NIRS™ DS3 / DS3 F
User Manual

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FOSS

The information contained in this manual is subject to change without prior notice. For the latest information about documentation updates for your specific instrument, please contact your local FOSS representative.

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1 Safety

	***For a description of the potential hazard, please consult this manual wherever this symbol is used.***

1.1 General

This user manual is intended for users operating the NIRS™ DS3 / DS3 F . Please read the manual carefully and act accordingly. For safety reasons, personnel not familiar with the safety information and operating instructions should not be permitted to use the instrument.

1.1.1 Safety Symbols

Explanation of safety symbols used in this manual.

Symbol	Description
	General hazard.
	Electrical shock hazard.
	Hot surface.

1.1.2 Safety Terminology

Explanation of safety terms used in this manual.

Term	Description
Warning	Danger to human safety.
Caution	Danger to product performance/operation.
Note	Important supplementary information.

1.2 Personal Safety

Warning

The instrument is not to be operated in atmospheres which could constitute an explosion risk.

Warning

The marking labels must be visible to the user and shall not be removed from the instrument or made unreadable in any way.

Warning

The instrument weighs 27 kg and must be lifted and carried by two people.

 **Warning**

Cooling liquid is harmful if swallowed. Refer to the appropriate material safety data sheet for reagent handling instructions.

 **Warning**

Hot Surface (label placed on lamp cover plate).

The lamp can be very warm. Cotton gloves must be used when replacing the lamp to avoid burn injuries.

 **Warning**

Electrical hazard. Covers or panels should be removed by certified personnel only.

1.3 Product Safety

 **Caution**

The instrument is only compliant if no changes or modifications are made to the device.

 **Caution**

The instrument is designed and tested for European (CE) compliance. To ensure that this compliance is maintained, connect only CE-approved equipment. Connecting equipment that is not CE-approved may cause EMC incompatibility and thereby affect the function of the instrument and other equipment.

 **Caution**

When nothing is connected the sealing caps should be mounted to maintain dust protection.

 **Caution**

Have space around the instrument so the cooling system can work properly. Do not cover the cooling system openings.

The air circulation around the lamp cooling flange must not be inhibited. Leave uncovered with sufficient space for air circulation at all times.

 **Caution**

Do not touch the lamp glass or reflector or let any rough surface come into contact with the lamp glass. A microscopic scratch in the glass might cause a lamp explosion later.

 **Caution**

The lamp can be damaged by fingerprints and oily residues. Cotton gloves must be used when replacing the lamp to avoid any damage.

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.

Caution

The system may only be repaired by personnel certified by FOSS.

Caution

FOSS recommends the use of original FOSS spare parts. If spare parts from other sources are used, the warranty no longer applies.

1.4 Disposal Instructions

Do not dispose of this electrical device with unsorted household waste. Improper disposal may be harmful to environment and human health. Please refer to your local waste authority for information on return and collection systems in your area.

1.5 Legal Data

The equipment is CE labelled and complies with the following directives:

- EMC (ElectroMagnetic Compatibility) Directive 2014/30/EU
- LVD (Low Voltage Directive) 2014/35/EU
- Packing and Waste Directive 94/62/EC
- RoHS Directive 2011/65/EU
- WEEE Directive 2012/19/EU
- REACH Directive 1907/2006/EC
- FCC ID: 2AZ6MNIRSDS3

The instrument is only compliant if no changes or modifications are made to the device.

1.5.1 RF Exposure

NIRS DS3 / DS3 F is compliant with the requirement for RF exposure in US with <50 mm separation distance between the user and/or bystander of the device.

1.5.2 Class B Digital Device

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

1.6 Warranty Policy

Warranty conditions are either specified on the order confirmation of the purchase order together with the invoice, or in the contract with the FOSS representative and only apply if:

- the Customer/User has followed all written instructions and documentation from FOSS regarding the product
- the product has been installed, maintained, adjusted and calibrated according to all descriptions and recommendations in the documentation
- the product has not been used for purposes other than those reasonably contemplated by FOSS
- the product has not been altered or repaired with non-original FOSS parts or by personnel not authorised by FOSS
- only original FOSS consumables and accessories or equivalents recommended by FOSS have been used
- the product has not in any other way been handled contrary to ordinary practice
- only software authorised by FOSS has been installed on any product PC
- any external PC complies with the recommendations of the FOSS representative
- computer games have not been played on the PC, including any games preinstalled together with the operating system.
- the instrument has been properly maintained, as recommended by FOSS

Your instrument may contain parts which, due to wear during use, are expected to have a shorter lifetime than the instrument in general. These parts are listed in the User Manual and/or in the FOSS product software and in the Owner's Guide.

Liability for worn parts subject to wear is limited to cases with extraordinary wear due to defective material or production errors.

1.7 Copyright of Embedded Software

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

- Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- The name of the author may not be used to endorse or promote products derived from this software without specific prior written permission.

This software is provided by the author 'as is', and any express or implied warranties, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose are disclaimed. In no event shall the author be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data, or profits; or business interruption) however caused and on theory of liability, whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

2 Introduction

2.1 General

NIRS™ DS3 / DS3 F is the fifth generation in a series of instruments designed for high precision NIR measurement, characterisation of organic materials, and qualification of known materials to allowable quality parameters. The instrument is designed for stable operation in harsh environments, while providing the precision and accuracy that users have come to expect of FOSS near-infrared (NIR) instruments.

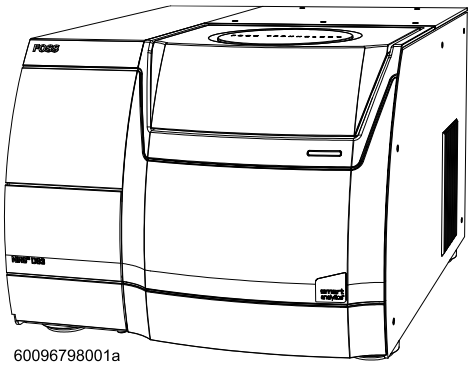

Fig. 1

NIRS DS3 / DS3 F uses a proven monochromator design, employing a digitally controlled dispersive grating, sensitive detection devices, and state-of-the-art circuitry to enhance signal/noise ratio and minimise any extraneous noise that might influence performance. The instrument may be protected by one or more patents listed at https://www.fossanalytics.com/en/news-articles/policies/patents.

This instrument uses near-infrared spectral energy in the range 400-2500 nm (NIRS DS3) / 850-2500 nm (NIRS DS3 F) to illuminate the sample. By measuring the energy reflected off the sample, chemical information and composition may be determined. This information may be used for quantification of constituents.

ISIscan Nova offers an easy user interface, using the familiar interface structure provided with previous generations of NIR instrumentation. All functions required to perform quantitation are provided, with easy tools for interpretation of results. ISIscan Nova offers full instrument diagnostics. ISIscan Nova stores all results in an SQL database for later lookup, with control chart views of results tracked over time.

Instrument communication is done through Ethernet connections. An Internet Protocol (IP) address is dynamically requested upon connection. This address may be permanently installed, if required for network purposes.

Connection through FossManager networking system allows for remote surveillance and diagnostics checks of the instrument, if necessary and authorised.

The instrument enclosure is completely sealed to prevent contamination by dust or other substances. The cooling fans operate outside the main enclosure and are thermally linked to an internal cooling system that maintains a constant temperature inside the instrument enclosure. There is no airflow drawn into the optics chamber instrument.

Lamp changes are performed through a single panel on the instrument.

The lamp is easy to remove/replace and requires no special tools or expertise.

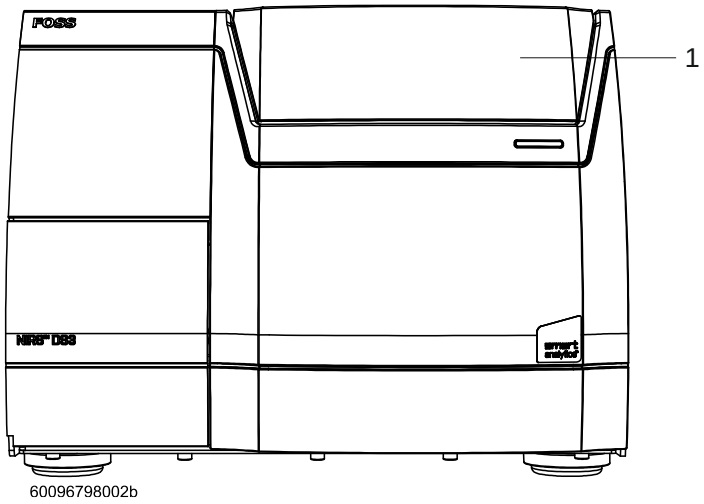

Fig. 2 Front view

1 Lid

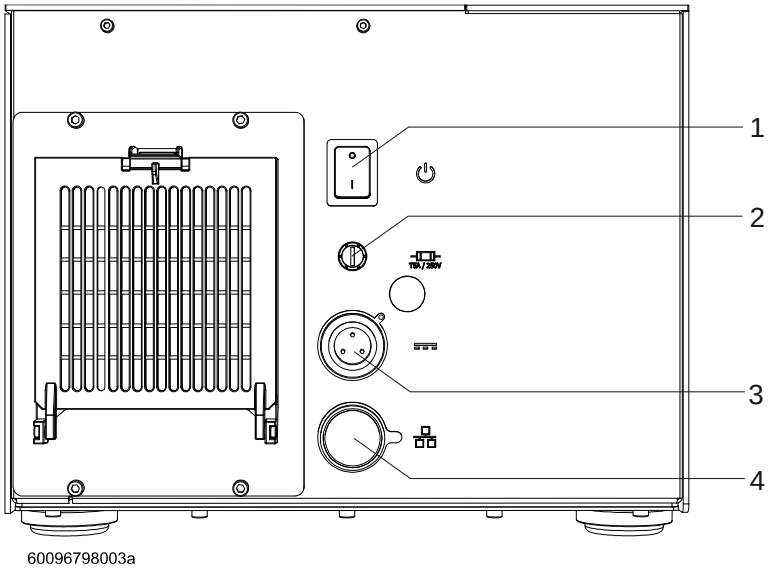

Fig. 3 Rear view

1 On/Off switch
2 Fuse holder
3 Power cable connection
4 Ethernet connection

2.2 Principle of Operation

A sample, ground or unground, is placed in a sample cup which is placed in the instrument. By means of a motor the cup is turned so that multiple parts of the sample are scanned. This multipoint reflectance measurement allows for an accurate analysis of the sample. Especially for inhomogeneous samples like pellets it is crucial to have a multipoint measurement.

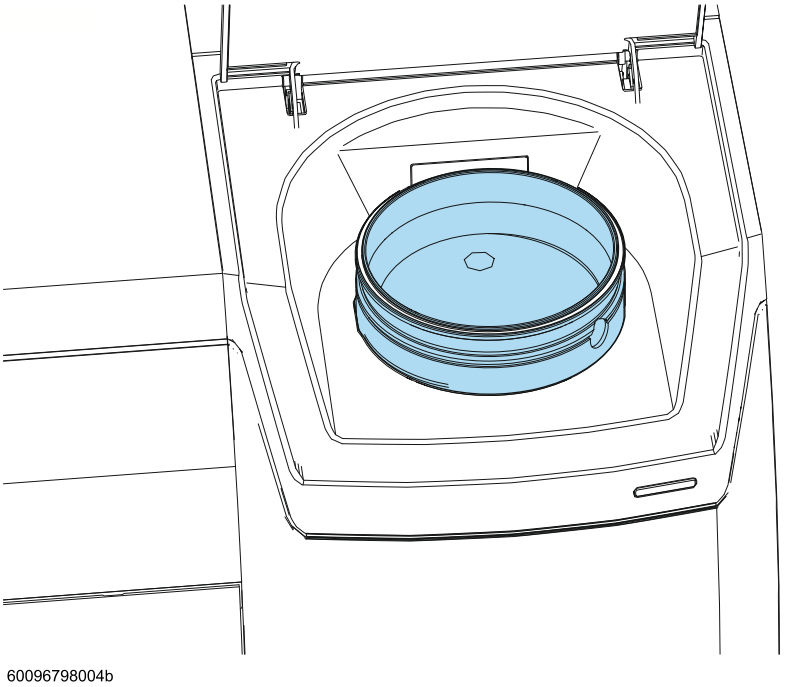

Fig. 4 Sample cup in instrument

2.3 Sample Cups

2.3.1 General

All sample cups used with NIRS DS3 / DS3 F fulfil the ISO 12099 requirement of a quartz window to eliminate drying effects of the interacting sample surface layer.

Analysis can be done with a range of different sample cups. The most commonly used are the small cup and the large cup. Other cup types are shown in section 2.3.3 Other Cups and Accessories.

The small cup is intended for fine samples in granular or powder form and products that are easy to compress. When placing the small cup in the sample presentation unit the holder must be used. (The holder is shown between the sample cups in the illustration below.)

The large sample cup is intended for unground or coarse samples like whole grains, pellets or cut silage. The bottom and upper part of the large sample cup are screwed together and can be taken apart, e.g., for cleaning or replacing the glass if needed. The bottom part also fit with the Large Cup Extension.

Note: When filling the cup it is important that the bottom of the sample cup be completely covered so that no light leaks through.

If you are not sure of which cup to use for your application, please contact FOSS.

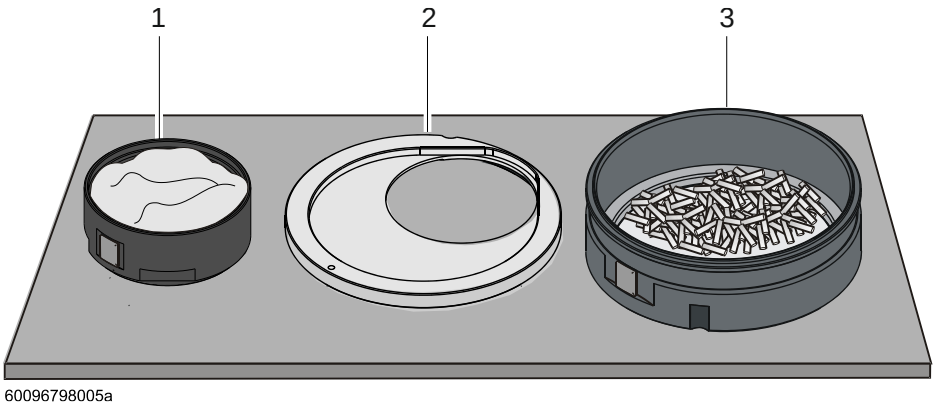

Fig. 5 Sample cups

1 Small cup
2 Small cup holder
3 Large cup

2.3.2 RFID Tag on Sample Cups

There is a radio-frequency identification (RFID) tag on all cups. The RFID tag contains information about cup type and a unique cup ID for each cup.

- The unique cup ID is stored together with each analysis providing traceability.
- The cup type can be connected to the specific application. A warning will be generated if the wrong cup type is used with that application.

The use of RFID for cup type or cup ID control can be edited or disabled via the software.

2.3.3 Other Cups and Accessories

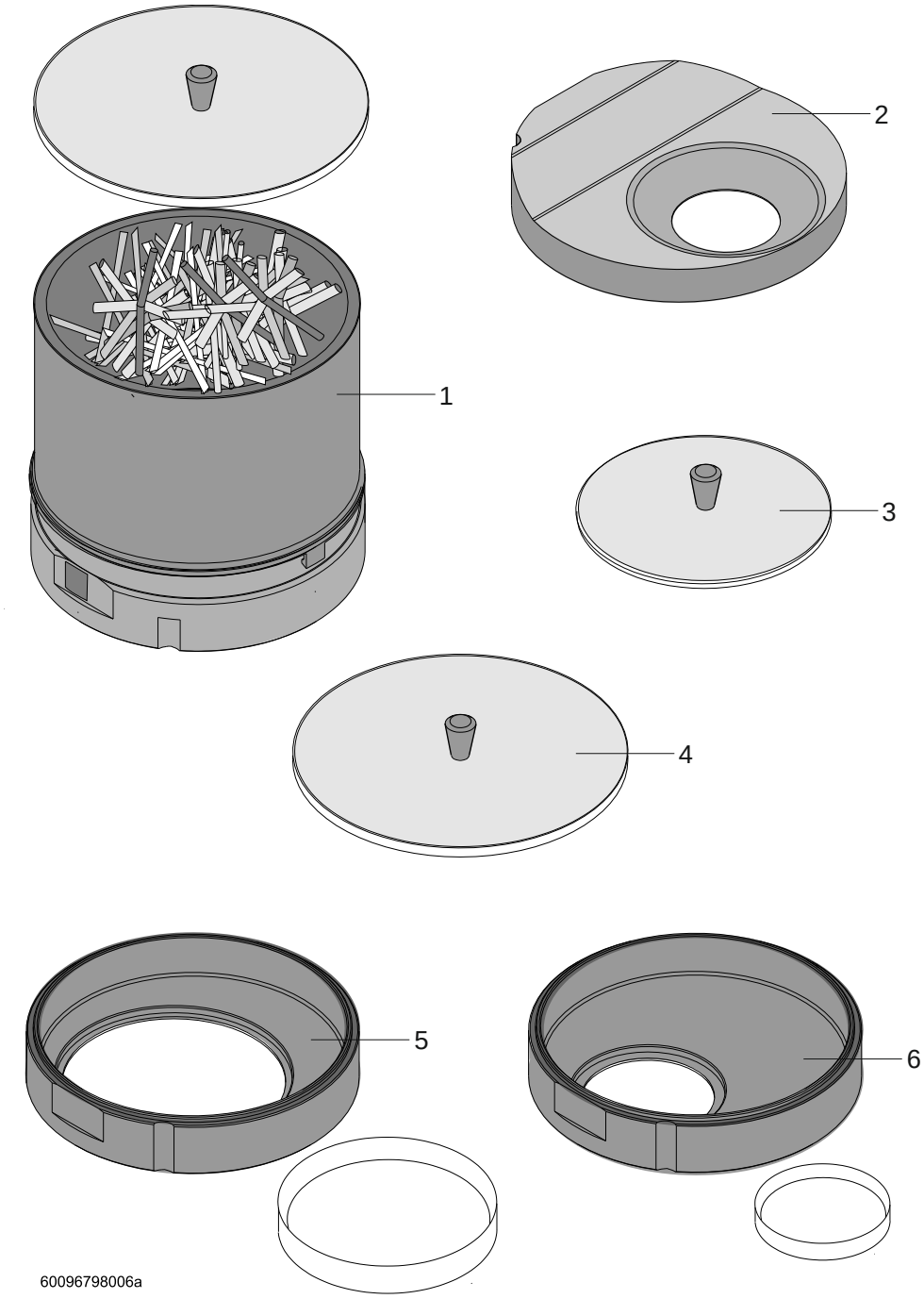

Fig. 6 Other cups and accessories

1	Large cup extension	4	Lid for large cup
2	Slurry cup	5	Petri dish holder 89 mm
3	Lid for small cup	6	Petri dish holder 58 mm

Large Cup Extension

The Large Cup Extension fits on the bottom part of the large sample cup. It can be used when a larger sample volume is required in order to scan a representative portion of the sample.

Slurry Cup

The best choice for samples that tends to stick to the cup. Also the preferred choice for samples warmer than 50 °C. It should only be used for homogeneous samples.

Petri Dish Holders

For wet, sticky or otherwise unpleasant samples. Can be used with plastic or glass petri dishes. The absorbance spectrum of the petri dish has to be taken into account while developing calibrations.

Gold Reflector

The gold reflector is suitable for homogeneous, fairly transparent, liquid samples. Liquid samples should preferably be analysed at a well-defined temperature since temperature has a large influence on the shape of the moisture spectrum. When the sample is placed in the cup, the gold reflector is placed over the sample. The sample will quickly heat up or cool down to the temperature of the cup and gold reflector. Keeping the cup and reflector at the same temperature thus ensures consistent results. Depending on the product analysed, the required path length may vary. Available path lengths for NIRS DS3 / DS3 F are 0.1 mm, 0.2 mm and 0.5 mm.

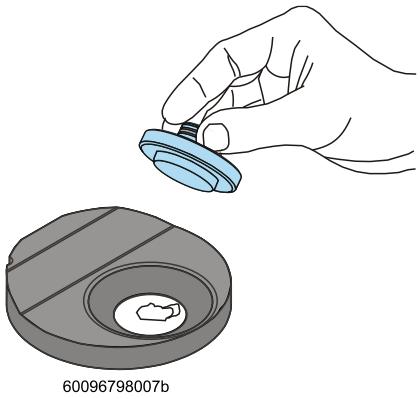

Fig. 7 Gold reflector

NIRS Ring Cup

A holder that allows for use of the NIRS ring cup is available. This permits scanning of an ISI ring cup on the NIRS DS3 / DS3 F. Its primary use is for cross-standardisation between NIR platforms.

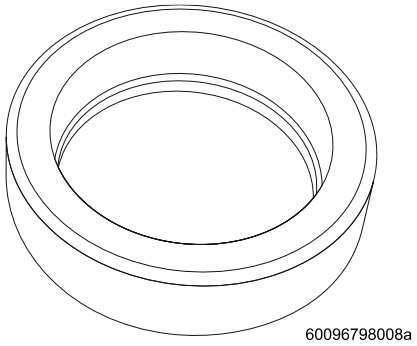

Fig. 8 NIRS ring cup

2.4 Software

This chapter gives an overview of the two software programs used for operation and network management of NIRS DS3 / DS3 F.

- ISIscan Nova
- FossManager

This user manual describes the main features and workflow for routine operations in the ISIscan Nova software and some in the FossManager software, which is used for configurations and setup. In both software systems you can find built-in Help files which give further information on specific details.

The Help file in ISIscan Nova can be accessed either via by pressing the F1 key or by clicking the question mark in the upper right corner in any view.

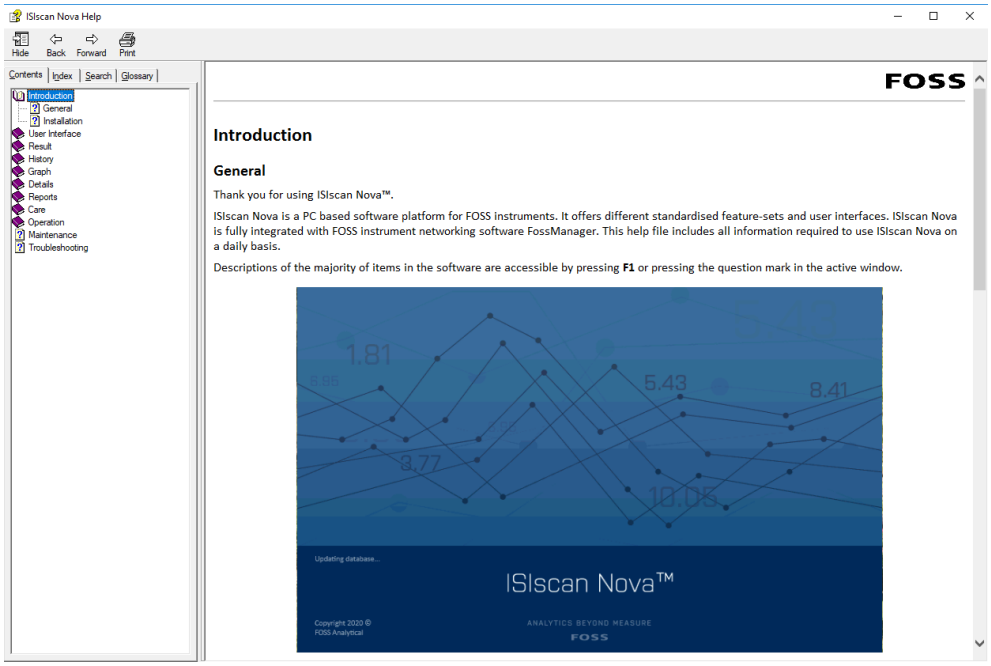

Fig. 9 ISIscan Nova help file

2.4.1 ISIscan Nova

ISIscan Nova is the operating software for the NIRS DS3 / DS3 F. It contains all necessary functionalities for the normal analysis routines:

- Select product and start analysis
- Enter Sample ID and other sample-related information fields
- Present results on screen, printer and/or transfer results to predefined network location
- Detailed views for current or historic samples including audit trails for each sample
- Generate result and diagnostic reports
- Perform diagnostics and instrument calibration
- Create backup of database
- Configuration for reporting, data transfer and backup paths
- Configuration and commands for communication with FossConnect server
- Initiate remote support session via Internet

2.4.2 FossManager

FossManager is used for configuration of the ISIscan Nova user interface determining what is available for the routine analysis operations:

- Active Products / Calibrations
- Operation profiles (e.g., which cup type to use for different products and calibrations)
- Calculated parameters
- Icons, parameter names and units
- Mandatory and/or optional sample information fields
- Report templates
- Slope/Intercept and Moisture Compensation settings

FossManager can also be used for networking one or several instruments with communication to/from a FossConnect server. The FossConnect server then also has the function as a backup of all data, results and configurations.

Connecting instruments to one or multiple FossConnect servers enables remote management of all configurations above as well as remote surveillance and troubleshooting.

An instrument can be connected to a FossConnect server and at the same time run local calibration models which are then administrated locally.

The two scenarios are elaborated below.

Instrument Configurations Managed Locally Using Local Configurator

- The Routine Operator operates NIRS DS3 / DS3 F via ISIscan Nova software.
- One PC is used for both ISIscan Nova and Local configurator software. This PC also contains the backup of data and configuration settings.
- Local Configurator connects to one single instrument.

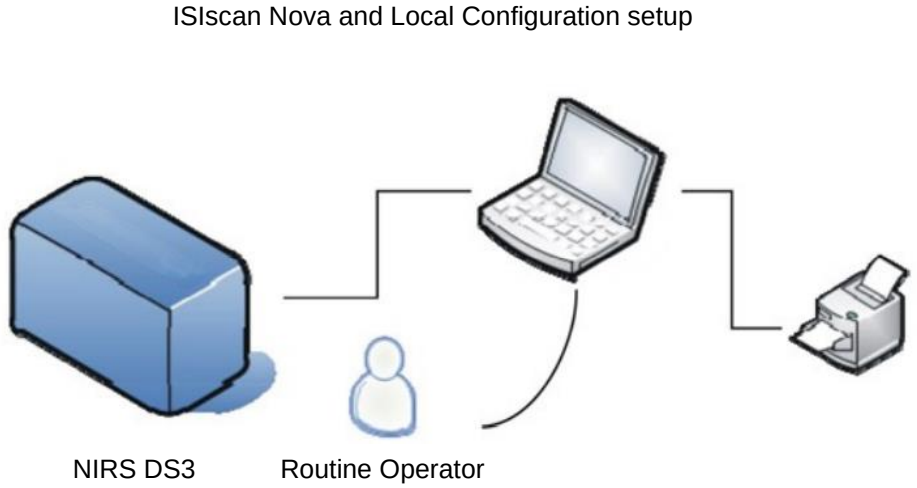

Fig. 10 Local Configurator setup

Instrument Configurations Managed Remotely by the Network Manager using FossManager

- The Routine Operator operates the NIRS DS3 / DS3 F via ISIscan Nova software.
- The FossConnect server is used for backup of data and configuration settings. The FossConnect server can either be FOSS hosted or customer hosted. Please contact your local FOSS representative for more details.
- Network can consist of one or several FOSS instruments of different types.
- Wide Area Network can also be a Local Area Network (LAN).

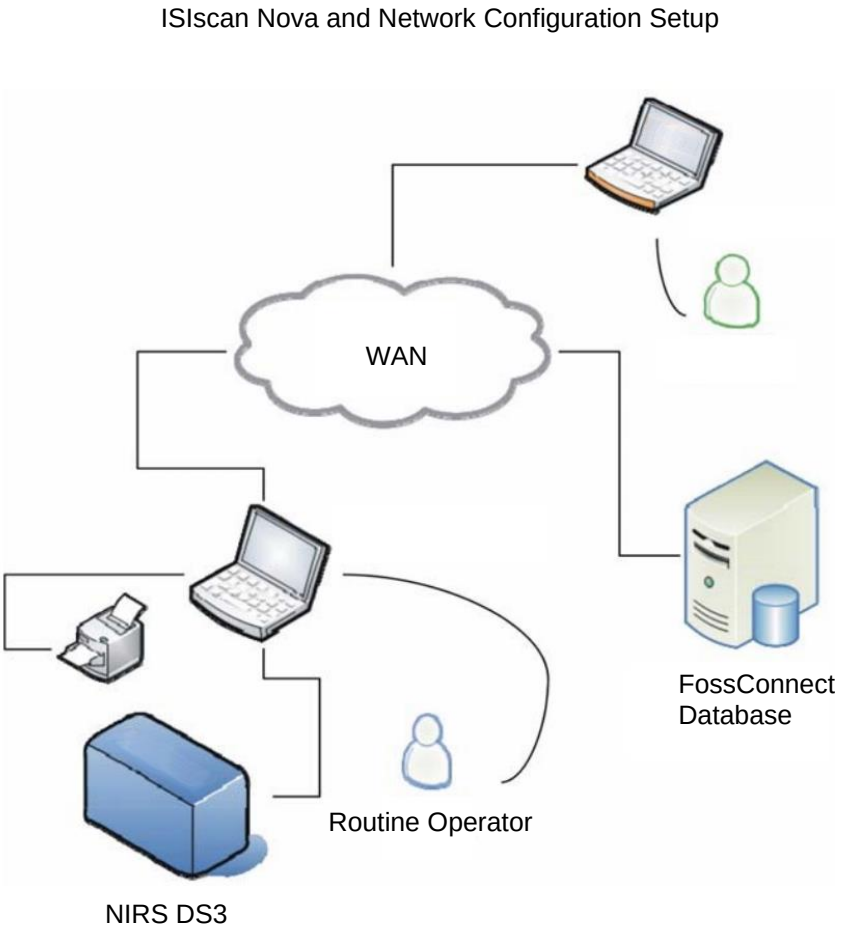

Fig. 11 FossManager - Network setup

2.4.3 User Interfaces in ISIscan Nova

General

The analyser is supplied with software to support all the necessary functions and features to operate the system on a daily basis.

At start-up of the instrument you will see the screen shown in Fig. 12.

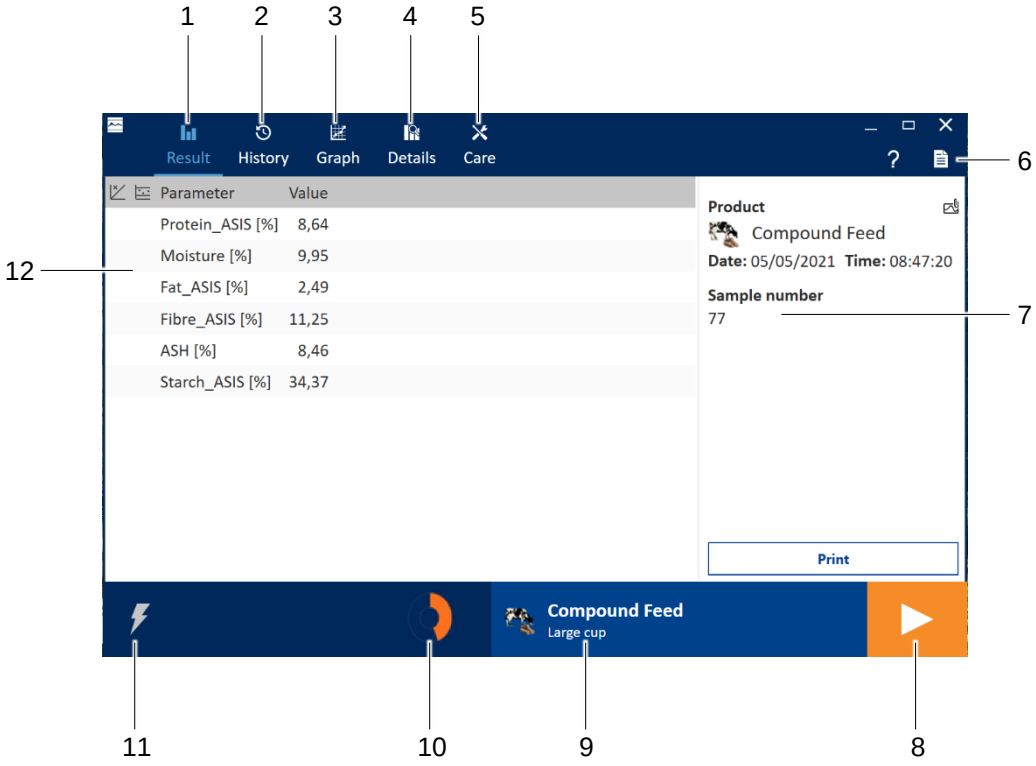

Fig. 12 Start-up screen

1	Result view	7	Sample registration
2	History view	8	Start/Stop analysis
3	Graph view	9	Product selector
4	Details view	10	Progress indicator
5	Care	11	Events indicator
6	Reports	12	Results

Result View

The **Result** view (Fig. 13) is the view normally used during routine analysis. The view shows the information about the last sample analysed. The information presented on the screen depends on the setup made in FossManager.

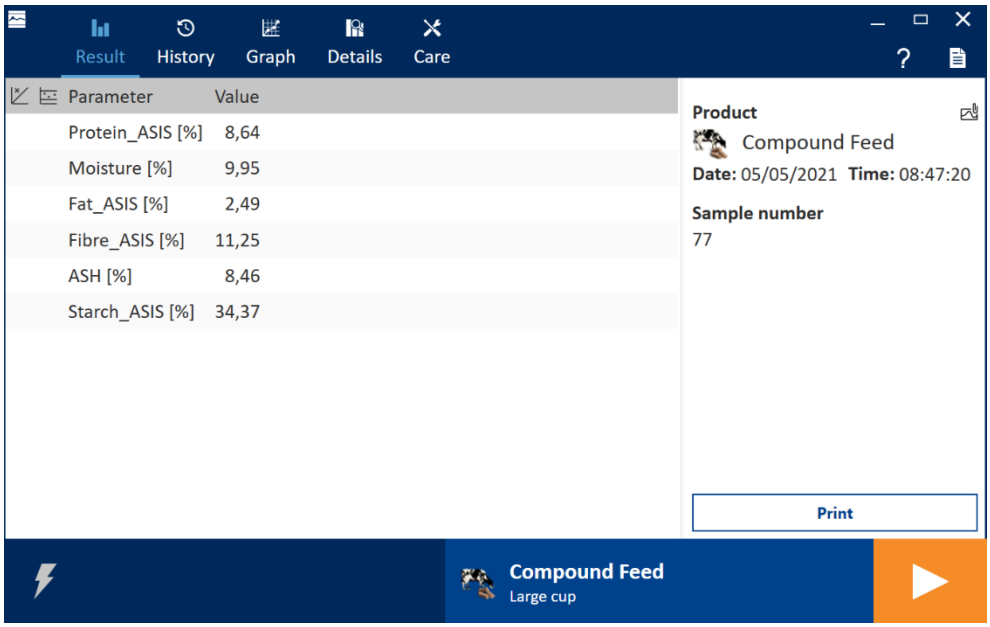

Fig. 13 Result view

The central part of the screen shows information about the sample being analysed. The information depends on the definitions that have been setup in FossManager. The left part of the screen is related to the analytical result and the right part is related to various user-defined fields containing sample registration information.

Start/Stop Analysis

Start the analysis by pressing the **Start** button in the lower right corner of the screen.

Fig. 14

During the analysis, the button's functionality changes to **Stop**.

Fig. 15

Product Icon

The **Product** selector (see Fig. 16) shows the product selected for analysis. Pressing it provides access to the available products that can be analysed.

Fig. 16

Progress Indicator

The **Progress** indicator shows the progress of the instrument scanning. The results will be displayed when all calculations are completed. This may be a couple of seconds after the progress indicator is filled.

Fig. 17

Event Indicator

Should there be an unexpected error or an opened lid during an analysis, it will be shown with a colour indication in the lower left corner of the screen (see Fig. 13). Errors are indicated in red and warnings in yellow. Press the event icon to access the **System Event** dialogue with an event log.

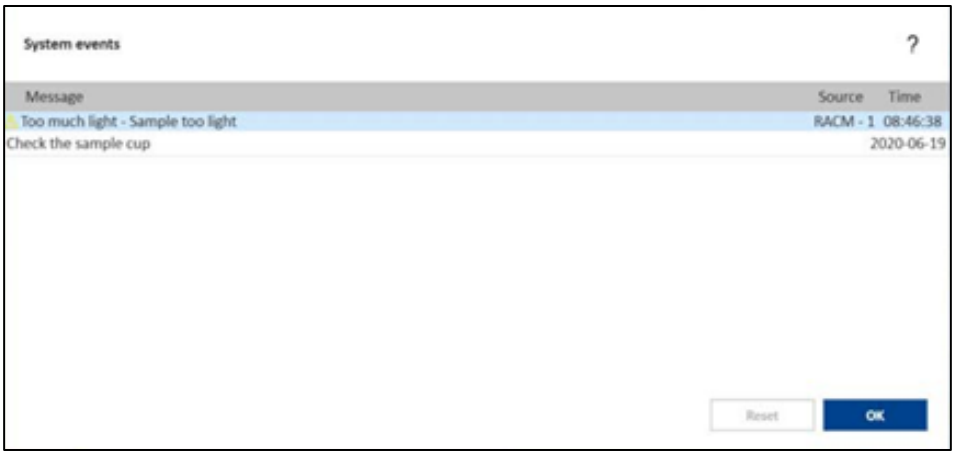

Fig. 18

Once the event has been read, press **Reset** to clear the event log. For detailed information, see the Help file in ISIscan Nova.

History View

The **History** view (Fig. 19) gives a list of the previously analysed samples for the selected product. Click on any sample in the list to see the detailed view for that specific sample.

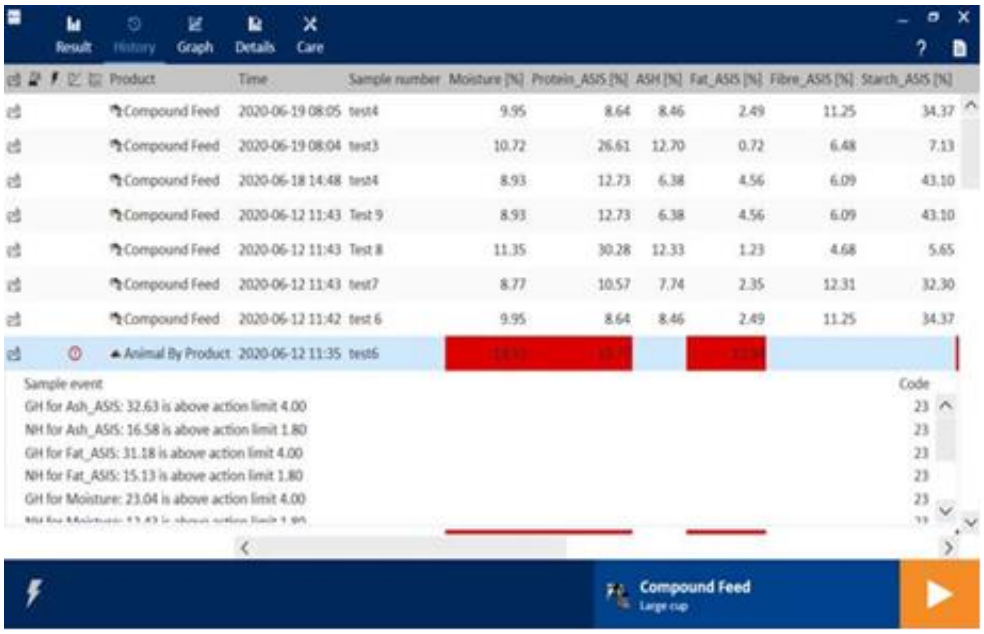

Fig. 19 History view

If product limits are used, a result exceeding a warning or action limit will be displayed with either a yellow (warning) or red (action) background. If you click in the coloured cell, the detailed view will open with information about the exceeded limits.

If you click the product selector, you can select another product and get a **History** view directly presented for that product.

There is also a **Multi-product History view** available. It will show all products rather than only the selected one. It must be set up in the Care/Settings/Instrument.

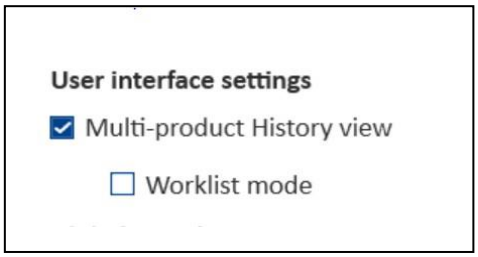

Fig. 20

Graph View

The **Graph** view (Fig. 21) gives a graphical presentation of the results for a specific product. Target, warning and action limits for each parameter can be defined in FossManager.

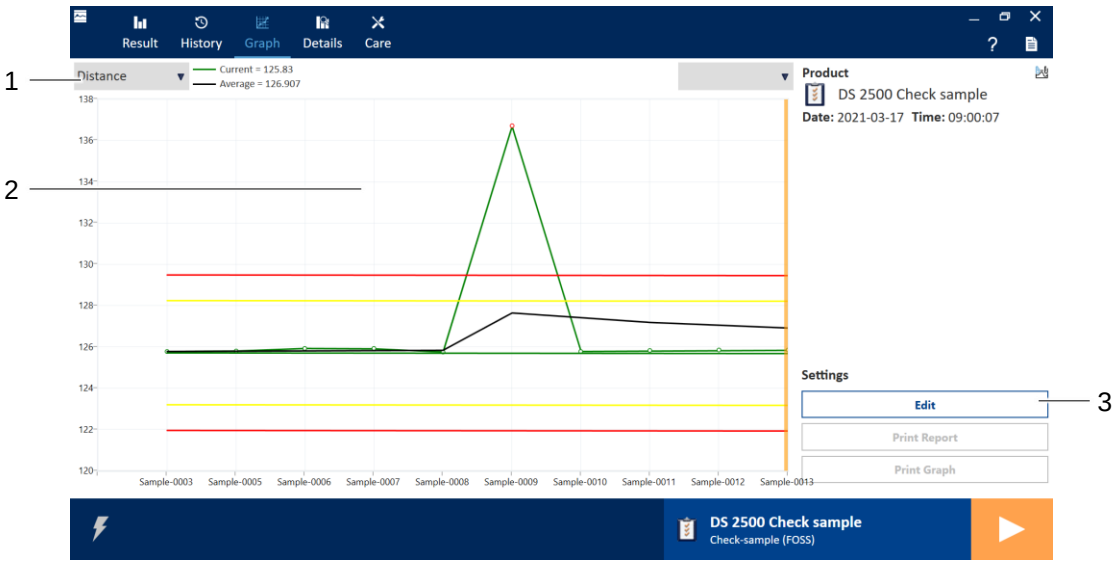

Fig. 21 Graph view

1 Parameter selector
2 Main graphs
3 Edit button

The two drop down lists above the displayed graph allow you to select the parameter or parameters to be displayed.

The **Edit** button in the lower right corner allows you to change the format of the graphs.

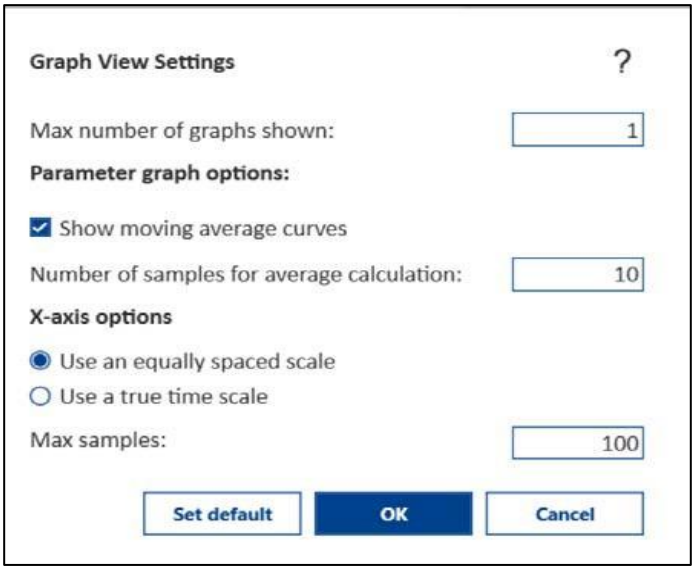

Fig. 22 Graph View Settings

Details

In the **Details** view (Fig. 23) extended information is obtained for a specific sample. It consists of five tabs.

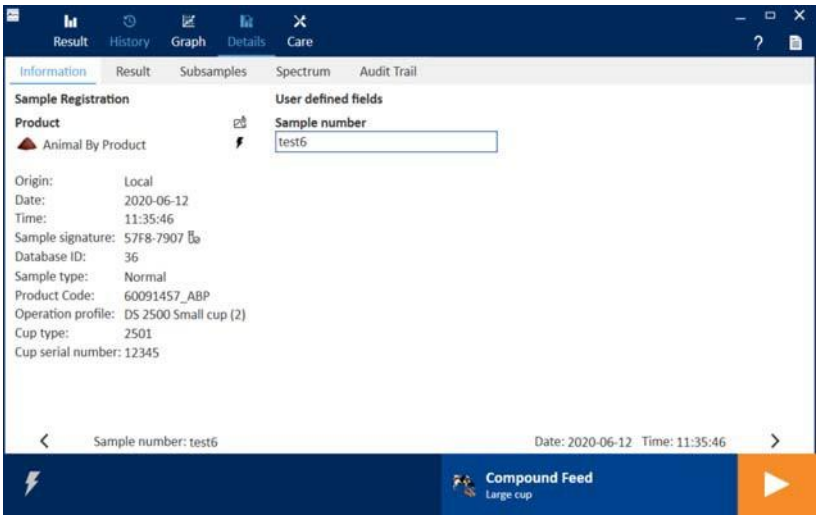

Fig. 23 The information tab in Details view

Information

All registrations linked to the sample by the user:

- Sample number
- Sample comments
- User-Defined Fields

Information about how and when the sample was analysed:

- Product
- Sample cup
- Operation profile
- Date and time

Result

Display of results and outliers.

Warnings and errors are indicated with yellow and red backgrounds.

Subsamples

Predictions per subsample, including min, max and standard deviation.

Spectrum

Graphical display of the absorbance spectrum (raw data).

Subsample spectra are displayed only if **Operation Profile** in FossManager is configured to store subsample spectra.

Audit Trail

The **Audit Trail** lists all relevant information on how the sample was analysed. It gives the user a traceable record of the circumstances under which the results were obtained.

Examples:

- Which prediction model and which version were used?
- What cup type and which operation profile were used?
- Was any Slope/Intercept applied?
- Which limits were used for outlier detection?

Report

The **Reports** function (pos. 6 in Fig. 12) enables printing and export of results according to predefined templates.

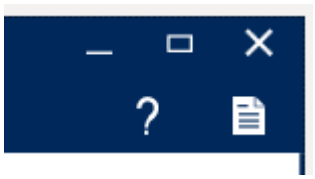

Fig. 24

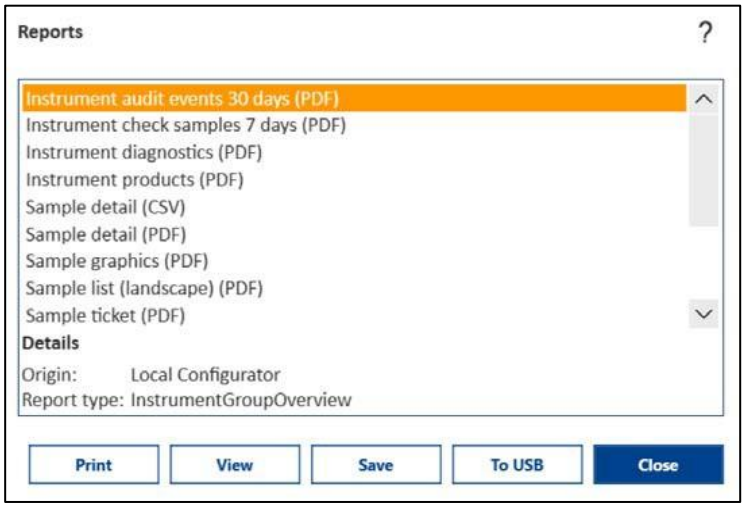

Fig. 25 Reports

Care

The Care menu (Fig. 26) is used for operations that are not related to routine analysis, such as shutting down the software or running instrument diagnostics. Usually only five buttons are available, but more buttons can be displayed by clicking **Show Advanced Settings**. See the chapter 4 Operating Instructions for more information.

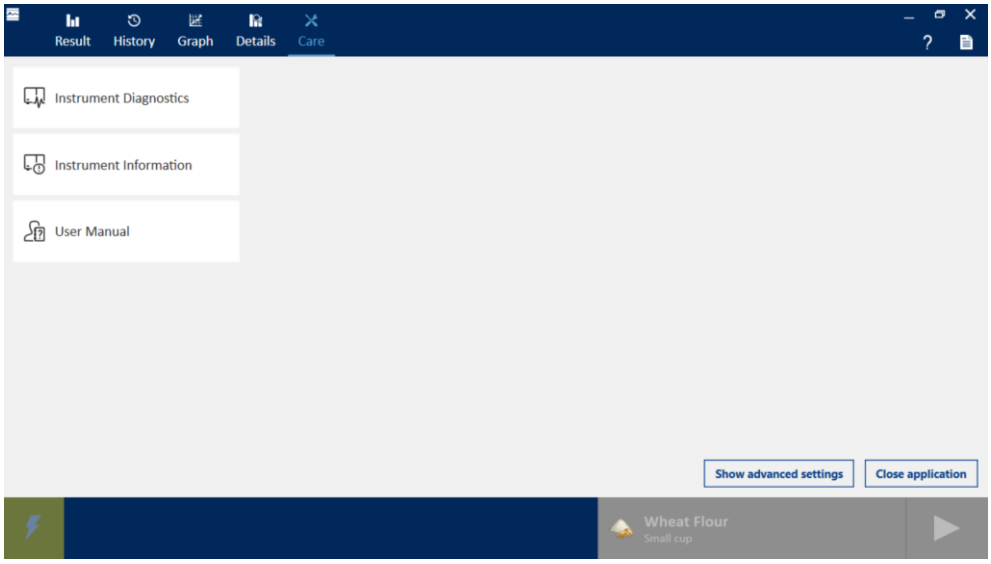

Fig. 26 Care

3 Installation

3.1 Site Preparation

A Site Preparation Check List is available from your FOSS representative. This document describes the necessary arrangements to be carried out or tested prior to installation. If this has not been done in advance the check list items should be considered during installation to ensure that the instrument is installed properly. This Check list also contains the PC requirements for the ISIscan Nova installation.

3.2 Unpacking and Checking

Unpack the instrument and its accessories with care. Save all packing material for later use. Use the packing list provided with the instrument to check that all parts are included.

An Installation Report is included with the accompanying documentation. Please answer the questions in the Installation Report and return it to FOSS in the enclosed postage paid envelope. If anything is damaged/missing or if you have any questions, please contact your FOSS representative.

3.3 Lifting and Placement of the Instrument

⚠ Warning

The instrument weighs 27 kg and must be lifted and carried by two people.

Place the instrument on the workbench. The workbench should be as free from vibrations as possible. Heavy vibrations can affect the analysis results.

⚠ Caution

The air circulation around the instrument must not be inhibited. Leave uncovered with sufficient space for air circulation at all times.

3.4 Software Installation

Installation of the Software is described in a separate Installation manual which comes together with the software itself.

New Software updates can be distributed via FossManager Network. This will be done during a synchronisation with the FossConnect server and the operator will be informed that there is a software update available. See section 4.4.5.

3.5 PC Connection

Connect the instrument to the PC in a way that is suitable for the current installation.

Direct Instrument to PC

This setup requires two network connectors on the PC if it also needs to be connected to a network (e.g., internet connection for FossManager Network synchronisation).

For a Local setup (using Local Configurator) only one network connection is needed.

A WiFi connection could be used for connecting PC to the internet (but not for connecting to the instrument).

Use the enclosed network cable for connecting the instrument to a PC.

We recommend that the WiFi be turned off during the first connection; it can be turned on again as soon as the connection is established.

Via Local Area Network

Connect the instrument to a LAN with the enclosed network cable and connect the PC to the same LAN with a standard network cable (not included with instrument).

Since ISIscan Nova can see other instruments connected to the same LAN it is important that the correct instrument serial number be entered (when prompted) the first time that ISIscan Nova is started.

If the LAN is connected to the internet, no other connections are needed to synchronise with the FossConnect server.

Via Switch / Network Hub

Connect the instrument to the switch/hub with the enclosed network cable and connect the PC to the same switch/hub with a standard network cable (not included with the instrument).

Since ISIscan Nova can see other instruments connected to the same switch/hub it is important that the correct instrument serial number be entered (when prompted) the first time ISIscan Nova is started.

If the LAN is connected to the internet, no other connections are needed to synchronise with FossConnect server.

4 Operating Instructions

4.1 Start-up

1. Switch on instrument.

   Wait for the orange front-LED to come on. If the lid was closed when instrument was switched on, the lid will at this point also open automatically.

2. Start ISIscan Nova software on PC.

   The software will automatically find the instrument and establish contact.

   Note: At the first installation the serial number of the instrument needs to be entered.

3. When ISIscan Nova starts up, it will automatically initiate the Instrument Diagnostic test.

   The automatic test above will not be initiated if an Instrument Diagnostic test already has been passed earlier the same day.

   If the instrument and ISIscan Nova are left switched on overnight, the Instrument Diagnostic test is started from the **Care / Instrument Diagnostics.**

   It is also possible to use the **Scheduled Diagnostics** feature and then it will be done automatically at the set time.

   It is also possible to use the **Smart Start** option to automatically start the instrument and have it to run a diagnostic.

4.2 Analysis Procedure

4.2.1 Sample Preparation

Grinding a sample prior to analysis gives two advantages:

- The sample analysed will be more representative to the whole due to the mixing that is obtained during grinding.
- The possible errors that can be obtained when filling the cup will be decreased due to the homogeneity of the sample.

When analysing samples in the in the form of pellets or samples having a wide range of particle sizes, be careful to avoid segregation of small and large particles when filling the cup.

4.2.2 Analysing a Sample

1. Choose the appropriate cup for the sample. Carefully prepare your sample and fill the sample cup completely. Sample types that tend to form voids if simply poured in should be compressed using the back of a spoon.
2. Place the filled sample cup in the sample compartment and close the lid.

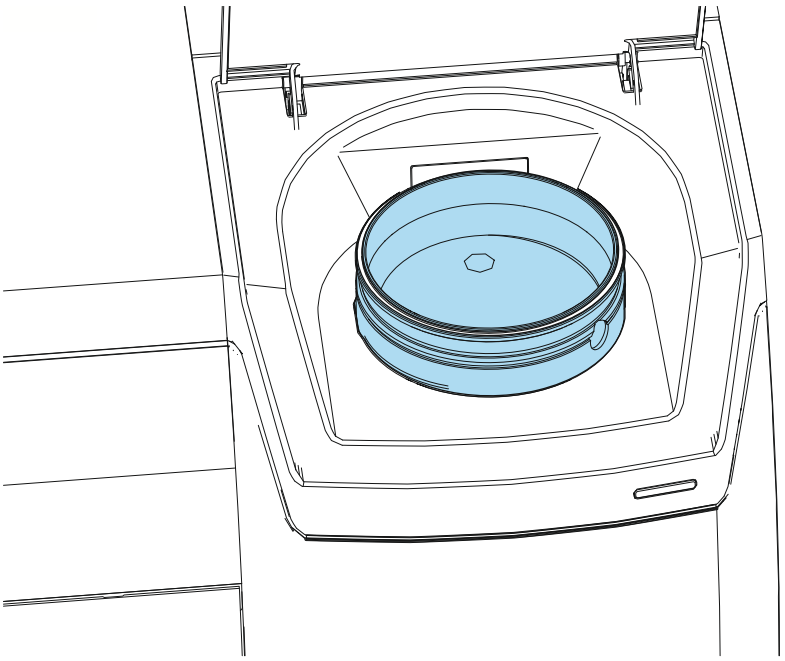

Fig. 27

3. Click the **Product** icon and select the product you would like to analyse.

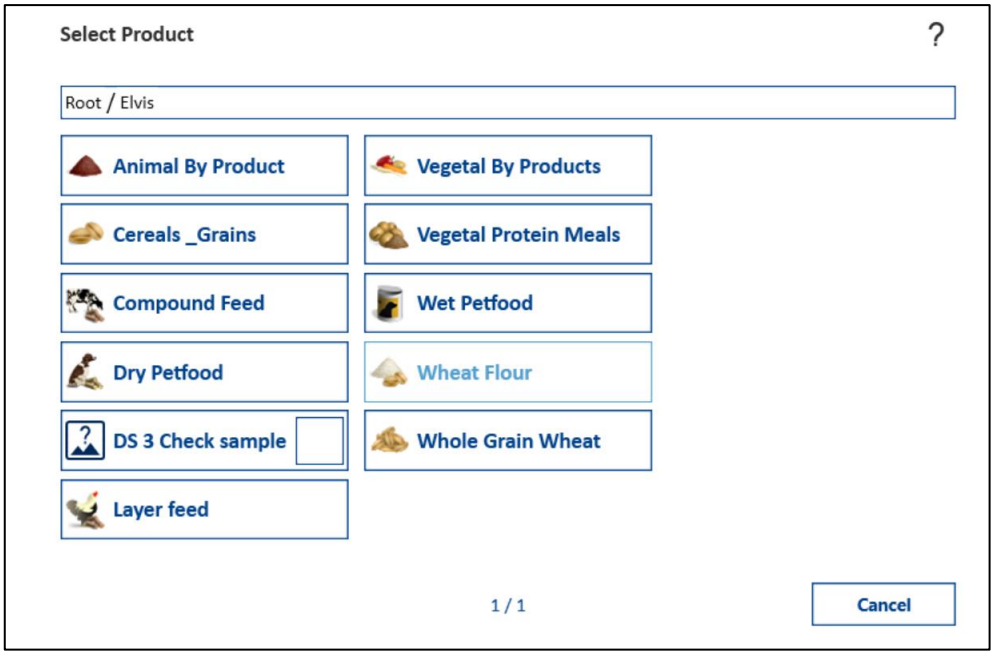

Fig. 28

Products are installed and configured in FossManager (please refer to the Installation Manual for details).

4. Select a product and place the filled sample cup in position.

   The specific cup to use with the product can be selected together with the product name in FossManager under **Operation Profiles**. Here, the cup type indication can also be enabled/disabled.

Fig. 29 Cup type = "Large cup"

5. Enter sample information in the **Sample Registration** dialogue and click **OK**.

   Sample detail fields and User defined fields can be configured in FossManager where they can be enabled or disabled and set to be optional or mandatory.

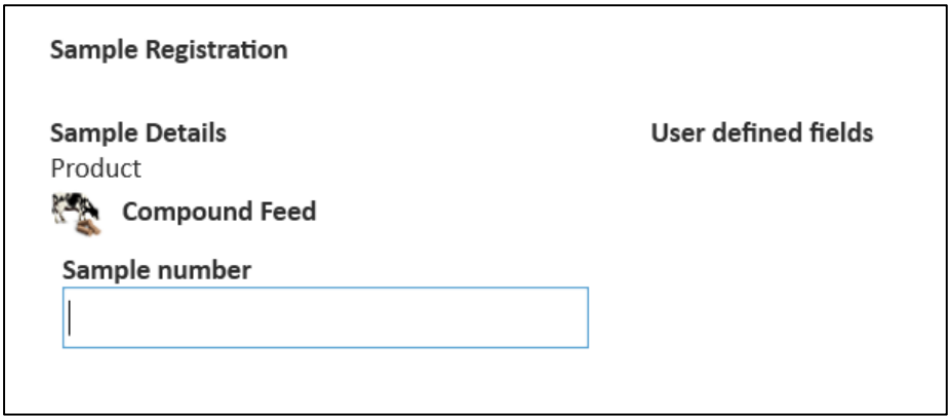

Fig. 30 Sample Registration window

6. Click the **Start** button to initiate the analysis.
7. The results are presented in the **Result** view. They can be printed and/or saved from the **Reports** dialogue.

   Configuration of manual reports to be available is done in FossManager under **Instrument Settings** and **Operation Profile**.

   For setting up automatic reporting or LIMS transfer, please refer to the Automatic sample transfer wizard in the care view.

   Note: You have to be in either the Result view, History view or Graph view to start an analysis. Analysis cannot be started from the Care view.

4.2.3 Multi-cup Analysis

For some sample types it is desired to split a larger sample volume into subsamples and report the results as the average of these subsamples. This is supported via the multi-cup analysis.

Normal operation uses sub samples as part of samples in one cup.

In the **Operation Profiles** in FossManager you can set the number of cups ('repetitions') for the product in question. In ISIscan Nova this is shown along with the product name.

Fig. 31 Multi-cup analysis (three cups of the type "Large cup")

Click the **Start** button to run the first cup and wait for a message before you continue with the next cup/sample. After scanning all cups, the results are presented as the average of all cups. Results of the individual cups are not presented.

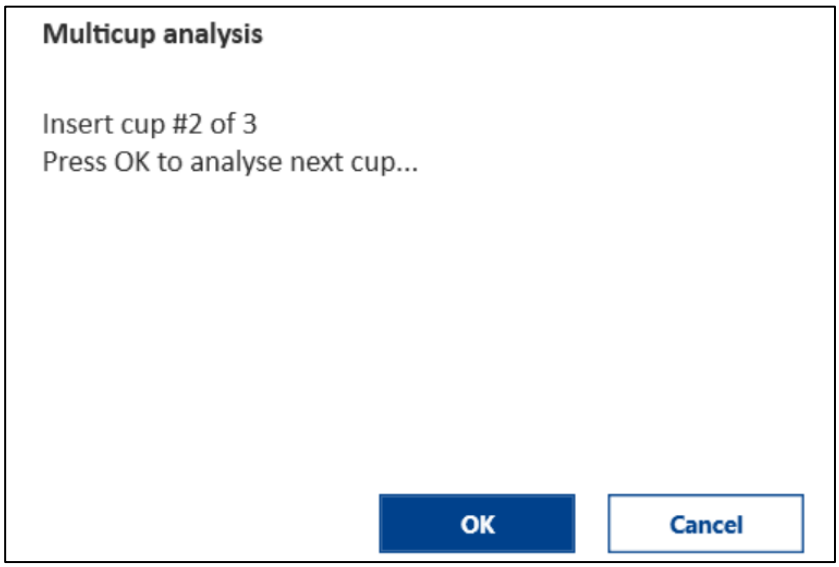

Fig. 32

4.2.4 Turning off the Analyser and Software

The instrument and PC can stay turned on between analyses and overnight without any problems. FOSS recommends turning it off over longer idle periods, e.g., over a weekend or during holidays.

The **Smart Start** option can also be used to reduce power consumption and save the instrument; both the PC and instrument need to be turned on. The instrument will go into sleep mode.

It is also recommended to turn off or reboot the PC at regular intervals to avoid problems from the build-up of temporary log files and redundant memory. (How

frequently a reboot is needed depends on the PC, but leaving it on for months is not recommended.)

The instrument and ISIscan Nova software are turned on and off separately. Shutting down the software will not turn off the instrument or the lamp inside it.

To turn off the analyser:

1. Go to the **Care** view.
2. Click **Close application**.
3. Click **OK** to shut down the software.
4. The power to the instrument and the lamp will still be on. To completely turn off the instrument, shut off the power with the on/off switch on the rear panel.

4.3 Care - Default Features

The **Care** view contains features not related to routine analysis. By default, five buttons are visible.

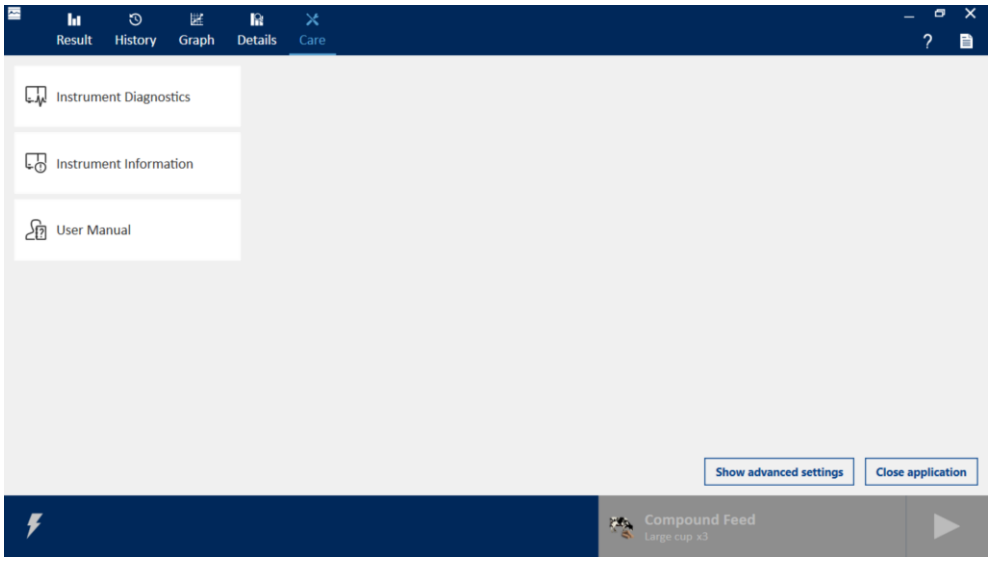

Fig. 33 Care menu - default features

4.3.1 Instrument Diagnostics

Fig. 34

Running Instrument Diagnostics will carry out the same tests and with the same test limits as during the start-up test. The outcome of the Instrument Diagnostics will be displayed as passed or failed on the screen.

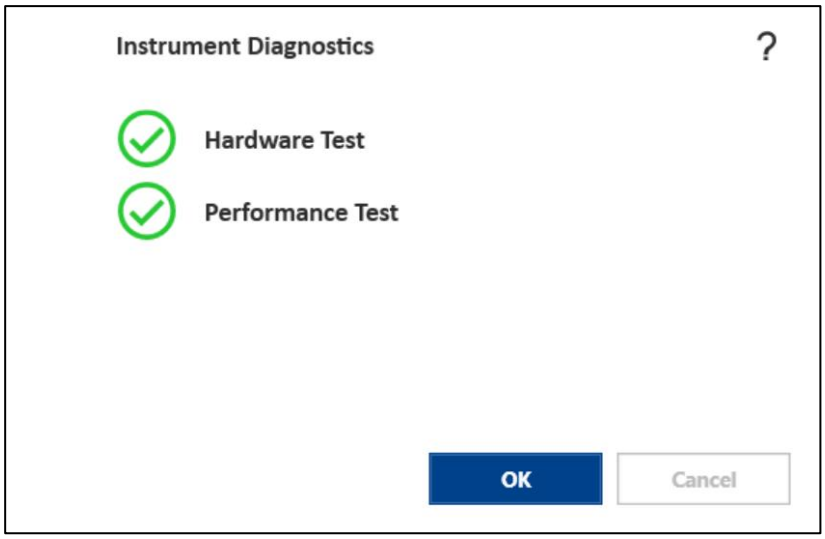

Fig. 35 Instrument diagnostics passed

A detailed test report can be viewed via **Reports**. Select the "Instrument diagnostic (PDF)" report and decide if you want to view it, save it or print it.

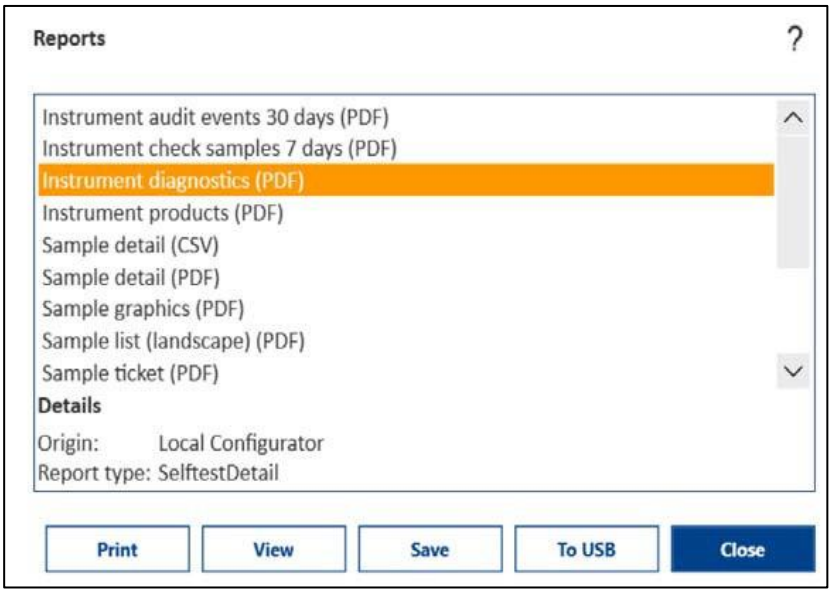

Fig. 36

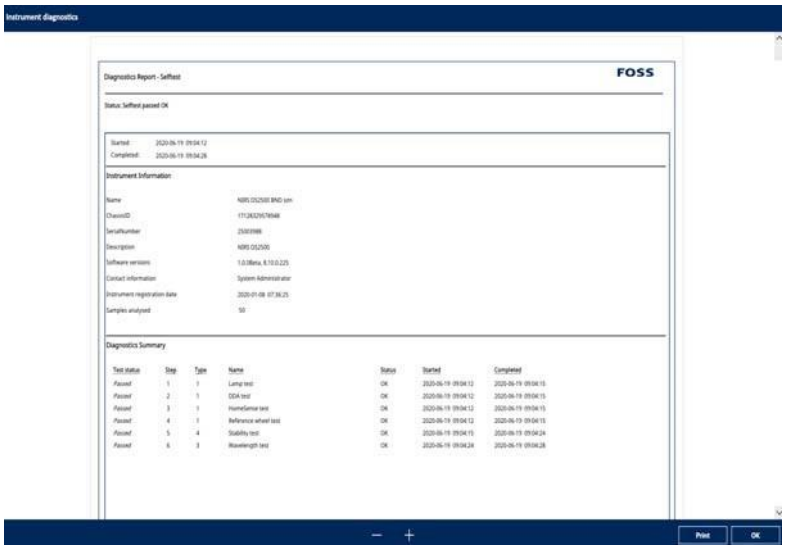

Fig. 37 Example of an Instrument diagnostics report

All test reports are stored in FossManager and can be viewed there.

4.3.2 Instrument Information

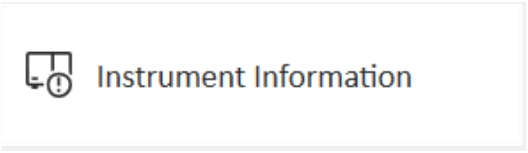

Fig. 38

Instrument Information contains the serial number, software versions, IP-address etc.

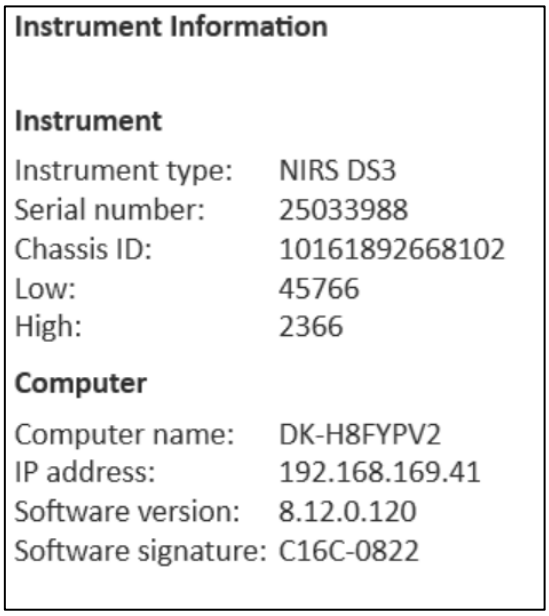

Fig. 39

If you need to report a problem it is recommended that you include this information when you contact a FOSS representative.

4.3.3 User Manual

Press User Manual to get access to this user manual directly on the screen in ISIscan Nova.

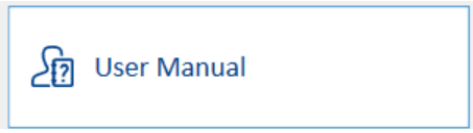

Fig. 40

4.3.4 Close Application

Click Close Application to shut down the software.

Fig. 41

Note: The power to the instrument and the lamp will still be on. To completely turn off the instrument, shut off the power with the on/off switch on the rear panel.

4.3.5 Show Advanced Settings

If you click **Show Advanced Settings** in the **Care** view, more options will appear. See the next section.

Fig. 42

4.4 Care View - Advanced Settings

If advanced settings is selected, the **Care** view is expanded and twelve more features appear. At the same time the button **Show Advanced Settings** changes to **Hide Advanced Settings.**

The system can be set to require a PIN code to access the advanced settings.

Fig. 43

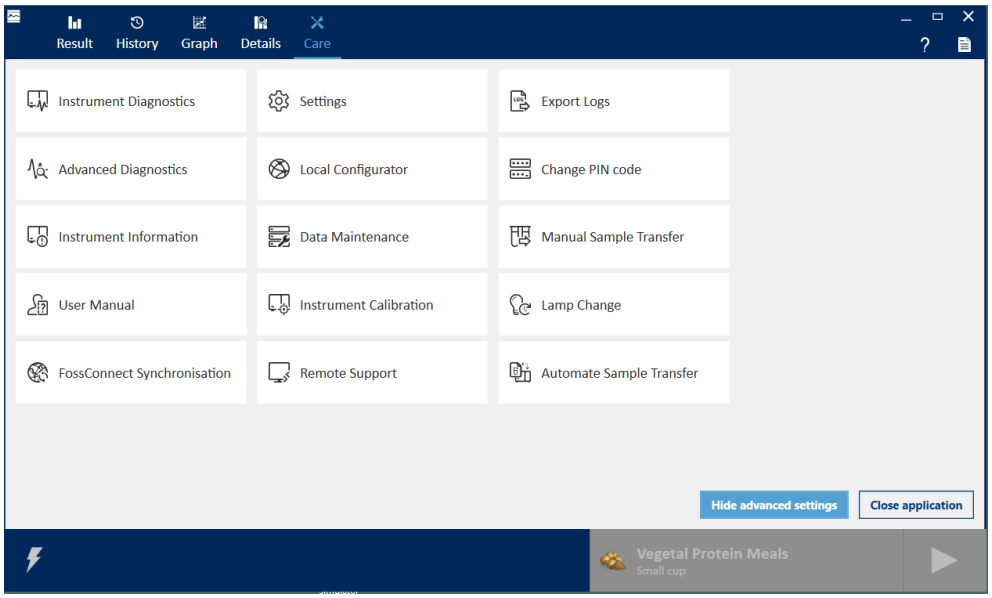

Fig. 44 Care View - Advanced Settings

4.4.1 Instrument Diagnostics

See section 4.3.1 Instrument Diagnostics.

4.4.2 Advanced Diagnostics

The Advanced Diagnostic feature will make it possible to run specific tests on important modules in the system. This is helpful for trouble shooting and is only required if the normal Instrument Diagnostic fails or there are random errors that are not caught by the instrument diagnostics.

These tests will operate the modules so better information can be acquired. This information is also sent up to FossManager and LinkDiagnostic if they are activated.

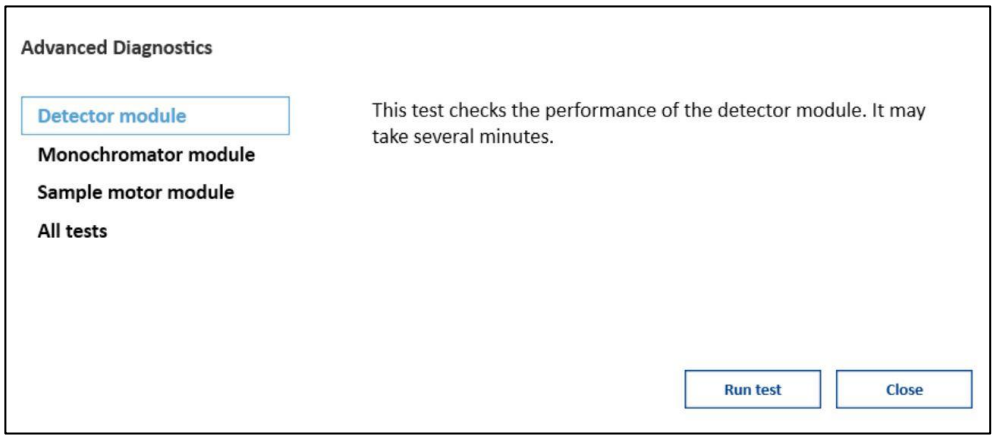

Fig. 45

4.4.3 Instrument Information

See section 4.3.2 Instrument Information.

4.4.4 User Manual

See section 4.3.3 User Manual.

4.4.5 FossConnect Synchronisation

The **FossConnect Synchronisation** window gives an overview of the latest synchronisations where the instrument has exchanged data with the server.

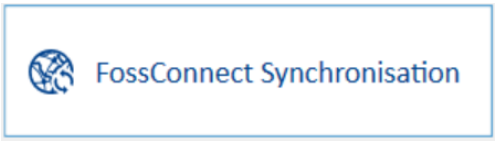

Fig. 46

To view the content of a session, select it and click **View Log**.

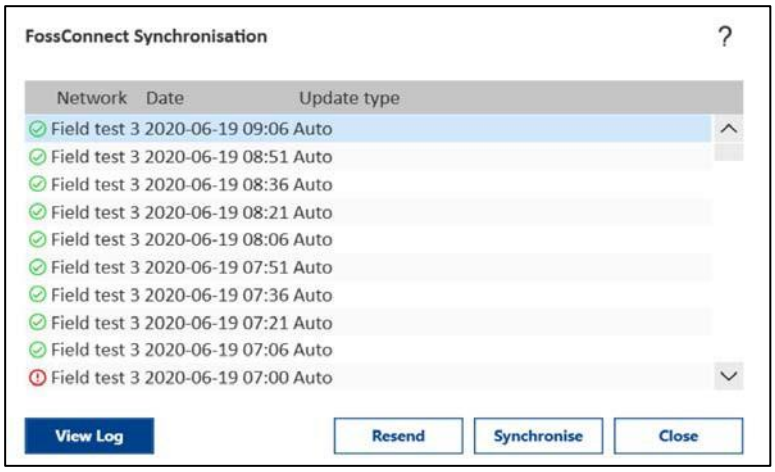

Fig. 47 FossConnect Synchronisation window

This opens the **View Log** dialogue. This shows what was done during the last session.

Click **Synchronise** to perform a manual synchronisation which will upload all relevant data to the FossConnect server, download all available updates from the FossConnect server and automatically activate the updates on the local instrument.

Automatic Synchronisations are performed at certain intervals (using settings in FossManager) and they will upload all relevant data to the FossConnect Server.

Automatic updates are performed at certain intervals (using settings in FossManager) and they will download all available updates from the FossConnect server. These updates will not be installed automatically, but the operator is alerted that new updates are available and is given the options **Upgrade now** or **Snooze**.

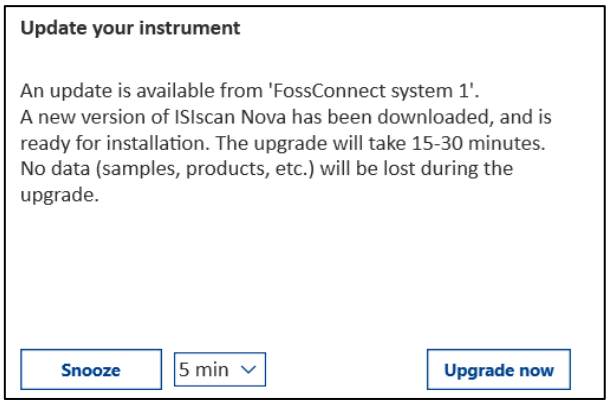

Fig. 48

If an updated version of ISIscan Nova is distributed from FossManager, a message will be displayed.

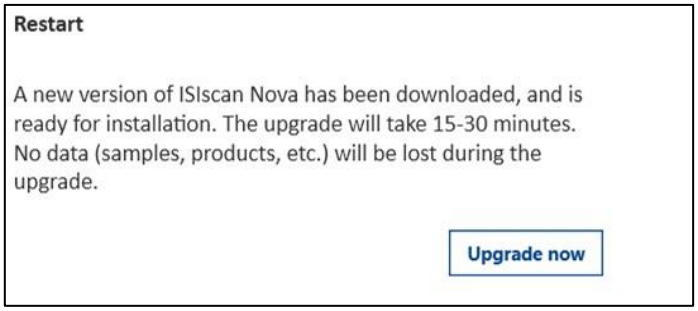

Fig. 49

Follow the on-screen instructions. After the upgrade is completed, ISIscan Nova requires a restart.

4.4.6 Settings

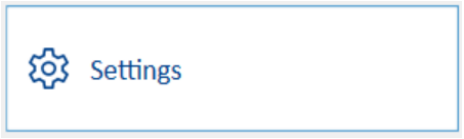

Fig. 50

The **Settings** dialogue is to be used to:

- Set FossConnect server connection
- Import products and licenses
- Specify export paths for storing export reports.
- Specify printer options
- Set automatic backup of database
- Instruments settings
- Schedule Diagnostics and Smart Start

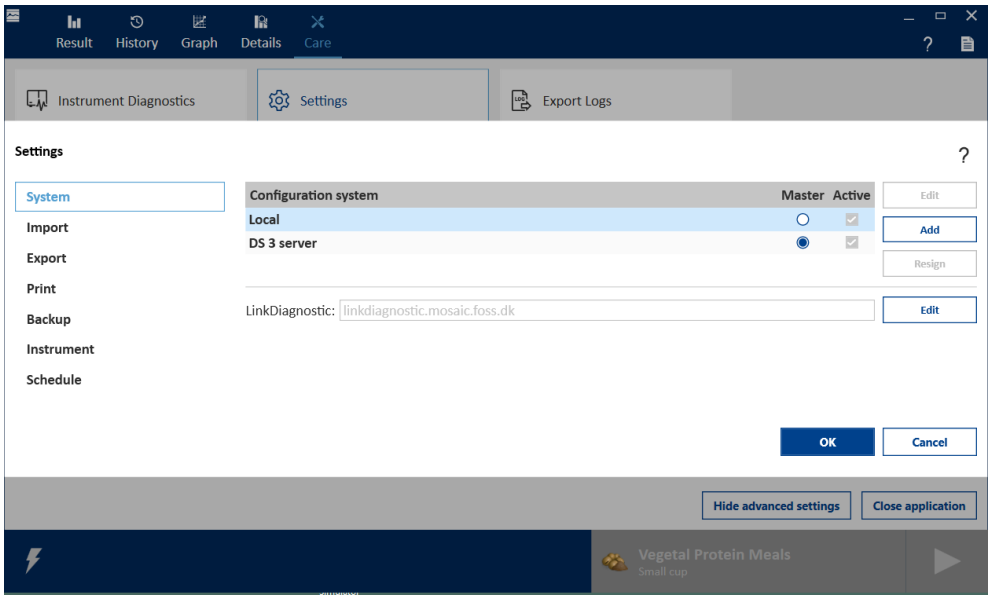

Fig. 51

FossConnect Configuration

Local Configurator is installed by default for configuration and management of local products and calibrations.

1. Click **Add** to add and configure one or multiple FossManager network connection(s).

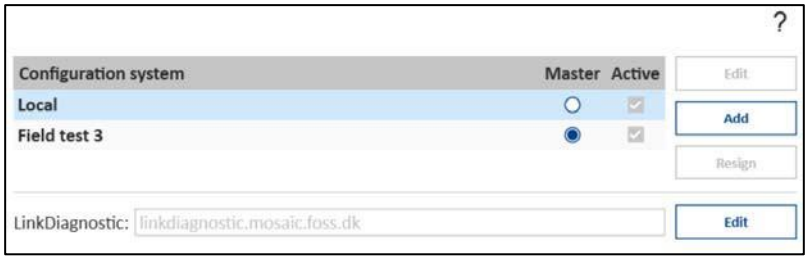

Fig. 52

2. Fill in the fields in the **Network properties** dialogue.
3. Click **Test Connection** to test and verify if a connection to the FossConnect server can be established.

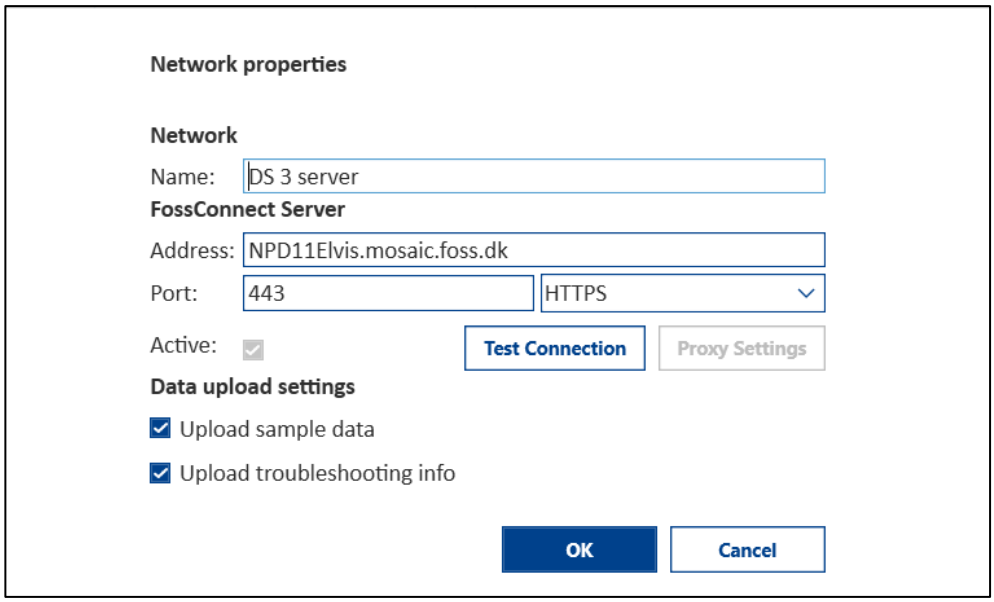

Fig. 53

If the correct address and port number is entered and the internet connection is OK, the following message is displayed:

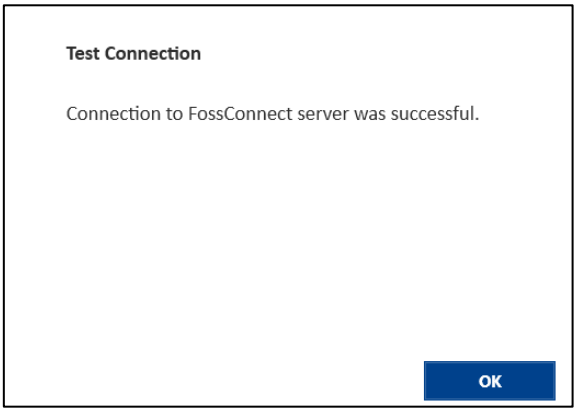

Fig. 54

4. Click **OK** to close it.
5. Click **OK** once again to save the FossConnect connection.

If an incorrect address or port number is entered or the internet connection does not allow the instrument to contact the server, an error message will appear.

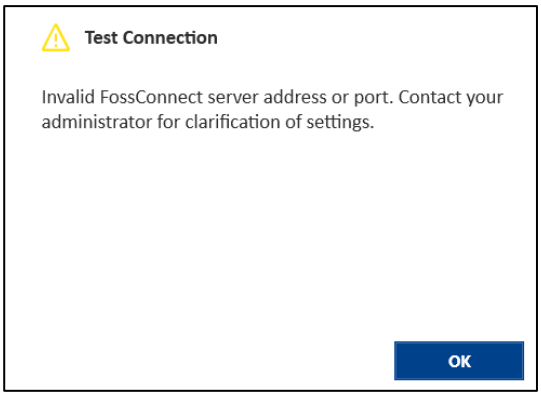

Fig. 55 Example of Communication error

Failure to connect to the FossConnect Network server could be due to a number of reasons, e.g., internet unavailability, firewalls in local IT-systems, blocked IP-address ranges and port number in local Networks, etc. Contact the IT support team for the installation site in question (or a person with similar responsibilities and knowledge about the local IT system).

Also, check the time and date settings on the local PC. If the time differs too much between the local PC and the FossConnect server, it will not allow you to connect.

LinkDiagnostic is a special FossConnect server only used for trouble shooting and backup of QA samples. It is pre-filled and it is only necessary to tick the **Active** box (which can be found on **Network** properties dialogue when clicking the **Edit** button).

Import

On the **Import** tab you can import a pre-made FossManager configuration file (*.mcf), with prediction models, parameter profiles, products, etc., as well as licenses for both prediction models and software features.

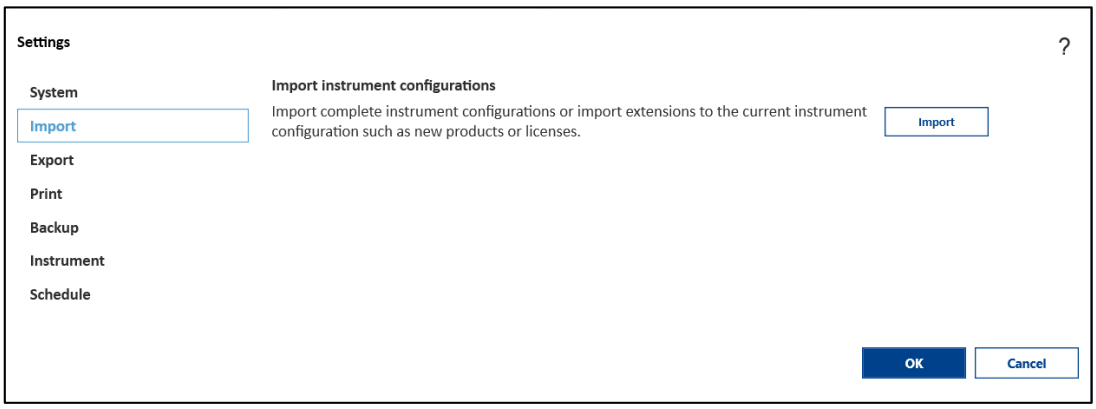

Fig. 56

For more options use the Local Configurator, where you can create new or edit existing configurations.

ISIscan Nova Auto Export

Nova has an Auto Export feature that can generate a file with sample data right after the measurement is completed. There are a number of settings that control the feature in Nova.

Automate Sample Transfer in the Care view is a wizard that helps to set this up.

Operation profile and Instrument settings must be set to Auto export for this to work.

Export can also be set up manually following the instructions below.

Instrument Settings in FossManager for Export

These are defined per instrument in the setting group named **Automatic export and print formats**.

This setting group defines the export format. The same format is used for all samples/products on this instrument. Another instrument using the same product(s) may have other formats configured.

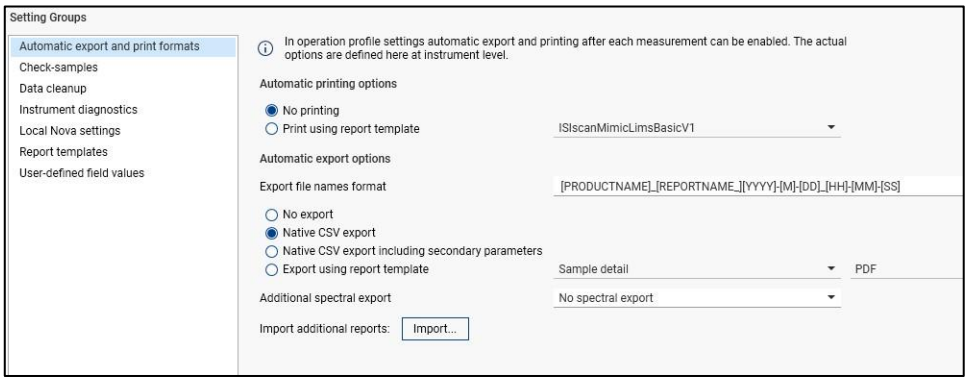

Fig. 57

Shown above are four options for Auto Export:

- **No export:** There is no export from this instrument.
- **Native CSV export:** Nova will export sample data in a standard .CSV format that cannot be customised.
- **Native CSV export incl. sec. parameters:** The same as above, but also including secondary parameters, e.g., GH, NH.
- **Export using report template:** The content is defined by a Crystal Report template with additional selection of file format (.CSV, .PDF, etc.)

The selected report template does not have to be included in the setting group named 'Report templates'.

In addition there is an option to export the spectrum for each sample to a .NIR file. This is independent of the other Auto Export.

In case of an instrument configured for multiple networks (networks or stand-alone configuration), it is the master network that defines which set of instrument settings apply.

Operation Profile Settings in FossManager

On Operation Profile there is a setting group named **Automatic export and print** with two check boxes. See Fig. 58.

- **Auto Print:** Enable printing after each sample.

- **Auto Export:** Enable exporting after each sample. This setting allows some product results to be exported while other products will not be exported. This setting applies to **all instruments** using products that link to the operation profile.

Fig. 58

Note: Enabling 'Auto Export' is a necessary condition for the export to take place, but it is not sufficient.

Local Settings in Nova

In Nova Care view, Export tab, there are also options that affect the Auto Export feature. The Wizard **Automate sample transfer** can be used to set up both import and export of sample data.

- **Allow automatic export of reports:** If the Auto Export format for the instrument is configured to use a Crystal Report template, then this setting applies. It is enabled by default and can be used locally on the instrument to disable auto export using report templates. Note that this setting is also used when the report template is used to produce a .CSV file.
- **Turn off automatic export:** Tick the box to turn off automatic export of results.
- **Export paths:** It is possible to configure paths for four different kinds of export.

For convenience, these values settings can also be inspected in FossManager but cannot be changed in the setting group named **Local Nova settings**.

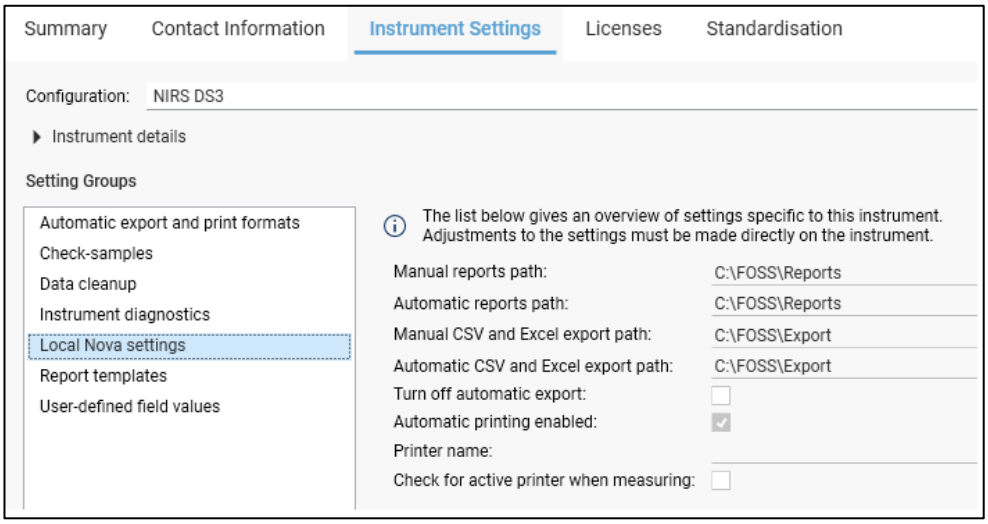

Fig. 59

To summarise, Nova will automatically export if all the following conditions are met:

- Export format is configured on the Master configuration system to either a native .CSV format or to use a valid report template.
- The product for the sample is linked to an operation profile with **Auto Export** enabled.
- The local setting in Nova is **Turn off automatic export.**
- The corresponding path is configured in Nova to a valid location.

If any one of these conditions is not fulfilled, auto export will not take place.

As soon as all conditions are met, auto export will start again from the next measurement.

Print

From the Print tab you can select a printer and the templates to be used when printing from the Result view, History view or Graph view ('Quick print reports').

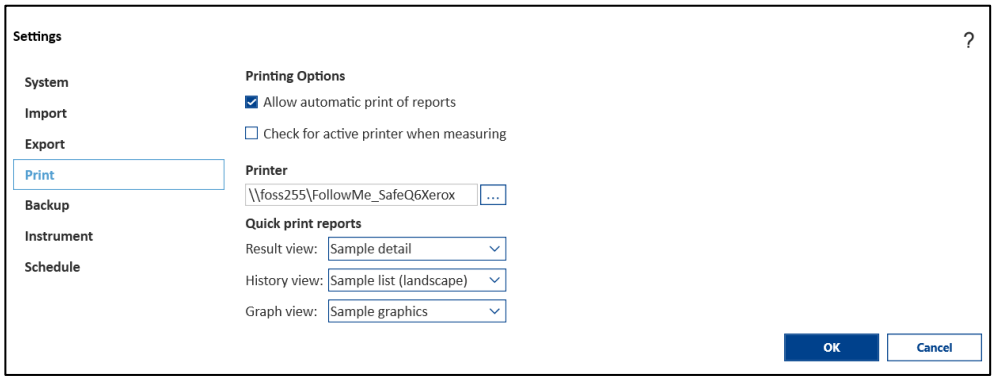

Fig. 60

When a printer and templates have been selected, a quick printing button becomes visible in the views for which you have selected a template.

Fig. 61

Backup

On the **Backup** tab you can:

- Enable auto backup of a database.
- Set the time and frequency for automatic backup.
- Set number of backups to keep before they are overwritten.
- Set destination path for the backup file(s).

Note that a pin code ('1234') is required in order to enable automatic backup.

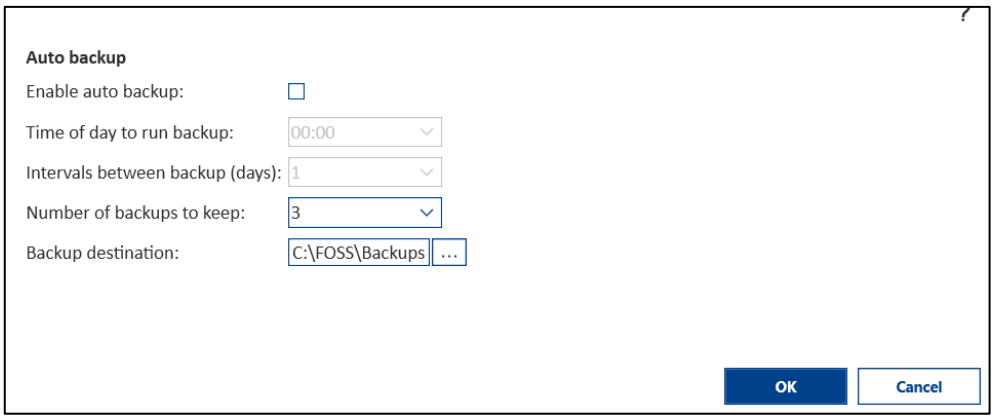

Fig. 62

With automatic backup enabled and the time and interval set, ISIscan Nova will automatically create a backup file on the specified location on the time/date in question. This is executed in the background and will not interfere with normal operation of the instrument.

Creating the database backup can take several minutes depending on its size.

When the specific number of backup files is reached, the next backup will overwrite the oldest file. If backup files need to be stored for longer times, they must be copied/ moved to another location.

Manual creation of database backup is described in section 4.4.3 below.

Note: If a USB or other types of external memory is used as destination for backup, ensure that there is enough free space. A single backup can be up to 10 GB. FOSS recommends a USB memory stick of minimum 16 GB.

Instrument

On the **Instrument** tab can you select:

- User interface settings
- Global sample counter

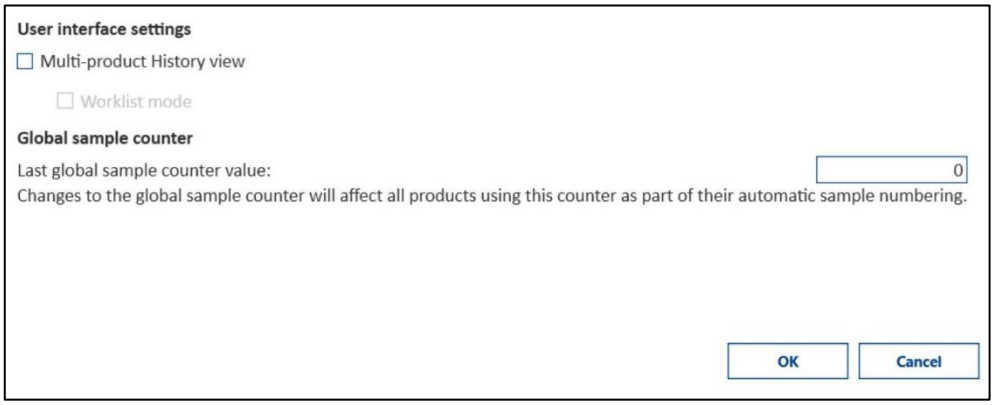

Fig. 63

Schedule

In the Schedule tab is it possible to configure:

- Smart Start
- Scheduled Diagnostic

Smart Start helps you to save energy and wear on the instrument.

It will automatically start the instrument and perform the instrument diagnostics so it is ready for use at the preferred time. It will also close down automatically.

The computer and instrument must still be on for this to work.

The Scheduled Diagnostics feature allows you to plan a diagnostics test to take place automatically at a specific time of day.

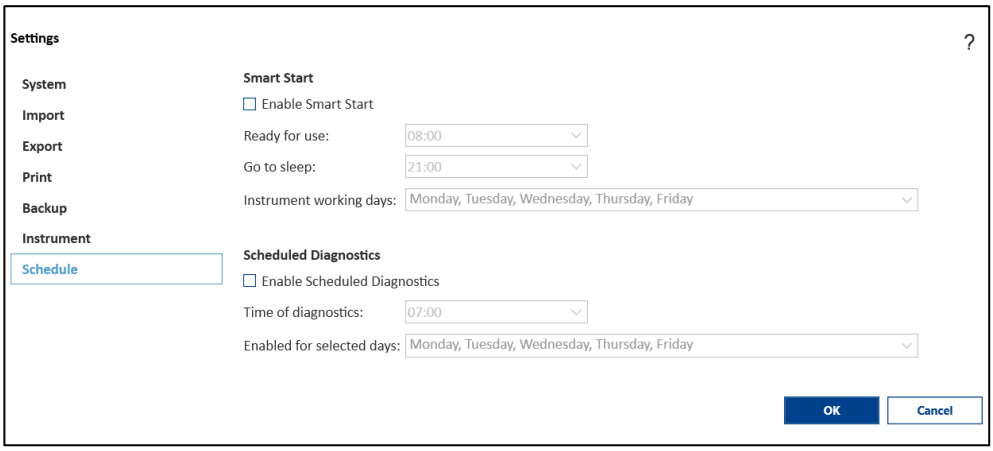

Fig. 64

Enable Schedule Diagnostics: When the feature is enabled, a diagnostics test will be performed at the configured time.

Time of diagnostics: Configure a suitable time for the diagnostics test. This could be in the morning before the workday begins or in a planned break during the day. If the Nova software is in progress with a measurement or if a dialogue is displayed on the screen at the time of diagnostics, the diagnostics test will wait until the current activity is completed.

Enabled for selected weekdays: Select the weekdays on which you want the diagnostics test to be performed. FOSS recommends that you schedule a diagnostics test for every day the instrument is in use.

4.4.7 Local Configurator

The Local Configurator is an external program that is used for configuring the local setup. A similar setup can also be done using the FossManager setup (network setup).

The Local Configurator is described in the Installation Manual.

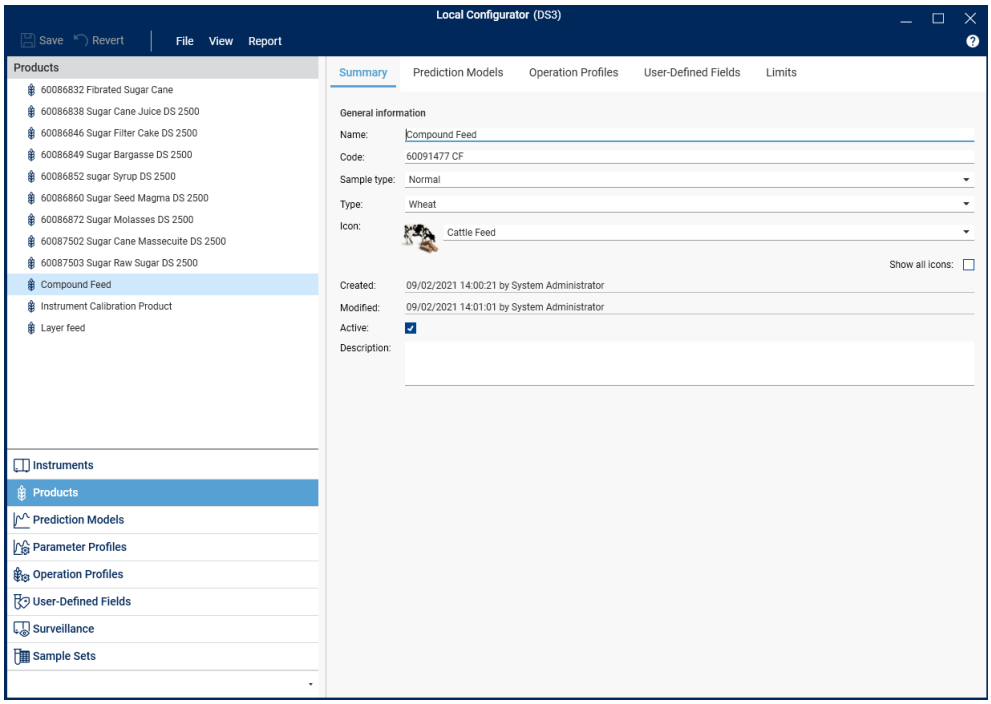

Fig. 65 Local configurator

4.4.8 Data Maintenance

The **Data Maintenance** dialogue is used to:

- Manually backup database (for automatic backup of database, see section 4.4.6)
- Restore an existing database backup

Fig. 66

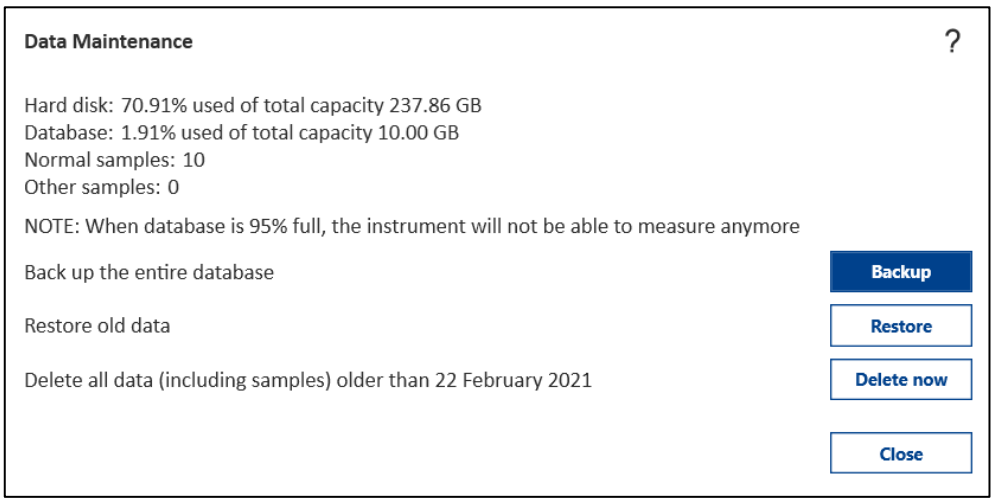

Fig. 67 Data Maintenance window

Backup

Running the backup creates a backup file which is named with the instrument serial number, software version, date and time.

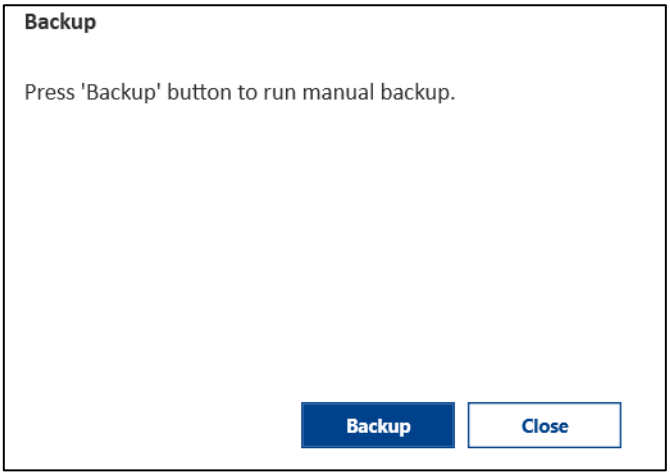

Fig. 68

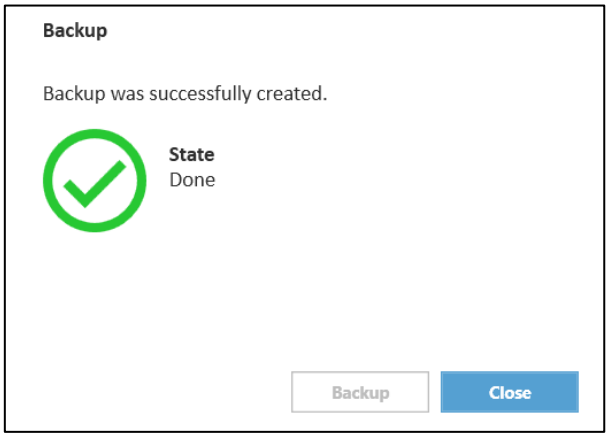

Fig. 69

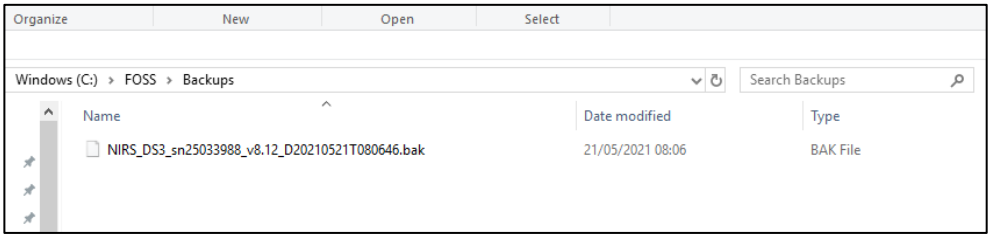

Fig. 70 Example of backup file

The path for storage of the backup files and the number of backup files to keep is set in Configuration/Backup (see section 4.4.6).

Restore

Restore will open a view where you are asked to browse to the backup file you want to restore.

1. Click **Restore**.

2. Enter the 4-digit code (default = '1234').

Fig. 71

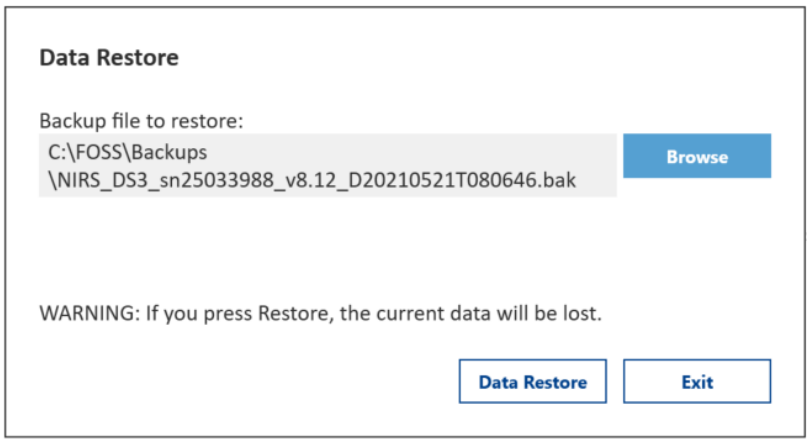

Fig. 72

3. Click **Yes** to continue.

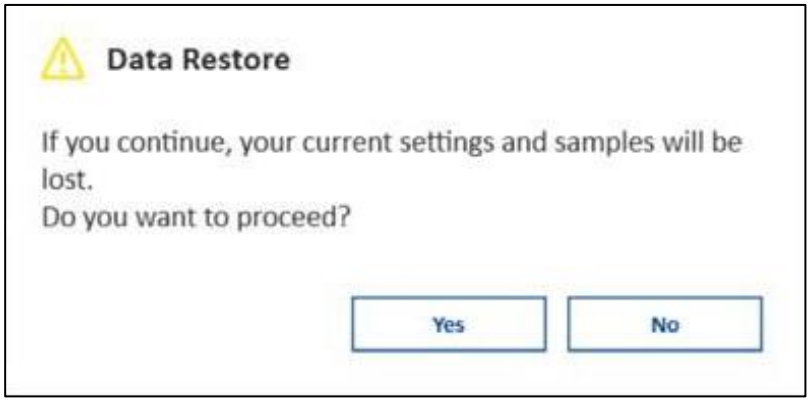

Fig. 73

Note: Restoring a database will erase all existing data and configurations from your ISIscan Nova installation.

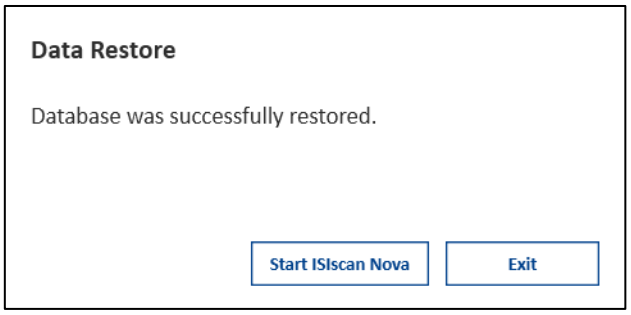

Fig. 74

Delete Now

Delete now is a function for manual deletion of samples older than the date specified in the text. This date is determined by settings in FossManager. (The default setting in FossManager is 'older than 60 days'.)

Clicking **Delete now** will prompt you for the PIN code '1234'.

Fig. 75

After this will you need to confirm the action to delete samples.

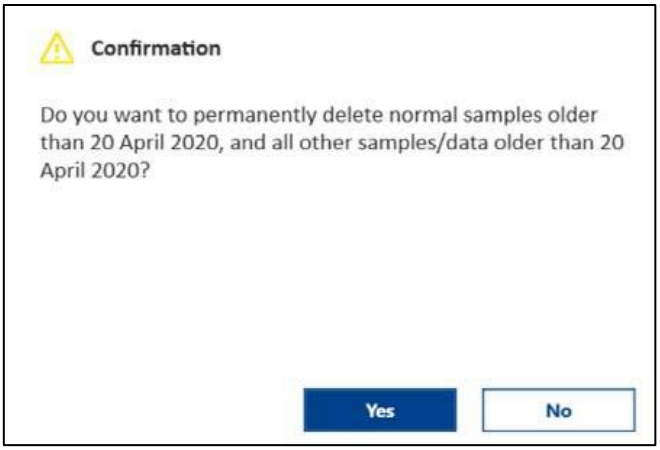

Fig. 76

4.4.9 Instrument Calibration

This section describes in short how to carry out the Instrument Calibration. For more detailed information about the instrument calibrations please see section 4.6 Instrument Calibration.

Fig. 77

Instrument Calibration consists of wavelength/bandpass calibration and intensity correction. This ensures that all instruments are calibrated to match each other and thereby enable a good transfer of calibration models between instruments.

For instrument calibration it is important that the instrument be thoroughly warmed up. it is recommended that the instrument be turned on for at least two hours before calibration.

For instrument calibration you need the ERC cup (for intensity correction) and matching USB key.

If instrument calibration is carried out with the external wavelength reference, you also need the EWC cup and matching USB key.

Note: This is usually only done by a trained FOSS service engineer.

USB Key

Along with the ERC and EWC cups come USB keys containing the calibration file for the specific cup. The file and the cup are matched by a serial number programmed into the RFID on the EWC/ERC cup. This USB keys must be connected to the PC during the entire calibration sequences.

1. Click **Instrument Calibration** button.
2. Enter the 4-digit pin code to get access. The code is '1234'.

Fig. 78

3. A typical instrument calibration is carried out with the internal wavelength filter, so the option **Use internal wavelength filter** should be selected.

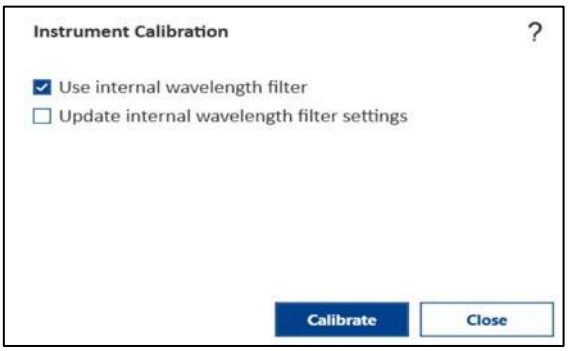

Fig. 79

If an external wavelength filter is used for instrument calibration, the option **Update internal wavelength filter settings** should be selected.

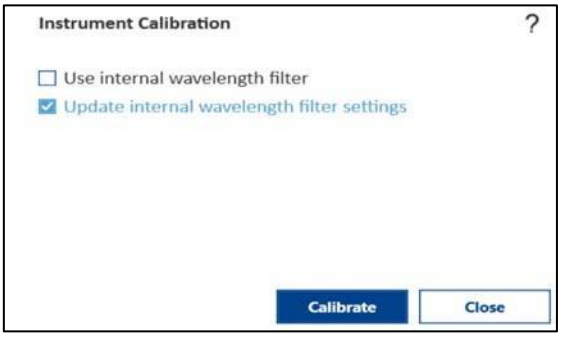

Fig. 80

4. Click the **Calibrate** button and place the ERC cup in the instrument and attach the USB key. If the USB is missing, the Software will ask for it later.

If the lid was not already closed, you will be asked to close it before the calibration starts.

Fig. 81

5. Follow the instructions on the screen and position cups and USB as requested.

The instrument calibration takes approximately five minutes and the message 'Calibration succeeded' is displayed when it is completed.

Remove the ERC cup (and EWC cup if used) and the matching USB and put it back into the box for safe storage until next instrument calibration.

Note: It is recommended that you make a safe backup of the USB key content in case the original USB key is lost. If the content of the original FOSS USB key is copied onto another USB, it is important that the new USB be renamed FOSSUSBKEY or the software will not recognise it as a proper USB key.

Missing Product - Message

For the Instrument Calibration the ISIscan Nova software requires a specific product to be configured. In Local Configurator this product is installed by default from installation, and in FossManager Network this product is set up by the administrator. If this product is not set up correctly you will receive this message:

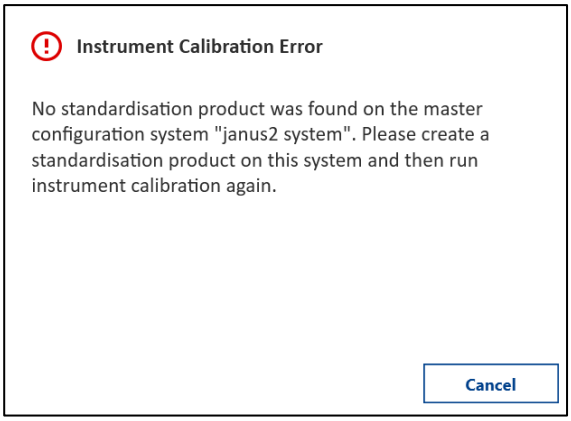

Fig. 82

Please verify that the standardisation product is set up correctly in FossManager (or contact your network administrator).

4.4.10 Remote Support

Click the Remote Support button to get remote support and start a TeamViewer session. Make sure that you have contact with a FOSS service engineer before doing this. An internet connection is required.

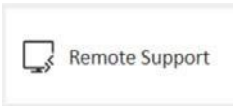

Fig. 83

4.4.11 Export Logs

Fig. 84

A command for collecting internal log files from ISIscan Nova and Local Configurator.

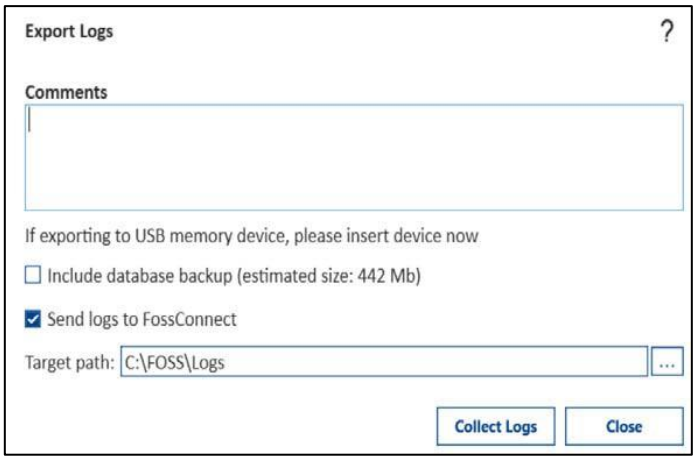

Fig. 85

Typically, these log files contain detailed, traceable information about the instrument's operation, but they do not contain any sample data or results. This command is used when log files are requested by your FOSS representative, e.g., for support issues.

4.4.12 Change PIN Code

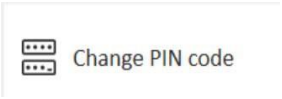

Fig. 86

The PIN code must contain four to six digits.

Please make sure that you store the new pin code in a safe place.

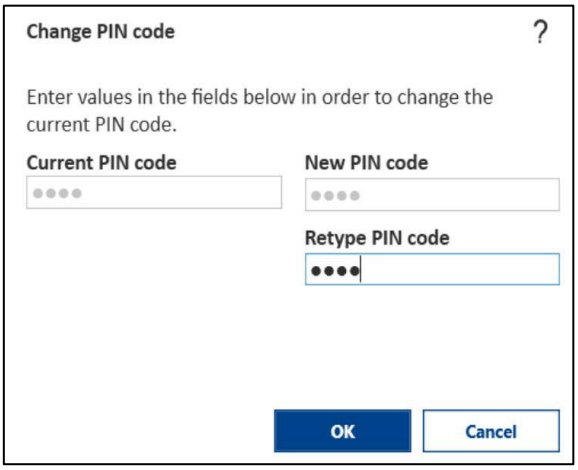

Fig. 87

4.4.13 Manual Sample Transfer

Manual Sample Transfer allows you to transfer samples from an instrument with a lost internet connection to a FossConnect server. Temporary solution when a connection has been lost. This is normally done automatically in the background.

Fig. 88

Follow the instructions on the screen.

Fig. 89

4.4.14 Lamp Change

The Lamp Change option is a help when replacing the lamp.

To access this option a PIN code must be entered. The default code is '1234'.

There is an option to reset a lamp counter so the system can warn you when there are 500 hours left of the expected lamp lifetime.

Here is also so you can change the type of lamp that is installed in the instrument,

either the normal 35 W lamp or the 50 W long-life lamp.

Note: There is a video on the FOSS YouTube channel on how to change the lamp.

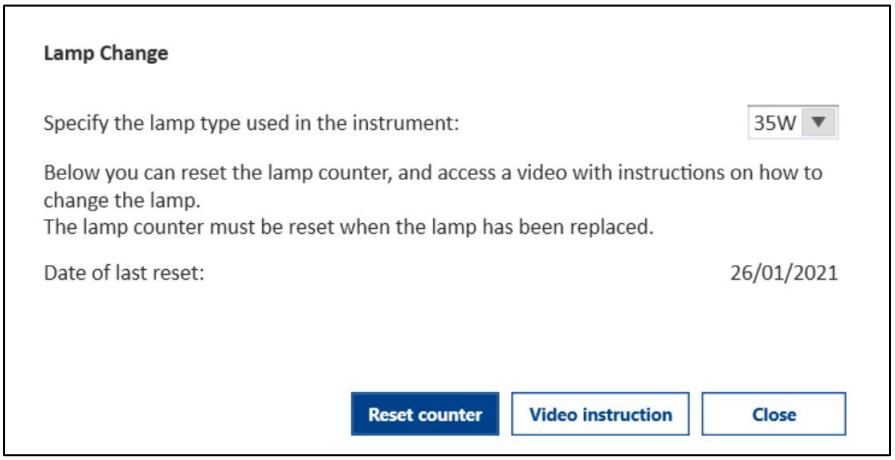

Fig. 90

Loosen the lamp by turning the lamp holder counter clockwise as shown in Fig. 91.

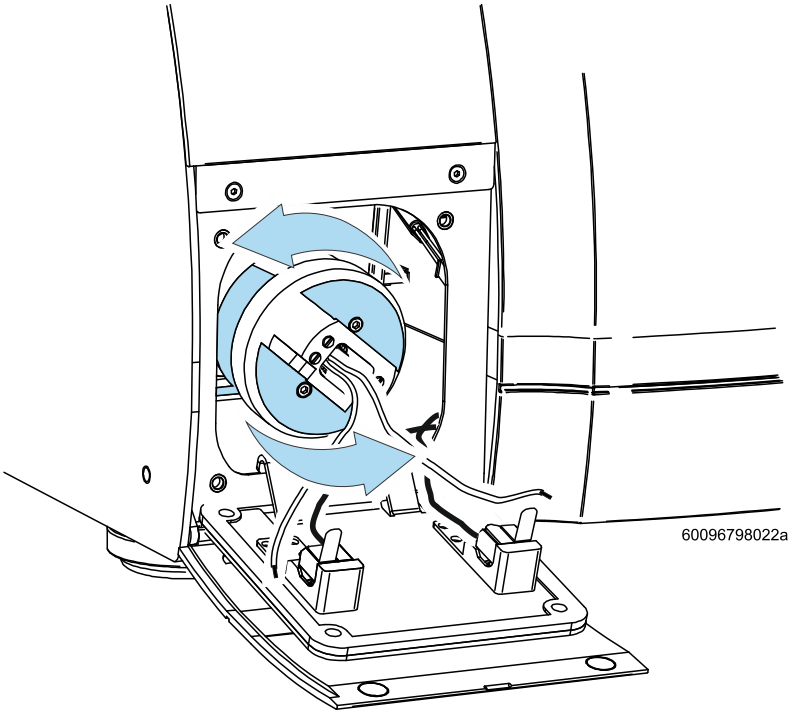

Fig. 91

See also section 5.3 Lamp Replacement for more detailed instructions.

4.4.15 Automate Sample Transfer

This is a wizard that helps to set up Export and/or Import of sample data.

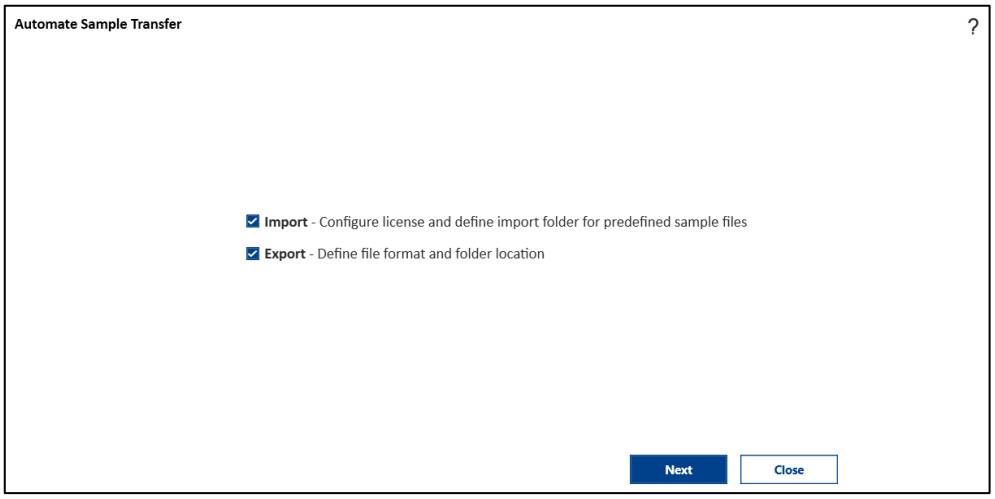

Fig. 92 Automate sample transfer

Tick the appropriate box for setting up import or export or both.

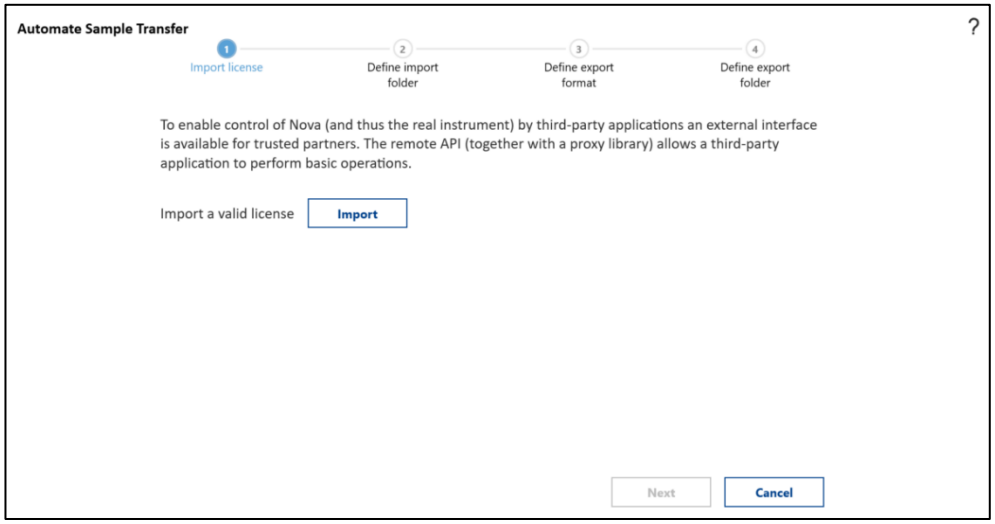

Fig. 93 Import License

To use the import function is a license required, this will activate the import function. Imported samples will show up in the history view or be analysed automatically depending on the settings in the import file.

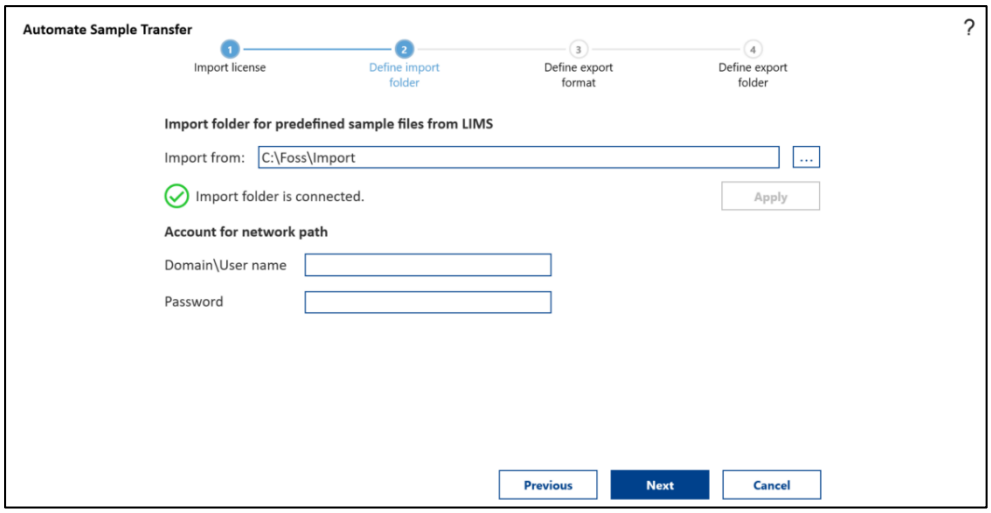

Fig. 94 Define import folder

Next step is to select a folder for the files to be imported.

If a network folder is used can an additional user name and password be added, if the log in used on the PC have access is this not required.

Export needs to be set up in Operational Profiles and Instrument settings in Local Configurator or FossManager. The selected Master will be the one used for the export settings here.

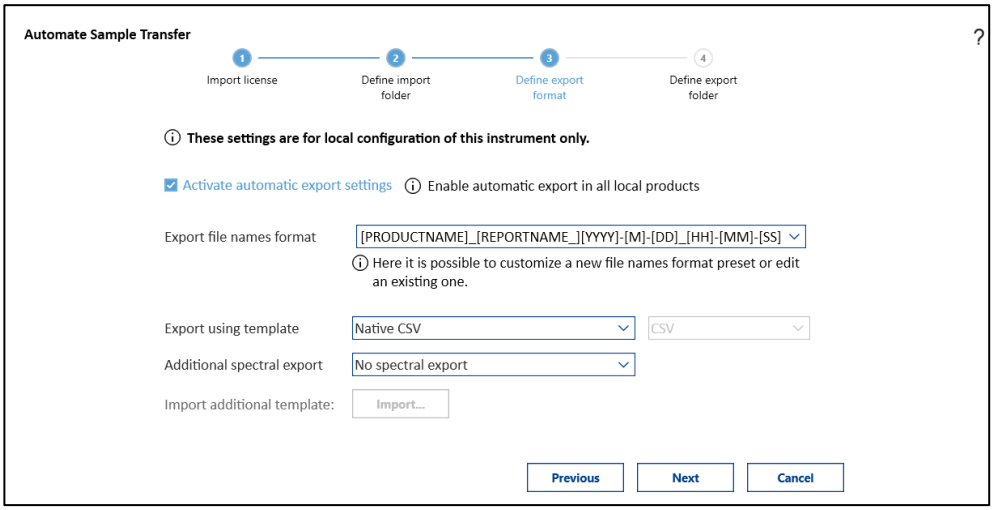

Fig. 95 Define export format

A number of predefined export file names exist in the drop down menu and more can be selected in Local Configurator or FossManager. There are also a number of predefined file types available. Additional templates can be imported as well.

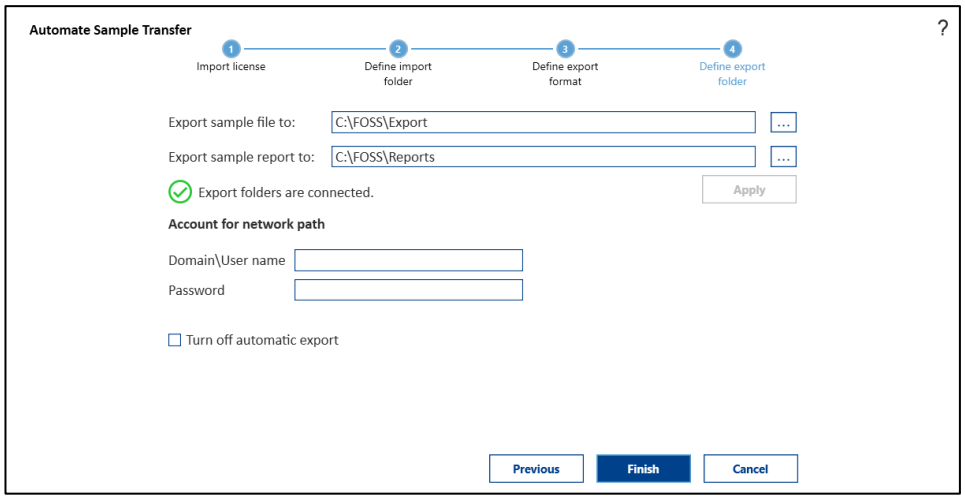

Fig. 96 Define export folder

The last step is to select a path for the exported files.

4.4.16 Help

Click on the question mark to get help.

Fig. 97

4.5 Check Samples

4.5.1 Empty Check Sample

This refers to the empty check sample cell which is filled with a local sample and used together with prediction models suitable for that sample type. For information about the artificial FOSS Check Sample, see section 4.5.2 FOSS Check Sample.

A check sample (or control sample) is measured on a regular basis to validate the stability of the analyser and everything around it that affects its performance (environment etc.). The test frequency is determined by your local quality routines, but a daily check sample test is the normal recommendation.

The local check sample is a real sample and as such it will not last forever. It will dry out or in other ways change its properties over time. Therefore, the check sample needs to be replaced on a regular basis and this frequency can either be determined in advance (based on experience with your samples) or monitored in ISIscan Nova by monitoring how the check sample results change.

Replacing the check sample with a new sample will most likely change the measured result(s) for it; therefore the targets for the check sample test must be changed accordingly. This can be done manually in FossManager or via a new check sample definition in ISIscan Nova.

Setting up the Check Sample Product (FossManager)

Before running the check sample you must create a check sample Product in FossManager.

1. Import the prediction model(s) you intend to use for your check sample and link a Parameter profile. (Create a new Parameter profile if needed.)

2. Create an Operation profile with Cup Type = 'Check sample (sealable)' and name it 'Check Sample', for example.

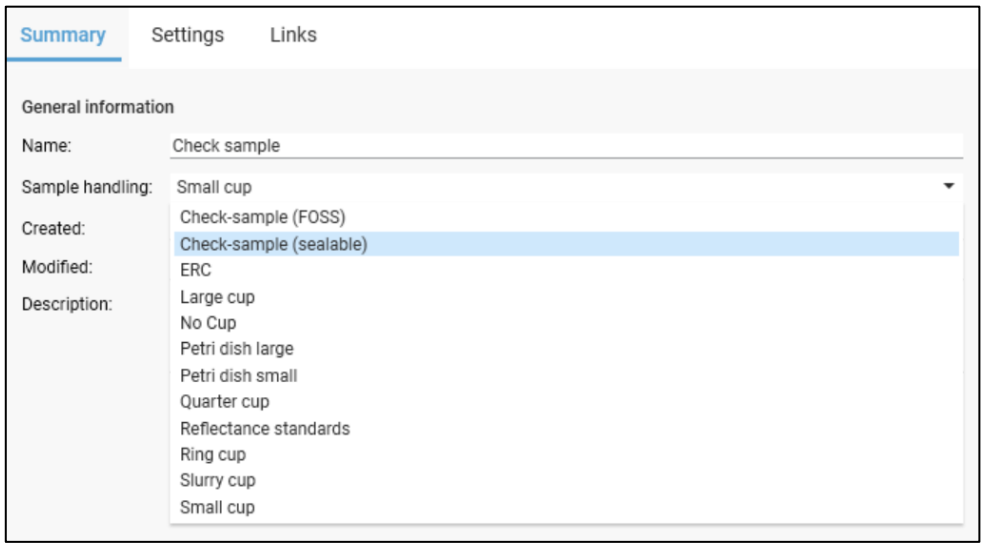

Fig. 98 Check sample setup in FossManager

3. Create a product and name it 'Check Sample', for example. In the different tabs you:
   - link the operation profile you just created above
   - link the prediction model(s) you imported above
   - add the Instrument Group where the instrument in question is registered.
   - set check sample limits for this new product (see separate section below for information).

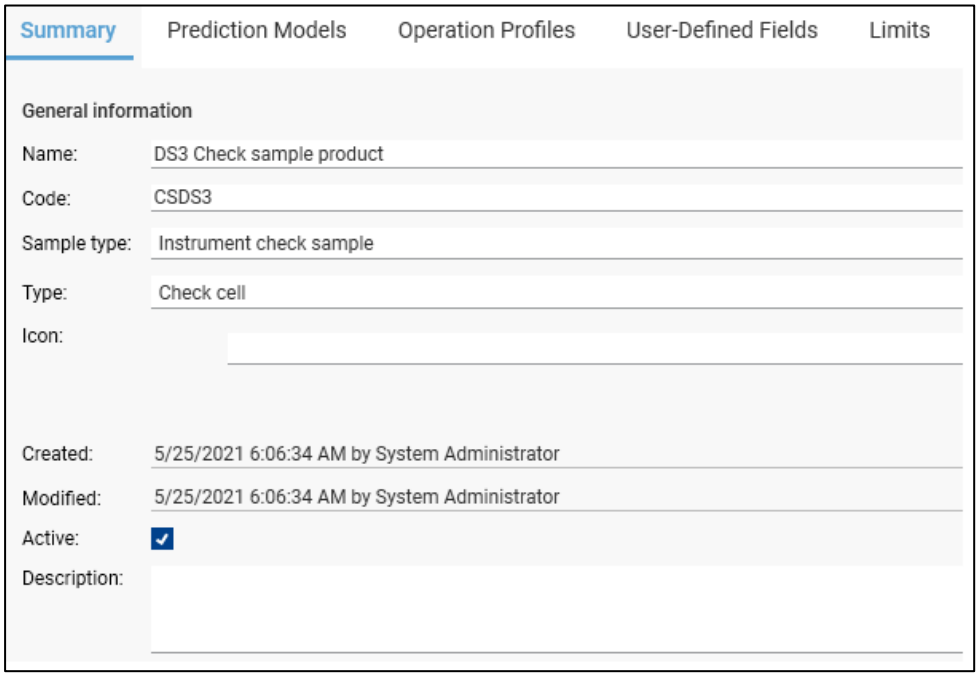

Fig. 99 Check sample setup in FossManager

4. If you are on the FossManager network, you now set up an Update Session in order to download the check sample product to the instrument(s). If you are on

the Local Configurator, then the check sample product is available in ISIscan Nova after you have saved the new product.

Setting Check Sample Limits (FossManager)

Analysing the check sample predicts the result on the constituents linked to the check sample product and compares them to the limits defined in FossManager.

Limits can be defined in three different ways in FossManager:

- Absolute limits
- Relative limits with a defined target
- Relative limits without a defined target

Absolute limits

If Absolute limits are defined in FossManager for your check sample, the target has no meaning. The check sample test will give a warning or error based on the defined absolute limits.

Example:

- Error Low: 8%, Warning Low: 9.5%, Warning High: 12.5%, Error High: 14%

Running a check sample definition is then not necessary, as no target value is needed.

Relative limits with a defined target

If Relative limits with a defined target are used, then FossManager has defined low/high warning/errors in terms of relative deviation (in %) from the target, and a specific target value has been set in FossManager.

Example:

- Error Low: -10%, Warning Low: -5%, Warning High: +5%, Error High: +10%, Target: 11%

Running a check sample definition is then not necessary, as the target value is already set in FossManager.

Note: Running a check sample definition in ISIscan Nova will not overwrite a defined target value in FossManager.

Relative limits without a defined target

If Relative limits without a defined target is used, then FossManager has defined low/high warning/errors in terms of relative deviation (in %) from the target, but no specific target value has been set in FossManager.

Example:

- Error Low: -10%, Warning Low: -5%, Warning High: +5%, Error High: +10%, Target: Empty

Note: Running a check sample definition in ISIscan Nova is then required.

Running a Check Sample Definition (ISIscan Nova)

Every time the check sample definition is run, it will redefine the check sample target, but will not change the limit settings (they can only be changed in FossManager).

1. Select the check sample product and tick the box on the right hand side so the product name changes to 'Check Sample (Definition)'.

Fig. 100

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Click **Start** and enter pin code '1234' to run the check sample definition.

Fig. 101

The check sample will now go through a series of analyses. ISIscan Nova may ask you for a sample number (depending on settings in Operation profile). A sample number is not required, but if you have more than one check sample it could be wise to enter the check sample serial number in this field for future reference.

5. The result of the check sample definition is displayed after analysis, and this target is stored in ISIscan Nova as the target value for the check sample test.

Running a Check Sample Test (ISIscan Nova)

1. Select the check sample product (box to the right should not be ticked).

Fig. 102

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Click Start to analyse the check sample. The check sample will now go through a series of analyses. ISIscan Nova may ask you for a sample number (depending on settings in Operation profile. A sample number is not required, but if you have more than one check sample it could be wise to enter the serial number of the check sample in this field for future reference.
5. Result for the check sample test is displayed after analysis.

If the check sample test fails, the results are displayed in yellow or red depending on whether the results are outside warning- or error limits. Please check that the correct check sample was used and that the glass surfaces on the check sample cup and the instrument are clean. Run the check sample test again to verify whether results are still outside limits.

Samples can still be analysed even after a failed check sample but they will be highlighted as Warning (in yellow) to indicate that last check sample was not OK.

Please consult your local standard operating procedures how to act on a failed check sample.

The sample inside the check sample cell may have changed over time and the proper action would then be to either replace the sample and/or to run a new check sample definition to redefine the target values or even review the limits in FossManager.

If the check sample is deemed to be OK and fresh, then running the Instrument Diagnostics (from Care View) may give you an indication if something has changed inside the instrument. Should the Instrument Diagnostics fail, then our recommendation is to contact your local FOSS representative for assistance.

Note: When not in use the check sample should be kept in a clean and dry location.

4.5.2 FOSS Check Sample

This refers to the artificial FOSS check sample. For info about the empty check sample cell please see 4.5.1 Empty Check Sample.

The FOSS check sample available for NIRS DS3 / DS3 F is an artificial type check sample intended for regular control of instrument stability. The frequency for running the check sample is determined by your local quality routines.

Running the check sample is done in ISIscan Nova just as a normal sample is run. The check sample requires a check sample product to be set up in FossManager with a proper operation profile and check sample prediction model.

The check sample product is delivered on a USB key together with the check sample. This product will predict a specific distance in the check sample spectra and the result is presented as a number without units. The result is compared to the limits that have been set for the check sample product and a Warning (yellow) or Error (red) will be displayed if the result is outside warning/action limits.

Setting up the Check Sample product (FossManager)

Before running the check sample you must import the check sample mcf file to the software. It is delivered on a USB together with the check cell.

Import the .mcf-file as a product and the check cell product will be visible with your other products.

Add an Instrument group to the product.

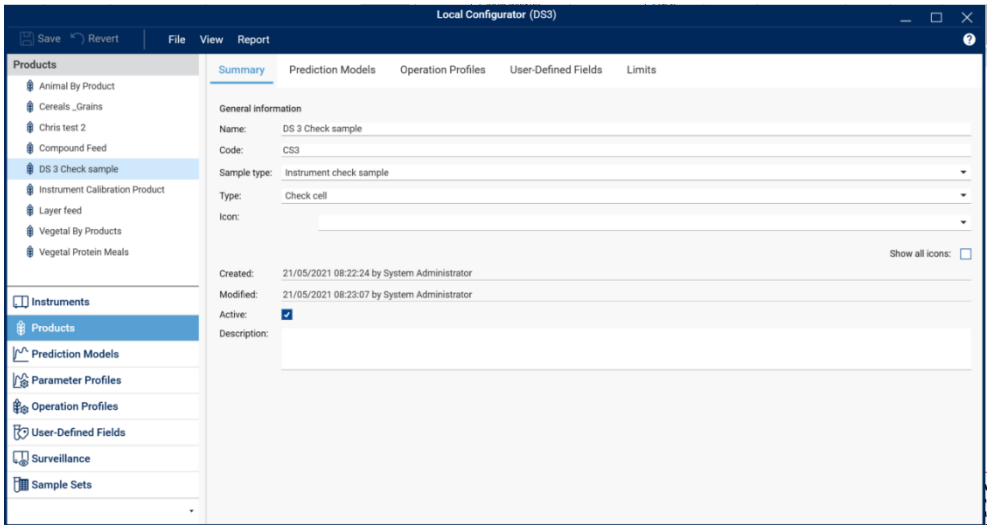

Fig. 103 Check sample setup in FossManager

If you are on the FossManager Network, you now set up an Update session in order to download the Check Sample product to the instrument(s). If you are on Local

Configurator, the Check Sample product is available in ISIscan Nova after you have saved the new product.

Setting Check Sample Limits (FossManager)

Limits can be defined in three different ways in FossManager:

- Absolute limits
- Relative limits with a defined target
- Relative limits without a defined target

For the artificial check sample it is strongly recommended to use relative limits without a defined target.

Relative limits without a defined target

Relative limits without a defined target means that the limits are specified in FossManager by the network administrator and the target is obtained by the operator by running a Check Sample definition in ISIscan Nova.

Recommended limits/settings:

- Error Low: -3%
- Warning Low: -2%
- Warning High: +2%
- Error High: +3%
- Target = Empty Example:

Prediction Model	Path	Parameter Profile	Type	Lower Action	Lower Warning	Target	Upper Warning	Upper Action
DS2500_CheckSample		Distance	Relative	3.00	2.00		2.00	3.00

Fig. 104

Running a Check Sample definition (ISIscan Nova)

The check sample definition will every time it is performed redefine the target for the check sample but it will not change the limit settings (these can only be changed in FossManager).

1. Select the check sample product and tick the box on the right-hand side so the Product name changes to 'Check Sample (Definition)'

Fig. 105

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Click Start to analyse the check sample. The check sample will now go through a series of analysis. ISIscan Nova may ask you for a Sample number (depending on settings in Operation profile. A Sample number is not required, but if you have more than one check sample it could be wise to enter the Serial number of the check sample in this field for future reference.
5. Result for the check sample definition is displayed after analysis and this target is stored in ISIscan Nova as the target value for the check sample test.

Running a Check Sample Test (ISIscan Nova)

1. Select the check sample product (box to the right should not be ticked)

Fig. 106

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Click **Start** and enter pin code '1234' to run the check sample definition.

   The check sample will now go through a series of analysis. ISIscan Nova may ask you for a Sample number (depending on settings in Operation profile. A Sample number is not required, but if you have more than one check sample it could be wise to enter the Serial number of the check sample in this field for future reference.

Fig. 107

5. Result for the check sample test is displayed after analysis.

If the check sample test fails, the results are displayed in yellow or red colours depending on whether the results are outside warning or error limits.

Samples can still be analysed even after a failed check sample but they will be highlighted as Warning (in yellow) to indicate that last check sample was not OK.

Please consult your local standard operating procedures how to act on a failed check sample.

The artificial check sample should not change over time but it may have been physically damaged or altered. Please control that correct check sample was used and that the glass surfaces on the check sample cup and the instrument are clean. Run the check sample test again to verify whether results are still outside limits. Also verify that correct limits for the check sample are set up in FossManager.

If the check sample is deemed to be OK, then running the Instrument Diagnostic (from Care View) may give you an indication of whether something has changed inside the instrument. Should the Instrument Diagnostic fail, then our recommendation is to contact your local FOSS representative for assistance.

4.6 Instrument Calibration

Instrument Calibration for is found in the **Care** menu and it includes two functions:

- Wavelength calibration, using either the built-in internal wavelength reference standard or the external wavelength reference standard (EWC).
- Intensity Correction, using the external reference correction standard (ERC).

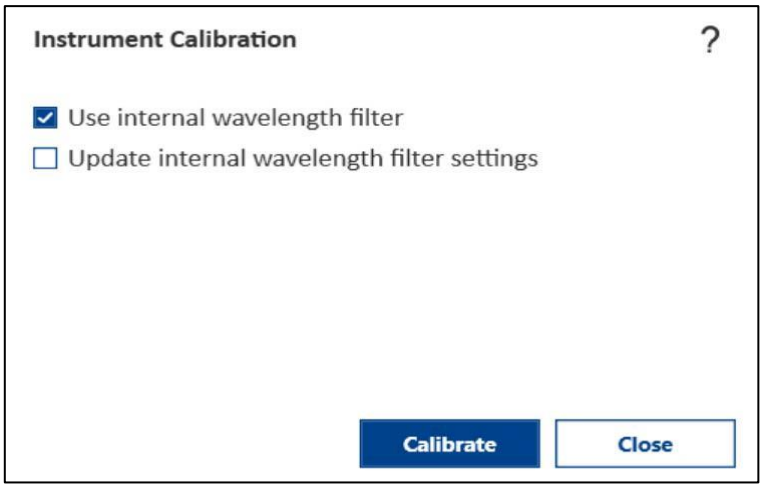

Fig. 108

Instrument calibration should be carried out when prompted by the software or when recommended by a FOSS representative. Not performing the instrument calibration when prompted will not prevent you from analysing samples (or other tasks) but all samples will be marked with the warning 'Instrument needs calibration'.

Instrument Calibration is also recommended after lamp replacement in NIRS DS3 / DS3 F.

Below is a description of the two operations but remember that both parts, Wavelength Calibration and Intensity Correction, are always carried out in sequence during Instrument Calibration. They cannot be initiated separately. ISIscan Nova will collect and include the results from both sequences in its advanced mathematical treatment in order to secure the optimal instrument calibration in terms of wavelength, bandpass and intensity accuracy.

4.6.1 Wavelength Calibration

NIRS DS3 / DS3 F uses an innovative method of wavelength calibration to assure consistency between instruments. A wavelength standard using materials with known stable peak positions is used to calibrate the wavelength scale of each instrument.

The internal and the external wavelength reference standard are made of identical material. At FOSS, these wavelength standards are calibrated on a controlled master instrument.

Each standard has its own unique factors that are used to ensure an accurate and traceable link to the master instrument. The calibration nominals for the external standard are delivered on a USB key together with the EWC cup. The calibration nominals for the internal wavelength standard are stored inside the instrument internal software.

For routine operation the internal wavelength standard is recommended when performing instrument calibration.

The use of the external wavelength standard is only recommended when vital parts inside the instrument have been replaced, so it should only be used by trained service engineers.

5000/6500 Compatibility Mode

For matching between NIRS DS3 / DS3 F and an existing Network Master instrument from FOSS, the instrument can be set up to use either the XDS (default) or the NIRS 5000/6500 compatibility mode.

Which mode to use is defined in FossManager software and is linked to the Operation Profile. 5000/6500 compatibility mode should only be used if the Network Master you are standardising towards is a NIRS 5000 or NIRS 6500.

Every time an Instrument Calibration (internal or external) is carried out in ISIscan Nova both wavelength scales are automatically recalibrated, meaning that you do not need to choose the wavelength scale at the time of instrument calibration.

4.6.2 Intensity Correction (ERC Cup)

Intensity Correction is part of the Instrument calibration and cannot be done as a separate function.

Intensity Correction (with the ERC standard) is a method to provide a virtual 100% reflectance reference at true sample interface, making measurements independent of the physical design. This is important in order to achieve a high-quality spectrum on each instrument and to secure transferability between instruments.

The Intensity Correction procedure corrects for possible differences in the instrument's optical path, such as influences from glass impurities etc. The determined correction is applied to every spectrum taken on the instrument to make each spectrum appears as if taken with a reference of 100% reflectance. This assures that spectra obtained on different instruments are perfectly aligned with each other.

The ERC cup is included with all deliveries of NIRS DS3 / DS3 F.

5 Maintenance

A NIRS DS3 / DS3 F requires little maintenance. The instrument enclosure is sealed to prevent contamination of critical modules, which keeps maintenance to a minimum.

Note: Do not attempt to open the instrument enclosure. There are no user-serviceable parts inside the instrument enclosure. Damage is not covered under warranty.

5.1 Cleaning the Instrument

Wipe the instrument cabinet with a moist cloth on a regular basis. Do not use any chemicals to clean the instrument, only a dilute soap and water solution. Brush off excess dust from the lamp cooling flange.

Use the supplied brush with fine bristles to gently sweep all dust and sample from the sample presentation glass. Do this regularly to avoid excessive dust build-up. Make sure to remove any fingerprints from the sample presentation glass. Fat and protein etc. from fingerprints may affect the analysis results. If necessary, add a small amount of alcohol to a dry cloth and wipe off the sample presentation glass.

The fan filter at the back should be inspected once per month. If the filter is dusty replace it with a new one. The instrument must not be used without the filter installed. Depending on the cleanness of the environment, the routine inspection and cleaning may be done less frequently.

5.2 Cleaning the Sample Cups

Sample cups can be cleaned using warm water (max. 60 °C / 140 °F) and normal detergents.

After cleaning, the cups should be dried using a soft towel or paper tissues.

Between analyses, the sample cup can also just be cleaned using soft paper tissues or the included brush. However, in the case of a very sticky sample, or if going from a very fat sample to a very lean sample, a thorough cleaning with water and detergent is recommended to avoid any possible sample carryover.

5.3 Lamp Replacement

The instrument should be well cleaned before lamp replacement to prevent dust from damaging the reflector. The replacement should be performed in a clean environment.

A video instruction on how to change the lamp is available on youtube.com.

See the Foss channel https://www.youtube.com/user/fossanalytical.

Note: There are two types of lamps, 35 W and 50 W. Select the correct type in the instrument software when changing.

⚠ Warning

Hot Surface. The lamp can be very hot. Cotton gloves must be used when replacing the lamp to avoid burn injuries.

⚠ Caution

Do not touch the lamp glass or reflector or let any rough surface come into contact with the lamp glass. A microscopic scratch in the glass might cause a lamp explosion later.

⚠ Caution

The lamp can be damaged by fingerprints and oily residues. Cotton gloves must be used when replacing the lamp to avoid any damage.

Replace the halogen lamp as follows:

1. Switch off the instrument. Disconnect from mains.
2. Open the front cover and remove the supplied Allen key.

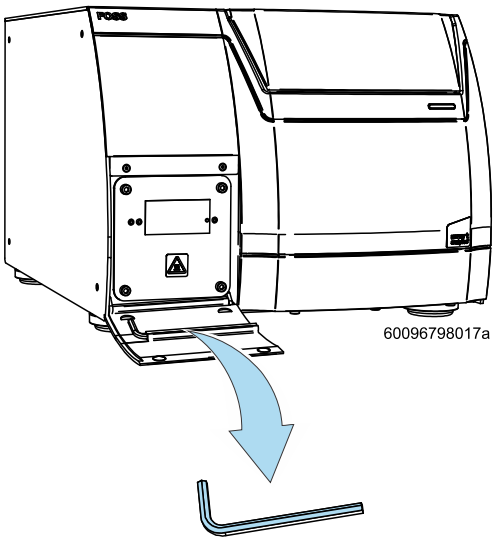

Fig. 109 Allen key

3. Remove the four screws holding the cover plate using the Allen key.

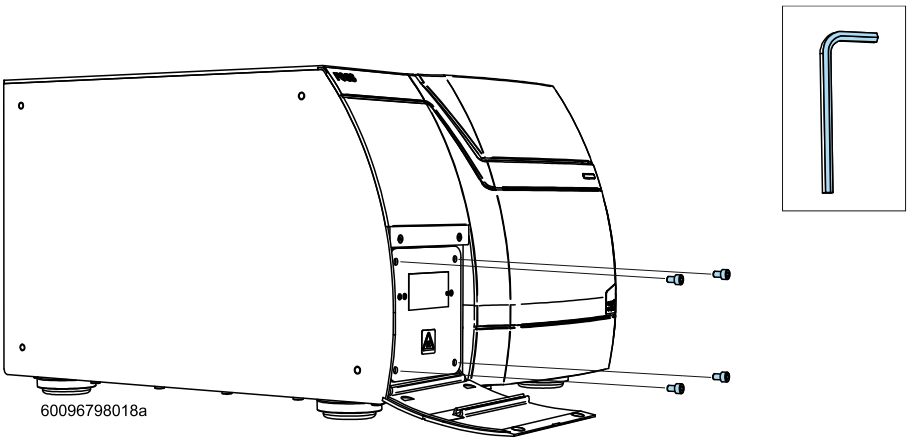

Fig. 110 Screws

4. Flip down the cover plate.

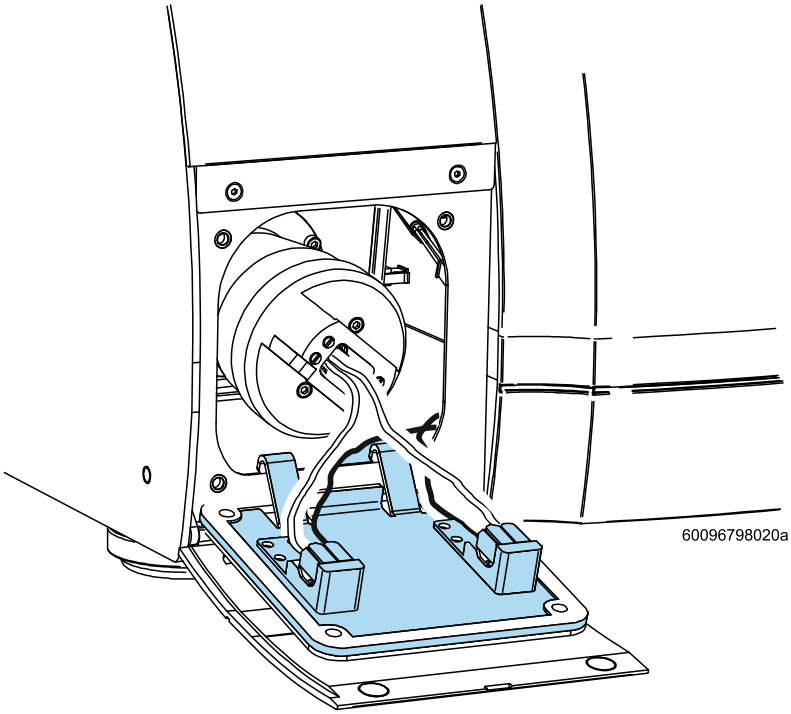

Fig. 111 Cover plate

5. Open the clamps where the white lamp cables are connected. Do not touch the black cables coming from inside the instrument.

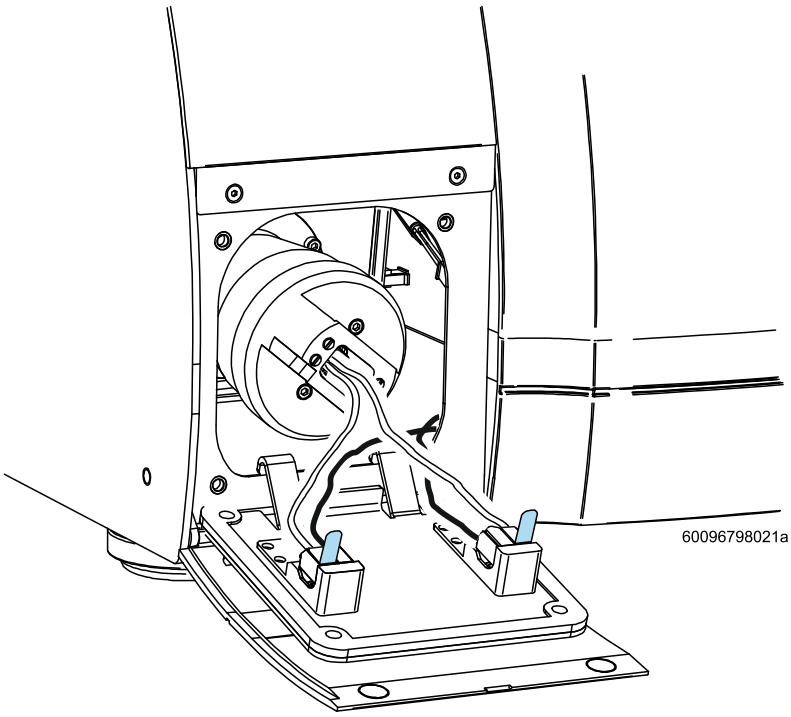

Fig. 112 Clamps

6. Remove the lamp by rotating the lamp holder counterclockwise.

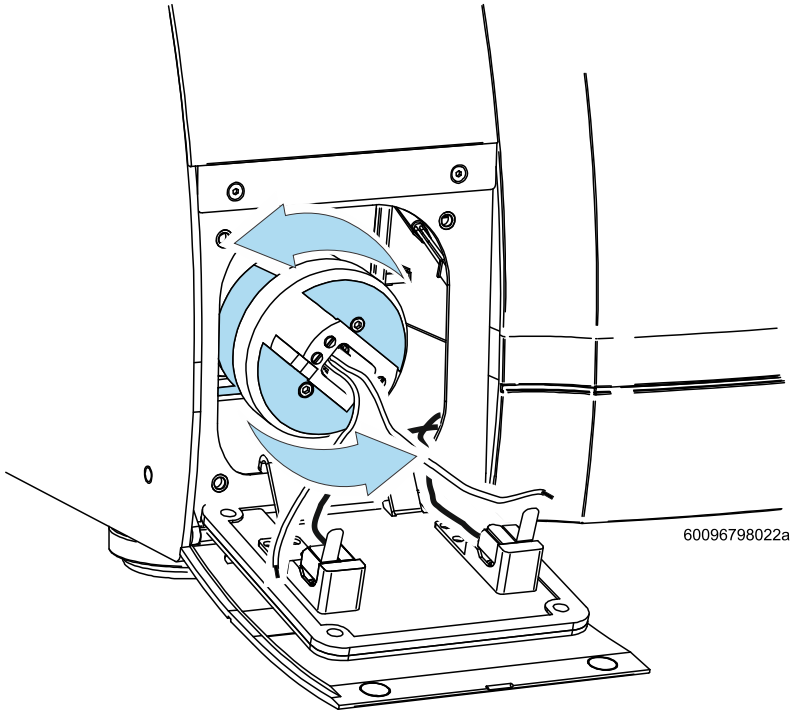

Fig. 113 Unscrew the lamp

7. Fit the new lamp and assemble in reverse order.
8. Start the instrument and software.
9. Reset the counter in the instrument software.

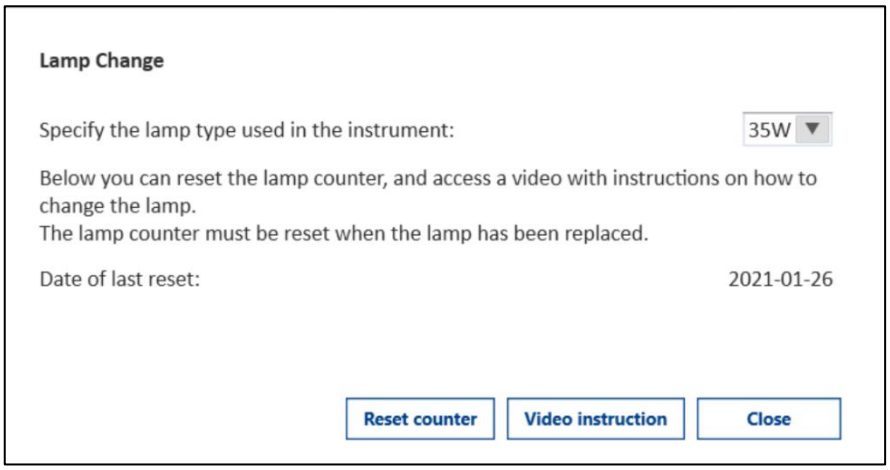

Fig. 114

5.4 Filter Replacement

The filter that is located at the rear of the instrument should be replaced regularly, approximately once a year.

1. Push down the handle on the lid and flip down the lid.

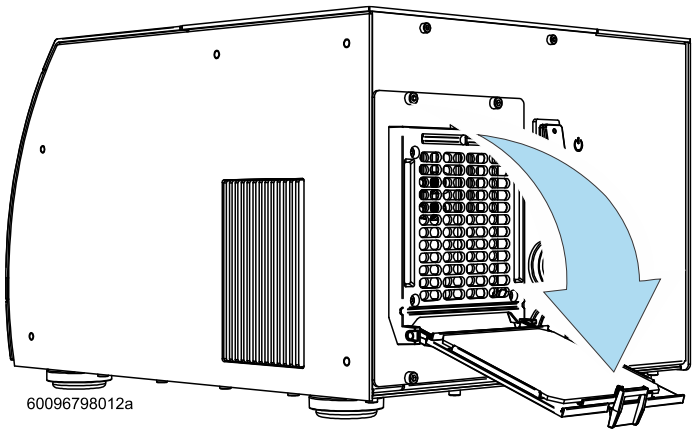

Fig. 115 Lid

2. Relace the filter.

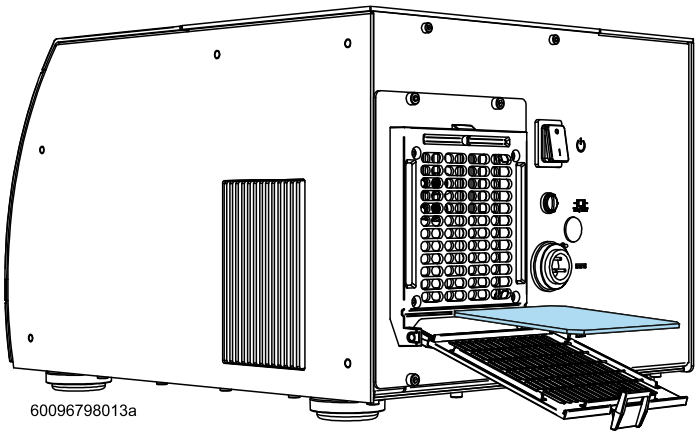

Fig. 116 Filter

3. Close the lid.

5.5 Cooling Liquid Replacement

The temperature inside the instrument is higher than the ambient temperature due to the heat generated by the lamp. Excessive temperature might cause the lamp to burn out prematurely. DS3 / F is equipped with a cooling system that helps to keep the internal temperature below the limit of 55 °C. Optimally, the lamp temperature should be stable and around 35-40 °C. If the temperature rises above 40 °C the cooling liquid level should be checked.

⚠ Warning

Always disconnect the power supply cable before checking and refilling the cooling liquid.

1. Turn off the instrument and unplug the power cable.

2. Remove the four screws holding the cover plate using a 3 mm Allen key.

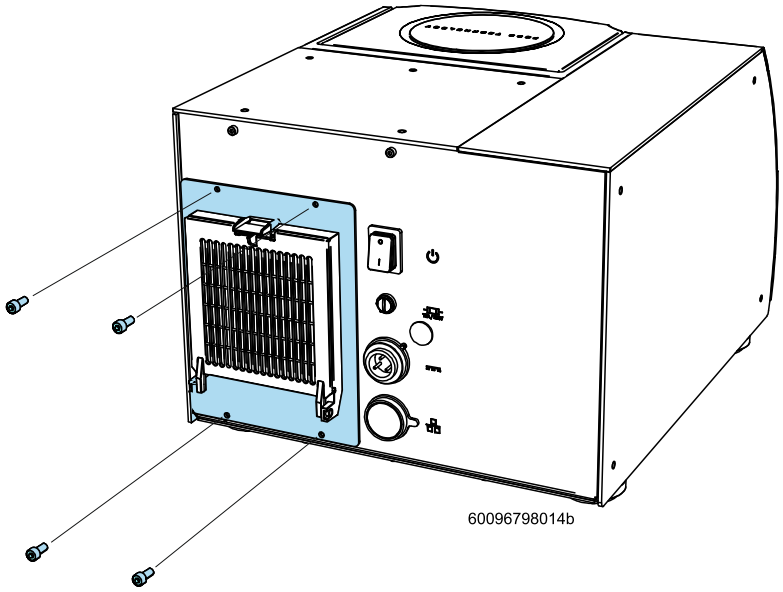

Fig. 117 Cover plate

3. The liquid pump is placed behind the cover plate.

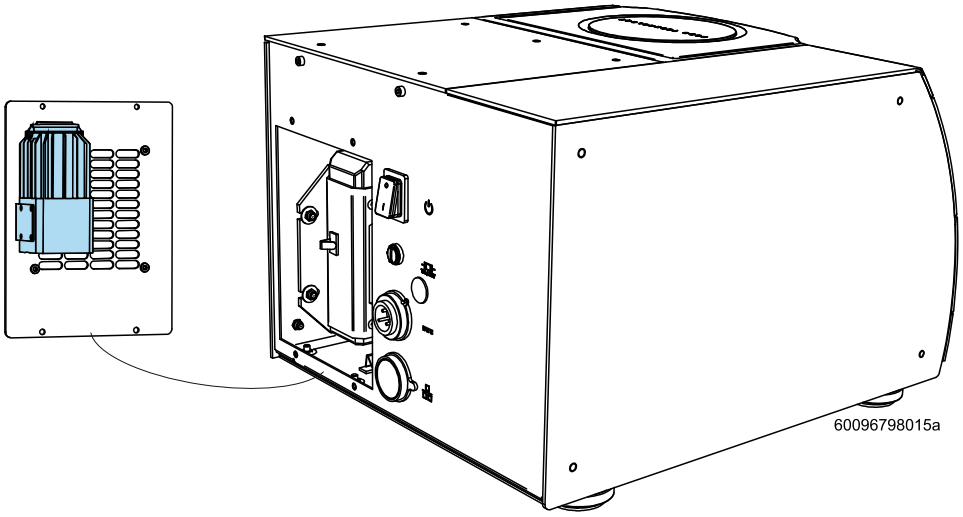

Fig. 118 Liquid pump

4. Remove the cap of the cooling liquid pump by turning it counterclockwise and pull.

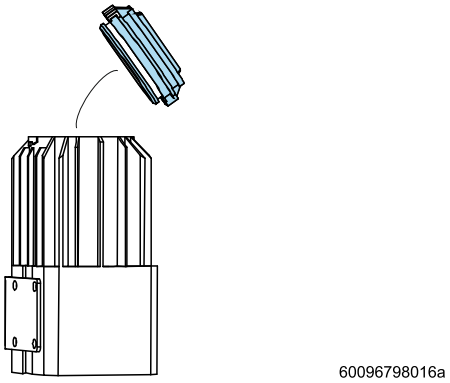

Fig. 119 Cap

5. Check the liquid level and refill if needed. Fig. 120 shows the correct level.

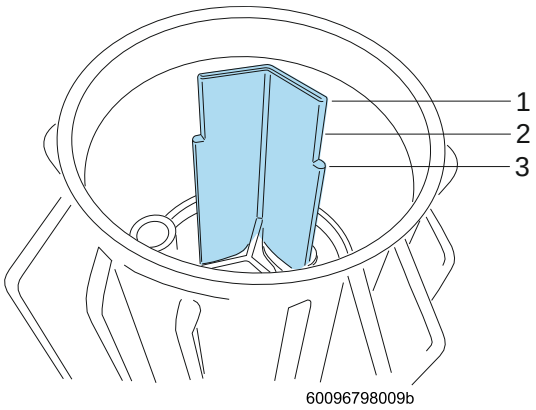

Fig. 120 Liquid levels

1	Too high
2	Correct liquid level
3	Too low

6. Assemble the instrument in reverse order.
7. Plug in the power cable and push the power button.
8. The instrument is now ready for analysis again. If the procedure took a long time, the instrument might have got cold and failed the diagnostics. If so, leave the instrument on for approximately two hours and try again.

5.6 FOSS Service Visit

Apart from regular user maintenance, FOSS also recommends that preventive maintenance be performed at intervals according to the Preventive Maintenance Protocol (see the Owner's Guide).

Preventive maintenance can be done either on-site or remotely using IT.

Contact your local FOSS representative for yearly maintenance.

FOSS offers a wide range of local support products and training adapted to your market requirements. Please contact the local FOSS representative for a tailor-made package to fit your specific needs.

6 Troubleshooting

6.1 General

The NIRS DS3 / DS3 F analyser is designed to be a dependable, trouble-free instrument with many years of use. In spite of the rugged design, problems may arise that require attention.

There are no user-serviceable parts inside the instrument enclosure except the lamp. Because of this design, we emphasise that under no circumstances should the user attempt to open the instrument cabinet and service any part other then the lamp. Trying to do so may damage or misalign components. Any diagnosis of internal functions should be performed using software diagnostics, not by internal inspection. In the event internal components should need replacement or other service such actions must be done by a trained service engineer.

System failure can be detected by malfunctions and error messages. Follow the recommendations and eliminate any possible causes listed.

If the instrument is still not operating, after all the recommendations have been checked, please contact your local FOSS service centre or your local authorised distributor.

To get a fast and accurate response when reporting a malfunction, it is essential that you provide relevant information in as specific detail as possible. Before calling for help, please answer the following questions:

- Can I already pinpoint the root cause of the problem myself?
- When did I first see the problem?
- Can I repeat the problem with a certain action, sequence or other method?
- Is the problem consistent or does it occur intermittently?
- Has it escalated in frequency or severity?
- Is the problem seen at specific times?

Environmental conditions shall also be considered, e.g. vibrations, electricity, temperature, humidity, etc.

If the problem is related to unsatisfactory results the following questions are also relevant.

- Does it happen on all products or just one or some products?
- Is the instrument performing according to the application specification or not?
- Are the problematic samples 'normal' or extraordinary in any obvious way?
- Is the problem repeatable if I rerun the sample or repack the sample cup?

The Instrument Diagnostics test will prove your instrument performance from day to day. Results and data from this test can often suggest the origin of a problem.

6.2 Recommended Actions

Fault	Action
The instrument doesn't start	Check incoming power
	Check the Power Supply
	Check the fuse
Unfamiliar internal noise	Restart the instrument. Turn off if problem persists
The instrument doesn't start at all (no sound, no front LED)	Check incoming power and the LED on the Power Supply
Instrument cannot be stabilised within the defined timeout (10 minutes). Usually a hardware problem.	Let instrument warm up for another 15 minutes and run Diagnostics from Care View.
Instrument takes long time before passing wavelength test during startup test.	Allow the instrument to warm up for at least two hours and then carry out an Instrument Calibration with ERC + internal wavelength reference. If calibration still don't work contact a Foss service representative.
Abnormal sound/noise	Restart the instrument. Turn off if problem persists.

6.3 Error Messages

Fault	Action
Sample cup cannot find the start position	Run analysis with the lid open. Check if the sample cup is jammed.
Sample cup has slipped during measurement	Run analysis with the lid open and check if the sample cup is jammed. Clean/dry the sample cup and remove labels (if present).
Cannot read RFID chip on sample cup	Test with another cup or cupholder. Run analysis with lid open and verify that cup goes to home position.
ISIscan Nova lost connection to the instrument	Restart instrument and ISIscan Nova. Check local area network or hub/switch if PC and instrument aren't connected via direct cable. Check Ethernet board settings and PC power saving options so it doesn't go into sleep or hibernation mode.

6.4 Outlier Function

Fault	Action
The instrument hosting service is not running.	If this happens at first start up after a software installation or upgrade, just restart ISIscan Nova and run startup test again. The services can also be started manually from the Control Panel / Administrative Tools / Services.
ISIscan Nova cannot connect to the instrument.	Connect direct cable between the PC and instrument. Turn Firewalls OFF. If PC and/or instrument just started, allow time for the network connection to establish (check in PC / Network & Sharing centre if connection is completed). Check that the correct instrument serial number is used. PC must not be set to Hibernation/Sleep mode. Turn off the WIFI. Once a connection is established, does it work normally?
Sample Cup cannot be found by instrument	Test with another cup or cupholder. Run analysis with the lid open and verify that cup goes to home position.
Local time adjusted. Licenses invalid.	If time/date adjustments are needed on ISIscan Nova PC, make them before ISIscan Nova is installed. If ISIscan Nova already is installed and time/date need to be adjusted, ISIscan Nova must be uninstalled and reinstalled.
Instrument temperature too high	Check the liquid level in the pump, refill if necessary. Check the pump, tubes and nipples for leakages or obstructions.

This is a list of the most common faults/actions. For other warning/messages/issues and for more advanced troubleshooting you must contact a FOSS representative. You will then be instructed on how to proceed and if a service visit is required.

6.5 Outlier Function

Global H (GH) and Neighbourhood H (NH) are two statistical warnings indicating that the sample and the calibration do not work together. Either the wrong calibration is selected or the sample is not properly represented in the calibration set.

A typical way to reduce the number of warnings and errors based on GH and NH is to add those samples to the calibration set. Take the samples, scan them, make a reference (chemical) analysis and add them to the calibration.

This is typically done together with an application specialist from FOSS or from your own organisation.

Note: FossAssure Pro is a FOSS service that will help you to keep track of the calibration performance. It is a great help in cases like this.

7 Parts, Accessories and Consumables

See 600968671 Parts, Accessories and Consumables on the USB with documentation.

8 Technical Specifications

8.1 Technical Data

Dimensions (W x D x H)	375 x 490 x 300 mm
Weight	27 kg
Fuse	5.0 A
Power consumption	105 VA
Noise level	<70 dB(A)
Cooling	DS cooling fluid, 500 ml (60066465) – Lamp Cooling
Degree of protection	IP 65

8.2 Installation Requirements

Voltage supply	100-240 V AC *), frequency 50-60 Hz, Class 1, protective earth
Ambient temperature	5-40 °C
Storage temperature	-20 to 70 °C
Ambient humidity	<93% RH
Mechanical environment	Stationary and moveable occasionally
EMC environment	Laboratory use, Industry requirements
Operation	Indoor use
Altitude	Up to 2000 m
Transient over-voltage	According to category II
Pollution	Degree 2
Vibrations, random (two different spectra)	0.19 Grms at 10-150 Hz to IEC 60068-2-64 spectra 0.19 Grms at 10-1250 Hz to FOSS internal spectra (more information available on request)
*) Mains supply voltage fluctuations not exceeding ±10% of the rated voltage.	

8.3 Performance Data

Measurement mode	Reflectance or transflectance (for liquids)
Wavelength range	400-2500 nm (850-2500 nm for DS3 F)
Detector	"Silicon, Si 400-1100nm (850-1100 nm for DS3 F) LeadSulphide, PbS 1100-2500 nm "
Optical bandwidth	8.75 ±0.10 nm
Number of data points	4200 (3300 for DS3 F)
Data resolution	0.5 nm
Absorbance range	Up to 2 AU
Number of subsamples	Default: 7 for small cup; 8 for large cup (Adjustable)
Self test	12 minutes (variable)
Wavelength accuracy	0.20 nm
Wavelength precision	0.015 nm as std
Photometric noise *)	"400-1100 nm < 200 1100-2500 nm < 200"
Analysis time	1 minute for 8 subsamples
Noise = Time normalised root mean square (RMS) value expressed as: $\mu AU * \sqrt{s}$	

8.4 PC Requirements

Contact your local FOSS representative for information.