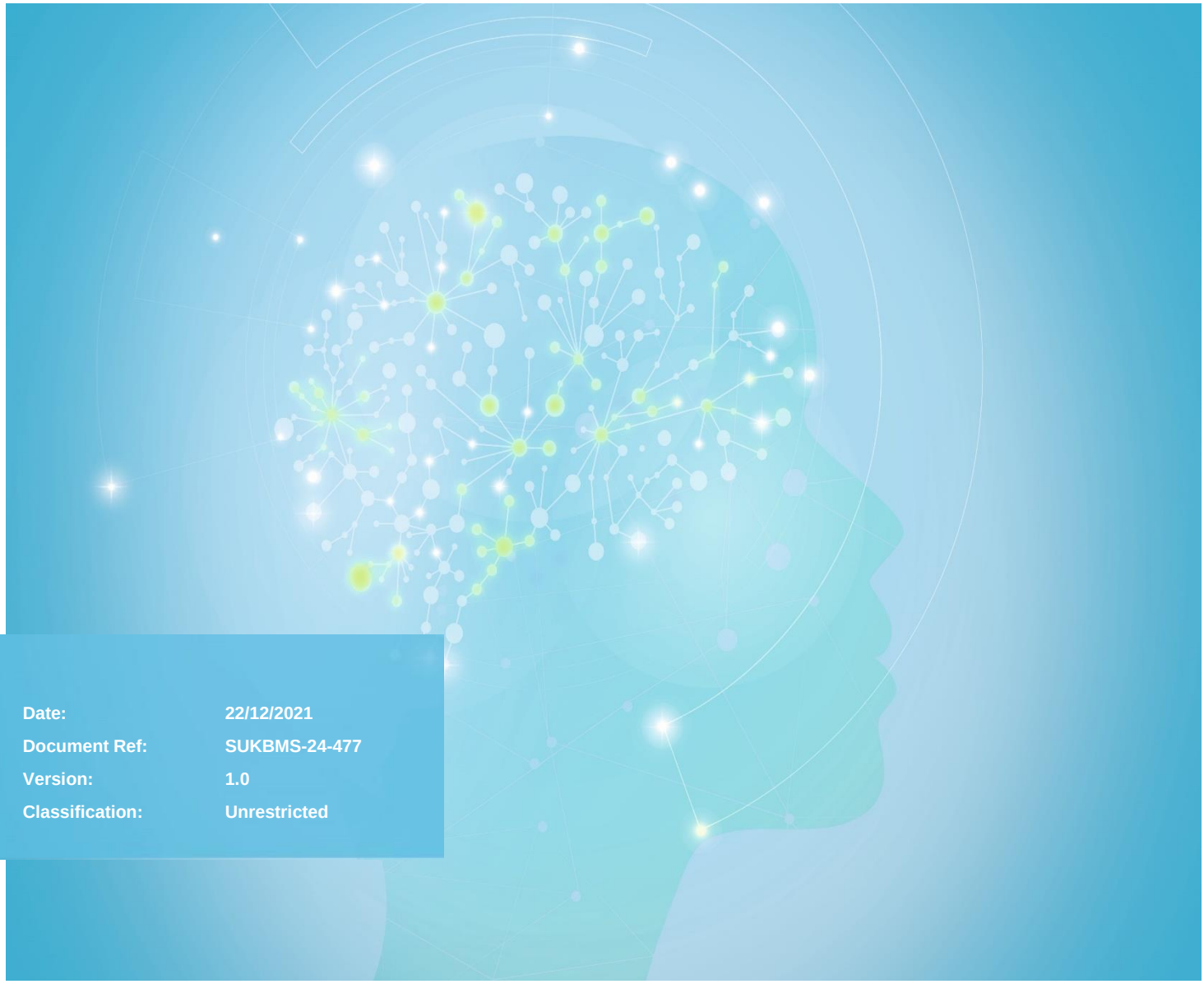
Troubleshooting Workbook

# Starrsed RS, RL and TL



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|---|---|
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# Disclaimer

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## Revision History

| Revised section | Alteration | Name | Date |
|---|---|---|---|
| All | New document | J Hammersley | July 2020 |
| All | Hazard symbols added | K Elgerton | May 2021 |
| All | Updated to reflect software update and include Starrsed TL specific troubleshooting | N Bowen | December 2021 |

## Reference Documents

| Document title | Version | Date |
|---|---|---|
| Starrsed TL Instructions for Use | MRN-164_2-EN Version 1.08 | Jan 2021 |
| Starrsed TL Service Manual | Version 1.03 MRN-175 | March 2021 |
| Starrsed RL Instructions for Use | MRN-164_2-EN Version 2.01 | Jan 2020 |
| Starrsed RS Instructions for Use | MRN-074-2-EN Version 2.01 | Jan 2019 |

## Explanation of Symbols

| Symbol | Explanation |
|---|---|
|  | **Risk of infection –** Always be aware of the dangers of infection, use caution and take appropriate measures. |
|  | **Risk of Injury –** Always be aware of the dangers of injury due to sharp objects, use caution and take appropriate measures. |
|  | **Caution –** Potentially hazardous situation, use caution and take appropriate measures to avoid injury or harm. |

# Starrsed Series Overview

The Starrsed RL, Starrsed RS and Starrsed TL analysers are fully automated in vitro diagnostic medical devices that carry out the erythrocyte sedimentation rate (ESR) analysis according to the Westergren method. The Starrsed RL and TL can be integrated into total haematology automation systems, Sysmex XN-Series and GLP track respectively. The Starrsed RS is a standalone analyser, however, like the Starrsed RL it uses Sysmex sample tube racks for a complete integration system.

| Facts and Figures | | | |
|---|---|---|---|
| **Analyser** | **Starrsed RS** | **Starrsed RL** | **Starrsed TL** |
| **Aspiration Volumes** | 1.4ml EDTA mode<br>1.6ml Citrate mode | | 1.4 - 1.6 ml EDTA mode |
| **Minimum Sample Volume** | 2.0ml | | |
| **Sample Types** | EDTA<br>Citrate | | EDTA |
| **Modes** | 30 mins<br>60 mins | | |
| **Method** | Fully automated Westergren method | | |
| **Dilution (EDTA only)** | 4 (whole blood) :1 (Sodium Citrate) | | |
| **Throughput** | | | |
| **30 min mode** | 140 samples per hour | | 135 samples per hour |
| **60 min mode** | 75 samples per hour | | 75 samples per hour |
| **Other** | 84 Westergren Pipettes<br>Temperature correction 18°C | | |

# Generic Troubleshooting Faults

The errors listed within this section are applicable to the Starrsed RL, Starrsed RS and Starrsed TL analysers.

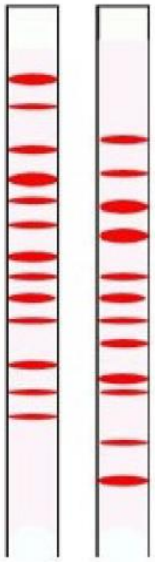
## Bubbles in Pipettes

Bubbles in the pipettes is one of the most common causes of errors on the Starrsed Series analysers and is caused by air entering the system inappropriately, i.e., faulty seals, leakage in tubing, insufficient sample etc. Different examples of bubbles within the pipettes include;

Too Many Boarders (TMB) 

A pipette which looks like a zebra crossing gives an [ESR Error 3]/Too many Borders error.

**NOTE:** This error may be generated if there is not enough blood in the sample tube for complete aspiration.



| Possible Cause | Solution |
|---|---|
| If it always occurs in the **SAME** pipette check the following; | |
| The bottom of the glass pipette may be chipped | - Replace pipette |
| Bottom of the pipette may be dirty | - Clean pipette<br>- Check disinfectant is available |
| The pipette may not be straight | - Replace pipette |
| If it happens **RANDOMLY** or with **EACH** pipette check the following; | |
| Check the fill nozzle O-ring | - Replace the fill nozzle O-ring |
| Check the fill nozzle alignment to the pipette | - Check the nozzle arm is tight on the rear vertical shaft. If it is loose engineer assistance is usually required. |

One Air Bubble about 5 mm under Meniscus

The filling (aspiration) speed is not critical but should be within certain limits. If just one air bubble is found about 5 mm below the meniscus the filling speed may be too **high.**

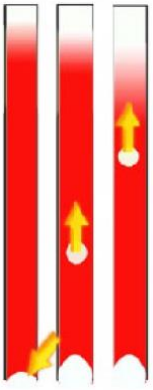
The blood column height should not exceed the fill sensor by more than 10mm.

One air bubble can result in an ESR Error 3.

**Solution:**

1. Fill speed may need adjusting. Contact Sysmex Customer Support.

One Air Bubble Rising in the Pipette



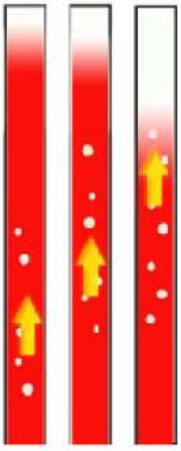
This can usually be caused by a wet fill nozzle and sometimes a dirty fill nozzle.

The Westergren pipette should **NOT** have blood right to the base of the pipette. There must be an air gap of 4mm - 5mm at the bottom of each Westergren pipette.

**Solution:**

1. Check the maintenance has been performed.
2. Clean the fill nozzle.

Small Air Bubbles Rising in the Pipette



This can usually be caused by a dirty of damaged fill nozzle.

**Solution:**

1. Check maintenance has been performed.
2. Check the fill nozzle for damage. If found, replace the fill nozzle.
3. Clean the fill nozzle.
4. Check if the sample line is leaking on the fill nozzle side, replace the sample line.

Random Air Bubbles in Pipette

Usually caused by a fault in the diluter system or insufficient blood volume.

**Solution:**

1. Check the sample to ensure sufficient blood volume. Minimum blood volume required = 2ml.
2. Prime diluter system checking diluent flow and looking for air bubbles.

## Foam in Column

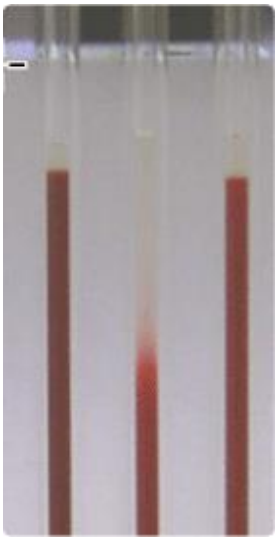
Foam in the column is caused by a layer of air bubbles that is concentrated on top of the blood column but does not affect the sedimentation process itself. The sedimentation develops normally below the bubbles. However, too many bubbles bring about a shortening of the effective blood column, which is a deviation from the Westergren method. The error generated due to foam in the column will depend on the length of the foam;

- 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.

**Solution:**

1. Check that tube connections are not leaking.
2. Check the fill nozzle condition:
    a. 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/Y mixing-piece block for cracks.

# Hazy Reports



"Hazy" reports are usually caused by a build-up of proteins on the inner wall of the pipettes. Another cause is growth of microorganisms in the diluter system. It is extremely important that the system is kept sterile. Erroneous haziness looks more like haemolytic plasma than 'normal' hazy plasma.

Symptoms for a contaminated instrument could include:

- If more than 3 - 5 out of 20 measurements are reported HAZY.
- Poor meniscus may be reported.
- Incorrect results.

**Solution:**

1. First run an extra Fill and Clean sequence.
    a. Check after a day's run if haziness has decreased.
2. When there are still many hazy reports, it is recommended to clean the diluter system (See the Cleaning diluent system work instruction in the relevant IFU).

## Vacuum Problems 

| Possible Cause | Solution |
|---|---|
| Blue filter disc wet or dirty<br>Obstruction in the vacuum system<br>HEPA filter wet or dirty<br>Compressor malfunction | - Check maintenance has been performed.<br>- Replace components individually if wet or dirty. |

## Dilution Errors 

| Possible cause | Solution |
|---|---|
| Blockages at the diluter T-piece/Y-mixing piece, sample needle or sample tube | - Check components for blockages |
| Blockages at the sample needle. | - Check needle for blockages. If necessary, replace sample probe or outer needle |
| Flow sensor board error<br>Diluter not starting | - Contact Sysmex customer support. |

## ID Read Error

| Possible Cause | Solution |
|---|---|
| Dirty barcode<br>Barcode incorrectly placed or wrong format<br>Incorrect position of the barcode | - Check barcode and correct error.<br>- Perform a barcode test if required (Please refer to user manual). |

## Leakage from Needle 

| Possible cause | Solution |
|---|---|
| Blockages at the sample needle. | - Check needle for blockages. If necessary, replace sample probe or outer needle. |

## Separator Errors 

| Possible Cause | Solution |
|---|---|
| Extensive foam build-up in the separator. | - Check the separator assembly and connections for possible air leaks. |
| Waste tube between separator and waste pump blocked. | - Replace the tube |
| Waste pump failure | - Check waste pump.<br>- Replace waste pump.<br>- If the error persists contact Sysmex Customer Support. |
| Waste line blocked | - Check waste line |
| Electrical bridge between the waste-level electrodes | - Clean the waste separator. |

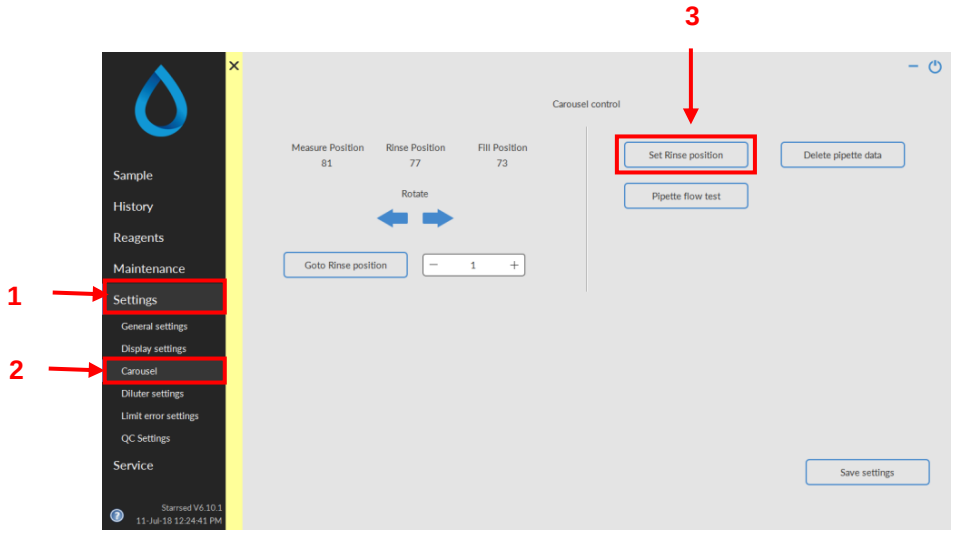
## Carousel Position Error

| Possible Cause | Solutions |
|---|---|
| Usually caused by the tube between the fill nozzle and the rinse nozzle caught behind a pipette or the unit has been turned off while running. | - Check for obstruction to carousel movement.<br>- Check rinse position and perform [Carousel Position Check].<br>- Perform [Wash all pipettes]. |

Carousel Position Check

To perform a carousel position check:

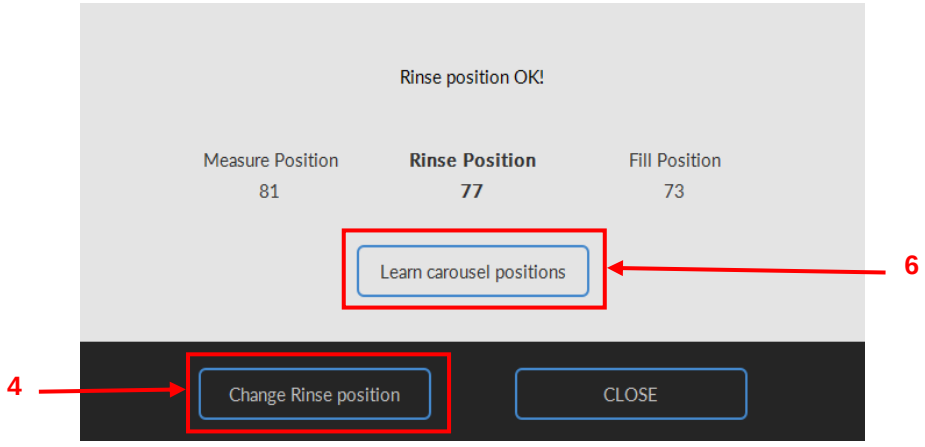
1. Select [Settings] and enter password [3964].




2. Select [Carousel] from the [Settings] sub-menu.

3. Check the pipette number in the rinse position matches the actual pipette number on the carousel. If it differs select [Set Rinse Position].

4. Select [Change Rinse Position]

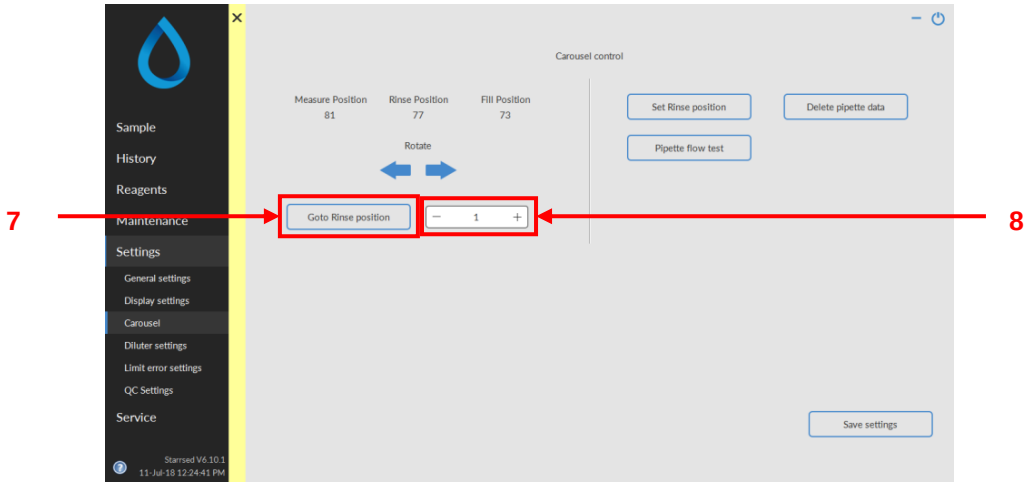



5. Enter the pipette number.

6. Select [Learn carousel positions].

7. Check position error is resolved by selecting [Go to rinse position].

8. Enter a higher pipette number than currently present in the rinse position. Position error is resolved if carousel moves to correct position without 'Position error' reoccurring. If error persists, contact Sysmex customer support.




9. If samples or liquid are present perform 'Wash all pipettes'. Go to [Maintenance], [Prime/Clean] and [Wash all pipettes].

**IMPORTANT:** All sample information will be lost. Failure to perform wash all pipettes following correction of a carousel position error could result in wrong results being reported on patients as the linked pipette number is not the same as before the position error.

# Leaking Pipettes

**IMPORTANT:** If a pipette is leaking, the pipette is not automatically disabled and therefore, leaking pipettes should be dealt with as soon as possible.

**NOTE**: If using Starrsed software version 6.12.3 or above it is possible to disable the leaking pipette.

| Possible Cause | Solution |
|---|---|
| Leakage of blood or cleaning agent from the base of the pipette is caused by a loss of vacuum in the pipette as a result of damage or dirty pipette valves. | - Perform pipette flow test.<br>- Check pipette valve for damage or dirt.<br>- Replace pipette valve if necessary. |

Pipette Flow Test

The valves situated in the top of each pipette will wear out over time causing the pipettes to leak. Performing a [Pipette Flow Test] can help identify those pipette valve that need replacing to prevent leaking pipettes. Alternatively, the procedure can be used to identify which pipette is leaking when a leak is identified.

**IMPORTANT**: Before performing a [Pipette Flow Test] it is important to perform a [Carousel Position Check] to ensure the Starrsed software is identifying the correct pipette number.

To perform a pipette flow test:

1. Ensure the analyser is in ‘Sample mode OFF’.

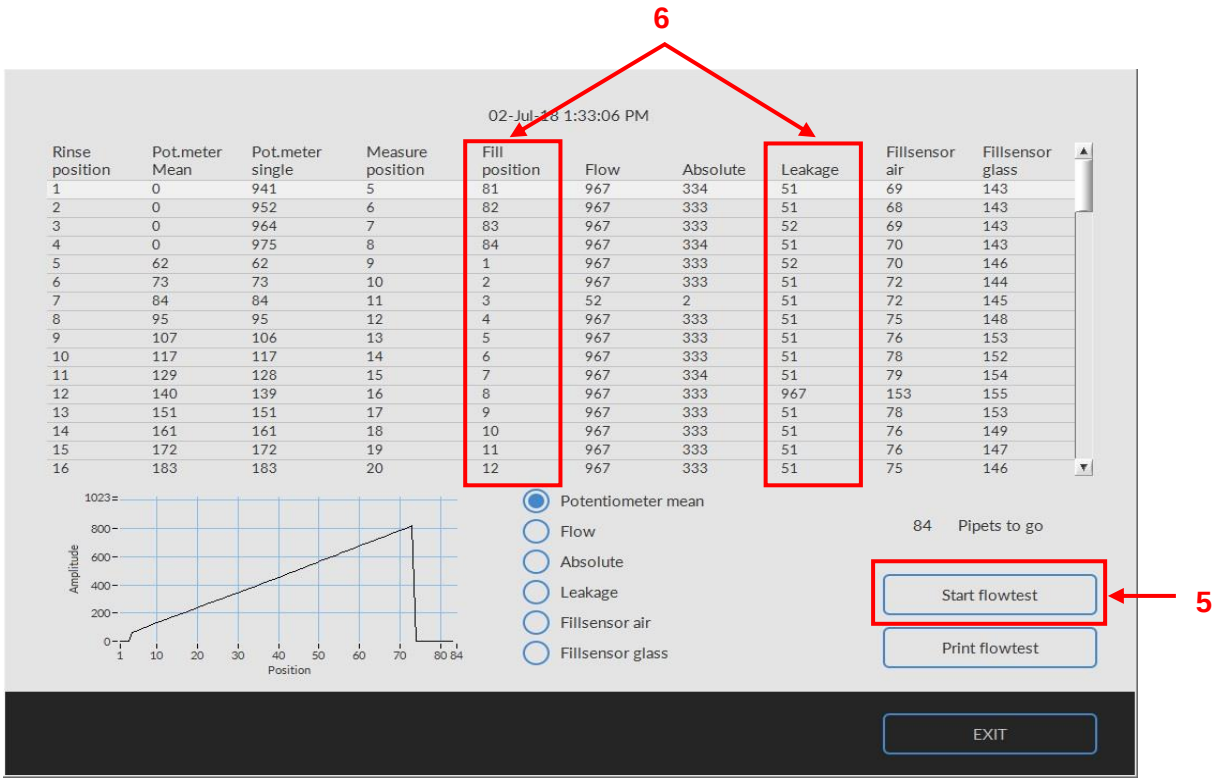
2. Select [Settings] and enter the password [3964].

3. Select [Carousel].

4. Followed by [Pipette Flow Test] to open the [Pipette Flow Test] screen.

5. Select [Start Flow Test]. The procedure will take approximately 10 minutes.

   **IMPORTANT**: Pipettes must be empty before starting this function otherwise all pipette data will be lost.




6. After completion refer to the leakage values that have been generated. Normal leakage values are typically between 45 – 70, and therefore, do not need replacing. Partially worn valves can generate a leakage value of 70+, however, these also DO NOT need replacing but it is advisable to keep an eye on these pipettes. Leakage values that exceed 100 indicate that the valves should be replaced. To determine the pipette that requires a new valve, refer to the 'fill position' alongside the relevant leakage value. The fill position number relates to the pipette number on the carousel.

7. Any pipettes identified as leaking should be checked and pipette valve changed as soon as possible. **IMPORTANT:** If a pipette is leaking the pipette is not automatically disabled and therefore leaking pipettes should be dealt with as soon as possible.

## Removing Pipettes from Carousel and Replacing Pipette Valve Tubing

To remove a pipette from the carousel and replace the pipette valve tubing:

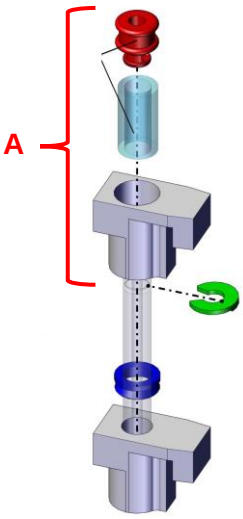
1. Move leaking pipette to rinse position and rinse pipette to remove remaining blood or cleaning agent.

2. Once the pipette is on the straight site of the carousel, preferably at the back to avoid the heating element, ensure analyser is in 'Sample mode OFF'. **TIP:** Carousel can be rotated in either direction through [Settings], [Carousel] and either rotating the carousel, [←] [→] or [Go to Rinse Position].

   **IMPORTANT**: **DO NOT** remove a pipette at the curved areas of the carousel.

3. Gentle push on the base of the pipette to lift the pipette off the lower (1) and upper (2) carousel belts.


4. Remove the top pipette holder/pipette valve assembly (A) with a twist and pull movement. **NOTE**: The pipette valve assembly will sit inside the top pipette holder.



**5.** Remove the pipette valve assembly from within the top pipette holder.


**6.** Remove the valve body (B) from the valve tubing (C) and dispose of the old valve tubing. **IMPORTANT: DO NOT** dispose of the valve body.

**7.** Replace the valve tubing (C) and reconnect with the valve body (B) and insert the valve assembly back into the top pipette holder.

**8.** Using your thumb/finger to hold the valve assembly in place, push and twist the pipette holder/pipette valve assembly on to the top of the pipette, ensuring the valve tubing is over the top of the Westergren pipette.

**9.** To reposition the pipette, hook the top pipette holder on to the upper carousel belt first, then reposition the bottom pipette holder on to the bottom carousel belt.

**10.** Ensure that the top (including valve assembly) and bottom of the pipette are in line with the surrounding pipettes and not protruding.

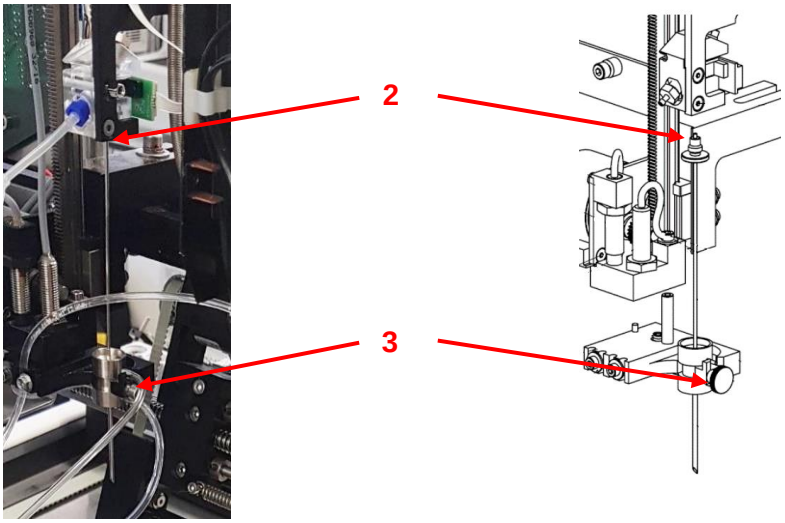
**11.** Select ‘Sample Mode ON’.

# Starrsed RS Specific Troubleshooting

## Check or Replace Sample Probe or Outer Needle

1. Ensure analyser is in ‘Sample mode OFF’ and remove the top cover from the cap piercer unit.

2. Unscrew the sample probe manually from the Y-Mixing piece.




3. Disconnect the tubes from the outer needle and unscrew the outer needle thumb screw. **TIP:** Mark tubes for easier reconnecting to the correct nipple.

4. Pull the sample probe complete with the outer needle towards you so it comes out of the needle assembly. The outer needle must be supported to protect it from falling.

5. Gently slide the sample probe out of the outer needle unit and inspect both for damage and/or blockages. If required replace the relevant component.

6. To replace, slide the sample probe into the outer needle, ensuring that the sample probe has a new O-ring.

7. Replace the sample probe/outer needle onto the needle assembly and tighten the sample probe into the Y-mixing piece. **IMPORTANT:** Do not overtighten the sample probe in the mixing piece or it will crack or strip the thread inside the block.

8. Replace the correct tubes on the outer needle and tighten the outer needle thumb screw. **IMPORTANT:** Do not over tighten the screw.

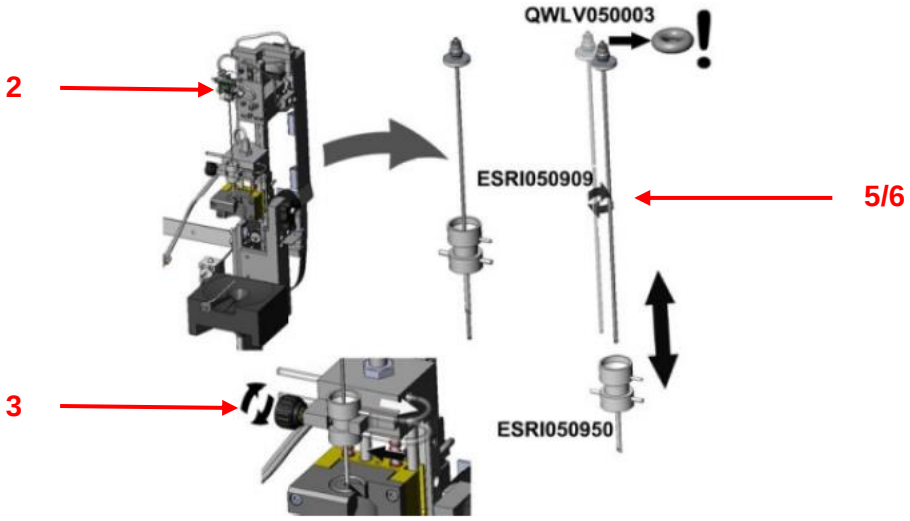
9. Replace the cap piercer unit cover.

# Starrsed RL Specific Troubleshooting

## Check or Replace Sample Probe or Outer Needle

1. Ensure analyser is in ‘Sample mode OFF’ to release the protective cover.

2. Unscrew the sample probe manually from the Y-Mixing piece.




3. Disconnect the tubes from the outer needle and unscrew the outer needle thumb screw. **TIP:** Mark tubes for easier reconnecting to the correct nipple.

4. Pull the sample probe complete with the outer needle towards you so it comes out of the needle assembly. The outer needle must be supported to protect it from falling.

5. Gently slide the sample probe out of the outer needle unit and inspect both for damage and/or blockages. If required replace the relevant component.

6. To replace, slide the sample probe into the outer needle, ensuring that the sample probe has a new O-ring.

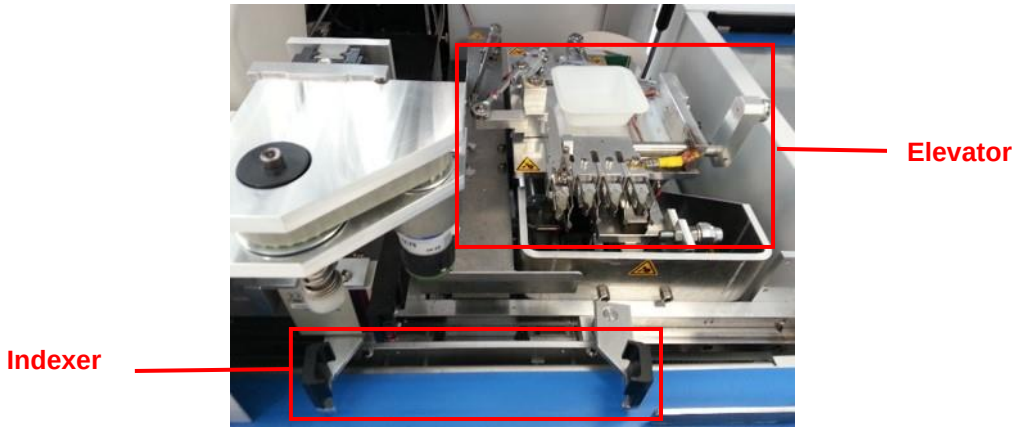
7. Replace the sample probe/outer needle onto the needle assembly and tighten the sample probe into the Y-mixing piece. **IMPORTANT:** Do not overtighten the sample probe in the mixing piece or it will crack or strip the thread inside the block.

8. Replace the correct tubes on the outer needle and tighten the outer needle thumb screw. **IMPORTANT:** Do not over tighten the screw.

9. Close the protective cover.

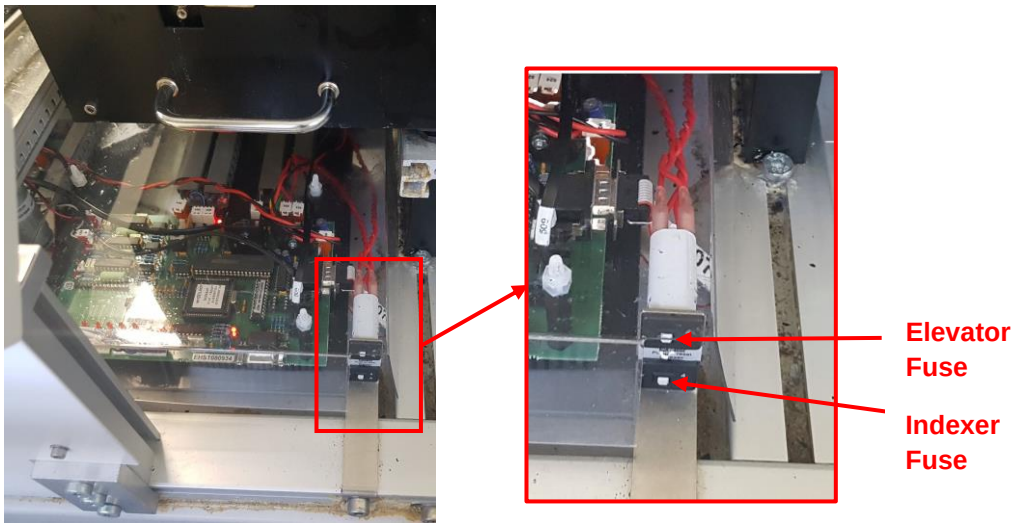
# Elevator and Indexer Motor Timeout Errors

Elevator or indexer time out errors can be generated due to an obstruction of the elevator or indexer, resulting in the elevator or indexer fuse to be activated, respectively., resulting in failure of the robot mixing arm.




To clear an elevator and/or indexer motor timeout error:

1. Clear the error by pressing the [Clear error] button.
2. Switch OFF the analyser and close the Starrsed software.
3. Check for mechanical obstructions of the elevator/indexer.
4. Reset the elevator/indexer fuse located at the back of the analyser by pushing it in.




5. Switch ON the ESR analyser and restart the PC software.

# Starrsed TL Specific Troubleshooting

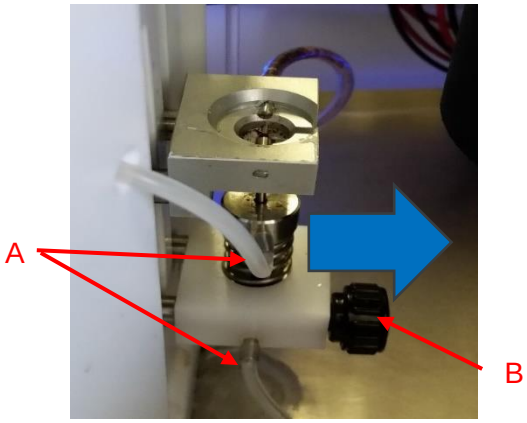
## Check or Replace Needle Unit

The age of the Starrsed TL analyser will depend on what type of needle unit is onboard. Please follow the relevant steps below for the correct needle unit for your analyser.

Check or Replace Needle Unit (Older analyser)

To replace the needle unit:

1. Remove the drip tray located beneath the needle unit.
2. Disconnect both tubes (A) and loosen fixing screw knob (B).
3. Remove needle assembly unit from the analyser.
4. Replace the needle assembly with new and push back onto the analyser.

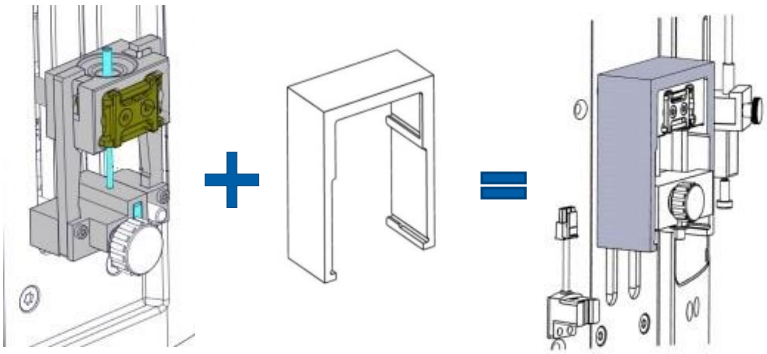



5. Fasten the fixing screw knob (hand tight) and reconnect both tubes.
6. Replace drip tray.
7. Perform ‘Prime needle/nozzle’ to ensure needle unit is fitted correctly.

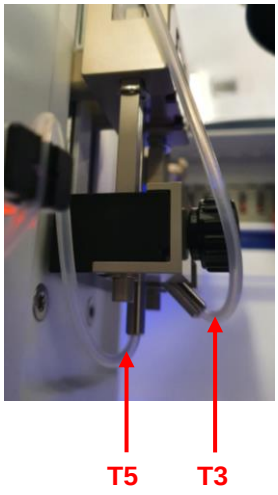
Check or Replace Needle Unit (Newer analyser)

To replace the needle unit:

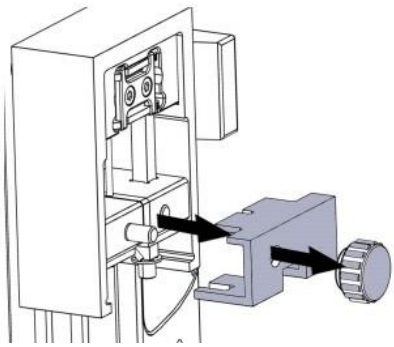
1. Place the needle replacement holder over the adapter



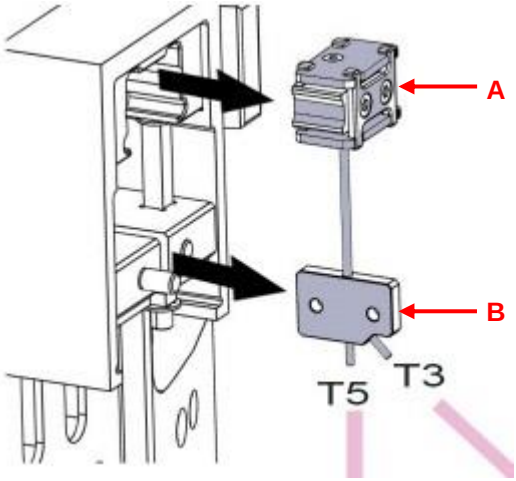
2. Remove tubing T3 and T5 from needle unit. **NOTE:** Mark the tubing to ensure the correct tubing is replaced in the correct place.




3. Remove the needle unit bracket by loosening the thumb screw.



4. Remove the needle and needle sealing block from the needle unit. **IMPORTANT: DO NOT** push down on the sealing block (A) or push the needle up (B) as this will result in the needle protruding through the top of the sealing block.

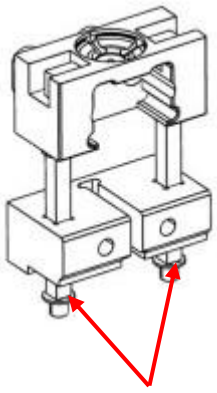



5. Remove the needle from the sealing block by gently pulling the needle and sealing block apart.

6. Replace the needle and reassemble the needle and needle sealing block. **IMPORTANT**: Keep fingers away from the needle hole on the sealing block.

7. Place needle/sealing block back into the needle unit.

8. Replace the needle unit bracket, ensuring the groves of the bracket sit above the round protrusions of the needle unit housing, and tighten the thumb screw.




9. Reconnect tubing T3 and T5.

10. Remove the needle replacement holder.

11. Perform ‘Prime needle/nozzle’ to ensure needle unit is fitted correctly.

# Robot Arm Errors

In the case of sample tube placement errors or lost tubes the analyser will generate an error. Deal with the error using the red alarm panel on the IPU screen, following which the analyser will initialise the mechanical parts.

If there were no lost tubes associated with the error, pressing the [Sample Mode ON] button will ensure any samples are returned to the buffer/rack/track as appropriate based on the order received by the analyser.

If there were lost tubes associated with the error, following the initialisation, place the tubes in the buffer position **BEFORE** pressing the [Sample Mode ON] button. Based on the status of the sample they will be returned to rack/track accordingly.

If the normal initialisation process does not solve errors, the robot arm needs to be reset.

**IMPORTANT:** Do not remove tubes from the gripper or other positions. Samples are routed with use of the track system and Laboratory Information System and information can be lost if tubes are not at the expected location.

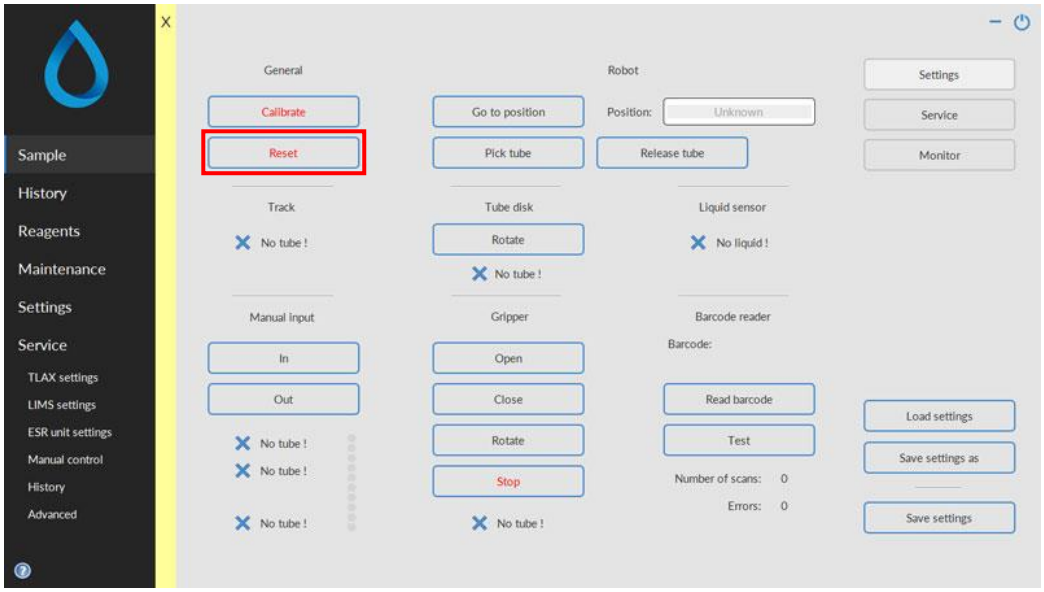
## Resetting the Robot Arm

To reset the robot arm:

1. Select [Service] and enter the service password [3964] and select OK.
2. Select [TLAX Settings].

3. Select [Service].

4. Select [Reset] to reset the robot arm.



# Contact Us

## Mail

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## Phone

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| Product Hotline<br>For urgent application support | 0333 320 3466 (UK) |
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## Sysmex Academy

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