

# **Model 926**

# **Chloride Analyzer**

## **Operator's Manual**

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# 1

## ***Introduction***

### **1.1 Introduction**

The M926 is a direct reading, digital chloride analyzer. It is designed for fast and accurate determinations of Chloride levels in industrial samples.

Sample volume is 0.5ml and results are displayed on a digital readout in mg/l (milligrams per litre Chloride) or mg% (milligrams percent) salt as Sodium Chloride.

This manual presents complete instructions for setting up and using the M926. A short time spent familiarising yourself with these instructions will be more than repaid in satisfactory operation.

The M926 is intended for use by persons knowledgeable in safe laboratory practices. If the M926 is not used in accordance with these instructions the protection provided by the equipment may be impaired.

A Service Manual is available as an optional extra, for use by appropriately qualified technical personnel. Please refer to Section 10.2.

### **1.2 Summary of the Test**

The M926 is used for the determination of chloride ions. It is an instrumental analogue of "Argentimetry", the traditional titrimetric methods using Silver Nitrate reagent. Like these classical methods it relies on the chemical formation of the very insoluble salt, Silver Chloride. The importance of chloride determination has been realised for well over a century, with many variations and changes being made to the techniques in order to improve the detectability and selectivity. Research into the analysis of chloride was conducted by Gay-Lussac (1832), Levof (1853), Mohr (1856) and Volhard (1874) and their findings have proven to be the basis of the methods that are still in common use today.

## ***Introduction***

continued

### **1.3 Reagents**

The following solutions are recommended for use with the M926. Ordering information is given in Section 10.2.

**NOTE** All reagents contain preservatives where required.

Standard Solution is 200mg/l Chloride.

Combined Acid Buffer Solution is a support electrolyte consisting of a mixture of Acetic and Nitric acids which maintains the correct pH for the complete cycle of titrations, and a colloid to hold precipitated silver chloride in suspension.

**WARNING** Acid Buffer is an irritant – avoid contact with skin. Wash exposed areas with water.

### **Dilution**

No dilution is required for Nelson Jameson reagents.

### **Storage**

Solutions should be stored away from direct sunlight in a cool place, preferably with an ambient temperature below 25°C (77°F). Do not use solutions after the expiration date shown on the bottle. Do not return decanted contents to the original bottle. Caps of standard solution bottles must be done up firmly to prevent evaporation.

### **Purification**

No purification or treatment is required when using these reagents.

### **Instability**

Never leave bottles of Standard Solution uncapped, as prolonged exposure to the atmosphere will affect the solution's concentration.

# 2

## *Installation*

### 2.1 Electrical Supply

The M926 operates at low voltage (12 Volts d.c.). The universal mains adapter supplied with the M926 comes with a range of plugs to suit most a.c. supplies around the world. The a.c. supply can be in the range 100 – 240V, 50 – 60Hz.

### 2.2 Unpacking

Upon receipt, the M926 should be removed from its carton and inspected for damage. Contact your Nelson Jameson representative if any items are missing or damaged.

1. Lift out the accessory tray.
2. Lift the instrument out of the polythene cover on to a bench.
3. Check the instrument and all the items in the carton for signs of damage. Check items received against the following list and notify your Nelson Jameson representative if any discrepancies are discovered.

**IMPORTANT** Quantities shown in the following list are those supplied with a new instrument. DO NOT re-order from this list; instead refer to Section 10 of this manual.

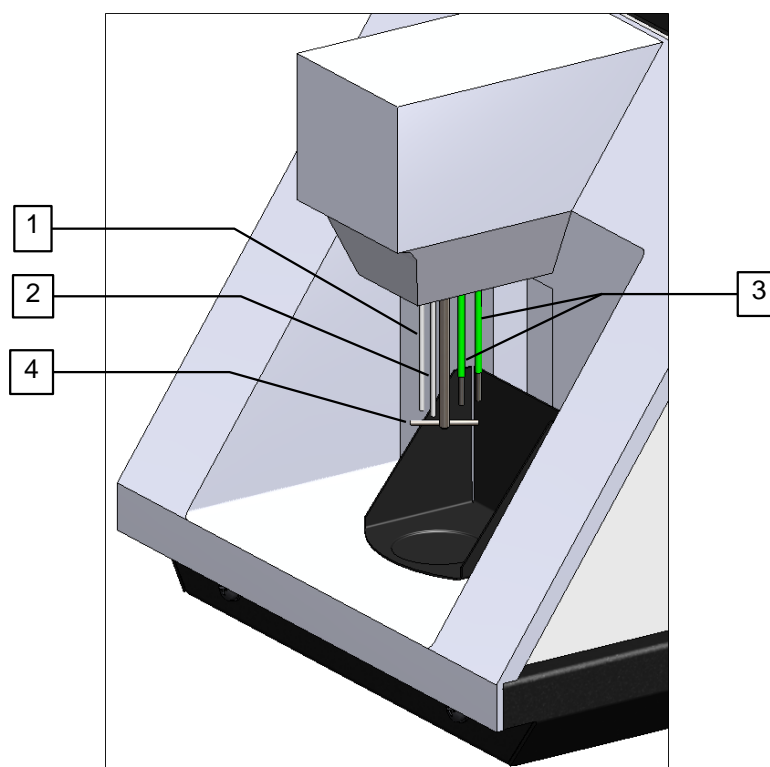
<u>Part No.</u>	<u>Description</u>	<u>Quantity</u>
001 53 313	Universal mains adapter	1
001 09 006	USB lead, A (M) – B (M), 1.8m	1
780-3750	Chloride Standard Solution, 200mgCl/l, 1 x 100ml	1 bottle
780-3730	Silver Electrode Polish	1 vial
131-3751	Combined Acid Buffer Solution, 1 x 500ml	1 bottle
780-3910	1 x Cathode, 2 x Detector Electrode, set of 3	1 set
780-3911	Anodes, pack of 3	1 pack
780-3010	Beaker, plastic, graduated at 14ml, Nelson Jameson	2
780-3950	Stirrer	1
	Chloride Analyzer M926 mkIII	1
780-3051	Lead, M926 to Printer/Computer	1
780-3902	Operators Manual	1

**Installation**

continued

**2.3 Assembly**

1. Fit the two shorter, sleeved electrodes into the two rear positions on the underside of the electrode head, Item 3, Figure 2.1. Ensure both electrodes are pushed firmly into their sockets behind the protective rubber boots.



**Figure 2.1      Electrode Head**

1. Cathode, 2. Anode, 3. Detector electrodes, 4. Stirrer.

2. Insert the stirrer through the stirrer hole and push it firmly into its coupling, as shown in Figure 2.1, Item 4.
3. Insert the cathode (un-sleeved, short electrode) through the left-hand hole and push it firmly into its socket, as shown in Figure 2.1, Item 1.
4. Fit an anode (70mm long electrode) through the remaining hole into its socket.
5. Check that the three shorter electrodes are all fully inserted and then adjust the position of the anode so that all four electrodes are the same length.
6. Position the M926 so that there is clear access to the on/off switch (Item 1, Figure 5.2, page 12).
7. The universal mains adapter supplied with the M926 comes with a range of plugs to suit most a.c. supplies around the world. Choose and fit the one that suits your local electricity supply.
8. Refer to Section 5 of this manual for detailed operating instructions.

# 3

## *Principles of Operation*

### 3.1 Description

An accurately measured volume of sample (0.5ml) is added to an acid buffer. The M926 automatically titrates chloride ions by passing a known constant current between two silver electrodes which provides a constant generation of silver ions. These silver ions combine with the chloride in the sample to form silver chloride, which is held in suspension by the colloid stabiliser. During the titration period the digital readout is updated approximately every 0.3 seconds. During these periods the number of silver ions introduced into the sample combine with one unit measurement of chloride. When all the chloride has been precipitated as silver chloride, free silver ions begin to appear and the solution conductivity changes. This change is detected by the detector electrodes and the readout is stopped, displaying the results directly in milligrams per litre of Chloride or milligrams % salt as Sodium Chloride. Another sample may now be added to the same acid buffer and the cycle repeated. The digital display is held until starting another cycle, when it is automatically reset to zero.

#### NOTES

1. The M926 uses an absolute method of operation and is calibrated at the factory. Recalibration should only be necessary after changing internal electronic components.
2. The mg% salt value is obtained from the mg/l Chloride result by a fixed calculation. This calculation is only correct for sample/diluent ratios equivalent to 1gm. sample per 100ml. diluent used to 'dissolve/dilute' the sample.



## **4 Performance Characteristics and Specifications**

### **4.1 Range**

10 to 999mg/l Chloride or 2 to 165mg% salt.  
See Note 2 on page 8 for more on mg% salt.

### **4.2 Accuracy**

Results will be within  $\pm 2$ mg/l (at the 100mg/l level) of the values obtained by standard wet-chemical methods after allowing for pipetting errors.

### **4.3 Linearity**

Results will be within  $\pm 3$ mg/l in the range 50 to 299mg/l.

### **4.4 Reproducibility**

The values obtained from five consecutive titrations of a nominal 200mg/l solution will be within 3mg/l of the mean value.

### **4.5 Stability**

The calibration level (mean of five titrations of a standard solution) will change by less than  $\pm 2$  Least Significant Digits over the life of any silver anode.

### **4.6 Response Time**

A stable reading will be displayed within 36 seconds of pressing the 'titrate' button, at a concentration level of 200mg/l.

### **4.7 Measurement Capacity**

Seven industrial samples at 0.5ml volume, per reagent change.

### **4.8 Samples**

#### **Type**

Chloride in solution, having low ionic strength, neutral pH and free of silver halides, silver reactive constituents (other than chloride), solid matter and high levels of dissolved solids.

#### **Presentation**

By pipette directly into the beaker of combined acid buffer.

#### **Volume**

0.5ml

# ***Performance Characteristics and Specifications***

continued

## **4.9 Readout**

Measurement results are shown in characters 15mm high on a 2.75" 60dpi backlit LCD screen. Separate areas of the display are reserved for measurement units and instrument status information.

## **4.10 Warm Up**

Five minutes warm up is required to meet the stated specification.

## **4.11 Environmental Conditions**

### **Operation**

Temperature range	+10°C to +35°C
Maximum relative humidity	85% at +35°C (non condensing)

### **Transportation**

Temperature range	-40°C to + 45°C
Maximum relative humidity	95% at +45°C

Compliance with the stated specification will be unaffected by a change in ambient temperature up to 4°C per hour, provided the operating temperature range is not exceeded.

### **Installation Category**

Installation category 1.

## **4.12 Power requirements**

### **Mains adapter Input**

100V – 240V ~, 50Hz – 60Hz, 0.6A

### **Mains adapter Output**

12V ⎓ 1.25A

## **4.13 Size**

Width	200mm (7")
Depth	250mm (9.8")
Height	315mm (12.4")

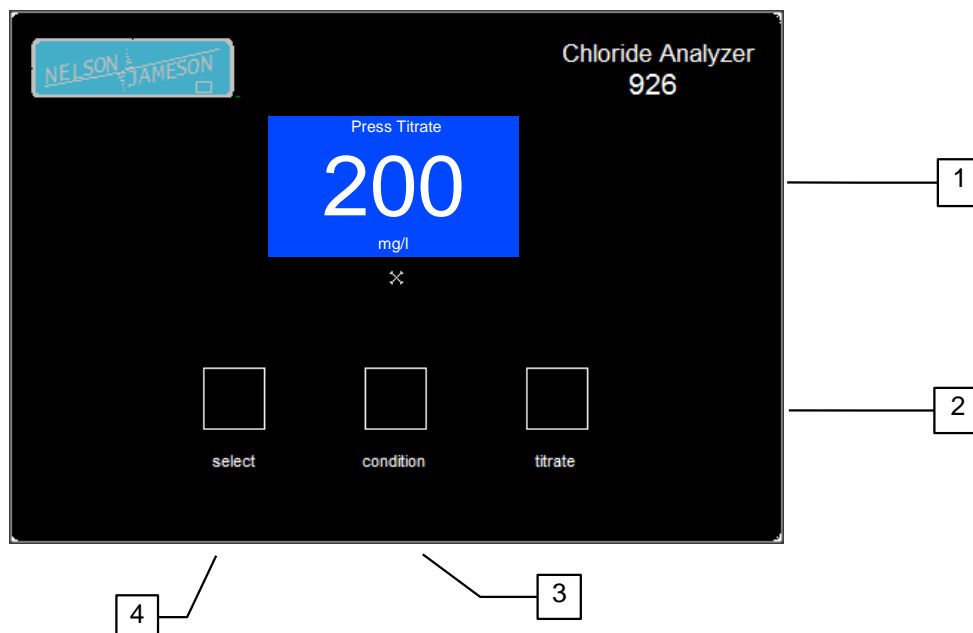
## **4.14 Weight**

1.9kg (4.2lbs)

# 5

## Operating Instructions

### 5.1 Controls and Indicators



**Figure 5.1 Front Panel**

1. Display screen, 2. 'titrate' button, 3. 'condition' button, 4. 'select' Units button.

#### 'condition'

Pressing this button initiates a conditioning cycle. The purpose of the conditioning cycle is to titrate out any Chloride present in the buffer or beaker, so that the subsequent titration is accurate. The conditioning cycle must be run each time the M926 is switched on and each time the buffer is changed, usually when 'Change Buffer And Condition/ Condition Required' is displayed.

#### 'titrate'

Pressing this button initiates a titration cycle. During a titration the stirrer operates for approximately 5 seconds before the readout is set to zero. The Chloride is then titrated out of the solution while the readout is incremented. When all the chloride is titrated the readout is stopped and held. The 'titrate' button is inoperative at switch on and when 'Change Buffer And Condition/ Condition Required' is displayed, usually after the allowed maximum number of consecutive samples (7) have been titrated. In each case this ensures that a condition cycle is carried out first. This prevents an erroneous result on the first titration due to chloride being present in the buffer or beaker.

#### 'select' Units

The 'select' button allows the user to choose the units in which the result of a titration is displayed. The M926 carries out measurements in units of mg/l Chloride and only calculates the final result in mg% salt when this is the unit on the display. This button only operates after a condition cycle.

## 5.2 Rear Panel Components



**Figure 5.2** Rear Panel and Label detail

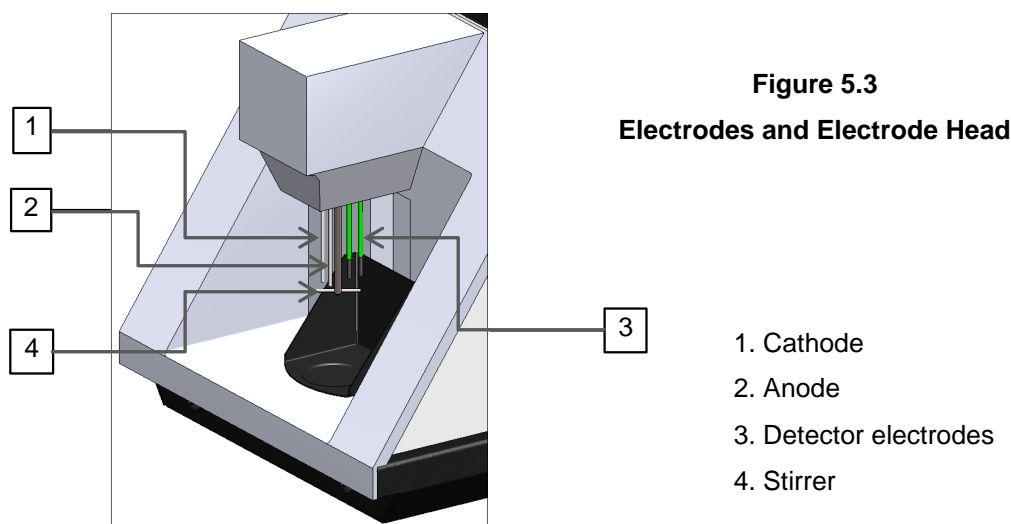
- |    |                     |  |
|----|---------------------|--|
| 1. | <b>Power switch</b> | On/Off toggle switch that switches the d.c. supply from the mains adapter to the instrument. 0 for Off, 1 for On.                |
| 2. | <b>Power</b>        | Input socket for d.c. lead from mains adapter to the instrument.   |
| 3. | <b>RS232 socket</b> | Input connector for Serial Cable (780-3051).   |
| 4. | <b>USB A socket</b> | To accept a memory stick for future firmware upgrades.   |
| 5. | <b>USB B socket</b> | Connector for USB Cable (001 09 006) as an alternative for connecting to computers that do not have an RS232 serial comms. port. |

**Operating Instructions**

continued

**5.3 Operation**

1. Connect power, switch on and allow 5 minutes for the M926 to warm-up.
2. Fill a plastic beaker, supplied, to the mark with combined acid buffer, place the beaker on the platform and raise the platform until it locates in the up position.
3. Pipette 0.5ml of 200mg/l standard solution into the beaker.
4. Press the '*condition*' button and wait for the condition cycle to complete.
5. Pipette 0.5ml of sample into the beaker and press the '*titrate*' button.
6. When the stirrer stops, note the reading on the display. If the results are required in mg% salt depress the '*select*' button so that mg% salt is shown in the units area at the bottom of the display screen. See Note 2, page 8.
7. Repeat paragraphs 5 and 6 for further samples.



8. At the end of the 5<sup>th</sup> titration, the message '*Condition in 2*' will appear on the display. At the end of the 6<sup>th</sup> titration '*Condition in 1*' will appear on the display.

**IMPORTANT** When the 7<sup>th</sup> titration is complete any further sample added will be lost. "*Change Buffer And Condition/ Condition Required*" will be displayed on the screen and the '*titrate*' button will have no effect. Go to paragraph 9 below.

9. When "*Change Buffer And Condition/ Condition Required*" is displayed, lower the beaker and empty out the contents. Rinse with deionised water and dry with clean tissue.
10. If necessary, adjust the vertical position of the anode, Item 2, Figure 5.3, so that it is the same length as the other electrodes.
11. If more samples are to be titrated return to paragraph 2 near the top of this page.
12. When determinations are complete, remove the beaker and dry the electrodes and stirrer by blotting with a clean tissue.

## 5.4 RS232 Output and Printing

The M926 has an RS232 output that enables results to be sent to external printers, such as the Portable Printer (780-3999), or other devices with serial inputs.

1. A Serial Cable (780-3051) is provided if you wish to use an external device. The small, round end of the cable fits into the socket on the rear of the M926 (Figure 5.2, Item 3) and the other end into the serial input socket of the external device - a printer or a computer serial interface.
2. Adjust the serial comms. settings of the external device to 9600 8-N-1.
3. Direct printing from the Model 926.

Switch on the external device then switch on the M926. After the initialisation sequence the software version (e.g. v0.24) and serial number (e.g. 16555) are shown on the display screen for approximately 5 seconds. The printer will print:-

```
926 Chloride Meter
Serial Number: 16555

Software Version: 0.24
```

4. Perform measurements as described in Section 5.3. After each titration the printer will print the screen value as: -

```
Sample 001 = 200 mg./l.
Sample 002 = 202 mg./l.
Sample 003 = 201 mg./l.
```

or, if mg% salt was the measurement unit on screen at the start of the titration:-

```
Sample 004 = 034 Salt
Sample 005 = 033 Salt
```

During and after the conditioning cycle there is no signal to the printer as conditioning can be necessary during the measurement run of samples. The sample number sequence is thus uninterrupted.

The number sequence on a printer can be reset to '001' only by switching off the M926 and reconditioning.

## ***Operating Instructions***

continued

### **5.5 USB B Output**

The M926 also has USB B port that enables results to be sent to computers that do not have an RS232 serial comms. port. A USB cable (001 09 006) is provided. The squarer end fits into the socket on the rear of the M926 (Item 5, Figure 5.2, page 12).

A PC utilities communications programme such as HyperTerminal is required to establish a connection with the M926 and receive data from it. Making a connection requires knowledge of which COM port (7 in the example above) the M926 is on and the settings **9600 8-N-1**.

For PC's running Windows 10 or newer the PC will recognise the M926 when connected and assign a comport.

For PC's running Windows 7 or earlier refer to Appendix A.

Please note that if the instrument is turned off while the communications programme (e.g. HyperTerminal) is active, it will be necessary to close and re-launch the programme after the instrument is switched back on to re-establish communications.

### **5.6 Active Salt Software Package**

The Active Salt package has been developed to enhance the Model 926 Chloride Analyzer. Designed initially for the Cheese industry the package may be applied to any food product requiring salt analysis and documentation; as the software may be configured by the operator to suit their particular laboratory requirements. Designed to collect data directly from a balance with RS232 output and the Chloride analyzer: some of the advantages are:-

No transcription errors.

No time wasted doing manual calculations.

No need to achieve specific sample and diluent weights.

Automatic data storage and analysis report generation.

For further detailed information contact your Nelson Jameson distributor.

# 6 *Operating Precautions and Hazards*

## 6.1 Operating Precautions

1. The electrodes may go black during use; this will not affect the performance. Only if the M926 will not measure a Standard or sample will it be necessary to clean the electrodes.
2. The M926 requires a warm up period of five minutes to meet the stated specification.
3. Reproducibly accurate results are dependent on reproducible pipetting from sample to sample and from aqueous standard to sample. If the M926 calibration is checked with an aqueous standard and reproducibly low results are obtained, hold up in the pipette should be suspected and a rinse out technique employed.
4. Always dispense standard solution into a small beaker or cup. Do not take standard solution directly from the bottle with a pipette, as the standard could become contaminated. Never pour standard solution back into the bottle once it has been dispensed. Ensure that only genuine Nelson Jameson reagents and supplies are used with the M926. Do not use solutions after the expiry date shown on the bottle.
5. Samples should have low ionic strength, neutral pH and be free of sulphide, sulphhydryl silver halides, silver reactive substances (other than chloride), solid matter and high levels of dissolved solids.
6. Do not leave the electrodes immersed in reagents when the instrument is not in use.
7. Use only the beakers supplied with the M926.
8. It is recommended laboratory practice to wear gloves when handling samples. Gloves will also afford protection against the Combined Acid Buffer and against accidental static damage to the electrodes.

## 6.2 Hazards

1. All electrical equipment is potentially hazardous. Never remove covers from the M926 without first ensuring that it is isolated from the a.c. supply.
2. Do not move the M926 when there is a beaker containing Combined Acid Buffer in position on the sample platform.



## 7.1 General

The M926 Chloride Analyzer has been designed to provide fast and accurate determinations of Chloride in industrial solutions.

The latest technology has been incorporated into the M926 to ensure the validity of the final results. However, the results can be affected by factors other than instrument malfunction, such as sample handling and storage. Nelson Jameson recommend therefore that a Quality Control programme is set up to monitor instrument and operator performance. Because the needs of each laboratory are different, due to size of workload, number of hours worked, statutory regulations, etc., no attempt has been made to formulate a rigid programme. Instead, in Section 7.2 there are a number of suggestions that will be helpful in specifying a procedure to suit your particular requirements.

The following references are recommended for further information on Quality Control.

BS600:2000 A guide to the application of statistical methods to quality and standardization.  
ISBN 058033227 6

Westgard, J.O., Clinical Chemistry 54:612, 200

**IMPORTANT** If you report your results to a Quality Control Scheme ensure that they are informed of the change in method, i.e. Nelson Jameson 926 Chloride Analyzer.

## 7.2 Quality Control Checks

The following notes are designed to assist you in formulating a Quality Control programme.

1. Include a Quality Control as specified in your Quality Control Scheme or at least once per sample run, once per day or every 40 samples.
2. Check abnormally high and low values daily.
3. Routinely include aqueous Standards that contain chloride concentrations that are different to the Standard concentration used for calibrating the M926.
4. Ensure day-to-day variations do not exceed acceptable values.
5. Reproducibility should be checked on 5 replicate samples on a routine basis.

# 8

## ***Maintenance***

### **8.1 General**

The M926 has been designed to reduce the need for regular maintenance to an absolute minimum. The maintenance required is detailed in Section 8.2, Daily. Refer to Section 10 for ordering information and catalogue numbers of parts used for daily maintenance, which are listed under *Equipment Required*.

### **8.2 Daily**

#### **Equipment Required**

Disinfectant Solution

electrode polish

1 x anode

1 x cathode

2 x detector electrodes

1. Check that all four electrodes are straight and parallel and the anode is the same level as the other electrodes. If necessary, refer to Section 8.3 to clean, adjust or replace the electrodes.
2. Check that the stirrer is present and is fitted firmly into its coupling.
3. Wipe down the sample area with disinfectant solution.

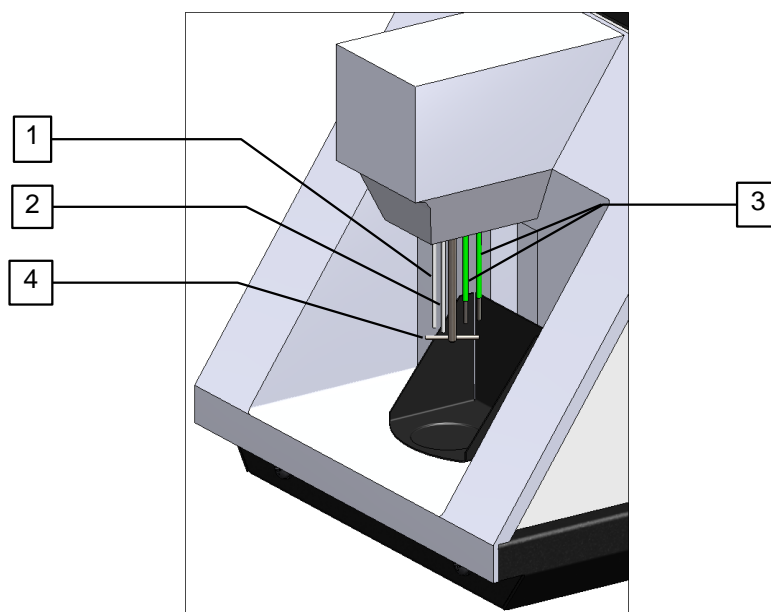
### 8.3 Electrode Cleaning and Replacement

#### Equipment Required

Electrode polish, soft cloth, 1 x cathode, 1 x anode and 2 x detector electrode.

1. Remove the four electrodes by withdrawing them downwards from the electrode head.

**NOTE** that the anode (Item 2, Figure 8.1) is longer than the other three electrodes.



**Figure 8.1 Electrodes and Electrode Head**

1. Cathode, 2. Anode, 3. Detector electrodes, 4. Stirrer.

2. If the length of the anode is less than 57mm discard it and fit a replacement.
3. Place a little Electrode Polish on a soft cloth and gently rub the exposed parts of the electrodes until they are clean and bright.
4. Refit the electrodes; ensure that with the cathode and Detector electrodes fully inserted, the anode is adjusted to the same length.
5. Place a beaker of deionised water on the sample lift and immerse the electrodes.
6. Carry out three condition cycles.
7. Remove the beaker and wipe the electrodes with a clean soft cloth.
8. Carefully inspect the electrodes to ensure that they are clean. If they are not repeat paragraphs 1 to 7. If they are still not clean fit replacements, ensuring that they are fully inserted.
9. Check that all the electrodes are straight and parallel, adjusting as necessary.

# 9

## Troubleshooting

### 9.1 Display not illuminated

Check that the instrument is connected to a working a.c. supply, and that the power switch is in the on position.

If the fault persists contact your Nelson Jameson distributor.

### 9.2 On-screen messages

These self-explanatory alerts may appear at the top of the display screen.

Change Buffer / And Condition Condition Required	Shown at start-up and after seven consecutive samples have been titrated.
Add Sample / Press Titrate Condition in 2	Shown after the 5 <sup>th</sup> consecutive titration.
Add Sample / Press Titrate Condition in 1	Shown after the 6 <sup>th</sup> consecutive titration.
Out of Solution / Check Buffer Condition Required	Shown if electrodes are not in liquid.
Reading 999+ / Check Sample Condition Required	999mg/l has been exceeded. Check sample dilution and that the pipette is dispensing 0.5ml.
Condition cycle timed out Refer to Operator Manual	Conditioning took too long. Too much Chloride in beaker. Stirrer not present or not turning.

### 9.3 Condition or titrate cycle inoperative

Check the beaker contains Chloride; add 0.5ml of standard solution if necessary.

Clean or replace the electrodes, refer to Section 8.3.

Make sure that the cathode electrode is fully inserted into its socket.

If the fault persists contact your Nelson Jameson distributor.

### 9.4 Reproducibly high or low results

Try using a fresh bottle of standard solution and another pipette.

Check that carry over in the pipetting is avoided by using a rinse out technique for each sample.

If the fault persists contact your Nelson Jameson distributor.

### 9.5 Non-reproducible results

The M926 requires a five minute warm up to meet the stated specification.

Try another pipette. (Ensure the pipette is reproducible to 0.5% Standard Deviation).

Clean or replace the electrodes, refer to Section 8.3.

Use a fresh bottle of Combined Acid Buffer.

If the fault persists contact your Nelson Jameson distributor.

# 10

## ***Spares and Accessories***

### **10.1 Ordering Information**

When ordering spares or accessories for the M926 please give the following information to your Nelson Jameson representative: -

Serial number  
Catalogue number of part (Cat. No.)  
Description  
Quantity required

This will ensure that your order is dealt with quickly and efficiently.

The number shown in the third column (Quantity) is the quantity of items that are supplied against the stated catalogue number. If the quantity is greater than one then only multiples of that quantity can be supplied.

### **10.2 Spares and Accessories**

<u>Cat. No.</u>	<u>Description</u>	<u>Quantity</u>
131-3751	Chloride Analyzer Combined Acid Buffer, 1 x 500ml	1 bottle
780-3750	Chloride Analyzer Standard, 200mg/l Cl, 6 x 100ml	1 pack
780-3730	Silver Electrode Polish, 25g	1 vial
780-3999	Printer Assembly, Universal	1
780-3700	Printer consumables kit	1 pack
780-3910	1 x cathode and 2 x detector electrode, set of 3	1 set
780-3911	Anodes, pack of 3	1 pack
780-3010	Beaker, plastic, graduated at 14ml, Nelson Jameson	1
780-3950	Stirrer, 20mm	1
780-3890	Service manual	1
780-3020	Active Salt Software Package	1
001 53 313	Universal Mains adapter	1
926 66 005	USB Driver Utility CD	1

**Loading USB Drivers for PC's running Windows versions upto Windows 7**

When using a mklII M926 Analyser a Driver must be installed regardless of the manner of connection, to allow the PC to recognise the M926 Analyser.

A PC utilities communications programme such as HyperTerminal is required to establish a connection with the M926 and receive data from it. Making a connection requires knowledge of which COM port (7 in the example above) the M926 is on and the settings **9600 8-N-1**.

It will be necessary to load the USB Driver Utility, from the CD provided, on to the computer so that it will assign a port to the 926.

Load the disc in the disc drive and wait for Autoplay to begin. The correct file for your computer (32-bit or 64-bit) will load.

If a dialog box does not appear from the toolbar at the bottom of the screen announcing the driver has been successfully loaded, open Device Manager on the computer.

You will need to know if you are using a 32-bit or 64-bit version of Windows to select the correct driver option: the 32-bit driver will not be recognised if you have a 64-bit system.

Connect the 926 to the computer with the USB Cable and switch it on. *926 Chloride Analyser* will appear under 'other devices'.

Highlight this and right click.

Select 'Update Driver' from the menu.

Browse to locate the file on the disc drive, select '*926 series chloride analyser 32*' if you have a 32-bit computer or '*926 series chloride analyser 64*' if you have a 64-bit computer, and click ok.

When the installation is complete the Device Manager will update and under Ports (COM & LPT) the M926 will typically appear as - *926 Series Chloride Analyser (COM7)*.

Make a note of the COM number.

## Nelson Jameson Inc. Product Warranty Statement

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**Warranty Term: 12 Months**

Nelson Jameson Inc. (Nelson Jameson) warrants, subject to the conditions itemised within this document, through either Nelson Jameson personnel or personnel of its authorised distributors, to repair or replace free of all charges, including labour, any part of this product which fails within the warranty time specified above, appertaining to this particular product. Such failure must have occurred because of a defect in material or workmanship and not have occurred as a result of operation of the product other than in accordance with procedures described in the instructions furnished with this product.

Conditions and specific exceptions that apply to the above statement are as follows:

1. End-user warranty time commences on the date of the delivery of product to end-user premises.
2. '*Free of all charges*' statement applies only in areas recognised by Nelson Jameson as being serviced either directly by its own personnel, or indirectly through personnel of an authorised distributor. Products purchased outside these areas requiring service during the warranty period will incur charges relative to the travel/transit costs involved. However, products purchased in such areas will be serviced during the warranty period free of all charges providing they are returned, carriage paid, to either Nelson Jameson or by pre-arrangement to an authorised Nelson Jameson distributor.
3. All maintenance (other than operator maintenance as described in the instructions), repairs or modifications have been made by Nelson Jameson or Nelson Jameson authorised personnel.
4. This product has where applicable been operated using Nelson Jameson specified supplies and reagents.
5. Nelson Jameson reserves the right to make any changes in the design or construction of future products of this type at any time, without incurring any obligation to make any changes whatsoever to this particular product.
6. Reagents, supplies, consumables, accessories and user maintenance items are not included in this warranty.

## Product Warranty Statement (continued)

7. Repairs or replacement of any part failing due to abnormal conditions including the following, are excluded from this warranty:
- a. Flood, lightning, earthquake, tornado, hurricane, or any other natural or man-made disaster.
  - b. Fire, bombing, armed conflict, malicious mischief or sprinkler damage.
  - c. Physical abuse, misuse, sabotage or electrical surge.
  - d. Damage incurred in moving the product to another location.

User agrees to permit Nelson Jameson personnel or personnel of its authorised distributor to make changes in the product which do not affect results obtained, but do improve product reliability.

Representations and warranties purporting to be on behalf of Nelson Jameson made by any person, including distributors and representatives of Nelson Jameson, which are inconsistent or in conflict with the terms of this warranty (including but not limited to the limitations of the liability of Nelson Jameson as set forth above), shall not be binding upon Nelson Jameson unless reduced to writing and approved by an officer of Nelson Jameson Inc.

Except for the obligations specifically set forth in this warranty statement, in no event shall Nelson Jameson be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort or any other legal theory and whether advised of the possibility of such damages.

Neither Nelson Jameson nor any of its third party suppliers makes any other warranty of any kind, whether expressed or implied, with respect to Nelson Jameson Products.

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