USER MANUAL

STARRSED COMPACT USER MANUAL

Version 20.13 MRN-031-EN

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Manufacturer:	Mechatronics Manufacturing B.V.
Phone:	+31 (0)229 - 29 11 29
Fax:	+31 (0)229 - 24 15 34
E-mail:	support@mechatronics.nl
Internet:	http://www.mechatronics.nl
Postal address:	P.O. Box 225 1620 AE Hoorn The Netherlands
Office address:	De Corantijn 13 1689 AN Zwaag The Netherlands

Issued by the After Sales Department of Mechatronics

Guarantee

The manufacturer guarantees to repair any manufacturing faults or defective materials or both in the products supplied.

Excluded are materials that become defective due to normal usage, such as needles, syringes, glass-ware, tubing, O-rings, etc.

The guarantee period commences on the day of delivery to the customer and shall be effective for a period of twelve (12) months.

No claims for guarantee can be made on Mechatronics Instruments BV if fluids and/or spare parts of other manufacturers than those prescribed in the manual are used.

The manufacturer, Mechatronics Instruments BV, takes no responsibility for the consequences of errors, which might appear in this manual in spite of every effort made in translations.

Document history overview

MRN-031-EN

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Issue No	Date	Revised Section(s)	Changes	Authorised
Preliminary	January 1996		• First manual for StaRRsed Compact	F.Schwartz
1.07	May 1996		• First manual for StaRRsed Compact	F.Schwartz
2.00	May 1998		• First standard Word manual, ready for use reagents • Menu function table revision page, 25 menu 5 item 0 Manual describes the use of ready for use reagents.	F.Schwartz
3.00	July 1999		• This manual has been adapted to the new waste pump assembly. Manual describes the use of ready for use reagents • Maintenance, 9000 sample maintenance added, waste pump cassette. • A number of spelling errors resolved. • Side panel and top cover removal changed because of screws in the present situation. • Pump tube replacement, found description error. • Reporting measurements, chapter 9. Temp. Celsius. • Top cover removal, later models have screws holding the top cover. • Tubing diagram added page 65 • Pinch valve tube replacement, vacuum fill-	F.Schwartz

			nozzle	
4.00	November 1999		• Added our WEB site. • Minor spelling corrections. Added our WEB site.	F.Schwartz
5.00		See History list	• Minor spelling corrections. Added our WEB site. • Reagent sensing deionised water + saline. Trouble shooting level sensors. • Page 7 keyboard functions, number of patient results in data buffer added. • Spelling and grammar checked. • Page index corrected. Page index corrected.	F.Schwartz
6.00	August 2001		• Accessories kit up dated pinch valve tube was missing. • Modification date in page header. • Technical spec's barcode reader 4/6mil. • Waste handling chapter 4. • Index up-date chapter 5. • Correction pipette wash time chapter 5 menu 3. • Added the language choices chapter 5 menu 3 – 0. • Barcode reader choice chapter 5 menu 7-0. • Checking the motor currents chapter 5 menu 10 – 9. • Added new items to the menu table. • Cosmetic text line out chapter 7. • Text correction chapter 10. • Altered the way of cleaning	F.Schwartz

			the measure sensor chapter 12/12.1. • Some changes in the way of cleaning the waste separator chapter 12/12.2. • Waste pump cassette replacement chapter 12/12.4. • Trouble shooting changing the peristaltic pump tubes chapter 14 • Text changes chapter 16 liquid flows. • changes for Flow and ABS chapter 5/8, 12/2 and 22 1/1 • Sensor value changes for analogue chapter 5/8 and 12/2.	
7.00	November 2000	All	• Value changes for Flow and ABS chapter 5/8, 12/2 and 22 1/1 • Sensor value changes for analogue chapter 5/8 and 12/2.	F.Schwartz
8.00	January 2001	Chapter 2,14 and 16	• Corrected TAB positions and removed Pinch valve tube from chapter 2. • Page numbering section 14 and 15 corrected. • Chapter 14, trouble shooting a number of major changes in sections Rinse and Saline pumps tubes. • Chapter 16 added little more information section 16.1 and 16.2.	F.Schwartz
9.00	August 2001	Chapter 5	Chapter 5 is corrected set parity was even and now none.	F.Schwartz
10.00	Sep 2001	All	• Rebuild the manual according the NEN5509 guidelines.	H.E. van Dijk

11.00	Dec 2001	Section Menu	• Add the menu structure for the Compact EHST in the menu section (December 2001). • Add Error list for the EHST in the appendix • Add Work instructions to this version in section Work Instructions.	H.E. van Dijk
12.00	January 2003	Section Trouble shooting Section Compact System messages	• Changed the Compact InteRRliner flow information. • Changed Compact InteRRliner version menu 1 • Add more information in section troubleshooting • Add more information in the appendix Compact system message.	H.E. van Dijk
13.00	July 2003	Add Appendix reagents	• Add appendix Manual reagents prepare • Add the text in section 3 see appendix reagents prepare. Add small spelling corrections in the text. • Cleaning separator is added in the weekly maintenance section 11. • Add procedure in the work instruction 171 • Add work instruction 181 Replacement dilutor Teflon Tip. • Add work instruction of the three monthly maintenance in section 11. • Add work instruction 181 in the three monthly the work instruction 174.	H.E. van Dijk
14.00	March 2004	Section 5, 8 and 13.2	• Add more information in the shut down section. • Add how to use the	H.E. van Dijk

			sequence of the stand-alone and the InteRRliner Compact. • Trouble shooting Section on position error is re written. • Some software changes added in the menu structure in Menu 7.	
15.00	December 2004	Section 4, 5	Update the keyboard information to the latest software version. Section 5 menu 8 replaced in the InteRRliner robot steering. Add Appendix InteRRliner default printout Add Alphabetical Index Section 4 correction of the disinfectant label.Copyright page new layout. Section 4 Labels and stickers is renamed to Standard Operating Procedures. The following sections are added into the Standard Operating Procedures; • Basics of Bio safety • S.O.P. for working with bio hazardous material • E.C. Declaration • Safety warning • Labels and stickers in use on the containers • StaRRsed Incident report Section 5	H.E. van Dijk
16.00	December 2005	Section 5 menu 9 Section 11	• Add a warning for Menu 9. Add in • 3-mouths-maintenance-change pinch valve tube ESRI010246.	H.E. van Dijk
17.00	September 2006	Section 6.3	• Section 6.3 the needle depth clearance is set at 5 mm instead 2 mm. • Add a warning: Potential	H.E. van Dijk

			dilution errors when needle is too close to the sample tube bottom. • Menu 2-8 add extra information about activated again this function is stopped. Delete the daily and weekly numbers in maintenance	
18.00	November 2008	New layout	• Replaced the text mouthy, quartile, half year and year maintenance for text level 4 till level 1 texts. • Section 8 replaced the above texts for the level numbers Work instructions 173, 174 the above text for the level numbers • Appendix maintenance schedule is now based on levels • Check the entire reagent QQR numbers and if applicable replaced the numbers for new numbers. • From Section Getting started all the issues concerning installation items are moved to the section Installation. Add new trouble shooting for Elevator and Indexer in trouble shooting • Update key board sections InteRRliner Compact for applying the new software 2.30.	H.E. van Dijk
19.00	June 2009	Remove all Compact InteRRliner related sections.	• Removed all Compact InteRRliner related sections to InteRRliner User manual MRN-021 • Add new analyzer error number to the list. 7 is limit error.	H.E. van Dijk

20.00	December 2009	add software changes to section 5	• Add function menu 5-4 results at limit error • Add Menu 4-8 print settings.	H.E. van Dijk
20.10	April 2011	Changed default dry time from 5 till 9 seconds	• Menu 3-3 default setting (9)section	H.E. van Dijk
20.11	June 2011	Turn off	• It is not a problem if the StaRRsed Compact is on all the time. However,....>	H.E. van Dijk
20.12	January 2012		• Annual update and publication	H.E. van Dijk
20.13	August 2013	S.O.P. Technical specifications Reagents Reporting Quality Control	• New EC-declaration • Data storage specifications • QRR 010947 is now used instead QRR010932 • Protocols added • Chapter Quality Control added • Chapter sequence changed according sequence in Instructions for Use	H. Schavemaker

CONTENTS

1. INTRODUCTION

The **StaRRsed Blood Sedimentation Rate Instrument** (hereafter called StaRRsed Compact) is an in vitro diagnostic medical device that automatically carries out the erythrocyte sedimentation rate analysis according to the **Westergren** method, conforming to CLSI approved standard H02-A5, using closed sample tubes filled with citrate or EDTA blood.

The StaRRsed Compact is an advanced ESR system that offers many unique features and benefits over the traditional ESR procedures. Automating this method has the following advantages:

- The Westergren pipettes are always filled to the correct level.
- Using closed sample tubes reduces the possibility of contamination for the user and environment.
- Standard glass Westergren pipettes are used, in which the measurement can be corrected to a constant temperature (18 C° Celsius). Even small abnormalities can be detected over a longer period of time, irrespective of where and when the blood sample was taken.
- Every sedimentation measurement is directly linked to an identified sample, so that a manual work sheet is unnecessary. Patient ID errors are reduced to a minimum by using the bar-code reader.
- In the EDTA mode, the accuracy of dilution of EDTA blood with citrate is considerably better than manual dilution achieved either by "tipping off" or using evacuated blood collection tubes pre-filled with citrate solution.
- The data can be send to your Lab Information System.
- The used sedimentation pipettes are automatically washed and dried.
- Minimum sample volume is 1.3 ml for the StaRRsed Compact.
- The StaRRsed Compact can use a variety of closed tubes from different manufacturers.

1.1. Dilution principle

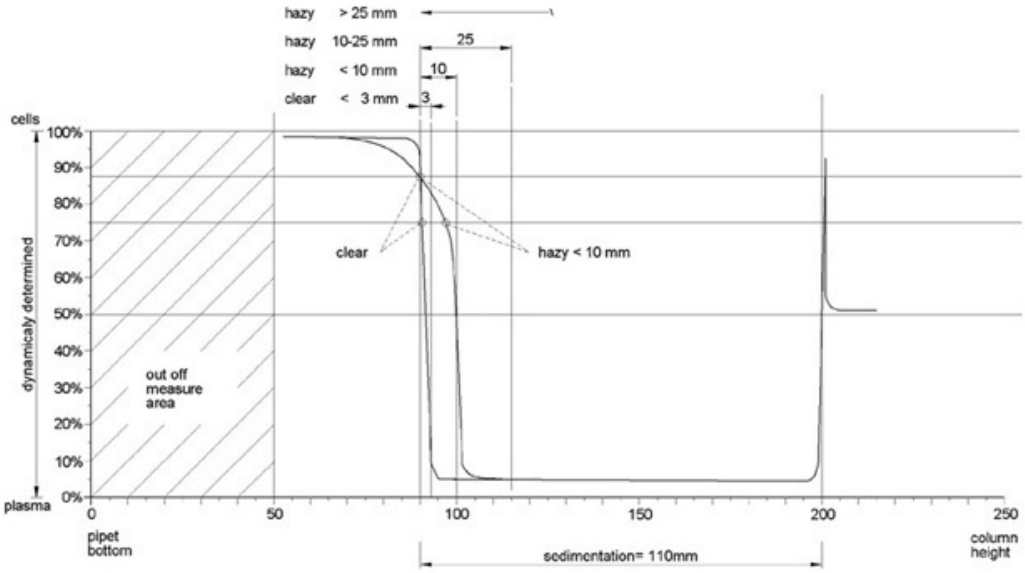
The principle of adding Diluent to a flow of whole blood is unique. The StaRRsed Compact has the capability of monitoring the air displacement during the aspiration cycle. This is called on-line dilution. The CPU receives data from the airflow sensor and calculates the syringe speed. Diluter accuracy is ± 3%.

1.2. Sedimentation measurement principle

The automatic reading of the Westergren sedimentation pipettes is carried out by moving an optical sensor along the pipettes. While the sensor is moving, a reading is made every 0.25 mm. The sensor is reading the absorption of infra red light through the Westergren pipette filled with blood. From these readings, values at a number of absorption levels are determined. All absorption figures are relative to the darkest and lightest reading (darkest = 100 % and the lightest = 0 % absorption respectively).

By definition the levels are:

87.5%	Cells/ plasma separation
75.0%	Hazy detection
50.0%	Meniscus detection



Graphic showing typical absorption values of a sample

2. INSTRUMENT DESCRIPTION

This manual describes the **Stand-alone** Compact analyser. The Instrument consists of the following:

- Basic unit with a belt holding 84 precision bore glass Westergren pipettes.
- Sampling unit, measuring unit, pipette-washing station.
- Barcode reader for sample identification.
- Serial / parallel interface.
- Easy accessible keypad with light key pressure due to piezo technology.
- LCD screen.
- Battery backup memory.
- Accessories kit.
- Built in vacuum unit.

2.1. Technical specifications

Technical specifications for the StaRRsed Compact:

StaRRsed Compact instrument models:

Model	Model name	Catalogue number
	StaRRsed Compact	**ESRI109000**

ESR method:

ESR method	Westergren method
Temperature compensation method	R.W. Manley: J. clin Path (1957), 10, 354
30 minute method	R. Rogers: Medical Laboratory World 1994
Allowed blood specimen types	• For EDTA mode: Whole blood with < 1% EDTA anticoagulant. • For Citrate mode: Whole blood (4 vols.) with sodium citrate anticoagulant-diluent (1 vol.)
Automatic dilution	4 vols. blood + 1 vol. sodium citrate diluent (3.2% NaCl); accuracy ±3%
Reported result	mm after 1 hour

Reagents:

Reagents used	QRR 010931 Diluent QRR 010947 Disinfectant QRR 010933 Saline QRR 010934 Rinse solution De-ionized water
Reagent barcode label information	Code39

Blood volume:

Aspirated blood volume per sample	1.4 ml in EDTA mode 1.6 ml in Citrate mode

StaRRsed Compact:

Mains voltage	100/240V	50-60Hz
Fuse (20 x 5 mm)	Slow blow 220V	2.5 Amp
	Slow blow 110V	5.0 Amp
Power consumption	Standby	60 VA
	Maximum	500 VA
Heat output	Standby	70 Watt
	Full operation	360 Watt
Interface	Serial male 9 pin sub-D	
	Parallel female 25 pin sub-D	

Barcode reader:

Barcode reader type	CCD.	
Reading capabilities	Most common barcode labels	
	Code39, ITF, Industrial 2 or 5, CodaBar,	
	EAN/UPC and CODE128.	

Compact overall dimensions:

Dimensions	Width	740 mm
	Height	770 mm
	Depth	400 mm
Total weight		45 kg
Min. table size	Width	800 mm
	Depth	600 mm

StaRRsed Compact environment:

Sound level	Less than 65 dBA
Environment temperature	18 - 28 ℃
Relative humidity	10-90%

Data storage:

Storage medium	Battery back-up memory
Storage capacity	Results and raw data of 256 samples

2.2. Accessories kit

The StaRRsed Compact comes with an accessories kit. For a complete list of the the contents of accessories kit, see ***Appendix - Article reference code for Compact*** (on page 190)

3. INSTALLATION

Before unpacking the StaRRsed Compact, we recommend that the packaging should be checked for damage. Any damage must be reported to the distributor.

Follow the next installation instruction steps.

3.1. Unpacking Compact system

1. Cut the binding of box 1 and lift the outside boxes from the pallet.
2. Remove the plastic bag from the StaRRsed Compact.
3. Unbolt the two transport screws holding the StaRRsed Compact to the pallet.
4. Lift the StaRRsed Compact from the pallet onto a table.
5. Take out the two transport screws holding the compressor down onto the instrument base plate. See attached document on the Compact.

3.2. Install at chosen location

Install the StaRRsed Compact in a location with the following specifications,

1. Avoid direct sunlight shining on the StaRRsed Compact.
2. Avoid droughts which may cause temperature changes.
3. Place the StaRRsed Compact on a **stable table**, with no nearby vibration.
4. Do not place in direct airflow of an air conditioning unit.
5. Leave a space of approximately 15 centimeters between the back side of the instrument and the wall to allow warm air to escape and to connect or run interface cables.
6. Level the instrument by using the three adjustable feet and the leveling-gauge, which is situated at the carousel.

3.2.1. Table size

Min. table size	Width	800 mm
	Depth	600 mm

3.3. Connecting up the instrument

Connecting the StaRRsed Compact and the printer

1. Check your local mains Voltage.
2. Check your socket has a good earth connection.
3. Check the voltage on the StaRRsed Compact identification plate and compare it with the main voltage. (Default setting 220 Volt AC)
4. Connect the mains power cord to the StaRRsed Compact.
5. Install printer. (See the printer manual for instructions.)
6. Connect the parallel printer cable between the printer and printer connector at the back of the StaRRsed Compact.

See **Appendix - Printer cable** (on page 193)

3.4. Ready for the first run

Make the Compact ready for the first run.

Connect and fill the supplied bottles (See Picture) with the prescribed liquids specified in the section Reagents preparation.

Tubing, wiring of the reagent bottles.

- Open the cover on the left and install the two peristaltic pump tubes.
- On the left peristaltic pump (Rinse) the thick silicon tube.
- Thin silicon tube on the right peristaltic pump (Saline). Insert the tube in the pinch valve next to the rinse bottle by pressing the tube in the clamp.
- The thick silicon tube on the left peristaltic pump (Rinse). Thin silicon tube on the right peristaltic pump (Saline).

Rinse- Saline and pinch valve tubes

See also work instructions ***WI-162 rinse tube replacement*** (on page 136) and ***WI-163 saline tube replacement*** (on page 137).

- Insert the tube in the pinch valve next to the rinse bottle by pressing the tube in the clamp.

Make up a bottle with a cleaning agent and run a fill and clean cycle to check for leaking pipettes. See ***Fill and clean procedure*** (on page 159).

3.5. Start-up the first time

Before using the StaRRsed Compact for the first time, the following items must be attended.

1. Check that the two vacuum pump transportation screws are removed.
2. Check the main power voltage (240V/110V).
3. Mains plug must be earthen.
4. Connect mains, switch on the Compact.
5. When applicable check paper quantity on the printer.
6. When applicable switch on the printer.
7. Set sample tube adapter adjustment.
8. Check the ***Liquid levels*** (on page 71) levels.
9. Set up the General settings.
    1. Check the ***Sample probe depth*** (on page 30) depending on sample tube length.
    2. Check the ***Pipette belt position*** (on page 30)
    3. Check the temperature sensor is Set room temperature.
10. ***Check barcode reader readability*** (on page 31) of the barcode reader.
11. ***Priming the fluid system*** (on page 31)
12. Leak check on the pipettes by run a fill and clean.
13. Start filling the carrousel with blood samples and check for leaking pipettes.

3.5.1. Barcode interface

The Barcode interface can handle two types of barcode readers,

- The Opticon (6 mil resolution).
- The Keyence (4 mil resolution).

If you are using labels with a higher density, contact your local distributor or agent.

The Barcode reader may be set to accept check digits, however this needs to be programmed by the distributor. Coda bar, Code 39, Code128, UPC, EAN and ITF 2 or 5 barcode types can be read with those barcode reader types.

To set-up the barcode readers to client specifications, use the set-up tools for the barcode readers. Detailed information can be found in Keyence Configuration manual MRN-011 or in Opticon Configuration manual MRN-015.

3.5.2. Use of the containers

Warning: Do not refill containers unless they are clean and empty.

1. Clean the empty container.
2. Flush each container first with hot water (80°C).
3. Use freshly prepared solutions.
4. Pre flush each container with its solution.

5. Add the additives and top-up the containers.
6. Stir the fresh prepared solution well. (Do not shake).

3.5.3. Waste container

The waste container will hold a maximum 2.5 liters of waste. The waste may be discharged into a drain or the container simply replaced by a new one.
As the Compact disinfects the waste, it may discharge into a drain/sink.

Disclaimer: Check your local environment rules about discharging the waste.

3.5.3.1. Waste line connection to central waste system

If the waste line is to be connected to a centralised waste collection system, the following requirements must be met:

1. Waste tube must not exceed 5 meters or 18 feet in length.
2. Drain height must not be higher than the original waste container inside the instrument.

Disclaimer: Check the specifications of the central waste system for rules about discharging the waste.

3.5.3.2. Replacing the waste container

1. Lift the left cover and pull the waste container forwards.
2. Unscrew the cap.
3. Place the new waste container and tighten the screw cap.
4. Lift the left cover and place the waste container back into the Compact.

Note: If you are re-cycling waste containers, make sure that they are bleached and rinsed thoroughly.

3.5.4. Cleaning solution

The cleaning agent needs to be prepared for a cleaning procedure which is used in level 4 maintenance.

1. Fill a container with hot 80°C de-ionised water
2. Add cleaning agent **(**QRR 010905**)** to the container.
3. Stir well. (Do not shake).

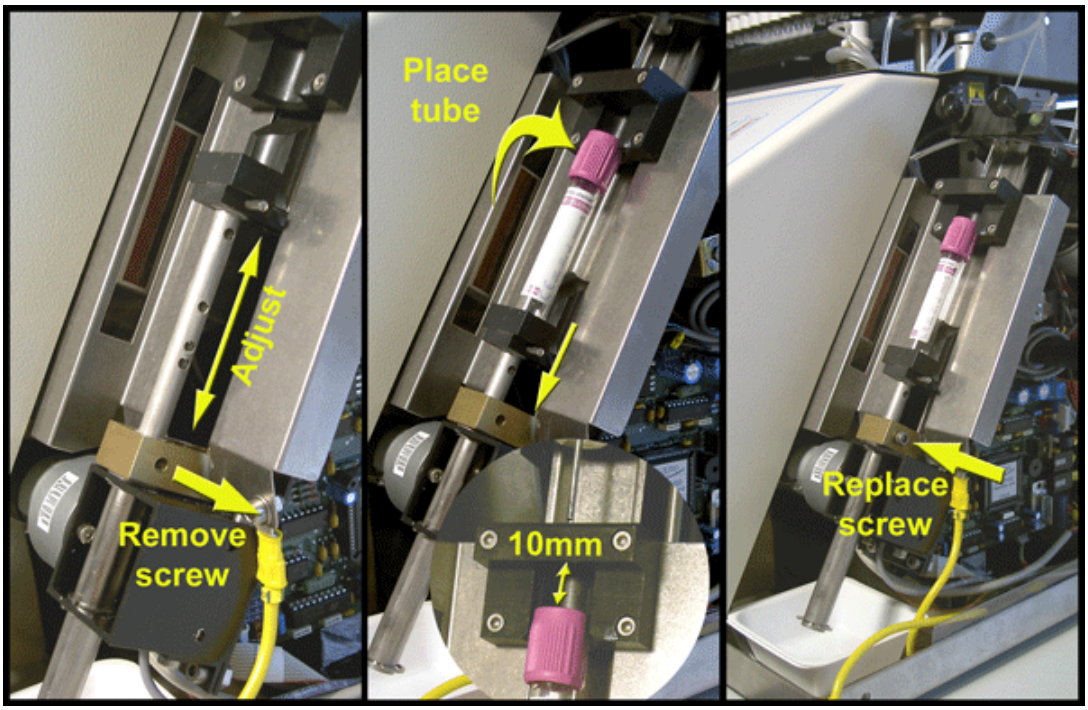
3.5.5. Set sample tube adapter adjustment

The Compact must be set to handle the correct tube sizes. Insert a sample tube in the sample tube adapter.
The sample tube cap must rest in the top black part of the sample tube adapter.
When a sample tube has been placed in the sample tube adapter, it should be free to move up and down and side to side.

Correct sample tube position:

Observe if the bottom and cap are correctly positioned, the cap must be in the top part of the tube adapter!

The sample tube must have about 5mm play in the sample tube adapter.



Exception:
Sarstedt tubes are positioned slightly different from other tubes. The thin part of the screw cap rests in the top of the sample tube adapter. The knurled part sits just below the black top of sample tube adapter.
The sample tube will be centered automatically when the sample tube adapter closes.
Only qualified service engineers may change the adapter adjustment.

3.5.6. General setting up

Check the general settings and select the required options;

1. EDTA mode (Default is ON) MENU 1-7.
2. Sample probe depth factory setting is 5 mm MENU 3-4.
3. Temperature correction (Default is ON) MENU 3-7.
4. 30 minutes (Default is OFF) MENU 5-8.
5. Display dilution (Default is OFF) MENU 6-3.

3.5.7. Sample probe depth

Sample probe depth is dependent on sample tube length. Use the **[ARROW]** keys and select (MENU 3-4) [SAMPLE PROBE DEPTH (MM)]**.** For each individual type of blood collection tube, the sample probe depth must be checked and set.

Example:

Measure the safe needle depth. The sample probe depth is usually slightly less than the maximum safety distance, enter this depth in millimeters. This will be the depth that the sample probe goes down into the sample tube.

- The safety depth distance is found to be 65 millimeters.
- Set needle depth in the software at 62 millimeters.

See also section Measuring maximum safe needle depth

Note: Setting the needle too close to the tube bottom may cause a fill time error. There should be approximately 2-millimeter clearance between the sample tube bottom and the tip of the sample probe.

3.5.8. Pipette belt position

Use the **[ARROW]** keys and select (MENU 4-4) [PIPETTE NUMBER AT RINSE POS.]**.** This function will show the current pipette number at the rinse position.

3.5.9. Set to room temperature

Use the **[ARROW]** keys and select (MENU 3-9) [ADJUST TEMP. SENSOR]**.** Enter the actual room temperature confirm with **[ENTER]**. The bottom line on the display shows the current setting.

The displayed value is the temperature according the build-in thermometer of the StaRRsed Compact.

1. Check the room temperature near the pipettes with a room thermometer.

2. Enter the measured temperature from the room thermometer as the current value for the temperature sensor.

3.5.10. Check barcode reader readability

Check barcode reading operation. Insert sample tube with barcode label in the sample tube adapter. Use the **[ARROW]** keys to select (MENU 4-0) [READ BARCODE]**.** This function will trigger the barcode reader. Normally the **[START]** key triggers the barcode reader, however for testing purposes this may be done manually. The label will be read and the patient ID will show on the display. In some cases, the barcode reader has to be programmed for particular types of bar code labels. The Distributor can set this if necessary.

3.5.11. Priming the fluid system

Use the **[ARROW]** keys and select Menu 2, select:

1. PRIME RINSE SOLUTION, activates the Rinse pump. Rinse solution must flow through the pipette.
2. PRIME SALINE, activates the Saline pump. Liquid must flush through the needle assembly.
3. PRIME DILUENT, activates the diluter prime cycle. Diluter system must be filled with diluent and free of air bubbles.
   - Diluter prime cycle is executed once. In order to fully prime the system it will be necessary to perform this step several times. (One cycle is 5 strokes of the Diluter)
4. PRIME DE-IONIZED WATER, activates the fill nozzle water valve. De-ionized water must flow through the tube connected to the fill nozzle cap.
5. PRIME DISINFECTANT, activates the disinfectant valve. Disinfectant must flow through the small tube connected to the pipette wash station.

When the StaRRsed Compact has been idle for more than eight hours, some reagents may have dropped from the tubes due to gravity. Prime all tubing before sampling with:

1. PRIME ALL UNITS
   All priming functions are sequentially performed one time.

3.6. Last step

Familiarise yourself with the Keyboard and how to navigate through the menu. See for detail information section ***Keyboard*** (on page 41).

4. STANDARD OPERATING PROCEDURES (S.O.P.)

In this section the following issues can be found:

- Basics of Bio safety
- S.O.P. for working with bio hazardous materials
- Safety warning
- StaRRsed Incident Report
- E.C. Declaration
- Labels and stickers on containers

4.1. Basics of Bio safety

Basic rules on bio safety in a laboratory;

- Wash hands after handling biological materials, removing gloves, or before leaving work area.
- Don't eat, drink, etc. in the work area.
- Never mouth pipette.
- Take extreme precautions when sharps must be used. Dispose sharps carefully and properly.
- Conduct procedures likely to create splashes, sprays, or aerosols within a biological safety cabinet that is certified annually.
- Decontaminate work surfaces at least daily.
- Decontaminate waste materials before disposal.
- Wear a BUTTONED lab coat to protect street clothes.
- Wear gloves when hands may contact potentially infectious materials, contaminated surfaces, or equipment.
- Wear eye/face protection if splashes or sprays are anticipated during work outside a biological safety cabinet.
- Transport materials outside of the laboratory using secondary containment and a cart. Avoid public areas during transport.
- Transfer materials to and from the MCG according to federal and international regulations.
- Be familiar with written instructions for laboratory procedures and proper responses to emergencies.
- Report spills, exposures, illnesses, and injuries immediately.

4.2. S.O.P. for working with bio hazardous materials

Purpose:

To inform and educate all engineers that work with biohazards
Effective Date: July 27, 2004

4.2.1. Facts and definitions:

Biological hazards are present in all human and animal tissues and body fluids.

The "normal" research activities carried out in a blood laboratory expose workers to human blood, urine, sweat, semen, saliva and muscle tissue.

For the purpose of assessing risk, we assume that all volunteers to our clinical studies are not normal healthy individuals, and take appropriate precautions.

We remain aware at all times that increased knowledge of disease transmission and occupational hazards may result in situations currently considered safe to be reclassified as having risk.

"Universal Precautions" describes a set of procedures for dealing with subjects based on the assumption that they are positive for blood borne pathogens. Other precautions are necessary to prevent exposure to potential respiratory diseases.

4.2.2. Medical requirements:

Routine personal medical assessments are advised at regular intervals (yearly) for all personal exposed to potential biohazard.
Immunisation for Hepatitis B is recommended for everyone who is taking blood samples or dealing with human blood or bodily fluids.

4.2.3. General laboratory practices:

The laboratory is a shared facility; it must be booked in advance with the Technician in Charge. All users must follow all Departmental Safety Guidelines and Bio safety Policy.
Each user is responsible to leave a clean, disinfected and tidy work place.
All biohazard waste must be properly disposed.

4.2.4. Specific laboratory practices and requirements:

Biohazard waste:

Dispose blood tubes into a biohazard sharps container.
Dispose sharps into a biohazard sharps container.
All other bio hazardous waste is to be deposited into a biohazard bag.
All bio hazardous waste is deposited into the Medical Waste Management (MWM) bin for pick up.

Decontamination procedures:

Routine: At the end of each experiment, or each day, disinfect lab benches and any equipment
Spills: Small spills of biohazard material should be treated by first covering them with an absorbent paper to avoid the formation of aerosols. Disinfect the spill by slowly pouring on a disinfecting solution working from the outside to the centre of the spill in a circular motion. Leave the spill long enough for disinfection to take place (check decontaminating instructions on the disinfectant container for time) and then carefully wipe up wearing gloves.
Pick up any glass using forceps.
Once all the material has been removed disinfect the area thoroughly.
Inform the Technician in Charge of the spill.

Food:

No food or beverages will be brought into or consumed inside a blood laboratory at any time.

Accident reporting:

All accidents and injuries must be reported within 24 hours to the technician in Charge, to the Departmental Joint Health and Safety Committee and to the Department of Environmental Health and Safety using an Incident Report from the main office or the Technician in Charge.

Laboratory access:

Access to the haematology laboratory is limited to persons who are directly involved with the testing equipment. Children are not permitted in the laboratory.

Personal protective equipment:

Laboratory and maintenance personnel are expected to use a laboratory coat while working in the blood laboratory.
We advice the use of non-canvas closed-toe shoes wherever there is a potential for foot injury from hazardous materials or from small physical objects.
Personal outer clothing should not be stored in the blood laboratory.
Lab coats worn in the blood laboratory should not be worn outside of the blood laboratory and should not be stored with personal outer clothing, to avoid transfer of contaminants.
Gloves are considered contaminated after ones wearing. Avoid contamination of work surfaces with gloves. Dispose of gloves into a biohazard container.
The use of eye protection is advised while processing samples.
Remove and properly dispose of gloves and wash hands before leaving the laboratory.

4.3. Safety warning

When there was an incident with the StaRRsed Compact which caused damage to the instrument, please notify your superior and your local equipment dealer before you continue using the instrument.

Example:

- A collision with a moving object or a person
- Something falling on the instrument
- Liquids spilling into the instrument

4.4. StaRRsed Incident Report

StaRRsed Incident Report

Environmental Health and Safety plan

Important - Complete this form within 24 hours of the incident and FAX to Mechatronics: +31 (0) 229 - 24 15 34					
Last Name:	First name:		Initial:	Company:	
Student – Visitor - Employee	Occupation at time of injury		Years exp. in this occupation		
Date of incident	20_ _-_ _-_ _	Time of day _ _-_ _	Date Reported	20_ _-_ _-_ _	Time of day _ _-_ _

Description of Incident	Type of incident	
State exactly the sequence of events leading to the incident; where it occurred; What the person was doing; the size, weight and type of equipment or materials involved; etc.	Incident involved results	☐
	Injury	☐
	First Aid Health Care [Medical Aid]	☐
	Other	☐

Names and addresses of witnesses:

Contributing Factors: What conditions contributed to the incident? Number the factors in order of importance.

Details of property damage if any:

Explanation of contributing factor[s]:

Corrective measures: Actions to prevent incident recurrence

Checkmark actions taken to prevent recurrence; More than one item may apply.

1 Reinstruct person involved	4 Improve personal protective equipment	7 Install guard or safety device	10 Inform all department supervision
2 Reassign person	5 Repair or replace equipment	8 Improve work procedure	11 Discipline persons involved
3 Order job safety analysis	6 Correct congested area	9 Check with manufacturer	1 2 Other (explain)

Describe actions taken to prevent recurrence:

Who is the attending physician?	
Occupational Health Services	
Organisation / Hospital	
Treatment of Injury	
Name of person reporting incident	Signature of person reporting incident

FS300 - StaRRsed Incident Report V 0.1 - August 2004

Issued by the Service Department of Mechatronics.

4.5. E.C. Declaration StaRRsed Compact

Mechatronics Manufacturing B.V.

De Corantijn 13
1689 AN ZWAAG
The Netherlands

P.O.Box 225
1620 AE HOORN
The Netherlands

Telephone : +31 (0)229 291129
Fax : +31 (0)229 241534
E-mail : purchase@mechatronics.nl
Internet : www.mechatronics.nl

V.A.T. number : NL 8048 22 979 B01
C.o.C. number : 36048153 (at Hoorn)

Banker : ABN AMRO
Account number : 5335.19.985
Swift-address : ABNANL2A
IBAN : NL04 ABNA 0533 5199 85

E.C. DECLARATION OF CONFORMITY

Herewith we declare that:

the Erythrocyte Sedimentation Rate Analyser:

StaRRsed Compact

- Is in conformity with the requirements of the following EC directives:

  98 / 79 / EC **IVD devices**
  2006 / 42 / EC **Machinery**

- The following harmonized standards have been applied:

EN 12100-1,	Safety of machinery - Part 1: Basic terminology, methodology
EN 12100-2,	Safety of machinery - Part 2: Technical principles
EN 61010-1,	Safety requirements for electr. equipm. for meas., control, and lab. use - General requirements
EN 61010-2-101,	Safety requirements for electr. equipm. for meas., control, and lab. use - Particular requirements for in vitro diagnostic (IVD) medical equipment
EN 591,	Instructions for use for in vitro diagnostic instruments for professional use
EN 980,	Symbols for use in the labelling of medical devices
EN ISO 14971,	Medical devices - Application of risk management to medical devices
EN ISO 13485,	Medical devices - Quality management systems - Requirements for regulatory purposes

The CE mark was applied for the first time on this instrument model in 1998.

Zwaag, The Netherlands
March 13, 2013

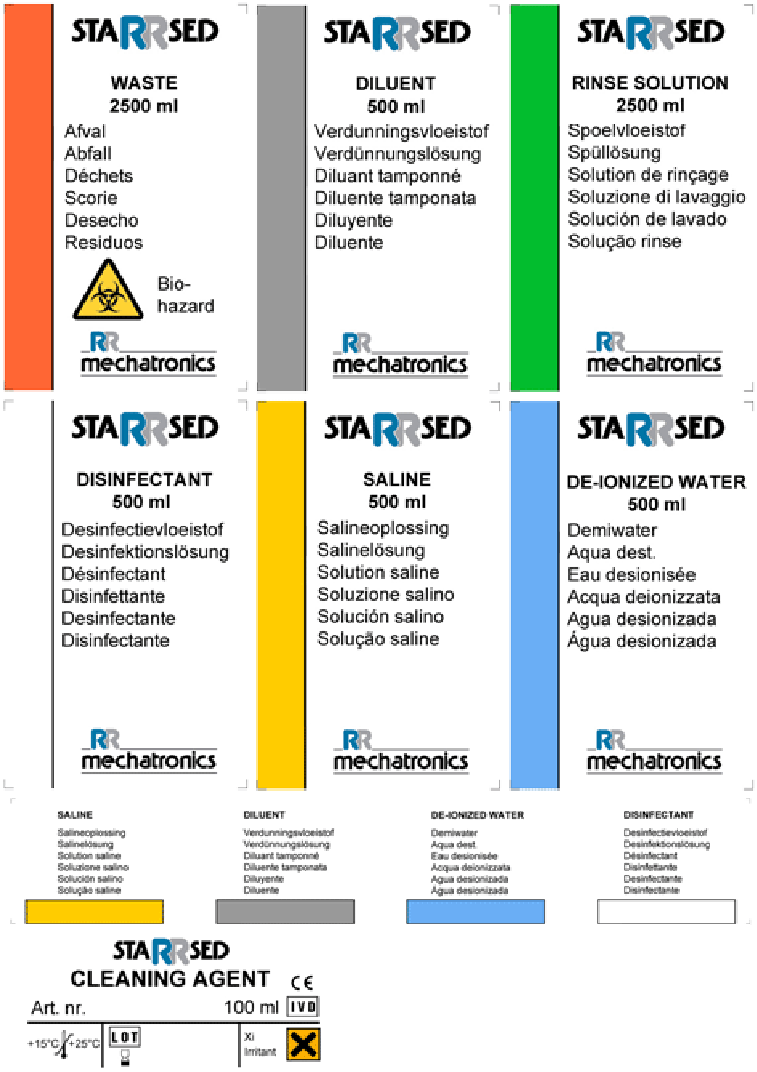
Mechatronics Instruments BV
De Corantijn 13
1689 AN ZWAAG
The Netherlands
www.mechatronics.nl

J. Nowee
Director Sales & Marketing
Mechatronics Manufacturing BV

Conditions: By the ORGALIME GENERAL CONDITIONS S2012 of March 2012.
Any other conditions are herewith explicitly rejected by us.

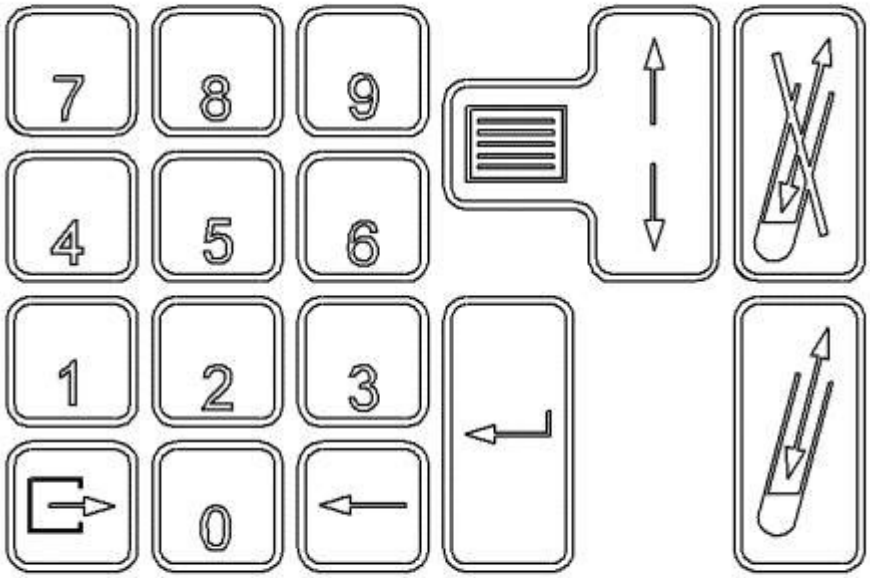
4.6. Labels and stickers on containers

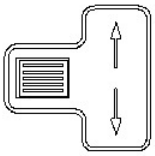
4.6.1. Stickers for the onboard reagents bottles



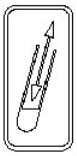
4.6.2. Stickers of the reagents containers

5. KEYBOARD

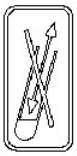




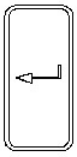
Menu and arrow keys



Start fill key



Stop fill key



Enter key

Backspace

Escape key

5.1. Navigating through the menus items

The main menu is displayed during operation. To access all the menus on the screen choose the required number on the display and press the return key.
To access other menus use the scroll key with the arrow.
The default settings in the different menus are printed in Bold

Menu 1*	Sampling sequence
Menu 2	The fluid system
Menu 3	Timing and language
Menu 4	Barcode reader, measure unit and pipette position
Menu 5	RS232 communications.
Menu 6*	Error Handling
Menu 7*	Service and testing *
Menu 8*	Empty in the Compact stand alone version
Menu 9	Solenoid valves and valves actuators *
Menu 0	Pumps and vacuum pump *

* Is not explained in this manual

5.1.1. Navigating the keyboard

The legend is:

[BOLD TEXT] is a text line in the display
(MENU 2-8) is menu 2 function 8
BOLD TEXT is the default setting
[ESC] is the key function
< NOT FILLED > is information on the LCD screen

Easy accessible keypad, light key pressure due to piezo technology.
The StaRRsed Compact has a menu-controlled operating system, each menu can be selected by pressing the **[MENU]** key first (main-menu) and scroll using the **[ARROW]** key. Functions are displayed on the LCD screen.

When the **[START FILL]** key is pressed the fill sequence starts.
When the **[STOP FILL]** key is pressed the fill sequence stops.

5.2. Display

In addition to showing the various functions the LCD screen may also show <ERROR> messages and system information.

5.3. Version number

From version number 1.64, additional information is added to the version indication on a **Stand-alone Compact**.
The version indication on the display includes a single alpha character. This character indicates the serial output format:

A. Standard Compact serial output. (***Appendix - String format for StaRRsed*** (on page 213))

B. ***Sedimatic 15*** (on page 231) serial output.

C. ***Sedimatic 100*** (on page 227) serial output.

D. ***Vesmatic*** (on page 233) serial output.

E. ***Sysmex R-3500*** (on page 223) serial output.

F. ***MECHATRONICS-02*** (on page 217) serial output.

5.4. Menu structure Compact stand alone

Function Key table for the User for Software version >1.68

	Menu 1
1	RUN MODE
2	Not in use
3	STATUS PATIENT
4	STATUS POSITION
5	PRINT DATA BUFFER
6	SEND DATA BUFFER TO HOST
7	EDTA MODE (ON/OFF)
8	ACCEPT ERROR SIGNAL
9	DISPLAY ERROR LIST
0	PRINT HEADER

	Menu 2
1	PRIME RINSE SOLUTION
2	PRIME SALINE
3	PRIME DILUENT
4	PRIME DE-IONIZED WATER
5	PRIME DISINFECTANT
6	WASH EACH PIPETTE (ON/OFF)
7	WASH ONLY SAMPLE PIPETTES (ON/OFF)
8	WASH ALL PIPETTES (ON/OFF)
9	FILL & CLEAN ALL
0	PRIME ALL UNITS

	Menu 3
1	ESR SEDIMENTATION TIME (MIN)
2	PIPETTE WASH TIME
3	PIPETTE DRY TIME (SEC.)
4	SAMPLE PROBE DEPTH (MM)
5	SET SYSTEM TIME
6	SET SYSTEM DATE
7	TEMP CORR [ON/OFF]
8	SET MANUAL ASPECT CODE
9	ADJUST TEMP. SENSOR
0	SELECT LANGUAGE

	Menu 4
1	MEASURE
2	TURN ONE POSITION
3	TURN TO POSITION (ESC)
4	PIPETTE NUMBER AT RINSE POS.
5	MEAS/FILL/TEMP SENSOR CHECK
6	DILUTER START SENSOR CHECK
7	FLOW SENSOR CHECK
8	PRINT SETTINGS
9	BAND POSITION <-- !!!
0	READ BARCODE

	Menu 5
1	SET BAUDRATE
2	Not in use
3	Not in use
4	RESULTS AT LIMIT ERROR (ON/OFF)
5	CHECKSUM (ON/OFF)
6	ACK/NACK (ON/OFF)
7	30 MIN. OUTPUT (ON/OFF)
8	30 MIN. METHOD (ON/OFF)
9	PRINTER (ON/OFF)
0	Not in use

	Menu 6
1	CLEAR FATAL ERROR
2	REPEATED SAMPLE SEQ.(ON/OFF)
3	DISPLAY DILUTION (ON/OFF)
4	DILUTION ERR. 0.... 25%
5	Not in use
6	Not in use
7	DELETE PIPETTE DATA
8	DELETE HISTORICAL DATA
9	SHUT DOWN PROCEDURE (ESC)
0	PASSWORD

	Menu 7 *
1	RAW DATA => PRINTER/RS232
2	PRINT RAW MEASURE DATA (ON/OFF)
3	DILUTION ADJUST 60....140%
4	ADRC (ON/OFF)
5	PIPETTE FLOW TEST
6	SERVICE (S) & SAMPLE (M) COUNTER
7	CLEAR SERVICE COUNTER
8	CLEAR ERROR LOG
9	QUICK BELT POS. CHECK
0	TYPE OF BARCODE READER

	Menu 8
1	Not in use
2	Not in use
3	Not in use
4	Not in use
5	Not in use
6	Not in use
7	Not in use
8	Not in use
9	Not in use
0	Not in use

	Menu 9 *
1	SAMPLE PROBE UP / DOWN
2	SAMPLE TUBE HOLDER UP/DOWN
3	FILL NOZZLE UP/DOWN
4	VALVE OUTER NEEDLE ON/OFF
5	RINSE NOZZLE UP/DOWN
6	RINSE ACTUATOR ON/OFF
7	FILL ACTUATOR ON/OFF
8	SAMPLE CONTROL SOLENOID ON/OFF
9	V-VALVE WASH SECTION ON/OFF
0	V-VALVE FILL SECTION ON/OFF

	Menu 10 *
1	VACUUM PUMP ON/OFF
2	WASTE PUMP ON/OFF
3	SALINE PUMP ON/OFF
4	RINSE PUMP ON/OFF
5	SET TUBE NUMBER (RINSE POS)
6	PIPETTE NUMBER AT RINSE POS.
7	Not in use
8	Not in use
9	DIAGNOSTICS MOTOR CURRENT
0	ALL PUMPS OFF

* Is not explained in this manual

5.4.1. Menu 1

This menu has all the instructions related to the sampling sequence.

	MENU 1
1	RUN MODE
2	Not in use
3	STATUS PATIENT
4	STATUS POSITION
5	PRINT DATA BUFFER
6	SEND DATA BUFFER TO HOST
7	EDTA MODE (ON/OFF)
8	ACCEPT ERROR SIGNAL
9	DISPLAY ERROR LIST
0	PRINT HEADER

1. [RUN MODE]
   The screen changes to a different layout when switched to fill sequence.
   Insert a sample tube in the tube adapter with barcode label to the left and press **[START FILL]**.
   Barcode will read and sampling sequence will take place.
   For tubes without a barcode ID, the patient ID number must be keyed in. Press **[START FILL]** and aspiration sequence will start.
   Press the **[ESC]** key or the **[MENU]** key to return to the main menu.
   Pressing the **[STOP FILL]** key interrupts the aspiration.

2. Not in use

3. [STATUS PATIENT]
   Select function, type the patient ID number, and press the **[ENTER]** key.
   Patient ID, pipette position and remaining ESR time will be displayed on the LCD screen. (ttg= means time to go).

   Insert the sample tube in the tube adapter. Press the **[START FILL]** key. The barcode will read and the information will be displayed on the LCD screen.

   If the status is asked during the ESR time, the information displayed is Patient ID, pipette position and remaining ESR time.
   If the status is asked after the ESR has been measured the information displayed is Patient ID, ESR60=10, ERROR=0

   The codes are defined as follows:
   ESR60= 1 to 140 mm is the length of the plasma found.
   ESR60= 0 a good result was not found during the measure, the error number is given as Error=X. The error codes are:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.
3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution

If the data is on the display, the **[ARROW]** keys have a special function.
The **[ARROW UP]** key will print data.
The **[ARROW DOWN]** key will send data to the RS 232 port.
Any other key will end this function.

4. [STATUS POSITION]
Select function, type the pipette number, and press the **[ENTER]** key.
Patient ID, pipette position and remaining ESR time will be displayed on the LCD screen. (ttg= means time to go.)
After the rinse sequences the message will be < NOT FILLED >

5. [PRINT DATA BUFFER]
The sample results are stored in a battery back-up memory.The maximum storage capacity is 256, then the 'first in' 'first out' rule applies. These results may be printed at any time using this function.
Select function and confirm with **[ENTER]**.

6. [SEND DATA BUFFER TO HOST]
Sending only the data buffer to the host computer and not to the local printer.

7. [EDTA MODE ON/OFF]
   Select fill mode, EDTA or CITRATE.
   Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.
   This setting is protected and can only be changed when Service mode is active.

8. [ACCEPT ERROR SIGNAL]
   This function will suspend the Error buzzer for a period of 5 minutes.
   Error message stays on the LCD screen.

9. [DISPLAY ERROR LIST]
   This function will display the last 15 errors of the instrument.
   The display is refreshed by the function first in first out.
   If no errors are displayed the last clear error time and date is shown in the display.
   "HIT ANY KEY" returns to normal menu display.

10. [PRINT HEADER] (Note: 0 is displayed)
    Send Header includes date and time to the printer. Select function and confirm with **[ENTER]**.

5.4.2. Menu 2

This menu has all the functions related to the fluid system.

	MENU 2
1	PRIME RINSE SOLUTION
2	PRIME SALINE
3	PRIME DILUENT
4	PRIME DE-IONIZED WATER
5	PRIME DISINFECTANT
6	WASH EACH PIPETTE (ON/OFF)
7	WASH ONLY SAMPLE PIPETTES (ON/OFF)
8	WASH ALL PIPETTES (ON/OFF)
9	FILL & CLEAN ALL
0	PRIME ALL UNITS

.

After each reagent change, the fluid system must be primed to fill the relevant tubes with reagent and remove air. This is also part of the daily start-up. Use the applicable button to perform the automatic priming cycle for this reagent:

1. PRIME RINSE SOLUTION:
   After each measurement, the pipettes are washed and dried automatically.
   Select this function and the prime rinse is carried out automatically.

2. PRIME SALINE:
   After each aspiration, the outer needle, sample probe and fill nozzle are washed with saline.
   Select this function and the prime saline is carried out automatically.

3. PRIME DILUENT:
   The Diluter prime cycle is 5 strokes of the syringe.
   Select this function and the prime diluter is carried out automatically.

4. PRIME DE-IONIZED WATER:
   After each aspiration, the fill nozzle is flushed with de-ionized water.
   The fill-nozzle will contaminate during normal operation. Select this function and the fill nozzle flush is carried out automatically.

5. PRIME DISINFECTANT:
   During a pipette rinse cycle, a small amount of disinfectant is flushed around the bottom of the pipette and into the waste system.
   Select this function and the prime disinfectant is carried out automatically.

6. WASH EACH PIPETTE (ON/OFF):
   When pipette belt turns one position at a time, each pipette will be rinsed and dried. Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.

7. WASH ONLY SAMPLE PIPETTES (ON/OFF):
   Only the pipettes with samples are washed and dried automatically.
   Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.
   Warning on the display <PIPETTE DATA WILL BE LOST>

Note: Before executing this function, ensure that the pipette belt is free of samples. If there are any remaining samples, they will be washed away and will not be read.

---

8. WASH ALL PIPETTES (ON/OFF):
   All pipettes on the pipette belt are washed and dried automatically.
   Use the **[ARROW]** keys to toggle and press **[ENTER]** to select. Warning on the display <PIPETTE DATA WILL BE LOST>.
   The Wash all pipettes function is interruptible by the **[ESC]** key. This will also be displayed.

Note: Before executing this function, ensure that the pipette belt is free of samples. If there are any remaining samples, they will be washed away and will not be read. Activate (MENU 2- 8) and **[ARROW DOWN]** again will stops this function.

---

9. FILL & CLEAN ALL:
   Automatic fill and clean function, each individual pipette on pipette belt will be filled with cleaning solution. Use the **[ARROW]** keys to toggle and press **[ENTER]** to select. This fill and clean cycle takes about 90 minutes. Fill and clean function is part of the monthly maintenance procedure.
   Warning on the display <PIPETTE DATA WILL BE LOST>

Note: The clock in the display is not updated during filling the pipettes.

---

10. PRIME ALL UNITS: (Note: 0 is displayed)
   This function will automatically perform all prime sequences (menu items 1 to 5) subsequently. When the StaRRsed Compact has been idle for more than eight hours, some reagents may have dropped from the tubes due to gravity.
   Confirm with **[ENTER]**.

Note: The system must be checked for air bubbles.

5.4.3. Menu 3

This menu has all the functions related to the Timing and language.

	MENU 3
1	ESR SEDIMENTATION TIME (MIN)
2	PIPETTE WASH TIME
3	PIPETTE DRY TIME (SEC.)
4	SAMPLE PROBE DEPTH (MM)
5	SET SYSTEM TIME
6	SET SYSTEM DATE
7	TEMP CORR [ON/OFF]
8	SET MANUAL ASPECT CODE
9	ADJUST TEMP. SENSOR
0	Not in use

1. [ESR SEDIMENTATION TIME (MIN)]
Default sedimentation time is 60 minutes, however this time can only be changed when the instrument is in Service mode. This value cannot be changed in the run mode.. In the Run mode a warning is displayed <NOT ALLOWED NOW!>
Go to (MENU 6-10) [PASSWORD] enter the password.
Enter a new ESR sedimentation time and press the **[ENTER]** key.
Press **[ESC]** key to abort entry.
This setting is protected and can only be changed when Service mode is active.

Note: The Westergren method stipulates a **60**-minute sedimentation time. The bottom line on the LCD screen shows the current setting. The changed value will be used only if the instrument is operated in the Service mode. When the instrument is in the Running mode the default value 60 minute is used.

---

2. [PIPETTE WASH TIME] (Default **7** sec)
The pipette wash time is set to **7** seconds, however this time can be changed if the instrument is in the Service mode. This value cannot be changed in the run mode. In the Run mode a warning is displayed <NOT ALLOWED NOW!>
Go to (MENU 6-10) [PASSWORD] enter the password.
Enter a new pipette wash time and press the **[ENTER]** key.
Press **[ESC]** key to abort entry.
This setting is protected and can only be changed when Service mode is active.

Note: Changing the pipette wash time has the following consequences.

- Making the pipette wash time longer will slow down the Compact throughput.

- Making the pipette wash time shorter may cause the pipettes to be insufficiently cleaned after the wash cycle and affect the sample results!
- The bottom line on the LCD screen shows the current setting.
- The changed value will be used only if the instrument is operated in the Service mode. When the instrument is in the Running mode the default value 7 sec is used.

3. [PIPETTE DRY TIME (SEC.)] (Default **9** sec)
   The pipette dry time is set to **5** seconds, however this time can be changed if the instrument is in the Service mode. This value cannot be changed in the run mode. In the Run mode a warning is displayed <NOT ALLOWED NOW!>. Go to (MENU 6-10) [PASSWORD] enter the password. Enter a new pipette dry time and press the **[ENTER]** key. Press **[ESC]** key to abort entry. This setting is protected and can only be changed when Service mode is active.

Note: Changing the pipette dry time has the following consequences.

- Making the pipette dry time longer will slow down the Compact throughput.
- Making the pipette dry time shorter may cause the pipettes to be dried insufficiently after the wash cycle, affecting the sample results!
- The bottom line on the LCD screen shows the current setting.
- The changed value will be used only if the instrument is running in the Service mode. When the instrument is in the Running mode the default value 9 sec is used.

4. [SAMPLE PROBE DEPTH (MM)]
   Can be changed if the instrument is in the Service mode. This value cannot be changed in the run mode.
   In the run mode a warning is displayed <NOT ALLOWED NOW!>
   Go to (MENU 6-10) [PASSWORD] enter the password.

   For each manufacturers type of blood collection tube the sample probe depth must be checked and set. Measure overall sample tube length. The sample probe depth is usually slightly less than the overall length of the tube, enter this depth in millimeters. This will be the depth that the sample probe goes down into the sample tube.

   Example:
   Tube length 75 millimeters.
   Set probe to 73 millimeters.
   This setting is protected and can only be changed when Service mode is active.

Note: Setting the needle too close to the tube bottom may cause a fill time error. There should be approximately 2-millimeter clearance between the sample tube bottom and sample probe. The bottom line on the LCD screen shows the current setting.

5. [SET SYSTEM TIME]
   Compact system time.
   System time can only be changed if the pipette belt is completely empty.
   Set time HH:MM:Confirm with the **[ENTER]** key.

Note: Changing the system time during the sedimentation time is not allowed, a warning is displayed <NOT ALLOWED NOW!>

6. [SET SYSTEM DATE]
   Compact system date.
   System date can only be changed if the pipette belt is completely empty.
   Set date DD-MM-YYYY: Confirm with the **[ENTER]** key.

Note: Changing the system date during the sedimentation time is not allowed, a warning is displayed <NOT ALLOWED NOW!>

7. [TEMP CORR [ON/OFF]]
   Default setting is temperature correction on, meaning that two result columns are printed.
   Column **esr** = result as measured.
   Column **tc** = temperature corrected result.
   This setting is protected and can only be changed when Service mode is active.

8. [SET MANUAL ASPECT CODE]
   The manual aspect code is a one or two digit numerical code.
   The number will be printed together with the normal aspect code. The manual aspect code can be found under the row "**ma** (on page 73)" on the printout.
   See section ***Reporting*** (on page 73)

9. [ADJUST TEMP. SENSOR]
   Enter the actual room temperature: Confirm with the **[ENTER]** key. The bottom line on the LCD screen shows the current setting.

10. [Not in use]

5.4.4. Menu 4

This menu has all the functions related to the Barcode reader, measure unit and pipette position.

	MENU 4
1	MEASURE
2	TURN ONE POSITION
3	TURN TO POSITION (ESC)
4	PIPETTE NUMBER AT RINSE POS.
5	MEAS/FILL/TEMP SENSOR CHECK
6	DILUTER START SENSOR CHECK
7	FLOW SENSOR CHECK
8	PRINT SETTINGS
9	BAND POSITION <-- !!!
0	READ BARCODE

1. [MEASURE]
   To overwrite the automatic measure function and manually measure sedimentation. Pipette at the measure position will be read and result printed.

2. [TURN ONE POSITION]
   Pipette belt moves one position.

3. [TURN TO POSITION (ESC)]
   Enter a pipette number; to move the pipette to the stop position, which is always the wash/rinse station
   Press **[ESC]** key to abort entry.

4. [PIPETTE NUMBER AT RINSE POS.]
   This function will show the current pipette number at the rinse position.

5. [MEAS/FILL/TEMP SENSOR CHECK]
   LCD screen shows the sensor status.
   Values must be within the following limits:
   Measure sensor MS 40..**50**..60
   Fill stop sensor FS 90..**140**..165
   Temperature sensor TS [Room temperature]

Note: Clean sensors first before executing this function ***WI-172 Cleaning Measure sensor*** (on page 141).

6. [DILUTER START SENSOR CHECK]
   In EDTA mode, if the diluter does not start during the aspiration, the status of this sensor must be checked.
   Diluter start sensor 400-700. If incorrect contact the distributor.

7. [FLOW SENSOR CHECK]
   During the aspiration sequence the airflow is monitored. The vacuum unit switches on and the following values are shown on the LCD screen:
   Flow: 0925.....1020 Abs: 0320....0360 Offset: 0045...0055

8. [PRINT SETTINGS]
   Print settings from the Compact to printer.

   The following settings are printed;

   M1-7 EDTA MODE (ON/OFF): ON

   M3-1 ESR SEDIMENTATION TIME (MIN): 60

   M3-2 PIPETTE WASH TIME: 7

   M3-3 PIPETTE DRY TIME (SEC.): 9

   M3-4 SAMPLE PROBE DEPTH (MM): 5

   M3-7 TEMP CORR [ON/OFF] : ON

   M5-1 SET BAUDRATE: 2400

   M5-4 RESULTS AT LIMIT ERROR (ON/OFF): ON

   M5-5 CHECKSUM (ON/OFF): OFF

   M5-6 ACK/NACK (ON/OFF): OFF

   M5-7 30 MIN. OUTPUT (ON/OFF): OFF

   M5-8 30 MIN. METHOD (ON/OFF): OFF

   M6-2 REPEATED SAMPLE SEQ.(ON/OFF): OFF

   M6-4 DILUTION ERR. 0.... 25%: 20

   M7-0 TYPE OF BARCODE READER: Opticon

   M7-3 DILUTION ADJUST 60....140%: 100

   M7-4 ADRC (ON/OFF): OFF

9. [BAND POSITION <-- !!!]
   With this function the carrousel can be moved one position backwards.

Warning: Only for trained personal. When this function is used, the built in safety functions are not active.

10. [READ BARCODE] (Note: 0 is displayed)
    This function will trigger the barcode reader. Label ID number will be seen on the LCD display. Normally the **[START FILL]** key triggers the barcode reader key, however for checking bar code labels, this may be used.

5.4.5. Menu 5

This menu has all the functions related to RS232 communications.

	MENU 5
1	SET BAUDRATE
2	Not in use
3	Not in use
4	RESULTS AT LIMIT ERROR (ON/OFF)
5	CHECKSUM (ON/OFF)
6	ACK/NACK (ON/OFF)
7	30 MIN. OUTPUT (ON/OFF)
8	30 MIN. METHOD (ON/OFF)
9	PRINTER (ON/OFF)
0	Not in use

.

1. [SET BAUDRATE]
   Use the **[ARROW]** keys to select and the **[ENTER]** key to confirm. Baud rate selection: 1200, 2400, 4800, 9600 and 19200 (**8-N-1**).
   Compact default communication settings:
   Baud rate **2400** (**8-N-1**)

2. [Not in use]

3. [Not in use]

4. [RESULTS AT LIMIT ERROR (ON/OFF)]
   For the ESR time, Dilution errors and Column height result at limit can be set for transmitting data OFF or ON.
   RESULTS AT LIMIT ERROR is ON: transmit data to the output.
   RESULTS AT LIMIT ERROR is OFF: transmit no data to the output when the ESR results are outside the selected range.

5. [CHECKSUM (ON/OFF)]
   Checksum output string: 1 byte checksum = 256 - (modulo 256, ASCII string sum).
   Use the **[ARROW]** keys to select and the **[ENTER]** key to confirm.

6. [ACK/NACK (ON/OFF)]

Allows data from Compact to be sent again to the host computer if there is an error in transmission.
Use the **[ARROW]** keys to select and the **[ENTER]** key to confirm. If this function is active, a confirmation is expected from the host computer after serial transmission. After receiving a "**Nack**" StaRRsed sends the data again (maximum two times). An "**Ack**" will let the StaRRsed carry on immediately. If "**Ack**/**Nack**" is not received, the StaRRsed carries on after a pause of 1 second between the transitions. "**ACK**"= Acknowledge, "**NACK**"= Not acknowledge.

Ack/ **Nack**
The **Ack** / **Nack** modus can be useful if transmission lines are extremely busy. A Nack (not acknowledge) character may be sent by the Host if the data string is incomplete or the check sum is incorrect. The StaRRsed will transmit the data string again.
If an Ack (acknowledge) character is sent by the Host the next string will be transmitted
Ack character = Hex 6, decimal 6 or Ctrl F
Nack character = Hex 15, decimal 21 or Ctrl U.

7. [30 MINUTE OUTPUT ON/OFF]

Special prints out, for detailed information see Appendix String format for Compact and StaRRsed and Reporting 60-minute mode. Use the **[ARROW]** keys to select and the **[ENTER]** key to confirm.
This setting is protected and can only be changed when Service mode is active.

Note: Changing the output during the sedimentation time is not allowed, a warning is displayed <NOT ALLOWED NOW!>

---

8. [30 MINUTE METHOD ON/OFF]

The Compact performs the ESR after 30 minutes (instead of 60 minutes) and converts this value to a 60 minute Westergren standard. The method has the advantage that sample results become available after 30 minutes to the operator, however this method is not according to the Westergren method and results may deviate from the original Westergren results.

If this method is switched ON, the ESR time automatically switches to 30 minutes and cannot be changed manually. If this method is switched OFF, the ESR time automatically switches to 60 minutes.

The actual measured 30-minute result will only be printed and sent to the host computer if (MENU 5-7) [30 MINUTE OUTPUT ON/OFF] is set to 'ON' as well. The converted Westergren standard (60 minute result) is sent to the printer and the host computer.

This setting is protected and can only be changed when Service mode is active.

Note: It is not recommended to use the 30-minute method on pre-citrated sample tubes.

Note: Changing the method during the ESR time is not allowed, a warning is displayed <NOT ALLOWED NOW!>

---

9. [PRINTER (ON/OFF)]

Toggle function, enable printer or disable printer.
Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.
Printer status is displayed on the LCD screen.

10. Not in use (Note: 0 is displayed)

5.4.6. Menu 6

This menu has all the functions related to Error Handling.

	MENU 6
1	CLEAR FATAL ERROR
2	REPEATED SAMPLE SEQ.(ON/OFF)
3	DISPLAY DILUTION (ON/OFF)
4	DILUTION ERR. 0.... 25%
5	Not in use
6	Not in use
7	DELETE PIPETTE DATA
8	DELETE HISTORICAL DATA
9	SHUT DOWN PROCEDURE (ESC)
0	PASSWORD

.

1. [CLEAR FATAL ERROR]
   If a <WASTE FULL ERROR> occurs the Compact will stop all functions, the Waste container must be emptied or replaced.
   In order to resume the process this function must be used.
   Confirm with the **[ENTER]** key.

2. [REPEATED SAMPLE SEQ.(ON/OFF)]
   Default setting is off.
   This function only operates during [RUN MODE].
   Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.
   Function ON; place sample tube with barcode in the sample tube adapter and press start fill-sequence. As soon as the aspiration has finished, replace the sample tube and the next sample will be identified and aspirated.
   This continues until the same sample ID has been read twice or no new sample tubes are placed on the instrument. Ensure that the sample tubes are placed correctly in the sample tube adapter. With this function active, there is a risk that the sample tube adapter can close, even when a sample tube has not been placed correctly!

3. [DISPLAY DILUTION (ON/OFF)]
   This function only works during the [RUN MODE].
   Use the **[ARROW]** keys to toggle and press **[ENTER]** to select.
   This function shows the dilution rate after each aspiration, the normal rate must be between 95%...105%.

4. [DILUTION ERR. 0.... 25%]
   Dilution Error deviation report. If a dilution error occurs during the aspiration sequence, an audible alarm sounds and the deviation value will be shown on the LCD screen. When the measure unit has evaluated the sample, the deviation value will be printed after the text "EDTA"

   Example: At the end of the print out, EDTA 085 is shown, indicating that this sample had only an 85% dilution.

5. [Not in use]

6. [Not in use]

7. [DELETE PIPETTE DATA]
   This function will erase all pipette data. Make sure that there are no samples on the pipette belt.
   Confirm with the **[ENTER]** key.

8. [DELETE HISTORICAL DATA]
   This function will erase all preset pipette data and clean the historical buffer. Make sure that there are no samples on the pipette belt.
   Confirm with the **[ENTER]** key.

9. [SHUT DOWN PROCEDURE (ESC)]
   All pipettes will be washed once and needle, fill-nozzle and wash station are primed.
   Confirm with the **[ENTER]** key.
   The Shutdown function is interruptible by the **[ESC]** key. This will also be displayed.

10. [PASSWORD] (Note: 0 is displayed)
    Password is needed to open the service menus 7 to 10.
    Password is 3964. Press the **[ENTER]** key.

Note: If the service mode is active <- SERVICE MODE -> is flashing in the Compact display.

5.4.7. Menu 7

*** Warning this is the service program ***
This menu has all the functions related to Service and testing.

	MENU 7
1	RAW DATA => PRINTER/RS232
2	PRINT RAW MEASURE DATA (ON/OFF)
3	DILUTION ADJUST 60....140%
4	ADRC (ON/OFF)
5	PIPETTE FLOW TEST
6	SERVICE (S) & SAMPLE (M) COUNTER
7	CLEAR SERVICE COUNTER
8	CLEAR ERROR LOG
9	QUICK BELT POS. CHECK
0	TYPE OF BARCODE READER

.

1 [RAW DATA => PRINTER/RS232]
Default setting is send to printer.
Sends measure values from the measure head to printer or to RS232 output.
Use the **[ARROW]** key to select printer or RS232
Confirm with the **[ENTER]** key.

Note: This function delays the Compact and should not be used during normal operation.

2. [PRINT RAW MEASURE DATA (ON/OFF)]
Prints all measured values from the measure head to the printer.

3. [DILUTION ADJUST 60....140%]
Adjusting the dilution rate, select Menu 6-3 and set the display dilution function to on. Run a number of sample tubes filled with water and note the dilution rate, which is shown on the LCD screen.
By entering the percentage deviation, a correction can be established.

Example:
The average dilution rate is 92%, enter 108 in order to correct to a 100% dilution rate.
If no input is given, a warning <OUT OF RANGE> is displayed.

4. [ADRC (ON/OFF)]

The Automatic Dilution Rate Control is by default setting OFF
Feature to automatically make a correction to the dilution rate if set to ON.

This mode checks the dilution rate and if the dilution rate tends to get to low or to high, it automatically makes a correction to the (manual) “dilution adjust” setting (menu 7-3). Long-term instability or long term changes will be corrected in this way. The system “looks” to the mean average of the 32 last dilutions to estimate the corrections on the syringe speed calculations.

If the setting in (MENU 7-4) [ADRC (ON/OFF)] is set to **OFF**, the system works with the number what is set in MENU 7-3.

Instructions how to set up the dilution

- Set in (MENU 7-4) [ADRC (ON/OFF)] the ADFC OFF
- Set in (MENU 6-3) [DISPLAY DILUTION (ON/OFF)] the display dilution ON.
- Run a few representative fresh samples of the day with the display dilution rate set to ON.
- Run a number of sample tubes with blood and note the dilution rate, which is shown on the LCD screen. By entering the percentage deviation, a correction value can be made.

Example: If the average dilution rate is 92%, enter 108 in order to correct to a 100% dilution rate. If no input is given, a warning <Out of range> is displayed.

Note: Do not use samples that are from yesterday, the software will not settle properly.

- Set the found average dilution rate in (MENU 7-3) [DILUTION ADJUST 60....140%].
- Run more samples, to inspect the dilution rate again.
- If the dilution rates are within expectation continue to the following steps.
- Set in (MENU 7-4) [ADRC (ON/OFF)] the ADFC ON.
- Run a few more samples, to inspect the dilution rate again.
- Set in (MENU 6-3) [DISPLAY DILUTION (ON/OFF)] the display dilution OFF.

5. [PIPETTE FLOW TEST]

Warning! Pipettes must be empty, before starting this function.

Before confirmation of the function the warning <PIPETTE DATA WILL BE LOST! > is displayed.
Select function and confirm with **[ENTER]**.
This is a useful function for checking the pipette position adjustment, vacuum adjustment and filling height sensor positioning adjustment.
Each individual pipette is tested and results are sent to the printer.

6. [SERVICE (S) & SAMPLE (M) COUNTER
   Service (S) Shows the number of samples performed between service visits, this value can be set to zero in MENU 7-7 .
   The sample (M) counter shows the total number of specimens tested on the instrument. This counter cannot be reset!
   Press any key

7. [CLEAR SERVICE COUNTER]
   Sets the service counter to zero.
   Confirm with the **[ENTER]** key.

8. [CLEAR ERROR LOG]
   This will clear all error messages in the error list Menu 1 - 9.
   Confirm with the **[ENTER]** key.

9. [QUICK BELT POSITION CHECK]
   Quick belt position will turn the belt for 84 positions while it is updating the memory table. It is possible to do this with blood-loaded pipettes. You can't stop this function while working.

10. [TYPE OF BARCODE READER] (Note: 0 is displayed)
    Use the **[ARROW]** keys to select barcode reader. Opticon (6mill) Keyence (4mill)
    Default is the Opticon barcode reader

5.4.8. Menu 8

*** Warning this is the service program ***

This menu has no functions and is empty in the stand alone Compact ESR analyser. In the Compact InteRRliner version, this menu has the control functions for the robotic arm.

	MENU 8
1	Not in use
2	Not in use
3	Not in use
4	Not in use
5	Not in use
6	Not in use
7	Not in use
8	Not in use
9	Not in use
0	Not in use

5.4.9. Menu 9

*** Warning this is the service program ***

This menu has all the functions related to solenoid valves and valves actuators

CAUTION: They ARE NOT monitored by the CPU and should only be used by authorised personnel as damage can be done if used incorrectly.

Warning:

When the Compact is in the RUN MODE and running samples do not activated one of the functions this will hold the Compact idle in that function.
For instance:
Menu 9-3 fill nozzle to the up position, the fill nozzle is now at the pipette position. When the fill nozzle does not return to the down position the Compact will stay idle in the fill nozzle up position.

	MENU 9
1	SAMPLE PROBE UP / DOWN
2	SAMPLE TUBE HOLDER UP/DOWN
3	FILL NOZZLE UP/DOWN
4	VALVE OUTER NEEDLE ON/OFF
5	RINSE NOZZLE UP/DOWN
6	RINSE ACTUATOR ON/OFF
7	FILL ACTUATOR ON/OFF
8	SAMPLE CONTROL SOLENOID ON/OFF
9	V-VALVE WASH SECTION ON/OFF
0	V-VALVE FILL SECTION ON/OFF

.

1. [SAMPLE PROBE UP / DOWN]
   Move the sample probe to the home position.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

2. [SAMPLE TUBE HOLDER UP/DOWN]
   Move the sample tube holder to the aspiration position.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

3. [FILL NOZZLE UP/DOWN]
   Moves the fill nozzle to the aspiration or home position.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

4. [VALVE OUTER NEEDLE ON/OFF]
   Energizing the outer needle solenoid valve.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

5. [RINSE NOZZLE UP/DOWN]
   Rinse nozzle moves to rinse position.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

6. [RINSE ACTUATOR ON/OFF]
   Rinse solenoid active, rinse valve-block down.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

7. [FILL ACTUATOR ON/OFF]
   Fill solenoid active, fill valve-block down.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

8. [SAMPLE CONTROL SOLENOID ON/OFF]
   Sample control solenoid fill sequence energized.
   The function of this solenoid is to build up a vacuum in the Westergren pipette before the aspiration starts.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

9. [V-VALVE WASH SECTION ON/OFF]
   Pipette wash vacuum control valve, controls the main vacuum line between the wash-station and separator.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

10. [V-VALVE FILL SECTION ON/OFF] (Note: 0 is displayed)
    Vacuum control fill-nozzle / sample probe, controls the main vacuum line between the fill nozzle cap and separator.
    Use the **[ARROW]** keys to select and **[ESC]** to abort this function..

5.4.10. Menu 10

*** Warning this is the service program ***

This menu has all the functions related to pumps and vacuum pump.

	MENU 10
1	VACUUM PUMP ON/OFF
2	WASTE PUMP ON/OFF
3	SALINE PUMP ON/OFF
4	RINSE PUMP ON/OFF
5	SET TUBE NUMBER (RINSE POS)
6	PIPETTE NUMBER AT RINSE POS.
7	Not in use
8	Not in use
9	DIAGNOSTICS MOTOR CURRENT
0	ALL PUMPS OFF

.

1. [VACUUM PUMP ON/OFF]
   Switches the main vacuum pump on for period of 65 seconds, the pump can be switched off using the **[ARROW DOWN]**
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

2. [WASTE PUMP ON/OFF]
   Switches the waste pump on, there is no time out feature available. Waste pump is used for emptying the liquid separator. Do not leave this function on as it may cause waste pump damage.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

3. [SALINE PUMP ON/OFF]
   Saline peristaltic pump on, pump stays on until the **[ARROW DOWN]** key is pressed. Note that if vacuum pump is off saline will spill over the Compact.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

4. [RINSE PUMP ON/OFF]
   Pipette wash peristaltic pump on. Pump stays on until the **[ARROW DOWN]** down key is pressed. Note that if vacuum pump is off rinse solution will spill over the Compact.
   Use the **[ARROW]** keys to select and **[ESC]** to abort this function.

5. [SET TUBE NUMBER (RINSE POS)]
   The Compact has a self-encoding pipette position system. If an intermittent 'position error' is displayed the position must be entered manually.
   Type the pipette number at the wash station, press **[ENTER]**.

6. [PIPETTE NUMBER AT RINSE POS.]
   This function is for service purposes, and shows the pipette position and the encoder values.

7. [Not in use]

8. [Not in use]

9. [DIAGNOSTICS MOTOR CURRENT]
   Testing motors and shows motor currents on the display. Example of the motor diagnostics only for reference use Motor hardware diagnostics;

Unit		**Current in mA**	
		Mean	Max
Nozzle	-	120	312
	-	84	380
Drive	-	92	340
Meas	-	84	328
		72	328
Needle	-	228	996
	-	240	1016
Tube	-	1012	1016
	-	176	752
Diluter	-	8	232
	-	8	240

Press any key

10. [ALL PUMPS OFF] (Note: 0 is displayed)
    All active pumps will be switched off.

6. GENERAL SETTINGS

Check the general settings and select the required options;

1. EDTA mode (Default is ON) MENU 1-7.
2. Sample probe depth factory setting is 5 mm MENU 3-4.
3. Temperature correction (Default is ON) MENU 3-7.
4. 30 minutes (Default is OFF) MENU 5-8.
5. Display dilution (Default is OFF) MENU 6-3.

6.1. Liquid levels

Liquid containers and levels must be checked frequently.
If the small onboard bottles are used, wash and keep the bottles clean to avoid bacterial growth.

The StaRRsed Compact has liquid level sensors. When the level sensor alarm appears, replace reagent as soon as possible.

6.2. Reagents preparation

1. Reagents preparation.
   - Use only the reagent containers which are supplied with the StaRRsed Compact.
   - To open the bulk reagent packages, remove the perforated flap from the cardboard box, pull the opening out of the box and fit the taps.
2. Fill up the containers with the reagents.
3. Replace the reagent containers.
4. Replace screw caps with level sensors.

6.2.1. Rinse solution QRR 010934

Rinse solution is used for rinsing the Westergren pipettes; approximately 8 ml is used for each sample.
The Rinse container is a 20- liter container (QRR 010934). Pre flush reagent bottle with de-ionized water.
Fill rinse container with rinse solution from the 20-liter container.

6.2.2. Saline QRR 010933

Saline is used for cleaning the needle and fill-nozzle assembly, approximately 1 ml of saline is used for each sample.
The saline container is a 5-liter container (QRR 010933). Pre flush the saline bottle using saline from the saline container. Fill saline bottle from the 5-liter container.

6.2.3. Diluent QRR 010931

Sodium citrate is used for diluting the EDTA sample,

- Approximately 0.5 ml Diluent is used for each sample.
- Approximately 2.5 ml is used for one Prime cycle.

The diluent container is a 5-liter container (QRR 010931).

The solution should be discarded if it becomes turbid.
If the Diluent does become turbid, clean the Diluent container thoroughly with a 5% Na-hypochlorite solution. After cleaning, rinse the container thoroughly with de-ionized water. Before refilling, flush the Diluent bottle with a little Diluent from the bulk container.

NOTE:
The latest version of the Material Safety Data Sheet (MSDS) of the used reagents can be found on our web site ***www.mechatronics.nl*** (***http://www.mechatronics.nl***).

6.2.4. De-ionised water

De-ionised water is used for rinsing the fill-nozzle, approximately 0.5 ml.
The outside of the metal fill-nozzle tube is washed automatically after each aspiration.
Note: Add one or two drops of saline to the de-ionised water to avoid **<bottle empty alarm>**.

6.2.5. Disinfectant QRR 010947

The disinfectant is used to disinfect the waste system; approximately 0.5 ml disinfectant is used after each pipette rinse.
The disinfectant bottle is a 5-liter container (QRR 010947)

Note: Since January 2013 Disinfectant QRR 010932 is no longer be used and is replaced by QRR 010947. See Information bulletin IB 2013001. Pre flush the disinfectant bottle using disinfectant from the disinfectant container. Fill disinfectant bottle from the 5-litre container.

7. REPORTING

The Compact is able to transmit different types of reports to the printer and the serial output port. Default mode the standard 60-minute report is used.
In **Menu 5**, the following options are selectable.

Checksum (on/off)	Menu 5 - 5
ACK/NACK (on/off)	Menu 5 - 6
30 minute output (on/off)	Menu 5 - 7
30 method (on/off)	Menu 5 - 8

Checksum is select ON (MENU 5 - 5), at the end of the string an extra byte is added. Checksum output string: 1 byte checksum = 256 (modulo 256 (ASCII string sum)). This output is also known as the advanced output.

ACK/NACK is select ON (MENU 5 - 6)**;** a confirmation is expected from the host computer after serial transmission. After receiving a **"Nack**", StaRRsed sends the data again (maximum two times). An **"Ack"** will let the StaRRsed carry on immediately.
If "Ack/Nack" is not received, the Instrument carries on after a pause of 1 second between the transitions. **("ACK"**= Acknowledge, **"NACK"**= Not acknowledge.)

See also ***Appendix - String format for StaRRsed*** (on page 213)

[30 minute output] is ON (MENU 5 - 7) the format of the report is changed independent of the selection of the status of checksum or ACK/NACK.

[30 METHOD] is ON (MENU 5 - 8) the ESR time automatically switches to 30 minutes and cannot be changed manually. The actual measured [30-MINUTE] result will only be printed and sent to the host computer if 30 MINUTE OUTPUT is set to '**on**' as well. If this method is switched **OFF** the ESR time automatically switches to 60 minutes. The converted Westergren standard (60 minute result) is sent to the printer and to the serial port.

The StaRRsed Compact performs the **ESR after 30 minutes** (instead of 60 minutes) and converts this value to a 60 minute **Westergren** standard. The method has the advantage that sample results become available after 30 minutes to the operator, however this method is not according to the Westergren method and results may deviate from the original Westergren results. For conversion to a standard Westergren, a table is used which correlates a **30-minute** ESR to a **60**-minute **ESR** result.

The method has been proposed and evaluated by Mr. Richard Rogers of the Royal Berkshire Hospital, Reading (U.K.). (See Medical Laboratory World, April 1994.)

Note: It is not recommended to use the 30-minute method on pre-citrated sample tubes.

7.1. Protocols

A protocol is a set of rules governing the communication and the transfer of data between machines, as in a computer system. Also a formal set of rules and procedures to be followed during a request for information before data is transferred between machines and computer systems. The protocol is installed before delivery.

The version indication on the display includes a single alpha character. This character indicates the serial output format:

A. Standard Compact serial output. (***Appendix - String format for StaRRsed*** (on page 213))

B. ***Sedimatic 15*** (on page 231) serial output.

C. ***Sedimatic 100*** (on page 227) serial output.

D. ***Vesmatic*** (on page 233) serial output.

E. ***Sysmex R-3500*** (on page 223) serial output.

F. ***MECHATRONICS-02*** (on page 217) serial output.

7.2. Result Printout

The results of the ESR measurements are send to the printer. The layout of the report depends on the selection of the 60- or 30 minute method.

7.2.1. Report 60-Minute mode

++++++++++++ REPORT EXAMPLE +++++++++++++++
(Not to scale)

-- StaRRsed--			Date 20/05/07				Time :	15:28		
1	2	3	4	5	6	7	8	9	10	11
Sample ID		ESR	Tc	ASPECT	Manual aspect	Pip.	Time	T	Error	EDTA
972005001		84	75	CLEAR		17	60	23		EDTA
972005002		14	13	Hazy<10mm		18	60	23		EDTA
972005003		22	21	Hazy<25mm		19	60	23		EDTA
972005004		67	61	Hazy>25mm		20	60	23		EDTA

Sample result with a manual aspect, where the manual aspect is shown as a number **3** in column 6 of this data record sample.

972005005		5	4	CLEAR	**3**	21	60	23		EDTA

In this sample, the dilution rate has a dilution failure of 21% and that is printed as **EDTA 079.**

972005006		5	5	CLEAR		22	60	23		**EDTA 079**

Sample results with a text error. This sample gives Too many borders found. Result of a pipette possibly filled with air bubbles.

972005007						24	60	23	Too many borders found	

Sample result with a text error. This sample is given limit error L_err(---/ 84/ 75/200)

972005001						25	60	23	**L_err(---/ 84/ 75/200)**	EDTA

1. Patient number.
2. Not corrected 30-minute ESR result (only in use if 30 minute mode is active).
3. Not corrected 60-minute ESR result.
4. 60-minute ESR result in millimeters, corrected for **18**℃. (only in use if temperature correction is active).
5. Aspect (clear, hazy).
6. Manually entered code number.
7. Sedimentation pipette number (number on the pipette belt).
8. Actual sedimentation time in minutes.
9. Temperature (in degrees Centigrade).
10. Error message (if the Analyser detects an error).
11. EDTA mode.

7.2.2. Report 30 Minute mode

++++++++++++ REPORT EXAMPLE +++++++++++++++
(Not to scale)

- StaRRsed--			Date 20/05/07				Time :	15:28		
1	2	3	4	5	6	7	8	9	10	11
Sample ID	Hh	ESR	Tc	ASPECT	Manual aspect	Pip.	Time	T	Error	EDTA
972005001	42	84	75	CLEAR		17	30	23		EDTA
972005002	5	14	13	Hazy<10mm		18	30	23		EDTA
972005003	8	22	21	Hazy<25mm		19	30	23		EDTA
972005004	32	67	61	Hazy>25mm		20	30	23		EDTA

Sample result with a manual aspect, where the manual aspect is shown as a number **3** in column 6 of this data record sample.

972005005	2	5	4	CLEAR	**3**	21	30	23		EDTA

In this sample, the dilution rate has a dilution failure of 21% and that is printed as **EDTA 079.**

972005006	2	5	5	CLEAR		22	30	23		**EDTA 079**

Sample results with a text error. This sample gives Too many borders found. Result of a pipette possibly filled with air bubbles.

972005007						24	30	23	Too many borders found	

Sample result with a text error. This sample is given limit error L_err(42/ 84/ 75/200)

972005001				Hazy<10mm		25	30	23	**L_err(---/ 84/ 75/200)**	EDTA

1. Patient number.
2. Not corrected 30-minute ESR result (only in use if 30 minute mode is active).
3. Not corrected 60-minute ESR result.
4. 60-minute ESR result in millimeters, corrected for **18**°C. (only in use if temperature correction is active).
5. Aspect (clear, hazy).
6. Manually entered code number.
7. Sedimentation pipette number (number on the pipette belt).
8. Actual sedimentation time in minutes.
9. Temperature (in degrees Centigrade).
10. Error message (if the Analyser detects an error).
11. EDTA mode.

7.2.3. ESR Error

Error messages can be found on the printout in column 10.
If errors are found during the measurement, the Compact will give an audible alarm.
The Error message is displayed on the main screen.

7.2.3.1. Explanation of the error messages

No cells/plasma found. **(**ERROR**)**
No contents could be detected in the pipette.

ESR Probably > 140 mm. **(**ERROR**)**
Extremely high ESR value.

Too many borders found. **(**ERROR**)**
More than three borders found, possibly air bubbles. (See Section Trouble shooting ***Air bubbles*** (on page 113)).

Column height <nnn>. **(**WARNING**)**
Column height must be between 180 and 210mm. <nnn> = the actual column height.

Measure error. **(**WARNING**)**
The down count is not equal to the up count from the measure head.

Bubbles on top. **(**WARNING**)**
Air bubbles on top of the ESR.

Limit error **(**ERROR**)**
One of the following limits are out of range.

- The ESR time
- The column height
- Dilution errors

7.2.4. Results at limit errors

When this option is set to YES and this limit error occurs, results will be printed/send to the LIMS.

When this option is set to NO and this limit error occurs, the fields for *30 min ESR, 60 min ESR* and the *temperature corrected ESR* are filled with spaces and thus results are not printed/send to the LIMS.

The error message in the error field (column 10) indicates that at least one of the limits (ESR time, dilution rate or column height) has been exceeded.

Together with the sedimentation time and dilution rate (which are still printed at the usual position), the operator/analyst can see what caused the error and may or may not use the ESR values which are preserved in the error message.

Description of the error message **L_err(hhh/www/ttt/ccc)** :

- **L_err** means it is a "limit error"
- **hhh** is the 30 minutes ESR
- **www** is the 60 minute ESR
- **ttt** is the temperature corrected 60 minute result
- **ccc** is the column height

Example of a limit error message:

- L_err(42/ 84/ 75/200) means 42 mm in the 30 minute method and temperature correction 75 with a correct column height.
- L_err(---/ 84/ 75/200) means 84 mm in the 60 minute method and temperature correction 75 with a correct column height.

ESR "ERROR" and "WARNING" code messages

This code appears in the "sample data record" at column 10.
The following codes are defined:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.
3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution

7.2.5. ESR Error and Warning code messages

ESR "ERROR" and "WARNING" code messages

This code appears in the "sample data record" at column 10.
The following codes are defined:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.
3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution • Bubbles on top • Hazy aspect • Temperature

7.2.6. Reporting range

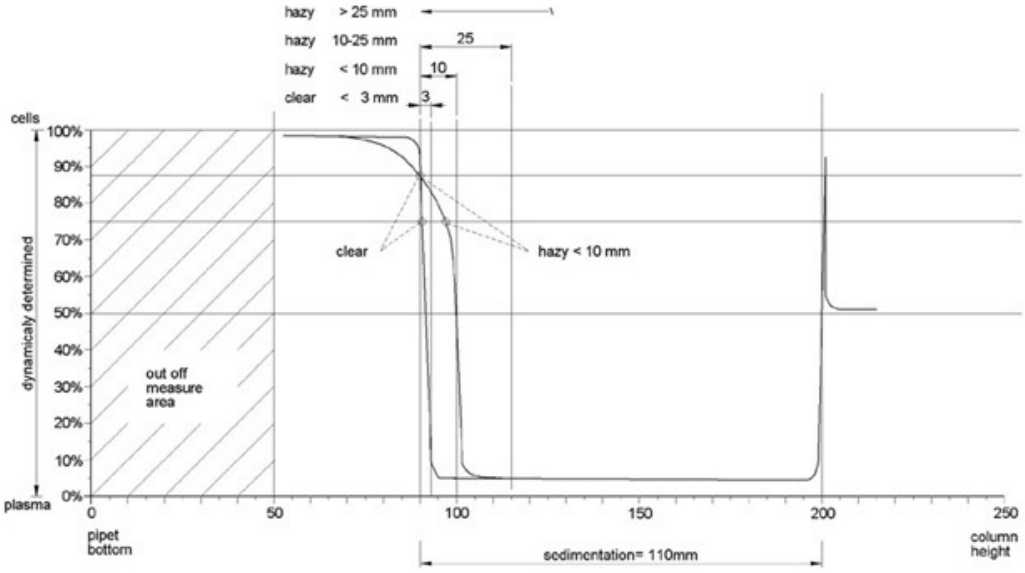
The reporting range in the columns 2, 3 and 4 are in millimeters. The start of the measure range is at the top of the meniscus down to 140 mm. If the detection of cells/plasma is over 140 mm then the report will be >140.

7.2.7. Aspect Hazy

The automatic reading of the Westergren sedimentation pipettes is carried out by moving an optical sensor along the pipettes. While the sensor is moving, a reading is made every 0.25 mm. The sensor is reading the absorption of infra red light through the Westergren pipette filled with blood. From these readings, values at a number of absorption levels are determined. All absorption figures are relative to the darkest and lightest reading (darkest = 100 % and the lightest = 0 % absorption respectively).

By definition the levels are:

87.5%	Cells/ plasma separation
75.0%	Hazy detection
50.0%	Meniscus detection



Graphic showing typical absorption values of a sample

The 'sedimentation' value is the distance in millimeters between the cells/plasma level (87.5% absorption) and the meniscus. If there is no haze, the absorption drops quickly to a value below the 75% level. If the distance between the 87.5% and the 75% level is less then 3mm, the report will state 'CLEAR'. If the distance between 87.5% and 75% level is more than 3mm then the report will state 'HAZY'.

Depending on the length of the 'hazy' area, three classes of 'haziness' are reported,

Length of area		**Reported class**	
Hazy area	>25 mm	Hazy	>25 mm
Hazy area	>10 mm <25 mm	Hazy	<25 mm
Hazy area	>3 mm < 10 mm	Hazy	<10 mm
Hazy area	< 3 mm	CLEAR	<3 mm

Hazy reports are shown when the change from the hazy level to the cell/plasma separation level occurs not within a given distance. The following code messages are reported in column 5.

7.2.7.1. Analyser "HAZY" code messages

This code appears in the "sample data record" at column 5.

The following 4 codes are defined:

0	Sample is clear.
1	Sample is Hazy < 10
2	Sample is Hazy < 25
3	Sample is Hazy > 25

Results with hazy aspect can be suppressed in the menu Limit error settings.

8. OPERATION

8.1. Quick start-up

This section describes a quick start-up procedure and a general description of what to do before starting a large batch of samples to run through the system.

8.1.1. Check list

Run this checklist before each large batch of samples.

1. If applicable printer must be switched on and online, and enough paper installed.
2. Waste container is empty.
3. Check the liquid levels.

8.1.2. Priming system

Use "**ARROW**" keys and select MENU 2 to perform all prime sequences manually. Check fluid flow through the applicable tubing. repeat a step if fluid flow is not correct.

1. PRIME RINSE SOLUTION, activates the Rinse pump. Rinse solution must flow through the pipette.
2. PRIME SALINE, activates the Saline pump. Liquid must flush through the needle assembly.
3. PRIME DILUENT, activates the diluter prime cycle. Diluter system must be filled with diluent and free of air bubbles.
   - Diluter prime cycle is executed once. In order to fully prime the system it will be necessary to perform this step several times. (One cycle is 5 strokes of the Diluter)
4. PRIME DE-IONIZED WATER, activates the fill nozzle water valve. De-ionized water must flow through the tube connected to the fill nozzle cap.
5. PRIME DISINFECTANT, activates the disinfectant valve. Disinfectant must flow through the small tube connected to the pipette wash station.

When the StaRRsed Compact has been idle for more than eight hours, some reagents may have dropped from the tubes due to gravity. Prime all tubing before sampling with:

PRIME ALL UNITS
All priming functions are sequentially performed one time. (MENU 2-10).

Note: The system must be checked for air bubbles.

8.1.3. Checks during operation

- Perform regularly visual checks for air bubbles in the sample pipettes, see ***Air bubbles*** (on page 113).

In case of a considerable number of pipettes with air bubbles:

- Perform the necessary maintenance or contact the service representative.

8.2. Fill procedure

Before you run a large batch of samples check the fill status in (MENU 1-7) and select the correct mode **EDTA** or **CITRATE.**

1. Press the [MENU] key and select function **"1"** - [RUN MODE].
2. Ensure samples are thoroughly mixed and sample tubes contain at least 2 ml of whole blood.
3. According to the ICSH, a sample should be flipped at least eight times.
4. Place the sample tube with barcode label facing to the left in the Compact sample tube adapter and with the cap upwards.
5. Press the [START] key.
6. On manual mode type ID number and press the [START] key.

Note: BE SURE THAT THE COMPACT IS SET TO THE CORRECT MODE. i.e. EDTA or CITRATE**.**

Place the sample tube with barcode label facing to the left

8.2.1. Liquid levels

Liquid containers and levels must be checked frequently.
If the small onboard bottles are used, wash and keep the bottles clean to avoid bacterial growth.

The StaRRsed Compact has liquid level sensors. When the level sensor alarm appears, replace reagent as soon as possible.

8.2.2. Reagents preparation

1. Reagents preparation.
   - Use only the reagent containers which are supplied with the StaRRsed Compact.
   - To open the bulk reagent packages, remove the perforated flap from the cardboard box, pull the opening out of the box and fit the taps.
2. Fill up the containers with the reagents.
3. Replace the reagent containers.
4. Replace screw caps with level sensors.

8.3. Turn off Compact

It is good practice to carry out the Daily maintenance procedure ***WI-170 Daily*** (on page 168).
Use the **[ARROW]** and select **(Menu 6-9)** for the [SHUT DOWN PROCEDURE].
Start a complete prime fluid cycle and all tubing that is susceptible to blood is flushed.

Note: The Shutdown function is interruptible by the **[ESC]** key. This will also be displayed.

8.3.1. Standby LCD screen back light off

There is no need to switch OFF the Compact as it switches automatically to the "**Standby**" mode.
The power consumption in standby mode will drop at a level around 60VA.

Attention: After 10 minutes of no keyboard activity the display backlight switches off.

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9. QUALITY CONTROL

9.1. Control pipettes

The correct function of the hardware and software of the StaRRsed Compact measurement unit should be checked at regular intervals with the aid of Mechatronics Control Pipettes (Order nr. QTST049000). More information can be found in the Control Pipette User Manual (MRN-019).

10. WASTE DISPOSAL

The waste container has a level sensor and as soon as the level sensor generates a waste error, the waste container must be emptied. The waste must be treated as potentially infectious (biohazardous) material and disposed of according to local regulations. Preferably, discard the complete waste container and replace it with a cleaned one. Press **[ESC]** to clear the error.

Disclaimer: Check your local environment rules about discharging the waste.

11. DATA SAFETY MANAGEMENT

All data in the StaRRsed Compact is stored in a **battery backup** memory.

This means that all raw data and results are kept, irrespective of a power failure or if the instrument is un-intentionally turned off. After the start-up procedure the software checks whether there are any ESR's still outstanding. If so, these will be carried out first. After a power failure the sedimentation time (60 or 30 min.) may be exceeded. However, the start time is saved and therefore the actual sedimentation time can be checked.

A limited amount of sample data can be stored, see Technical Specifications.

11.1. Power failure

If a power failure occurs it is recommended that the StaRRsed Compact is switched **OFF** by the power switch. When the power returns, the instrument can be switched **ON**. After the standard start-up process the StaRRsed Compact will continue to process the remaining samples.

11.2. Backup memory for data

The StaRRsed Compact has a **battery backup** memory. This means that important data is kept irrespective of a power failure or if the instrument is un-intentionally turned off. After the start-up procedure the software checks whether there are any ESR's still outstanding, if so, these will action first.

Note: Do not switch the StaRRsed Compact **OFF** unnecessarily!

11.3. RS232 serial output

The StaRRsed Compact is equipped with a serial port, which can be connected to any laboratory host computer system or PC. The data sent by the StaRRsed Compact to the printer can also be sent to a host computer or PC for further processing.

11.4. Specifications for the RS232 port

RS232 Serial data transmission.
Baud rate can be set from **1200** to **19200** baud (**default setting is 2400 baud**). Transmission protocol is default setting: **8** bit data, **1** stop bit, and **no** parity. To change the baud rate go to **(Menu 5 - 1).**

For more detailed information on the Serial connection see **Appendix - RS-232 hardware connections Compact (on page 205).**

12. COMPACT SYSTEM MESSAGES

The Compact generates four main types of error messages;

- System messages.
- Test messages.
- System time-out messages.
- Error messages.

12.1. System messages (3)

During normal operation the following "**System messages**" may occur:

1. *Waiting tube*
   - If a filled pipette is at the measuring position before the elapsed time has finished and the operator is ready to fill the next pipette, the *Waiting tube* message will be displayed.
   - To continue the sample loading sequence the operator must wait until the pipette at the measuring position has been measured.

2. *Reagents level empty message*
   - All reagent containers have level detectors; the display shows an error that indicates which reagent container(s) is (are) empty.
   - The expiry date of the reagent is exceeded or the container is opened longer than three months.
3. Prepare new reagent as described in section Reagents preparation
   Waste bottle full message or No waste bottle message
   - The waste container also has a level detector. If a waste error is shown on the display, the StaRRsed Compact will stop filling and cleaning pipettes until a new or empty container has been installed.
   - Empty the waste container and press **[ESC]** to clear the error**.**
4. *Fatal separator error*

12.2. Test messages

During the start-up sequence all the positing sensors are tested, if incorrect the instrument will generate a **Test message**,

1. Switch printer on.
2. Test fill-nozzle unit.
3. Test rinse-unit.
4. Test measure-unit.
5. Test needle-unit.
6. Test drive-unit.

12.3. System time-out <xxxx>

If during normal operation the following "**system time-out**" errors occur, call distributor or local supplier of this instrument.

These errors are usually fatal and need engineer's assistance.

1. Drive-unit.
2. Measure-unit.
3. Rinse-unit.
4. Fill-nozzle unit.
5. Needle adapter.
6. Sample probe.

12.4. Error messages

The following error messages may occur during normal operation,

1. Vacuum error.
2. Vacuum stabilisation error.
3. Fill time-out error.
4. Diluter error.
5. Position error.
6. Up sensor or down sensor error.
7. Rinse head up error.
8. Measure head not home error.
9. Separator full error

The explanation of all these messages can be found in Appendix - System messages Compact (3)

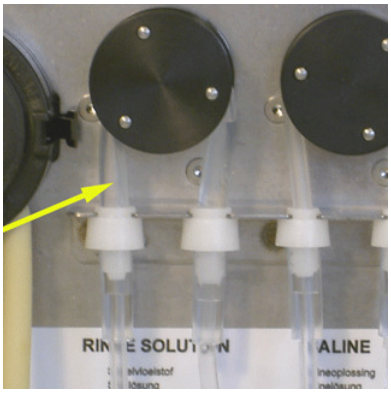
13. TROUBLE SHOOTING

Occasionally small faults may cause major problems. This chapter may help to solve the most common faults and explain why a specific problem occurs.
A lot of the problems or errors are due to a lack of maintenance. Remember that this instrument operates with a considerable amount of whole blood, virtually undiluted, stores it in a pipette for one hour and then cleans pipettes for re-use. Therefore, it is important to keep to the maintenance schedules. It is recommended that trained service personnel checks and applies service to the instrument at least once a year.

13.1. Peristaltic pumps

The Peristaltic pumps are located under the Waste bottle housing assembly flap.

13.1.1. Rinse solution not primed through the system



1. Check the ***rinse tube*** (on page 190) condition. It may be worn or leaking or incorrectly fitted. Check the pick-up tube in the rinse container, it may have become detached from the tube connector in the cap. See ***WI-162 rinse tube replacement*** (on page 136).
2. Check rinse solution level in rinse solution container.
   - If the level is insufficient, a message is displayed and the alarm sounds!
3. One of the tubes carrying the rinse solution may be blocked or kinked.

13.1.2. Rinse solution spilling over the instrument

If rinse solution spills over the top of the pipettes, the following items must be checked:

1. Is the vacuum pump working?
2. Check the vacuum pressure: Check the airflow, select (MENU 4) [FLOW SENSOR CHECK].
3. When rinsing, the rinse actuator must be energized.
   - The rinse actuator can be found under top cover at the top of pipette being rinsed.
4. Wash station must engage with pipette.
   - The Wash station is the white Rinse nozzle that engages the bottom of the pipettes.

5. Check the piercing pin in the wash station, it must be straight.
   - The piercing pin is to pierce the bottom meniscus when a filled pipette is at the wash station.
6. Wash station or tubing from wash station may be blocked.
   - Activate the PRIME DISINFECTANT (MENU 2-5). The disinfectant must flow through the system.

13.1.3. Rinse pump defective

1. Liquid flows back into the rinse container.
   - Replace the rinse pump tube.
2. At the start of the rinse sequence the first pipette is not washed.
   - Replace the rinse pump tube. ***WI-162 rinse tube replacement*** (on page 136).

13.1.4. Sample probe is not washed after aspiration

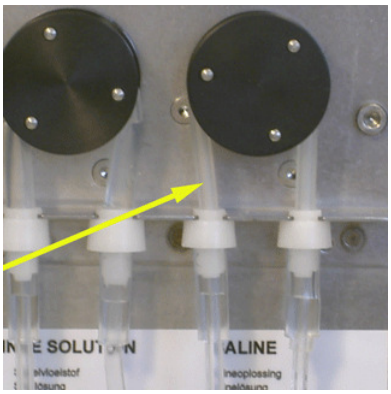
1. Check saline level in saline container.
   - If the level is insufficient, usually a message will be on the display and the alarm sounds!
2. Check pick-up tube in saline container.
   - It may have become detached from the tube connector.
   - Loosen the cap of the saline container in order to inspect.
3. Check the saline peristaltic pump tube condition.
   - It may be worn or leak. (See ***Level 4 maintenance*** (on page 129)).
   - An incorrectly fitted saline peristaltic pump tube may cause the same problem.
   - One of the tubes carrying saline maybe blocked or bended.

13.1.5. Saline dripping in the sample tube adapter

If Saline drips from the needle assembly check the following;

1. Does the vacuum pump work?
   - Check the vacuum pressure by using the option CHECK FLOW SENSOR.
2. Sample probe may be blocked.
3. Fill nozzle may be blocked.
4. Waste line may be blocked.
5. Outer needle may be blocked.
6. Pinch valve not working or blocked.
   - Replace pinch valve tube, **technical assistance** is needed.

13.1.6. Saline pump defective



1. Liquid flowing back to the saline container.
   - Replace the saline pump tube.
2. Needle is not washed sufficiently.
   - Replace the saline pump tube see ***WI-163 saline tube replacement*** (on page 137).

13.1.7. Pipettes not dry after washing and drying

If pipettes are not dried after the wash cycle, the following items need to be checked.

1. Does the vacuum pump work?
   - Check the vacuum pressure by using the option CHECK FLOW SENSOR.
2. Rinse vacuum control valve not working, technical assistance is needed.
3. Waste separator leaking, remove separator and reassemble.
4. Rinse nozzle not aligning,
   - Re-alignment for the rinse nozzle, **technical assistance** is needed.

13.2. Compact stalls

1. Check main power connection and the two fuses at the main power inlet.
2. Check the display:
   - Text or blinking cursor visible
   - Backlight on or off
   - Clock: observe the seconds, if the system stalls, usually the clock stops or or up-dates 2 seconds at a time.
3. Response to key inputs

Report this to the distributor.

13.3. Liquid level sensor not sensing

1. Liquid in the container is not detected. This occurs sometimes with the De-ionized water bottle and is caused by a very low conductivity.
2. Add one or two drops of Saline to the De-ionized water to increase the conductivity.

13.4. Diluter

13.4.1. Diluter system not sufficiently primed

1. The Diluent inlet valve is located next to the T-piece junction on top of the syringe.
2. The Diluent outlet valve is located on the right hand side of the transparent sample probe block.

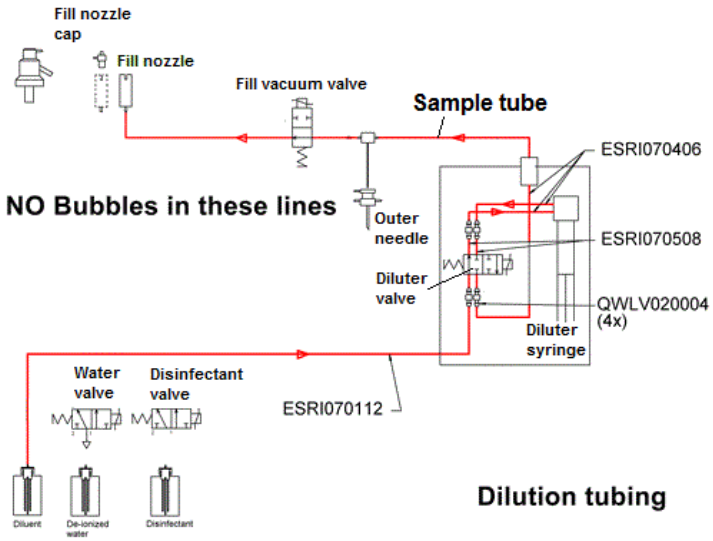
13.4.2. Air bubbles entering the Diluent system

1. Check the diluter syringe tip
2. Check on the **T-piece** / **Y-piece** joints and connectors for leaks and replace if necessary.
3. Check the connectors on the EDTA flow sensor for leaks and replace if necessary.

Select (MENU 2- 3), [PRIME DILUENT], vacuum pump is on and system must be filled with Diluent. When the citrate is priming, liquid should be seen flowing through the tube connection to the fill nozzle cap.

Occasionally when the diluter system is primed for the first time, air locks occur in the tubing and the diluter will not self-prime. If this occurs, disconnect the luer fitting at the syringe and connect a syringe filled with Diluent to the tubing and fill system manually.

1. Check pick-up tube at the Diluent container, it may be kinked.
2. One of the Diluent lines has become blocked or kinked.



13.4.3. Diluter errors

Dilution error

If the display shows dilution errors it indicates that the current sample has not been diluted correctly e.g. **-21%** Diluent added to the sample. After the sample measurement the dilution rate will be printed as: **EDTA 079.**

Dilution errors can be caused by:	**Solution**
Irregular filling speed due to poor vacuum.	Check the vacuum settings.
Blocked sample probe.	Remove the blockage.
Blocked or T-piece / Y-piece.	Unblock the the T-Piece / Y-Piece by using a syringe with hot water.
Sample tube pinch valve error.	Check if the sample tube pinch valve is working.
Sample tube not correct in the sample tube pinch valve.	Check the sample tube is still fitted correctly in the pinch valve.
Insufficient sample volume.	Check before sampling if the sample tube has sufficient blood volume.
Wrong diluter settings	Check/change diluter settings in software: See Diluter settings for all possible settings

Dilution errors can be solved by the user, when all the mentioned solutions does not help to solve the problem **technical assistance** is needed.

Display shows "Diluter failure"

May be caused by;

1. Mechanical obstruction.
2. Diluter power cable loose.
3. A defective diluter motor.
4. Top or bottom position sensor failure.
5. Broken flexible print cable or connector.
6. Motor tacho failure.

For Diluter failure **technical assistance** is needed.

13.5. Vacuum

The Compact uses vacuum, for both aspirating and the wash/rinse system. If trouble occurs, it is most likely because of poor or no vacuum.

Check the airflow (MENU 4 -7) [FLOW SENSOR CHECK]. The following values are shown on the LCD display:
Flow: 0925-**0980**-1020 Abs: 0300-**327**-0390 Offset: 0045-**0050**-0055

Press the **[ESC]** key to return to the normal mode.

If for example the yellow orifice is blocked the flow will be: 0050 (offset value).
Low value for the airflow may be caused by dirty or blocked blue disc filter, or orifices (especially the yellow one). Start the pipette wash sequence (MENU 2-8) and observe the drying process, pipettes must be free of water spots.

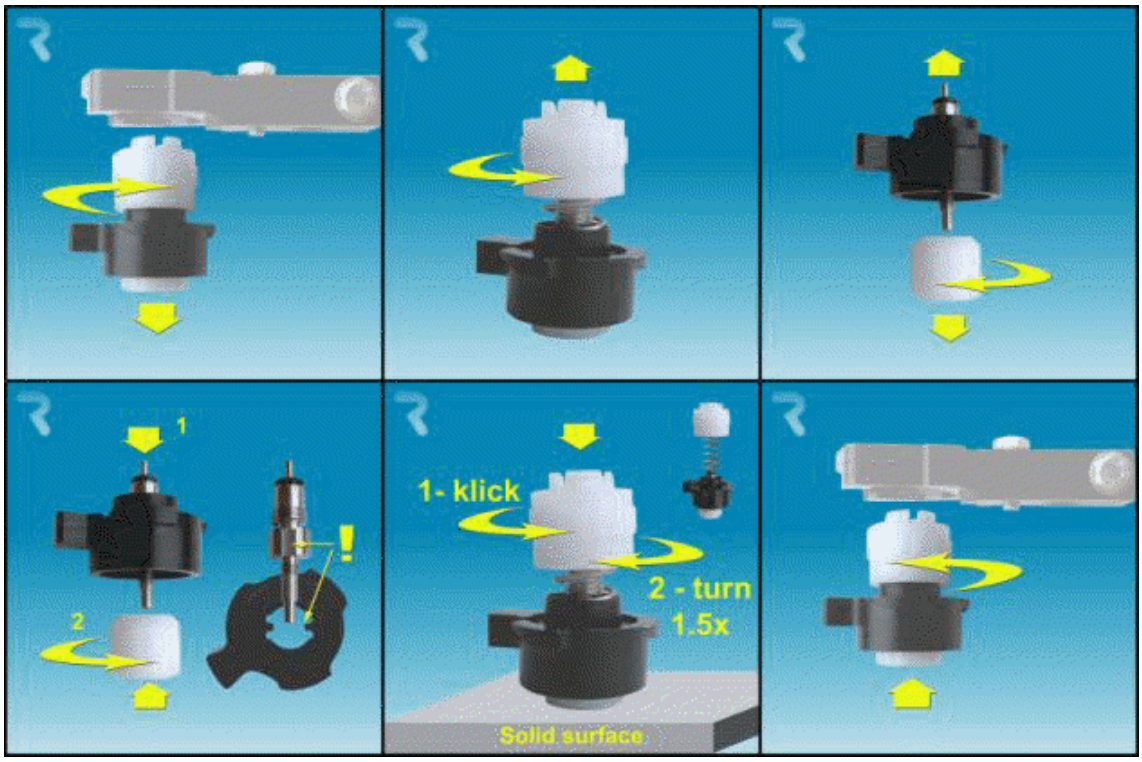
13.5.1. Vacuum stabilisation problems

The Compact checks the vacuum built up in a pipette just before Sampling. A vacuum stabilisation error will occur if it takes too long to evacuate a pipette or vacuum level is not stable.

Vacuum stabilisation error may caused by;

1. Leak in sample tube connecting T-piece/Y-piece and fill nozzle.
   - Replace the silicone sample tube.
2. Fill block washer defective or not in place.
   - Washer needs to be replaced.
3. Leaking washer in the fill nozzle. Replace fill-nozzle washer.
   - (See ***WI-203 Replace the fill nozzle O-ring*** (on page 156))
4. Sample tube pinch valve next to fill nozzle not operating.
   - Needs replacement, fatal error.
5. Wet or dirty blue air filter on flow-sensor board. Replace blue air filter
   - (See ***WI-179 Replace blue air filter*** (on page 147))
6. Defective flow sensor board.
   - Needs replacement, fatal error.

It is also possible that the outer Needle valve is not functioning correctly and vacuum is leaking away.



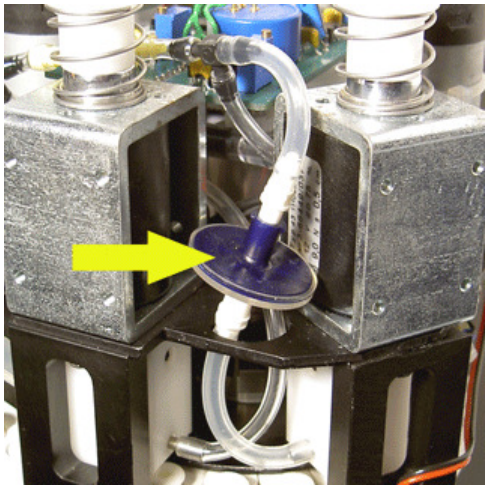
13.5.2. Vacuum error

The Compact monitors the vacuum pressure. If the vacuum pressure drops below a pre-set level, a *Vacuum stabilisation error* message will be indicated on the Main screen.

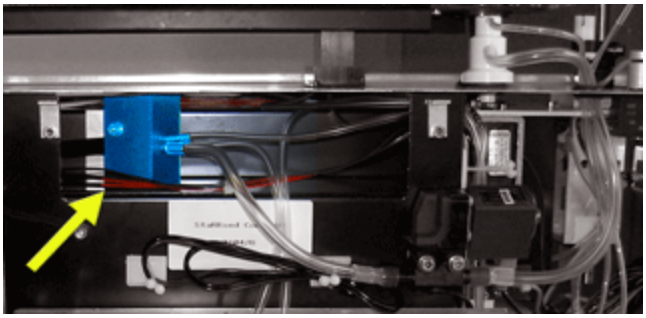
Vacuum error may caused by:

1. Blocked filter. Replace the blue filter.

- ***WI-179 Replace blue air filter*** (on page 147).



2. Liquid separator wrongly assembled or blocked.
    - ***WI-196 Cleaning liquid separator*** (on page 151).
3. Main vacuum pump defective.
    - Fatal error.
4. Bad vacuum. Need adjustment on the vacuum.
    - Fatal error, **technical assistance** is needed.
5. Blockage in the 3 way vacuum manifold.
    - Fatal error, **technical assistance** is needed.



13.6. Flushing liquids

After each sample aspiration the entire system is washed automatically.
If there is no liquid flow:

- Check that the peristaltic pumps are running. If the pump tubes are worn or leaking, replace the tubes.
- Check that the pump tubes are installed correctly.
- Check the tubes between the containers and pumps/valves.
- Unscrew the cap from the container. Check the pick-up tubes in the container and that there is enough liquid in the container.
- Check the tubes for blockages or kinks.

13.6.1. De-ionised water flow (3)

Select from (MENU 2-4), vacuum pump should operate and liquid flows through the thin tube connected to the side of the fill nozzle cap.
After each sample aspirations, the fill nozzle aspiration tube is washed automatically with deionised water.

If there is no liquid flow:

1. Check pick-up tube in de-ionised water container, it may have become disconnected from the nozzle in the lid. (Older models only).
2. Unscrew the cap of the deionised water container to check.
3. One of the de-ionised water lines may be blocked or kinked.

13.6.2. Disinfectant flow

To disinfect the Compact waste, select from (MENU 2-5), vacuum pump should operate, and liquid must be seen flowing through the thin tube connected to the side of the wash station.
After each wash cycle, approximately 0.5 ml of disinfectant will be flushed through the wash station.

If no disinfectant flows;

1. Unscrew the cap of the disinfectant container to check.
2. One of the disinfectant lines may be blocked or kinked.
3. Check pick-up tube in disinfectant container, it may have become disconnected from the nozzle in the lid. (Older models only).

13.6.3. Diluent flow

After each sample aspiration, the syringe is refilled with diluent.

Select from MENU 2-3, the vacuum pump should operate and liquid flows through the thin tube connected to the syringe via the T-piece - fill nozzle and through tube of the fill nozzle cap.

13.7. Tube adapter

As soon as the barcode is accepted or the ID number keyed in manually, the tube adapter closes.

13.7.1. Tube adapter does not close

Check for mechanical obstructions.

1. The sample tube size must be within the span of the sample tube adapter.
   - Only qualified service engineers may change the sample tube adapter span.
2. Electronic failure, fatal error, **technical assistance** is needed.
3. Mechanical failure, fatal error, **technical assistance** is needed.

13.7.2. Sample probe fails to go down

Under normal circumstances, the sample probe goes down when the sample tube adapter closes. If sample probe fails to go down check the following.

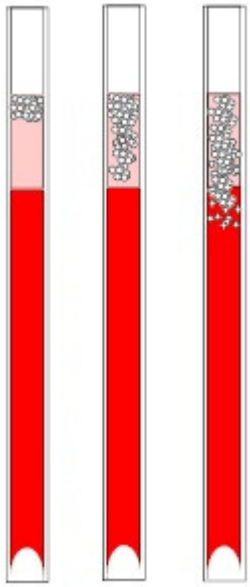
1. Sample probe depth wrong. Set the correct needle depth in MENU 3-4.
   - If the sample probe has being set too deep, it will touch the bottom of the sample tube. The sample probe then pushes the sample tube slightly down wards, and the aspiration cycle will be aborted.
2. A broken outer needle may cause a similar fault.
3. Check for mechanical obstructions.
4. Electronic failure, fatal error, **technical assistance** is needed.
5. Mechanical failure, fatal error, **technical assistance** is needed.

13.8. Air bubbles

After a normal aspiration, the Westergren pipette must be free of air bubbles. In the following examples different patterns of air bubbles which can appear in the pipettes are shown. Air bubbles can affect the sedimentation and are mostly reported as errors and no ESR result is reported.

Usually bubbles are caused by a leakage at the bottom of the pipette. If air bubbles are visible in the pipette, check the following :

13.8.1. Foam in column



A layer of air bubbles that is concentrated on top of the blood column does not affect the sedimentation process itself. The sedimentation develops normally below the bubbles. However, too many bubbles bring about a shortening of the effective blood column, which is a deviation from the Westergren method.

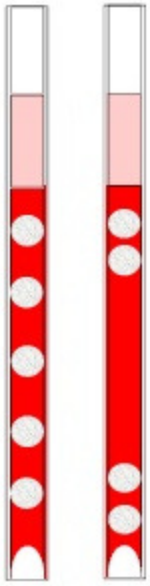
A layer of bubbles up to 5 mm: No message. Normal ESR result is reported.

A layer of bubbles from 5 to 25 mm: ESR warning 6: "Bubbles on top". Results should be reviewed before release.

A layer of bubbles larger than 25 mm: ESR Error 3: "Too many borders found". No ESR result is given.

1. Check that tube connections are not leaking.
2. Check the fill nozzle condition:
   - Inspect for any cracks or deep scratches in the base that holds the fill nozzle washer or O-ring.
3. Check for air in diluter system.
4. Check that the sample probe O-ring is not leaking.
5. Check transparent T- piece or Y-piece block for cracks.

13.8.2. Pipette looks like zebra crossing



If this always occurs in the same pipette, check the bottom of the pipette for the following:

1. Glass may be chipped.
   - Replace pipette.
2. Dirt, e.g. dried blood.
   - Clean the pipette.
   - Check disinfectant flow at the rinse nozzle.
3. Perpendicularity and straightness of the bottom face.
   - Replace pipette.

If this happens randomly or with each pipette, check the following:

1. Fill nozzle O-ring or flat washer.
2. Fill nozzle alignment to pipette.
   - Check the nozzle arm is tight on the rear vertical shaft. Usually engineer's assistance is required.

A pipette which looks like zebra crossing gives ESR Error 3.

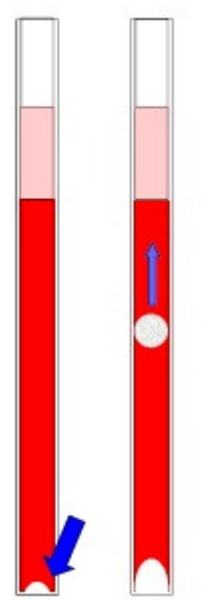
13.8.3. One air bubble about 5 mm under meniscus

The filling (aspiration) speed is not critical but should be within certain limits.

1. If just one air bubble is found about 5mm below the meniscus, the filling speed may be too high.
2. The blood column should not exceed the filling height sensor by more than 10mm.

One air bubble can result in ESR Error 3.

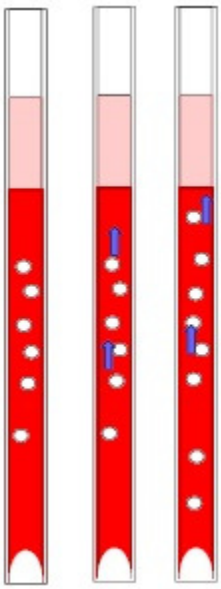
13.8.4. One air bubble rising in pipette



1. Usually this is caused by a wet or dirty fill nozzle.
   - The blood column should not reach right to the base of the pipette. There must be a clear air gap of 4...5mm at the bottom of each pipette.
2. Insufficient sample volume.
   - Need more blood in the sample tube.

One air bubble rising can result in ESR Error code 3.

13.8.5. Small air bubbles rising in pipette



Usually this is caused by a dirty or damaged fill nozzle.

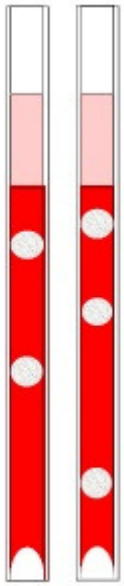
- Observe the maintenance schedules.
- Clean the fill nozzle.
- Check the fill nozzle for damage. If necessary, replace the fill nozzle.

Sample tube is leaking on the fill nozzle side.

- Replace the silicon sample tube

Small air bubbles result in ESR Error 3.

13.8.6. Random air bubbles in pipette



1. Check Diluent flow by priming the diluter system.
2. Insufficient sample volume.

Random air bubbles result in ESR Error 3.

13.8.7. One air bubble random in pipette

When air bubbles are seen after filling.

This can be caused during preparation of the sample. If the sample tube is, not mixed or inverted well air can arise in the blood. This causes an air bubble occurs in the pipette.

According to the ICSH, a sample should be gently inverted at least eight times. Do not shake the sample.

13.9. Leaking pipettes

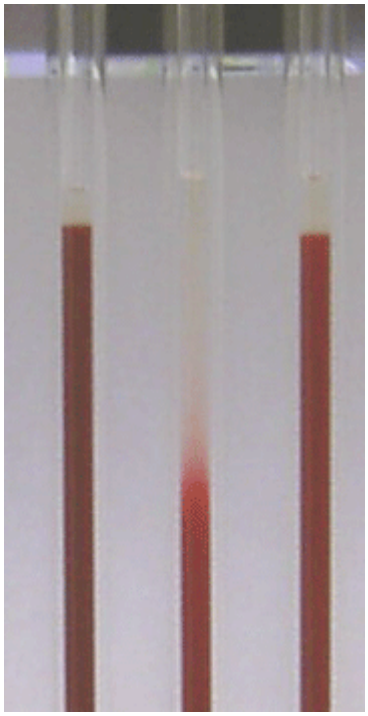
If blood or cleaning solutions leak from a pipette, perform the following procedures and check the performance of the system after each step to see if the problem has been solved. If the completion of the following steps does not result in a correction of the problem contact technical support.

1. Check for specks of dirt or hairs in the pipette valves.
2. A scratched valve tube.
3. A scratched valve body.
4. Valve on top of the pipette is dirty or damaged.
5. Check pipette bottom, glass may be chipped.
6. Check the pipette valve for contamination or wear.

13.10. Hazy reports

"Hazy" reports are usually caused by build-up of proteins on the inner wall of the pipettes. Another cause is growth of micro organisms in the diluter system. It is extremely important that the system is kept sterile.

First run an extra Fill & Clean sequence, then check after a day's run if haziness is decreased. When there are still many reports, it is recommended to fill the diluter system with a 5% chlorine solution. See ***WI-195 Cleaning the diluent system*** (on page 150)



A picture example of haziness

13.11. Contaminated instrument

The StaRRsed Compact has bacterial and micro organism's growth. Clean the instrument with a strong cleaning agent (Menu 2-9) [Fill & clean all] .See ***WI-167 Fill and clean*** (on page 159) and ***WI-178 Hazy problems*** (on page 146) for details.

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13.12. Fill time-out error

Normally the fill sequence takes about 15 seconds. However, if the fill sequence exceeds 20 seconds, a fill time-out will be generated. The Compact aborts the fill sequence and this error message will be shown on the display and reported to the printer.

Fill time-out error may be caused by:

1. Blood clots or rubber debris from the tube cap in the sample.
   - Check the condition of the outer needle.
2. Filling procedure stopped by operator.
3. Insufficient sample volume.
   - Should be at least 1.4 ml.
4. Faulty filling nozzle or filling nozzle washer/O-ring.
   - Check filling nozzle and washer/O-ring.
5. Incorrectly adjusted sample probe depth.
   - Check needle depth MENU 3-4.<default 5 mm>
6. No or poor vacuum.
   - Check vacuum MENU 4-7.

13.13. Position error

Compact stand alone software version >1.61

Position error can occur if the Compact is switched OFF while the carrousel is moving to the next position. When the Rinse nozzle sticks up this can also cause a position jump.

1. Position error
   - Compact was not able to position the carousel. There was a difference found in the pipette memory position table and the actual measured position of the position sensor.
   - Check in MENU 4 - 4 [PIPETTE NUMBER AT RINSE POS.]

2. If not correct select
   - MENU 6 - 0 [PASSWORD] and type 3964.
   - MENU 10 - 5 and type the correct number of the pipette at the rinse station.
   - Go to MENU 4-2 [TURN ONE POSITION] and check that the carrousel moves without giving position error.
   - MENU 6-0 [PASSWORD] **[ENTER]** to leave the service mode.

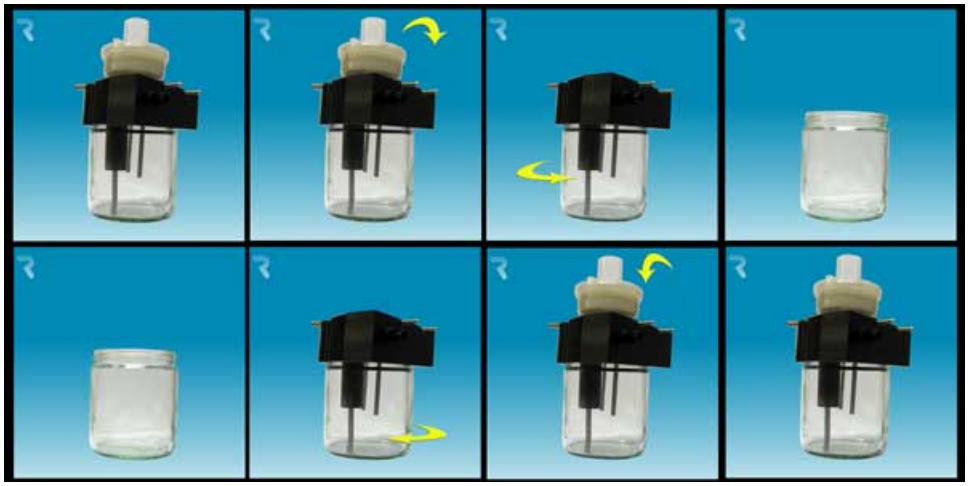
3. If position errors occur frequently, or item 2 above does not solve the problem the following procedure must be carried out.
   - MENU 6 - 0 [PASSWORD] and type 3964.
   - MENU 10 - 5 and type the correct number of the pipette number at the rinse station.
   - MENU 7 – 9 [QUICK BELT POS. CHECK] and leave the carrousel to move one complete revolution. This action will reset and remember the new positions.
   - MENU 6-0 [PASSWORD] **[ENTER]** to leave the service mode.

If position errors still occur, the positioning device needs replacement.

13.14. Separator error

If it takes too long for the waste pump to empty the liquid separator, the system generates a separator error.

Separator error may be caused by:	
Extensive foam build-up in the liquid separator.	Check the separator assembly and connections for possible air leaks.
Waste-tube between liquid separator and waste pump is blocked.	Replace the tube.
Waste-tube between waste pump and waste container blocked.	Replace the tube.
Waste pump failure.	Exchange the waste pump cassette. If the error returns, call for service.
Electrical bridge between the waste-level electrodes.	Clean liquid separator, see ***WI-196 Cleaning liquid separator*** (on page 151)



13.15. Reagents

Check the expire dates of the reagents regularly. Do not use the reagents if expired.

Note: If expired reagent has been used accidentally, the results obtained with these reagents may only be used, when the expire date was not exceeded more than 30 days.

Diluent is sensitive for bacterial growth. The solution should be discarded if it becomes turbid or infected. When using the small onboard containers, clean the Diluent container thoroughly with 10% Na-hypochlorite. Make sure that the container has been thoroughly rinsed after cleaning.

13.16. Fill nozzle

Normally the fill sequence takes about 3 seconds. However, if the fill sequence exceeds 10 seconds, a fill time-out error will be generated. The Compact aborts the fill sequence and this error message will be shown on the display and reported to the printer.
Check for mechanical obstructions and remove them. If the error returns, call for service.

13.16.1. Fill nozzle does not engage with pipette

1. Motor time out generated, fill nozzle stops half way up.
2. Check for mechanical obstruction.
3. Motor failure. Fatal error, call distributor.

13.16.2. Fill nozzle not at fill position

The fill nozzle did not reach the fill position in a certain time limit.

Possible reason;

- Fill nozzle motor is faulty.
- Fill nozzle motor driver is faulty.
- Fill nozzle is blocked.
- Fatal error, call distributor.

13.16.3. Fill nozzle not at home position

The fill nozzle did not reach the home top sensor with a certain time limit.

- Fill nozzle motor faulty.
- Fill nozzle motor driver is faulty.
- Fill nozzle is blocked.
- Fatal error call distributor.

14. MAINTENANCE

The **StaRRsed Compact** is an analyzer that operates with considerable amounts of whole blood virtually undiluted, and stores it in a pipette for one hour. For this reason instrument maintenance is of the utmost importance.

To maintain the maximum reliability of the instrument, the maintenance procedures must be strictly followed. All procedures are based on a number of samples.

Maintenance levels	Work instruction
Daily	***WI-170 Daily*** (on page 168)
Weekly	***WI-171 Weekly*** (on page 169)
Level 4 Maintenance	***WI-173 Level 4 maintenance*** (on page 172) Every 5000 samples
Level 3 maintenance (on page 133)	***WI-174 Level 3 maintenance*** (on page 178) Every 15000 samples
Level 2 maintenance (on page 133)	Every 30000 samples
Level 1 maintenance (on page 134)	Every 60000 samples

Note: Numbers are based on 5 days week with 230 sample per day.

WARNING!!!
Always be aware of the danger of infection, especially during maintenance. Take appropriate precautions. There is blood involved and therefore a **BIO HAZARD**

14.1. Maintenance Schedule example

See ***Appendix - Maintenance schedule.*** (on page 201)

14.2. Daily

The purpose of the daily maintenance is to keep the instrument clean and contamination as low as possible.
Clean all parts that are exposed to blood, wipe the outer surface and the stainless steel plate below the pipette belt.

Detailed instructions of this procedure can be found in the Work Instruction ***WI-170 Daily*** (on page 168) and ***WI-177 Sample probe*** (on page 160)

14.3. Weekly

The purpose of the weekly maintenance is to carry out the daily maintenance and additionally check the optical sensor of the measure head and the vacuum pressure.
Detailed instructions of this procedure can be found in the Work Instruction ***WI-171 Weekly*** (on page 169).

14.3.1. Vacuum

The Compact uses vacuum, for both aspirating and the wash/rinse system. If trouble occurs, it is most likely because of poor or no vacuum.

Check the airflow (MENU 4 -7) [FLOW SENSOR CHECK]. The following values are shown on the LCD display:
Flow: 0925-**0980**-1020 Abs: 0300-**327**-0390 Offset: 0045-**0050**-0055

Press the **[ESC]** key to return to the normal mode.

If for example the yellow orifice is blocked the flow will be: 0050 (offset value).
Low value for the airflow may be caused by dirty or blocked blue disc filter, or orifices (especially the yellow one). Start the pipette wash sequence (MENU 2-8) and observe the drying process, pipettes must be free of water spots.

14.3.2. Measure sensor check

Use the **[ARROW]** key to select (MENU 4-5) and check the values on the display in the bottom line.
The values must be in the following limits: Measure sensor MS 40..**50**..60

If the measure sensor is out of range the sensor must be cleaned first.
Detailed instructions of this procedure can be found in the **WI-172 Cleaning Measure sensor (on page 141).**

14.3.3. Fill stop sensor check

Use the **[ARROW]** key to select (MENU 4-5) and check the values on the display in the bottom line.
The values must be in the following limits: Fill stop sensor FS 90..**140**..165

14.3.4. Cleaning liquid separator

The separator is designed to separate liquid from the air and can handle a lot of blood, rinse and other used reagents from the instrument. After a period of time the separator is getting dirty and therefore it needs to be cleaned weekly.

Detailed instructions of this procedure can be found in the Work Instruction **WI-196 Cleaning liquid separator (on page 151).**

Symptoms of a dirty separator:

1. Separator errors.
2. Foam in the separator.
3. Waste pump cannot sufficiently remove the waste from of the separator.

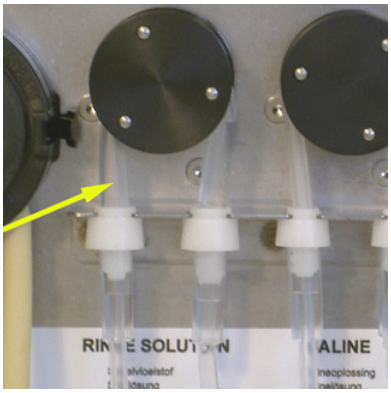
14.4. Level 4 maintenance

The purpose of level 4 maintenance is to carry out the daily and the weekly maintenance. Replace the pump tubing, bacterial filters and the Fill nozzle O-ring. After replacing those items, the Instrument needs a Fill and Clean sequence to clean the pipettes.

Over a monthly period protein builds up in the Westergren pipettes and needs to be deproteinized using a strong cleaning agent.
Detailed instructions of this procedure can be found in the Work Instruction ***WI-173 Level 4 maintenance*** (on page 172).

14.4.1. Rinse-pump tube replacement

New rinse pump tube assembly **ESRI090902**.



Open left cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

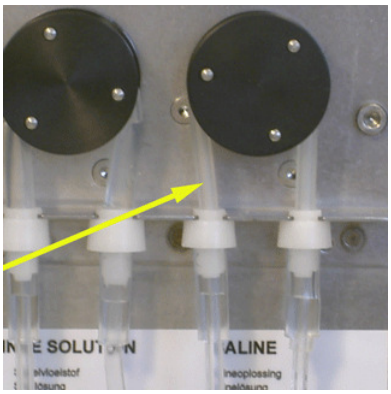
If the tube is not fitted correctly or is worn the following symptoms can occur.

- Liquid flowing back into the container.
- First glass tube on the pipette belt is not washed sufficiently.

Note: The wider bore tube is for the rinse pump.

14.4.2. Saline-pump tube replacement

New saline pump tube assembly **ESRI090903**



Open left Cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

If the tube is not fitted correctly or is worn the following symptoms can occur.

- Liquid flowing back into the container.
- Sample needle is not washed sufficiently.

Note: The narrower bore tube is for the saline pump.

14.4.3. Replace bacterial filters

Detailed instructions of this procedure can be found in **WI-196 Cleaning liquid separator (on page 151).**

As part of the Cleaning liquid separator procedure the bacterial Hepa filter **QWLV040002** is replaced with a new one.

Exchange bacterial filter **QWLV040001** on the waste bottle assembly.

14.4.4. Fill-nozzle O-ring replacement

As the fill nozzle O-ring (**QWLV050004**) ages, it looses its flexibility and air-bubbles may occur in the Westergren pipettes, the washer needs to be replaced.

Symptoms for a bad fill-nozzle O-ring
After the aspiration, the Westergren pipette has a zebra pattern (air- blood- air -blood, nicely divided in the column.)
Vacuum stabilisation errors may occur.

14.4.5. Fill and clean procedure

Cleaning agent preparation :

1. Prepare a flask filled with 150 ml of hot de-ionized water (80ºC)
2. Add 15 ml cleaning agent QRR 010905.
3. Mix well do not shake

Start fill and clean procedure:

1. From the (MENU 2- 9) select FILL & CLEAN ALL.
2. The sample probe will lower halfway; connect the extension tube carefully to the sample probe. (Extension tube **ESRI 110004** must be in the flask with the cleaning agent.)

Press **[ENTER]** to start the fill and clean procedure.

Compact stand alone

Note: Each pipette on the pipette belt will be filled with cleaning agent, after one hour the first pipette is washed and dried. Fill and clean takes about 1 ½ hours to complete.

Erroneous haziness looks more like haemolytic plasma than 'normal' hazy plasma. If there is an abnormal number of 'hazy' aspects, check the dispenser system carefully and clean it if there is any doubt.

Symptoms for a contaminated instrument:

1. If more than **3… 5** out of **20** measurements are reported **HAZY.**
2. Poor meniscus may be reported.
3. Incorrect results.

14.5. Level 3 Maintenance

Level 3 maintenance is level 4 maintenance adding the following extra's.

1. Replace the pinch valve tube **ESRI010246.**
2. Replace the blue disk filter **QWLV040003.**
3. Replace the Peristaltic waste pump cassette **ESRI 090921** including the Blotting washer **ESRI090920.**

   Be careful, as there may be blood in the cassette. First, make up some disinfectant and put this in the liquid separator. Press PRIME DISINFECTANT to pump disinfectant through the pump cassette.

Symptoms for a bad or faulty waste pump cassette:

- Waste separator error.
- Taking too long before the separator empties.

Detailed instructions of this procedure can be found in the Work Instruction ***WI-174 Level 3 Maintenance*** (on page 178).

14.6. Level 2 maintenance

Level 2 maintenance is level 3 maintenance and add the following extra's.

Replace the Teflon tip on the syringe of the diluter assembly. (From repair set QWLV030902.) Detailed instructions of this procedure can be found in the Work Instruction number ***WI-181 Dis- and re-assembly diluter syringe*** (on page 187).

Detailed instructions of this procedure can be found in the Work Instruction number ***WI-174 Level 3 Maintenance*** (on page 178).

14.7. Level 1 maintenance

Annual maintenance (Level 1 maintenance) is Level 3 Maintenance and ***WI-181 Dis- and re-assembly diluter syringe*** (on page 187) and adds the following extras;

We recommend that this procedure is carried out by dealers service engineers.

The following items need to be replaced annually.

1. Replace all the tubing.
2. Replace the waste pump motor **ESRI090920.**
3. Replace Waste pump cassette **ESRI090921**.
4. Replace blue Vacuum filter disc. Part no **QWLV040003**.
5. Replace Fill block washer. Part no **ESRI030906.**
6. Replace the outer needle and sample probe if needed.
7. Replace waste container filter disc **QWLV040001.**(only applicable if internal waste container is used)
8. Replace Pinch valve tubing. Part no **ESRI010246**.
9. Replace the Teflon tip of syringe on the Diluter assembly.
10. Check the pipette valves bodies and replace if necessary (84 pieces) **QTST040001.**

See Appendix - Maintenance schedule (2)

14.8. Reagents preparation

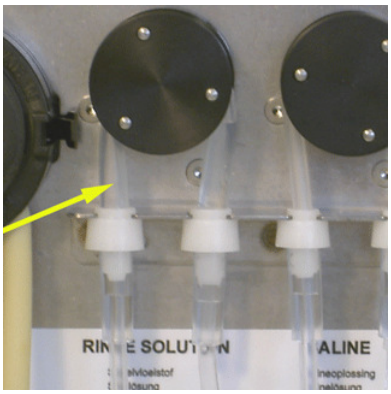
1. Reagents preparation.
   - Use only the reagent containers which are supplied with the StaRRsed Compact.
   - To open the bulk reagent packages, remove the perforated flap from the cardboard box, pull the opening out of the box and fit the taps.
2. Fill up the containers with the reagents.
3. Replace the reagent containers.
4. Replace screw caps with level sensors.

15. WORK INSTRUCTION STARRSED COMPACT

Work instruction section

Work instruction Number 162	
Page 1 of 1	**Purpose:** Change Rinse pump tube
Safety: None Bio Hazard area	
Instrument: Compact	**Revision:** 001,October 2012

New rinse pump tube assembly **ESRI090902**.



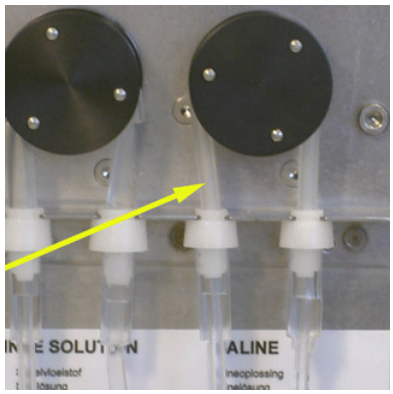
Open left cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

Work instruction Number 163	
Page 1 of 1	**Purpose:** Change Saline pump tube
Safety: None Bio Hazard area	
Instrument: Compact	**Revision:** 001,October 2012

New saline pump tube assembly **ESRI090903**



Open left Cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

Work instruction Number 166	
Page 1 of 2	**Purpose:** Peristaltic waste pump cassette replacement
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft,October 2008

Waste Cassette

The waste system must be cleaned before replacing the waste pump cassette.

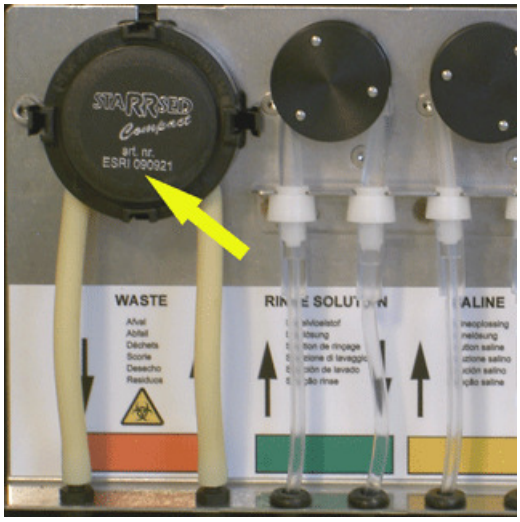
1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Remove bacterial HEPA filter.
5. Fill waste separator with 100ml disinfectant or 100 ml water with 2% bleach.
6. Replace bacterial HEPA filter.
7. Lift left cover.
8. Lift stainless steel vacuum tube up.
9. Insert the liquid separator sliding it over the support shelf.
10. Push the liquid separator towards the rear, with the sensor connectors in the holes.
11. Release the stainless steel vacuum tube.
12. Replace the waste container.
13. Close left cover.

Prime Saline (166)

1. Select PRIME SALINE. Repeat the prime saline until the liquid separator is empty.

Waste Cassette

1. Disconnect the two tubes from the waste pump cassette.
2. Press levers (at three o'clock and nine o'clock positions) and pull at the same time.
3. Clean peristaltic pump motor shaft using a tissue soaked in alcohol.
4. Remove the old blotting washer **ESRI090026** around the motor shaft.
5. Place the new blotting washer **ESRI090026**.
6. Insert new waste pump cassette **ESRI090921** until it clicks into place.
7. Remove the protection caps on from the tubes.
8. Connect the two tubes to new waste pump cassette.



Work instruction Number 168	
Page 1 of 3	**Purpose:** Pipette handling valve
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Version 1, October 2008

Remove of the top cover

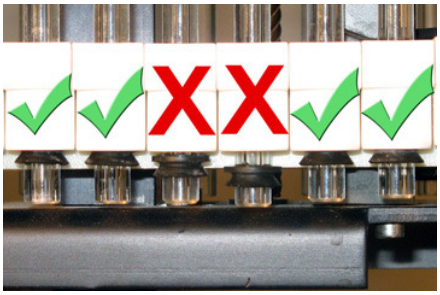
1. Switch StaRRsed Compact **OFF**.
2. Remove the two rear screws of the top cover.
3. Lift the top cover carefully from the instrument.

Pipette valve check or replacement: (168)

1. Hold the top pipette clamp and remove the valve body QTST040002
2. Clean or replace the valve body.
3. Check the silicon tube position inside the pipette clamp, it must be in the centre of the hole and equidistant from the sides.
4. Re-install pipette valve body.

Pipette installation

1. Hook pipette assembly on to the pipette belts.
2. Make sure that pipettes are correctly fitted on to the pipette belts,
3. Visually check height of all pipette valves, they must all be at the same height.
4. Visually check the bottom of the pipette V shape ring.
5. Incorrect fitted pipettes may cause **mechanical damage** to the instrument.
6. Check for leakage after the first **Fill & Clean**



Replace the top cover: (172)

1. Put the cover carefully over the instrument.
2. Replace the two rear screws of the top cover. (If present or if needed).

Work instruction Number 172	
Page 1 of 2	**Purpose:** Cleaning measure sensor
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001, October 2001

Remove of the top cover

1. Switch StaRRsed Compact **OFF**.
2. Remove the two rear screws of the top cover.
3. Lift the top cover carefully from the instrument.

If the measure sensor is out of range, the sensor must be cleaned.
In order to clean the measure sensor remove the pipette at the measuring position (complete with top and bottom clamp).
For cleaning use a cotton bud dipped in deionised water or aerosol air blower, make sure the cotton bud is just damp. Do not use any organic solvents.

Pipette removal

1. Push and pull vertically the pipette from the holding position of the belts.
2. Take pipette off the carousel.
3. Store the pipette on a safe place.

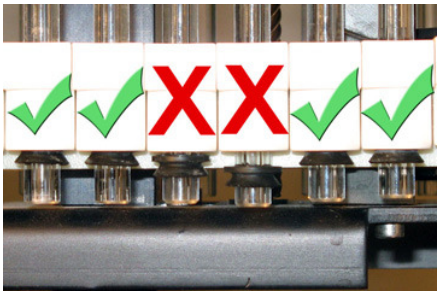
Switch Compact **ON**

1. Carefully clean the inner part of the measuring sensor by using a cotton bud.
2. Check the values of the Measure sensor MS 40..**50**..60 by using the CHECK MEASURE SENSOR function.
3. If not in range repeat cleaning the inner part of the measuring sensor.

4. When in range switch **OFF** the Compact.

Pipette installation

1. Hook pipette assembly on to the pipette belts.
2. Make sure that pipettes are correctly fitted on to the pipette belts,
3. Visually check height of all pipette valves, they must all be at the same height.
4. Visually check the bottom of the pipette V shape ring.
5. Incorrect fitted pipettes may cause **mechanical damage** to the instrument.
6. Check for leakage after the first **Fill & Clean**



Replace the top cover: (172)

1. Put the cover carefully over the instrument.
2. Replace the two rear screws of the top cover. (If present or if needed).

Switch **ON** the Compact.

mechatronics	
Work instruction Number 175	
Page 1 of 3	**Purpose:**: Pipette handling, valve tube
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Version 1,October 2007

Remove of the top cover

1. Switch StaRRsed Compact **OFF**.
2. Remove the two rear screws of the top cover.
3. Lift the top cover carefully from the instrument.

Pipette removal

1. Push and pull vertically the pipette from the holding position of the belts.
2. Take pipette off the carousel.
3. Store the pipette on a safe place.

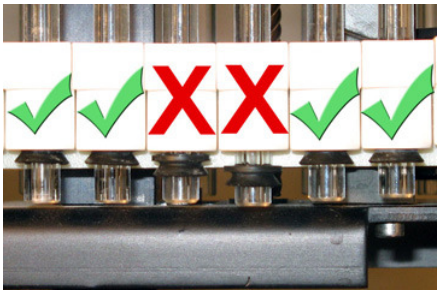
.

Re-assemble pipette(175)

1. Re-assemble valve body ESRI 030522 and silicon valve tube ESRI 030516.
2. Insert the re-assembly in top pipette clamp.
3. Wet the top of the pipette with water. (black C-clip indicates pipette top)
4. Compress the valve body into the pipette clamp and insert the pipette into pipette clamp.
5. The black C-clip must be as close to the pipette clamp as possible!
6. The flat surface of the C-clip must be next to the pipette clamp.
7. Remove the valve body and check the silicon tube position, it must be exactly centred.
8. Fit the bottom tube clamp and V-seal ring.
9. Check the position of the valve. If incorrect, disassemble pipette valve and tube and re-assemble again.

Pipette installation

1. Hook pipette assembly on to the pipette belts.
2. Make sure that pipettes are correctly fitted on to the pipette belts,
3. Visually check height of all pipette valves, they must all be at the same height.
4. Visually check the bottom of the pipette V shape ring.
5. Incorrect fitted pipettes may cause **mechanical damage** to the instrument.



6. Check for leakage after the first **Fill & Clean**

Replace the top cover: (172)

1. Put the cover carefully over the instrument.
2. Replace the two rear screws of the top cover. (If present or if needed).

Work instruction Number 178	
Page 1 of 1	**Purpose:** Hazy problems
Safety: *Bio Hazard area*	
Instrument: StaRRsed Compact	**Revision:** 001, October 2012

Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.
Cleaning the diluent system:

Step 1

1. Remove the suction-tube from the diluent bottle.
2. Place the suction tube in chlorine solution.
3. Use the [PRIME DILUENT] function. This fills the dispenser system with the disinfectant.
4. After the prime sequence stops press the [PRIME DILUENT] key 5 times to fill the dispenser system with the disinfectant.
5. Leave the disinfectant in the system for 15 minutes.

Step 2

1. Take the diluent suction tube out of the disinfectant.
2. Wipe the tube clean and dry with a tissue.
3. Take hot de-ionized water (80°C).
4. Use the [PRIME DILUENT] function.
5. After the prime sequence stops press the [PRIME DILUENT] key 5 times to fill the dispenser system with the hot water.

Step 3

1. Clean the diluent bottle(s) with the disinfectant.
2. Rinse the diluent bottle with hot de-ionized water (80°C).
3. Rinse the diluent bottle with diluent solution.
4. Refill the diluent bottle with new diluent solution.
5. Use the [PRIME DILUENT] function.
6. After the prime sequence stops press the [PRIME DILUENT] key 5 times to fill the dispenser system with the new diluent solution.

Step 4

1. Prepare a Fill and Clean arrangement.
2. Run the fill and clean sequence. When all the pipettes are filled the needle goes back to the home position.
3. Remove the Fill and clean arrangement.

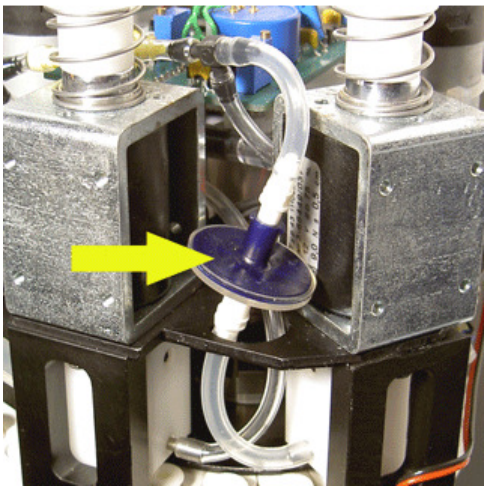
Work instruction Number 179	
Page 1 of 1	**Purpose:** Replace blue air filter
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, October 2001

Remove of the top cover

1. Switch StaRRsed Compact **OFF**.
2. Remove the two rear screws of the top cover.
3. Lift the top cover carefully from the instrument.

Air filter replacement (ESRI) (179)

1. Pull both tube connectors out of the blue filter.
2. Replace with new blue filter
3. Reconnect the tube connectors on the filter



Replace the top cover: (172)

1. Put the cover carefully over the instrument.
2. Replace the two rear screws of the top cover. (If present or if needed).

Work instruction Number 180	
Page 1 of 1	**Purpose:** *Prepare disinfectants bleach*
Safety: *Bio Hazard area*	For cleaning bio hazard area's
Instrument: StaRRsed Compact	**Revision:** Draft, October 2001

Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

mechatronics	
Work instruction Number 188	
Page 1 of 2	**Purpose:** Replace diluter tip
Safety: None Bio Hazard area	
Instrument: Compact	**Revision:** Draft, October 2001

1. Take the syringe from the diluter assembly.
2. Pull the plunger out of the syringe.
3. Cut the Teflon tip of the plunger with a sharp knife.
   Be careful not to damage the metal plunger.
4. Replace the O-ring and then the tip.
5. Replace the old tip for the new tip assembly. (From repair set QWLV030902)
6. Moisten the tip with water to ease the tip back into the glass syringe barrel.

1. PRIME DILUENT
2. Repeat above step until there are no air bubbles in the whole diluent system.

Check your dilution settings: (188)

1. Go to tab SETTINGS> DILUTER SETTINGS and select DISPLAY DILUTION OFF
2. Run 10 samples through the instrument and make a note of the dilution rate.
3. Calculate the mean of the 10 samples.
4. Make adjustment if necessary in SETTINGS> DILUTEr and adjust the Dilution adjustment
5. Go to tab SETTINGS> DILUTER SETTINGS and select Display dilution ON

Work instruction Number 195	
Page 1 of 1	**Purpose:** Cleaning diluent system
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001, September 2011

Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

Step 1

1. Remove the suction-tube from the diluent bottle.
2. Place the suction tube in chlorine solution.
3. Use the [PRIME DILUENT] function. This fills the dispenser system with the disinfectant.
4. After the prime sequence stops press the [PRIME DILUENT] key 5 times to fill the dispenser system with the disinfectant.
5. Leave the disinfectant in the system for 15 minutes.

Step 2

1. Take the diluent suction tube out of the disinfectant.
2. Wipe the tube clean and dry with a tissue.
3. Take hot de-ionized water (80°C).
4. Use the [PRIME DILUENT] function.
5. After the prime sequence stops press the [PRIME DILUENT] key 5 times to fill the dispenser system with the hot water.

Step 3

1. Clean the diluent bottle with hot de-ionized water (80°C)
2. Refill the diluent bottle with new diluent solution.
3. Use the "Prime diluent" function.
4. After the prime sequence stops press button "Prime diluent" 5 times to fill the dispenser system with the new diluent solution.

Work instruction Number 196	
Page 1 of 3	**Purpose:** Cleaning liquid separator Version 2
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001, October 2012

Removing the liquid separator

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Disconnect the silicon tube from the tube connection on the top section.
5. Remove bacterial HEPA filter.
6. Remove and disassemble the liquid separator.

Cleaning liquid separator

1. Clean all parts with hot water and a brush.
2. Use some acid free vaseline on the screw-thread of the glass jar.
3. Assemble the separator.

Replacing the liquid separator

1. Replace the top section.
   A little silicon grease on the rim of separator will make the assembling and adjustment easier.
2. If applicable replace the bacterial HEPA filter
   (For Maintenance Level 4: Exchange bacterial HEPA filter QWLV040002)
3. Re-connect the silicon tube to the tube connector on the top section.
4. Lift left cover.
5. Lift stainless steel vacuum tube up.
6. Insert the liquid separator sliding it over the support shelf.
7. Push the liquid separator towards the rear, with the sensor connectors in the holes.
8. Release the stainless steel vacuum tube.
9. Replace the waste container.
10. Close left cover.

Work instruction Number 199	
Page 1 of 1	**Purpose:** Maintenance level 1
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001, January 2013

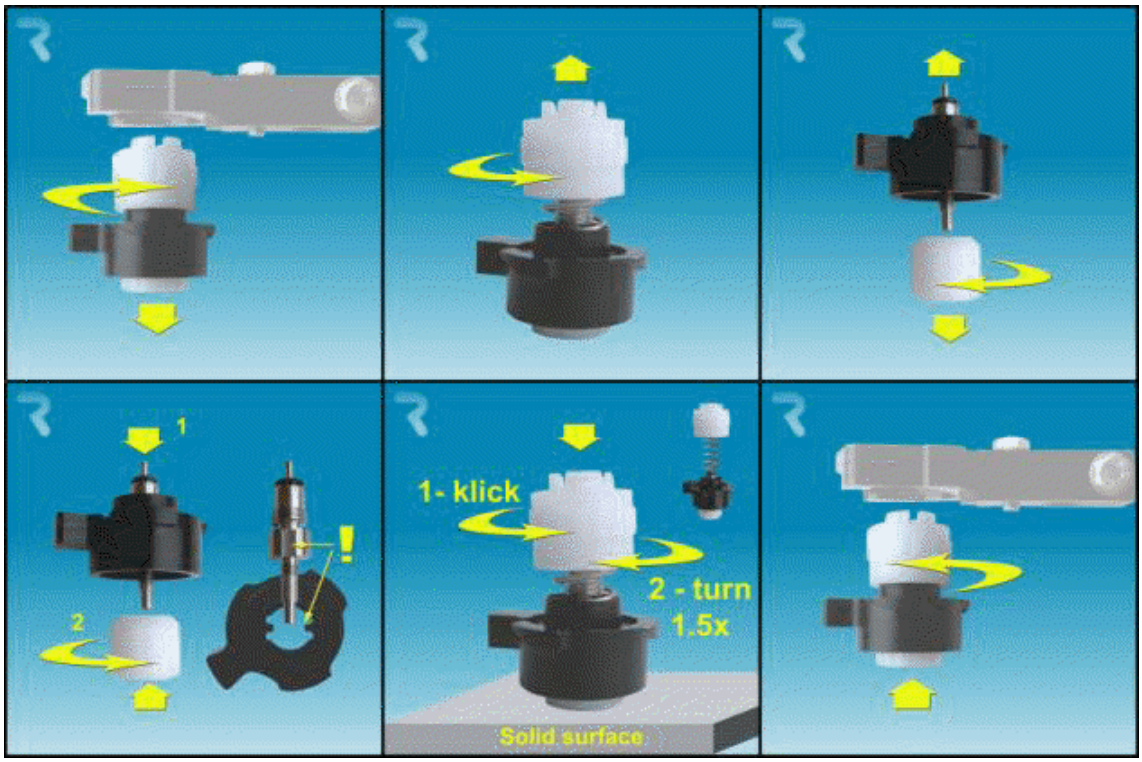
We recommend that this procedure is carried out by dealers service engineers.

The following items need to be replaced annually.

1. Replace all the tubing.
2. Replace the waste pump motor **ESRI090920.**
3. Replace Waste pump cassette **ESRI090921**.
4. Replace blue Vacuum filter disc. Part no **QWLV040003**.
5. Replace Fill block washer. Part no **ESRI030906.**
6. Replace the outer needle and sample probe if needed.
7. Replace waste container filter disc **QWLV040001.**(only applicable if internal waste container is used)
8. Replace Pinch valve tubing. Part no **ESRI010246**.
9. Replace the Teflon tip of syringe on the Diluter assembly.
10. Check the pipette valves bodies and replace if necessary (84 pieces) **QTST040001.**

Work instruction Number 201	
Page 1 of 1	**Purpose:** Disassembly and assembly of the fill nozzle
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, February 2005

Instructions for disassembling and assembling the fill nozzle

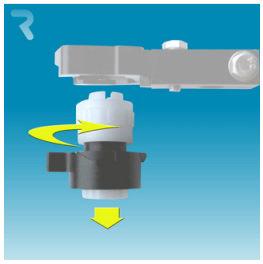


Note: For the O-ring replacing, only take the top part away from the fill nozzle.

Work instruction Number 202	
Page 1 of 1	**Purpose:** Cleaning the fill nozzle
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, February 2005

Disassemble the fill-nozzle:

1. Turn the holder to the right.
2. The fill-nozzle can now be removed.
3. Disconnect the silicon tube from the fill nozzle.

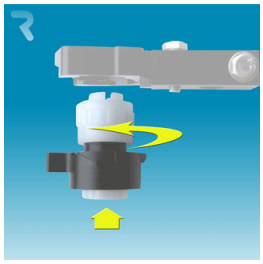


Clean fill-nozzle:
The use of a toothbrush and detergent is recommended.

1. Carefully scrub the fill nozzle inner part.
2. Use a tissue to dry the fill nozzle.

Assemble fill-nozzle:

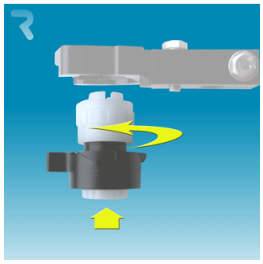
1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Work instruction Number 203	
Page 1 of 3	**Purpose:** Replace the fill nozzle O-ring
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, February 2005

Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Clean fill-nozzle:
The use of a toothbrush and detergent is recommended.

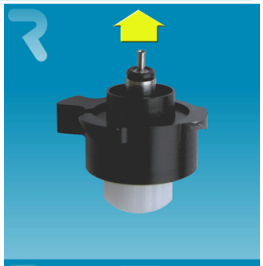
1. Carefully scrub the fill nozzle inner part.
2. Use a tissue to dry the fill nozzle.

Disassemble fill nozzle holder:

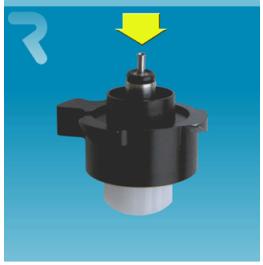
1. Turn the holder to the right.
2. The holder can now be removed

Replace O-ring:

1. Remove the O-ring. (**QWLV050004**)



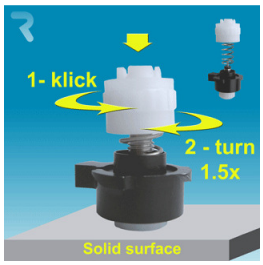
1. Install new O-ring. (**QWLV050004**)



Assembly holder:

Push the head down

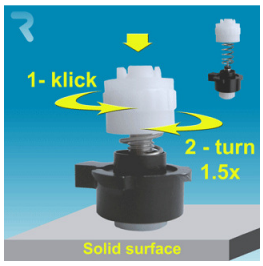
1. Turn the head anti clockwise till clicking sound
2. Turn the head clockwise for 1.5 turns.



Assemble fill nozzle holder:

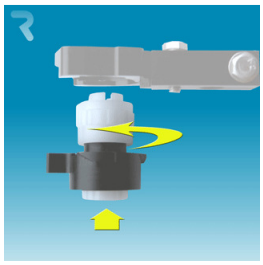
Push the plastic top part down against the spring pressure.

1. Turn the plastic top part anti clockwise until you hear or feel a click.
2. Turn the plastic top part clockwise for 1.5 turns.



Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Work instruction Number 205	
Page 1 of 1	**Purpose:** Replace the pinch valve tube ESRI010246
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, February 2005

Replace the pinch valve tube
ESRI010246

1. Open the left cover.
2. Pull the tube out the pinch valve.
3. Disconnect the silicon tube from the bottom connector and the top connector.
4. Remove the tube.
5. Connect the silicon tube to the bottom connector and the top connector.
6. Push the tube in the pinch valve.
7. Close the left cover.

Work instruction Number 167	
Page 1 of 1	**Purpose:** Fill and Clean the pipettes
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001, October 2012

Cleaning agent preparation :

1. Prepare a flask filled with 150 ml of hot de-ionized water (80ºC)
2. Add 15 ml cleaning agent QRR 010905.
3. Mix well do not shake

Start fill and clean procedure:

1. From the (MENU 2-9) select FILL & CLEAN ALL.
2. The sample probe will lower halfway; connect the extension tube carefully to the sample probe. (Extension tube **ESRI 110004** must be in the flask with the cleaning agent.)
3. Press **[ENTER]** to start the fill and clean procedure.

Note: Each pipette on the pipette belt will be filled with cleaning agent, after one hour the first pipette is washed and dried. Fill and clean takes about 1 ½ hours to complete.

Work instruction Number 177	
Page 1 of 3	**Purpose:**: Sample probe or outer needle replacement
Safety: *Bio Hazard area*	
Instrument: StaRRsed Compact	**Revision:** 001, October 2012

Removal of the Right-hand cover:

1. Switch OFF the Compact.
2. Loosen the three screws.
3. Move the side-cover to the right.

Safety screens removal:

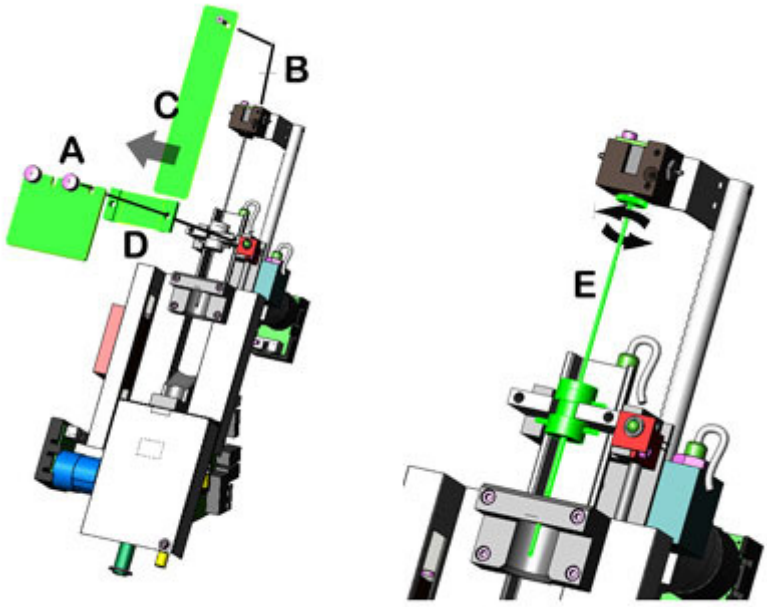
1. Remove the two knurled knobs from the safety screen..
2. Remove the needle safety screen. (A)
3. Remove the counter sunk screw holding the protection screen; the screw is located in the T-piece or Y piece.
4. Remove the protection screen. (C)
5. Remove the guide strip ESRI050030. (D)

Needle exchange:

1. Unscrew sample probe manually. (E)
2. Mark each tube for easier reconnecting to the correct nipple.
3. Disconnect the tubes from the outer needle.
4. Pull the sample probe, complete with outer needle, towards the front edge of the Compact. The outer needle must be supported to protect it from falling.
5. Slide the new sample probe into the (new) outer needle.
6. Make sure the Sample probe has a (new) O-ring QWLV050003.
7. Install (new) sample probe ESRI050909 together with the (new) outer needle ESRI050901.
8. Tighten the sample probe. Do not over-tighten the sample probe in the T-piece / Y-piece or it will crack or strip the threading inside the block.
9. Replace the correct tubes on the outer needle.

Replace covers for the Compact stand alone:

1. Replace the guide strip and protection screen.
2. Replace the safety screen and tighten the screw.
3. Re-install side cover, replace needle-safety screen and tighten the two knurled knobs.



Work instruction Number 1210	
Page 1 of 2	**Purpose:** Installing Y-piece on standalone Compact
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, July 2011

- Switch the Compact **OFF**.
- Remove the cover from the right side of the Compact.

Remove the old T-piece

1. Remove the transparent safety screen and needle shield.
2. Remove the old sample tube with loop.
3. Disconnect the tube between T-piece and diluter from the T-piece.
4. Disconnect the diluter start sensor print from T-piece.
5. Disconnect sample probe from T-piece.
6. Remove T-piece from the bracket.

Exchange the drip tray on bottom tube holder

The stainless steel drip tray behind the lower tube holder must be replaced with a shorter version. This is to prevent damage to the diluter start sensor print which may occur if the tube motor is activated without a sample tube being present.

1. Remove the lower stainless steel cover plate.
2. Remove the black plastic top tube holder and the left and right stainless steel cover plates.
3. Loosen the adjustment screw for the bottom tube holder and pull the tube holder out.
4. Exchange the drip tray ESRI050019.
5. Re-install the bottom tube holder and cover plates in the reversed order.

Install the new Y-piece

1. Attach the diluter start sensor print to the Y-piece.
2. Attach Y-piece to the bracket.
3. Connect sample probe to the Y-piece.
4. Install new sample tube (without loop).
5. Install new tube between Y-piece and diluter. Fixate the tube at the Y-piece bracket with a tie-wrap.
6. Re-install the transparent safety screen and needle shield.

Adjust the sample probe home sensor

Due to the changed connections and the size of the Y-piece, the home position of the sample probe must be changed in order to avoid collision with the plastic needle unit cover.

1. Disconnect the sample probe home sensor ESRI089053 from the needle board (connector no. "53").
2. Remove any tie-wraps from the sensor cable.
3. Loosen the plastic hex nut of the sensor.
4. Turn the sensor **down** by **3 complete turns (= 3mm)**.
5. Fasten the hex nut and re-fix the cable with tie-wraps.
6. Connect the sensor to the needle board.
7. Push the sample probe carefully down as far as it goes. Check that all cables and tubes stay clear from the moving parts.

- Switch the Compact **ON**.

Change needle depth setting

1. Enter the service mode (MENU 6-0)
2. In menu 3-4 NEEDLE DEPTH, **reduce the present setting by 3mm**.

Check the function

1. Activate function Prime Saline (MENU 2-2). Saline must not be dripping from the needle. Check for leaks at the Y-piece.
2. Activate function Prime Diluent (MENU 2-3). Check for air and diluent leaks at the Y-piece.
3. Check the diluter start sensor (MENU 4-6) and adjust if necessary.
4. Start the sample mode and fill a sample. Check for air leaks at the Y-piece.
   During the rinsing cycle of the needle unit, saline mst not be dripping from the needle.

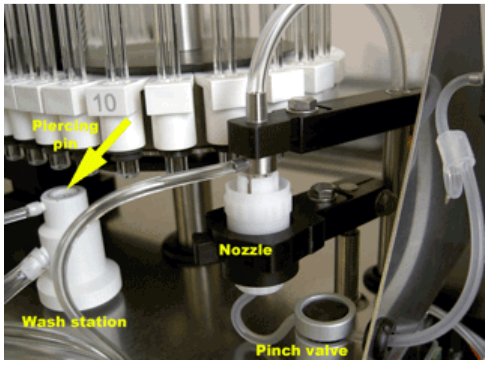
- Install the plastic cover on the right side of the Compact.

Work instruction Number 164	
Page 1 of 1	**Purpose:**Cleaning the fill nozzle
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, October 2001

Disassembly fill nozzle:

The use of detergent is recommended.

1. Disconnect the silicon tube from the fill nozzle.
2. Remove the fill nozzle.
3. Push the leaf spring downwards and slide spring to the left



Clean the fill nozzle
The use of a toothbrush and detergent is recommended.

- Scrub the fill nozzle inner part.

Assembly fill nozzle:

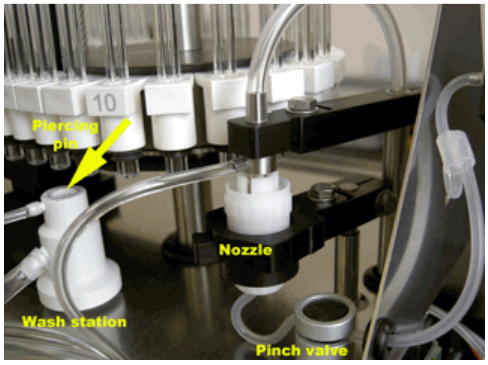
1. Ensure the flat edge of the fill nozzle is correctly aligned with flat edge in the black arm.
2. Push blade spring downwards and slide to the right.
3. Reconnect the silicone tube.

Work instruction Number 165	
Page 1 of 2	**Purpose:**Washer ring replacement in fill nozzle
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, October 2001

Disassembly fill nozzle:

The use of detergent is recommended.

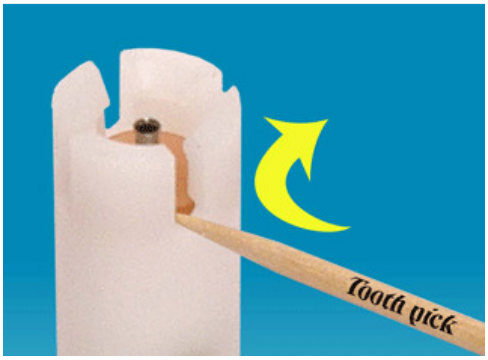
1. Disconnect the silicon tube from the fill nozzle.
2. Remove the fill nozzle.
3. Push the leaf spring downwards and slide spring to the left



Fill nozzle washer replacement (165)

1. Carefully remove the flat washer ring in the "FILL NOZZLE" by using a wooden tooth pick .Do not use sharp items to remove the washer
2. Clean the nozzle with water
3. Fit the new washer (QWLV06001)

NOTE: Under normal circumstances the fill nozzle washer needs to be replaced monthly



Work instruction Number 169	
Page 1 of 3	**Purpose:**Cleaning liquid separator
Safety: *Bio Hazard area*	
Instrument: Compact:	**Revision:** Draft, October 2001

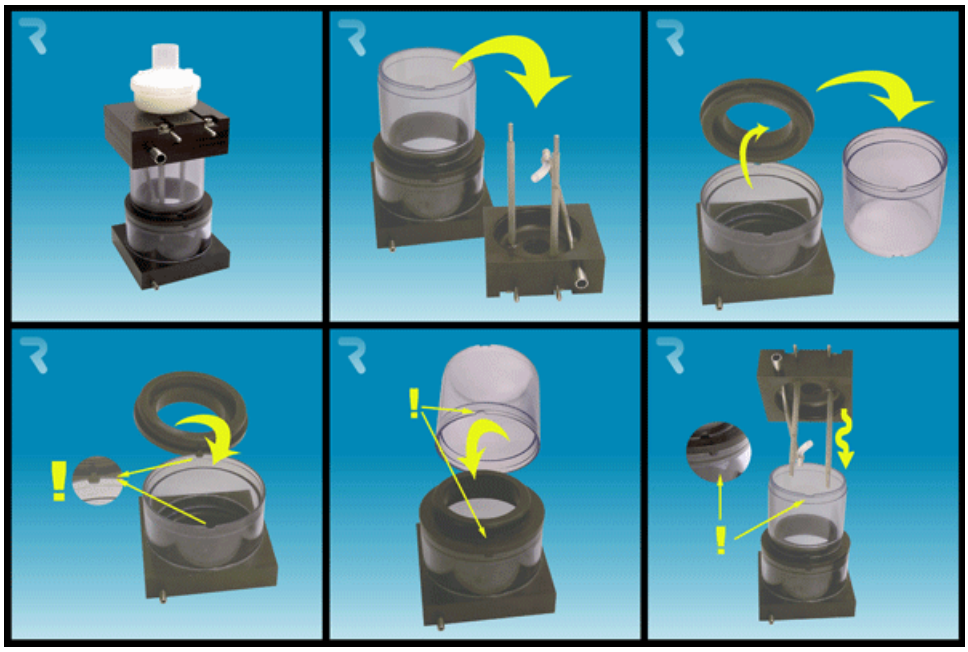
Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

Removing the liquid separator

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Disconnect the silicon tube from the tube connection.
5. Remove bacterial HEPA filter.
6. Open the liquid separator by pulling off the top section.

Cleaning the liquid separator

1. Clean the internal parts of the separator with disinfectant.



Replace the liquid separator

1. Replace the top section.
   A little silicon grease on the rim of separator will make the assembling and adjustment easier
2. If applicable replace the bacterial HEPA filter
   (For Maintenance Level 4 exhange bacterial HEPA filter QWLV040002)
3. Re-connect the silicon tube to the bottom tube connector.
4. Lift left cover.
5. Lift stainless steel vacuum tube up.
6. Insert the liquid separator sliding it over the support shelf.
7. Push the liquid separator towards the rear, with the sensor connectors in the holes.
8. Release the stainless steel vacuum tube.
9. Replace the waste container.
10. Close left cover.

Work instruction Number 170	
Page 1 of 1	**Purpose:** Daily
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** 001,October 2012

1. **Prepare disinfectant:** (if not already prepared).
   Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
   This disinfectant is for cleaning of all external parts that are exposed to blood.
   Perform the (MENU 6 - 9) [SHUT DOWN PROCEDURE] function.
2. Check system for leakage.
3. Inspect the peristaltic pump tubes and connections for leaks.
4. Check that liquid does not run back into the supply bottles after the pumps have stopped.
5. Inspect sample needle condition.
   If necessary replace the sample probe or outer needle. See Work Instruction Sample probe or outer needle replacement.
6. Check tubing from the syringe for trapped air bubbles.
7. Check Diluent syringe for trapped air bubbles.
8. If trapped air bubbles are found, perform (MENU 2- 3) [PRIME DILUENT].
9. Wipe outer surface and stainless steel plate below the pipettes with disinfectant.

Clean and inspect the outer needle.

1. Loosen the two knurled nuts and remove the safety screen..
2. Dip a cotton bud in the disinfectant.
3. Clean the outer needle.

Re-install the safety screen and fasten the two knurled nuts.

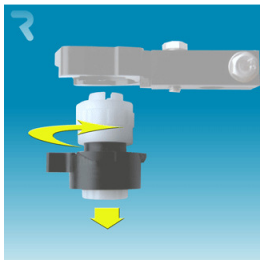
Work instruction Number 171	
Page 1 of 6	**Purpose:** Weekly
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Version 3, March 2010

Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

Fill nozzle

Disassemble the fill-nozzle:

1. Turn the holder to the right.
2. The fill-nozzle can now be removed.
3. Disconnect the silicon tube from the fill nozzle.

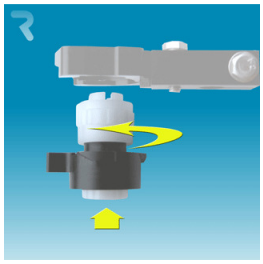


Clean fill-nozzle:
The use of a toothbrush and detergent is recommended.

1. Carefully scrub the fill nozzle inner part.
2. Use a tissue to dry the fill nozzle.

Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Liquid separator

Removing the liquid separator

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)

4. Disconnect the silicon tube from the tube connection on the top section.
5. Remove bacterial HEPA filter.
6. Remove and disassemble the liquid separator.

Cleaning liquid separator

1. Clean all parts with hot water and a brush.
2. Use some acid free vaseline on the screw-thread of the glass jar.
3. Assemble the separator.

Replacing the liquid separator

1. Replace the top section.
   A little silicon grease on the rim of separator will make the assembling and adjustment easier.
2. If applicable replace the bacterial HEPA filter
   (For Maintenance Level 4: Exchange bacterial HEPA filter QWLV040002)
3. Re-connect the silicon tube to the tube connector on the top section.
4. Lift left cover.
5. Lift stainless steel vacuum tube up.
6. Insert the liquid separator sliding it over the support shelf.
7. Push the liquid separator towards the rear, with the sensor connectors in the holes.
8. Release the stainless steel vacuum tube.
9. Replace the waste container.
10. Close left cover.

Sensor check

Optical sensor check:

1. Use the arrow keys to select (MENU 4-5), [MEAS/FILL/TEMP SENSOR CHECK]
2. Values must within the following range;
   - Measure sensor MS 40..**50**..60
   - Fill stop sensor FS 90..**140**..165
3. Measure head out of range: clean sensor of measure head. Work Instruction 172.

Vacuum pressure:

1. Use the arrow keys to select (MENU 4-7), [FLOW SENSOR CHECK].
2. The vacuum unit switches on and the following values are shown on the display:
   - Flow: 0925....1020 Abs: 0320....0360 Offset: 0045.....0055

If the vacuum is not in range there is a possibility that there is a blockage in the flow. The value in the flow will be: Offset: 0045-**0050**-0055. Press the **[ESC]** key to return to the normal mode.

Final preparation

Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

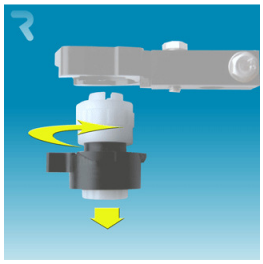
1. Check system for leakage.
2. Inspect the peristaltic pump tubes and connections for leaks.
3. Check that liquid does not run back into the supply bottles after the pumps have stopped.
4. Inspect sample needle condition.
   If necessary replace the sample probe or outer needle. See Work Instruction Sample probe or outer needle replacement.
5. Check tubing from the syringe for trapped air bubbles.
6. Check Diluent syringe for trapped air bubbles.
7. Wipe outer surface and stainless steel plate below the pipettes with disinfectant.

Work instruction Number 173	
Page 1 of 11	**Purpose:** Level 4 Maintenance
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Version 3,October 2012

Fill nozzle

Disassemble the fill-nozzle:

1. Turn the holder to the right.
2. The fill-nozzle can now be removed.
3. Disconnect the silicon tube from the fill nozzle.

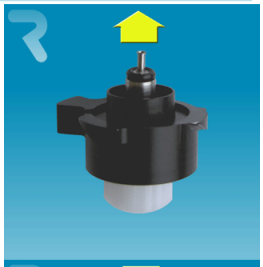


Disassemble fill nozzle holder:

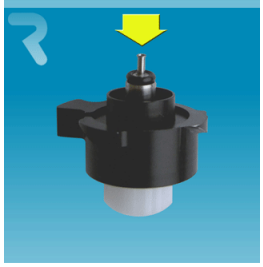
1. Turn the holder to the right.
2. The holder can now be removed

Replace O-ring:

1. Remove the O-ring. (**QWLV050004**)



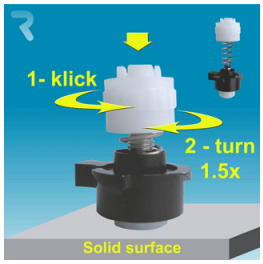
1. Install new O-ring. (**QWLV050004**)



Assemble fill nozzle holder:

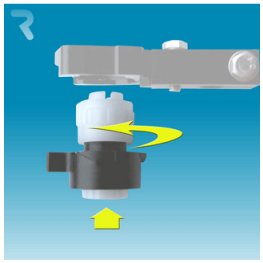
Push the plastic top part down against the spring pressure.

1. Turn the plastic top part anti clockwise until you hear or feel a click.
2. Turn the plastic top part clockwise for 1.5 turns.



Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Liquid separator

Removing the liquid separator

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Disconnect the silicon tube from the tube connection.
5. Remove bacterial HEPA filter.
6. Open the liquid separator by pulling off the top section.

Cleaning the liquid separator

1. Clean the internal parts of the separator with disinfectant.

Cleaning liquid separator

1. Clean all parts with hot water and a brush.
2. Use some acid free vaseline on the screw-thread of the glass jar.
3. Assemble the separator.

Replace the liquid separator

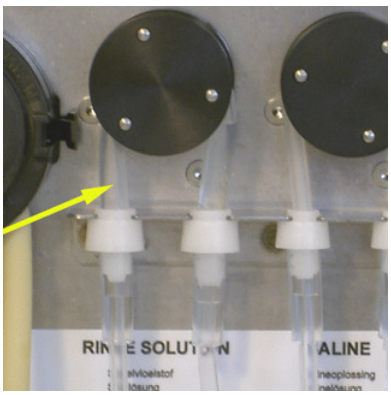
1. Replace the top section.
   A little silicon grease on the rim of separator will make the assembling and adjustment easier

2. If applicable replace the bacterial HEPA filter
   (For Maintenance Level 4 exhange bacterial HEPA filter QWLV040002)
3. Re-connect the silicon tube to the bottom tube connector.
4. Lift left cover.
5. Lift stainless steel vacuum tube up.
6. Insert the liquid separator sliding it over the support shelf.
7. Push the liquid separator towards the rear, with the sensor connectors in the holes.
8. Release the stainless steel vacuum tube.
9. Replace the waste container.
10. Close left cover.

Exchange bacterial filter **QWLV040001** on the waste bottle assembly.

Rinse and saline tube

New rinse pump tube assembly **ESRI090902**.

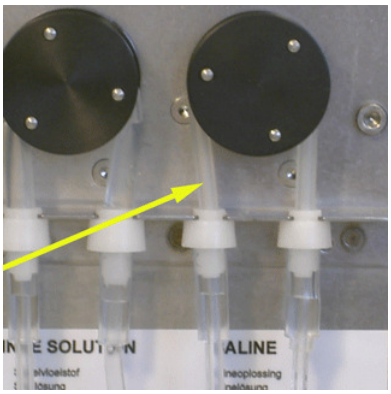


Open left cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

New saline pump tube assembly **ESRI090903**



Open left Cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

Fill and clean

Cleaning agent preparation :

1. Prepare a flask filled with 150 ml of hot de-ionized water (80ºC)
2. Add 15 ml cleaning agent QRR 010905.
3. Mix well do not shake

Start fill and clean procedure:

1. From the (MENU 2- 9) select FILL & CLEAN ALL.
2. The sample probe will lower halfway; connect the extension tube carefully to the sample probe. (Extension tube **ESRI 110004** must be in the flask with the cleaning agent.)
3. Press **[ENTER]** to start the fill and clean procedure.

Note: Each pipette on the pipette belt will be filled with cleaning agent, after one hour the first pipette is washed and dried. Fill and clean takes about 1 ½ hours to complete.

Check sensors

Optical sensor check:

1. Use the arrow keys to select (MENU 4-5), [MEAS/FILL/TEMP SENSOR CHECK]
2. Values must within the following range;
   - Measure sensor MS 40..**50**..60
   - Fill stop sensor FS 90..**140**..165
3. Measure head out of range: clean sensor of measure head. Work Instruction 172.

Vacuum pressure:

1. Use the arrow keys to select (MENU 4-7), [FLOW SENSOR CHECK].
2. The vacuum unit switches on and the following values are shown on the display:
   - Flow: 0925....1020 Abs: 0320....0360 Offset: 0045.....0055

If the vacuum is not in range there is a possibility that there is a blockage in the flow. The value in the flow will be: Offset: 0045-**0050**-0055. Press the **[ESC]** key to return to the normal mode.

Final preparation

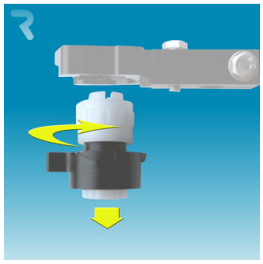
Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

1. Check system for leakage.
2. Inspect the peristaltic pump tubes and connections for leaks.
3. Check that liquid does not run back into the supply bottles after the pumps have stopped.
4. Inspect sample needle condition.
   If necessary replace the sample probe or outer needle. See Work Instruction Sample probe or outer needle replacement.
5. Check tubing from the syringe for trapped air bubbles.
6. Check Diluent syringe for trapped air bubbles.

Work instruction Number 174	
Page 1 of 15	**Purpose:** Level 3 maintenance
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, October 2001

Disassemble the fill-nozzle:

1. Turn the holder to the right.
2. The fill-nozzle can now be removed.
3. Disconnect the silicon tube from the fill nozzle.

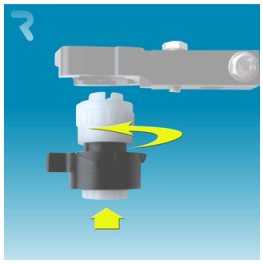


Clean fill-nozzle:
The use of a toothbrush and detergent is recommended.

1. Carefully scrub the fill nozzle inner part.
2. Use a tissue to dry the fill nozzle.

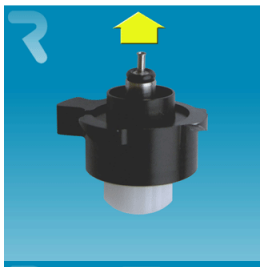
Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.

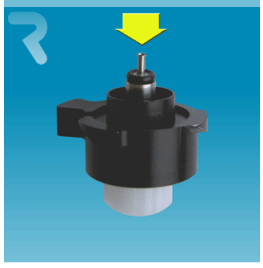


Replace O-ring:

1. Remove the O-ring. (**QWLV050004**)



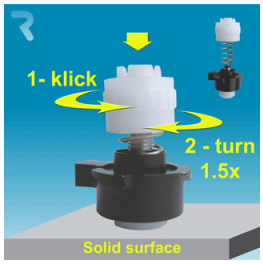
1. Install new O-ring. (**QWLV050004**)



Assemble fill nozzle holder:

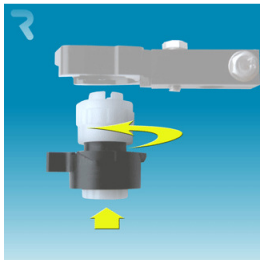
Push the plastic top part down against the spring pressure.

1. Turn the plastic top part anti clockwise until you hear or feel a click.
2. Turn the plastic top part clockwise for 1.5 turns.



Assemble fill-nozzle:

1. Connect the silicon tube to the fill nozzle.
2. Put the fill nozzle into the holder.
3. Push the fill nozzle upwards and turn the holder to the left.



Removing the liquid separator

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Disconnect the silicon tube from the tube connection.
5. Remove bacterial HEPA filter.
6. Open the liquid separator by pulling off the top section.

Cleaning the liquid separator

1. Clean the internal parts of the separator with disinfectant.

Cleaning liquid separator

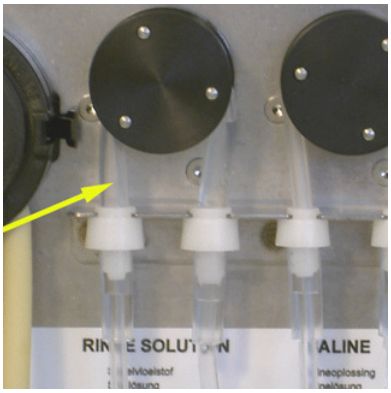
1. Clean all parts with hot water and a brush.
2. Use some acid free vaseline on the screw-thread of the glass jar.
3. Assemble the separator.

Replace the liquid separator

1. Replace the top section.
   A little silicon grease on the rim of separator will make the assembling and adjustment easier
2. If applicable replace the bacterial HEPA filter
   (For Maintenance Level 4 exhange bacterial HEPA filter QWLV040002)
3. Re-connect the silicon tube to the bottom tube connector.
4. Lift left cover.

5. Lift stainless steel vacuum tube up.
6. Insert the liquid separator sliding it over the support shelf.
7. Push the liquid separator towards the rear, with the sensor connectors in the holes.
8. Release the stainless steel vacuum tube.
9. Replace the waste container.
10. Close left cover.

New rinse pump tube assembly **ESRI090902**.

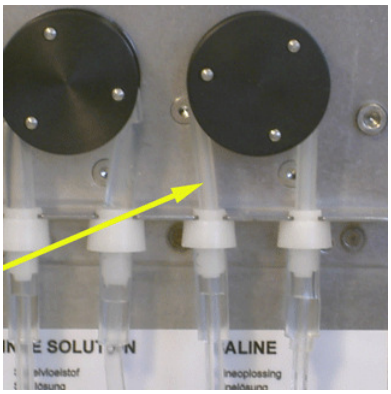


Open left cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

New saline pump tube assembly **ESRI090903**



Open left Cover.

New tube replacement:

1. Pull pump tube slightly downwards and at the same time towards the front of the unit to release the tube out of the pump plate holder.
2. Remove the old tube from the peristaltic pump rotor.
3. Disconnect the tubing at both ends of the tube connectors.
4. Connect new tubing to both ends of the connectors.
5. Place one end of the tube in the pump plate holder.
6. Pull the new tube over the peristaltic pump rotor.
7. Pull pump tube slightly downwards and at the same time towards the back of the StaRRsed Compact.

Cleaning agent preparation :

1. Prepare a flask filled with 150 ml of hot de-ionized water (80ºC)
2. Add 15 ml cleaning agent QRR 010905.
3. Mix well do not shake

Start fill and clean procedure:

1. From the (MENU 2-9) select FILL & CLEAN ALL.
2. The sample probe will lower halfway; connect the extension tube carefully to the sample probe. (Extension tube **ESRI 110004** must be in the flask with the cleaning agent.)
3. Press **[ENTER]** to start the fill and clean procedure.

Note: Each pipette on the pipette belt will be filled with cleaning agent, after one hour the first pipette is washed and dried. Fill and clean takes about 1 ½ hours to complete.

Optical sensor check:

1. Use the arrow keys to select (MENU 4-5), [MEAS/FILL/TEMP SENSOR CHECK]
2. Values must within the following range;
   - Measure sensor MS 40..**50**..60
   - Fill stop sensor FS 90..**140**..165
3. Measure head out of range: clean sensor of measure head. Work Instruction 172.

Vacuum pressure:

1. Use the arrow keys to select (MENU 4-7), [FLOW SENSOR CHECK].
2. The vacuum unit switches on and the following values are shown on the display:

- Flow: 0925....1020 Abs: 0320....0360 Offset: 0045.....0055

If the vacuum is not in range there is a possibility that there is a blockage in the flow. The value in the flow will be: Offset: 0045-**0050**-0055. Press the **[ESC]** key to return to the normal mode.

Prime Saline (166)

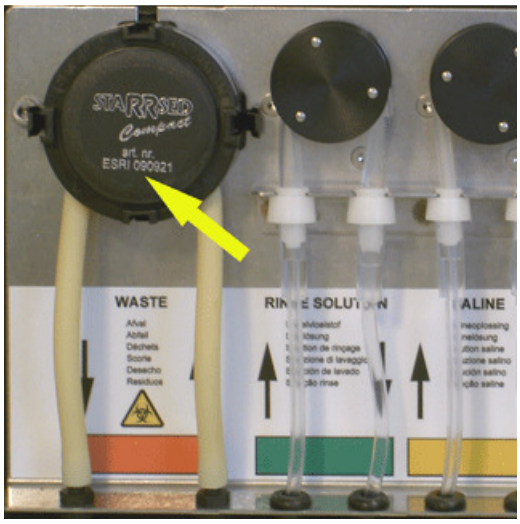
1. Select PRIME SALINE. Repeat the prime saline until the liquid separator is empty.

Waste Cassette

The waste system must be cleaned before replacing the waste pump cassette.

1. Open the left cover and remove the waste container. The liquid separator is now visible.
2. Lift the stainless steel vacuum tube with use of the lever.
3. Pull the liquid separator towards the front of the Compact. (Note: The separator has two sensor connectors at the rear)
4. Remove bacterial HEPA filter.
5. Fill waste separator with 100ml disinfectant or 100 ml water with 2% bleach.
6. Replace bacterial HEPA filter.
7. Lift left cover.
8. Lift stainless steel vacuum tube up.
9. Insert the liquid separator sliding it over the support shelf.
10. Push the liquid separator towards the rear, with the sensor connectors in the holes.
11. Release the stainless steel vacuum tube.
12. Replace the waste container.
13. Close left cover.

Waste Cassette



1. Disconnect the two tubes from the waste pump cassette.
2. Press levers (at three o'clock and nine o'clock positions) and pull at the same time.
3. Clean peristaltic pump motor shaft using a tissue soaked in alcohol.
4. Remove the old blotting washer **ESRI090026** around the motor shaft.
5. Place the new blotting washer **ESRI090026**.
6. Insert new waste pump cassette **ESRI090921** until it clicks into place.
7. Remove the protection caps on from the tubes.
8. Connect the two tubes to new waste pump cassette.

Replace the pinch valve tube **ESRI010246**

1. Open the left cover.
2. Pull the tube out the pinch valve.
3. Disconnect the silicon tube from the bottom connector and the top connector.
4. Remove the tube.
5. Connect the silicon tube to the bottom connector and the top connector.
6. Push the tube in the pinch valve.
7. Close the left cover.

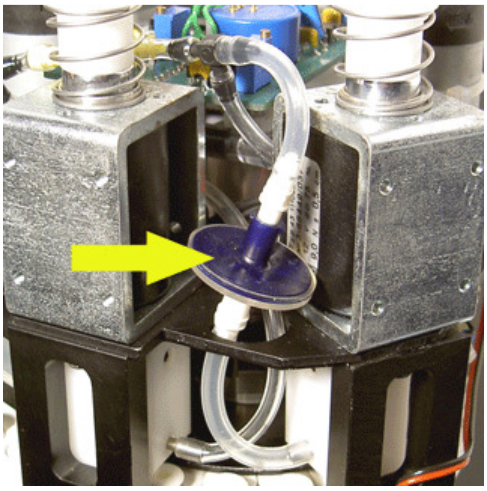
Prepare disinfectant: (if not already prepared).
Add **10 ml** bleach (sodium hypochlorite) to **190 ml** de-ionized water. **(5% solution)**
This disinfectant is for cleaning of all external parts that are exposed to blood.

1. Check system for leakage.
2. Inspect the peristaltic pump tubes and connections for leaks.
3. Check that liquid does not run back into the supply bottles after the pumps have stopped.

4. Inspect sample needle condition.
   If necessary replace the sample probe or outer needle. See Work Instruction Sample probe or outer needle replacement.
5. Check tubing from the syringe for trapped air bubbles.
6. Check Diluent syringe for trapped air bubbles.

Air filter replacement (ESRI) (179)

1. Pull both tube connectors out of the blue filter.
2. Replace with new blue filter
3. Reconnect the tube connectors on the filter

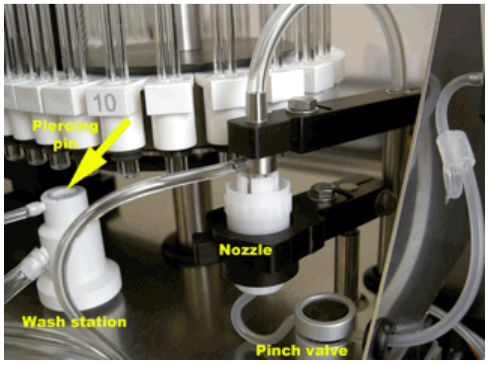


Work instruction Number 176	
Page 1 of 1	**Purpose:** Replace the fill nozzle
Safety: *Bio Hazard area*	
Instrument: Compact	**Revision:** Draft, October 2001

Disassembly fill nozzle:

The use of detergent is recommended.

1. Disconnect the silicon tube from the fill nozzle.
2. Remove the fill nozzle.
3. Push the leaf spring downwards and slide spring to the left



Assembly fill nozzle:

1. Ensure the flat edge of the fill nozzle is correctly aligned with flat edge in the black arm.
2. Push blade spring downwards and slide to the right.
3. Reconnect the silicone tube.

Work instruction Number 181 (3)	
Page 1 of 1	**Purpose:** Replace diluter syringe Teflon tip
Safety: None Bio Hazard area	
Instrument: Compact	**Revision:** Draft, October 2001

Disassembly diluter syringe: (181)

1. Unscrew the knurled knob on the end of the syringe plunger.
   1. Take the syringe from the diluter assembly.
   2. Pull the plunger out of the syringe.
   3. Cut the Teflon tip of the plunger with a sharp knife.
      Be careful not to damage the metal plunger.
   4. Replace the O-ring and then the tip.
   5. Replace the old tip for the new tip assembly. (From repair set QWLV030902)
   6. Moisten the tip with water to ease the tip back into the glass syringe barrel.

Replace the syringe back on the diluter assemble. Make sure flange on glass barrel is clipped into groove on black plastic back plate.

1. Tighten the knurled knob on the back plate of the syringe plunger.
2. Reconnect the tube connector on top of the syringe.
3. Prime diluent (MENU 2-3) [PRIME DILUENT]
4. Repeat this step until there are no air bubbles in the total diluent system.

Check your dilution settings:

1. Select display dilution on (MENU 6-3) [DISPLAY DILUTION ON/OFF].
2. Run 10 samples through the instrument and make a note of the dilution rate.
3. Calculate the mean value of the 10 samples.
4. Make adjustment if necessary in (MENU 7-3)[DILUTION ADJUSTMENT].

16. APPENDIX FOR STARRSED COMPACT

Appendix section

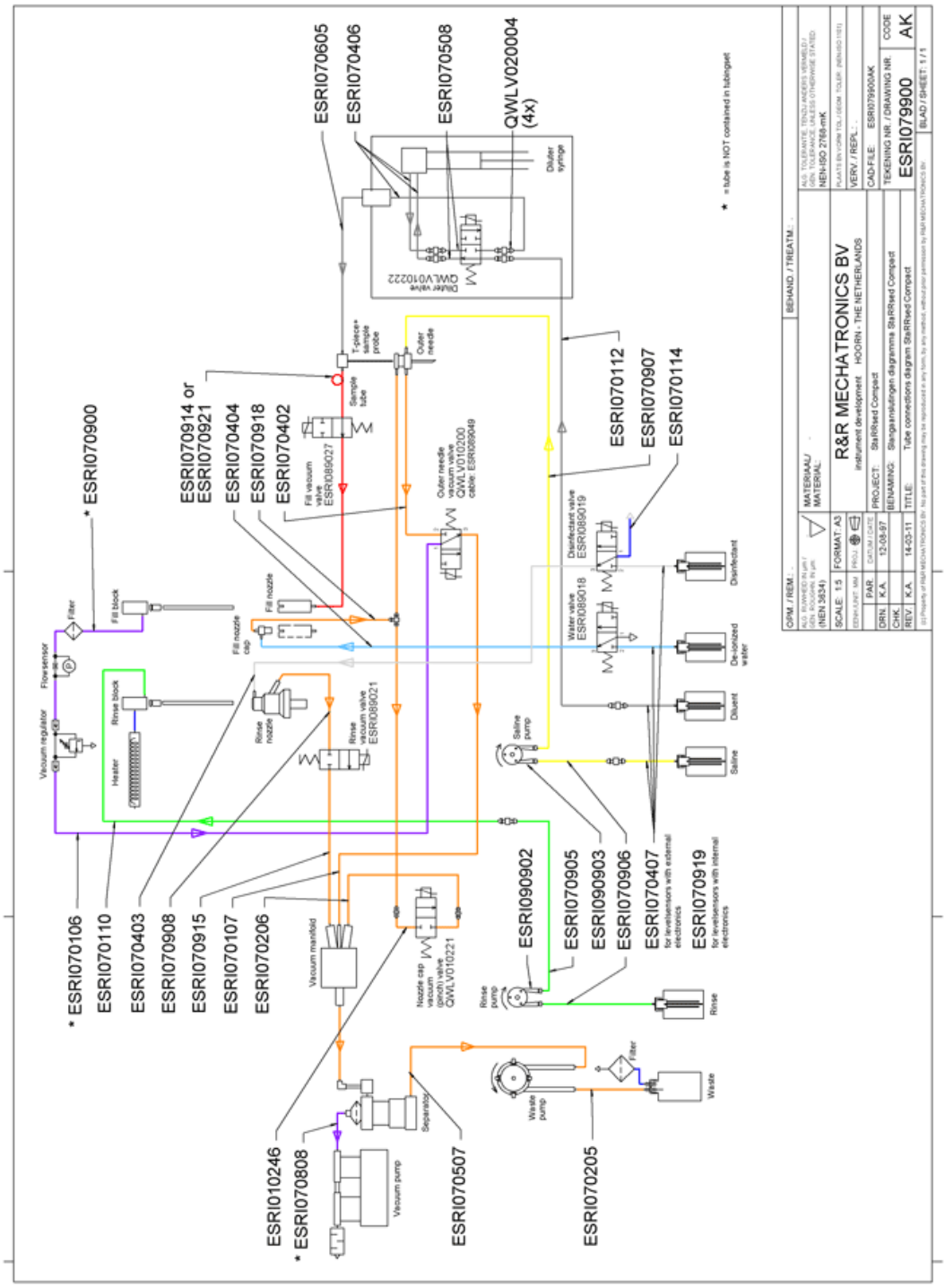
Appendix - Article reference list Compact

The Compact is delivered with a complete accessories kit ESRI 110991. This reference list is for article order numbers only.

Part number	Description
QWFG010200	Bottle 2.5 litres
QWFG010201	Cap bottle 2.5 litres
ESRI010246	Pinch valve tube
QWLV040002	Bacterial Filter (waste separator)
ESRI010907	Cap waste bottle
QRR 010905	Cleaning agent
QRR 010931	Diluent
QRR 010947	Disinfectants
QRR 010933	Saline
QRR 010934	Rinse solution
QWLV050004	O-ring for Fill Nozzle
ESRI030903	Westergren pipette assembly
QWLV050003	0-ring Sample Probe
ESRI050909	Sample Probe assembly
QWLV040001	Disc filter 25mm Waste cont. (White)
QWLV040003	Disc filter Vacuum Regulator (Blue)
ESRI090902	Rinse Tube assembly
ESRI090903	Saline Tube assembly
ESRI090921	Waste cassette assembly
ESRI090026	Blotting washer
QEPT100001	Parallel Printer cable
ESRI110001	Ruler StaRRsed Compact
ESRI110004	Tube silicon 1.5*3.2 (Fill & clean)
ESRI110011	User manual Compact
QEDK10001	Euro power cord
ESRI110019	Taps for the reagents containers
QEDV130022	Fuse 5 A. (110V) Slow 5x20 mm.
QEDV130019	Fuse 2.5 A. (230V) Slow 5x20 mm.

ESRI110105	Waste sticker 2500 ml

Appendix - Tube connection Compact



Appendix - Printer cable

For the connection to the printer, use a standard printer to PC cable. This cable can be obtained in any Computer shop.

Note: Since 2010 this type of cable is not always available anymore.

Appendix - Compact system messages

The Compact generates four main types of error messages;

- System messages.
- Test messages.
- System time-out messages.
- Error messages.

During normal operation the following "**System messages**" may occur:

1. *Waiting tube*
   - If a filled pipette is at the measuring position before the elapsed time has finished and the operator is ready to fill the next pipette, the *Waiting tube* message will be displayed.
   - To continue the sample loading sequence the operator must wait until the pipette at the measuring position has been measured.

2. *Printer failure*
   - When the printer is off in the display. Go to [MENU 5-4 PRINTER ON/OFF]" and toggle on.
   - Check paper feed and quantity.
   - Check printer cable connection.
   - Printer must be on-line.
   - Note: data will be stored in the buffer and can be printed afterwards

3. *Reagents level empty message*
   - All reagent containers have level detectors; the display shows an error that indicates which reagent container(s) is (are) empty.
   - The expiry date of the reagent is exceeded or the container is opened longer than three months.
     Prepare new reagent as described in section Reagents preparation.

-
-

4. *Waste bottle full message*
   - The waste container also has a level detector. If the "*Waste bottle full*" message is indicated on the display, the compact will stop the "rinse and fill" cycle until a new or empty container has been installed.
   - [MENU 6-1 CLEAR FATAL ERROR]. must be carried out before the compact will start again.

5. *Fatal separator error*
   - The separator container has also a level detector. If the "*Fatal separator error*" message is indicated on the display, the Compact will stop the "rinse" cycle until the separator is empty.
   - The cause of this problem can be foam, or the waste pump is not working. The compact will continue to measure and send the ESR results on time to the printer, but the rinse and fill sequences are stopped until the error is solved.

During the start-up sequence, all the positioning sensors are tested. If incorrect the instrument will generate one of the following **test messages**.

1. Switch printer on.
   - Compact checks printer availability, if printer is off line or busy this message will appear.

2. Test fill-nozzle unit.
   - Checks position of the fill-nozzle unit, if incorrect the unit will be re-positioned by the system.

3. Test rinse-unit.
   - Checks position of the rinse-unit, if incorrect the unit will be re-positioned by the system.

4. Test measure-unit.
   - Checks position of the measure-unit, if incorrect the unit will be re-positioned by the system.

5. Test needle-unit.
   - Checks position of the needle-unit, if incorrect the unit will be re-positioned by the system.

6. Test drive.
   - Checks position of the drive unit, if incorrect the unit will be re-positioned by the system.

During normal operation the following "**System time-out**" errors may occur.
These are usually fatal errors. Call distributor or your local supplier of the Compact.

1. Drive-unit.
   - Compact was not able to position the pipette belt within a certain time limit.
   - Check for mechanical obstructions.

2. Measure-unit.
   - Compact was not able to position the measure-unit within a certain time limit.
   - Check for mechanical obstructions.

3. Rinse-unit.
   - Compact was not able to position the rinse-unit within a certain time limit.
   - Check for mechanical obstructions.

4. Fill-nozzle unit.
   - Compact was not able to position the fill-nozzle unit within a certain time limit.
   - Check for mechanical obstructions.

5. Needle adapter.
   - Compact was not able to position the needle adapter within a certain time limit.
   - Check for mechanical obstructions.

6. Sample probe.
   - Compact was not able to position the sample probe within a certain time limit.
   - Check for mechanical obstructions.

The following "**Error messages**" may occur during normal operation.

1. Vacuum error.
   - Check if vacuum is available.
   - Check if the flow sensor is working in [MENU 4-7].
   - Fatal error, call distributor.

2. Vacuum stabilization error.
   Compact was not able to get a stable reading during the vacuum test before aspirating the sample.
   - Check for leakage on the pipette or fill nozzle.
   - Fatal error, call distributor.

3. Fill time error.
   The fill sensor was not triggered in time.
   - Not enough liquid was sucked up in the pipette.
   - Insufficient sample volume.
   - No or poor vacuum, blocked needle or fill block.

4. Dilutor error.
   - Dilutor not started.
   - Can be seen in the run mode display as EDTA 001.
   - Check the value of the dilutor sensor in [MENU 4-6].
   - Check if vacuum is available.
   - Check if the flow sensor is working in [MENU 4-7].
   - Fatal error, call distributor.

5. Position error.
   Compact was not able to position the carousel. There was a difference found in the position table and the actual measured position of the position sensor.
   - Check in MENU 4 - 4 [PIPETTE NUMBER AT RINSE POSITION]
   - If not correct select MENU 6-0 [PASSWORD], MENU 10 - 5 [SET TUBE NUMBER] and type the correct number of the pipette at the rinse station. Run MENU 7-9 [QUICK BELT POS. CHECK].

6. Up or down sensor error.
   Compact was not able to detect the position of the fill nozzle on the sensors.
   - Up sensor failure, the fill nozzle is not at the fill position.
   - Down sensor failure the fill nozzle is not at the home position.
   - Check for mechanical obstruction around the fill nozzle.
   - Fatal error, call distributor.

7. Rinse head up error.
   The rinse head down sensor was not triggered during the movement time of the carousel.
   - Check the gap between the top of the rinse nozzle and the bottom of the pipette this should be 1.5 to 2 mm.
   - Check if the sensor is correct, or readjust the sensor.
   - Fatal error, call distributor.

8. Measure head not home error.
   Measure head is not at the home position.
   - Check the home sensor
   - Measure motor faulty.
9. Separator full error
   It takes to long for the waste pump to empty the liquid separator
   - Check separator assembly on air leaks
   - Replace waste tubes
   - Exchange waste pump cassette
   - Clean liquid separator

Appendix - Factory default settings Compact

Menu text	Menu	Software Default Setting	Factory Setting	Client settings
EDTA mode	Menu 1-7	ON	ON	
Wash each pipette	Menu 2-7	OFF	OFF	
Select language	Menu 3-0	English	English	
ESR	Menu 3-1	60 Min	60 Min	
Pipette wash time	Menu 3-2	7 Sec	7 Sec	
Pipette dry time	Menu 3-3	5 Sec	5 Sec	
Sample probe depth	Menu 3-4	5	5	
Set system Time	Menu 3-5	00.00.00	Time	
Set system Date	Menu 3-6	01-01-1998	Date	
Set Tcorr	Menu 3-7	ON	ON	
Adjust temp. Sensor	Menu 3-9	18.3	18.3	
Meas/Fill/Temp	Menu 4-5	FS 90..**140**..165 MS 40..**50**..60 TS room temperature	FS 90..**140**..165 MS 40..**50**..60 TS room temperature	
Diluter start	Menu 4-6	400-700	400-700	
Flow sensor check	Menu 4-7	Flow: 0925-**0980**-1020 Abs: 0300-**0327**-0345 Offset: 0045-**0050**-0055	Flow: 0925-**0980**-1020 Abs: 0300-**0327**-0345 Offset: 0045-**0050**-0055	
Set baud rate	Menu 5-1	9600	9600	
Checksum	Menu 5-5	OFF	OFF	
ACK/NACK	Menu 5-6	OFF	OFF	
30 min. output	Menu 5-7	OFF	OFF	
30 min. Method	Menu 5-8	OFF	OFF	
Printer	Menu 5-9	On	On	
Display dilution	Menu 6-3	OFF	OFF	
Dilution err dect 0…25	Menu 6-4	10	10	
Bar code reader	Menu 7-0	Opticon	Opticon	
Dilution adjustment 80%..100%	Menu 7-3	100%	100%	

Print raw measure data	Menu 7-2	OFF	OFF	

Appendix - Maintenance schedule

Maintenance schedule StaRRsed Compact				Daily	Once a week	Level 5	Level 4 30 days	Level 3 90 days	Level 2 180 days	Level 1 365 days	Total amount / year
Sample volume		200-400	Per day								
			Clean outside of the aspiration needle	X							
			Perform End-of-day wash	X							
Check			Measure sensor MS 40..**50**..60		X						
Check			Fill stop sensor FS 90..**140**..165		X						
Check			Flow sensor Flow: 0925-**0980**-1020 Abs: 0300-**0327**-0345		X						
Check			Diluter start sensor 400-700		X						
Check			Temperature sensor TS [Room temperature]		X						
Check			Diluent flow sensor check Signal down and signal Up must be green		X						
Based on	1500	Fill Nozzle cleaning		every	7	days					
Based on	1500	Clean liquid separator		every	7	days					
Based on	6000	Run fill and clean procedure (Cleaning agent)		every			30	days			

ESRI050909	C/R	Sample Probe assembly							X	
QTST040001	C/R	Valve Tubing silicon							X	84
ESRI070914	Replace	Sample tube assembly							X	1
ESRI079200		Tubing Set Compact							X	1
ESRI090920	C/R	Waste pump motor assembly							X	1
Note: C/R = **C**heck: if not correct -> **R**eplace the part										

Maintenance schedule StaRRsed Compact Sample volume 200-400 Per day Daily Sample volume 300		Daily	Once a week	Level 5	Level 4 30 days	Level 3 90 days	Level 2 180 days	Level 1 365 days	
Article number	Article description								
QWLV040002	Bacterial Air Filter (Hepa)				X				12
QWLV050004	O-ring 2.5x1.5 (Valve body A) (Fill nozzle)				X				12
QWLV040001	Disc Filter 25 mm (white) (only if internal waste container is used)				X				12
QWLV040003	Disc filter (blue)				X				22
ESRI090902	Rinse Tube assembly				X				12
ESRI090903	Saline Tube assembly				X				12
ESRI090921	Waste cassette assembly					X			4
QWLV030901	Teflon tip repair set (1 ring)						X		2
ESRI030906	Flat washer for fill block							X	1
ESRI010246	Pinch valve tube					X			4
ESRI090026	Blotting washer					X			4
ESRI050909	Sample Probe assembly							X	1
ESRI090920	Waste pump motor assembly							X	1
QTST040001	Valve Tubing silicon (pipettes)							X	84

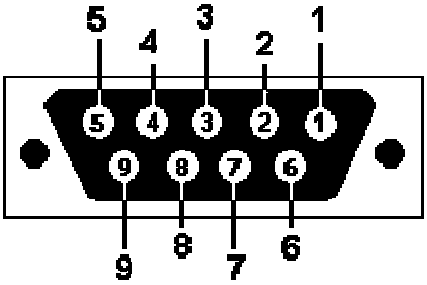
For older models

QWLV060001	Flat Washer Fill-Nozzle EDTA				X				12
ESRI060911	Teflon tip repair set (Version I diluter 2 rings)						X		2
QWLV010104	One-way check valve (Version I diluter 2 rings)							X	1

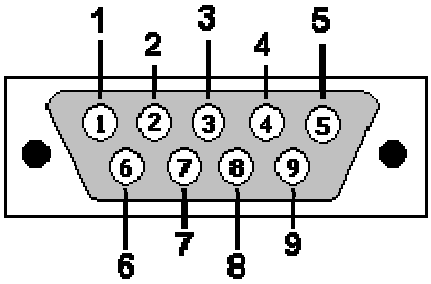
Appendix - RS-232 (DB9 pins male) hardware back panel connector

The 9-pins sub D (male) connector is for the serial output of the StaRRsed Compact.

Connector layout DB9



DB9: View looking into female connector DCE



DB9: View looking into male connector DTE

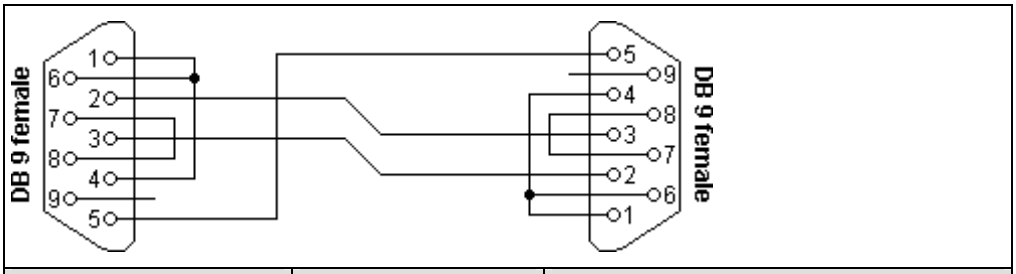
At the female connector the pin layout is:

Pin no	Name	Dir	Notes / Description
1	DCD	Input	Data Carrier Detect. Raised by DCE when modem synchronized.
2	SD (TXD)	Output	Transmit Data (a.k.a TxD, Tx). Sending data to DTE.
3	RD (RXD)	Input	Receive Data (a.k.a RxD, Rx). Arriving data from DCE.
4	DTR	Output	Data Terminal Ready. Raised by DTE when powered on. In auto-answer mode raised only when RI arrives from DCE
5	GND (SG)		ground
6	DSR	Input	Data Set Ready. Raised by DCE to indicate ready.
7	RS (RTS)	Output	Request To Send. Raised by DTE when it wishes to send. Expects CTS from DCE.
8	CS (CTS)	Input	Clear To Send. Raised by DCE in response to RTS from DTE
9	RI	Input	Ring Indicator. Set when incoming ring detected - used for auto-answer application. DTE raised DTR to answer.

Null modem with loop back handshaking for DB 9 connectors

The simple null modem cable without handshaking shows incompatibilities with common software. The main problem with this cable is that there is a possibility for the software to hang if it checks the modem signal lines in a proper way. I.e. with this null modem cable, good written programs will perform worse than badly written programs.

To overcome this problem and still be able to use a cheap null modem communication cable with only three lines in it, a fake null modem cable layout has been defined. The null modem cable with loop back handshaking resulted from this.



Connector 1	Connector 2	Function
2		RD (RXD) <- SD (TXD)
3		SD (TXD) -> RD (RXD)
5		GND (SG)
1 + 4 + 6		DTR -> CD + DSR
	1 + 4 + 6	DTR -> CD + DSR
7 + 8		RS (RTS) -> CS (CTS)
	7 + 8	RS (RTS) -> CS (CTS)

The main purpose of this null modem cable is to let well defined software think there is handshaking available, with a null modem cable which has no provisions for it.

All specified RS232 signals are completely isolated from the 'computer earth' and the 'mains supply'.

Handshake:

Hardware handshake is not applied.

Change the data transmission parameters:
From the transmission parameters, only the baud rate can be selected from 1200 up to 9600.

Appendix - 60 minutes reporting

++++++++++++ REPORT EXAMPLE +++++++++++++++++

(Not to scale)

-- StaRRsed--			Date 20/05/07				Time :	15:28		
1	2	3	4	5	6	7	8	9	10	11
Sample ID		ESR	Tc	ASPECT	Manual aspect	Pip.	Time	T	Error	EDTA
972005001		84	75	CLEAR		17	60	23		EDTA
972005002		14	13	Hazy<10mm		18	60	23		EDTA
972005003		22	21	Hazy<25mm		19	60	23		EDTA
972005004		67	61	Hazy>25mm		20	60	23		EDTA

Sample result with a manual aspect, where the manual aspect is shown as a number **3** in column 6 of this data record sample.

972005005		5	4	CLEAR	**3**	21	60	23		EDTA

In this sample, the dilution rate has a dilution failure of 21% and that is printed as **EDTA 079.**

972005006		5	5	CLEAR		22	60	23		**EDTA 079**

Sample results with a text error. This sample gives Too many borders found. Result of a pipette possibly filled with air bubbles.

972005007						24	60	23	Too many borders found	

Sample result with a text error. This sample is given limit error L_err(---/ 84/ 75/200)

972005001						25	60	23	**L_err(---/ 84/ 75/200)**	EDTA

1. Patient number.
2. Not corrected 30-minute ESR result (only in use if 30 minute mode is active).
3. Not corrected 60-minute ESR result.
4. 60-minute ESR result in millimeters, corrected for **18**°C. (only in use if temperature correction is active).
5. Aspect (clear, hazy).
6. Manually entered code number.
7. Sedimentation pipette number (number on the pipette belt).
8. Actual sedimentation time in minutes.
9. Temperature (in degrees Centigrade).
10. Error message (if the Analyser detects an error).
11. EDTA mode.

This code appears in the "sample data record" at column 5.

The following 4 codes are defined:

0	Sample is clear.
1	Sample is Hazy < 10
2	Sample is Hazy < 25
3	Sample is Hazy > 25

Results with hazy aspect can be suppressed in the menu Limit error settings.

ESR "ERROR" and "WARNING" code messages

This code appears in the "sample data record" at column 10.
The following codes are defined:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.
3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution • Bubbles on top • Hazy aspect • Temperature

Appendix - 30 minutes reporting

++++++++++++ REPORT EXAMPLE +++++++++++++++++

(Not to scale)

- StaRRsed--			Date 20/05/07				Time :	15:28		
1	2	3	4	5	6	7	8	9	10	11
Sample ID	Hh	ESR	Tc	ASPECT	Manual aspect	Pip.	Time	T	Error	EDTA
972005001	42	84	75	CLEAR		17	30	23		EDTA
972005002	5	14	13	Hazy<10mm		18	30	23		EDTA
972005003	8	22	21	Hazy<25mm		19	30	23		EDTA
972005004	32	67	61	Hazy>25mm		20	30	23		EDTA

Sample result with a manual aspect, where the manual aspect is shown as a number **3** in column 6 of this data record sample.

972005005	2	5	4	CLEAR	**3**	21	30	23		EDTA

In this sample, the dilution rate has a dilution failure of 21% and that is printed as **EDTA 079.**

972005006	2	5	5	CLEAR		22	30	23		**EDTA 079**

Sample results with a text error. This sample gives Too many borders found. Result of a pipette possibly filled with air bubbles.

972005007						24	30	23	Too many borders found	

Sample result with a text error. This sample is given limit error L_err(42/ 84/ 75/200)

972005001				Hazy<10mm		25	30	23	**L_err(---/ 84/ 75/200)**	EDTA

1. Patient number.
2. Not corrected 30-minute ESR result (only in use if 30 minute mode is active).
3. Not corrected 60-minute ESR result.
4. 60-minute ESR result in millimeters, corrected for **18**°C. (only in use if temperature correction is active).
5. Aspect (clear, hazy).
6. Manually entered code number.
7. Sedimentation pipette number (number on the pipette belt).
8. Actual sedimentation time in minutes.
9. Temperature (in degrees Centigrade).
10. Error message (if the Analyser detects an error).
11. EDTA mode.

This code appears in the "sample data record" at column 5.

The following 4 codes are defined:

0	Sample is clear.
1	Sample is Hazy < 10
2	Sample is Hazy < 25
3	Sample is Hazy > 25

Results with hazy aspect can be suppressed in the menu Limit error settings.

ESR "ERROR" and "WARNING" code messages

This code appears in the "sample data record" at column 10.
The following codes are defined:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.
3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution • Bubbles on top • Hazy aspect • Temperature

Appendix - String format for StaRRsed

ESR string format for StaRRsed 60 minutes format

```
[stx]PPPPPPPPPP www WWW AAAAAAAAmm ppp TTT CC EEEEEEEEEEEEEEEEEEEE MMMMMMMMMM[cr][lf][eot]
```

stx	80 data characters	cr	lf	eot			Checksum - OFF	60 min
stx	80 data characters	cr	lf	etx	cs	eot	Checksum - ON	60 min

Data consists, if 30 min. output is switched to OFF

Position		Description	Format	
1	10	Patient identification text	Text	PPPPPPPPPP
13	15	E.S.R. in mm. 60 minute	xxx	www
18	20	E.S.R. in mm. (60 min corrected for temp)	xxx	WWW
22	30	Aspect	Text	AAAAAAAAA
31	32	Manually added code	xx	mm
34	36	Pipette number	xxx	ppp
39	41	Sedimentation time	xxx	TTT
45	46	Temperature in degree. (Default C.)	xx	CC
48	69	Error messages	Text	EEEEEEEEEEEEEEEEEEEE
71	80	EDTA message	Text	MMMMMMMMMM

CS =1 byte checksum = 256 - (modulo 256 (ASCII string sum)).
ASCII string sum = the ASCII sum of all preceding characters incl. stx, cr, lf and ext modulo 256 (ASCII string sum) = the remainder of the ASCII string sum when divided by 256.

ESR string format for StaRRsed 30 minutes format

```
[stx]PPPPPPPPPP hhh www WWW AAAAAAAAAmm ppp TTT CC EEEEEEEEEEEEEEEEEEEE MMMMMMMMMM[cr][lf][eot]
```

stx	80 data characters	cr	lf	eot			Checksum - OFF	30 min
stx	80 data characters	cr	lf	etx	cs	eot	Checksum - ON	30 min

Data consists, if 30 min. output is switched to ON

Position		Description	Format	
1	10	Patient identification text	Text	PPPPPPPPPP
12	14	E.S.R. in mm. Half hour method	xxx	hhh
16	18	E.S.R. in mm. (calculated to 60 minutes)	xxx	www
20	22	E.S.R. in mm. (60 min corrected for temp)	xxx	WWW
24	32	Aspect	Text	AAAAAAAAA
33	34	Manually added code	xx	mm
37	39	Pipette number	xxx	ppp
41	43	Sedimentation time	xxx	TTT
45	46	Temperature in degree. (Default C.)	xx	CC
48	69	Error messages	Text	EEEEEEEEEEEEEEEEEEEE
71	80	EDTA message	Text	MMMMMMMMMM

Where	ASCII	HEX	DEC
STX	ASCII	$02	02
ETX	ASCII	$03	03
EOT	ASCII	$04	04
LF	ASCII	$0A	10
CR	ASCII	$0D	13
CS	1 byte		

Text.: left aligned followed by spaces (ASCII $20).
xx….: number made up of (xx...) digits 0 9 (ASCIII $30 $39) with leading zeros.
Leading zeros and non-specified positions are filled with spaces (ASCII $20).

Appendix - Protocol MECHATRONICS-02 unidirectional

1	2..254	255	256
STX	Data (253 characters)	**CS**	**ETX**

Position	Data field	# of Bytes	Format	Comment
1	Start of text	1	[STX]	
2	Text distinction code	8	"ESRRE"	Left aligned followed by spaces
10	Instrument ID	20	text	If applicable
30	Sample ID	40	text	
70	Reserved (spaces)	15	text	
85	Aspiration date	10	ddmmyyyy	Text format. E.g. 01012010 = January 1, 2010
95	Aspiration time	5	hhmm	Text format. E.g. 0001 = 0:01 (24-hour clock)
100	E.S.R. 30 minutes (mm/½h)	5	xxxxx	
105	E.S.R. in mm. 60 minute (mm/h)	5	xxxxx	
110	E.S.R. 60 minutes temperature corrected (mm/h)	5	xxxxx	
115	E.S.R. 120 minutes (mm/h)	5	xxxxx	If applicable
120	Reserved (spaces)	10	text	
130	Sample code	5	xxxxx	See section Sample codes
135	Aspect code	5	xxxxx	See section Aspect codes
140	Manually added code	5	xxxxx	

145	Pipette number	5	xxxxx	
150	Sedimentation time (minutes)	5	xxxxx	
155	Temperature	5	xxxxx	
160	Dilution rate (%)	5	xxxxx	
165	Column height (mm)	5	xxxxx	
170	Error code	5	xxxxx	See section ESR error codes
175	Limit error message (results)	30	text	See section Limit error message
205	Reserved (spaces)	50	text	
255	Checksum	1	[CS]	See section Checksum calculation
256	End of text	1	[ETX]	
	Total	**256**		

Text.: left aligned followed by spaces

xx….: number (digits 0-9) with leading spaces

Non-specified positions are filled with spaces

Sample type	Transmitted code
Patient sample	0
QC normal	1
QC abnormal	2

Note: Transmission of QC codes 1 and 2 is part of an internal QC procedure which is still under development. Until this procedure is introduced, all samples are treated as Patient sample (code 0).

Aspect	Transmitted code
Clear	0
Hazy < 10	1
Hazy < 25	2
Hazy > 25	3

ESR error	Transmitted code	Comment
No ERROR	0	
No cells/plasma found	1	ERROR, no result transmitted!
ESR Probably > 140 mm	2	ERROR, no result transmitted!
Too many borders found	3	ERROR, no result transmitted!
Column height	4	WARNING!
Measure error	5	WARNING!
Bubbles on top	6	WARNING!
Limit error	7	ERROR, see Limit error message

Note: See analyzer manual for more information about limit error settings!

When a limit error occurs, the fields for *ESR 30 min, ESR 60 min, temperature corrected ESR* and *ESR 120 min* are filled with spaces and thus results are not send to LIMS.

Together with the other data fields, e.g. the sedimentation time, the operator can see what caused the error and may or may not use the ESR values which are preserved in the limit error message.

Description of the limit error message: **L_err(hhh www ttt ccc ddd)**

- **L_err** means "limit error"
- **hhh** is the 30 minutes ESR
- **www** is the 60 minute ESR
- **ttt** is the temperature corrected 60 minute ESR
- **ccc** is the column height
- **ddd** is the 120 minute ESR (if applicable)

Example of a limit error message without 30 minute ESR and 120 minute ESR:
L_err(--- 123 89 200 ---)

CS = Checksum, XOR sum off all the data (with the exception of CS, STX, and ETX).
E.g.: CS = ((byte2 XOR byte3) XOR byte 4) XOR….etc.

Note: Cannot be equal to that of the ETX byte (03h).

The CS byte verifies the accuracy of each transmitted message. Before transmission, the value of the CS byte is calculated by the “exclusive-or’ing” of all data bytes in the message, with the exception of CS, STX, and ETX. Since the CS byte precedes the ETX byte within the data stream, the calculated value for CS cannot be equal to that of the ETX byte (03h). Therefore, if the calculated CS value is 03h, the transmitted CS byte is set to the substitute value 83h in order to avoid erroneous action by the receiving device.

Appendix - Sysmex R-3500 unidirectional protocol

R-3500 sample data record format (202 bytes)
This is a modified data record coming from a R-3500.

Sample data record format (202 bytes)			
Parameter	**# Of chars**	**Example**	**Comment**
Text distinction code I	1	"D"	
Text distinction code II	1	"1"	
Sample distinction code	1	"U"	
Day	2	23	Day 23
Month	2	03	Month 3 = march
Year	2	00	Year 00 = 2000
Rack no.	4	1234	Rack number = 1234
Tube position no.	2	05	Tube position in rack = 5
Sequence no.	5	00000	n.a.
ID information	1	4	Barcode from barcode label
Sample ID number	13		Patient number
Instrument ID number	9		ID number from compact
Analysis information	1	0	n.a.

Reserved	18	0	n.a.
RET%	5	12300	Esr value = 123
RET#	5	01200	Hazy code = 12
RBC	5	00200	Error code = 2
IRF	5	01200	Temperature in degr. Celsius = 12 degr.
LFR	5	01200	Sedimentation time in minutes = 12 min.
MFR	5	10100	Dilution rate = 101
HFR	5	12300	30 minute ESR value = 123
Reserved	105	0000…	n.a.

n.a. = not applicable

R-3500 Sample data flag record format (131 bytes)

Parameter	# Of chars	Example	Comment
Text distinction code I	1	"D"	
Text distinction code II	1	"B"	
Sample distinction code	1	"U"	
Day	2	23	Day 23
Month	2	03	Month 3 = march
Year	2	00	Year 00 = 2000
Rack no.	4	1234	Rack number = 1234

Tube position no.	2	05	Tube position in rack = 5
Sequence no.	5	00000	n.a.
ID information	1	4	Barcode from barcode label
Sample ID number	13		Patient number
Flags	97	0	n.a.

Compact "HAZY" code messages.
The code appears in the "sample data record" at variable 'RBC'

This code appears in the "sample data record" at column 5.

The following 4 codes are defined:

0	Sample is clear.
1	Sample is Hazy < 10
2	Sample is Hazy < 25
3	Sample is Hazy > 25

Results with hazy aspect can be suppressed in the menu Limit error settings.Compact "ERROR" code messages
This code appears in the "sample data record" at variable 'HGB'.

The following 7 codes are defined:

0	NO ERRORS		
1	No cells/plasma found	ERROR	No contents could be detected in the pipette.
2	ESR Probably > 140 mm	ERROR	Extremely high ESR value.

3	Too many borders found	ERROR	More than three borders found, possibly air bubbles. See Section Trouble shooting ***Air bubbles*** (on page 113).
4	Column height <nnn>	WARNING	Column height must be between 180 and 210mm. <nnn> = the actual column height.
5	Measure error	WARNING	The down count is not equal to the up count from the measure head.
6	Bubbles on top	WARNING	Air bubbles on top of the ESR. See Section Trouble shooting ***Air bubbles*** (on page 113).
7	Limit error	ERROR	One of the following limits are out of the setting range: • ESR Time • Column height • Dilution • Bubbles on top • Hazy aspect • Temperature

Appendix - Sedmatic 100 string format

Normal result string:

pp[ ]PPPPPPPPPP[ ]WWWW[ ][ ][ ][ ][ ][ ][ ][ ][cr][lf]

26 data characters	CR	LF	Total length = 28 characters

- Or - -: Result string with Aspect:

pp[ ]PPPPPPPPPP[ ]WWWW[ ][ ][ ][ ][ ][ ][ ][ ]AAAAAAAAAAA[cr][lf]

- Or -: Result string with Error:

pp[ ]PPPPPPPPPP[ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]EEEEEEEEEEE[cr][lf]

37 data characters	CR	LF	Total length = 39 characters

Data consists:				
Position		Description	Format	
1	2	Pipette number	xx	pp
4	13	Patient identification text	Text	PPPPPPPPPP
15	18	E.S.R. in mm. (60 min)	xxxx	WWWW
		String with Aspect or Error		
27	37	Aspect	Text	AAAAAAAAAAA
27	37	Error	Text	EEEEEEEEEEE

Where		Hex	Dec
CR	ASCII	$0D	013
LF	ASCII	$0A	010
[ ] = Space	ASCII	$20	032

Text.: left aligned followed by spaces (ASCII $20).
xx….: number made up of (xx...) digits 0 9 (ASCIII $30 $39) with leading zeros..
Leading zeros and non-specified positions are filled with spaces (ASCII $20).

Aspect messages:

Aspect	AAAAAAAAAAA
Hazy < 10	Hazy[ ]<[ ]10
Hazy < 25	Hazy[ ]<[ ]25
Hazy > 25	Hazy[ ]>[ ]25

Error messages:

Error	EEEEEEEEEEE
1.No cells / plasma found	Error[ ]1
2.ESR Probably >140 mm	Error[ ]2
3.Too many borders found	Error[ ]3
7.Limit error	Error[ ]7

Note:
If the Compact is switched to the 30 min method the output string has the same format. The Compact automatic apply the conversion table to the 60 min method.
If temperature correction is switched on the ESR value will be the temperature corrected ESR value.

Appendix - Sedmatic 15 string format

1	2..28	29..30	31..32
STX	Data (28 characters)	**CC**	**ETX**
stx	R04PPPPPPPP01pp01WWWW[ ][ ][ ][ ][ ][ ][ ]	CC	etx

Data consists:				
Position		Description	Format	
4	11	Patient identification text	Text	PPPPPPPP
14	15	Pipette number	xx	pp
18	21	E.S.R. in mm. (60 min)	xxxx	WWWW
29	30	Checksum	xx	CC

Checksum = EXOR sum off all 28 data characters.
If checksum is equal to the [ETX] character the checksum is converted to [DEL].

Where		**Hex**	**Dec**
STX	ASCII	$02	002
ETX	ASCII	$03	003
ACK	ASCII	$06	006
NACK	ASCII	$15	021
[ ] = Space	ASCII	$20	032
DEL	ASCII	$7F	127

Text.: left aligned followed by spaces (ASCII $20).
xx….: number made up of (xx...) digits 0 9 (ASCIII $30 $39) with leading zeros.

Note:

- Timeout for response (ACK/NACK) from HOST is 20 seconds.
- If the Compact is switched to the 30 min method, the output string has the same format. The Compact automatic applies the conversion table to the 60 min method.
- If temperature correction is switched on, the ESR value will be the temperature corrected ESR value.
- If the result has an error, the ESR value will be 4 space characters (ASCII $20).

Appendix - String format Vesmatic

[CR] [SP] XX [SP] = [SP] AAAAAAAAAAAA [SP] NNN [SP]

[cr] + 24 data characters Total length = 25 characters

Where		**Hex**	**Dec**
cr	ASCII	$0D	13
sp	ASCII	$20	32

Data consists, if 30 min. method is switched to OFF				
Position		Description	Format	
2	3	Pipette number (1..84)	Number	XX
7	19	Patient identification text	Text	AAAAAAAAAAAA
21	23	The ESR value 60 minute method	Text	NNN
If error is detected				
21	23	E and an error number (see table for number translation)	Text	[sp]EN

Data consists, if 30 min. method is switched to ON				
Position		Description	Format	
2	3	Pipette number (1..84)	Number	XX
7	19	Patient identification text	Text	AAAAAAAAAAAA
21	23	The ESR value convert to 60 minute method	Text	NNN

If error is detected				
21	23	E and an error number (see table for number translation)	Text	[sp]EN

Text.: left aligned followed by spaces (ASCII $20).
xx….: number made up of (xx...) digits 0 9 (ASCII $30 $39)
Leading zeros and non-specified positions are filled with spaces (ASCII $20).

The following error codes are defined:		
EN		
E1	No cells / plasma found	ERROR
E2	ESR Probably >140 mm	ERROR
E3	Too many borders found	ERROR
E7	Limit error	ERROR

Note:
If the Compact is switch to the 30 min method the output string has the same format. The Compact automatics apply the conversion table to the 60-minute method.
If temperature correction is switched on the ESR value will be the temperature corrected ESR value.

Appendix - Configuration barcode readers

The Barcode interface can handle two types of barcode readers,

- The Opticon (6 mil resolution).
- The Keyence (4 mil resolution).

If you are using labels with a higher density, contact your local distributor or agent.

The Barcode reader may be set to accept check digits, however this needs to be programmed by the distributor. Coda bar, Code 39, Code128, UPC, EAN and ITF 2 or 5 barcode types can be read with those barcode reader types.

To set-up the barcode readers to client specifications, use the set-up tools for the barcode readers. Detailed information can be found in Keyence Configuration manual MRN-011 or in Opticon Configuration manual MRN-015.

17. GLOSSARY OF TERMS

E

17.1.1.1.1. ESR

ESR is short for **Erythrocyte Sedimentation Rate.** It is the amount of sedimentation (setting) of erythrocytes (red blood cells) in a blood column during a specified time.

H

17.1.1.1.2. Hazy

A sedimentation is reported to be "**hazy**", when the boundary between blood plasma and erythrocytes can not be defined clearly.

M

17.1.1.1.3. MRN

MRN is short for **Master Registration Number**. It is used as an identification number for any manual for Mechatronics products.

W

17.1.1.1.4. WI

WI is short for **Work Instruction** and is used with an index number for a range of work instructions.

18. INDEX

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