. Change of user name/New Worklist**, page Daily Guide-22
- ♦ **5. Standby mode**, page Daily Guide-23
- ♦ **6. End of the day**, page Daily Guide-25
- ♦ **7. Annex: sampling alarms, analytical and quality flags**, page Daily Guide-29.

1. Instrument start up

1.1. Tanks

At the beginning of each day, physically check if:

- the distilled water tank needs to be filled
- the waste tank needs to be emptied.



Wastes must be handled according to your local/national regulations (see Section 10, [Waste handling precautions](#), page 10-9).

1.2. Cuvettes

Physically check if the rack of new cuvettes needs to be filled. Fill it if necessary (see Section 8, [Fill the rack of new cuvettes](#), page 8-20).

Physically check if the rack of used cuvettes needs to be emptied. Empty the used cuvettes rack if necessary (see Section 8, [Empty the rack of used cuvettes](#), page 8-21).



Dispose of used cuvette segments according to your local/national guidelines for biohazard waste disposal.

1.3. ISE reagents

Physically check the ISE reagents and replace them if necessary (see Section 9, [1.14. ISE reagents replacement](#), page 9-24).



In order to minimize environment interferences, the ISE module cover must be always closed during the ISE module operation.

1.4. Printer start up

Check the printer paper. If more printer paper is needed, replace it according to the Printer user manual that is supplied with the instrument.

Turn the printer ON by pressing the ON/OFF switch. Check that the control LEDs are ON.

1.5. Pentra 400 start up

The **Pentra 400** hardware has to remain ON 24 hours a day. This is necessary to keep the cooling unit functional and therefore maintain the temperature in the refrigerated area of the reagent tray.

Only the **Pentra 400** software is started up either manually (see [1.5.1. Manual start up](#), page Daily Guide-7) or automatically if automatic start up is programmed (see [1.5.2. Automatic start up](#), page Daily Guide-7).

1.5.1. Manual start up

(1) Press the button located on the right-hand side of the instrument for a few seconds.



1.5.2. Automatic start up

The automatic start up is programmable in the «System Configuration» menu (see Section 7, [3.1.7. Software exit](#), page 7-82).

The following steps are then carried out:

- switching ON PC and spectrophotometer lamp
- temperature regulation of reaction tray and reagent needle
- computer boot
- launch Windows XP and **Pentra 400** software.

Then, the «Start up» window is displayed and the instrument initialization is performed:

- checking and compacting databases
- synchronisation of PC/instrument
- mechanical initialization
- reading barcodes on the reagent and sample trays
- spectrophotometer gain adjustment and check
- lamp stability on air
- measuring reference intensity (I_0) on water
- checking reaction tray (used cuvette segments are unloaded from the reaction tray and new cuvette segments are loaded)
- checking temperatures.

As soon as the instrument initialization is completed, the «Start up» window is accessible.

(1) Select the user name or login (see Section 7, **3.8. Users**, page 7-112).

(2) Then, enter the password for this user name.

(3) The «New Worklist» box is checked by default.



This option allows the user to begin a new day of work. A new Worklist is created and the previous Worklist is archived. For further information, please refer to Section 2, **2.2.7. New Worklist**, page 2-21.

(4) Press the «OK» button.

(5) The Main menu is then displayed.



1.6. Solution status

(1) From the Main menu, check the solution status using the reagent tray representation (see Section 4, **2. Reagent tray representation**, page 4-4).

The solutions appearing in red require a check.

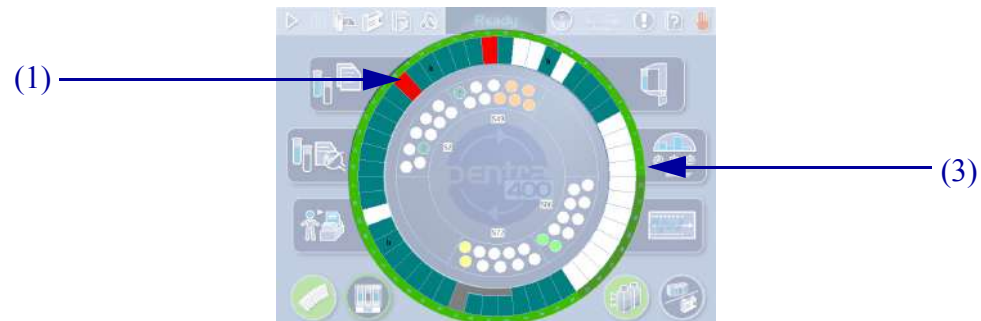
(2) Physically check the solutions in red and replace them if necessary.



Using reagent racks or calibrator/control reagent racks, the user must ensure that a sufficient solution volume without air bubbles or foam is placed on the instrument.



(3) The reagent tray is accessible only when the colored circle on the Main menu is green.



1.7. ISE module activation

If the ISE module etching procedure has been performed at the end of the day, it is recommended to perform the ISE module activation (see Section 7, **4.1.3. ISE activation**, page 7-119) before running samples.

2. Calibration and control

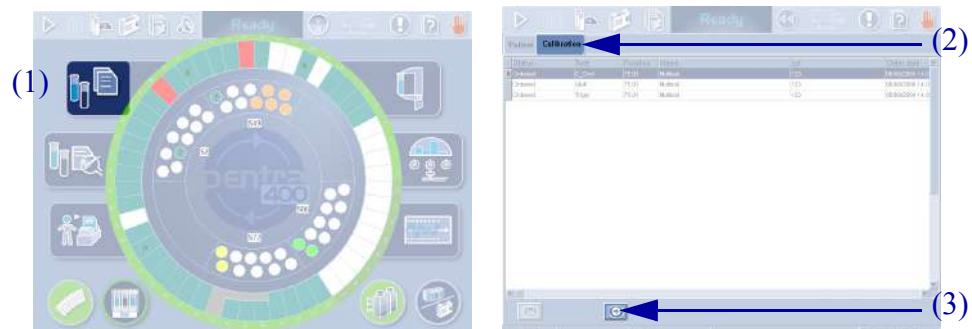
Every day, before running samples, it may be necessary to perform a new calibration for some tests. The tests that need a new calibration can be displayed on the calibration request capture screen by using the selective filter «All calibrations expired only» (see [2.1. Worklist](#), page Daily Guide-10).

Moreover, tests have to be checked using the corresponding control materials. Controls can be requested from the control request capture screen (see [2.1. Worklist](#), page Daily Guide-10). If, for a test, the option «Control Required» is selected in the application and the required default controls are configured for this test, then the default controls will be automatically performed with the calibration.

The ISE module remains ON 24 hours a day and performs automatically 1-point and 2-point calibrations. The ISE calibration results can be reviewed by using the «ISE Module Status» button from the Main menu (see [2.7. ISE calibration results](#), page Daily Guide-16).

2.1. Worklist

- (1) Press the «Worklist» button from the Main menu.
- (2) Press the «Calibration» tab from the «Worklist» menu.
- (3) Then, press the «Add new» button in order to open the calibration request capture screen.



(4) From the calibration request capture screen, use the selective filter «All calibrations expired only». The tests that need a new calibration are selected by default.



If configured, you can also use the selective filter «All calibrations expired in window».

(5) Press the «OK» button to validate the request.



For further information, please refer to Section 2, **2.3.2. Creation of a calibration request**, page 2-25.

(6) Press the «Control» tab.

(7) Then, press the «Add new» button in order to open the control request capture screen.

(8)(9) Create the control requests. If default controls are configured, simply check the «Default Control» box and select the tests.

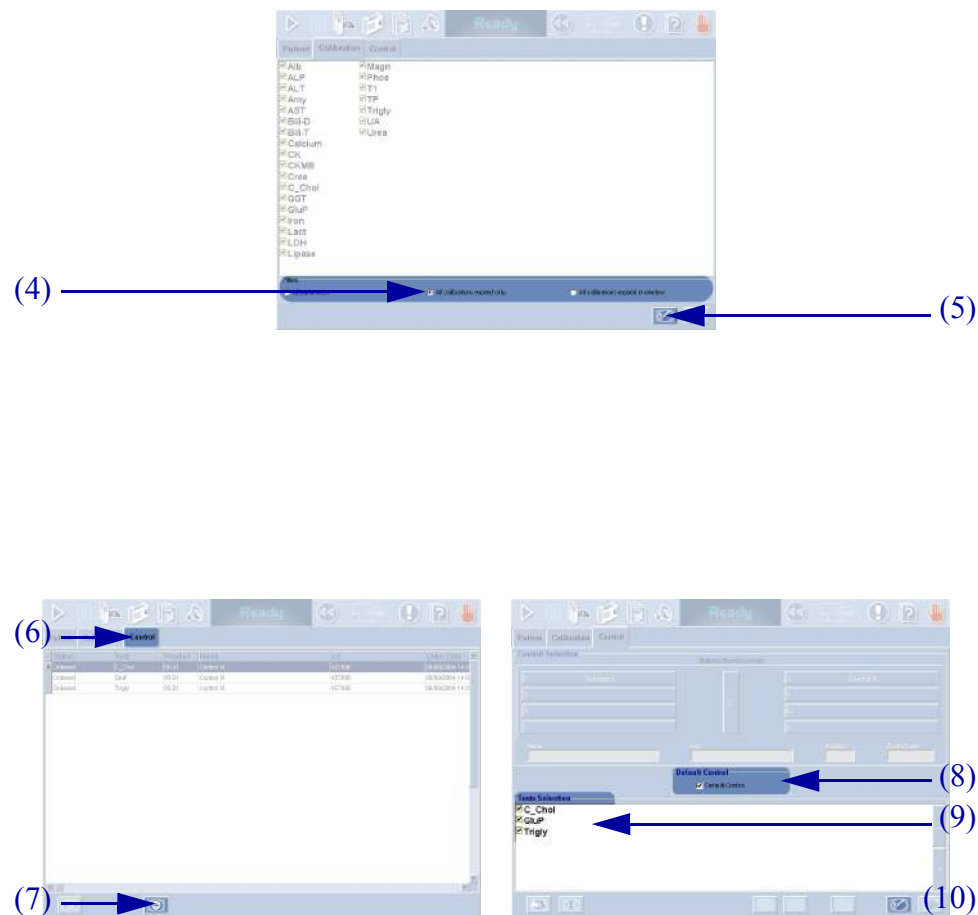


If, for a test, the option «Control Required» is selected in the application and the required default controls are configured for this test, then the default controls will be automatically performed with the calibration.

(10) Press the «OK» button to validate the request.



For further information, please refer to Section 2, **2.4.2. Creation of a control request**, page 2-29.



2.2. Loading of calibrators and controls

Position the calibrators and controls on sample and/or reagent racks depending on the calibrator and control positions defined in the «Calibration/Control» menu (see [Section 5: Calibration and Control](#), page 5-1).

Then, load the racks on the corresponding tray (see [3.2. Continuous loading of patient samples](#), page Daily Guide-18).

2.3. Work Balance

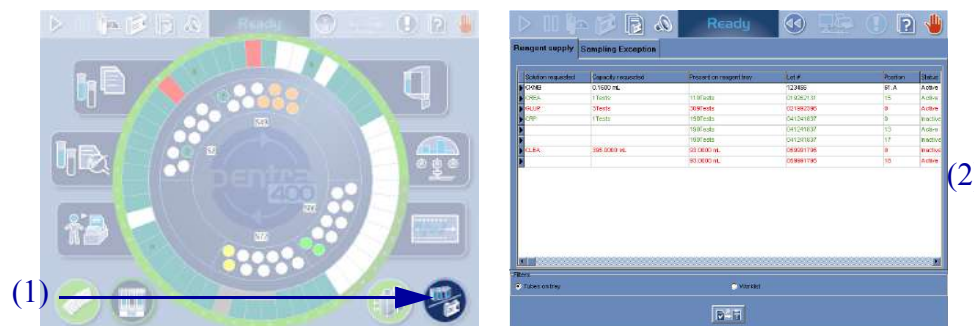
(1) Press the «Work Balance» button from the Main menu.

(2) From the «Reagent supply» tab, check the pending and available tests. Replace missing solutions (solutions appearing in red) if necessary.

From the «Sampling Exception» tab, check the expected sampling alarms (see [7.1. Sampling alarms](#), page Daily Guide-29).

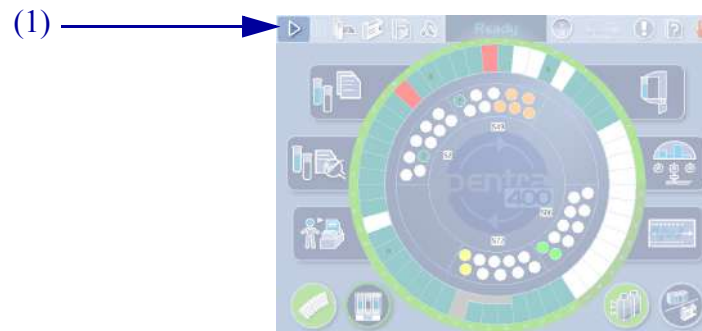


For further information, please refer to Section 1, [4.4.4. Work Balance](#), page 1-33.



2.4. Start analyses

- (1) Press the «Start» button from the generic toolbar.



2.5. Test Review

- (1) Press the «Test Review» button from the generic toolbar.

- (2) Then, press the «Sampling Exception» tab to ensure that no sampling alarm has been triggered (see [7.1. Sampling alarms](#), page Daily Guide-29).



When a sampling alarm or a flag is triggered, the «Test Review» button becomes red until the user clicks it to check the corresponding sampling alarm or flag.



2.6. Result validation

If automatic validation is configured for calibrations and controls in the «System Configuration» menu (see Section 7, [3.5. Results Validation](#), page 7-101), then calibration and control results can be automatically validated according to the following criteria.

♦Calibrations are automatically validated if:

- no point used for calculation is associated to an analytical flag (except the flags CALC_RANGE_HIGH and CALC_RANGE_LOW)
- the deviations (Dev_Rep and/or Dev_C) calculated for each level do not exceed the authorized deviations
- the calibration factor is not out of the programmed range.

♦Controls are automatically validated only if they are not associated to an analytical flag (except the flags CONF_RANGE_HIGH_W and CONF_RANGE_LOW_W).

Calibration and control results can be reviewed in the «Result Validation» menu.

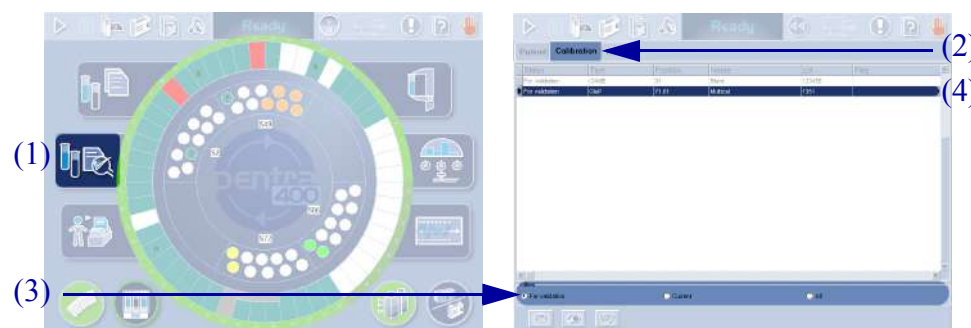
(1) Press the «Result Validation» button from the Main menu.

(2) Then, press the «Calibration» tab from the «Result Validation» menu.

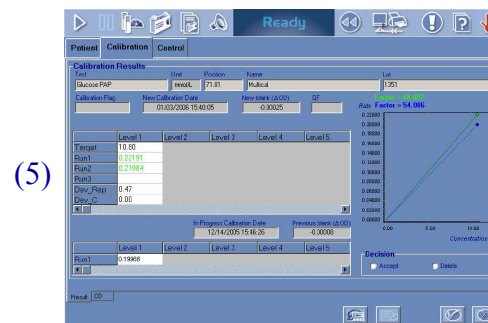
The Calibration Result list groups the calibrations that are incomplete, for validation and validated.

(3) Use the selective filter to display either the calibrations for validation, the current calibrations or all the calibrations.

(4) Double-click an item from the Calibration Result list in order to review the calibration results.



(5) The calibration validation screen is then displayed (see Section 2, **3.3.2. Calibration validation screen**, page 2-50) and the calibration results can be reviewed.



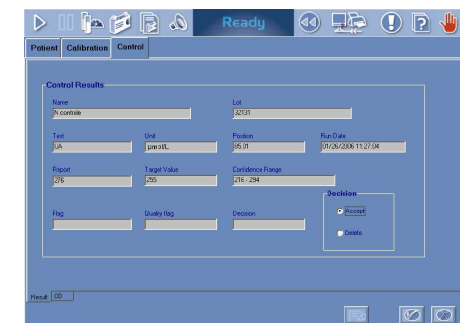
(6) Press the «Control» tab.

The Control Result list groups the controls that are incomplete, for validation and validated.

(7) Use the selective filter to display either the control blocks for validation or the current control blocks.

(8) Double-click an item from the Control Result list in order to review the control results.

(9) The control validation screen is then displayed (see Section 2, **3.4.2. Control validation screen**, page 2-73) and the control results can be reviewed.



2.7. ISE calibration results

The ISE module performs automatically 1-point and 2-point calibrations. The ISE calibration results can be reviewed by using the «ISE Module Status» button from the Main menu.

(1) Check the ISE module status using the «ISE Module Status» button.

- When the button is blue with a green circle, the ISE module is available and the calibrations are finished.

- When the button is blue with a blue circle, the ISE module is occupied (performing the calibrations for example).

- When the button is blue with a red circle, this indicates an error on the calibrations.

- When the button is red, this indicates an error on the ISE module.

- When the button is disabled, the ISE module is disabled (see Section 7, **3.1.9. ISE Module**, page 7-84).

Then, press the «ISE Module Status» button from the Main menu.

(2) The ISE module status screen is then displayed and the ISE calibration results can be reviewed (see Section 1, **Tab. 1–15: ISE calibration results**, page 1-32).

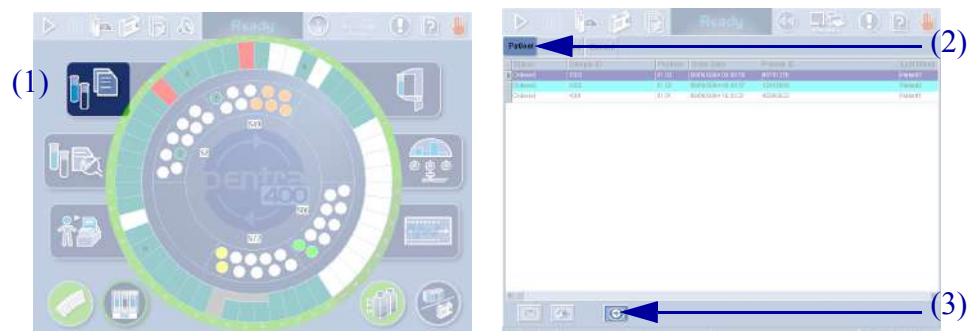


3. Running samples

3.1. Worklist

The Worklist can be either loaded from the Host (see Section 2, [2.2.3. Loading Worklist from the Host](#), page 2-11) or manually created by the user on the instrument.

- (1) Press the «Worklist» button from the Main menu.
- (2) Press the «Patient» tab from the «Worklist» menu.
- (3) Then, press the «Add new» button in order to open the request capture screen.



- (4) Fill the Patient Demographics.
- (5) Fill the Sample Characteristics.
- (6) Select the tests, ratios and/or profiles to be performed.
- (7) Press the «OK» button to validate the request.



For further information, please refer to Section 2, [2.2.5. Request capture screen](#), page 2-14.

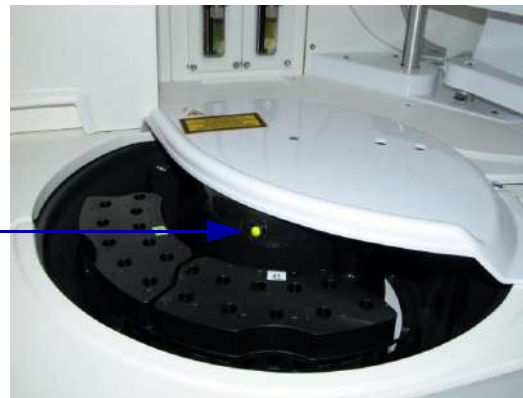


3.2. Continuous loading of patient samples

Position the sample tubes on sample racks or sample cup racks.

Then, load the racks on the sample tray.

(1) Racks must be loaded only when the LED is green.



(2) If the LED is red, press the «Pause» button from the generic toolbar and wait for the LED to turn green.



If automatic reruns are to be performed, the instrument turns to «Sampling» status and the LED turns orange for a few seconds before turning red. Never load racks when the LED is orange or red.



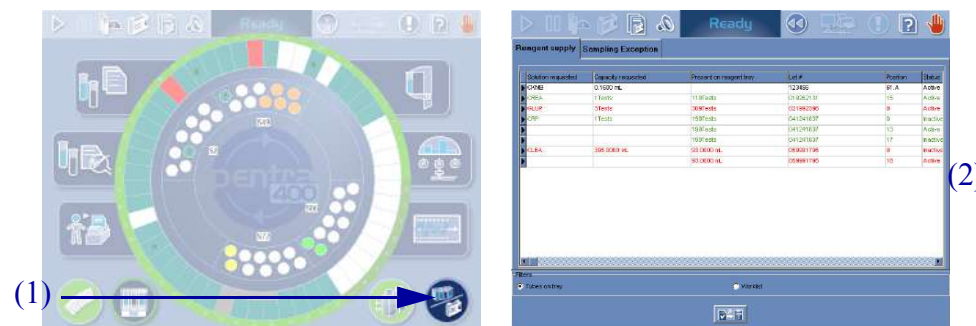
3.3. Work Balance

- (1) Press the «Work Balance» button from the Main menu.
- (2) From the «Reagent supply» tab, check the pending and available tests. Replace missing solutions (solutions appearing in red) if necessary.

From the «Sampling Exception» tab, check the expected sampling alarms (see [7.1. Sampling alarms](#), page Daily Guide-29).

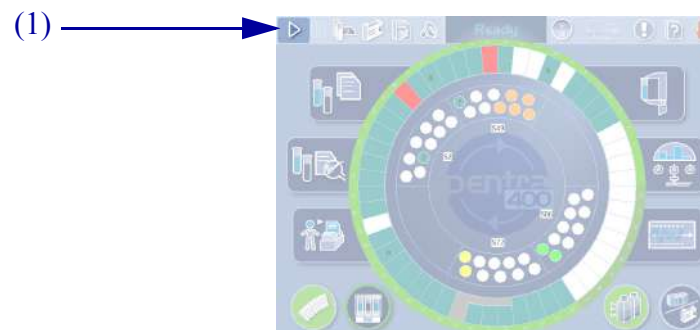


For further information, please refer to Section 1, **4.4.4. Work Balance**, page 1-33.



3.4. Start analyses

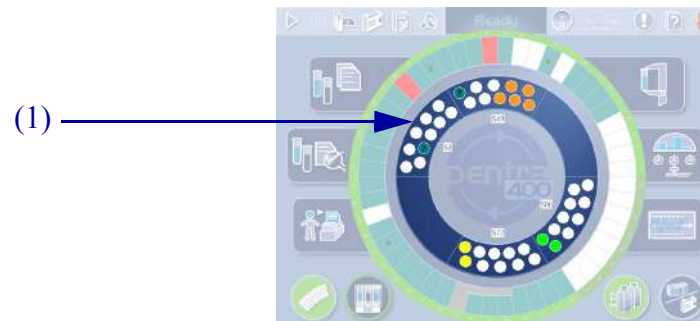
- (1) Press the «Start» button from the generic toolbar.



3.5. Sample status

(1) From the Main menu, check the sample status using the sample tray representation (see Section 2, [1.3. Sample tray representation](#), page 2-4).

The samples appearing in red require a check.



If some samples require a check:

- (2) Press the «Test Review» button from the generic toolbar.

- (3) Then, press the «Sampling Exception» tab to review the sampling alarms triggered (see [7.1. Sampling alarms](#), page Daily Guide-29).



When a sampling alarm or a flag is triggered, the «Test Review» button becomes red until the user clicks it to check the corresponding sampling alarm or flag.



3.6. Result validation

The validation of patient samples is configured in the «System Configuration» menu (see Section 7, [3.5. Results Validation](#), page 7-101).

Depending on this configuration, patient results can be:

- ◆ all automatically validated
- ◆ all manually validated
- ◆ automatically validated on criteria.

Patient results can be reviewed in the «Result Validation» menu.

(1) Press the «Result Validation» button from the Main menu.

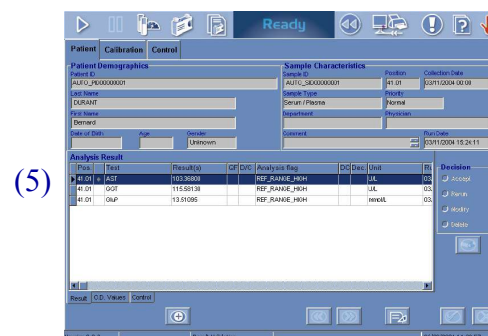
(2) Then, press the «Patient» tab from the «Result Validation» menu.

The Patient Result list groups the patient samples that are ordered or pending with at least one test of the sample finished, incomplete, for validation and validated.

(3) Use the selective filter to display either the patient samples incomplete, for validation, validated or all the patient samples.

(4) Double-click an item from the Patient Result list in order to review the patient results.

(5) The result validation screen is then displayed (see Section 2, [3.2.2. Result validation screen](#), page 2-36) and the patient results can be reviewed.



4. Change of user name/New Worklist

The change of user name and/or the creation of a new Worklist can be done during the day of work without instrument reinitialization.

- (1) Press the «Exit» button from the generic toolbar.

The «Shutdown» window opens.

- (2) Choose Change User by using the corresponding radio button.

- (3) Then, press the «OK» button.



Without instrument reinitialization, the «Start up» window is accessible.

- (1) Select the user name or login (see Section 7, [3.8. Users](#), page 7-112).

- (2) Then, enter the password for this user name.

- (3) The «New Worklist» box is unchecked by default.

Check this box to create a new Worklist (see Section 2, [2.2.7. New Worklist](#), page 2-21).

- (4) Press the «OK» button.

- (5) The Main menu is then displayed.



5. Standby mode

The **Pentra 400** system can be turned to standby mode either manually (see [5.1. Manual standby mode](#), page Daily Guide-23) or automatically if automatic standby mode is programmed (see [5.2. Automatic standby mode](#), page Daily Guide-24).

The standby mode consists in the following steps:

- ISE module cleaning (if required)
- system cleaning (if required)
- turning the spectrophotometer lamp to standby mode.

5.1. Manual standby mode

(1) Press the «Exit» button from the generic toolbar.

The «Shutdown» window opens.

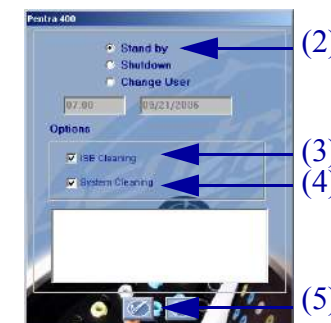
(2) Choose Standby mode by using the corresponding radio button.

The user is able to check:

- (3) the «ISE Cleaning» box
- (4) the «System Cleaning» box

in order to perform the ISE module cleaning, the system cleaning or both before the instrument turns to standby mode.

(5) Then, press the «OK» button.



The ISE module cleaning and the system cleaning can be automatically performed if programmed in the «System Configuration» menu (see Section 7, [3.1.7. Software exit](#), page 7-82).

Moreover, the cleaning solutions can be configured in the «Customer Services» menu (see Section 7, [4.1.2. Cleaning](#), page 7-119). If a cleaning solution is configured, make sure that it is positioned on the reagent tray.



To come back to the Main menu:

- ◆ Enter the user name and password.
- ◆ The «New Worklist» box is unchecked by default.
- ◆ Press the «OK» button.

5.2. Automatic standby mode

The automatic standby mode is programmable in the «System Configuration» menu (see Section 7, [3.1.7. Software exit](#), page 7-82).

6. End of the day



Before performing end of the day procedure, check that no analysis is pending in the «Worklist» menu.

6.1. Tanks

At the end of each day, physically check if:

- the distilled water tank needs to be filled
- the waste tank needs to be emptied.



Wastes must be handled according to your local/national regulations (see Section 10, [Waste handling precautions](#), page 10-9).

6.2. Cuvettes

Physically check if the rack of new cuvettes needs to be filled. Fill it if necessary (see Section 8, [Fill the rack of new cuvettes](#), page 8-20).

Physically check if the rack of used cuvettes needs to be emptied. Empty the used cuvettes rack if necessary (see Section 8, [Empty the rack of used cuvettes](#), page 8-21).



Dispose of used cuvette segments according to your local/national guidelines for biohazard waste disposal.

6.3. ISE reagents

Physically check the ISE reagents and replace them if necessary (see Section 9, [1.14. ISE reagents replacement](#), page 9-24).



In order to minimize environment interferences, the ISE module cover must be always closed during the ISE module operation.

6.4. ISE module etching

Perform the ISE module etching procedure on a daily basis (see Section 9, [1.1. ISE module etching](#), page 9-4). This procedure consists in cleaning the ISE module with **ABX Pentra Etching CP - Ref. A11A01769**.



- ◆ The ISE module etching procedure must be performed on a daily basis only if more than 20 samples are run daily.
- ◆ If less than 20 samples are run daily, the procedure should be performed once a week only (see Section 9, [1.3. ISE module cleaning](#), page 9-7).

6.5. Needle deproteinization without mixer

Perform the needle deproteinization procedure on a daily basis without the mixer cleaning (see Section 9, [1.2.1. Needle deproteinization without mixer](#), page 9-5). This procedure consists in cleaning the sample and reagent needles with **ABX Pentra Deproteinizer CP - Ref. A11A01754**.

6.6. Shutdown

The shutdown consists in the following steps:

- ISE module cleaning (if required)
- system cleaning (if required)
- checking reaction tray (used cuvette segments are unloaded from the reaction tray)
- switching OFF spectrophotometer lamp, temperature regulation and PC.



The **Pentra 400** hardware and the cooling unit have to remain ON 24 hours a day to maintain the reagents refrigerated. Do not switch OFF neither the **Pentra 400** nor the cooling unit.

(1) Press the «Exit» button from the generic toolbar.

The «Shutdown» window opens.

(2) Choose Shutdown mode by using the corresponding radio button.

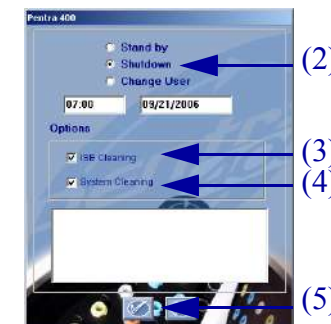
If automatic start up has been programmed in the «System Configuration» menu (see Section 7, [3.1.7. Software exit](#), page 7-82), the next start up date and time are displayed.

The user is able to check:

- (3) the «ISE Cleaning» box
- (4) the «System Cleaning» box

in order to perform the ISE module cleaning, the system cleaning or both before the shutdown.

(5) Then, press the «OK» button.



The ISE module cleaning and the system cleaning can be automatically performed if programmed in the «System Configuration» menu (see Section 7, [3.1.7. Software exit](#), page 7-82).

Moreover, the cleaning solutions can be configured in the «Customer Services» menu (see Section 7, [4.1.2. Cleaning](#), page 7-119). If a cleaning solution is configured, make sure that it is positioned on the reagent tray.



Once the shutdown is finished, the position 36 of the reagent tray must be always positioned in front of the yellow arrow.

Make sure that the reagent tray is correctly positioned in particular when one of the following events occur:

- an alarm is triggered during the shutdown
- the reagent tray is manually moved after the shutdown.



7. Annex: sampling alarms, analytical and quality flags

7.1. Sampling alarms

Sampling alarms are displayed on the «Sampling Exception» tab of the «Test Review» menu (see Section 2, [4. Test Review](#), page 2-81).

If a sampling alarm occurs, follow the instructions given in the following table. If the sampling alarm is repeated, call your **HORIBA ABX** representative.

Message	Error type	Action
INTERRUPT	A sampling alarm has interrupted the tests in progress.	The tests not completed will be performed at the next start.
SPLE_EMPTY	Insufficient volume (detected by the sample needle). Tests in progress for this sample are interrupted.	Check the sample.
SOLUTION_EMPTY/SN	Insufficient volume (detected by the sample needle). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SOLUTION_EMPTY/RN	Insufficient volume (detected by the reagent needle). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SAMPLE_FOAM	Air bubbles or insufficient volume (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample.
SOLUTION_FOAM/SN	Air bubbles or insufficient volume (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SOLUTION_FOAM/RN	Air bubbles or insufficient volume (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.

SAMPLE_FIBRIN	Sample needle may be clogged (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample needle and clean it if necessary. Run a sample pressure calibration. Check the sample.
SOLUTION_CLOGGING/SN	Sample needle may be clogged (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the sample needle and tubing. Run a sample pressure calibration. Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SOLUTION_CLOGGING/RN	Reagent needle may be clogged (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent needle and tubing. Run a reagent pressure calibration. Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
SPLD_SHOCK_DETECT	Sample tube may be capped. Tests in progress for this sample are interrupted.	Check the sample tube.
SOLUTION_SHOCK	Reagent may be capped. The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent, remove the caps and activate the reagent in «Reagent Configuration» menu.
INC_SAMPLE_PIPET	Air bubbles or insufficient volume (detected by the sample pressure sensor). Tests in progress for this sample are interrupted.	Check the sample.
INC_SOLUTION_PIPET/SN	Air bubbles or insufficient volume (detected by the sample pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
INC_SOLUTION_PIPET/RN	Air bubbles or insufficient volume (detected by the reagent pressure sensor). The reagent is then inactivated. Tests in progress for this reagent are interrupted.	Check the reagent and replace it if necessary. Activate the reagent in «Reagent Configuration» menu.
REAG_MISSING	The reagent is missing.	Place the reagent on reagent tray.
DIL_MISSING	The diluent is missing.	Place the diluent on reagent tray.
CLEANER_MISSING	The cleaner is missing.	Place the cleaner on reagent tray.
REAG_LOCKED	The reagent is inactivated. It then cannot be used for the pending analyses.	Activate the reagent in «Reagent Configuration» menu.
DIL_LOCKED	The diluent is inactivated. It then cannot be used for the pending analyses.	Activate the diluent in «Reagent Configuration» menu.
CLEANER_LOCKED	The cleaner is inactivated. It then cannot be used for the pending analyses.	Activate the cleaner in «Reagent Configuration» menu.

REAG_EXPIRED	The reagent has expired. It then cannot be used for the pending analyses.	Replace the reagent.
DIL_EXPIRED	The diluent has expired. It then cannot be used for the pending analyses.	Replace the diluent.
CLEANER_EXPIRED	The cleaner has expired. It then cannot be used for the pending analyses.	Replace the cleaner.
NOT_ENOUGH_REAG	Not enough reagent.	Replace the reagent.
NOT_ENOUGH_DIL	Not enough diluent.	Replace the diluent.
NOT_ENOUGH_CLEANER	Not enough cleaner.	Replace the cleaner.
CALIBRATOR_EXPIRED	The calibrator has expired.	Replace the calibrator.
CTRL_EXPIRED	The control has expired.	Replace the control.
POS_NOT_SET	The calibrator or control position is not configured.	Configure the calibrator or control position in «Calibration/Control» menu.
CALIBRATOR_MISSING	The calibrator is missing.	Place the calibrator.
CTRL_MISSING	The control is missing.	Place the control.
NO_CAL_IN_MEMORY	No current valid calibration for this test.	Run a calibration for this test.
NO_CTRL_IN_MEMORY	No current valid control for this test.	Run a control for this test.
NOT_ENOUGH_CUV	Not enough cuvettes in the cuvette changer.	Fill the rack of new cuvettes.
MISMATCH	For a rack position, the Sample ID in the Worklist is different from the barcode label read on the sample tube.	Check the sample tube. Modify the Sample ID in the Worklist or place correctly the sample tube.
POS_CHANGE	The sample tube has been moved during the analysis. Warning! This manipulation is strictly forbidden.	Replace the sample tube to its previous position.
BARCODE_DUPLICATE	At least 2 identical sample barcodes.	Check the sample barcodes.
ACTIVE_REAG_ABX_CASSETTE_MISSING	No active cassette for this reagent.	Activate the cassette in «Reagent Configuration» menu.
ACTIVE_DIL_ABX_CASSETTE_MISSING	No active cassette for this diluent.	Activate the cassette in «Reagent Configuration» menu.
ACTIVE_CLEANER_ABX_CASSETTE_MISSING	No active cassette for this cleaner.	Activate the cassette in «Reagent Configuration» menu.
ELECTRODE_DISABLED	One electrode is inactivated.	Activate the electrode in «Customer Services» menu.

7.2. Analytical and quality flags

- ♦ **7.2.1. Kinetic analytical flags**, page Daily Guide-32
- ♦ **7.2.2. Calibration analytical flags**, page Daily Guide-37
- ♦ **7.2.3. Result analytical flags**, page Daily Guide-39
- ♦ **7.2.4. Analytical flags priority**, page Daily Guide-44
- ♦ **7.2.5. Quality flags**, page Daily Guide-45
- ♦ **7.2.6. ISE analytical flags**, page Daily Guide-46.

Analytical and quality flags are displayed on the «Error Report» tab of the «Test Review» menu (see Section 2, **4. Test Review**, page 2-81).

7.2.1. Kinetic analytical flags

The following flags apply only to kinetic curves for all cuvettes (Blank, Calibrator, Control, Patient sample):

- ♦ **High absorbance**, page Daily Guide-33
- ♦ **Sample limit**, page Daily Guide-33
- ♦ **Reagent range**, page Daily Guide-33
- ♦ **Blank range**, page Daily Guide-34
- ♦ **Non linear**, page Daily Guide-34
- ♦ **Noise**, page Daily Guide-35
- ♦ **High activity**, page Daily Guide-35
- ♦ **Reaction limit**, page Daily Guide-36
- ♦ **Sign**, page Daily Guide-36.

High absorbance

Message	HIGH_ABS
Definition	At least one absorbance point used in the calculation has exceeded 3.0 A if wavelength is 340 nm or 3.5 A for other wavelengths.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is not displayed. - For blank and calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page Daily Guide-37). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and reassay.

Sample limit

Message	SAMPLE_LIMIT
Definition	The sample limit value is used to determine the sample-specific absorbance. The reagent blank absorbance is subtracted from the sample absorbance, both measured at the defined cycle. The calculated value is checked to ensure that it is not higher than the programmed sample limit value.
Applies on	Patient sample
Implications	The result is displayed and flagged.
Actions	Check the sample visually; it may be icteric, hemolytic or lipemic. Dilute it manually and reassay.

Reagent range

Message	REAG_RANGE_HIGH REAG_RANGE_LOW
Definition	All reagent blank absorbance values used for calculations are checked to ensure that they are not out of the programmed reagent range.
Applies on	Blank
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag , page Daily Guide-37).
Actions	Reassay with fresh reagents.

Blank range

Message	BLK_RANGE
Definition	The absorbance variation of the reagent blank is checked to ensure that it is not out of the programmed blank range.
Applies on	Blank
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag , page Daily Guide-37).
Actions	Reassay with fresh reagents.

Non linear

Message	NON_LIN_A, NON_LIN_B, NON_LIN_C, NON_LIN_D
Definition	The Kinsearch calculation type failed to find a linear portion of the reaction curve or less than 5 data points are within the linear portion. This flag applies to each calculation step (Steps A, B, C and D); see Section 7, Definition, Steps, Formula , page 7-34.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is not displayed. - For blank and calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page Daily Guide-37). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and reassay. Check sample cup for fibrin clots or air bubbles. Check the water stream from the sample needle. Use fresh calibrators, controls, patient samples and/or reagents if necessary.

Noise

Message	NOISE_A, NOISE_B, NOISE_C, NOISE_D
Definition	One or more data points within the linear portion of the reaction curve exceed a calculated difference from the regression line (only for the kinsearch calculation type). This flag applies to each calculation step (Steps A, B, C and D); see Section 7, Definition, Steps, Formula , page 7-34.
Applies on	Blank, Calibrator, Control, Patient sample
Implications	The result is displayed. - For blank and calibrator: Does not flag nor block the calibration calculation. - For control: The control cannot be automatically validated. If manually validated, the control is flagged with CTRL_ERR (see 7.2.5. Quality flags , page Daily Guide-45). - For patient sample: The result is flagged.
Actions	If more than one sample is flagged, it may be necessary to provide fresh reagents.

High activity

Message	HIGH_ACTIV
Definition	This flag occurs if the two following checks fail simultaneously: reaction limit and sign.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error , page Daily Guide-37). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and reassay.

Reaction limit

Message	REAC_LIMIT_A, REAC_LIMIT_B, REAC_LIMIT_C, REAC_LIMIT_D
Definition	The reaction limit value is used to determine substrate depletion. - For Kinetic calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first reading point. - For Kinsearch calculation type: the absorbance measured at the defined cycle is subtracted from the absorbance value of first point within the linear range. The calculated value is checked to ensure that it is not higher than the programmed reaction limit value. This flag applies to each calculation step (Steps A, B, C and D); see Section 7, Definition, Steps, Formula, page 7-34.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error, page Daily Guide-37). - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution is programmed in the application.
Actions	If no post dilution is programmed in the application, dilute the sample manually and reassay.

Sign

Message	SIGN
Definition	The absorbance change for the flagged sample minus the absorbance change of the reagent blank does not agree with the reaction direction programmed in the application.
Applies on	Calibrator, Control, Patient sample
Implications	The result is not displayed. - For calibrator: The calibration is then flagged with CALCHK_ERROR (see Calibration check error, page Daily Guide-37). - For control: The control cannot be validated. - For patient sample: The sample is flagged.
Actions	Check sample cup for fibrin clots or air bubbles. If more than one sample is flagged, it may be necessary to provide fresh reagents.

7.2.2. Calibration analytical flags

The following flags apply only when calculating a calibration curve:

- ♦ **Calibration check flag**, page Daily Guide-37
- ♦ **Calibration check error**, page Daily Guide-37
- ♦ **Calculation error**, page Daily Guide-37
- ♦ **Calibration not optimised**, page Daily Guide-38
- ♦ **Calibration factor flag**, page Daily Guide-38.

Calibration check flag

Message	CALCHK_FLAG
Definition	At least one calibrator is flagged with REAG_RANGE, BLK_RANGE or DEVIATION.
Implications	The calibration is calculated and flagged. It cannot be automatically validated. If manually validated, all following results are flagged with CAL_ERROR (see 7.2.5. Quality flags , page Daily Guide-45).

Calibration check error

Message	CALCHK_ERROR
Definition	At least one calibrator is flagged with HIGH_ABS, NON_LIN, HIGH_ACTIV, REAC_LIMIT or SIGN.
Implications	The calibration is not calculated. It must be deleted. Then, the previous calibration will be the current calibration and all following results are flagged with CAL_ERROR (see 7.2.5. Quality flags , page Daily Guide-45).

Calculation error

Message	CALC_ERROR
Definition	Three cases: - For non-linear calibration modes, the calculation algorithm cannot generate an acceptable standard non-linear curve fit. - For mathematical algorithms (LOGIT/LOG4, LOGIT/LOG5, EXPONENT5), the curve fit is not monotonic. - For linear calibration modes (Slope average, Linear regression), the calculated calibration factor is negative.
Implications	The calibration is not calculated. It must be deleted. Then, the previous calibration will be the current calibration and all following results are flagged with CAL_ERROR (see 7.2.5. Quality flags , page Daily Guide-45).

Calibration not optimised

Message	CAL_NOT_OPTIMISED
Definition	For non-linear calibration modes, a maximum of 150 iterations will be performed to optimise the curve fit. If the number of 150 iterations is reached, the calibration is flagged. This flag means that the calibration has been calculated but not with the best optimisation.
Implications	The calibration automatic validation is not blocked but all following results are flagged with CAL_ERROR (see 7.2.5. Quality flags , page Daily Guide-45).

Calibration factor flag

Message	FACTOR_FLAG
Definition	For linear calibration modes (Slope average, Linear regression), the calculated calibration factor failed one of the three calibration factor checks (see Section 7, Factor calibration , page 7-24).
Implications	The calibration is calculated and flagged. It cannot be automatically validated. If manually validated, all following results are flagged with CAL_ERROR (see 7.2.5. Quality flags , page Daily Guide-45).

7.2.3. Result analytical flags

- ♦ **Deviation**, page Daily Guide-39
- ♦ **Result calculation error**, page Daily Guide-40
- ♦ **Linearity range**, page Daily Guide-40
- ♦ **Calculation range**, page Daily Guide-41
- ♦ **Test range**, page Daily Guide-41
- ♦ **Confidence range**, page Daily Guide-42
- ♦ **Reference range**, page Daily Guide-43
- ♦ **Critical range**, page Daily Guide-43

Deviation

Message	DEVIATION
Definition	Two types of deviation are checked. - Deviation concerning replicates (Dev_Rep): For each level, the absorbance values of the replicates are compared with the mean value. The maximum deviation is calculated (Dev_Rep) and then checked to ensure that it is not higher than the authorized Dev_Rep. - Deviation to the curve (Dev_C): For each level, the concentration of the mean value is compared with the theoretical value. The deviation is calculated (Dev_C) and then checked to ensure that it is not higher than the authorized Dev_C.
Applies on	Calibrator
Implications	The result is displayed and flagged. The calibration is then flagged with CALCHK_FLAG (see Calibration check flag, page Daily Guide-37).
Actions	It may be necessary to use fresh calibrators and/or reagents. Perform the Qualitest procedure in order to check the pipetting accuracy and precision (see Section 9, 1.6. Qualitest, page 9-12).

Result calculation error

Message	RESULT_CALC_ERR
Definition	For linear regression and non-linear calibration modes, at least one result could not be calculated using the selected algorithm.
Applies on	Control, Patient sample
Implications	The result is not displayed. - For control: The control cannot be validated. - For patient sample: The sample is flagged.
Actions	It may be necessary to use fresh calibrators and/or reagents.

Linearity range

Message	LINEARITY_HIGH LINEARITY_LOW
Definition	The calculated result is not within the linearity range programmed in the application.
Applies on	Control, Patient sample
Implications	The result is displayed and flagged. - For control: The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 7.2.5. Quality flags , page Daily Guide-45). - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of LINEARITY_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Calculation range

Message	CALC_RANGE_HIGH CALC_RANGE_LOW
Definition	This check is performed for non-linear calibration modes. - For calibrator: If, for the highest calibrator point, one absorbance value is higher than the theoretical value, then CALC_RANGE_HIGH is triggered. If, for the lowest calibrator point, one absorbance value is lower than the theoretical value, then CALC_RANGE_LOW is triggered. - For control and patient sample: If the absorbance value is between the calculated mean value and the theoretical value of the highest calibrator point, then CALC_RANGE_HIGH is triggered. If the absorbance value is between the calculated mean value and the theoretical value of the lowest calibrator point, then CALC_RANGE_LOW is triggered.
Applies on	Calibrator, Control, Patient sample
Implications	In case of CALC_RANGE_HIGH flag, the result equals to the highest calibrator point concentration. In case of CALC_RANGE_LOW flag, the result equals to the lowest calibrator point concentration. - For calibrator: Does not flag nor block the calibration calculation. - For control: The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 7.2.5. Quality flags, page Daily Guide-45). - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of CALC_RANGE_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Test range

Message	TEST_RANGE_HIGH TEST_RANGE_LOW
Definition	This check is performed for non-linear calibration modes. If the absorbance value is higher than the calculated mean value of the highest calibrator point, then TEST_RANGE_HIGH is triggered. If the absorbance value is lower than the calculated mean value of the lowest calibrator point, then TEST_RANGE_LOW is triggered.
Applies on	Control, Patient sample
Implications	The result is not displayed. - For control: The control cannot be validated. - For patient sample: The sample will be automatically rerun if a post dilution or post concentration is programmed in the application.
Actions	In case of TEST_RANGE_HIGH flag and if no post dilution is programmed in the application, dilute the sample manually and reassay.

Confidence range**a - Westgard rules disabled**

Message	CONF_RANGE_HIGH CONF_RANGE_LOW
Definition	The calculated result of a control is outside the programmed low and high confidence range values.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 7.2.5. Quality flags , page Daily Guide-45).
Actions	Reassay with fresh controls and/or reagents.

b - Westgard rules enabled (see Section 7, Westgard rules, page 7-102)

Message	CONF_RANGE_HIGH_W CONF_RANGE_LOW_W
Definition	The calculated result of a control is outside the confidence range and no Westgard rule has been validated.
Applies on	Control
Implications	The result is displayed and flagged.
Actions	-
Message	CONF_RANGE_HIGH_W1, CONF_RANGE_HIGH_W2, CONF_RANGE_HIGH_W3, CONF_RANGE_HIGH_W4, CONF_RANGE_HIGH_W5, CONF_RANGE_HIGH_W6 CONF_RANGE_LOW_W1, CONF_RANGE_LOW_W2, CONF_RANGE_LOW_W3, CONF_RANGE_LOW_W4, CONF_RANGE_LOW_W5, CONF_RANGE_LOW_W6
Definition	The calculated result of a control is outside the confidence range and the Westgard rule 1, 2, 3, 4, 5 or 6 has been validated.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 7.2.5. Quality flags , page Daily Guide-45).
Actions	Reassay with fresh controls and/or reagents.

Message	WESTGARD_RULE_4, WESTGARD_RULE_5, WESTGARD_RULE_6
Definition	The calculated result of a control is inside the confidence range and the Westgard rule 4, 5 or 6 has been validated.
Applies on	Control
Implications	The result is displayed. The control cannot be automatically validated. If manually validated, all following results are flagged with CTRL_ERR (see 7.2.5. Quality flags , page Daily Guide-45).
Actions	Reassay with fresh controls and/or reagents.

Reference range

Message	REF_RANGE_HIGH REF_RANGE_LOW
Definition	The calculated result of a sample is outside the programmed reference range.
Applies on	Sample
Implications	The result is displayed and flagged.
Actions	Patient diagnostic.

Critical range

Message	CRITICAL_HIGH CRITICAL_LOW
Definition	The calculated result of a sample is outside the programmed critical range (see Rerun range , page 7-20).
Applies on	Patient sample
Implications	The result is displayed and flagged. The sample will be automatically rerun without post dilution or post concentration.
Actions	-

7.2.4. Analytical flags priority

When several analytical flags occur on the same result, only one is displayed with the order of priority described in the following table:

Priority	Message	Flag and description
+ 	HIGH_ABS	High absorbance (see High absorbance , page Daily Guide-33).
	SAMPLE_LIMIT	Sample limit (see Sample limit , page Daily Guide-33).
	REAG_RANGE_HIGH REAG_RANGE_LOW	Reagent range (see Reagent range , page Daily Guide-33).
	NON_LIN	Non linear (see Non linear , page Daily Guide-34).
	HIGH_ACTIV	High activity (see High activity , page Daily Guide-35).
	REAC_LIMIT	Reaction limit (see Reaction limit , page Daily Guide-36).
	NOISE	Noise (see Noise , page Daily Guide-35).
	BLK_RANGE	Blank range (see Blank range , page Daily Guide-34).
	SIGN	Sign (see Sign , page Daily Guide-36).
	TEST_RANGE_HIGH TEST_RANGE_LOW	Test range (see Test range , page Daily Guide-41).
	RESULT_CALC_ERR	Result calculation error (see Result calculation error , page Daily Guide-40).
	DEVIATION	Deviation (see Deviation , page Daily Guide-39).
	LINEARITY_HIGH LINEARITY_LOW	Linearity range (see Linearity range , page Daily Guide-40).
	CONF_RANGE_HIGH CONF_RANGE_LOW	Confidence range (see Confidence range , page Daily Guide-42).
	CRITICAL_HIGH CRITICAL_LOW	Critical range (see Critical range , page Daily Guide-43).
- 	REF_RANGE_HIGH REF_RANGE_LOW	Reference range (see Reference range , page Daily Guide-43).
	CALC_RANGE_HIGH CALC_RANGE_LOW	Calculation range (see Calculation range , page Daily Guide-41).

7.2.5. Quality flags

Message	Abbreviation	Definition and Implications
CAL_CONV	R	Results converted using the CONV function are flagged with R.
CAL_ERROR	C	- If the calibration is flagged with CALCHK_FLAG, CAL_NOT_OPTIMISED or FACTOR_FLAG and validated, all following results are flagged with C. - In case the calibration is deleted, then the previous calibration will be the current calibration and all following results are flagged with C.
CTRL_ERROR	Q	If a default control is flagged (except with CONF_RANGE_HIGH_W and CONF_RANGE_LOW_W) and validated, all following results are flagged with Q.
CAL_EXPIRED	KE	If the current calibration used is expired, the calibration is flagged with KE and all following results (Control, Patient sample) are flagged with C.
CALIBRATOR_EXPIRED	CE	If the calibrator used is expired, the calibration is flagged with CE and all following results (Control, Patient sample) are flagged with C.
CTRL_EXPIRED	QE	If the control used is expired, the control is flagged with QE. In case a default control is flagged with QE, all following results (Patient sample) are flagged with Q.
SOL_EXPIRED	SE	- If the solution used is expired, the result (Calibrator, Control, Patient sample) is flagged with SE. - In case a calibration is flagged with SE, all following results (Control, Patient sample) are flagged with C. - In case a default control is flagged with SE, all following results (Patient sample) are flagged with Q.
INCOMPATIBILITY	I	- If two incompatible test samplings are performed one after the other without the programmed cleaning, the second test result (Calibrator, Control, Patient sample) is flagged with I. - In case a calibration is flagged with I, all following results (Control, Patient sample) are flagged with C. - In case a default control is flagged with I, all following results (Patient sample) are flagged with Q.



- ◆ When several quality flags occur on the same result, only one is displayed with the following order of priority: R, C, Q, KE, CE, QE, SE, I.
- ◆ Expired current calibrations, calibrators, controls and solutions can be used only if configured by your distributor.

7.2.6. ISE analytical flags

ISE error

Message	ISE_ERROR
Definition	For ISE tests, this flag is triggered by the ISE error codes 052 and/or 055 (see Section 7, Tab. 7–100: ISE error codes , page 7-125).
Applies on	Control, Patient sample
Implications	The result is not displayed.
Actions	Reassay with fresh controls and/or patient samples.