# FIAstar™ 5000
# User Manual

**1001 0038 / Rev. 3**



FOSS Analytical AB, Box 70, SE-263 21 Höganäs, Sweden
Tel Int +46 42 361500, Fax +46 42 340349, E-mail info@foss.dk

FOSS

Information may be changed or updated without notice. The latest version is found at www.foss.dk.

| Rev. | Date of Issue | Revised Material |
|---|---|---|
| 1.3 | 2004-11-01 | Performance data. Accessories and spare parts. Templates |
| 2 | 2006-05-02 | Section 3, 4, 5, 6, 7 and 9 updated. |
| 3 | 2010-02-04 | Section 5 Software updated. |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**NOTE: Please note that all information is liable to change without prior notice.**

Please inform Market Communication Dpt - Technical Communication Team at the address given below, if you have any opinions about or proposals for changes to this manual.

Market Communication Dpt - Technical Communication Team

E-mail tig@foss.dk

FOSS Analytical AB, Box 70, SE-263 21 Höganäs, Sweden

Tel Int +46 42 361500, Fax +46 42 340349

**English**

**⚠ Warning**

***In order to find out the nature of the potential hazard, please consult this manual in all cases where this symbol is used.***

***The information will be found on the yellow pages.***

**Deutsch**

**⚠ Warnung**

***In allen Fällen, wo dieses Symbol verwendet wird, informieren Sie sich bitte in der Bedienungsanleitung über die möglichen Gefahren.***

***Die Informationen finden sich auf den gelben Seiten.***

**Dansk**

**⚠ Advarsel**

***Venligst, rådfør Dem med brugervejledningen i tilfælde, hvor dette symbol anvendes, for at finde ud af omfanget af en eventuel risiko.***

***Informationen kan findes på de gule sider.***

**Español**

**⚠ Advertencia**

***En todos los casos donde aparece este símbolo, por favor, consulte este manual con objeto de conocer la naturaleza del riesgo potencial.***

***La información figura en las páginas amarillas.***

**Suomeksi**

**⚠ Vaara**

***Selvittääksesi varoituksen tai riskin luonteen, lue siihen liittyvä selitys aina kun tämä symboli on käytössä!***

***Tiedot löytyvät keltaisilta sivuilta.***

**Français**

**⚠ Avertissement**

***Merci de consulter votre manuel lorsque ce symbole apparaît afin de trouver l'origine du problème.***

***Ces informations se trouvent dans les pages jaunes.***

**Ελληνικά**

**⚠ Προσοχή**

***Παρακαλώ συμβουλευθήτε τον οδηγό σέ όλες της περιπτώσεις πού βλέπετε αυτό το σύμβολο γιά νά μπορέσετε νά εντοπίσετε την αιτία του άμεσου κινδύνου.***

***Οι πληροφορείες βρίσκονται στις κίτρινες σελίδες.***

**Íslenska**

**⚠ Viðvörun**

***Þar sem þetta viðvörunartákn kemur fram, ávallt lesið ykkur til um þá hættu sem gæti stafað og hvers konar hættu um er að ræða.***

***Upplàsingarnar má finna á gulu sídunum.***

**Italiano**

**⚠ Attenzione**

***Per valutare la natura del potenziale pericolo vi preghiamo consultare il presente manuale tutte le volte che viene visualizzato questo simbolo.***

***Le informazioni si trovano sulle pagine gialle.***

**Nederlands**

**⚠ Waarschuwing**

***Wanneer dit symbool is aangegeven raadpleeg de handleiding om de aard te zien van de eventuele gevaren.***

***De informatie staat in de gouden gids.***

**Norsk**

**⚠ Advarsel**

***Vær vennlig å se i denne håndboken i de tilfellene hvor dette symbolet er tatt i bruk for å finne ut av faremomente.***

***Informasjonen finnes på de gule sidene.***

**Português**

**⚠ Atenção**

***Sempre que este símbolo seja usado, por favor consulte este manual, de modo a obter informação sobre o potencial perigo.***

***As informações encontram-se nas páginas amarelas.***

**Svenska**

**⚠ Varning**

***Då denna symbol förekommer: Läs alltid i den här manualen för att få reda på vilken potentiell risk det handlar om.***

***Informationen hittas på de gula sidorna.***

# Table of Contents

# 1 Safety Precautions

## 1.1 Intended Use

The FIAstar™ 5000 Analyzer is designed for laboratory use, analysing parameters as specified in FOSS Analytical AB Application Notes.

### Caution

***The responsible body shall be made aware that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.***

## 1.2 Safety Precautions

Please read these operating instructions carefully and act accordingly.

For safety reasons people not familiar with these operating instructions must not use the instrument.

### Warning

***In order to find out the nature of the potential hazard, please consult this manual in all cases where this symbol is used.***

### Warning

***Careful handling of the solutions used in an analysis is mandatory for laboratory safety. Refer to the appropriate material safety data sheet for reagent handling instructions.***

### Electrical Shock Hazard

***Before replacing the fuses, disconnect incoming mains supply.***

### Warning

***Modification, alterations, rebuilding or use of safety parts not authorized by FOSS Analytical AB violates the warranty. FOSS Analytical AB has no responsibility for damages, material or personal, occuring as a result of such actions.***

### Warning

***The peristaltic pump has moving parts and this causes a risk for squeezing.***

### Equipotentiality

***Terminals identified by the symbol, bring the various parts of a system to the same potential e.g. ground potential, when connected together. Note that such a terminal must not be used as a protective earth (ground) connection.***

### Electrical Shock Hazard

***This device is equipped with a grounding/earthing type power plug for your protection against electrical shock hazard and should only be attached to a properly grounded/earthed receptacle.***

**Note: To maintain the limits for the CE approval only CE approved instruments may be connected.**

## 1.3 FOSS Analytical AB Licence Agreement

In the agreement below, FOSS Analytical AB is referred to as “the Seller”.

### 1.3.1 Grant of Licence

The Seller grants you the right to use the hardware or one copy of the delivered software program (hereinafter jointly referred to as the “Software”) on a single terminal connected to a single computer (i. e. with a single CPU). You may not network the Software or otherwise use it on more than one computer or computer terminal at the same time.

### 1.3.2 Copyright

The Software is owned by the Seller or one of the Sellers suppliers and is protected by copyright laws and international treaty provisions. Therefore, you must treat the Software like any copyrighted materials (e.g. a book or musical recording) except that you may either (a) make one copy of the Software solely for backup or archival purposes, or (b) transfer the Software to single hard disc provided you keep the original solely for backup or archival purposes. You must reproduce and include the copyright notice on any copy. You may not copy the written materials accompanying the Software.

### 1.3.3 Other Restrictions

You may not rent or lease the Software, but you may transfer the Software and accompanying written materials on a permanent basis provided you retain no copies and the recipient agrees to the terms of this Agreement. You may not reverse engineer, decompile or disassemble the Software.

**Note:**

**You may not use, copy, modify, or transfer the software or any copy in whole or in part, except as expressly provided in this license. All rights not expressly granted are reserved by company or its suppliers.**

# 2 Introduction

## 2.1 Brief Description

FIAstar™ systems are used for the fully automated wet chemical analysis of nutrients and other parameters in water and soil as well as in meat and dairy products and other food. Main applications are the determination of Nitrogen parameters like Ammonium, TKN, Nitrate, Nitrite and total Nitrogen as well as Phosphate and total Phosphorus using approved methods.

The FIAstar™ 5000 system is modular, and can be set up for 1-3 channel operation, enabling simultaneous analysis of up to three different parameters in the sample. The system can be configured by ordering the separate modules, or ordering complete 1, 2 or 3-channel systems.

The FIAstar™ 5000 system set up:

- 5000-001 Analyzer module
- 5000-0xx Method Cassette
- 5027-003 or 5027-004 Sampler
- 5000-100 FIAstar™ 5000 Windows based software, SoFIA
- PC with one COM-port (for the 5027 Sampler, USB ports and Windows XP
- Printer

The 5027 Sampler is optional; the system can be run manually. The PC (required) and printer (optional) are not supplied by FOSS.

The Analyzer module comprises an injector unit with variable volume injection loops, a pump module with pump tube holders for up to 8 pump tubes, an exchangeable method cassette and a photometric detector with flow through cuvette. Each module also has a built in thermostatted reaction coil.

## 2.2 Performance Data

### FIAstar™ 5000 Analyzer

| | |
|---|---|
| Principle | Flow Injection Analysis (FIA) |
| Injector | 6 port variable volume rotary injector |
| Sample size | 20-400 µl |
| Pump | 2x4 channel peristaltic pump with variable speed and stand-by feature |
| Thermostat | Built in thermostat, 30-120 °C ±1 |
| Method Cassette | Reagent consumption 0.3-2 ml/sample |
| Detector | Digital Dual Wavelength photometer with automatic background correction |
| Flow cell | 10 mm path length; 18 µl volume |
| Wavelength range | 400-1000 nm with separate plug-in interference filters. Bandwidth 12 nm. |
| Absorbance interval | 0-2.5 AU |
| Resolution | 0.001 mAU |
| Reproducibility | Better than 1 % r.s.d. |

### SoFIA Software

| | |
|---|---|
| Calibration points | Up to 10 standards |
| Calibration curve fit | Linear or second order acc. to ISO 8466 |
| QC&GPL routines | Check samples, multiple sample and standard runs, automatic recalibration, out of reagent, out of sample, out of range warnings. Predefined methods |

# 3 Installation

## 3.1 Unpacking and Checking

Unpack the FIAstar™ 5000 Analyzer and its accessories with care. Remove all packing material.

Use the packing list, packed together with the instrument and check that you have received all parts. Use fig Fig. 3:1 to identify the different parts. If any parts are missing, contact your FOSS representative.

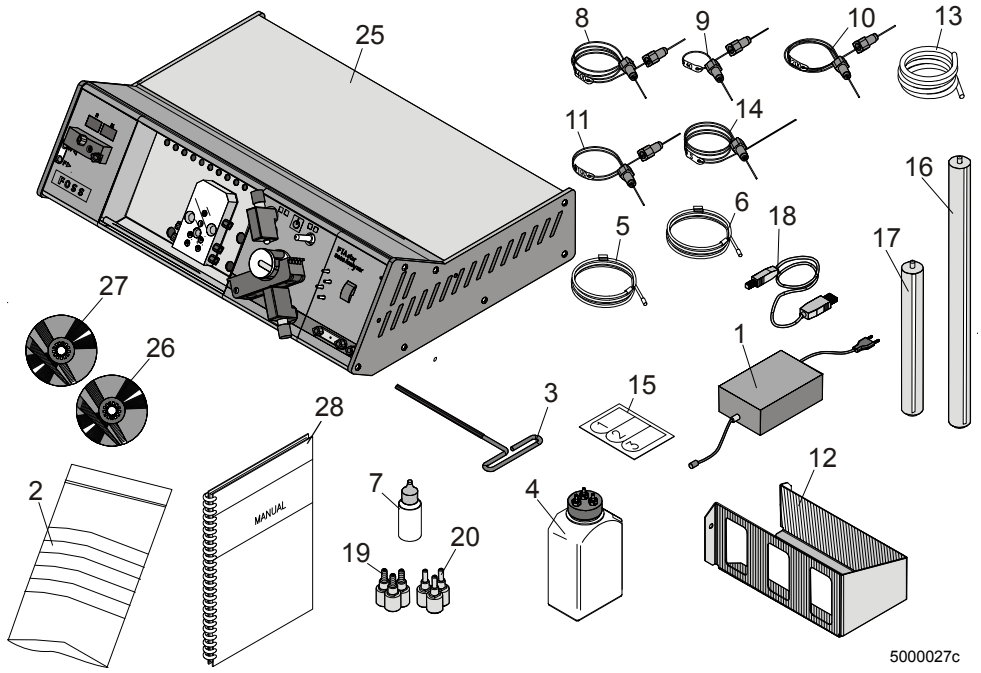


*Fig. 3:1 FIAstarTM 5000 Analyzer and accessories*

| | | | |
|---|---|---|---|
| 1 | Power supply | 13 | Carrier and waste tube |
| 2 | Tubing flush kit | 14 | Sample inlet tube |
| 3 | Valve tool | 15 | Identification labels |
| 4 | Rinse bottle | 16 | Extension stand |
| 5 | Pump tubes | 17 | Extension stand |
| 6 | Pump tubes | 18 | USB-cable |
| 7 | Silicone oil | 19 | Extra tube couplings (3.5 mm, 3 pcs.) |
| 8 | 400µl sample loop | 20 | Extra tube couplings (3 mm, 3 pcs.) |
| 9 | 40 µl sample loop | 25 | FIAstar Analyzer Module |
| 10 | 200 µl sample loop | 26 | Software Installation CD |
| 11 | 100 µl sample loop | 27 | Application Note CD |
| 12 | Reagent bottle holder | 28 | User Manual |

## 3.2 Installation Requirements

| **FIAstar 5000 Analyzer** | |
|---|---|
| Power supply | 100-240 V AC, 50-60 Hz (24 V DC) |
| Power consumption | 70 W (per Analyzer) |
| Weight | 8.7 kg (per Analyzer) |
| Dimensions, WxDxH | 450 x 310 x 145 mm (with reagent holder 625x310x145) |
| Connection to PC | USB (Universal Serial Bus) |
| **PC Specifikationen** | |
| PC with Windows XP operating system and Service Pack 3 | |
| At least 32 MB RAM | |
| 40 MB available space on the hard disk drive | |
| One 1.44 MB floppy drive or CD drive | |
| One RS232 com port for communication with the Sampler 5027. If data transfer will be used, two RS232 ports are required | |
| One USB port for each FIAstar Analyzer Module. Usually a PC's rear is equipped with two USB ports. For three modules a hub is required | |
| SVGA Monitor with 600x800 resolution and PC compatible printer (do not use line printer) | |

### 3.2.1 Input and Output Connections

- USB A port
- 2.5 mm DC-plug

## 3.3 Hardware Installation

1. Depending on system configuration you can have one, two or three Analyzer modules. If you have more than one, place them on top of each other.
2. Make all the tube, voltage and communication connections and attach each reagent bottle holder before stacking the modules.

   **Note: Do not connect the FIAstar modules to the PC before the software installation. Windows will recognize the new USB devices but will not be able to locate the correct USB drivers. Software installation is described in section 5.1 Installation on page 5:1.**

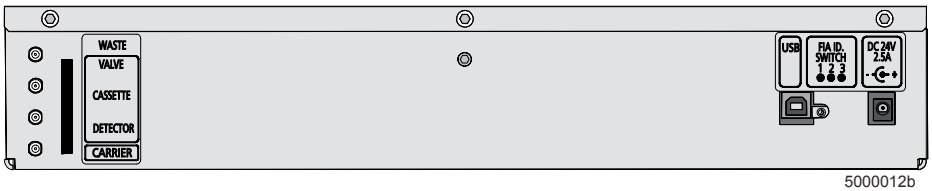


*Fig. 3:2 Analyzer rear panel*

### 3.3.1 Power Supply

1. The FIAstar 5000 Analyzer is supplied with a voltage of 24 VDC from the accompanying power supply, one for each Analyzer module. See Fig. 3:3 for connection.
2. The DC power supply is then connected to the domestic power supply.

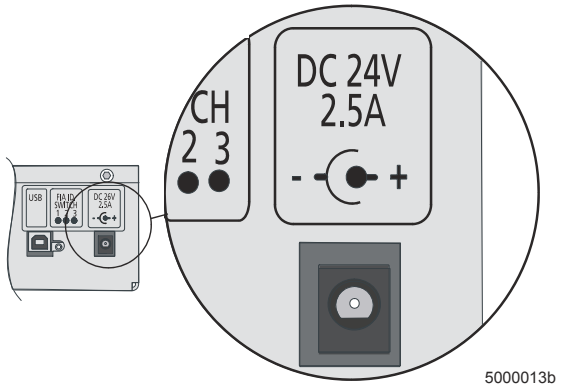


*Fig. 3:3 Voltage feed*

### 3.3.2 Carrier and Waste Tubes

1. Cut the carrier/waste tubing supplied in the accessory kit in 4 pieces. Make one piece ~50 cm (to be used as carrier) and the other three evenly long (to be used as waste tubing).
2. Connect the three waste tubings on the connectors at the rear panel. See Fig. 3:4. Lead the waste tubing to a drain or a waste bottle.

   **Note: If three Analyzer modules are used simultaneously, the waste bottle will quickly be filled.**
3. Connect the carrier tubing to the carrier inlet connector on the rear panel of the Analyzer, see Fig. 3:5. For easy identification of carrier tubing when you have more than one Analyzer, use labels to identify carrier 1, carrier 2 etc.

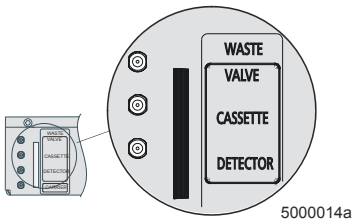


*Fig. 3:4 Waste tube connection*

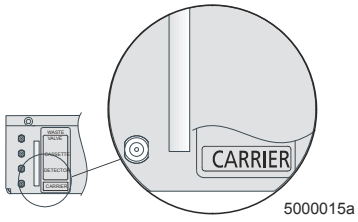


*Fig. 3:5 Carrier tube connection*

### 3.3.3 FIA Identification

1. The mode switch on the rear panel should be set in positions 1, 2 and 3 depending on how many FIAstar Analyzers shall be connected, starting with FIA 1 as the lowest, see Fig. 3:6.

   **Note: If changing the identification switch when the Analyzer and the PC are on, you have to disconnect and reconnect the USB-cable to establish communication.**

2. Insert the FIA 1, 2 and 3 identification labels on each Analyzer, see Fig. 3:7.

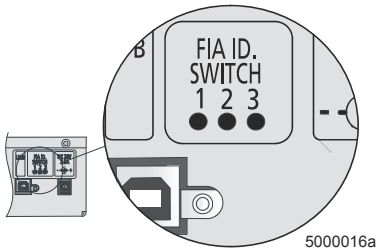


*Fig. 3:6 FIA identification switch*

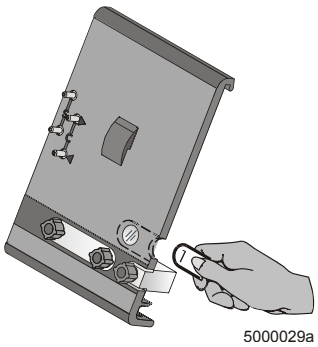


*Fig. 3:7 FIA identification labels*

### 3.3.4 Installing the Reagent Bottle Holder

1. Attach the reagent bottle holder on the two holding screws situated on the right hand side of the Analyzer.
2. Use the screws to fasten it if necesssary. See Fig. 3:8.

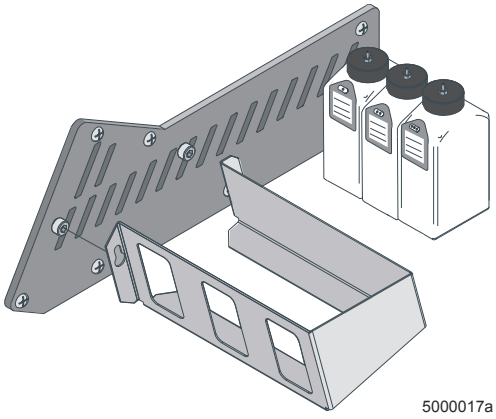


*Fig. 3:8 Installing the reagent bottle holder*

### 3.3.5 Stacking the FIAstar Modules

When stacking the modules, use the accompanying extension stands. These are screwed in place, see Fig. 3:9.

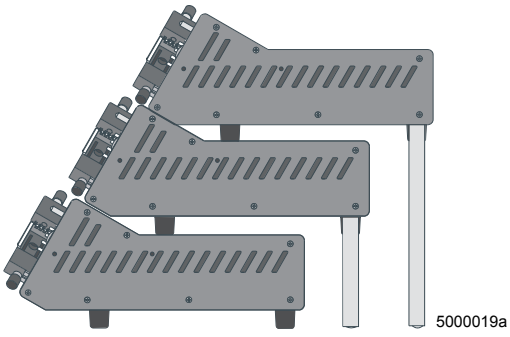


*Fig. 3:9 Extension stands attachment*

### 3.3.6 Sampler 5027

For installation of Sampler see Sampler manual. Install the Random Access kit according to the instructions provided with the kit.

1. The Sampler 5027 is placed to the right of the Analyzer. Using the RS-232 cable, connect the Sampler 5027 to one of the COM-ports on the PC.
2. Set the mode switch on the rear side of the Sampler panel to:
   - Position D = 120 cups configuration
   - Position 9 = 64 cups configuration

   and press reset.
3. Connect the sample inlet tube, supplied in the accessory kit, from the injection valve front panel on the Analyzer, (see Fig. 3:12) to the Sampler 5027 probe. If two or three Analyzers are to be used, use the special 2 or 3 needle probe (10010182 or 10010184 respectively).
4. To connect the probe with the inlet tube, use a piece of the silicone tube (55820062) supplied in the Sampler accessory kit.

### 3.3.7 Installation of Method Cassettes

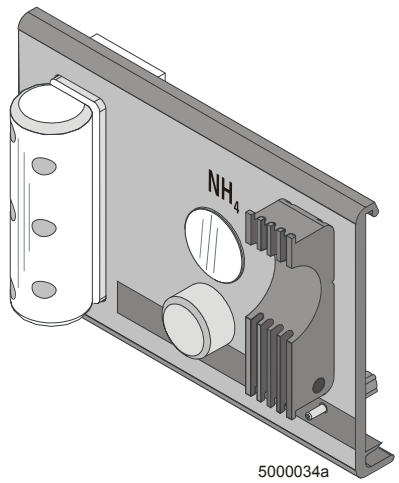


*Fig. 3:10 Method cassette*

The Method Cassette is equipped with a cassette connection block with reaction coils and tubing in which the chemical reaction takes place. On the FIAstar Analyzer there is a corresponding connecting block, which functions to transport the Carrier and sample to the Cassette connecting block and then back to the detector. When you install the Cassette, you lock these two connecting blocks against each other, and they are sealed with the o-rings at the liquid transfer points.

On the front panel where the pump tubes are connected to the Cassette, the symbols •, ••, ••• show the Reagent 1, Reagent 2 and Reagent 3 inlets. The pump tubes for the reagents are marked with the corresponding symbols. (Note; some Cassettes need only two reagents, so the symbols are then •, ••)

To install the Cassette, grip the securing screw on the front, hang the Cassette on the FIAstar Analyzer and then tighten the screw firmly. There is an inspection window on the Cassette front, where you can visually inspect that the sealing o-rings are flattened when you turn the screw.

### 3.3.8 Installing the Filters

For each Method Cassette a measuring (M) and a reference (R) interference filter is provided. In the Application Notes for the cassette, it is specified which filter is used for M and R respectively. Insert the filters in the openings provided in the detector, see Fig. 3:11.

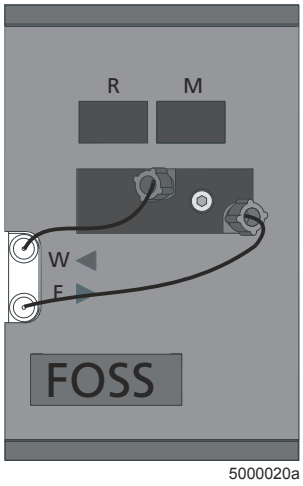


*Fig. 3:11 Detector module front*

### 3.3.9 Installing the Sample Loop

For each Analyzer a set of sample loops is included, volumes are 40, 100, 200 and 400uL. Which loop to use depends on the concentration range of the samples you want to analyse for that method. In the Application Note you will find the different concentration ranges and guidance on which loop to use.

Install the loop on the injection valve front panel, see Fig. 3:12. Use the sample loop holder if necessary.

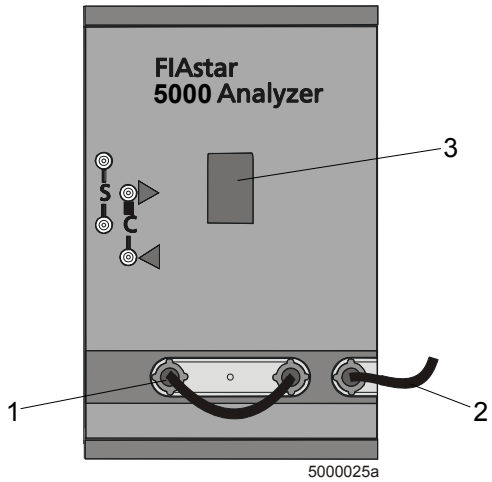


*Fig. 3:12 The injection valve front panel*

| | | | |
|---|---|---|---|
| 1 | Installation of sample loop | 3 | Sample loop holder |
| 2 | Sample inlet tube | | |

### 3.3.10 Carrier, Reagent and Rinse Bottles

Each Cassette is supplied with three reagent bottles and one rinse bottle, (500ml). These are to be placed in the reagent bottle holder on the right side of the FIAstar Analyzer.

The accompanying label set with the symbol •, ••, ••• correspond to reagent 1, 2 and 3 respectively. These will identify the reagent so that you know which pump tube should be connected to what reagent. Put the labels on the reagent bottles.

Each bottle is equipped with a tube coupling on which you place the pump tube. The rinse-bottle is equipped with 3 tube couplings, and is used after an analysis to rinse the system from all reagents.

Each FIAstar Analyzer is supplied with one carrier bottle (1000ml) and a rinse bottle. The carrier is in most applications distilled water. For some applications other solutions are used, then use a rinse bottle with distilled water to rinse the Carrier solution from the system.

Place the cassette holder on the reagent bottles according to Fig. 3:13 and secure it with the lock arm. When changing cassette, lift the holder with the reagent bottles. Place the cassette on the cassette holder by hanging it on the front. In this way, cassette and reagents are stored together for easy identification.

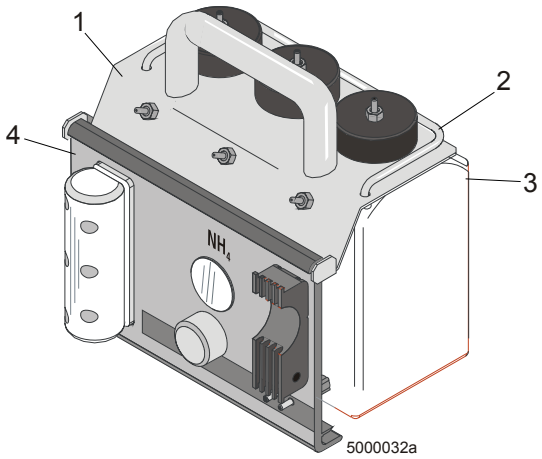


*Fig. 3:13*

| | | | |
|---|---|---|---|
| 1 | Cassette holder | 3 | Reagent bottles |
| 2 | Locking arm | 4 | Cassette |

## 3.3.11 Starting the Pump and Checking the Flow

### Pump Tube Connection

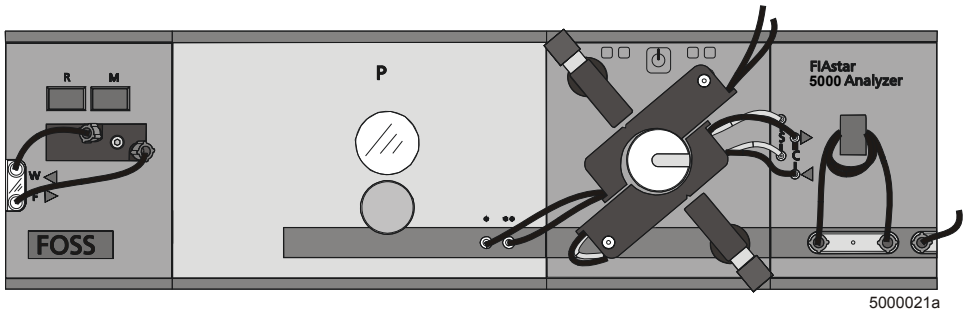


*Fig. 3:14 Pump tube connections*

The Carrier and Sample pump tubes are already installed on the FIAstar Analyzer upon delivery.

Fill Carrier and rinse bottles with distilled water. Place the Carrier bottle(s) on the table behind the reagent bottle holder(s) and the rinse bottles in the reagent bottle holder.

Connect the Carrier inlet tube on the rear panel of the FIAstar Analyzer to the Carrier bottle. Put the pump tube holder for the Cassette on the top pin of the pump. Connect all reagent pump tubes to the rinse bottle.

The Carrier pump tube will transport the solution from the Carrier bottle via the Carrier inlet connection on the rear panel to the pump and then through the injection valve and on to the Cassette.

The Sample pump tube will aspirate the sample via the sample inlet tube on the injection valve panel, through the valve and out to waste.

### Starting the Pump

Switch the FIAstar Analyzers on. Make sure all the waste tubes are fed to a drain. If the sample inlet tube is connected to the sampler, fill the wash bottle with water. If you are not using the sampler simply put the sample inlet tube in a beaker of water.

Apply a drop of silicone oil on the pump tubes to lubricate them. Then start the pump by grabbing and turn the pump handles to lock the pump tube holders to the pump wheel.

### Checking the Flow

On each pump handle there is a securing screw. Turning the screw clockwise will increase the pressure on the pump tubes and anticlockwise will decrease the pressure. Observe the liquid as it flows through the pump tubes from the Carrier and rinse bottles and increase the pressure if necessary. The flow should be even and smooth. Note that over tightening will drastically decrease the lifetime of the pump tubes, so tighten only one turn at a time. If you find it difficult to observe the flow, disconnect the pump tube momentarily from the bottle to let some air in and then put it back.

### Stopping the Pump

To stop the pump, grab and turn the pump handles to release them from the pump tube holders. Note that during an analysis, the software will not allow you to stop the pumps this way. You should use the Stop pump command in the software for this purpose.

**Note: Always release the pressure on the pump tube holders when the FIAstar is turned off.**

# 4 Operating Instructions

## 4.1 Principle of Operation

The sample is aspirated by the peristaltic pump through a loop. When an injection is ordered, the loop content is transferred into the carrier stream.

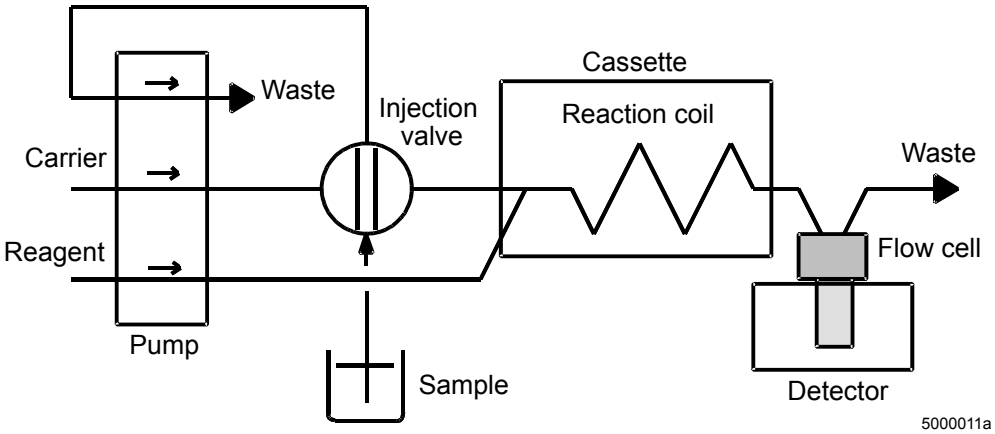


*Fig. 4:15 Principle of operation*

The addition of reagents is made in a connecting block mounted on the cassette. The carrier stream transports the sample plug to one or several merging points where the reagents are added. The merging points can be seen from the front of the cassette.

The sample plug becomes coloured as a result of the chemical reaction taking place between sample and reagents. This colour change is detected in a photometer. From the flow cell of the photometer the liquid is led to waste.

The total analysis time required to aspirate, react, detect and rinse out a sample is about 50-70 seconds. The signal from the detector is processed by SoFIA in the data handling system. By introducing standard solutions with known concentrations, the concentration of a sample is calculated. The results are presented on screen and on hard copy.

The running of the FIAstar system is controlled by a data handling system.

### 4.1.1 Detector Function

The detector measures the absorbance of light at two different wavelengths; - the measuring channel and the reference channel.

The measuring channel measures the absorbance change resulting from the chemical reaction of the sample with the reagents, plus the absorbance changes caused by optical, hydraulic and electrical noise. In the reference channel only the absorbance change caused by the optical, hydraulic and electrical noise is measured.

In the software, the absorbance values for the measuring and reference channels are subtracted, resulting in a baseline noise reduction.

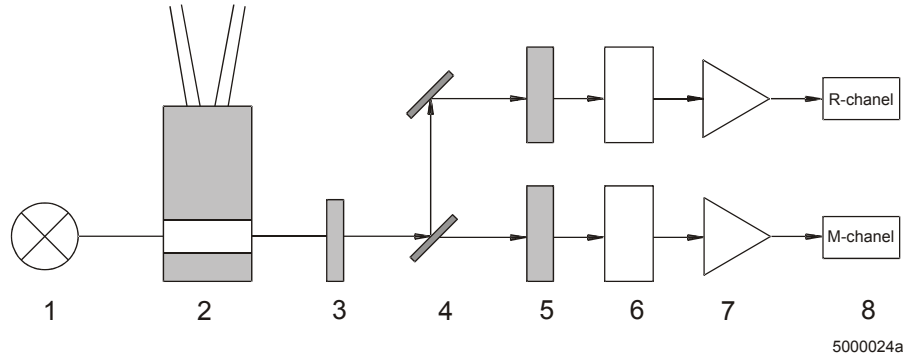


*Fig. 4:16* Detector principle

| | | | |
|---|---|---|---|
| 1 | Lamp | 5 | Interference filter |
| 2 | Cuvette, flow cell | 6 | Photodiode sensor |
| 3 | Linearisation filter | 7 | Transimpedance amplifier |
| 4 | Beam splitter | 8 | 24-Bit A/D converter |

## 4.2 Identification of Operating Controls and Symbols

The power switch on the FIAstar Analyzer is located on the front panel above the pump. Press to turn power on.

On the FIAstar Analyzer two pairs of LED´s indicate system function. These are located on each side of the Power switch.

- The right pair toggles between green and yellow as the injection valve switches between fill and inject positions.
- The left pair indicates that the system is on and is ready for use, and also the thermostat function.
- The left blinks green and turns to a steady green when system is turned on and during a reset. If this light turns red, the internal diagnostic test has failed and that FIAstar needs repairing.
- The right blinks green when the thermostat is heating and turns to a steady green when set temperature has been reached.

The power switch on the Sampler 5027 is located on the rear panel.

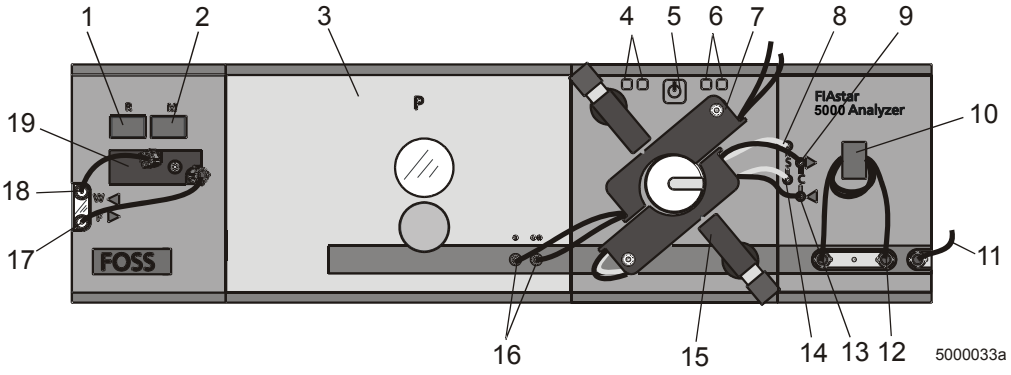


*Fig. 4:17 Controls and symbols*

| | | | |
|---|---|---|---|
| 1 | Reference filter | 11 | Sample inlet tube |
| 2 | Measuring filter | 12 | Sample loop |
| 3 | Method cassette | 13 | C, Aspiration side of carrier pump tube, flow direction carrier bottle to pump |
| 4 | LED indicators | 14 | S, Aspiration side of sample pump tube, flow direction from sample to pump |
| 5 | Power switch | 15 | Pump handle |
| 6 | LED indicators | 16 | Reagent inlet |
| 7 | Pump tube holder | 17 | F- To flow cell, flow direction from cassette to flow cell |
| 8 | S-Press side of sample pump tube, flow direction pump to waste | 18 | W, To waste, flow direction from flow cell to waste |
| 9 | C- Press side of carrier pump tube, flow direction from pump to injection valve | 19 | Flow cell |
| 10 | Sample loop holder | | |

## 4.3 Application Notes

With the system a CD is included with all Application Notes for all Methods Cassettes. Print out the preferred Application Notes.

For the blank cassette there is an instruction, AN 5299, Adapting FIAstar 5012 Applications to FIAstar 5000.

Please contact your FOSS representative for more details about FIAstar 5012 applications.

## 4.4 Preparation of Reagents and Calibration Standards

The preparation of the reagents and calibration standards is described in the Application Notes provided for each method cassette.

When setting up a system for simultaneous determination of several parameters, mixed calibration standards have to be used.

Fill the reagent bottles for respective cassette and put them in the reagent bottle holder on the Analyzer unit. Degassing of the Carrier and reagents is recommended when analysing near the detection limits.

## 4.5 Preparation of Samples

The preparation of the samples is described in the Application Notes provided for each method cassette. To prevent clogging of the tubing in the valve and cassette, make sure that the samples look clear to the eye. Visible particles of material have to be filtered out.

## 4.6 Routine Operation

### 4.6.1 Before You Start

For a full description on how to install the method cassettes, connecting pump tubes, starting the pump and checking the flow, installing the sample loop, see the Hardware installation 3.3.

Before the system can be used on a routine basis after the installation, the Configuration settings menu in the software has to be completed (see Configuration 5.6) and also the detector filter calibration for each method cassette (see Filter calibration ).

#### General Considerations

If you want to use three FIAstar Analyzers simultaneously and plan to run many samples in one run with multiple injections and recalibrations during the run, check during the analysis that you have enough solution in the reagent bottles, sample cups, recalibration cup and sampler wash bottle.

#### System Warm-up Time

The FIAstar Analyzer needs to be on for about 15 minutes before you start the analysis. Following the routine operation procedure below will automatically allow a proper warm up time

#### System Flow Equilibration

The system needs to be equilibrated by pumping the reagents for about 10 minutes before you start the analysis. Following the routine operation procedure below will automatically allow a proper equilibration time.

Avoid stopping the pump during analysis or calibration, since this will disrupt the flow equilibrium. If a pump stop has been necessary, let the system equilibrate for a few minutes after restart of the pump.

#### Recalibration

To compensate for drift in sensitivity during a run of many samples, automatic calibration every 30 minutes is recommended.

### Pump Stand-by Function

In the pump stand by mode, the pumps will rotate very slowly, consuming only a few millilitres of the reagents overnight. This makes unattended operation overnight possible and also shortens the start-up time the following day.

## 4.6.2 Routine Operation Procedure

The routine operation procedure is always described in the Application Notes. It may vary depending on which parameters that is analysed.

1. Turn on all FIAstar Analyzers units and (if used) the Sampler 5027
2. Verify that the correct method cassette(s) and corresponding detector filters are installed on each unit
3. Start the pump(s) and pump distilled water through each unit and check the flow
4. Turn the PC on and start SoFIA
5. Start pumping the reagents
6. Load the method in the software. Verify that the correct sample loop is installed on each unit
7. Load the Sampler with the samples and make a Sample List in the software
8. Load the calibration standard(s) on the Sampler calibration tray; make a few Test Injections of one of the samples to verify that the system is equilibrated
9. Make a calibration/check calibration
10. Start the Sample List
11. Make a report
12. Close the system down

## 4.6.3 Closing Down

For certain applications, specific rinsing procedures and solutions apply, see respective Application Note.

When the analysis is completed, you need to rinse the system with water.

1. Move all the reagent pump tubes to the rinse bottle, and also the Carrier tube if it has been used for other solutions than distilled water.
2. Fill the wash bottle on the sampler with distilled water.
3. Start the Rinse cycle in the software
4. When the Rinse cycle is completed, disconnect all pump tubes and pump air through the units to remove the remaining water.
5. Unlatch pump handles to release the pressure on the pump tube holders and turn all units off.

# 5 Software

## 5.1 Installation

### 5.1.1 General

SoFIA is a Windows XP based software, using the standard menus and commands from Windows XP systems. During installation you have the choice of several language options.

The help option in the task bar gives advice on how to proceed as well as available options.

The Help menu is easily accessed through a speed button on the toolbar in the software. In some operations, where the Help menu is not accessible, use the right mouse button or F1 to get help information.

SoFIA follows Windows standards for access key assignment.

The SoFIA 2.0 software is designed to use Microsoft SQL server database functionality. Database management is accessed through a separate software tool called the Database manager, providing functions for e.g. Creating a database, making Backup, Restore and Import of data.

The Microsoft SQL Server 2005 Express Edition SP2 is included in the software installation package.

### 5.1.2 Software Installation

The software installation is performed in 2 steps:

1. Installation of SoFIA, see 5.1.3.
2. Installation of the USB drivers, see 5.1.4.

**Note:** Do not connect the FIAstar modules to the PC before having completed SoFIA installation. This is because Windows will recognize the new USB devices but will fail to locate the proper drivers.

### 5.1.3 Installation of SoFIA

1. Insert the SoFIA installation CD in the CD drive
2. Select Run on the start menu
3. Select setup.exe on the CD

4. A prompt for Accepting the conditions for the Microsoft SQL application appears, see Fig. 5:18

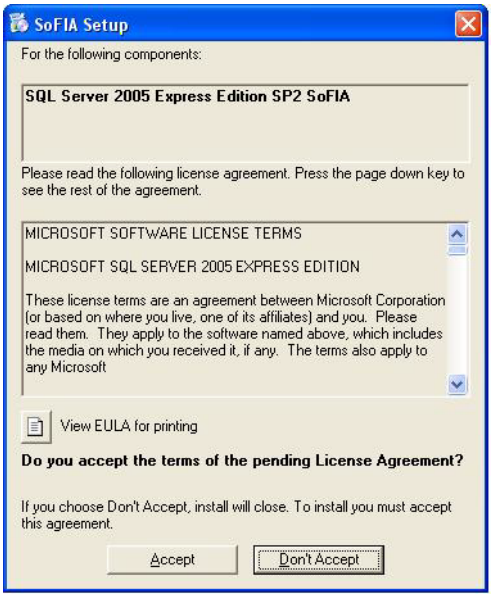


*Fig. 5:18 SoFia Setup, Licence Agreement*

5. Select Accept and the installation proceeds, see Fig. 5:19


*Fig. 5:19 SoFIA Setup*

6. Next the SoFIA software installation wizard is shown, see Fig. 5:20. Press Next to continue.


*Fig. 5:20 Setup Wisard*

7. Choose preferred language for SoFIA, see Fig. 5:21


*Fig. 5:21 Select Language*

8. Select installation folder and press Next, see Fig. 5:22

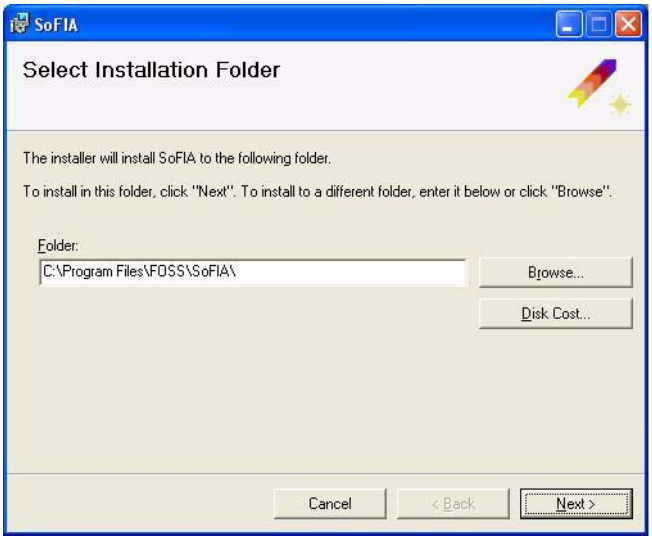


*Fig. 5:22 Installation Folder*

9. Confirm the installation by pressing Next, see Fig. 5:23

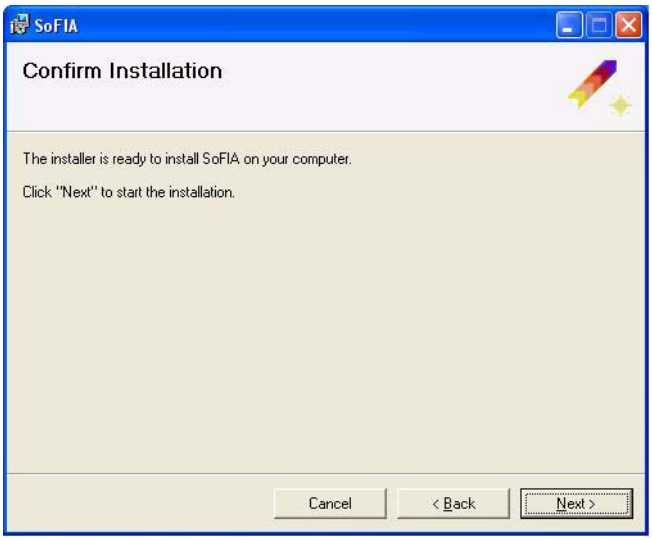


*Fig. 5:23 Confirm Installation*

10. After the installation is complete the following picture is shown, see Fig. 5:24

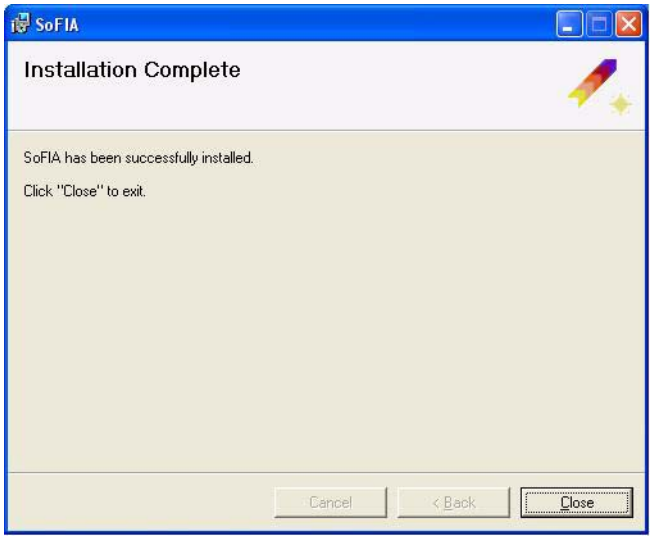


*Fig. 5:24 Installation Complete*

11. You must now restart the computer, see Fig. 5:25 .

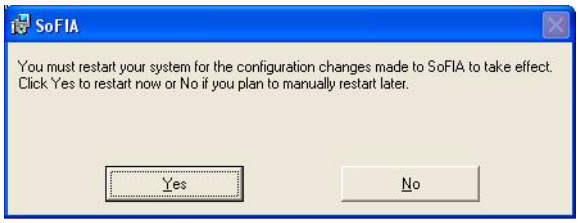


*Fig. 5:25 Restart after installation*

You cannot start SoFIA before creating a database, see Chapter 5.2 for instructions. Before proceeding with the database, make sure to install the USB drivers as described below.

## 5.1.4 Installation of the USB drivers

### For Systems with One FIAstar Module

1. Make sure the (FIA ID SWITCH) is in position 1, see Fig. 5:26.
2. Connect the USB cable from the FIAstar module to the PC, see Fig. 5:26

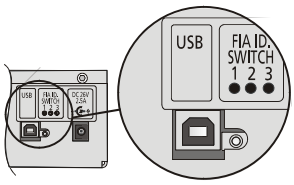


*Fig. 5:26 USB – connection at the FIA*

The ”find new hardware wizard ” is initialized, see Fig. 5:27


*Fig. 5:27 Hardware wizard*

3. Ignore using Windows update by ticking the "No, not this time" box.
4. Insert the SoFIA CD, and choose the option "install from a specific location (advanced)" in the wizard, see Fig. 5:28.

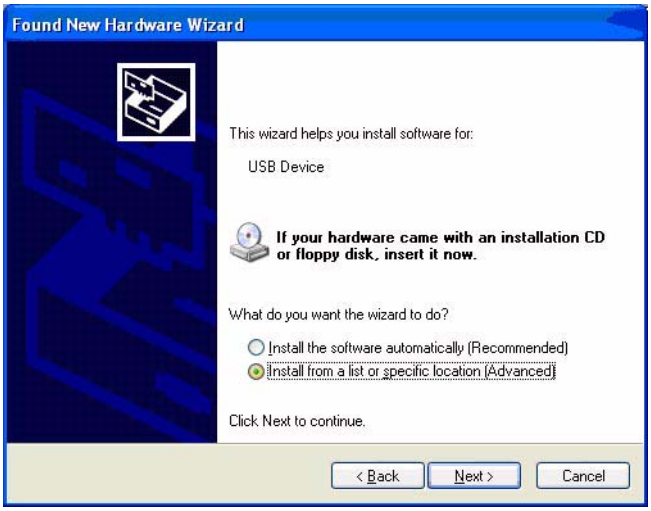


*Fig. 5:28 Hardware wizard*

5. Next, choose "search removable media" according to Fig. 5:29

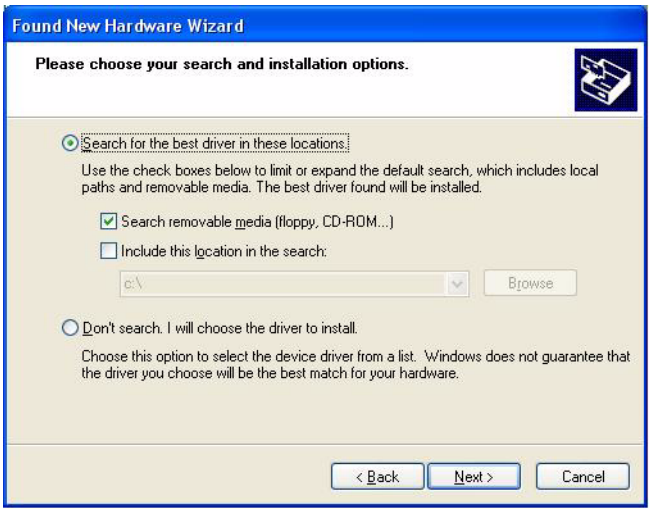


*Fig. 5:29 Hardware installation option*

6. If the search was successful, the wizard informs you that Windows has found a driver for this device, see Fig. 5:30. The USB driver name for FIA 1 is (tabiic0).

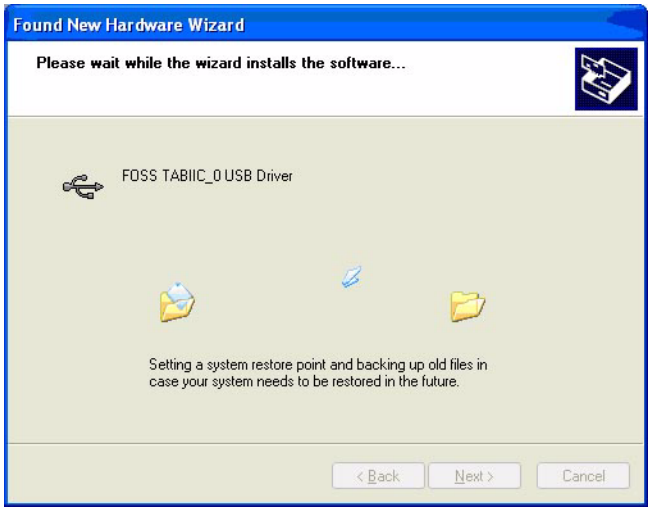


*Fig. 5:30 Hardware installation*

7. Next, Windows warns you that you are about to install a driver that has not passed Windows logo test, see Fig. 5:31. You can safely ignore this warning. Just click “Continue Anyway”.


*Fig. 5:31 Windows logo test*

8. The wizard informs that the installation is complete. Click “Finish”.
9. If the search fails, you must manually locate the drivers on the CD. Specify the path to the USB driver directory (DRIVERS) on the SoFIA CD.

### For Systems with Two or Three FIAstar Modules

For systems with two or three FIAstar modules, the installation of the USB drivers should be done stepwise for FIA 1, 2 and 3. Connecting all three modules to the PC at the same time may cause Windows not to properly recognize the USB drivers when starting up the system.

For some PC:s a USB hub may be required in case there are too few USB ports. See Fig. 5:32 for connection description. The hub shipped with FIAstar systems is not self powered, use the included power supply.

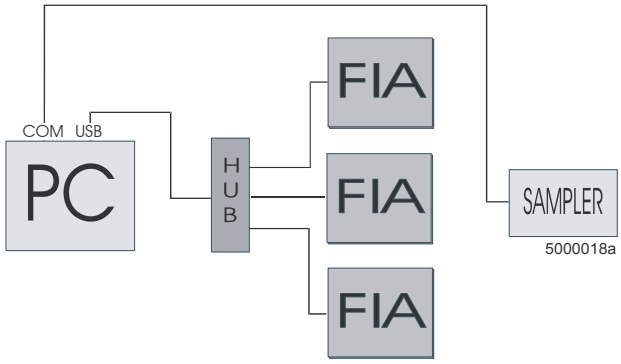


*Fig. 5:32 Connection of Analyzer and Sampler to PC*

Proceed like this:

10. Make sure the FIA ID SWITCH is in position 1, 2 and 3 on respective modules, see Fig. 5:26.
11. If a hub is used, connect this to the PC before connecting the FIAstar modules
12. Connect the USB cable from the FIAstar module 1 to the PC, see Fig. 5:32. If a hub is used, connect the USB cable to the hub.
13. Proceed according to 2-9 above.
14. Connect the second FIAstar module (FIA2) to the PC (or to the hub if used).
15. Proceed according to 2-9 above. The USB driver name for FIA 2 is (tabiic1).
16. Connect the third FIAstar module (FIA3) to the PC (or to the hub if used).
17. Proceed according to 2-9 above. The USB driver name for FIA 3 is (tabiic2).

Before starting SoFIA software you need to create a database. See next chapter 5.2.2 Create database on how to proceed.

## 5.2 Data Management

### 5.2.1 Database Manager

The Database manager tool is used outside the SoFIA application. It gives access to several data managing functions, all described below.

After installation of SoFIA, you first have to Create a new database. Next, you select methods for use in SoFIA software.

- For a new installation, select to Import FOSS methods from the Application Notes CD

- For an upgrade installation from SoFIA 1.30, you can choose to convert your old methods for use in SoFIA 2.0.

The Database Manager is started from the Start/All Programs/FOSS/SoFIA/Tools/ DB Manager, see Fig. 5:34. Close SoFIA 2.0 before using the Database manager.

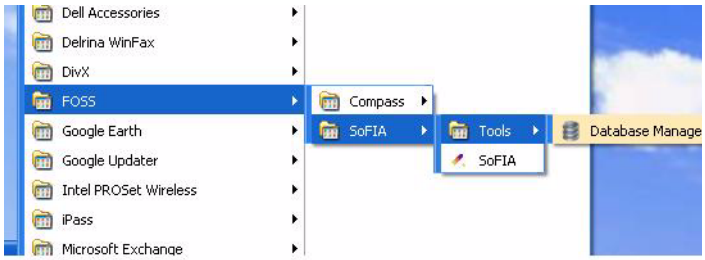


*Fig. 5:33 Start database manager*

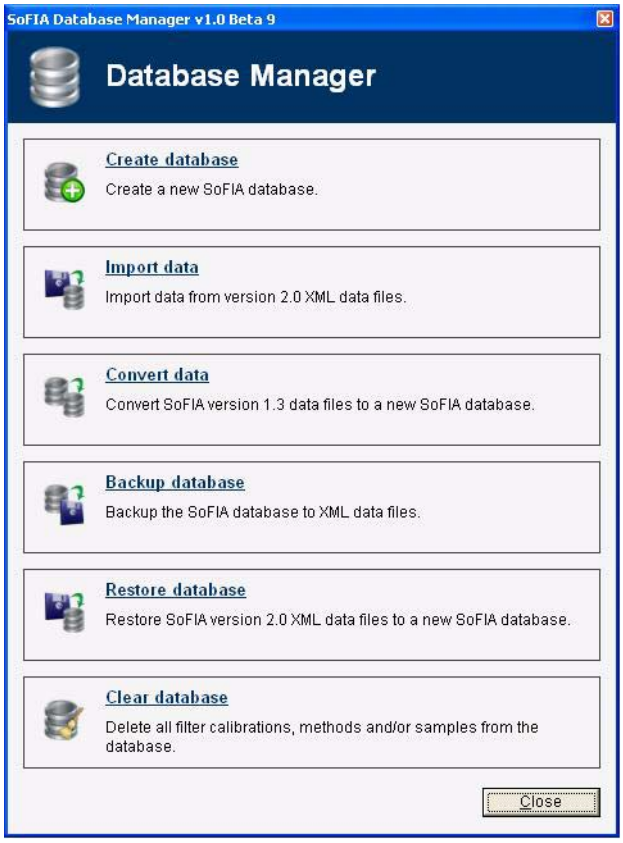


*Fig. 5:34 The Database manager menu*

### 5.2.2 Create Database

At the installation and before starting SoFIA 2.0 a database has to be created. Simply click on ´Create´.

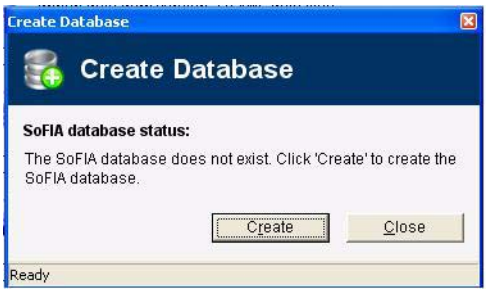


*Fig. 5:35 Create database*

Using the ´Create´database on a PC which already contains a database will delete the current database and replace it with a new. All data will be deleted. To save current data, make a Backup of the database prior to creating a new.

### 5.2.3 Import data

The Import data function is used for importing one or several methods plus corresponding calibrations to the current database. These methods can then be used in SoFIA software to analyse samples.

When selecting methods in the Import, a check is automatically made and if the method already exists in the database you will get a prompt to overwrite the method or to create a copy.

At the installation, you can Import Methods provided by FOSS to the database. These methods are located on the Application Notes CD.

To Import methods from the CD, proceed like this:

- Select Source directory, see Fig. 5:36.

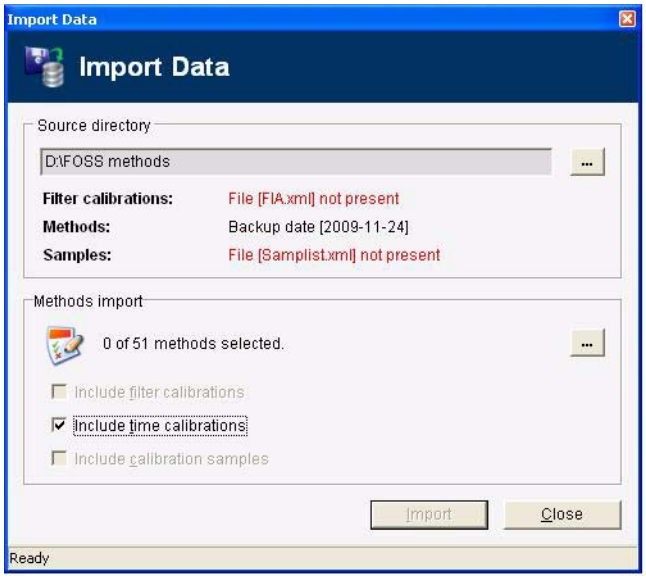


*Fig. 5:36*

- In the menu, click the browse symbol to display the list of methods, see Fig. 5:37

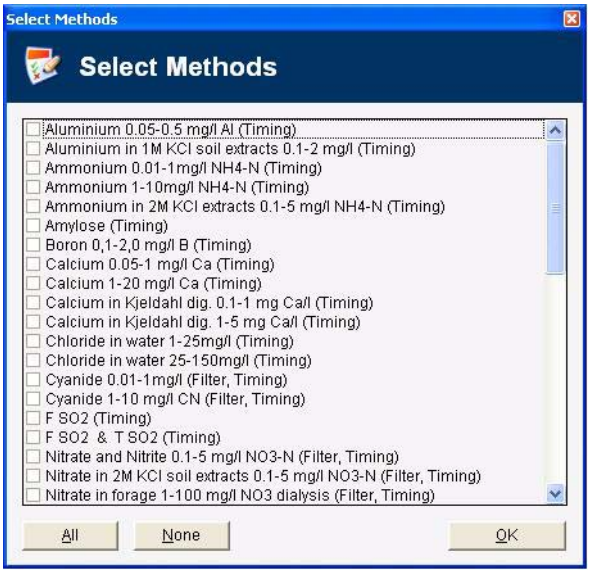


*Fig. 5:37*

- Select the method you want to import from the list by checking the box next to the method name. When selection is done, click OK.
- Next, check the box Time calibrations.
- Click on Import to finalise the import of the methods. A message appears confirming that the Import was made successfully.
- Close the Database manager and start SoFIA. The methods are displayed in the Method Browser, see Chapter 5.6 Method Browser for more information.

You can also Import methods from a Backup. If these methods have been calibrated, you will see this information next to the method name, see examples in  and Fig. 5:39.

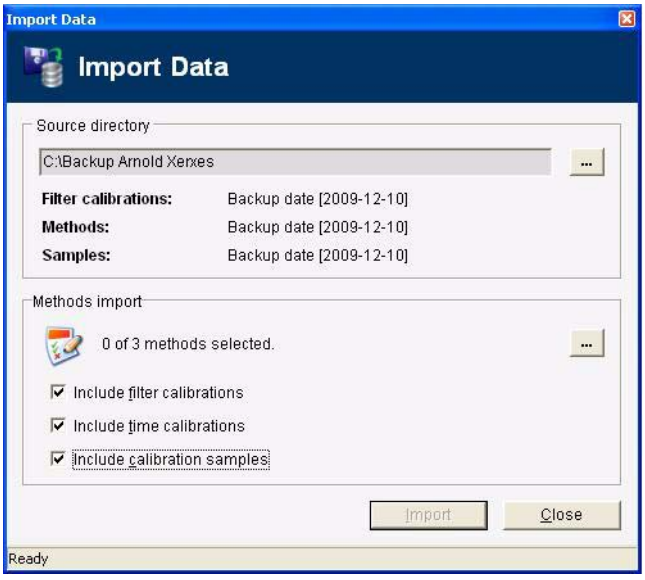


*Fig. 5:38*

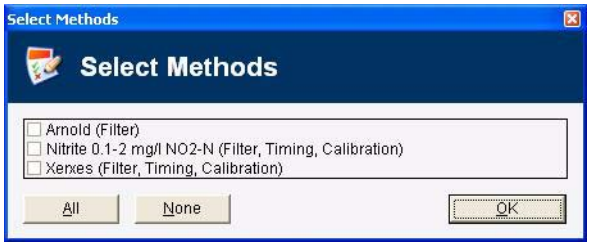


*Fig. 5:39*

- Filter - the method is filtercalibrated
- Timing - the method is Time calibrated
- Calibration - the method is calibrated with calibration standards.

To Import from a Backup, proceed like this:

- Select Source directory
- Click on the Browse symbol to display the list of methods
- Select which methods to Import by checking the box next to the method name in the browser, see Fig. 5:39.
- Next, check which data for each method you want to include for the selected method, see . Observe that the Calibration standards box can only be checked if you also check the other boxes.
- Click on Import to finalise the import of the methods. A message appears confirming that the Import was made successfully.
- Close the Database manager and start SoFIA. The methods are displayed in the Method Browser.

### 5.2.4 Convert SoFIA 1.30 Data to SoFIA 2.0

SoFIA 1.30 data can be converted to be used in SoFIA 2.0. To enable this, you need to do a Backup of your data from SoFIA 1.30 before removing it from the PC. Convert can also be used on all past SoFIA 1.30 Backups, you simply need to specify the directory where the backup is.

**Note: Due to frequent corruption problems of the SoFIA 1.30 database there is no guarantee that Sample Lists will be converted correctly. Therefore, make a printout or an Export as .csv filesof all Sample Lists you need to archive before removing SoFIA 1.30.**

Proceed like this:

- For a new installation, first Create a new database.
- Next, select Convert Data
- Select Source directory where the SoFIA 1.30 backup is located.

- Next, select areas you want to be included, see Fig. 5:40 .

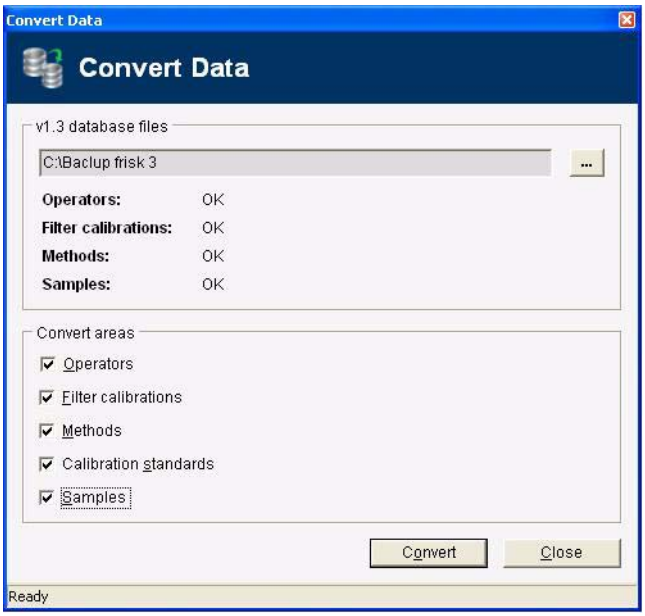


*Fig. 5:40 Convert data menu*

- Depending on available data in the backup, different convert areas can be choosen.
- Click on Convert. A warning message appears reminding you that existing data in the database will be deleted for the selected areas, see Fig. 5:41.

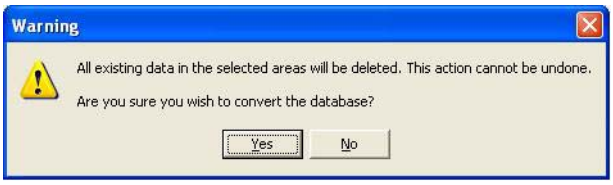


*Fig. 5:41 Convert method warning*

- For a new database there is no data so you can safely ignore the warning
- In other cases, you can do a Backup of existing data before converting.

- Close the Database manager and Start SoFIA. Your 1.30 data is now in the database and can be viewed and used inside SoFIA.

### 5.2.5 Backup Database

The Database Backup function will backup the existing data to a selected directory.

From a Database Backup you can make a Restore database to bring the data back into the existing database You can also do a selected Import of methods from the backup for use/reviewing in SoFIA.

To perform a Backup, proceed like this:

- Select destination for the Backup. Directories cannot be created from the database manager menu, so you need to create these prior to performing a Backup.
- Select Backup areas. It is recommended to check all boxes. You can always choose what to Restore or Import later on.
- Click on the Backup key. A message appears confirming a successful backup.

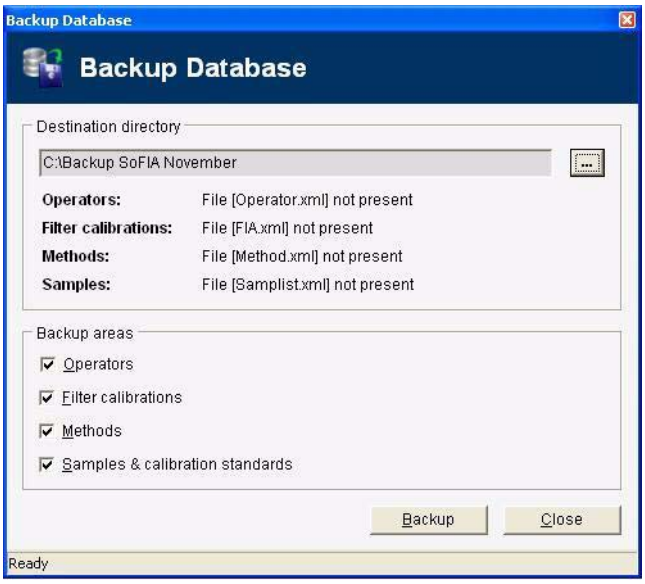


*Fig. 5:42 Backup menu*

### 5.2.6 Restore Database

Use this function to restore an earlier backup. Note that the Restore database will overwrite the existing data in your database, but only for the selected areas. It is recommended to perform a Backup database prior to restoring an earlier database.

To perform a Restore database, proceed like this:

- Select source directory
- Select areas for the restore action by checking the appropriate boxes.
- Click the Restore key.
- A warning is issued to remind you that existing data in the database will be overwritten by the restored data for the selected areas. see Fig. 5:44.

  - For example, Restoring Samples only will not affect the existing methods.
- Close the Database manager and Start SoFIA. Your restored data can be viewed and used in SoFIA.

*Fig. 5:43 Restore database menu*

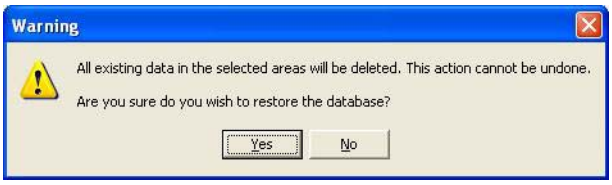


*Fig. 5:44 Restore database warning*

### 5.2.7 Clear Database

Use this function to delete data in selected areas in the existing SoFIA 2.0 database.

Proceed like this:

- Select areas by checking the appropriate box
- Click on Clear
- A warning is issued that data in selected areas will be deleted, see Fig. 5:46.


*Fig. 5:45 Clear database menu*


*Fig. 5:46 Clear database warning*

## 5.3 Splash Screen

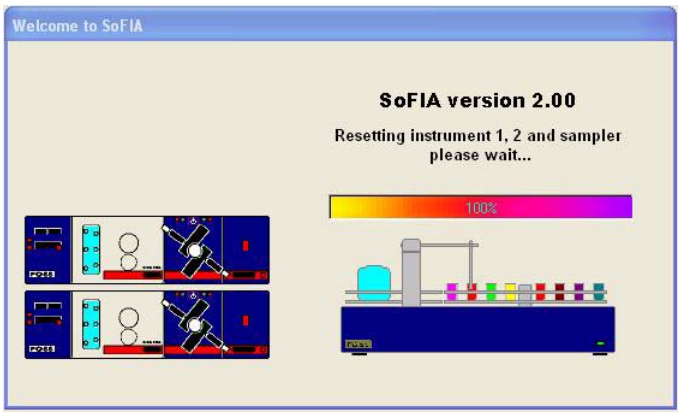


*Fig. 5:47 The splash screen*

Click on SoFIA icon to start the software.

The splash screen will show how many FIAstar analyzers that are installed and also the Sampler. To the right of each module, the text “resetting” will be followed by OK if communication has been established. If communication establishment fails, e.g. if the power is not on in one or several modules, the picture of that module is grey in colour.

The first time the software is used after installation the splash screen will look different; no modules will be shown since they have not been defined in the software. Proceed with Login below and continue to Configuration in order to define the number of attached units.

## 5.4 Login and Passwords

When using the software for the first time after installation, you need to configure it for your specific demands.

In the Login window:

1. Enter category: Select Administrator.
2. Enter user name: Adm appears automatically.
3. Enter password: Default passwords is “Admin”.
4. Click on OK. This takes you to SoFIA Main Menu.

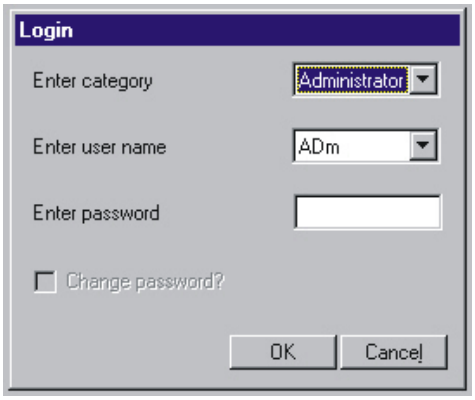


*Fig. 5:48 Login Menu*

There are five different user categories that allow access to different parts of the software. The different categories are described below. We recommend you to add your own operator names for the Operator and Administrator Category in the configuration menu.

If you have logged in on one level and need to change to a higher level, click on File on the task bar and then Login.

Menus in the software that are not available for a respective category will be displayed with text in grey colour.

### 5.4.1 Operator

A user in this category is responsible for the day-to-day work with the FIAstar 5000.

Default password: Operator.

### 5.4.2 Administrator

A user in this category has the same access as above plus access to configuration of hardware, results and certain calibration operations not performed daily.

Default password: Admin

### 5.4.3 Specialist

Gives access as above and also to both the reference, measuring and measuring minus reference values from the detector. Allows time calibration (peak plot and peak window setting)

Default password: Specialist

### 5.4.4 Service

Allows access to the service menus.

Default password: Support

### 5.4.5 FOSS

Only accessible to authorized service personnel. Allows access to all levels in the software.

### 5.4.6 Change Password

It is recommended to change the default password. Put a check mark in the “change password” box and follow the instructions. Only one password per category is allowed.

### 5.4.7 Adding and Deleting Users

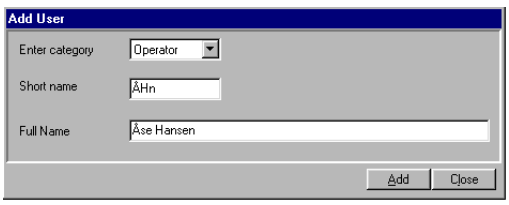


*Fig. 5:49 Add user*

Select the Configuration option on the taskbar, and then User.

Here you can add or delete operators from different categories.

## 5.5 Main Menu

### 5.5.1 Working procedure in SoFIA

The working procedure in the software is in short like this:

1. Load a method in the Method Browser.
2. Make a Sample List for the method in the Sample List Browser.
3. Make a Calibration or a Check calibration for the loaded method.
4. Start the Sample List to analyze the samples.
5. Make/print a report of the results

To perform these operations, you select functions from the task or the toolbar located at the top of the main menu. The status bar at the bottom of the main menu will show you the system status at all times.

The Method Browser, Sample List Browser, Calibration procedures, taskbar, toolbar and statusbar functions are described in detail in the following sections of the manual.

### 5.5.2 The Toolbar functions

The toolbar contains shortcut icons for frequently used functions, all of which can also be started from the taskbar.

*Fig. 5:50 The toolbar*

Displays the **Method List** browser. The list contains all the methods that can run on the system for the different method cassettes.

Displays the **Sample List** browser. The list contains all the Sample Lists that have been made. Until you have made a Sample List the browser will be empty.

**Check calibration** with one standard. An existing calibration graph can be checked with one standard and the slope will be adjusted.

**Test Inject** makes a single injection of a sample or a a standard to test system function.

**Rinse system**. After an analysis the injection valve will automatically inject wash solution four times.

**Export** the Sample List Report to LIMS or to a file

**Print**

**Stop** all pumps. All pumps will go to stand-by.

**Start** all pumps.

**Reset** all FIAstar 5000 Analyzers

**Reset** the Sampler

**Help** function

**Sound** off. Turns off the alarm.

### 5.5.3 The Taskbar functions

From the taskbar you access all functions in SoFIA. The functions are grouped and when opened displays more choices. See below for an overview:

**File –** Method and Sample List Browser, Login, Print and Export

**Method –** Calibration/Check calibration, Method detailed, Calibration data, Filter and Time calibrations.

**Inspect –** Testinjection, Read baseline, Check camium reductor efficieny, Check Ammonium Indicator absorbance

**Analyzers –** Reset, Start/Stop pumps, Rinse and Service menu

**Sampler –** Reset, Service menu

**Configuration –** Settings for Hardware, SoFIA, Results, LIMS, Paths, Data, Printer, User.

**Help –** Help menu

For easy access, the most frequently functions are available as shortcut icons on the toolbar.

### 5.5.4 The Status Bar, Symbols and Function

At the bottom of the main menu is the status bar. Here you can view system status, e.g. the number of analysers connected, which method is loaded and what the operation state is. Beneath are explanations of the different fields and symbols that have been used.

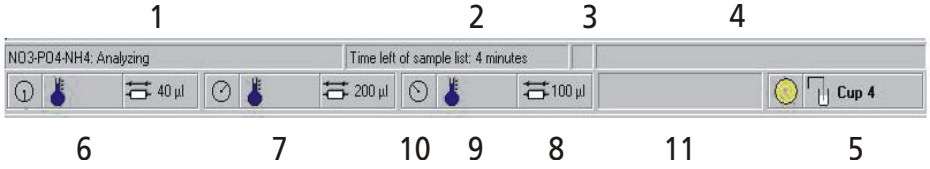


*Fig. 5:51 The status bar*

1. Shows which method is loaded and the operation state.

   The operation states are:

   **Idle** - the instrument is ready to perform any task.

   **Preparing** - the instrument is preparing to start a Sample List or calibration.

   **Analysing** - the instrument is busy analysing a Sample List.

   **Calibrating** - the instrument is busy calibrating.

   **Pausing** - the instrument is pausing in a Sample List or calibration
2. Time left for method operation.
3. Flag, symbol for error and warnings related for the system.
4. Error/warning messages for the system are displayed here.
5. Sampler probe position
6. FIA 1 module
7. FIA 2 module
8. Injection volume
9. Temperature symbol: will show temperature when the thermostat is used. Will blink until temperature is stabilized. Required temperature will be displayed and the actual temperature within parenthesis
10. Pump symbol: will rotate when pump is on.

11. Progress bar for data managment.

A red cross on a FIA module or the Sampler on the status bar indicates no communication between SoFIA and the Analyzer module/Sampler.

## 5.6 Configuration Settings

When starting the software for the first time you need to configure it for your specific demands, e.g defining the number of Analyzers used, sampler, printer, result presentation etc.

In order to get started quickly, make only the hardware configuration and leave the rest to default settings. You can change these later on when you are more familiar with SoFIA.

You need to be logged in as “Administrator” in order to have access to the configuration menu. If you need to change the login category, click on File, Login and follow the instructions on the screen.

Select the Configuration option on the taskbar and then Settings. The configuration settings menu is displayed, consisting of Results, SoFIA software, hardware, LIMS, paths, and Log. All the different configurations settings are described below.

To change settings, click on the Edit key. When all settings in the different folders have been made, click on the Save key.

### 5.6.1 Result Settings

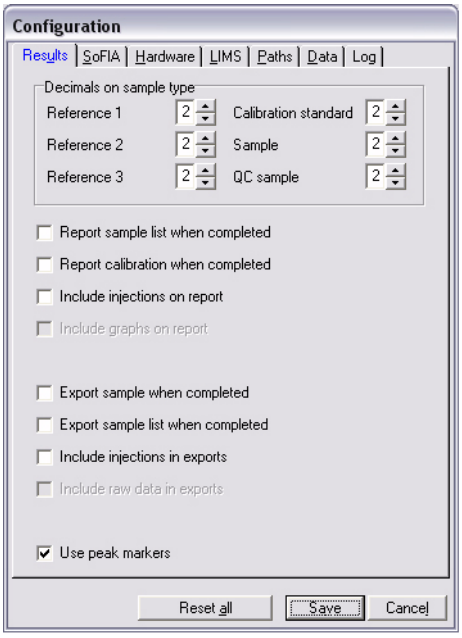


*Fig. 5:52 Results settings*

The results configuration defines the layout of the reports and export of data. More information about Report/Export is found in 5.17 Reporting results on page 5:49.

**Report Sample List when completed** - brings up the Print dialogue menu automatically after a completed Sample List.

**Report calibration when completed** - brings up the Print dialogue menu automatically after a completed calibration.

**Include injections on reports** - the individual injections will be printed out (when using multiple injections).

**Include graphs on report** - all the peak plots are included in the report.

**Note: Once you have closed the Sample List after a run, the peak plots are not saved, unless you have checked, "save all the raw data", in the Data settings under the Configuration menu.**

**Export sample when completed** - each sample result will be exported continuously during the run. When multiple injections are used, the export is made after all injections have been made.

**Export Sample List when completed** - export of the Sample List is made automatically after the run.

**Include injections in exports** - the individual injections will be exported (when using multiple injections).

**Include raw data in exports** - all the raw data for each injection are included in the export.

**Use peak markers** - allows the use of peak markers in the peak plots on the screen and on the printouts. The peak markers visualise the Baseline (Red) and Peak (Green) time windows used in the method.

**Note: You can always make a manual export/print-out using the speed button on the toolbar after the run.**

### 5.6.2 SoFIA Settings

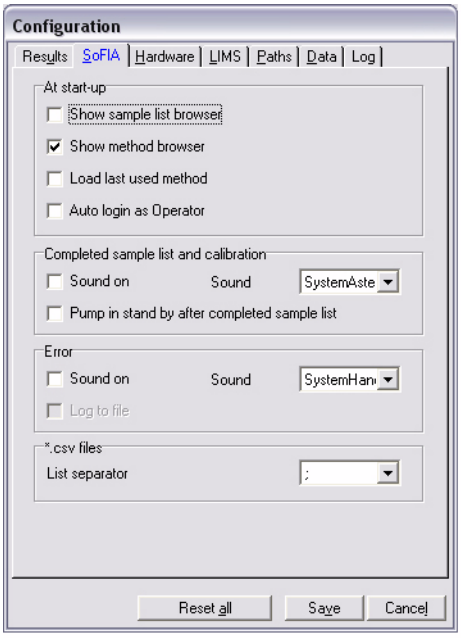


*Fig. 5:53 SoFIA settings*

**At start-up** - Select to have auto start-up of certain menus. Default settings are to show the Method List browser and to Load the last used method.

**After completed Sample List and Calibration** - You can select to have a sound on to tell you that the sample run and calibration is completed. Default setting is off.

Selecting Stop pump after completed Sample List will automatically turn the pump to stand-by mode after each run.

**Error** - The Error box will give you possibility to have an alarm signal if an error has occurred in the system. You can also select to generate a Log file of all errors that have occurred from system start-up to close down.

**Login** - If you select Auto login, the software will automatically login as the last user of the category operator.

**csv files**- Comma separated value (*.csv) is a file format in which Sample Lists can be exported. See section 5.17.2 Export results on page 5:50. Check that the list separator used matches the selection of list separator in Windows. This setting is found in Windows Control Panel; open Regional and Language Options and check the Number filed under the Regional Options tab.

**Note: If the decimal setting in Windows Control Panel is a comma you can not use comma as a list separator. You have to choose semicolon (;) in this case.**

### 5.6.3 Hardware Settings - FIAstar and Sampler

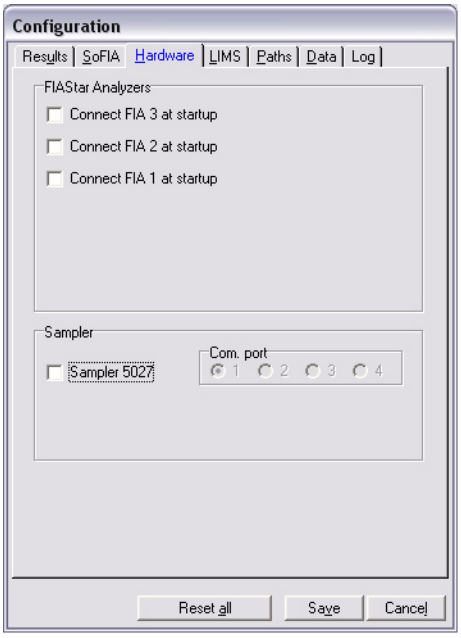


*Fig. 5:54 Hardware settings*

**FIAstar Analyzer** - Check the respective box to select which FIAstar Analyzer to connect at start-up.

Included in this menu is a log of the number of injections that have been made for each Analyzer. This is for Service purposes and the log can only be cleared if logged in as “service”.

**Sampler** - If you are using a sampler, click on the sampler box, and then click on the appropriate COM-port where the sampler is connected on the PC.

### 5.6.4 LIMS Settings

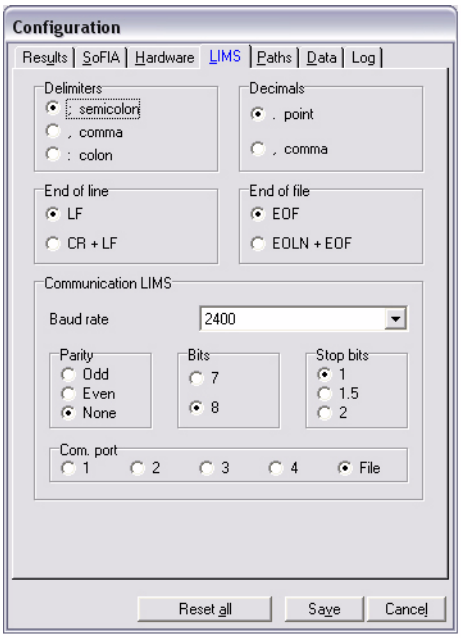


*Fig. 5:55 LIMS settings*

SoFIA supports distribution of a Sample List to a LIMS system.

SoFIA can export automatically either after each sample is completed or after each completed Sample List. This selection is made in Configuration/Results, see section 5.6.1.

The export can be made directly to a COM -port or to File. If you select File, you will have to select a path in Configuration/Paths menu, see section 5.6.5. The files will be saved to the selected directory. The name of the file will be LIMS xxx.DAT, where xxx is 01-999. The files will be created in the order 01-999, and when all the file names have been used, the first file will be overwritten and so on.

Starting or restarting SoFIA will automatically reset file-numbering to LIMS 001.DAT for the first new file.

Before using the LIMS facilities, configure the above settings and also ensure that the export format is in accordance with the requirements of your LIMS system.

### 5.6.5 Paths Settings

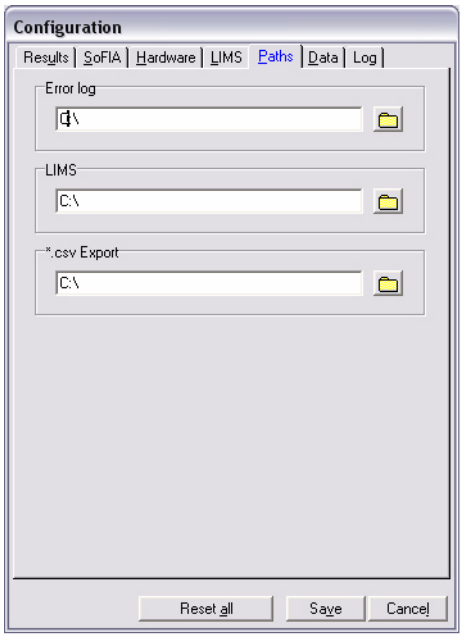


*Fig. 5:56 Paths settings*

Select the paths for the error log file, LIMS file and the *.CSV Export.

### 5.6.6 Data Settings

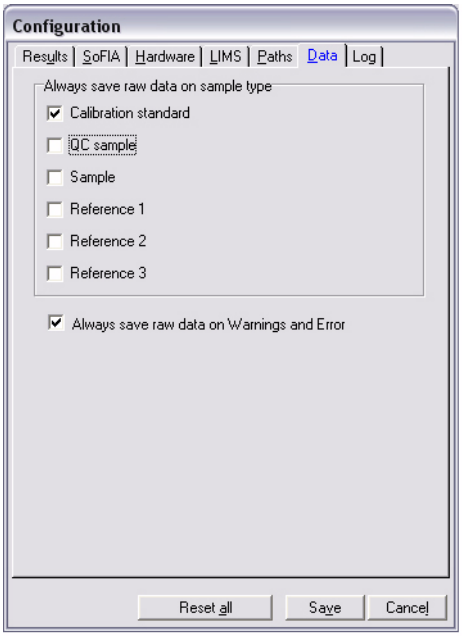


*Fig. 5:57 Data settings*

In this menu you can select to save raw data for all the samples, standards, QC-samples and so forth. Saving rawdata enables viewing of all peak plots in completed/ stopped Sample List. Note that when a Sample Lists has been completed, all the peak plots can be displayed on the screen or in the report as long as you do not close the Sample List. When closing the Sample List, only raw data for the sample types that you have checked in the Configuration/Data menu will be saved.

The default setting is to save raw data for samples where a warning has been issued and for calibrations.

### 5.6.7 Log

The log functions serves to log errors in the software. Enable and use it only in co-operation with a FOSS support person, who will assist with instructions.


*Fig. 5:58 Log*

### 5.6.8 Printer

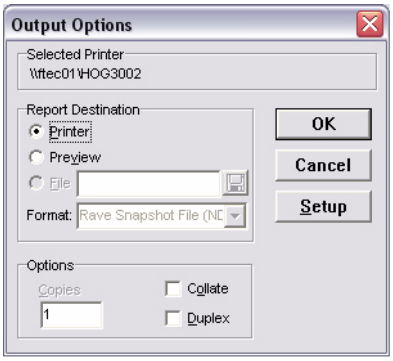


*Fig. 5:59 Print set-up*

The printer configuration is located under File on the taskbar. Click on File and then Print setup.

Checking the Duplex box will give a 2-sided printout.

Select how you want the results printed. The printer used will be the default printer in Windows.

## 5.7 Method Browser

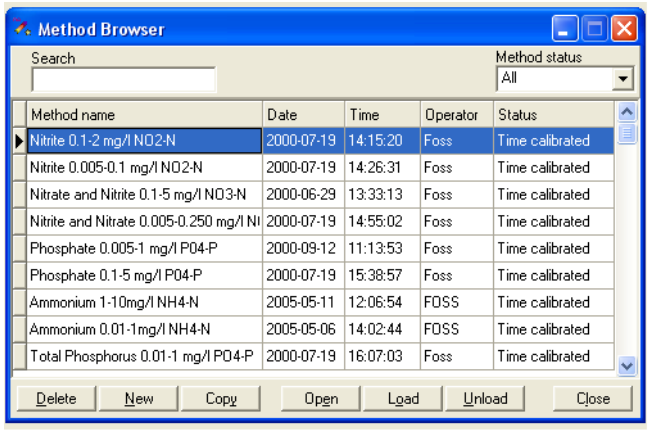


*Fig. 5:60 The method browser*

The Method Browser contains the methods that can be used for analysing samples. At installation, the Method Browser is empty. FOSS provides methods for use in SoFIA and also corresponding Application Notes containing the chemical preparations. These are located on the Application Notes CD that is supplied in the software package.

- FOSS SoFIA methods must be imported from the Application Notes CD to the Method Browser using the Database manager tool, see Chapter 5.2.
- Alternatively you can create your own methods, see 5.7.7 and 5.7.8.
- Both FOSS methods and user created methods have to be calibrated before you can use them to analyse samples.
- All FOSS SoFIA methods are designed for use with 1 FIAstar Analyzer. For FIAstar systems using 2-3 Analyzer modules simultaneously, it is easy to make a multichannel method by a copy/paste function from the original methods, see 5.7.8.

  - There is one exception – the method for simultaneous determination of Free and Total SO2 is available as a 2-channel method already on the Application Notes CD.

### 5.7.1 Method preparations

Before any method can be used fully, certain preparations have to be made. These are:

- Filter calibration

  This will calibrate the detector absorbance scale for a set of wavelength filters, see 5.13.13 on how to proceed.
- Time calibration

  - This procedure sets the time windows for the baseline and the peak evaluations for a method. In addition, the absorbance scale is adjusted to fit the methods concentration range.
  - The FOSS SoFIA methods are already timecalibrated. Only new/user created methods needs a time calibration, see 5.13.14.
  - The time calibration can only be made if a filtercalibration has been made first.
- Calibration with standard solutions.

  - The calibration will create a calibration graph of absorbance values plotted versus the calibrations standards. This needs to be carried out prior to analysing samples, see 5.13.
  - Calibration of a method can only be made if both the filter-and time calibration have been carried out.

### 5.7.2 Method status

The method status for each method is displayed in the Method Browser. The status reflect the preparations above.

- New method – requires both a filter and time calibration plus a calibrations using standard solutions before it can used to analyse samples.
- Time calibrated – method can be calibrated using standard solutions
- Calibrated – methods can be used directly to analyse samples.

### 5.7.3 Loading/unloading a method

To use a method, mark the method with the cursor and click on the Load key. The method is now loaded and you will see the method name and current operation on the status bar in the lower left corner of the main menu. To load a different method, simply select the method and click on Load.

To unload a method, click Unload.

### 5.7.4 Open a method

The Method detailed window will be displayed showing the detailed setting for a method, see 5.8 for more information.

### 5.7.5 Copy method

Highlight the method you wish to copy and select Copy. Everything is copied except the calibration graph. You will need to save the method with a new name.

### 5.7.6 Deleting methods

Highlight the method in the Method browser and select Delete. Multiple methods lists can be deleted by using the Ctrl key and at the same time the mouse to mark the methods you wish to delete.

### 5.7.7 Making a new method

To make a new method you need to log-in to SoFIA as a Specialist. From the Method Browser, select New. In the method detailed menu – enter all necessary information for the method, see 5.8 for more information.

### 5.7.8 Making a method for simultaneous determination of 2 or 3 parameters

All FOSS methods in the Method Browser are made for use with one FIAstar Analyzer during the installation; i.e. they contain only one parameter.

In order to make a method which can be used for simultaneous determination of two or three parameters you need to make a new method and copy/paste the single parameter methods to this new method and then save it. This procedure copies all the parameter settings, so no changes have to be made for these. In addition, the time and filter calibrations will be copied.

When using a multi parameter method, the software will automatically accommodate for the “slowest” parameter, ensuring that the measuring and sample fill times will be long enough.

Proceed as follows:

1. In the Method browser, click on New to make a new method.
2. Make additional folder(s) by right clicking on the tab. Maximum three tabs can be used.
3. Next, in the Method Browser, open the first of the methods you wish to copy from. Right click on the tab, and select “copy”.

4. Then switch back to the new method, right click on the first tab and select “paste”.
5. Switch back to the Method Browser and open the second method you wish to copy from. Right click on the folder, and select “copy”.
6. Then switch back to the new method, right click on the second folder and select “paste”.
7. If you want a third method copied, proceed in the same way.
8. The number of standards follows the first copied method. Verify that the standards are according to your needs. If necessary, include more standards.
9. Name the new method with an appropriate name, e.g. “Ammonium/phosphate low range”.
10. Save the new method.
11. The new method will now be included in the Method Browser.
12. When using the method, make sure that you use corresponding Method Cassettes on FIA1, 2 and 3.

## 5.8 Method Detailed

Detailed method information about injection time, injection volume etc can be viewed in the Method Detailed menu.

There are two different ways to reach this menu:

**For the loaded method** - Click on Open in the Method browser or go to Method and then Method detailed on the task bar.

**For not loaded methods** -Mark the method in the Method Browser list and click on Open.

The Method detailed menu consists of three tabs: Parameter data, Calibration standards and Result presentation. The tabs are described in following chapters.

### 5.8.1 Edit a Method

To edit the settings in Method detailed, click on the Edit key. When all changes have been made, click on the Save key to save the new settings.

Method editing is password protected. The Operator level does not give access to any method editing. The Administrator level gives access to modifying calibration standards in the method. The Specialist level gives access to all method editing. Some changes to a method will change its status, requiring a new time calibration. See more in Chapter 5.13.14.

**Note: Editing of method detailed cannot be done on a loaded method. To edit, first unload the method and then click on Edit.**

### 5.8.2 Parameter Data Tab

A method can contain one, two or three parameters. Each has its own tab, with the name displayed at the top.

Some settings are common for all parameter tabs, such as the sampler function settings.

Other settings are specified per parameter, and reflect the settings specified in respective Application Note.

**Note:** The parameters with the longest measurement time rules the sample throughput.

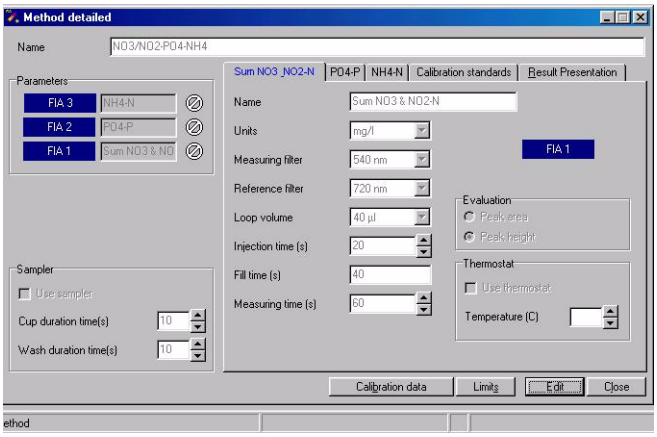


*Fig. 5:61 Method Detailed, parameter data*

The squares FIA1, FIA2 and FIA3 symbolize the Analyzer module that should be used for respective parameter, and on which the corresponding method cassette should be installed.

### 5.8.3 Change From/To Manual Analysis

To select whether to use a sampler or not, click on Edit, and check the “use sampler” box as appropriate.

### 5.8.4 Moving a Parameter to another Analyzer

Click on Edit and “move” the parameter by clicking on the handle beside the FIA1, FIA2 or FIA3 symbols where the name of the parameter is and drag it to the selected FIA (the blue square). If this parameter has not been used on that Analyzer before you will need to do a new filter calibration.

### 5.8.5 Thermostat

If a method requires the use of the built in thermostat, there will be a checkmark in the “use thermostat” box, and the temperature setting will be filled in.

### 5.8.6 Signal Filter

The signal filter is a software calculation of the signal from the detector. The software will calculate a sliding mean value on the measured data from the detector for 1, 2 or 3 seconds. This is to reduce the short term noise on the baseline during analysis. The setting has been optimised for each method provided by FOSS. Most methods use one second sliding mean filtration.

This option is only available for the Specialist category users.

### 5.8.7 Evaluation

You can select whether to evaluate the peak using peak area or peak height. More info about this function is found in 5.13.14.

**Peak area** - integrates the peak area for each measured cycle (5 per second) in the peak window.

**Peak height** - the largest change from the baseline is reported.

### 5.8.8 Calibration Standards Tab

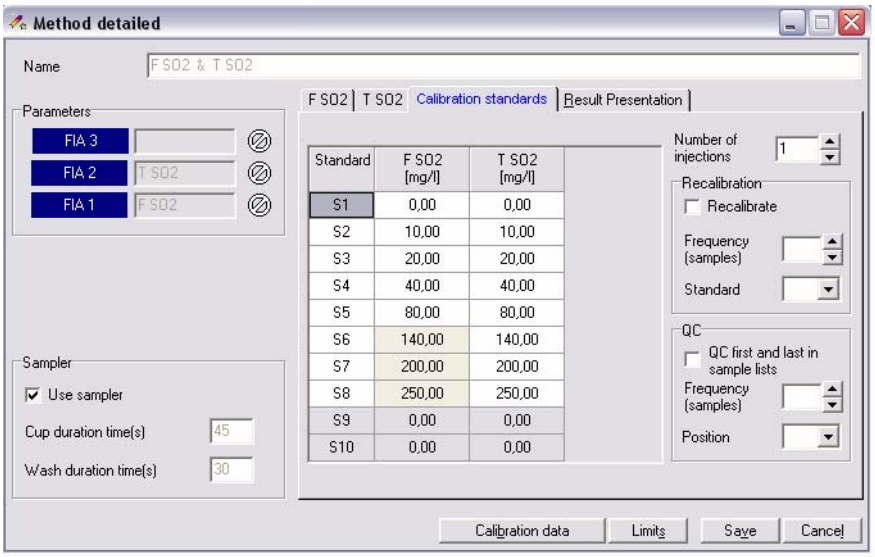


*Fig. 5:62 Calibration standards*

All settings are protected against changes if you are logged in as Operator. If you log in as Administrator, you can change all.

If more than one parameter is analysed the number of columns where to enter standards will correspond to the number of parameters to be analysed.

If you wish to do a calibration skipping one or more of the standards, click on Edit, mark the standards, right click and select Exclude.

To include a standard, mark it, right click and select Include.

### 5.8.9 View and Print Calibration Data

Clicking on Calibration data in the Method detailed window will display all the calibration data for that method. If you are logged in as Administrator you will find the detector filter calibration, the time calibration and the concentration calibration data. On the Operator level, only the concentration calibration data is shown.

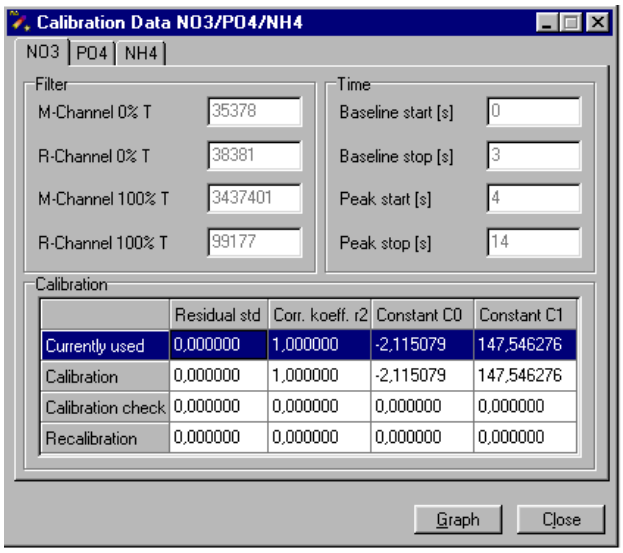


*Fig. 5:63 Calibration data*

If the method is loaded and in use you will see which Check calibration or recalibration is currently used by the system.

Clicking on Graph, the original calibration graph for the method will be displayed.

To print calibration data, click the Print symbol.

### 5.8.10 Changing the Number of Injections

To change the number of injections, click on Edit, and then increase/decrease the number of injections.

### 5.8.11 Quality Check Samples

A quality check sample (QC) can be included in the Sample List by enabling the QC function in the Calibrations standards menu. To include a QC-sample, do like this:

1. Click on the Edit key and check the QC -box
2. Select a free position on the calibration tray.
3. Select frequency of the QC-sample. It will always be the first and last analysed sample. Additionally it can be analysed at selectable sample frequency.
4. Enter the concentration of the QC-sample in the Standards table. The concentration has to be within the highest and lowest standard.
5. Select limits for the QC-sample. Click on the Limits key. Then select Edit and Category/results. See also section 5.8.15 Limits, Error and Warning on page 5:31.

If the result for the QC sample during a run is outside the error limit for the expected concentration the QC sample will be rerun automatically. If the result is still outside the error limit, the run will automatically stop and the Sample List will be aborted. If the result after rerun of the QC sample is within the error limit, the run will continue.

### 5.8.12 Automatic Recalibration during Analysis

1. To select, put a check mark in the Recalibrate box.
2. Select which standard to use and with which frequency it should be used. It is re-commended to use the highest standard in the calibration set, and at every 30 minutes. For single injections, this corresponds to about 25 samples. For two injections per sample, the frequency will be approx. every 12 sample.

Below is a description of the recalibration function.

- Automatic recalibration during a run will automatically adjust the calibration graph for any drift. The selected standard is injected and the new absorbance value is compared with the previous (from the original calibration graph or from the previous recalibration, whichever is the latest), and the relative difference (in %) is calculated.
- If the difference is not greater than the warning limits, the recalibration is accepted and the samples will be evaluated according to the new graph.
- If the recalibration is outside the warning limits, the recalibration will not be accepted and the results will be calculated using the previous calibration /recalibration.
- If the recalibration is outside the error limits, the system will stop.
- The deviation obtained for each recalibration can be displayed in each sample list, see section 5.8.13 below.

### 5.8.13 Result Presentation Tab

The results presented in a Sample List can be configured for each method. Select the results to be shown in Sample Lists from the list of available results. These are:

**Concentration** - the concentration values

**Absorbance** - the absorbance values

**Deviation** - the deviation between recalibrations (in %) during the analysis of the samples or deviation (in %) for a QC-sample.

Move them to the selected list with the arrow buttons. If you don't want a result to be shown move it from the selected list to the available list.

A single arrow button moves the selected items; a double arrow button moves all items.

To change the order of the results select a result in the selected list and move it with the up / down arrow buttons to the right. The order of results is the same for all parameters.

The Result presentation can be changed at any time in active or completed Sample Lists. Just right click and select Result presentation.

### 5.8.14 Calculated Result Field

A result can be calculated. For example, if Nitrate plus Nitrite is analysed on FIA 1 and Nitrite on FIA 2, the Nitrate values can be calculated as Parameter 1 minus Parameter 2 and reported for each sample. Select the parameter name and the operation for the calculation in the calculated result section. The calculated field can be placed before or after the parameter result.

### 5.8.15 Limits, Error and Warning

For each parameter there are limits specified for the results from sample analysis and calibration procedures. This is to help you maintain a good quality of the results.

To view the limits, open the Method and click on Limits. For a loaded method you can also click on Method, Limits on the task bar.

#### Edit Limits

To edit a limit for a parameter, do like this:

1. Log in as Administrator
2. Unload method
3. Open method; select Limits
4. In the left column, select Category.
5. In the right column, select Warning/Error type.
6. Click on Edit, and change the limit for the particular parameter. The default value is always displayed.
7. Click on Save

If you want to disable the warnings/errors, edit the limit to a very high value. This will effectively remove the chance that they will ever be issued.

### Warning Limits

For a Sample List or a calibration / recalibration, any results deviating from the specified warning limits will be displayed in yellow.

In the detailed window of the particular sample/standard, more information about the warning is displayed.

**For results (samples and QC):** the system will proceed with analysis.

**For calibration:** the system will proceed with calibration.

**For recalibration:** the system will ignore the recalibration and instead use the preceding recalibration/calibration.

### Error Limits

For a Sample List or a calibration / recalibration, any results deviating from the specified error limits will be displayed in red.

In the detailed window of the particular sample/standard, more information about the error is displayed.

**For results (samples):** the system will stop.

**For QC-samples:** the system will reanalyse the QC-sample one more time. If error limit is exceeded again, the system will stop.

**For calibration:** the system will stop.

**For recalibration:** the system will stop.

### Description of Limit Types

The limits are divided into two categories; Calibration and Results. In each category there are a number of limits, described below. The whole set of limits applies to one parameter. All default values are displayed in table below.

## Calibration limits:

| | |
|---|---|
| M-Channel 0% T: | Limit for the measured transmittance of the detector Measuring channel when the lamp is off. |
| R-Channel 0% T: | Limit for the measured transmittance of the detector Reference channel when the lamp is off. |
| M-Channel 100% T: | Limit for the measured transmittance of the detector Measuring channel when the light is on, and distilled water in flow cell. This limit is optimised for each particular wavelength, differing from the default value. |
| R-Channel 100% T: | Limit for the measured transmittance of the detector Reference channel when the light is on, and distilled water in flow cell. This limit is optimised for each particular wavelength, differing from the default value. |
| Air in reagents: | Limit for the measured standard deviation of the baseline absorbance in the baseline window on both the Measuring and Reference channels. When this value is larger than 0.05 AU (=50mAU), the error limit is exceeded. This typically happens when there is air passing the flow cell continuously. |
| Air in injection: | Limit for the measured absorbance value within the peak window. When this is larger than 2 AU (=2000mAU) for both Measuring and Reference channel, the warning limit is exceeded. This typically happens when a large volume of air passes the flow cell at the time the peak would normally appear. |
| Recalibration deviation: | Limit for the recalibration deviation is expressed as percent deviation of the new absorbance value compared to the previous. Default warning limit is +/-10%, and default error limit is +/-200%. |
| Check calibration deviation: | Limit for the check calibration expressed as percent deviation of the new absorbance value compared to the previous. Default warning limit is +/-25%, and default error limit is +/-50%. |

**Results limits:**

| | |
|---|---|
| Air in reagents: | Limit for the measured standard deviation of the baseline absorbance in the baseline window on both the Measuring and Reference channels. When this value is larger than 0.05 AU (=50mAU), the error limit is exceeded. This typically happens when there is air passing the flow cell continuously. |
| Air in injection: | Limit for the measured absorbance value within the peak window. When this is larger then 2 AU (=2000mAU) for both Measuring and Reference channel , the warning limit is exceeded. This typically happens when a large volume of air passes the flow cell at the time the peak would normally appear. |
| Deviation n>2: | Limit for the standard deviation between more than 2 injections for each sample. The limit for each parameter supplied by Foss has been optimised according to the concentration range, and is usually not the same as the default value. The limit value is expressed in the same concentration unit as for the method. The limit applies both to samples, standards, Reference samples and QC-samples. |
| Deviation n=2: | This indicates the limit for the standard deviation between 2 injections for each sample. The limit for each parameter supplied by Foss has been optimised according to the concentration range, and is usually not the same as the default value. The limit value is expressed in the same concentration unit as for the method. The limit applies to samples, standards, Reference samples and QC-samples. |
| QC Relative deviation: | This limit applies to the difference (in % concentration) of the expected result for the QC-sample compared to the actual. The expected result is entered in the Calibration Standards table in the Method detailed window. The default error limit is +/-10%. |
| Absorbance out of calibration: | Limit for the result expressed in % absorbance. Warning limit is exceeded if the result is 10% higher than the absorbance of the highest standard in the calibration set. |

**The different limits and their default values are described below:**

Foss Tecator
SoFIA Report

**Limits for Ammonium 1-10 mg/l NH4-N**

NH4-N

| Category | Limits | Error (low) | Warning (low) | Warning (high) | Error (high) | Units |
|---|---|---|---|---|---|---|
| Calibration | M-Channel 0% T | | 0 | 300000 | | Transmittance |
| Calibration | R-Channel 0% T | | 0 | 300000 | | Transmittance |
| Calibration | M-Channel 100% T | 0 | 100000 | 15000000 | 16000000 | Transmittance |
| Calibration | R-Channel 100% T | 0 | 100000 | 15000000 | 16000000 | Transmittance |
| Calibration | Air in reagents | | | | 0,050 | Absorbance |
| Calibration | Air in injection | | | 2,000 | | Absorbance |
| Calibration | Recalibration dev | -200,000 | -10,000 | 10,000 | 200,000 | % Absorbance |
| Calibration | Check calibration dev | -50,000 | -25,000 | 25,000 | 50,000 | % Absorbance |
| Result | Air in reagents | | | | 0,050 | Absorbance |
| Result | Air in injection | | | 2,000 | | Absorbance |
| Result | Sample Deviation n>2 | | | 1,500 | | Concentration |
| Result | Sample Deviation n=2 | | | 2,500 | | Concentration |
| Result | Ref1 Deviation n>2 | | | 1,500 | | Concentration |
| Result | Ref1 Deviation n=2 | | | 2,500 | | Concentration |
| Result | Ref2 Deviation n>2 | | | 1,500 | | Concentration |
| Result | Ref2 Deviation n=2 | | | 2,500 | | Concentration |
| Result | Ref3 Deviation n>2 | | | 1,500 | | Concentration |
| Result | Ref3 Deviation n=2 | | | 2,500 | | Concentration |
| Result | QC Deviation n>2 | | | 1,500 | | Concentration |
| Result | QC Deviation n=2 | | | 2,500 | | Concentration |
| Result | QC Relative dev | -10,000 | | | 10,000 | % Concentration |
| Result | Absorbance out of calibration | | | 10,000 | | % Absorbance |

## 5.9 Checking the Baseline

To read the baseline from a detector, click on Inspect on the taskbar and then on Read Baseline. The Read Baseline window will open. Select Start to view the absorbance value (M-R). During 10 seconds the absorbance value for the baseline will be displayed and after this the mean value and Standard deviation for the baseline will be calculated.

To leave the menu, click on Close.

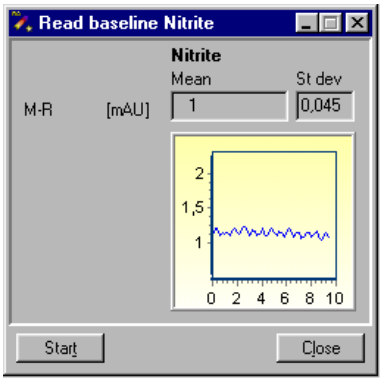


*Fig. 5:64 Read baseline*

## 5.10 Test Inject

The test inject is used to make a single injection of a sample or a standard in order to check the system function before starting with the actual calibration or analysis.

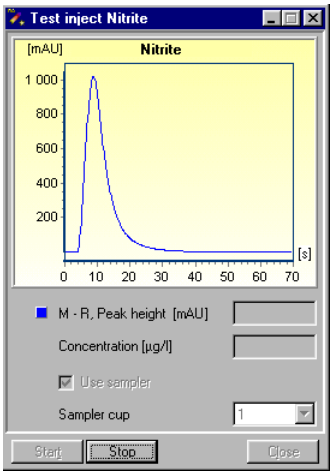


*Fig. 5:65 Test inject*

1. To do a test inject you need to have a method loaded. You can use the sampler or do a manual aspiration of the sample.
2. To start a test inject click on the  on the toolbar. Using the Sampler put a check mark in the Sampler box and then select a sample or standard from the drop down box.
3. Click on Start and the Sampler will move the probe to the selected cup and the sample will be aspirated and then injected automatically.
4. For a manual test inject, put the sample aspiration tube into the selected sample and wait for the loop to be filled, and then click on Start.
5. The window will display in real time as the sample is analysed and when completed, the peak height will be reported. If the loaded method already has an existing calibration graph the concentration will be reported as well.

## 5.11 Adjust Ammonium Indicator

This function is used for the Ammonium methods, and is a tool for the Ammonium Indicator absorbance adjustment. To adjust the Indicator solution before use, click on Inspect on the taskbar and then on Adjust indicator. Select which Analyzer you will use for measuring the Indicator solution absorbance.

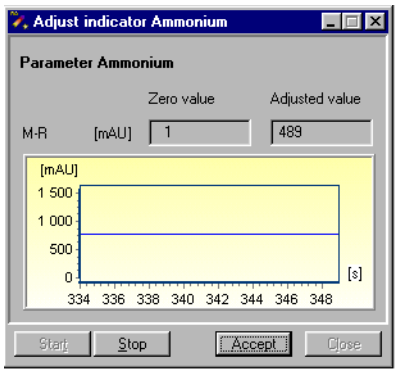


*Fig. 5:66 Adjust indicator*

A window will open giving you instructions on what to do.

1. Start pumping distilled water in all pump tubes, then select Start.
2. The software will measure the baseline (M-R). Click on Accept when it is stable.
3. Switch the R2 (••) reagent pump tube to the Indicator solution bottle, and click on OK.
4. The software will now display the absorbance for the indicator as it is pumped through the detector flow cell.
5. Adjust the solution to the specified absorbance according to the instructions in the Application Note, until the measured value is satisfactory.
6. Before you accept, you can do a simple test of the membrane condition by moving the R1 (•) pump tube from distilled water to the NaOH solution. The absorbance should not increase more than 100 - 200 mAU when the NaOH is pumped. If it increases more than this you should replace the membrane.
7. When the adjustment is completed, click on Accept and then Close.

## 5.12 Cadmium Reductor Efficiency Check

This procedure is only used for the Nitrate methods. To check the cadmium reductor efficiency click on Inspect on the taskbar and then on Check reductor efficiency. Select which Analyzer you will use for the reductor efficiency check.
A window will open giving you the instructions what to do.

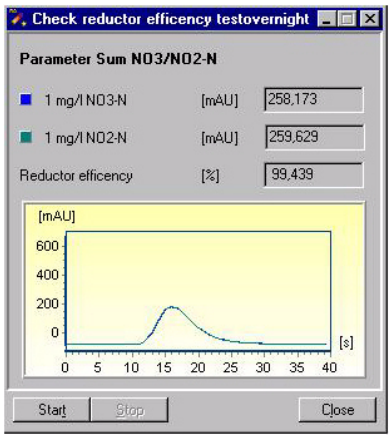


*Fig. 5:67 Check efficiency*

1. Pump all the necessary reagents for this analysis and install the cadmium reduction column.
2. Click on Start. The software prompts you to aspirate 1mg/l NO3-N. When the injection loop is completely filled, click on OK.
3. After the NO3-N standard has been analysed the software prompts you to aspirate 1mg/l NO2-N.
4. When the injection loop is completely filled, click on OK. The peak height of the NO3-N standard is compared with the NO2-N standard and the % efficiency is calculated.
5. % efficiency is calculated as (mAU (NO3-N)/mAU (NO2-N))*100
6. Note that any NO2-N and NO3-N standard can be used for this test as long as the nitrogen content is equal.

## 5.13 Calibration of methods

### 5.13.1 General

The calibration procedures are:

- Calibration - with all standards. Any new method or imported FOSS method needs to be calibrated with all standards in order to run a Sample List.
- Check calibration - with one of the standards, for a slope adjustment of the calibration graph, see section 5.13.11.
- Recalibration (automatic during run) - continuous recalibration at selectable frequency with one standard during the run of a Sample List. This setting is stored with the method, see section 5.8.12 for more details.

The Check calibration and Recalibration adjustments are temporary calibration graph slope adjustments, and therefore not permanently stored with the method. Once SoFIA is turned off or the method is unloaded, only the ”full calibration ” remains.

- Currently used calibration data can always be displayed by selecting Method/ Calibration data from the taskbar.

## 5.13.2 Calibration

The calibration is made with the standards that are specified in the Method detailed/ Calibration standards tab. Mixed standards are required for simultaneous determination of more than one parameter.

1. Load the method
2. Select Method/Calibration on the taskbar
3. Press Start

All the standards will be injected automatically if using the sampler. In manual mode you will get a prompt to make sure the loop is filled before injection.

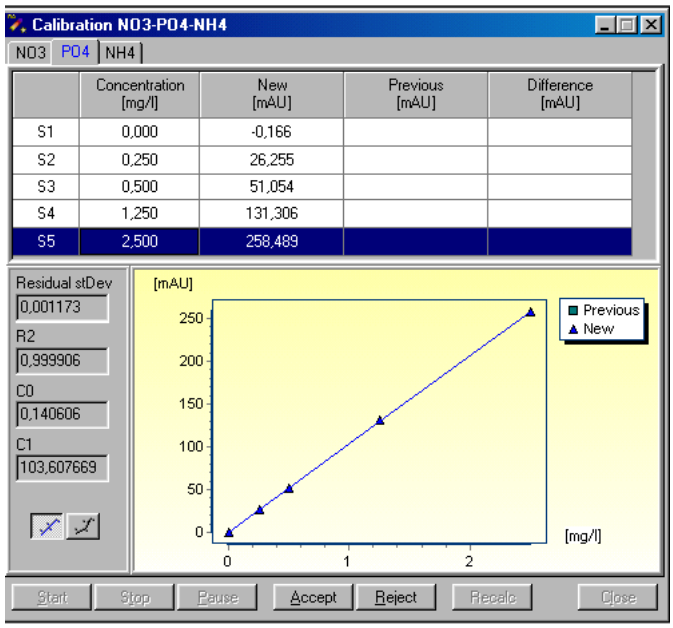


*Fig. 5:68 Calibration*

The completed and accepted calibration is stored with the method, and will be used for evaluation of the sample in the subsequent Sample Lists. Each parameter in a method has its own calibration graph.

## 5.13.3 Calibration Standard Detailed View

Once the calibration is started a detailed view opens displaying the peak in real time. You can also see the result from each injection. The detailed view can be closed and opened at any time during calibration. To reopen, double-click on the currently analysed standard in the list.

The absorbance scale will automatically be fitted to the absorbance range when all standards have been injected. The scale can be manually adjusted before accepting the graph.

The peak markers visualise the baseline (red) and peak (green) time window settings for the method. The peak marker function is optional, see 5.6.1 Result Settings on page 5:19.

### 5.13.4 Calculation of the Calibration Graph

The results are presented in the calibration results table, with the evaluated peak height or peak areas (depending on the selected evaluation). If there is an older calibration graph present, the previous data is also displayed.

When all standard solutions have been injected, the resulting calibration graph/ graphs will be displayed.

The coefficients for the graph are displayed to the left. The graph coefficients have been calculated according to the following formulas:

Linear: $y = C0 + C1 \cdot x$

Non-linear: $y = C0 + C1 \cdot x + C2 \cdot x^2$

Click on the linear/non-linear symbols to change curve fit.

The residual standard deviation is a mathematical expression of the quality of the curve fit. The lower the value the better the fit. This expression follows the ISO 8466 guidelines for method calibration procedures.

For the linear graph the correlation coefficient will also be displayed, which is the more traditional evaluation of curve fit used.

### 5.13.5 Accepting the Graph

Before you accept the graph, check that there are no warnings for high standard deviation in the results. If the standard deviation is high on one of the standards, you can select to rerun the injection which is deviant or delete it, see below.

If you reject the graph, nothing will be saved.

### 5.13.6 Recalculation of the Calibration Graph

After you have accepted the calibration graph, you can select to have it recalculated from linear to non-linear or vice versa. Click on the Recalc button and then on one of the graph symbols (the left depicts linear and the right depicts nonlinear). If you wish to accept the recalculated graph click on accept.

### 5.13.7 Re-run One Injection

If you want to rerun one of the injections, double click on the row of that standard in the calibration results table to display the detailed window. Right click on the injected standard you wish to rerun and select rerun. The standard will be injected again, and the graph will be recalculated for all parameters.

### 5.13.8 Delete One Standard

If you want to delete one standard, right click on that standard in the calibration results table and select Exclude. The graph will be recalculated. Click on Accept to accept the recalculated graph.

### 5.13.9 Pause

Clicking on Pause will make the system Pause. If you want to continue, just click on Resume. If for some reason you need to stop the pumps, you can click on pause, and then on the  symbol on the toolbar. Bear in mind that stopping the flow in the middle of a calibration will disrupt the system equilibration and you risk having a very poor calibration graph.

### 5.13.10 Stop

Clicking on Stop will stop the entire calibration. The pumps will go to standby.

## 5.13.11 Check Calibration

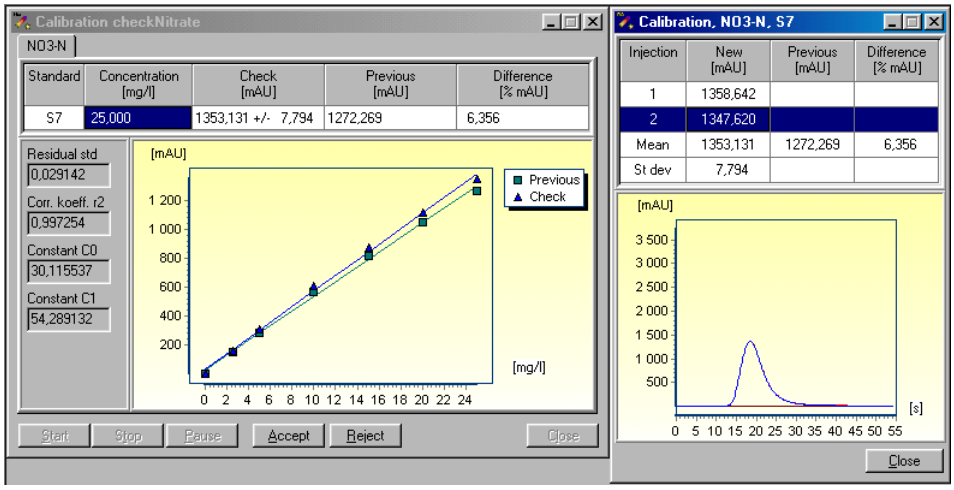


*Fig. 5:69 Check calibration, detailed view*

For a calibrated method, you can select to do a Check calibration with one standard and adjust the slope of the graph. The software will calculate the difference between the old value (in mAU) for that standard and the new value, then apply the percentage difference to all standards.

Proceed like this:

1. Load the method
2. Select , or Method/check calibration on the taskbar
3. Select standard. It is recommended to choose the highest standard.
4. Press Start

The standard will be injected automatically if using the sampler. In manual mode you will get a prompt to make sure the loop is filled before injection.

## 5.13.12 Accepting the Graph

The new graph is displayed along with the original graph. If the difference is more than 25% it is recommended to perform a complete new calibration instead.

If you reject the graph, nothing will be saved.

If accepted, the check calibration is stored and used fo all following samples; until you make a new check calibration, unload the method or restart SoFIA.

## 5.13.13 Filter Calibration

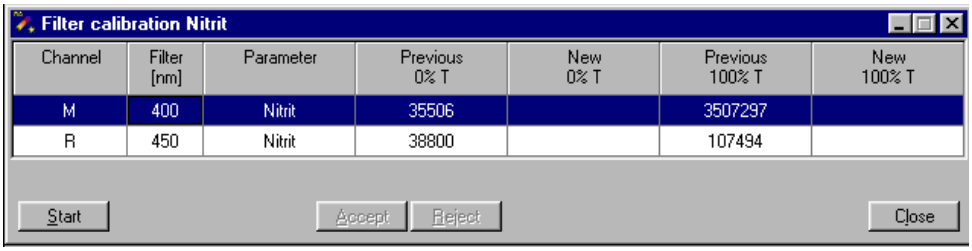


*Fig. 5:70 Filter calibration*

When a Method Cassette is used for the first time on a FIAstar Analyzer, the detector needs to be calibrated with the accompanying detector filters. The calibration procedure sets the 0% and 100 % transmittance for the detector.

In the Application Note you will find information on which detector filter should be used for the Measuring Channel and Reference channel respectively. The calibration is then stored in the software, and is identified by the Method when you want to start an analysis.

The calibration is stored along with the information on which FIA you made the calibration. If you have more than one FIAstar Analyzer and you want to use a Method cassette on another unit than the one you made the original filter calibration on, you will get a prompt to make a new filter calibration for that unit.

A new filter calibration should always be made when replacing a flow cell or a detector filter. If you have more than one filter of the same wavelength, label them so that you know which one you made the calibration on, since they give slightly different intensities.

Proceed as follows:

1. Put the FIA unit(s) on.
2. Install the Method Cassette(s).
3. Start pumping distilled water in all pump tubes to fill the system with water.
4. Insert the detector filters in the M and R slots on the detector/s.
5. Start the software. Log in as Administrator.
6. In the Method Browser load the method you wish to use for the Method Cassette.
7. Select Method on the taskbar, then select Filter.
8. When the Filter calibration menu is displayed, first check that there are no air bubbles locked in the flow cell, then Click on Start and the calibration procedure will be performed automatically.
9. In the calibration menu, the transmittance values for the M and R channel for 0% and 100% will be displayed. If there exists an earlier calibration you will also see the previous calibration data.
10. When the calibration procedure has been completed click on Accept. If the values are outside the limits set in the software, you will get a warning or an error message. To view the limits, click on Method on the taskbar and then on Limits.
11. Close the filter calibration window.

## 5.13.14 Time Calibration

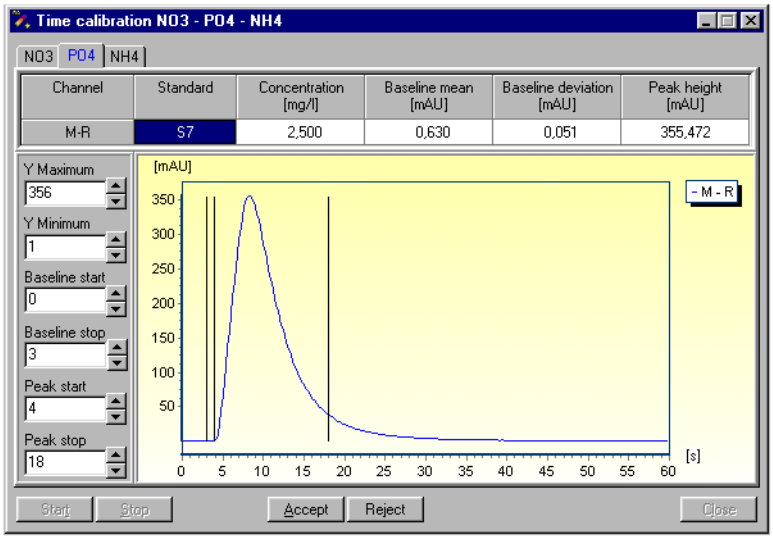


*Fig. 5:71 Time calibration*

The time calibration sets the time windows for the baseline and the peak evaluations for a method. In addition, the absorbance scale is adjusted to fit the methods concentration range.

The FOSS SoFIA methods are already timecalibrated. Only new/user created methods needs a time calibration.

The time calibration can only be made if a filtercalibration has been made first. The current settings may be visualised for each sample/standard that is analysed, by selecting the peak marker function, see 5.6.1 Result Settings on page 5:19.

If you change certain settings in Method Detailed, a new time calibration will be required. These settings are:

- injection time
- measurement time
- wavelength (if not used before on the FIA analyser)
- loop volume
- signal filter
- pump speed

### Make a new time calibration

#### Preparations

1. Install the method cassettes, detector filters and start pumping the Carrier/Reagents through the system and let it equilibrate for 10 minutes.
2. Go to Method/Time/ on the taskbar, and the Time calibration window will open. The time calibration will be performed after injecting the highest standard in the Calibration Standards table. Verify that this standard is present.
3. To start the time calibration, click on Start.
4. If the sampler is connected, the sampler will automatically move to the correct standard cup. If not you will get a prompt to start aspirating the selected standard. After the fill time, the standard will be injected and analysed by the system.

The software will automatically suggest an absorbance scale and time windows for the baseline and peak. If the method involves more than one parameter, each parameter will be displayed on different tabs identified by their names.

1. Verify the proposed values. If you wish to change the scale or time window, just click on the up and down arrow keys to the left of the peak window.
2. The baseline window should be at least 3 seconds and it should not coincide with the slope of the peak.

   **Peak height evaluation:** The peak maximum should be within the peak start/stop window.

   **Peak area evaluation:** The whole peak should be within the peak start/stop window.

   For both settings, the height/area is calculated in the peak start/stop time window vs. the baseline recorded in the baseline start/stop window.
3. It can happen that the software fails to locate the peak resulting in both baseline and peak window times being located towards the end of the cycle. The proposed settings need to be corrected. This is done by starting at the end of the cycle and changing first the baseline start and stop times and then the peak start and stop times.
4. When all the settings have been made, click on Accept to save the time calibration.

## 5.14 Sample List

The Sample List is a protocol containing the samples you want to analyse. The list contains information about sample name, method used, sample dilution factors, and number of injections per sample. A completed Sample List also contains the results from the measurements.

### 5.14.1 Sample List Browser

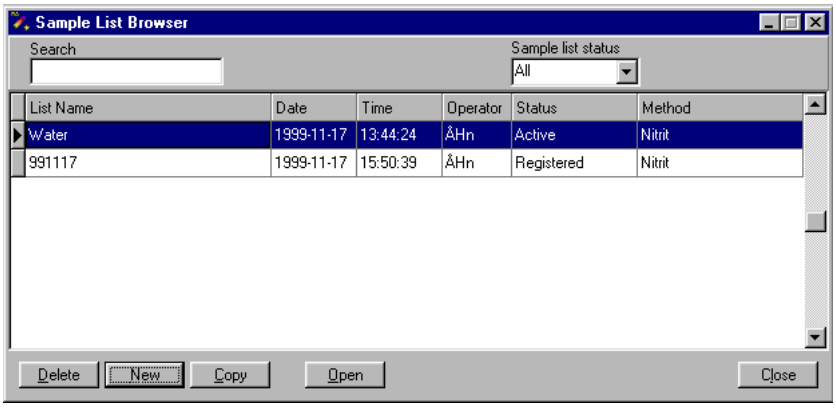


*Fig. 5:72 Sample List Browser*

All Sample Lists are stored in the Sample List Browser. To open the Browser, just click on the  on the toolbar. When you start the software for the first time, the Sample List browser will be empty until you have made a Sample List.

Click on the List name column to display all existing Sample Lists with their names in alphabetical order, along with the date and time they where made, and by which operator. The last column shows which method they were/are used for. To search for a particular Sample List, type the name in the Search box and the list will scroll automatically.

Click on the date column to display the list in chronological order.

### Sample List Status

The Sample Lists can have different status; registered, active, completed or stopped. An active Sample List is the Sample List that is presently being analysed. A completed Sample List will contain all the results for the analysed samples. You can change the setting in the status box to show only the preferred Sample Lists.

## 5.14.2 Make a New Sample List

To make a new Sample List, click on New in the Sample List Browser and fill in using the guide below.

**Sample name** - The name of each sample

**Nr** - The sample number is just the order of the entered sample. It is automatically entered by the software.

**Tray/Cup** - This column is automatically filled in as you enter the samples. The tray number is the entire Sampler tray number, for example using the 64 cup tray, the first 64 samples will be in Tray 1 and the next 64 in Tray 2. The Cup number is the position on the tray. To change the cup number, simply click on tray:cup column and change the number.

**Automatic numbering** - the sample names are filled in one by one, or using the automatic numbering function. For example, if you wish to enter samples H1, H2, H3 etc, first write H1, then use the arrow key to the next row and press F2. This will automatically increment the next sample to H2 and so forth.

**Sample type** - click on the Sample type column and select sample type; Sample and Reference 1, 2, 3. Click on the column to select. A Reference sample is typically a standard/reference substance that undergoes all the sample preparation steps to check the analytical procedure. It is possible to select a printout/report export as .csv of all reference samples in all Sample Lists, see 5.17.3

**Pump Stand by** - check this box if you wish the pumps to go to standby mode after the run. This box is already checked if you have selected this function in the Configuration/Sofia menu.

**List description** - enter a name for the Sample List

**Method** - select which method you want to use the Sample List for. The loaded method is automatically filled in.

**Injections** - select the number of injection per sample. The default value is the same as stated in Method detailed, but you can change it here.

**Dilution factor** - fill in the dilution factor in the Sample List. You may enter individual factors in the table.

When the Sample List is completed, click on Save. A registered Sample List may be printed.

**Note that the recalibration standards and QC samples are not displayed in the Sample List until it has been started.**

## 5.14.3 Copy a Sample List

You can select to make a new Sample List by copying an older Sample List, make the necessary alterations and then saving it with a new name. Click on the Sample List you wish to copy and then click on Copy in the Sample List browser.

You can use copy/paste/delete to make the alterations. Save the list with a new name.

**Note: The recalibration frequency and QC-routine are not copied.**

### 5.14.4 Edit a Sample List

To Edit a Sample List, double-click on the list name to open it (or click on Open). Then click on Edit, make the alterations and Save. An active or completed Sample List can only be edited in the Remarks column.

### 5.14.5 Delete Sample Lists

To delete a Sample List from the Sample List browser, click on the Sample List you wish to delete and then click on Delete. Multiple lists can be deleted by using the Ctrl key and at the same time the mouse to mark the lists you wish to delete. Select Delete and a message appears asking you to confirm deleting the selected lists.

### 5.14.6 Import a Sample List

Imports a Sample List registration from a text file. The text file may be created in Word, Excel or Notepad as long as it is saved as a text file.

First the Import Dialog will open to let you choose the file to import.

Then a Sample List window is opened to let you save and start your Sample List.

**The contents of the text file**

The field in the Sample List that should be replaced by text is inside the signs <' '> in the description below.

The delimiters between fields are picked from your computers Windows settings, look in the Control panel | Regional settings | Number | List separator. Most commonly used is semicolon ';'.

On the first row in the text file the list name and method name should be defined, like this:

<List name>;<Method name>

On the rows that follow, describe one sample for each row like this:

<Tray>;<Cup>;<Sample name>;<Sample type>;<Dilute factor>;<Remark>

The only required fields are <Tray> and <Cup>. If you leave a field blank the default value will be picked instead.

The default value for <Sample name> is blank

The default value for <Sample type> is Sample

The default value for <Dilution factor> is 1.

The default value for <Remark> is blank.

**Example**:

Imported list; Nitrite

1;1;Wastewater;Sample;1;

1;2;Distilled water;Sample;1;For check

### 5.14.7 Start a Sample List

To start a Sample List you first need to load the method. Perform a calibration/check calibration. Click on the preferred Sample List in the Sample List browser to open it, and then click on Start.

## 5.14.8 Active Sample List

Below is an example of an active Sample List.

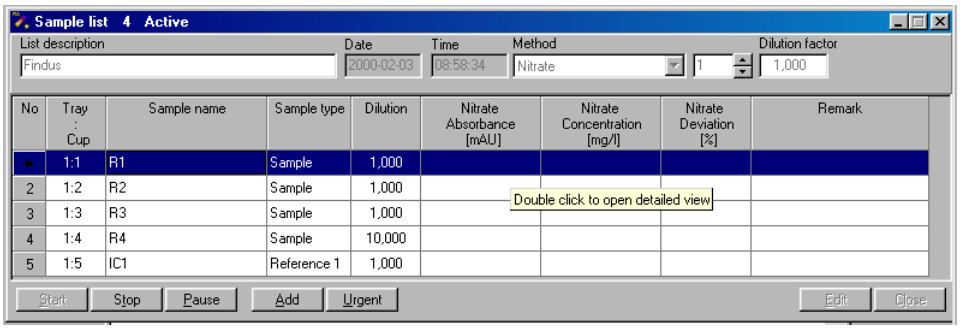


*Fig. 5:73 Active Sample List*

An active Sample List contains the following columns:

**Parameter/absorbance** - The absorbance values for each parameter is displayed here.

**Parameter/concentration** - The evaluated concentration for each parameter is displayed here.

**Remark** - In the remark column you can enter your own remarks for a particular sample. Click on Edit and then fill in.

Selection on what columns to display is made by right-clicking on the Sample List, and opening the Result presentation, see 5.8.13.

## 5.14.9 Sample List Detailed View

When a Sample List is active, you can view the peak as the samples are being analysed. The detailed window opens automatically. It can be closed and reopened at any time during the run. Reopen by double-clicking on the currently analysed sample in the list

The individual results from multiple injections will be displayed in detail.

The peak markers visualise the baseline (red) and peak (green) time window settings for the method. The peak marker function is optional, see 5.6.1 Result Settings on page 5:19.

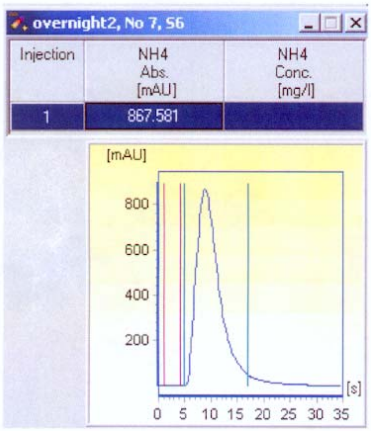


*Fig. 5:74 Active Sample List, detailed view*

### 5.14.10 Add Sample

Add a sample to the Sample List. The added sample will be added as the last sample.

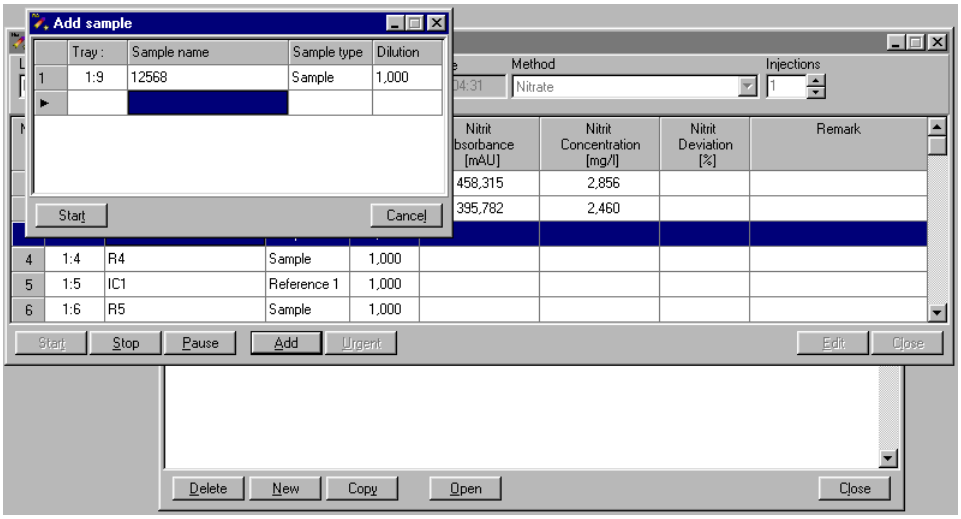


*Fig. 5:75 Add sample*

### 5.14.11 Urgent Sample

Add a sample to the Sample List. The added sample will be analyzed as the next sample.

### 5.14.12 Pause

Will pause an active Sample List. When you need to pause for various reasons, like you discover that you have forgotten to fill the sample cup. Selecting the pause function will also give you access to the Start/Stop pump function on the toolbar. When you wish to resume the run click on Resume.

### 5.14.13 Stop

Will abort an active Sample List.

## 5.15 The Rinse Function

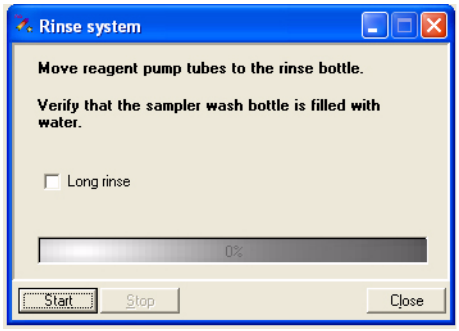


*Fig. 5:76 The rinse function*

After use the Analyzers and the injection valves should be cleaned by pumping and/or injecting distilled water to clean all tubing. Selecting the  on the toolbar will start a sequence where the pumps will be switched on and the injection valve will do four injections automatically. The Rinse procedure takes about 5 minutes. Prolonged rinse can be chosen, takes 10 minutes.

## 5.16 Calculations of Results, Mean Values and Standard Deviations

The calculation of the concentrations for the samples are based on the currently used calibration equation. The currently used calibration is either:

- the stored calibration
- a check calibration made before the start of the Sample List
- an automatic recalibration performed during the processing of a Sample List

Results from multiple injections are calculated with mean values and standard deviations. The standard deviation calculations are different for just two injections per sample compared to >2 injections per sample.

$$N = 2\sqrt{\frac{(a-b)}{2}^2} \qquad N > 2\sqrt{\frac{\Sigma(x_i - \bar{x})}{n-1}^2}$$

## 5.17 Reporting results

The results can be printed or exported in different formats, automatically or upon a manual command.

- automatic printing/export is selected in Configuration/Settings/Results, see 5.6.1 Result Settings on page 5:19.
- Manual printing/exporting is selected by the shortcut icons on the tool bar  

The layout and content is user selectable. In short, the layout is determined in two ways:

- general settings for all methods are done in Configuration/Settings/Results, see 5.6.1 Result Settings on page 5:19.
- individual method settings are done in Method Detailed/Results presentation, see 5.8.13 Result Presentation Tab on page 5:31.

The layout of a completed or stopped Sample List may be changed prior to printout or export.

### 5.17.1 Printout of calibrations and results

The printout always contains the Method name, the Sample List name, the date and time it was run, the calculated results and Error/Warnings/Remarks. In addition the calibration data used to generate the results is printed at the top of the list. The graph is not displayed, only the coefficients used for the calibration equation.

- For preview, select in the Print dialogue\Preview.
- A completed Calibration can be printed when the Calibration window is open.
- Both completed, stopped and registered Sample Lists may be printed.

## 5.17.2 Export results

The Export files always contain the Method name, the Sample List name, the date and time it was run, the calculated results and Error/Warnings/Remarks. The export formats are:

- to LIMS
- as a comma separated file, .csv

### LIMS

This export function is selected by marking the Sample List and using the Export short cut icon on the tool bar, or by having it done automatically once the sample or Sample List is completed. The export can be done straight to a LIMS system or to a LIMS file in a selected directory, see section 5.6.4 and 5.6.5.

### .csv file

This format exports data in columns suitable for use in e.g. Excel.

- Open Sample List Browser, then go to File/Export/Sample List on the task bar.
- Select one list or several lists for export. To select all lists, click the All button.
- Select directory for export. Default directory will be the specified directory in section 5.6.5 Paths Settings on page 5:23.
- Enter a file name for the export.
- Click on Export

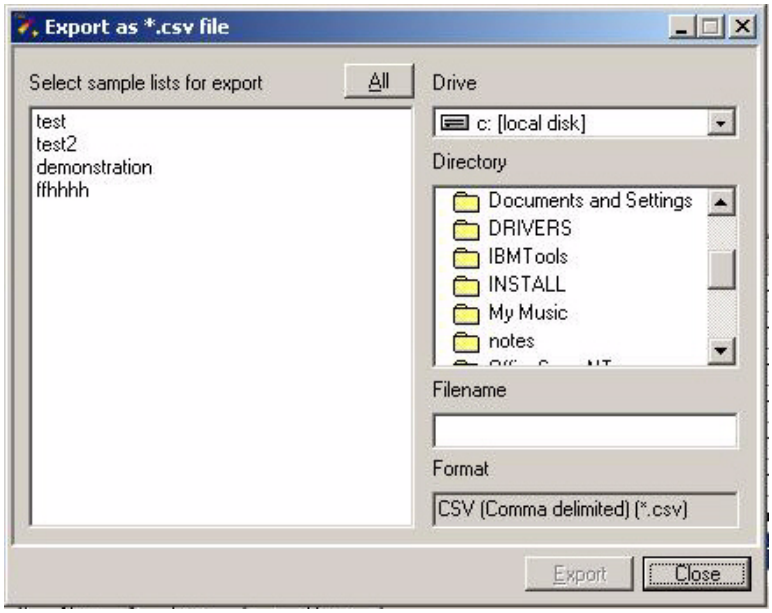


*Fig. 5:77 Export as *.csv file*

## 5.17.3 Reference Sample

For the reference samples you can have a separate report, including all reference samples in all or selected Sample Lists. Go to File/RefSample on the task bar to make a report. This function is typically used to continuously monitor the analysis of, for example, an inter-calibration sample.

The reference sample list can be exported as a *.csv-file.

# 6 Maintenance

FIAstar is a high-performance laboratory instrument and must be treated in a professional way.

**⚠ Warning**

***Modification, alterations, rebuilding or use of safety parts not authorized by FOSS Analytical AB violates the warranty. FOSS Analytical AB has no responsibility for damages, material or personal, occuring as a result of such actions.***

## 6.1 Routine Maintenance

The system and method cassettes are intended for use of aqueous solutions only. Never, not even for cleaning purposes, pump ethanol or any other organic solvent through the system. Ethanol/water mixtures are tolerated up to about 25 % (v/v).

### 6.1.1 Daily

- If the pump tubes are dry to the touch, put a drop of silicone oil on the pump tubes and rub it in slightly.
- Rinse the system with distilled water after use, following the closing down procedure. If fatty samples have been analysed, a special rinse solution (e.g. a detergent or a weak alkali solution) might be required for the injection valve and the used sample loop, followed by cleaning with distilled water.
- Check for any leaks beneath the Analyzers.
- Wipe off any spill of liquids on the Analyzer and Sampler.

### 6.1.2 Weekly

- Through wear on the pump rollers a black debris is formed, causing an increased friction on the pump tubes which will decrease the pump tube life time. Remove the pump tube holder and release the pump tubes. Wipe off the holder, the pump rollers and the pump tubes.
- Some applications will result in precipitation of reaction products in the tubing to and in the flow cell. The cleaning procedure for such cases is described in respective Application Note.
- Check the condition of the pump tubes. If they are very flat replace them. It is recommended to replace all pump tubes at the same time.
- Using soft tissue wetted with ethanol, clean the exterior of the flow cell. If any visible debris or precipitation in the interior can be seen you need to clean the interior channels in the flow cell.

### 6.1.3 Every Six Months

- Check that the detector filters are not damaged and make a new detector filter calibration procedure for all methods.
- Clean the injection valve rotor.

### 6.1.4 Every Year

We recommend that you have your FIAstar Analyzer serviced yearly by a service engineer from your Foss representative. They will check the system and replace parts according to a service protocol.

### 6.1.5 Cleaning/Replacing the Injection Valve Rotor

Every six months we recommend that you disassemble the injection valve and clean the rotor. If you have had problems with reproducibility of analysis, and the cleaning of the rotor does not improve the performance of the valve, replace the rotor.

#### Disassembling the Injection Valve

- Remove the pump tube holder that holds the Carrier and Sample pump tubes as it may block access to the injection valve panel. Open the injection valve panel and the valve will slide forward automatically.
- Using the Allen key provide with the system accessories (the one with the red handle), unscrew the three screws holding the injection valve top. We recommend unscrewing gradually all three screws, since the internal spring will start pressing on the injection valve top.
- Carefully pull out the injection valve top and let it hang by the tubes.
- The rotor is placed on the injection valve body. Carefully remove it.
- Inspect the rotor for any dirt or debris located in the small grooves. Wash it with distilled water and wipe off with a soft tissue.

#### Reassembling the Injection Valve

- Put the rotor back (or put the new one on) on the injection valve body. It can only be positioned one way.
- If the screws on the injection valve top has fallen off, put them back and then carefully put the entire injection valve top back on the injection valve body.
- Tighten the screws gradually one by one, until you reach a firm stop. Make sure you tighten properly as there is very little risk of over tightening.
- Close the injection valve panel.

### 6.1.6 Cleaning the Flow Cell

It is important that the external walls of the flow cell are kept absolutely clean. Finger prints, grease etc. can be removed using tissue paper soaked with pure ethanol.

After use, pump distilled water through the system and the flow cells to prevent reagents drying out and crystallizing in the system.

The three most probable causes for air bubbles to accumulate in the flow cell are:

- reagent(s) and carrier solutions have not been properly degassed.
- the internal parts of the flow cell have been contaminated (probably by grease).
- flow cell connected the wrong way, the inlet J-shaped channel on the flow cell should be face down when the flow cell is placed in the detector.

To clean the flow cell, remove the flow cell completely from the detector and rinse it in the following way:

- Fill a syringe with 2M sodium hydroxide. Use the syringe provided in the Tubing Flush Kit.

**Note: Use gloves and safety glasses (strong alkaline solutions immediately destroy the cornea of the eye).**

- Connect the syringe to the flow cell and slowly push the solution through.
- Rinse the syringe and fill it with distilled water. Connect the syringe to the flow cell and slowly push the water through. Repeat once more.
- Reinstall the flow cell in the detector.

If the flow cell is blocked by debris, you need to take the top cover of the flow cell off to clean the channels.

- Unscrew the screw holding the flow cell top cover.

- Remove the top. Be careful not to loose the two small o-rings that seal the top cover against the glass.
- Flush the glass channels with a syringe, and also the in and outlet channels in the top cover.
- When assembling, make sure that you place the o-rings so that they seal properly. Ensure you put the flow cell top back correctly. The inlet J-shaped channel on the flow cell should be face down when the flow cell is placed in the detector. The ▶ (to flow cell) and ◀ (to waste) symbols on the front panel of the detector shows the flow direction to and from the flow cell.
- Tighten the screw moderately. Check that there is a free flow through the flow cell without any leakages.
- Check that the flow cell tubing are free from blockages and that the o-rings on the connectors are not damaged.
- Before putting the flow cell back in the detector, pump distilled water through it, checking that the connections are tight and that there are no leakages.

### 6.1.7 Replacing the Pump Tubes

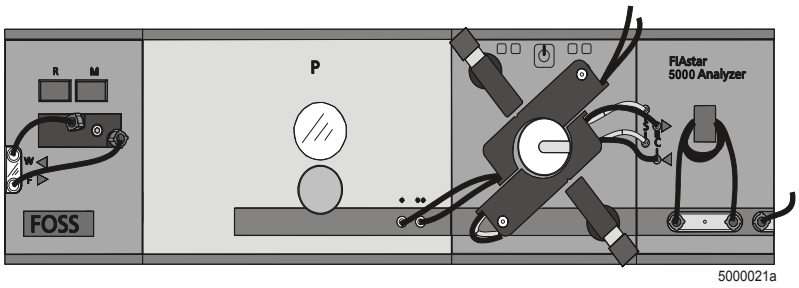


*Fig. 6:76 Replacing pump tubes*

When the pump tubes are worn out they need to be replaced.

Replacing the method cassette pump tubes:

- Remove the first pump tube from the connector on the cassette, and put a new one on. Verify that it has the same colour code as the old one. Move the pump tube label from the old tube to the new one. Continue with the next pump tube until all have been replaced.
- Slightly release the screws on the pump handles since the new tubes will not require as much pressure as the old ones.

Replacing the Carrier and Sample pump tubes:

- The ▶ and ◀ symbols show the flow direction (the pump rotation is anti-clockwise).
- Remove the Carrier pump tube from the connectors to the right of the pump, and put a new one on. The pump tube connectors are marked with a **C** symbol. Verify that it has the same colour code as the old one.
- Remove the Sample pump tube from the connectors and put the new one on. The pump tube connectors are marked with an **S** symbol. Verify that it has the same colour code as the old one.
- Slightly release the screws on the pump handles, since the new tubes will not require as much pressure as the old ones.

### 6.1.8 Replacing the Photometer Lamp

Lamp failure can be identified in several ways:

- Increased baseline noise (on water)
- Failed filter calibration
- Photometer error
- Remove flowcell from instrument, if no light from lamp is seen, lamp is burnt out.

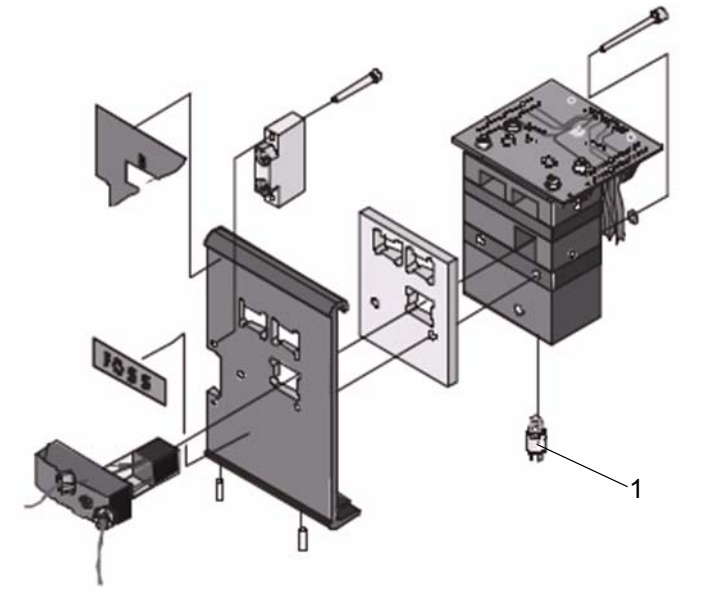


*Fig. 6:77 Photometer and lamp*

1. Turn off the unit and disconnect the power cable.
2. Locate the two grub screws on the lower side of the front panel and unscrew them partly.
3. Grip the lower side of the photometer and swing it upwards and outwards to release it from the upper beam.
4. Disconnect the lamp leads. Use a pair of pliers if necessary.
5. Locate the lamp (1), see Fig. 6:77, on the underside of the photometer block. Grasp firmly and pull out. You may have to use the pair of pliers to do this.
6. Position the new lamp in the photometer block. Avoid fingerprints on the new lamp as this will shorten the lamp life.
7. Reconnect the leads.
8. Replace the detector and tighten grub screws.

# 7 Error Messages and Trouble-shooting

The hardware and software have a number of built in error checks.

- System errors related to hardware and communication problems see section 7.2.
- Errors/warning detected during analysis/calibration. These are related methods limits having been exceeded, see section 7.3.

Not all errors can be recognized by the software. Typically chemical and hydraulic problems will require more troubleshooting, see section 7.4.

## 7.1 Service Menus

### Analyzer:

1. Log into SoFIA as Specialist, create a Specialist user name if needed. Default password: Specialist (case sensitive)
2. From the Analyzer drop-down box, select Service then the appropriate Analyzer. The following box should appear.

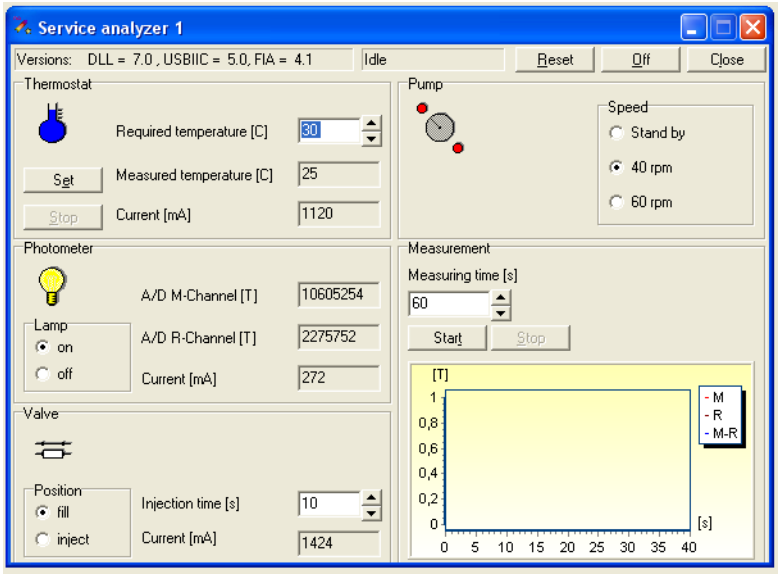


*Fig. 7:78 Analyzer*

3. The valve may be toggled between fill and inject as needed by selecting the desired position. This is useful for troubleshooting blockages.
4. If needed the pump speed may be controlled by selecting the desired speed.

### Sampler:

From the Sampler drop-down box on the taskbar, select Service then Sampler. The following box should appear.

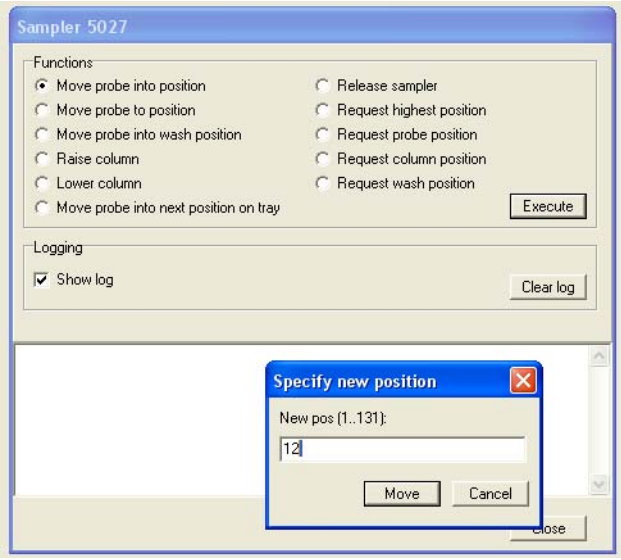


*Fig. 7:79 Sampler*

1. You may direct the probe column to any cup position using this menu.

2. If a realignment of the Sampler is needed it must be carried out by an authorized service engineer.

## 7.2 System Error Messages at Start-up

### 7.2.1 General

When the program is started, a number of files will be loaded. An error during this start up will result in an error message. If there are any difficulties comprehending this message and how to correct it, please contact your FOSS Analytical representative.

### 7.2.2 Self Diagnostic Test

When the Analyzer(s) are turned on, a self-diagnostic test is performed. A red light from the LED on the left side of the power switch indicates that an error has been detected. If the test passes, the LED will turn to a steady green.

### 7.2.3 Establishing Communication

When the software is started, the splash-screen will show the number of attached units and the program will establish communication with each of them. If any of the attached units is not on, the corresponding picture of the unit will be shown in grey on the splash-screen. In this case, turn the unit on and proceed with the log-in as usual. Then reset the Analyzer/Sampler by clicking on corresponding Reset on the toolbar.

When loading a method to run a Sample List, the software will check the system before start and during the sample run. The following error messages and their likely cause may appear as a pop up message on the screen and in the status bar.

### 7.2.4 Error Messages "timing not right in this environment"

This error message typically appears already at the installation/early use of SoFIA. The interpacket delay setting needs to be modified in order to correct the error. This Setting is available only when logged in as Service.

1. Log into SoFIA as Service; create a Service user name if needed.
   Default Password: Support. (case sensitive)
2. Select Configuration/Settings/Hardware. The window in Fig. 7:80 should appear.
3. Change the setting Interpacket delay setting from the default 40 ms to the next higher.
4. Restart the software.
5. If the error message appears anyway, try the next higher setting.

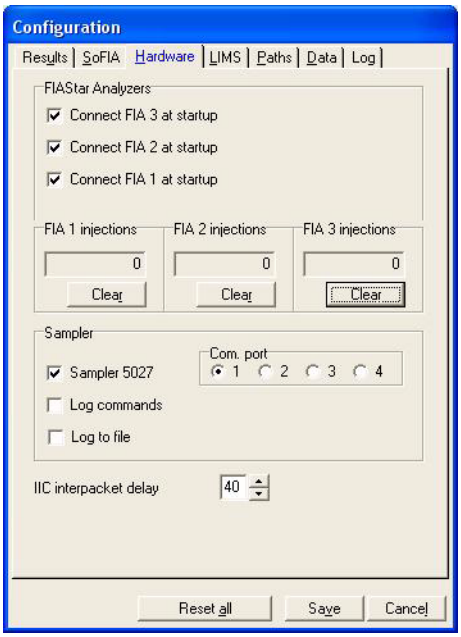


*Fig. 7:80*

### 7.2.5 Error message "FCL.dll not found "

This is a Windows related error-message, and results in that SoFIA cannot be started.

1. The FCL.dll should always be in the same directory as the sofia.exe file. On the latest version 2.0 it should be in the directory C:\Program Files\FOSS\SoFIA. In older versions it is in C:\tecator\sofia or C:\FOSS\SoFIA.
2. Use Windows Explorer to locate C:\Program Files\FOSS\SoFIA.
3. If you find both the FCL.dll-file and the sofia.exe file there, try to start the program from there and check. Don't try to start it from a shortcut on your desk top, it may be pointing at an old directory. This is just to test if it works to start in this way.
4. If 2 is OK, use the search function in the explorer and search for the FCL.dll on your complete hard drive. If several files are present you must delete everyone except in the C:\Program Files\FOSS\SoFIA directory.

### 7.2.6 Error Messages when Loading Methods and Editing/ Starting/Running Sample Lists

When loading a method to run a Sample List, the software will check the system before start and during the sample run. The following error messages and their likely cause may appear as a pop up message on the screen and in the status bar.

| Message | Probable Cause | Action |
|---|---|---|
| Function call with bad parameters | Corrupt method | If error persists, make a new method or Import from the CD or an earlier Backup. |
| Channel not connected | One of the FIAstar modules used by the method is not on.<br>USB controller error | Turn the unit on and make a reset Analyzer command from the software.<br>Check USB cables and connections. Disconnect/reconnect the USB cable from the Analyzer and try again. |
| No response from instrument | The instrument has been turned off during ignore run. | Turn unit on and make a reset Analyzer command from the software. |
| Pump error | Pump handles are off<br>Pump controller error | Tighten pump handles and try again.<br>Turn pump on and try again. If error remains, contact your FOSS service representative. |
| Sampler failed to connect | No communicatioin with sampler at start-up | Make sure the sampler is switched on and make a reset sampler command from software. |
| Sampler time out moving to position | Column/tray movement is blocked. | Check column/tray and probe. |
| | Faulty main board or probe assy | Contact your FOSS service representative |
| Sampler failed on command | No communication to sampler | Check RS cable/connections, make a reset sampler command from software and try again. |
| Injection valve error | Valve controller error. Something wrong with valve cables and/or connectors or valve driver assy | Contact your FOSS service representative. |
| Thermostat error | The thermostat temperature is not within 1 degree C of set temperature<br>Temperature sensor is not working | Wait until the thermostat temperature has stabilised and try again.<br>If error remains, contact your FOSS service representative. |
| Data storage error | Internal FIAstar memory error | Make a reset Analyzer command from the software.<br>If error remains, contact your FOSS service representative. |
| Photometer error | No response from photometer | Contact your FOSS service representative. |

## 7.3 Error and Warning Messages during Analysis and Calibration

For each parameter in each method, a number of limits apply. These serve to prevent reporting erroneous results.

- Results that exceed the limits will be highlighted in yellow (warnings) or red (errors) on the corresponding row in the Sample List or Calibration.
- The detailed view of the peaks will display the actual warning /error message.

For more information about limits and how to edit them, see 5.8.15 Limits, Error and Warning on page 5:31. Limits should be wide enough not to issue warning or stopping the system unnecessarily. Frequent warnings may require that you edit the limits.

## 7.4 General Troubleshooting Guide

The trouble shooting guide below covers hydraulic, chemical and other related problems that may occur during analysis, and how to correct them.

- Tubing flush kit - The kit is to help remove particulates and blockages in the FIAstar cassette and other parts in the flow system. It can be used with the Teflon tubing, ¼-28 fittings, injection valve, most cassette components and flow cell, see 7.4.1.
- General hydraulic troubleshooting, see 7.4.2
- Blockages, see 7.4.3
- Unstable baseline, see 7.4.4
- High baseline, see 7.4.5
- No or too small peaks, see 7.4.6
- Negative peaks, see 7.4.7
- Poor repeatability, see 7.4.8
- Drift in baseline and/or sensitivity, see 7.4.9
- Irregular peak shape, see 7.4.10

### 7.4.1 Tubing Flush Kit

The kit is to help remove particulates and blockages in the FIAstar cassette. It can be used with the Teflon tubing, ¼-28 fittings, injection valve, most cassette components and flow cell.

Usage:

1. Assemble the syringe, syringe adaptor and union according to figure below.
2. Use the 8 mm wrench to unscrew the tubing connectors on the FIAstar 5000.
3. Connect the tubing you want to flush according to picture below. For use on the injection valve, the adaptor may be secured directly into the threaded ports in the valve body.
4. Fill the syringe with water, and flush (using both forward and back motions) the tubing or valve to remove any blockages/particles.
   a. To avoid confusion, only remove and flush one component at a time and im mediately reconnect.
   b. Consult the cassette diagram in the application note if needed.
5. Put the tubing connector back and tighten it using the wrench.
   a. Avoid cross-threading the connectors during reassembly.

***Caution: Use the wrench carefully as to not over tighten the connector. Over-tightening can cause deformation and constriction of the Teflon tubing leading to flow blockages in the system. Tighten until the o-ring seals against the perimeter of the hole.***

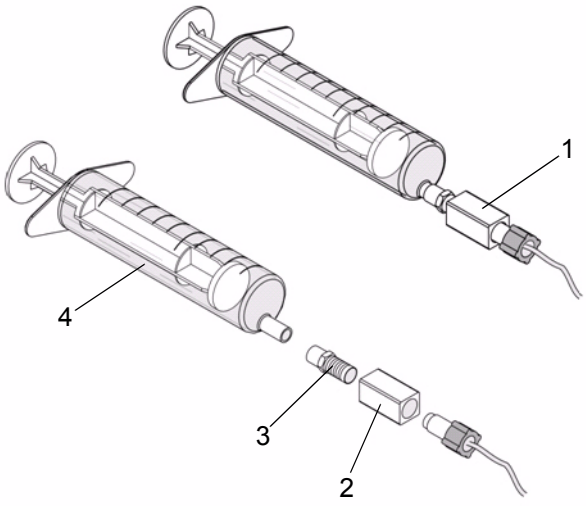


*Fig. 7:81 Tubing flush kit*

| | | | |
|---|---|---|---|
| 1 | Cassette tubing and connector | 3 | Adaptor |
| 2 | Union | 4 | Syringe |

### 7.4.2 General Hydraulic Troubleshooting

| Fault | Probable Cause | Action |
|---|---|---|
| Leaking Valve | Loose connector | Tighten connector |
| | Cross threaded connector | Replace connector |
| | Dirty or clogged rotor | Clean or replace rotor |
| | Scratched rotor | Replace rotor |
| | Valve not properly assembled | Reassemble correctly |
| | Blockage | See section 7.4.3 |
| Pump tubes not drawing reagent, sample or carrier | Tension on tubes too loose | Increase tension |
| | Pump tubes are worn | Replace pump tubing |
| | Pump tubes are dry | Add 1-2 drops of silicone oil |
| | Loose pump head | Tighten pump roller head |
| | Avoid mounting pump tubes in the outer most position on the pump tube holders.<br>Avoid placing large and small ID pump tubes next to one another. This can create the need for too much tension on the tubes. | |
| | Blockage | See section 7.4.3 |
| Air Bubbles | Using non-degassed water or reagents | Degas solutions |
| | Bubbles forming in cassette | Tighten loose fittings |
| | Bubbles coming from reagent bottles | Tighten loose fittings on bottle cap |
| | | Degas solutions |
| | Water, reagent or carrier depleted | Replace solution |
| Sample doesn't flow | Loose fitting | Tighten fitting |
| | Clogged probe | Flush and clean probe |
| | Worn sample pump tubing | Replace pump tube |
| | Clogged rotor | Clean rotor |
| | Blockage | See section 7.4.3 |

To inspect flow characteristics:

1. Momentarily disconnect pump tube inlet from water or reagent bottle.
2. Follow the bubble through the tube. Flow should be smooth although some slight pulsation may be noted due to the peristaltic pumping action.

**Note:**

1. Adjust the pump tube tension if needed. Increase the tension only to the point of achieving a good flow on all lines. Too much tension will cause premature pump tube wear.
2. Apply a small amount of silicone oil to the pump tubes.
3. Refer to section 6 for pump cleaning and maintenance procedures.

### 7.4.3 Blockages

#### General Considerations

1. Use only water to flush tubing.
2. Refer to the operator's instructions for the tubing flush kit for proper usage of syringe assembly.
3. Before attempting to flush cassette, try to get reagents out of the instrument. If used, uninstall the cadmium column before beginning troubleshooting
4. Wear safety glasses when flushing the FIA cassettes with the syringe assembly.
5. In the event that a blockage cannot be removed by flushing, a small piece of wire can be tried to gently dislodge debris.
6. Regularly inspect and clean dialysis or gas diffusion cell flow channels.
7. Adhere to recommendations for routine cleaning, maintenance as described in the section 6 and appropriate Application Note.
8. Repeated plugging problems may indicate insufficient sample preparation procedures (i.e. samples need filtration) and/or reagent preparation (i.e. incomplete dissolution or need for filtration).
9. Regularly (weekly) clean out reagent containers and sampler wash jar. Do not continually ”top off ” reagents as this may lead to microbial growth which can create blockages.
10. Blockages can also be created by crimps in the tubing. Regularly inspect the tubing. Do not compress tubing between the blocks when mounting the cassette; if any resistance is encountered, remove cassette and inspect.
11. Do not over-tighten fittings.

| No. | Fault | Probable Cause | Action |
|---|---|---|---|
| 1 | Carrier pump tube pops off when valve is in Fill mode<br><br>(Pos A, Fig. 7:82)<br><br>Refer to section 7.1 Service Menus on page 7:1 for use of Service menu to switch the valve between inject and fill. | Blockage can either be in:<br>• valve<br>• cassette<br>• internal tubing connecting valve port 5 to the internal cassette block.<br>With valve in Fill mode, the carrier solution is routed through valve positions 4 to 5, see Fig. 7:60. | 1. Carefully remove the cassette from the FIAstar. Keep all tubes attached.<br>2. Latch the pump handles and start pumping water. Use paper towels to absorb water from the cassette.<br>3. Observe position G, see Fig. 7:83, where carrier enters the cassette for flow.<br>If flow is good, blockage is likely in the cassette ”downstream” from the carrier entrance. Proceed to #3.<br>If carrier pump tube still pops off, the blockage is in the valve, around positions 4 or 5 or in the tubing connecting valve port 5 to the internal cassette block.<br>4. Disassemble and clean rotor, valve and tubing as required. |
| 2 | Carrier pump tube pops off when valve is in Inject mode.<br><br>(Pos A, Fig. 7:82) | Blockage can either be in:<br>• valve<br>• sample loop<br>• cassette or<br>• internal tubing connecting valve port 5 to cassette block<br>With the valve in the Inject mode, the carrier solution is routed through valve positions 4 to 3, the sample loop, valve positions 6 to 5 and then to the cassette, see Fig. 7:82. | 1. Carefully remove the cassette from the FIAstar. Keep all tubes attached.<br>2. Latch the pump handles and start pumping water. Use paper towels to absorb water from the cassette.<br>3. Observe position G, see Fig. 7:83, where carrier enters the cassette for flow.<br>If flow is good, blockage is likely in the cassette “downstream” from the carrier entrance. Proceed to #3.<br>If carrier pump tube still pops off, the blockage is in the valve, around positions 4 to 3, 6 to 5 or in the tubing connecting valve port 5 to the internal cassette block or the sample loop assembly.<br>4. Disassemble and clean the sample loop, rotor, valve and tubing as required. |

| No. | Fault | Probable Cause | Action |
|---|---|---|---|
| 3 | Cassette blockage after carrier inlet. | Blockage in cassette components or flow system. | Consult the flow and cassette diagrams in the application note.<br>1. Close both pump handles to clamp all pump tubing closed. Power off the FIAstar to stop the pump<br>2. Disconnect the pump tube with the highest number of dot designations (•, ••, •••) at the cassette.<br>3. Connect the syringe directly to the tube coupling using a small piece of flexible tubing. Attempt to push water through the cassette.<br>If water cannot be pushed through, blockage is in the flow components after the reagent addition. Reconnect pump tube disconnected previously and proceed to #5.<br>If water can be pushed through the cassette, this confirms no blockage from the last reagent addition, through the final mixing coils, flow cell then to waste.<br>Check that water is flowing from the flow cell waste line into the waste.<br>1. Reconnect pump tube disconnected previously.<br>2. Disconnect the next lowest tubing as described above and connect the syringe. Attempt to push water through the cassette.<br>If water cannot be pushed through the cassette, blockage is between this and the previous reagent addition. Proceed to #5.<br>If water can be pushed through cassette, blockage is before this reagent addition.<br>1. Reconnect pump tube disconnected previously, and continue with remaining reagent addition ports as needed.<br>2. Proceed to #5 when having found the blockage point/s |
| 4 | Sample pump tube pops off.<br>(Pos. B, Fig. 7:82) | Blockage in sample internal waste line, bulk-head connector and / or waste line. | Flush and replace tubing if necessary. |

| No. | Fault | Probable Cause | Action |
|---|---|---|---|
| 5 | Blockage in FIAstar and cassette components | | Proceed as in #3 to identify location of blockage. Once identified, follow instructions per component/s below (#6-9). |
| 6 | Blockage in flow cell | • Blockage in flow cell inlet or outlet ports.<br>• Blocked or crimped tubing. | Flush flow cell:<br>1. Remove the cassette from the FIAstar.<br>2. Disconnect the fitting at position H, see Fig. 7:83. Connect the syringe assembly to this fitting. Attempt to push water through the flow cell.<br>3. If this line is blocked, individually flush flow cell, inlet and outlet tubing and waste line<br>4. Replace tubing if needed.<br>5. Clean flow cell if needed, see section 6.1.6 Cleaning the Flow Cell on page 6:2. |
| 7 | Blockage in heat bath coil | Blocked or crimped tubing | Flush the heat bath (thermostated coil):<br>1. Remove the cassette from the FIAstar.<br>2. Disconnect the fittings at position J and K, see Fig. 7:83. Connect the syringe assembly to either fitting. Attempt to push water through the heat bath.<br>3. If this line is blocked or crimped, it may be difficult to clear or repair. Replace the line. |

| No. | Fault | Probable Cause | Action |
|---|---|---|---|
| 8 | Blockage in cassette components | Blocked or crimped tubing | Flushing individual cassette components:<br>1. Individually disconnect the component to be flushed. Attach the syringe assembly and attempt to push water though the component.<br>2. If the component is blocked, flush or replace.<br>3. If the component is clear, repeat with next component until source of problem is found.<br>**Note:** Only work with one cassette component at a time and immediately reconnect when finished.<br>Consult the flow and cassette diagrams in the application note |
| 9 | Blockage in dialyzer or gas diffusion cell | • Blocked or crimped tubing<br>• Blocked in / outlet ports | 1. Proceed as in as above "Cassette components".<br>2. Flush both sides of the membrane. Identify the correct reagent connections and attempt to push water through the cassette.<br>3. If the component is blocked, flush or replace.<br>4. If the component is clear, repeat with next component until source of problem is found.<br>5. Replace membrane.<br>**Note:** Be sure to inspect all inlet and outlet ports associated with the dialyzer or diffusion blocks |
| 10 | Reagent lines pop off at cassette reagent addition ports (•, ••, •••) | Blocked or crimped tubing. | Proceed as in #3 to identify location of blockage. |
| 11 | Sample loop doesn't fill with sample | Blockage in valve ports or tubing | See #1 and #2. |
| | | Loose fitting | Tighten fittings |
| | | Insufficient fill time | Refer to application note for correct valve timing |

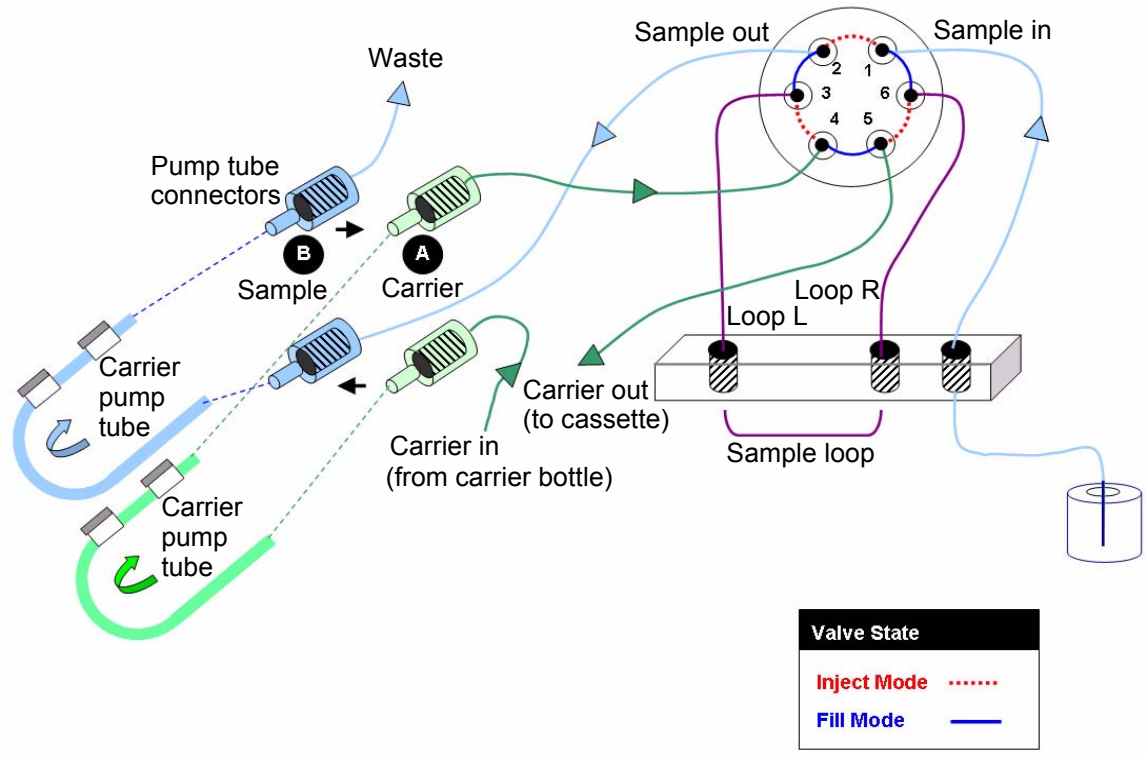


*Fig. 7:82 Injection valve plumbing*

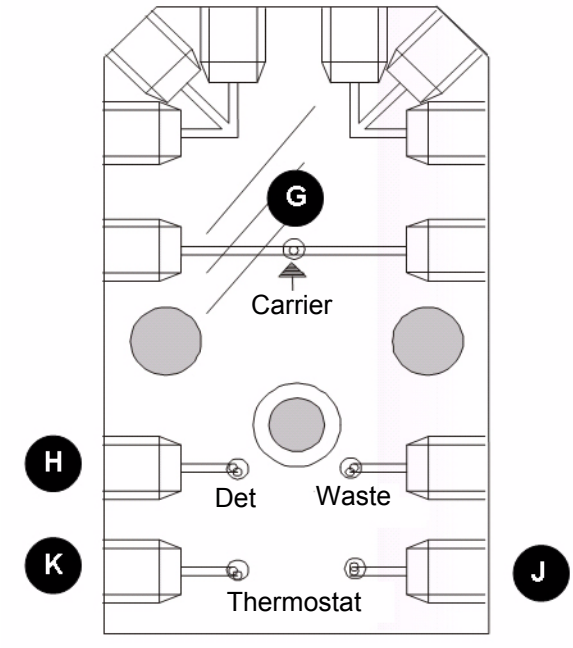


*Fig. 7:83 Internal cassette block (FIA side)*

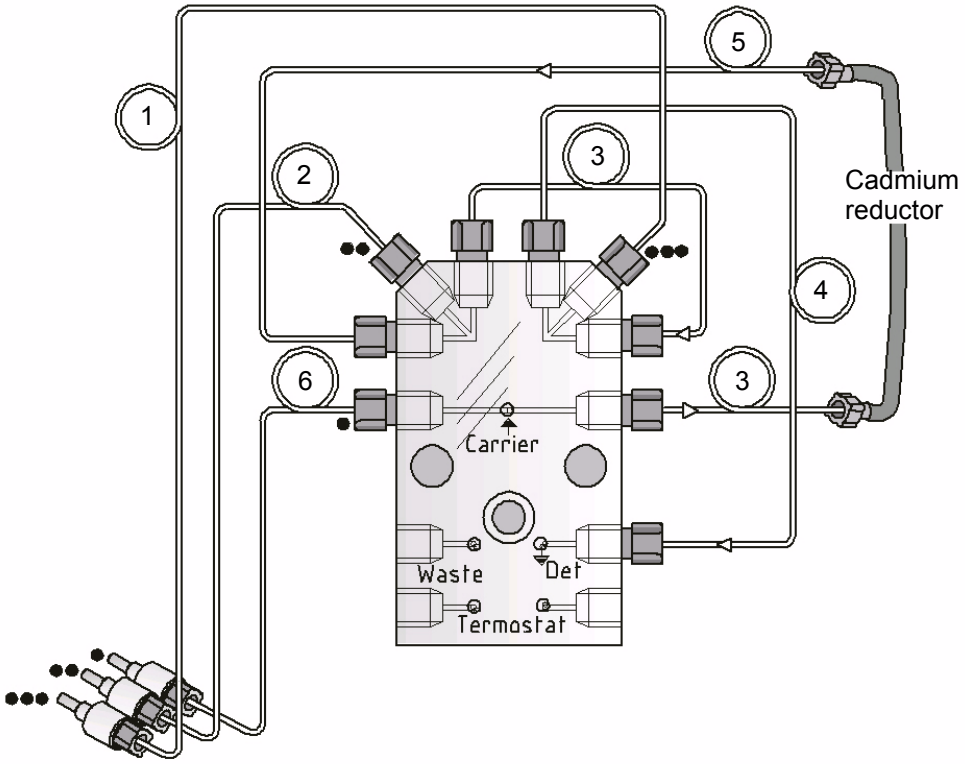


*Fig. 7:84 Cassette tubing ($NO_2$/$NO_3$ shown for example purposes)*

### 7.4.4 Unstable Baseline

To troubleshoot an unstable baseline, always begin by observing baseline while pumping water.

| Fault | Probabe Cause | Action |
|---|---|---|
| Unstable baseline on water.<br>Using the Inspect menu/read baseline a typical baseline SD (M-R) <0.1. | Loose fittings | Tighten fittings |
| | Bubbles in the cassette or flow cell | Clear bubbles |
| | | Degas water |
| | Poor flow characteristics | Replace pump tubes |
| | | Correct pump tube tension |
| | Particulates in water | Filter / use good quality deionized or distilled water |
| | Flow cell oriented the wrong way | Make sure the J-shaped channel in the glass body is the flow inlet. |
| | Poor lamp in photometer | Replace lamp |
| | Unstable detector | Contact your FOSS service representative. |

| Fault | Probabe Cause | Action |
|---|---|---|
| Unstable baseline on reagent (if water baseline is acceptable).<br>Typical baseline SD (M-R) <0.3 for most applications.<br>For methods with a high background absorbance, normal SD (M-R) < 0.6. | Particulates in reagent | Filter or remake reagent |
| | Poor flow characteristics | Replace pump tubes<br>Correct pump tube tension |

### 7.4.5 High baseline

| Fault | Probable Cause | Action |
|---|---|---|
| High baseline on water | Bubble caught in flow cell | Remove by gently pulling out the flow cell and tapping it.<br>Degas reagents/water if necessary.<br>Make sure the J-shaped channel in the glass body is the flow inlet. |
| | Debris/dirt in/on flow cell | Clean flow cell |
| | Wrong detector filters for the loaded method | Verify that the correct filters are used |
| | Faulty filter calibration. | Repeat filter calibration |
| High baseline on reagents (if water baseline is acceptable) | Contaminated reagents/Carrier | Prepare new reagents/Carrier. If problem remains, try water from a different source.<br>Avoid using the same reagent bottles for different reagents/differ as cross contamination may occur. |
| Ammonium analysis - high baseline on reagents (if water baseline is acceptable) | Contaminated reagents/Carrier | See above |
| | Poorly adjusted indicator | Adjust according to AN |
| | Broken membrane | Verify by replacing the reagent 1 with distilled water. If baseline drops dramatically, the membrane needs to be replaced. Note that this effect is also seen when having heavily contaminated reagents. |

### 7.4.6 No or Small Peaks

| Fault | Probable Cause | Action |
|---|---|---|
| No or small peaks - general checking procedure | Sample is not aspirated/injected | See 7.4.2 General trouble shooting, ”Sample does not flow ”. |
| | Pump tubes not drawing reagent/Carrier | Adjust tension on pump tube, see 7.4.2 General troubleshooting. |
| | Wrong detector filters | Verify with AN |
| | Wrong injection loop | Verify with AN |
| | Sample too acidic/alkaline | Check with a standard prepared in distilled water |
| | Flow cell oriented the wrong way | Make sure the J-shaped channel in the glass body is the flow inlet. |
| No or small peaks - Nitrate analysis. | Make sure the lever that switches between NO2 and / NO3 analysis is in the correct position | Check with AN and verify on cassette |
| | Cadmium reduction column has lost efficiency | Check efficiency acc to AN. Replace column if necessary. |
| | Sample to acidic/alkaline. pH should be 5-9 before passing it through the column. | Check with a standard prepared in distilled water |
| | Reagents added in the wrong order | Verify that the pump are according to connection diagram in AN, and are directed to the correct reagent bottles. |
| | Reagent 3 (NED) is too old. | Stable for about 2 weeks. Prepare new if necessary. |
| No or small peaks - Phosphate analysis | Reagent 2 (Stannous Chloride is too old) | Stable for about 2 weeks. Prepare new if necessary. |

### 7.4.7 Negative peaks

| Fault | Probable Cause | Action |
|---|---|---|
| Negative peaks on samples | Contaminated reagents | Typically this happens when the distilled water used for preparing the Carrier and reagents is contaminated. The samples analysed give negative peaks since they contain less than the reagents.<br>Try preparing reagents using water from a different source. |

### 7.4.8 Poor repeatability

| Fault | Probable Cause | Action |
|---|---|---|
| Poor repeatability on multiple injections | Worrn out pump tubing | Refer to section 7.4.2 General troubleshooting |
| | Tension on tubes too low | |
| | Particulates in the sample/reagents | |
| | Sample injection is not working properly | |
| | Air in reagents/Carrier | |
| | Air in flow cell | |
| | Baseline and peak time windows in software are not correct | Turn on the peak marker function in the software (Configuration /Settings/Results menu) and verify that the baseline and peak time windows match with the actual peak appearance. The baseline window should not coincide with the slope of the peak. |
| | Ammonium analysis - weak membrane | Check membrane acc. to AN. replace if necessary. |

### 7.4.9 Drift in Baseline/Peak Height

| Fault | Probable Cause | Action |
|---|---|---|
| Drift in baseline/ peak height | Too short warm up time | Match Standards and Carrier to sample matrix. |
| | Reagents not at room temperature | For reagents stored in the refrigerator, allow at least 1 hour to reach room temperature. |
| | Pump tube tension too low | Adjust tension |
| | Worn out pump tubing | Replace tubing |
| | Ammonium analysis - weak membrane | Check membrane acc. to AN |
| | Nitrate analysis - poor efficiency in Cadmium column | Check efficiency acc. to AN |
| | Phosphate analysis - precipitation in flow cell | Rinse system with 10 % Ammonia solution Carrier tubing and all reagents tubing. |

### 7.4.10 Irregular Peak Shape

| Fault | Probable Cause | Action |
|---|---|---|
| Irregular peak shape. Peaks are split, or are preceded/followed by small dips/extra peaks on the baseline | Refractive index effect | Match Standards and Carrier to sample matrix. |
| | Sample pH not compatible with the method. | Inject a smaller volume or neutralise sample to verify. For Ammonium/ TKN, a stronger alkali may be used as reagent 1. |
| | Sample injection is not working properly | Refer to section 7.4.2 General troubleshooting. |

# 8 Technical Specifications

## 8.1 Safety

The insulation of external, inaccessible circuits is reinforced.

## 8.2 Environmental Conditions

The equipment is designed to be safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m.
- Temperature 5 °C to 40 °C.
- Maximum relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity at 40 °C.
- Mains supply voltage fluctuations not exceeding ±10 % of the rated voltage.
- Transient over-voltage is in accordance with category II, which is normal for this type of equipment.
- Pollution degree 2.

# 9 Accessories and Spare Parts

## 9.1 Consumables

### 9.1.1 FIAstar 5000 Analyzer Unit

1001 0274 Pump tube red/red, set of 5 (short)

1001 0275 Pump tube gray/gray, set of 5 (short)

5000 0477 Silicone oil

### 9.1.2 $NO_2/NO_3$ Method Cassette

5000 3139 Cadmium reduction columns, set of 3

1001 0268 Pump tube orange/white, set of 5

1001 0269 Pump tube black/black, set of 5

### 9.1.3 $NH_4$ Method Cassette

1001 0269 Pump tube black/black, set of 5

1001 0273 Pump tube red/red, set of 5 (long)

5000 0295 Ammonium Indicator Mixture, 5g

5000 2875 Gas diffusion membranes, set of 10

### 9.1.4 TKN Method Cassette

1001 0269 Pump tube black/black, set of 5

1001 0273 Pump tube red/red, set of 5 (long)

1001 0271 Pump tube white/white, set of 5

5000 0295 Ammonium Indicator Mixture, 5g

1000 4893 Gas diffusion membranes, TKN, set of 10
(Extra durable for TKN analysis)

### 9.1.5 P Method Cassette

1001 0267 Pump tube orange/yellow, set of 5

### 9.1.6 $NO_2/NO_3$ Dialysis Method Cassette

5000 3139 Cadmium reduction columns, set of 3

1001 0268 Pump tube orange/white, set of 5

1001 0273 Pump tube red/red, set of 5 (long)

5000 2262 Dialysis membranes, set of 12

### 9.1.7 Total $SO_2$ Method Cassette

| | |
|---|---|
| 1001 0270 | Pump tube orange/orange (set of 5) |
| 1001 0267 | Pump tube orange/yellow (set of 5) |
| 1001 0273 | Pump tube red/red, long, (set of 5) |
| 5000 2262 | Dialysis membranes (set of 12) |

### 9.1.8 Free $SO_2$ Method Cassette

| | |
|---|---|
| 1001 0269 | Pump tube black/black (set of 5) |
| 1001 0271 | Pump tube white/white (set of 5) |
| 1001 0270 | Pump tube orange/orange (set of 5) |
| 1000 4893 | Gas diffusion membranes (set of 10) |

### 9.1.9 Blank Cassette and other Method Cassettes

| | |
|---|---|
| 1001 0208 | Mixed pump tube set, comprising: |
| | Pump tube orange/yellow, set of 2 |
| | Pump tube orange/white, set of 4 |
| | Pump tube black/black, set of 4 |
| | Pump tube orange/orange, set of 2 |
| | Pump tube white/white, set of 4 |
| | Pump tube red/red (long), set of 2 |
| | Pump tube red/red (short), set of 2 |
| | Pump tube gray/gray (short), v2 |
| 1001 0267 | Pump tube orange/yellow, set of 5 |
| 1001 0268 | Pump tube orange/white, set of 5 |
| 1001 0269 | Pump tube black/black, set of 5 |
| 1001 0270 | Pump tube orange/orange, set of 5 |
| 1001 0271 | Pump tube white/white, set of 5 |
| 1001 0273 | Pump tube red/red (long), set of 5 |

### 9.1.10 Sampler 5027

| | |
|---|---|
| 5000 3724 | Sample cup 12 ml, set of 2000 |
| D0399436 | Sample cup 30 ml, set of 750 |
| 5000 1822 | Sample cup 100ml, set of 400 (for standards) |
| 1001 3805 | Perforated caps for 12 ml cups, 100 pcs |
| 15770191 | Perforated caps for 30 ml cups, per piece |

## 9.2 Spare Parts

### 9.2.1 Pump

| | |
|---|---|
| 1001 2446 | Pump tube holder |
| 1000 9979 | Pump handle |
| 5000 1026 | Pump wheel |

### 9.2.2 Detector

| | |
|---|---|
| 1000 9508 | Flow cell assembly |
| 1001 0053 | Flow cell inlet tubing (15 cm/0.5 mm Id) |
| 1001 0052 | Flow cell outlet tubing (12 cm/0.5 mm Id) |
| 5542 0019 | Flow cell O-ring |
| 1000 9175 | Flow cell top |
| 1001 4924 | Lamp |

### 9.2.3 Injector

| | |
|---|---|
| 1575 0086 | Injection valve |
| 1575 0095 | Rotor |
| 1001 0056 | Sample loop 40 µl |
| 1000 9893 | Sample loop 100 µl |
| 1000 9894 | Sample loop 200 µl |
| 1001 0057 | Sample loop 400 µl |
| 1001 0058 | Tube, sample inlet |
| 1591 0018 | Valve disassembling key |
| 1001 0277 | Injection valve tube kit |

### 9.2.4 Thermostat

| | |
|---|---|
| 1000 9895 | Tubing |
| 1000 9740 | Thermostat unit |

### 9.2.5 FIAstar™ 5000, Miscellaneous

| | |
|---|---|
| 5000 1078 | O-ring, Viton, set of 10 |
| 1000 9211 | Cassette connecting block, FIA |
| 1001 0319 | Internal tube kit |
| 1582 0210 | Carrier/waste tube, per m |
| 1001 0019 | Tube coupling 3.5 mm |
| 1521 0067 | T-piece |
| 1001 4473 | Tubing flush kit |

### 9.2.6 Common for All Cassettes

| | |
|---|---|
| 1001 0207 | Tube set, comprising: |
| | Teflon tube, 30 cm/0.35 mm I.D., set of 1 |
| | Teflon tube, 21 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 30 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 60 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 30 cm/ 0.7 mm I.D., set of 2 |
| | Teflon tube, 60 cm/0.7 mm I.D., set of 2 |
| | Teflon tube, 12 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 15 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 9 cm/0.5 mm I.D., set of 2 |
| | Teflon tube, 7 cm/0.5 mm I.D., set of 2 |
| | Reaction coil 30 cm/ 0.5 mm I.D., set of 2 |
| 1001 2352 | Teflon tubing set |
| | Teflon tube, 7cm/0.5mm I.D., set of 1 |
| | Teflon tube, 9cm/0.5mm I.D., set of 1 |
| | Teflon tube, 12cm/0.5mm I.D., set of 1 |
| | Teflon tube, 15cm/0.5mm I.D., set of 1 |
| | Teflon tube, 30cm/0.5mm I.D., set of 1 |
| | Reaction coil, 30cm/0.5mm I.D., set of 1 |
| | Teflon tube, 60cm/0.5mm I.D., 1set of 1 |
| | Teflon tube, 21cm/0.5mm I.D., set of 1 |
| 1000 9605 | Tube coil |
| 1000 9606 | Tube coil cover |
| 1001 0019 | Tube coupling 3.5 mm |
| 1001 0083 | Reagent bottle 500 ml |
| 1001 0084 | Carrier bottle 1000 ml |
| 1001 3550 | Bottle, 1000 ml, 3-connector |
| 1001 0102 | Rinse bottle 500 ml |
| 1001 0059 | Label set, bottles |
| 1001 0020 | Tube coupling for bottles, 3 mm |
| 1000 9212 | Cassette connection block, cassette |
| 1001 1772 | Label set for pump tubing, set of 50 |

### 9.2.7 Gas Diffusion and Dialysis Cassettes

1000 9243 Gas diffusion unit, top block

1000 9242 Gas diffusion unit, lower block

### 9.2.8 Nitrite/Nitrate Cassette

1582 0212 Silicon tube

5000 1423 By-pass tube

5000 3563 Column fitting

### 9.2.9 Sampler 5027

5000 3651 Sample probe, 1 channel

1001 0182 Sample probe, 2 channels

1001 0184 Sample probe, 3 channels

5000 2779 Rinse bottle

1000 7361 H9/S25 Communication cable for PC, RS232

1001 3755 Filter tip sampler probe

1001 3709 Sample probe backflush assembly

# 10 Safety Precautions (GB)

## 10.1 Introduction

The FIAstar™ 5000 Analyzer is designed for laboratory use, analysing parameters as specified in FOSS Application Notes.

### Caution

***The responsible body shall be made aware that if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.***

## 10.2 Safety Precautions

Please read these operating instructions carefully and act accordingly.

For safety reasons people not familiar with these operating instructions must not use the instrument.

### Warning

***In order to find out the nature of the potential hazard, please consult this manual in all cases where this symbol is used.***

### Warning

***Careful handling of the solutions used in an analysis is mandatory for laboratory safety. Refer to the appropriate material safety data sheet for reagent handling instructions.***

### Electrical Shock Hazard

***Before replacing the fuses, disconnect incoming mains supply.***

### Warning

***Modification, alterations, rebuilding or use of safety parts not authorized by FOSS Analytical AB violates the warranty. FOSS Analytical AB has no responsibility for damages, material or personal, occuring as a result of such actions.***

### Warning

***The peristaltic pump has moving parts and this causes a risk for squeezing.***

### Equipotentiality

***Terminals identified by the symbol, bring the various parts of a system to the same potential e.g. ground potential, when connected together. Note that such a terminal must not be used as a protective earth (ground) connection.***

### Electrical Shock Hazard

***This device is equipped with a grounding/earthing type power plug for your protection against electrical shock hazard and should only be attached to a properly grounded/earthed receptacle.***

**Note: To maintain the limits for the CE approval only CE approved instruments may be connected.**

## 10.3 Technical Specifications

### 10.3.1 Safety

The insulation of external, inaccessible circuits is reinforced.

### 10.3.2 Environmental Conditions

The equipment is designed to be safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m.
- Temperature 5°C to 40°C.
- Maximum relative humidity 80% for temperatures up to 31°Cdecreasing linearly to 50% relative humidity at 40°C.
- Mains supply voltage fluctuations not exceeding ±10% of the rated voltage.
- Transient over-voltage is in accordance with category II, which is normal for this type of equipment.
- Pollution degree 2.

# 11 Sicherheitsvorschriften (DE)

## 11.1 Anwendungsbereich

Das FIAstar™ 5000 ist für den Laborgebrauch zur Analyse von Parametern nach den Anweisungen in den Application Notes von FOSS vorgesehen.

### Warnung

***Das verantwortliche Personal muß gewarnt werden, daß der Betrieb der Ausrüstung auf eine nicht vom Hersteller angegebene Weise deren Schutzfunktion beeinträchtigen kann.***

## 11.2 Sicherheitsvorkehrungen

Bitte lesen Sie diese Betriebsanleitung sorgfältig durch und handeln Sie dementsprechend.

Aus Sicherheitsgründen darf das Instrument nur von Personal angewendet werden, das mit dem Inhalt dieser Betriebsanleitung völlig vertraut ist.

### ⚠ Warnung

***In allen Fällen, wo dieses Symbol verwendet wird, informieren Sie sich bitte in der Bedienungsanleitung über die möglichen Gefahren.***

### ⚠ Warnung

***Vorsichtige Handhabung der Lösungen, die für eine Analyse benutzt werden, ist für die Laborsicherheit unumgänglich. Wir verweisen auf das geltende Werkstoffsicherheits-Datenblatt für Anweisungen zur Behandlung von Reagenzien.***
***Eine Schutzbrille ist bei allen Arbeiten zu tragen.***

### ⚠ Gefahr von elektrischen Schlägen

***Vor dem Auswechseln von Sicherungen ist der Netzstrom zu unterbrechen.***

### ⚠ Warnung

***Änderungen und Umbauten oder die Anwendung von Sicherheitsteilen auf eine nicht von FOSS Analytical AB gutgeheißene Weise schränkt die Gültigkeit der Garantie ein. FOSS Analytical AB trägt keine Verantwortung für Personen- oder Sachschäden, die als ein Ergebnis solcher Handlungen auftreten.***

### ⚠ Warnung

***Die Perestaltikpumpe hat bewegliche Teile. Dies stellt eine Quetschungsgefahr dar.***

### Potentialausgleich

***Klemmen, die mit diesem Symbol gekennzeichnet sind, gleichen das Potential der einzelnen Teile einer Anlage aus, z.B. Massepotential, wenn sie miteinander verbunden werden. Bitte beachten, dass eine solche Klemme nicht als Schutzerdung verwendet werden darf.***

### Gefahr von elektrischen Schlägen

***Diese Vorrichtung ist mit einem geerdeten Netzstecker ausgerüstet, um den Anwender vor elektrischen Schlägen zu schützen, und darf nur an eine entsprechend geerdete Steckdose angeschlossen werden.***

**Hinweis: Um die Bedingungen der CE-Zulassung zu erfüllen dürfen nur CE-zugelassene Geräte an das Instrument angeschlossen werden.**

## 11.3 Technische Daten

### 11.3.1 Sicherheit

Die Isolierung der äußeren, nicht zugänglichen Stromkreise ist verstärkt.

### 11.3.2 Umfeldbedingungen

Das Gerät ist für sicheren Betrieb bei mindestens folgenden Bedingungen ausgelegt:

- Innenraumbetrieb
- Höhe bis zu 2000 m
- Temperatur 5°C to 40°C.
- Höchste relative Luftfeuchtigkeit 80% für Temperaturen bis zu 31°C linear absinkend auf 50% relative Luftfeuchtigkeit bei 40°C.
- Spannungsschwankungen der Stromquelle nicht höher als ±10% der Nennspannung
- Transienten-Überspannungskategorie II, was für diesen Gerätetyp normal ist
- Luftverschmutzung Stufe 2

# 12 Sikkerhedsforholdsregler (DK)

## 12.1 Anvendelse

FIAstar™ 5000 er beregnet for laboratorieformål under anvendelse af analyseparametrene som specificeret i FOSS ABs Application Notes

### ⚠ Advarsel

***Den ansvarlige skal være opmærksom på, at anvendes apparatet på anden måde end specificeret af producenten, kan udstyrets indbyggede sikkerhedsanordninger svigte.***

## 12.2 Sikkerhedsforholdsregler

Brugsanvisningen skal gennemlæses nøje og overholdes.

Af sikkerhedshensyn må personale, som ikke er bekendt med brugen af apparatet, ikke anvende det.

### ⚠ Advarsel

***Venligst, rådfør Dem med brugervejledningen i tilfælde, hvor dette symbol anvendes, for at finde ud af omfanget af en eventuel risiko.***

### ⚠ Advarsel

***Forudsætningen for sikkerhed på arbejdspladsen i laboratoriet er den omhyggelige håndtering af de opløsninger, som skal analyseres. Der henvises til de relevante sikkerhedsdatablade for håndtering af reagenser.***
***Øjenværn er påbudt.***

### ⚠ Risiko for elektrisk stød

***Før udskiftning af sikringer trækkes stikket ud af vægdåsen.***

### ⚠ Advarsel

***Modifikationer, ændringer, ombygning eller anvendelse af sikkerhedskomponenter, som ikke er godkendt af FOSS Analytical AB annullerer garantien. FOSS Analytical AB kan ikke gøres ansvarlig for skader på materiale eller personer, som er en følge af disse handlinger.***

### ⚠ Advarsel

***Peristaltikpumpen har bevægelige dele, som medfører risiko for klemning.***

### ⏚ Ækvipotentialitet

***Udgange, der er mærket med dette symbol, sætter et systems forskellige dele på samme spænding, fx mod jord, når de forbindes med hinanden. NB! Den type udgang må ikke bruges som beskyttelsesjording (jordforbindelse).***

### ⚠ Risiko for elektrisk stød

***Apparatet er udstyret jordforbundet stik som beskyttelse mod strømstød og må kun tilsluttes stikdåser med jord.***

**NB: For at overholde grænserne for CE-godkendelsen, må der udelukkende tilsluttes CE-godkendte enheder til dette instrument.**

## 12.3 Tekniske specifikationer

### 12.3.1 Sikkerhed

Afskærmningen af eksterne elektriske kredsløb uden tilgangsmulighed er forstærket.

### 12.3.2 Arbejdsmiljø

Apparatet er konstrueret for sikker funktion under i hvert fald følgende forhold :

- Anvendelse indendørs
- Højder op til 2000 m
- Temperatur 5°C til 40°C.
- Maksimum relativ luftfugtighed 80% for temperaturer op til 31°C aftagende lineært til 50% relativ luftfugtighed ved 40°C.
- Strømspændingsvariationer på ikke over ±10% af nominalspændingen
- Transient overspænding kategori II, som er normalt for denne type udstyr
- Forureningsgrad 2

# 13 Precauciones de Seguridad (ES)

## 13.1 Introducción

El FIAstar™ 5000 está diseñado para analizar parámetros en laboratorios como se especifica en las Notas de Aplicación de FOSS.

### Precaución

***Los responsables deben saber que si el equipo no se usa de la forma especificada por el fabricante, la protección que ofrece el mismo puede ser irregular.***

## 13.2 Instrucciones de seguridad

Por favor, lea estas instrucciones atentamente y actúe de acuerdo con las mismas.

Por razones de seguridad, el equipo no deberá ser usado por personas que no estén familiarizadas con estas instrucciones de funcionamiento.

### ⚠ Advertencia

***En todos los casos donde aparece este símbolo, por favor, consulte este manual con objeto de conocer la naturaleza del riesgo potencial.***

### ⚠ Advertencia

***Para la seguridad en el laboratorio es imprescindible hacer un uso cuidadoso de las soluciones empleadas en el análisis Consulte la hoja de datos de seguridad referente a las instrucciones de manejo de material reactivo. Es necesario utilizar protección para los ojos y actuar cuidadosamente cada vez que se manejen tubos de digestión calientes.***

### ⚠ Riesgo de descarga eléctrica

***Antes de cambiar los fusibles desconecte la alimentación eléctrica.***

### ⚠ Advertencia

***Las modificaciones, alteraciones, recomposiciones o uso de piezas de seguridad no autorizadas por FOSS Analytical AB, provocarán la nulidad de la garantía. FOSS Analytical AB no se hace responsable de daños materiales o personales derivados de dichas acciones.***

### ⚠ Advertencia

***La bomba peristáltica tiene piezas móviles, lo que crea peligro de compresión.***

### ⏚ Equipotencialidad

***Los terminales identificados por el símbolo llevan las diferentes partes de un sistema al mismo potencial, es decir, potencial de masa, cuando se conectan conjuntamente. Nótese que un terminal de este tipo no ha de utilizarse como conexión protectora de tierra (masa).***

### ⚠ Riesgo de descarga eléctrica

***Este aparato ha sido equipado con un cable de alimentación con conexión a tierra para protegerle contra riesgos de descarga eléctrica y sólo deberá ser conectado a una toma con conexión a tierra adecuada.***

**¡Nota!: Para mantenerse dentro de los límites de la marca CE, sólo deben conectarse productos que cuenten con dicha marca.**

## 13.3 Especificaciones técnicas

### 13.3.1 Seguridad

El aislamiento de los circuitos exteriores a los que no se puede acceder ha sido reforzado.

### 13.3.2 Condiciones ambientales

El equipo ha sido diseñado para ofrecer seguridad bajo las siguientes condiciones:

- Uso en interiores
- Altitud máxima de 2000 m
- Temperatura de 5°C a 40°C.
- Nivel máximo de humedad relativa 80% para temperaturas hasta 31°C disminución lineal de 50% de humedad relativa a 40°C.
- Fluctuaciones en el voltaje de alimentación principal inferiores a ±10% del voltaje nominal
- Sobrevoltaje transitorio categoría II, normal para este tipo de equipo
- Grado 2 de contaminación

# 14 Prescriptions de Securite (FR)

## 14.1 Introduction

L'Analyseur FIAstar™ 5000 est un appareil de laboratoire, destiné à l'analyse des paramètres selon les spécifications décrites par FOSS.

### Attention

***Le responsable doit être parfaitement conscient que si l'équipement n'est pas utilisé comme le spécifie le fabricant, la garantie et la sécurité offertes par l'équipement ne peuvent plus être assurées.***

## 14.2 Précautions de sécurité

Lire attentivement les instructions de fonctionnement et les suivre scrupuleusement.

Pour des raisons de sécurité, les personnes qui ne sont pas habituées à ce genre d'opération ne doivent pas utiliser l'instrument.

### ⚠ Avertissement

***Merci de consulter votre manuel lorsque ce symbole apparaît afin de trouver l'origine du problème.***

### ⚠ Avertissement

***Les précautions de manipulation des solutions utilisées dans les analyses sont impératives pour la sécurité en laboratoire. Se référer à la fiche technique de sécurité touchant les produits concernés pour les instructions de manipulation réactive. Toujours utiliser des lunettes de protection et faire très attention pour manipuler des tubes de digestion chauds.***

### ⚠ Risque d'électrocution électrique

***Avant de remplacer les fusibles, couper l'alimentation électrique principale.***

### ⚠ Avertissement

***Le responsable doit être parfaitement conscient que si l'équipement n'est pas utilisé comme le spécifie le fabricant, la garantie et la sécurité offertes par l'équipement ne peuvent plus être assurées.***

### ⚠ Avertissement

***La pompe péristaltique comporte des organes en mouvement, prendre garde de ne s'exposer à ceux-ci.***

### ⏚ Equipotentiel

***Les bornes identifiées par le symbole amènent les différentes parties d'un système au même potentiel, c'est à dire le potentiel de masse, lorsqu'elles sont reliées entre elles. Notez que de telles bornes ne doivent pas être utilisées comme raccord de masse de protection (terre).***

### ⚠ Risque d'électrocution électrique

***Ce dispositif est équipé d'une fiche de branchement avec masse/terre pour assurer une bonne protection contre les dangers d'électrocution et doit uniquement être branché à une prise adéquate avec masse/terre.***

**Remarque: Pour rester conforme aux normes CE, lappareil doit exclusivement être raccordé à des produits homologués CE.**

## 14.3 Caractéristiques techniques

### 14.3.1 Sécurité

L'étanchéité des circuits externes et inaccessibles est renforcée.

### 14.3.2 Conditions d'environnement

L'équipement est conçu pour assurer la sécurité au moins dans les conditions suivantes:

- Utilisation intérieure
- Altitude jusqu'à 2000 m.
- Températures de 5°C à 40°C.
- Humidité relative maximale 80% pour des températures jusqu'à 31°C décroissant linéairement jusqu'à 50% d'humidité relative à 40°C.
- Variations de tension d'alimentation ne dépassant pas ±10% de la tension nominale.
- Surtension transitoire conformément à la catégorie d'installation II, c'est-à-dire normale pour ce type d'équipement.
- Pollution de degré 2

# 15 Λήψη Μέτρων Ασφαλείασ (GR)

## 15.1 Εισαγωγή

Ο Αναλυτής FIAstar™ 5000 έχει σχεδιαστεί για εργαστη- ριακή χρήση για την ανάλυση παραμέτρων όπως αυτές καθορίζονται στις Σημειώσεις Εφαρμογής της FOSS Analytical AB.

### Προσοχή

***Οι υπεύθυνοι για τη λειτουργία της συσκευής πρέπει να γνωρίζουν ότι εάν η συσκευή δεν χρησιμοποιείται σύμφωνα με τις οδηγίες του κατασκευαστή, η προστασία που παρέχει θα είναι μειωμένη.***

## 15.2 Λήψη μέτρων ασφαλείας

Παρακαλούμε διαβάστε προσεκτικά και ακολουθήστε πιστά αυτές τις οδηγίες χρήσης.

Για λόγους ασφαλείας, η συσκευή δεν πρέπει να χρησιμοποιείται από άτομα που δεν γνωρίζουν τις οδηγίες χρήσης.

### Προσοχή

***Παρακαλώ συμβουλευθήτε τον οδηγό σέ όλες της περιπτώσεις πού βλέπετε αυτό το σύμβολο γιά νά μπορέσετε νά εντοπίσετε την αιτία του άμεσου κινδύνου.***

### Προσοχή

***Ο προσεκτικός χειρισμός των διαλυμάτων που χρησιμοποιούνται στις αναλύσεις είναι επιτακτικός για την ασφάλεια μέσα στο εργαστήριο. Αναφερθείτε στο σχετικό φύλλο πληροφοριών ασφαλείας υλικού σχετικά με το χειρισμό αντιδραστηρίων. Πρέπει πάντα να χρησιμοποιούνται γυαλιά προστασίας για τα μάτια, ο δε χειρισμός των καυτών σωλήνων πρέπει να γίνεται με μεγάλη προσοχή.***

### Κίνδυνος ηλεκτροπληξίας

***Πριν αντικαταστήσετε κάποια καμένη ασφάλεια, πρέπει να αποσυνδέσετε τη συσκευή από την παροχή ρεύματος.***

### Προσοχή

***Οι τροποποιήσεις, οι αλλαγές, οι επισκευές και η χρήση των εξαρτημάτων ασφαλείας που γίνονται χωρίς την έγκριση της εταιρείας FOSS Analytical AB αποτελούν παραβίαση της εγγύησης. Η εταιρεία FOSS Analytical AB δεν υπέχει ευθύνη για καμία βλάβη, υλική ή σωματική, οφειλόμενη σε τέτοιες ενέργειες.***

### Προσοχή

***Η περισταλτική αντλία έχει κινούμενα μέρη και αυτό δημιουργεί κίνδυνο συμπίεσης.***

### Ισοδυναμική σύνδεση

***Οι ακροδέκτες που επισημαίνονται με το σύμβολο αυτό, εξισώνουν το δυναμικό των επί μέρους εξαρτημάτων ενός συστήματος, π.χ. με το δυναμικό της γης, εφόσον συνδεθούν μεταξύ τους. Παρατηρήστε ότι ακροδέκτης αυτού του τύπου δεν πρέπει να χρησιμοποιείται σαν σύνδεση γείωσης προστασίας (γης).***

### Κίνδυνος ηλεκτροπληξίας

***Η συσκευή αυτή είναι εφοδιασμένη με ρευματολήπτη τύπου γείωσης για τη δική σας προστασία από ηλεκτροπληξία και πρέπει να συνδέεται μόνο σε κατάλληλα γειωμένο ρευματοδότη (πρίζα).***

**Σημείωση: Για να τηρηθούν οι περιορισμοί της έγκρισης σήματος CE, μόνο εξωτερικές μονάδες με έγκριση CE πρέπει να συνδέονται στο όργανο.**

## 15.3 Τεχνικά στοιχεία και προδιαγραφές

### 15.3.1 Ασφάλεια

Η μόνωση των εξωτερικών, απροσπέλαστων κυκλωμάτων της μονάδας είναι ενισχυμένη.

### 15.3.2 Περιβαλλοντικές συνθήκες

Η μονάδα έχει σχεδιαστεί ειδικά για να παρέχει ασφάλεια χρήσης κάτω από τις εξής συνθήκες:

- Χρήση σε κλειστό χώρο.
- Υψόμετρο έως 2000 μέτρα.
- Θερμοκρασία 5° C έως 40° C.
- Μέγιστη σχετική υγρασία 80% για θερμοκρασίες έως 31° C με γραμμική ελάττωση στο 50% σχετικής υγρασίας στους 40° C.
- Διακυμάνσεις ρεύματος τροφοδοσίας όχι πέραν του ±10% της ονομαστικής τάσης.
- Η προστασία από μεταβατικές υπερτάσεις είναι αντίστοιχη με την κατηγορία εγκαταστάσεων II, η οποία είναι η συνήθης για εξοπλισμό του τύπου αυτού.
- Βαθμός μόλυνσης 2

# 16 Precauções de Segurança (PT)

## 16.1 Introdução

O Analisador FIAstar™ 5000 foi concebido para a utilização em laboratórios na análise de parâmetros tal como especificado nas Notas de Aplicação FOSS.

### Cuidado

***O corpo responsável é avisado de que se o equipamento for utilizado de um modo não indicado pelo fabricante, a protecção fornecida pelo equipamento pode ser comprometida.***

## 16.2 Precauções de segurança

Por favor leia estas instruções de utilização cuidadosamente e cumpra as suas indicações.

Por razões de segurança, indivíduos não familiares com estas instruções de operação não devem utilizar o instrumento.

### ⚠ Atenção

***Sempre que este símbolo seja usado, por favor consulte este manual, de modo a obter informação sobre o potencial perigo.***

### ⚠ Atenção

***O cuidado na utilização das soluções utilizadas numa análise é obrigatório para segurança no laboratório. Consulte a folha de dados de segurança apropriada para instruções sobre como lidar com reagentes. Deve ser sempre utilizada protecção ocular e deve ser exercido cuidado especial no manuseamento de tubos de digestão quentes.***

### ⚠ Perigo de choques eléctricos

***Antes de substituir os fusíveis, desligue a tomada da fonte de alimentação.***

### ⚠ Atenção

***Modificações, alterações, reconstruções ou utilização de peças de segurança não autorizadas pela FOSS Analytical AB violam a garantia. A FOSS Analytical AB não assume qualquer responsabilidade por danos, materiais ou pessoais, decorrentes de tais acções.***

### ⚠ Atenção

***A bomba peristáltica tem peças móveis em que poderá entalar os dedos.***

### ⏚ Igualização de potencial

***Quando se ligam os terminais identificados pelo símbolo, as várias partes do sistema adquiram o mesmo potencial, ou seja, o mesmo potencial de terra. Observar que um tal terminal não pode ser usado como ligação à terra de protecção.***

### ⚠ Perigo de choques eléctricos

***Este aparelho está equipado com uma tomada terra para sua protecção contra o perigo de choques eléctricos e deve ser ligada a um recipiente terra apropriado.***

**Nota: Para manter os limites para aprovação CE só devem ser ligados produtos aprovados CE.**

## 16.3 Especificações técnicas

### 16.3.1 Segurança

O isolamento de circuitos externos e inacessíveis é reforçado.

### 16.3.2 Condições ambientais

O equipamento é concebido para ser seguro pelo menos sob as condições seguintes:

- Utilização em interior
- Altitudes até 2000 m.
- Temperatura 5°C a 40°C.
- Máxima humidade relativa de 80% para temperaturas até 31°C diminuindo linearmente até 50% de humidade relativa a 40°C.
- Flutuações de voltagem no fornecimento de energia não excedendo ±10% da voltagem indicada.
- Sobrevoltagem momentânea está de acordo com a categoria de instalação II, o que é normal para este tipo de equipamento.
- Grau de poluição 2

# 17 Varotoimet (FI)

## 17.1 Johdanto

FIAstar™ 5000 on tarkoitettu parametrien analysointiin laboratorioissa FOSS in käyttöohjeiden mukaisesti.

### Varoitus

***Käytöstä vastaavan elimen tietoon on saatettava, että jos laitteistoa käytetään valmistajan ohjeiden vastaisesti, sen tarjoama suoja saattaa heiketä.***

## 17.2 Varotoimet

Lue nämä käyttöohjeet huolellisesti ja toimi niiden mukaisesti.

Turvallisuussyistä eivät henkilöt, jotka eivät ole perehtyneet näihin käyttöohjeisiin, saa käyttää laitetta.

### Vaara

***Selvittääksesi varoituksen tai riskin luonteen, lue siihen liittyvä selitys aina kun tämä symboli on käytössä!***

### Vaara

***Laboratorion turvallisuuden vuoksi on analyyseihin käytettäviä liuoksia käsiteltävä varovasti. Katso reagenssin käsittelyohjeet ko. materiaalin käyttöturvallisuustiedotteesta. Silmiensuojaimia on käytettävä koko ajan ja kuumien uuttoputkien käsittelyssä on noudatettava varovaisuutta.***

***verkkojohto ennen sulakkeiden***

### Sähköiskujen vaara

***vaihtamista.***

### Vaara

***Modifikaatiot, muutokset, laajennukset tai muiden kuin FOSS Analytical AB:n hyväksymien turvallisuusosien käyttö on takuuehtojen vastaista. FOSS Analytical AB ei vastaa tällaisesta menettelystä aiheutuvista materiaali- ja henkilövahingoista.***

### Vaara

***Peristaltiikkapumpussa on liikkuvia osia ja tämä aiheuttaa puristusvaaran***

### Tasapotentiaalisuus

***Tällä symbolilla merkityt päätteet tasaavat järjestelmän potentiaalit esim. maapotentiaaliin, kun ne kytketään toisiinsa. Huomaa, ettei tällaista päätettä saa käyttää suojamaadoitusliitäntänä.***

### Sähköiskujen vaara

***Tämä laite on varustettu sähköiskuilta suojaavalla maadoitetulla pistokkeella, jonka saa liittää ainoastaan asianmukaisesti maadoitettuun pistorasiaan.***

**Huom: CE-hyväksynnän vaatimusten täyttämiseksi yksikköön saa liittää vain CE-hyväksyttyjä tuotteita.**

## 17.3 Tekniset tiedot

### 17.3.1 Turvallisuus

Ulkoisten, ulottumattomissa olevien piirien eristys on vahvistettu.

### 17.3.2 Ympäristöolosuhteet

Laitteiston turvallinen käyttö edellyttää käyttöympäristöltä seuraavia vähimmäisvaatimuksia:

- Käyttö sisätiloissa
- Korkeus merenpinnasta maks. 2000 m.
- Lämpötila 5°C - 40°C.
- Suurin suhteellinen kosteus 80% lämpötiloissa maks. 31°C aleten lineaarisesti suhteelliseen kosteuteen 50% lämpötilassa 40°C.
- Verkkojännitevaihtelut eivät saa ylittää ±10% nimellisjännitteestä.
- Ylijännite on asennusluokan II mukainen, joka on normaali tämäntyyppisille laitteille.
- Saasteluokka 2

# 18 Öryggisreglur (IS)

## 18.1 Inngangur

FIAstar™ 5000 sjálvirka útdráttarkerfið er hannað til notkunar á rann- sóknastofum til greiningar á efnaþáttum sam- kvæmt verklýsingum frá FOSS.

### Varúð

***Þeim sem ábyrgð ber á notkun tækisins skal gerð grein fyrir því að ef tækið er notað á einhvern þann hátt sem framleiðandinn hefur ekki mælt með dregur úr þeirri vörn sem tækið veitir.***

## 18.2 Öryggisreglur

Lesa ber þessar notkunarleiðbeiningar og fara eftir þeim.

Öryggisins vegna er þeim óheimilt að nota tækið sem ekki hefur kynnt sér þessar leiðbeiningar .

### Viðvörun

***Þar sem þetta viðvörunartákn kemur fram, ávallt lesið ykkur til um þá hættu sem gæti stafað og hvers konar hættu um er að ræða.***

### Viðvörun

***Öryggisins vegna ber að meðhöndla varlega lausnir sem notaðar eru við greiningu. Fara ber eftir leiðbeiningum um meðhöndlun hvarfefna á gagnablaði um öryggi efna. Ávallt skal bera augnhlífar og gæta varúðar þegar heit meltingarglös eru handleikin.***

### Hætta á raflosti

***Áður en skipt er um öryggi þarf að taka tækið úr sambandi.***

### Viðvörun

***Endurbætur, breytingar, endurbygging eða notkun öryggishluta sem ekki eru samþykktir af FOSS Analytical AB nema ábyrgðina úr gildi. FOSS Analytical AB ber ekki ábyrgð á tjóni á efnum eða einstaklingum sem kann að leiða af slíku athæfi.***

### Viðvörun

***Pumpan hefur hluta sem hreyfast og þetta getur valdið kreistingi.***

### Jafnmætti

***Tengi sem merkt eru þessu tákni koma hinum ýmsu hlutum kerfis í sama spennufar, t.d. grunnspennufar þegar þau eru tengd saman. Athugið að slíkt tengi má ekki nota sem jarðtengi til verndar.***

### Hætta á raflosti

***Þetta tæki er búið jarðtengdri rafmagnskló til þess að koma í veg fyrir að notandi verði fyrir raflosti og tækið má einungis tengja við jarðtengdan tengil.***

**Ath: Svo að virt séu mörkin fyrir CE prófun eru einungis leyfilegt að tengja CE-prófaðan búnað.**

## 18.3 Tæknilýsing

### 18.3.1 Öryggi

Einangrun ytri óapgengilegra leipslna hefur verip bætt.

### 18.3.2 Apstæpur í umhverfinu

Búnapurinn er hannapur svo ap hann sé öruggur ap minnsta kosti vip eftirfarndi skilyrpi.

- Notkun innandyra
- Í hæp upp ap 2000m.
- Hitastig 5°C til 40°C.
- Hámarks hlutfallslegur raki 80% vip hitastig upp ap 31°C lækkandi línulega í 50% hlutfallslegan raka vip 40°C.
- Spennusveiflur á rafmagni fari ekki yfir ±10% af uppgefinni spennu.
- Skammvin yfirspenna er í samræmi vip uppsetningarflokk II sem er algengur fyrir þessa gerp búnapar.
- Mengunarstig 2

# 19 Norme Precauzionali di Sicurezza (IT)

## 19.1 Introduzione

L'analizzatore FIAstar™ 5000 è destinato all'uso di laboratorio per l'analisi dei parametri come specificato nelle Note applicative FOSS.

### Attenzione

***L'organismo responsabile dovrà essere messo al corrente del fatto che, qualora l'attrezzatura venga utilizzata in modi non specificati dal fabbricante, la protezione fornita dall'attrezzatura stessa potrebbe venire compromessa.***

## 19.2 Norme precauzionali

Si raccomanda di leggere queste istruzioni operative attentamente e di agire in conformità con esse.

Per ragioni di sicurezza le persone che non abbiano familiarità con le presenti istruzioni operative non dovranno utilizzare il gruppo.

### ⚠ Attenzione

***Per valutare la natura del potenziale pericolo vi preghiamo consultare il presente manuale tutte le volte che viene visualizzato questo simbolo.***

### ⚠ Attenzione

***Al fine di mantenere la sicurezza del laboratorio è indispensabile manipolare con estrema attenzione le soluzioni. Fare riferimento alle schede tecniche sulla sicurezza dei materiali appropriati per quanto riguarda le istruzioni di manipolazione di ogni reagente. Si raccomanda di indossare continuamente appositi dispositivi di protezione per gli occhi e di usare molta cautela durante la manipolazione delle provette per la mineralizzazione, che sono estremamente calde.***

### ⚠ Pericolo di scosse elettriche

***Prima di sostituire i fusibili, scollegare l'alimentazione di rete in entrata.***

### ⚠ Attenzione

***Modifiche, alterazioni, ricostruzione o d'utilizzo di parti di sicurezza non autorizzati dalla Foss Analytical AB costituiscono violazioni della garanzia. La Foss Analytical AB non si assumerà alcuna responsabilità per danni, a cose o persone, che avvengano in seguito a tali azioni.***

### ⚠ Attenzione

***Sulla pompa peristaltica sono presenti delle parti mobili che possono provocare rischi di appiattimento.***

### Equipotenzialità

***I morsetti contrassegnati dal simbolo, se collegati tra loro portano le vaie parti del sistema allo stesso potenziale ad es. potenziale di terra. Da notare che un simile morsetto non va utilizzato come collegamento di protezione di terra (massa).***

### ⚠ Pericolo di scosse elettriche

***Questo dispositivo è dotato di una spina di alimentazione provvista di messa a massa/terra per la protezione dell'utente dal pericolo di scosse elettriche e dovrebbe essere collegata esclusivamente a prese correttamente messe a massa/terra.***

**Nota: Per rispettare i limiti dell'approvazione CE, utilizzare solo prodotti approvati CE.**

## 19.3 Dati tecnici

### 19.3.1 Sicurezza

L'isolamento di circuiti esterni o inaccessibili è stato rinforzato.

### 19.3.2 Condizioni ambientali

L'attrezzatura è stata progettata per operare in modo sicuro almeno alle seguenti condizioni ambientali:

- Impiego in interni
- Altitudine sino ai 2000 m.
- Temperatura da 5°C a 40°C.
- Massima umidità relativa 80% per temperature sino ai 31°C diminuisce in modo lineare sino al 50% di umidità relativa a 40°C.
- Fluttuazioni della alimentazione di rete non superiori al ±10% del carico nominale.
- La sovratensione transitoria è prevista per le installazioni di categoria II ed è normale per questo tipo di equipaggiamenti.
- Classificazione di protezione ambientale 2

# 20 Veiligheidsmaatregelen (NL)

## 20.1 Introductie

Het FIAstar™ 5000 is ontworpen voor laboratoriumgebruik bij het analyseren van parameters zoals gespecificeerd in de FOSS Application Notes.

### Waarschuwing

***Het verantwoordelijk lichaam moet ervan op de hoogte worden gebracht, dat als de uitrusting wordt gebruikt op een manier die niet door de fabrikant wordt gespecificeerd, de bescherming die door de uitrusting wordt geboden geschaad kan worden.***

## 20.2 Veiligheidsmaatregelen

Lees deze gebruiksinstructie alstublieft zorgvuldig door en ga dienovereenkomstig te werk.

Om veiligheidsredenen moeten personen die niet bekend zijn met deze gebruiksaanwijzing het instrument niet gebruiken.

### ⚠ Waarschuwing

***Wanneer dit symbool is aangegeven raadpleeg de handleiding om de aard te zien van de eventuele gevaren.***

### ⚠ Waarschuwing

***Voorzichtig omgaan met de oplossingen die bij een analyse worden gebruikt is verplicht voor de veiligheid van het laboratorium. Verwijs naar het informatieblad voor het veilig omgaan met het desbetreffende materiaal. Een oogbescherming moet altijd worden gedragen en zorgvuldigheid moet in acht worden genomen bij het omgaan met hete reageerbuisjes.***

### ⚠ Gevaar voor elektrische schokken

***Voor het vervangen van de zekeringen de inkomende hoofdstroom uitschakelen.***

### ⚠ Waarschuwing

***Het aanpassen, wijzigen, reviseren of gebruiken van veiligheidsonderdelen zonder toestemming van FOSS Analytical AB maakt inbreuk op de garantie. FOSS Analytical AB draagt geen verantwoordelijkheid voor beschadiging van materialen of letsel aan personen, dat zich voordoet als een gevolg van dergelijke acties.***

### ⚠ Waarschuwing

***De peristaltische pomp heeft bewegende onderdelen waardoor gevaar voor samendruk ontstaat.***

### Equipotentiaal

***Terminals met dit symbool brengen de diverse delen van een systeem bij koppeling op hetzelfde potentiaal (bijv. aardpotentiaal). Dergelijke terminals mogen niet als aardsluitingsbeveiliging worden toegepast.***

### ⚠ Gevaar voor elektrische schokken

***Dit toestel is uitgerust met een grondend/aardend type stroomplug om u te beschermen tegen het gevaar van elektrische schokken en dient alleen te worden aangesloten op een op de juiste manier gegrond/geaard stopcontact.***

**NB: Om de grenzen voor de CE-goedkeuring in stand te houden, mogen alleen CE-goedgekeurde producten worden aangesloten.**

## 20.3 Technische specificaties

### 20.3.1 Veiligheid

De isolatie van externe, ontoegankelijke circuits is versterkt.

### 20.3.2 Milieutechnische voorwaarden

De uitrusting is ontworpen om veilig te zijn tenminste onder de volgende voorwaarden:

- Gebruik binnen
- Hoogte tot 2000 m.
- Temperatuur 5°C tot 40°C.
- Maximale relatieve vochtigheid 80% voor temperaturen tot 31°C lineair afnemend tot 50% relatieve vochtigheid bij 40°C.
- Netvoeding voltage fluctuaties niet meer dan ±10% van het opgegeven voltage.
- Een kortstondig teveel aan voltage is overeenkomstig installatiecategorie II, hetgeen normaal is voor dit type apparatuur.
- Milieuverontreinigingsgraad 2

# 21 Sikkerhetsregler (NO)

## 21.1 Innledning

FIAstar™ 5000 er utviklet for laboratoriebruk til analysering av parametere slik det er beskrevet i FOSS bruksanvisning.

### Advarsel

***Det ansvarlige organ skal gjøres oppmerksom på at dersom utstyret brukes på en annen måte enn spesifisert av produsenten, kan beskyttelsen som gis av utstyret bli redusert.***

## 21.2 Sikkerhetsregler

Les disse driftsinstruksene nøye og følg dem.

Av sikkerhetsgrunner må personer som ikke kjenner disse driftsinstruksene ikke bruke instrumentet.

### ⚠ Advarsel

***Vær vennlig å se i denne håndboken i de tilfellene hvor dette symbolet er tatt i bruk for å finne ut av faremomente.***

### ⚠ Advarsel

***For å opprettholde sikkerheten i laboratoriet er det påbudt å behandle de løsninger som brukes i en analyse forsiktig. Se de aktuelle sikkerhetsdatabladene for behandling av reagens. Bruk alltid øyevern. Vær forsiktig ved behandling av varme oppslutningsrør.***

### ⚠ Fare for elektrisk støt

***Før skifting av sikringer må strømtilførselen frakoples.***

### ⚠ Advarsel

***Modifikasjoner, endringer, ombygging eller bruk av sikkerhetsdeler som ikke er autorisert av FOSS Analytical AB, gjør garantien ugyldig. FOSS Analytical AB påtar seg intet ansvar for material- eller personskader som oppstår som følge av slike handlinger.***

### ⚠ Advarsel

***Den peristaltiske pumpen har bevegelige deler og dette medfører fare for klemmeskader.***

### ⏚ Ekvipotensialpunkt

***Kontakter som er merket med dette symbolet sikrer at forskjellige deler av samme system har samme spenning (potensial) når de er forbundet med hverandre. Merk at slike kontakter ikke må benyttes til jording.***

### ⚠ Fare for elektrisk støt

***Enheten er utstyrt med jordet støpsel for å beskytte mot fare for elektrisk støt. Den må derfor bare tilkoples jordet kontakt.***

**Merk: For å overholde grensene for CE-godkjenning, skal bare CE-godkjente enheter koples til instrumentet.**

## 21.3 Tekniske spesifikasjoner

### 21.3.1 Sikkerhet

Isolasjonen av utvendige, utilgjengelige kretser er forsterket.

### 21.3.2 Miljømessige spørsmål

Utstyret er konstruert for å være trygt under minst følgende forhold:

- Innendørs bruk
- Høyde opptil 2000 m.
- Temperatur 5°C til 40°C.
- Maks. relativ luftfuktighet 80 % ved temperaturer opptil 31°C, fallende lineært til 50 % relativ luftfuktighet ved 40°C.
- Variasjoner i tilførselsspenning må ikke overstige ±10 % av merkespenningen.
- Transient overspenning er i henhold til installeringskategori II, som er normalt for denne type utstyr.
- Forurensning av 2. grad

# 22 Säkerhetsföreskrifter (SE)

## 22.1 Inledning

FIAstar™ 5000 är avsedd för laboratorieanvändning vid analys av parametrar enligt specifikation i FOSS Application Notes.

### ⚠ Varning

***Ansvarig instans skall känna till att, om utrustningen används på sätt utanför tillverkarens specifikation, kan det skydd som hör till utrustningen försämras.***

## 22.2 Säkerhetsföreskrifter

Läs noga igenom dessa driftinstruktioner och följ dem.

Av säkerhetsskäl får personer utan kunskap om dessa driftinstruktioner inte använda instrumentet.

### ⚠ Varning

***Då denna symbol förekommer: Läs alltid i den här manualen för att få reda på vilken potentiell risk det handlar om.***

### ⚠ Varning

***Varsam hantering av lösningarna som används i en analys är absolut nödvändigt för säkerheten på laboratoriet. Se aktuellt datablad över materialsäkerhet med hanteringsanvisningar för reagensmedel. Skyddsglasögon skall alltid användas och varsamhet iakttas vid hantering av heta kokrör.***

### ⚠ Risk för elektrisk stöt

***Bryt inströmmen före byte av säkringarna.***

### ⚠ Varning

***Modifieringar, ändringar, ombyggnad eller användning av skyddskomponenter som inte godkänts av FOSS Analytical AB gör garantin ogiltig. FOSS Analytical AB påtar sig inget ansvar för skador, materiella eller person, som uppkommer till följd av sådana handlingar.***

### ⚠ Varning

***Peristaltiska pumpen har rörliga delar vilket innebär klämrisk.***

### ⏚ Varning

***Anslutningsstift märkta med symbolen, gör att olika delar i ett system får samma potential, t.ex. jordpotential, när de är sammankopplade. Observera att en sådan potential inte får användas som skyddsjordanslutning.***

### ⚠ Risk för elektrisk stöt

***Denna apparat är utrustad med en jordad stickontakt för att skydda mot risken för elektrisk stöt och skall enbart anslutas till reglementsenligt jordat uttag.***

**Obs: För att kunna upprätthålla gränserna för CE-godkännande får enbart CE-godkända produkter anslutas.**

## 22.3 Tekniska specifikationer

### 22.3.1 Säkerhet

Isoleringen av utvändiga, oåtkomliga kretsar är förstärkt.

### 22.3.2 Miljöförhållanden

Utrustningen är konstruerad att vara säker under minst dessa förhållanden:

- Användning inomhus
- Upp till 2000 m ö h.
- Temperatur 5°C till 40°C.
- Max relativ fuktighet 80% för temperaturer upp till 31°C linjärt sjunkande till 50% relativ fuktighet vid 40°C.
- Spänningsvariationer i nätströmmen ej överstigande ±10% av märkspänningen.
- Transient överspänning enligt installationskategori II, vilket är normalt för denna typ av utrustning.
- Föroreningsgrad 2