NIRS™ DA1650
User Manual

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FOSS

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

Rev.	Date of Issue	Revised Material
1	2011-05-10	First edition
2	2013-03-25	General update to reflect ISIscan Nova software version 5.2
3	2013-09-13	General update to reflect ISIscan Nova software version 6.0
4	2015-10-21	FOSS address updated
5	2017-06-15	Safety sections moved to seperate manual. General update to reflect Plug and Play installation.
6	2019-04-23	Name change
7	2019-11-12	Small Updates
8	2020-12-17	Detailed steps how to install Mosaic Solo on external win 10 PC

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

Table of Contents

1 Safety

1.1 General

Please read the user manual carefully and use the instrument as advised. Follow all safety precautions as instructed.

Safety Symbols

Explanation of safety symbols used in this manual.

Symbol	Description
	General hazard.
	Hot surface.

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 (label placed on lamp module)

The lamp module can be very warm if the operating temperature is high. Cotton gloves must be used when replacing the lamp to avoid burn injuries.

1.3 Product Safety

⚠ 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

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 damages.

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 2002/95/EC
- WEEE Directive 2012/19/EU
- REACH Directive 1907/2006/EC
- FCC ID: 2AZ6M-DA1650
- DA1650 is only compliant if no changes or modifications are made on the device.

1.5.1 RF Exposure

DA1650 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.

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 ways been handled contrary to ordinary practice
- only software authorised by FOSS has been installed on any product PC
- any external product PC has complied 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 that, due to wear during use of the instrument, 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.

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

1.7 Copyright of Embedded Software

1.8 Trademarks

NIRS™ DA1650 is a registered trademark of FOSS Analytical A/S. Windows® is a registered trademark of Microsoft Corporation.

2 Introduction

2.1 General

NIRS™ DA1650 is a robust, simple-to-use and accurate near-infrared analyzer that is based on diode array technology. NIRS DA1650 is a robust instrument that can be used in a laboratory or at-line environments. The user interface is designed for simple daily routine operation.

Measurements are simple to perform and results are delivered in minutes. The analyzer is easy to move around and can be placed close to the production line. The sample handling is easy, making high quality analysis a matter of routine. The NIRS DA1650 is ready to use with a range of FOSS calibrations.

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

Connection through a FossManager networking system allows for remote surveillance and diagnostic checks of the instrument, if necessary and authorized.

The instrument enclosure is completely sealed to prevent contamination by dust or other substances. The cooling fans operate inside the main enclosure, and are thermally linked to an external heat sink at the rear of the instrument 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 rear surface of the instrument. The lamp is easy to remove and replace, and requires no special tools or expertise.

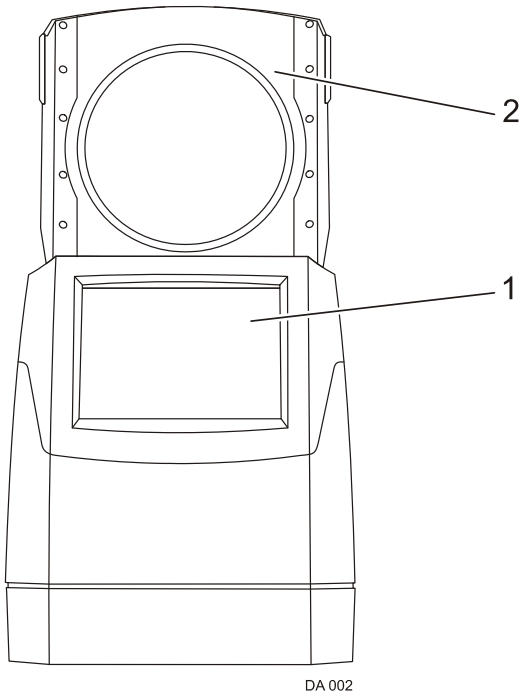

Fig. 2:1Front view of NIRS DA1650

1	Touch screen display	2	Lid

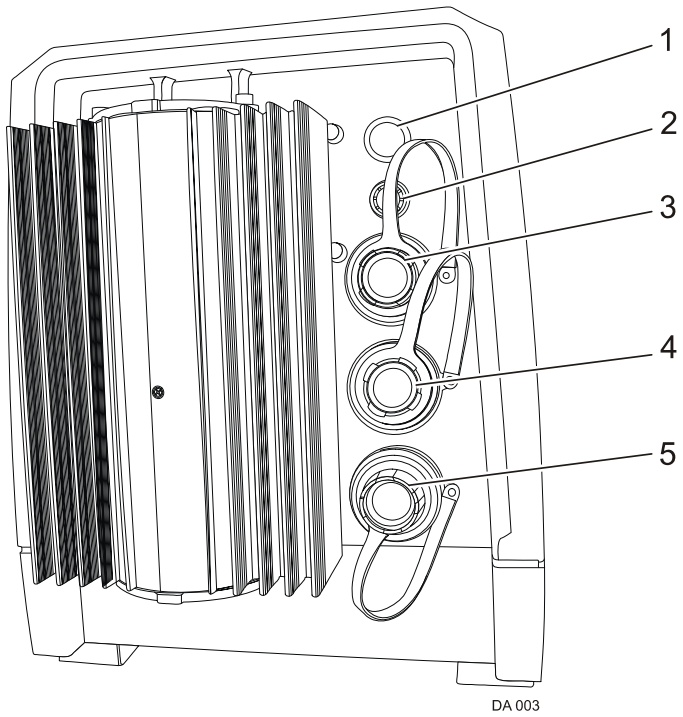

Fig. 2:2Rear view of NIRS DA1650

1	On/Off switch	4	Ethernet connection
2	Fuse holder	5	USB connection
3	Power cable 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 is scanned. This multipoint reflectance measurement allows for an accurate analysis of the sample. For inhomogeneous samples like pellets it is crucial with a multipoint measurement.

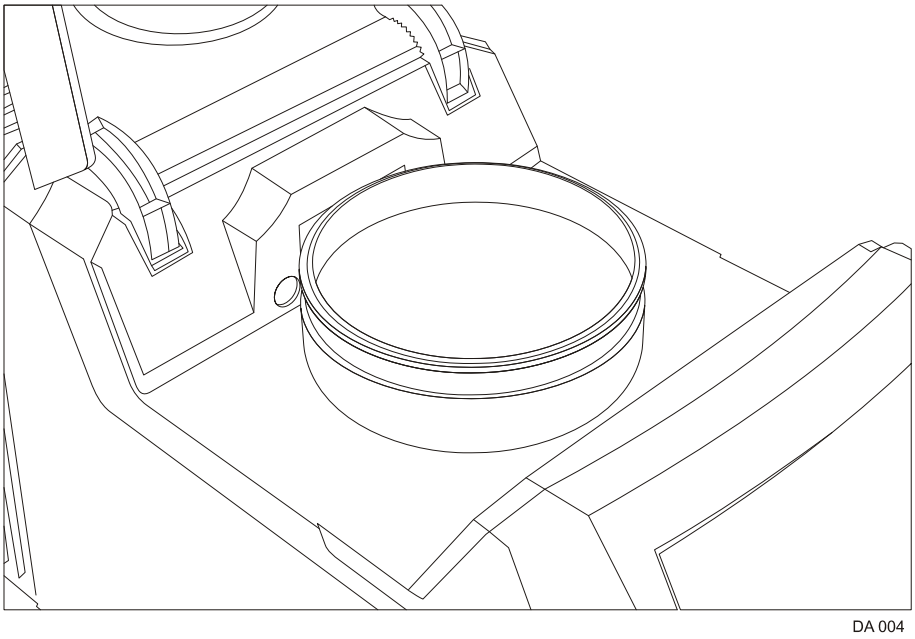

Fig. 2:3Sample cup in instrument

2.3 Sample Cups

2.3.1 General

All sample cups used with NIRS DA1650 fulfill the requirements of ISO 12099 requiring 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.

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 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 for e.g. cleaning or for 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 is completely covered so that no light leaks through.

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

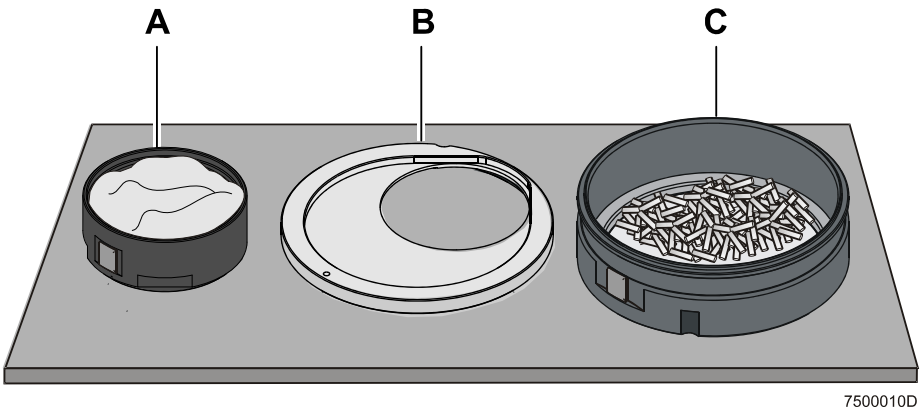

Fig. 2:4Sample cups

A	Small cup	C	Large cup
B	Small cup holder		

2.3.2 Radio Frequency Identification System

Radio Frequency Identification (RFID) is a method used by the NIRS DA1650 for identifying each individual sample cup. There is a small RFID chip in each cup with CupType information and a unique CupID.

The CupType information can be used to ensure that the correct Cup Type is used for each measurement. The analysis is aborted and a automatic warning is displayed if analysis is started with a different cup type than what is specified in the application setup.

The unique Cup ID is stored with each measurement so it afterwards can be traced which cup that was used for the individual analyses.

RFID settings can be enabled/disabled in the FossManager software.

2.3.3 Other Cups and Accessories

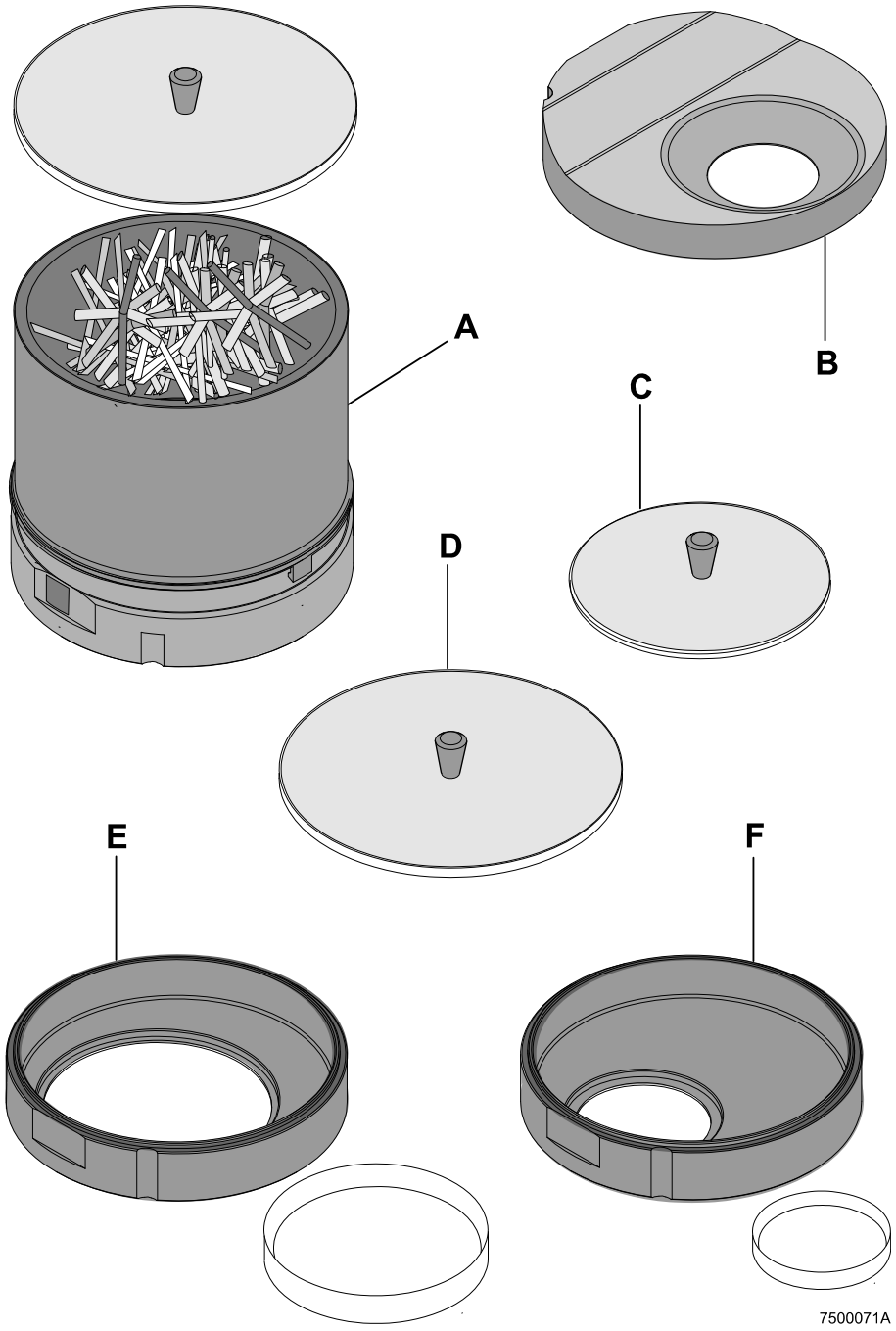

Fig. 2:5Other cups and accessories

A	Large cup extension	D	Lid for large cup
B	Slurry cup	E	Petri dish holder 89 mm
C	Lid for small cup	F	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. Should only be used for homogenous 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 homogenous, fairly transparent liquid samples. Liquid samples should preferably be analysed at a well defined temperature since temperature have 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. For NIRS DA1650 there are gold reflectors giving a path length of 0.1, 0.2, 0.5and 6 mm gold reflectors. To get optimal performance the maximum absorbance level should be below 2 AU. If needed, you can ask your FOSS representative for recommendations.

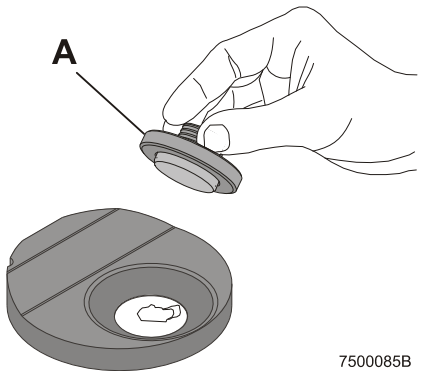

Fig. 2:6Gold reflector

A 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 DA1650. Primary use is for cross-standardization purposes between NIR platforms.

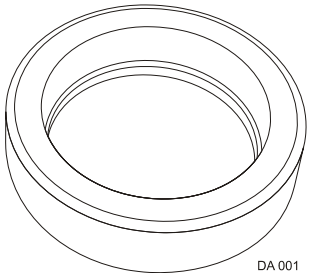

Fig. 2:7NIRS ring cup

2.4 NIRS DA1650 Software

NIRS DA1650 is operated by two separate software programs:

- ISIscan Nova
- Mosaic Solo

This User Manual describes the main features and work flows for routine operation in ISIscan Nova software and some of the FossManager software which is used for configurations and setup.

In both softwares there are built-in help files which can give further information on specific details.

2.4.1 ISIscan Nova

ISIscan Nova is the operating software for the NIRS DA1650. 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
- 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 local configuration

FossManager is used for configuration of the User Interface of ISIscan Nova 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 a FossConnect server 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 not administrated via the network.

The two scenarios are shown below.

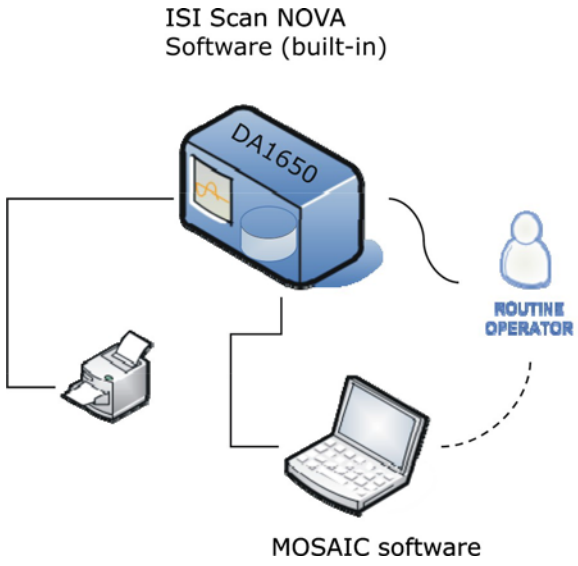

Fig. 2:8FossManager - Solo setup

- Instrument configurations managed locally from an external PC running FossManager software.
- Routine Operator operates NIRS DA1650 via ISIscan Nova software via the built-in touch screen.

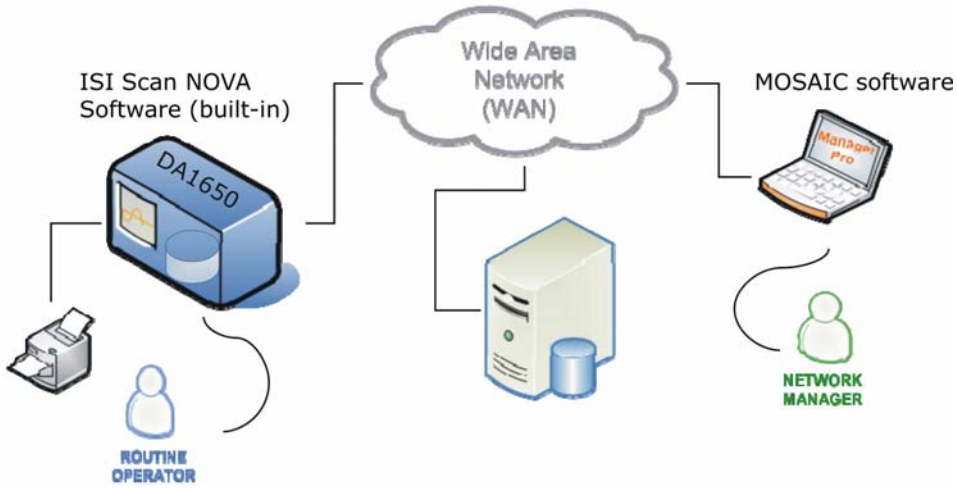

Fig. 2:9FossManager - Network setup

- Instrument configurations managed remotely by the Network manager using FossManager software.
- Routine Operator operates the NIRS DA1650 via ISIscan Nova software via the built-in touch screen.
- 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).

2.4.3 Routine Operation Software

The NIRS DA1650 analyzer is supplied with software to support all the necessary functions and features to operate the system on a daily basis.

Touch Screen Display

Fig. 2:10Overview

1	Care Menu	7	Current product
2	Product and sample information	8	Select Product
3	Go to previous sample	9	Task indicator
4	Go to next sample	10	Event indicator
5	Sample registration values (User Defined Fields)	11	Print result
6	Start/Stop analysis	12	Result

Product and sample information

Information on the last sample analysed or the last historical sample inspected using toggle arrows.

Go to previous sample

Press to display information about the previous sample.

Go to next sample

Press to display information about the next sample.

Sample registration values

These can be lists or free text fields. Lists are indicated with an arrow and free text fields with a keyboard. A star will indicate if the field is mandatory and has to be filled out. Once the sample is synchronised to the FossConnect server it can no longer be edited, which is indicated with a small padlock icon.

Start/Stop analysis

Press to start analysis. Once analysis has been initiated the button turns into a stop button. Press to abort analysis and open the lid.

Current product

Name of the product currently selected.

Select product

This will open up the Product list.

Task indicator

This indicator lights up when there is a error or a warning that has to be handled by the operator. Press the task icon to access the task list.

Event indicator

If something happened during analysis, like an unexpected error or if the lid was opened, this will be shown with a colour indication. Errors are indicated with red and warnings with yellow. Press the event icon to access the event log. Once the event has been read, press RESET to remove and upload the event.

Print result

Pressing the print button will print the sample displayed to the Windows default printer. If no printer is configured, a save dialog for the print file will appear.

Result

In the case that product limits are used, a result exceeding a warning or action limit will be displayed with either a yellow (warning) or red (action) background. Pressing on the coloured box will open up a dialog with information of the exceeded limits.

For more inforation about ISIscan Nova, see chapter 4 and the on-line helpfiles available in the software.

Care Menu

The Care View Menu contains features not related to routine analysis. They are described in chapter 4 and you need to go through some of them during installation to ensure your instrument is configured correctly. This is also the view you use for some regular or ad hoc activities (e.g. database backup, instrument diagnostics, FossManager synchronisations for Networked instruments).

Fig. 2:11

Fig. 2:12

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.

3.2 Unpacking and Checking

Unpack the NIRS DA1650 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

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

3.4 Software Installation and Initial Configuration

The NIRS DA1650 comes with the operating software ISIscan Nova already installed on the embedded PC. Import and configuration of calibration models are described in a separate Installation manual delivered with the instrument as a pdf-file on the SW USB.

If purchased with FOSS calibrations/products they will already be installed and no further configuration is required.

For changes to the pre-installed default configuration Mosaic Solo should be connected as described in section 3.5 below.

3.5 PC connection for Mosaic Solo

Instruments are configured with Foss standard setup and purchased calibrations at the time of delivery. So a PC only needs to be connected if changes from the standard setup is required. Connect the instrument to the PC in a way that is suitable for the current installation.

3.5.1 Installation of Mosaic Solo on external PC

For carrying out Configurations and other tasks in Mosaic Solo (when running the instrument in Solo mode, see 2.4) you need to connect an external PC to the NIRS DA1650 via the Ethernet port on the back of the instrument.

An installation instruction is delivered with the ISIscan Nova software describing how to connect and install Mosaic Solo on the external PC. This instruction also contains a guide for the initial configuration required in Mosaic Solo during installation.

Connecting a PC, installing Mosaic Solo and initial configuration is normally done at time of instrument installation by a trained technician.

Mosaic Solo is operated from an external computer which needs to be connected the NIRS DA1650 via an Ethernet cable.

The installation files for installation of Mosaic Solo are located on a shared folder inside the NIRS DA1650 and these are accessible via the PC's browser.

Make sure the NIRS DA1650 is switched on and connected to the PC.

1. Start Explorer on the external PC.
2. Enter the IP address or the Name of the internal computer inside NIRS DA1650 like the example below.

Fig. 3:1

3. Press Enter.

The IP address and Computer Name can be found under Instrument Information in the Care View of ISIscan Nova.

Fig. 3:2

You can use the Computer name if the instrument is connected to an office network with DHCP and name server otherwise you need to use the IP address of the instrument.

A log-in is required to access the internal folder of the NIRS DA1650.

- Username: administrator
- Password: ms2361

4. Press OK.

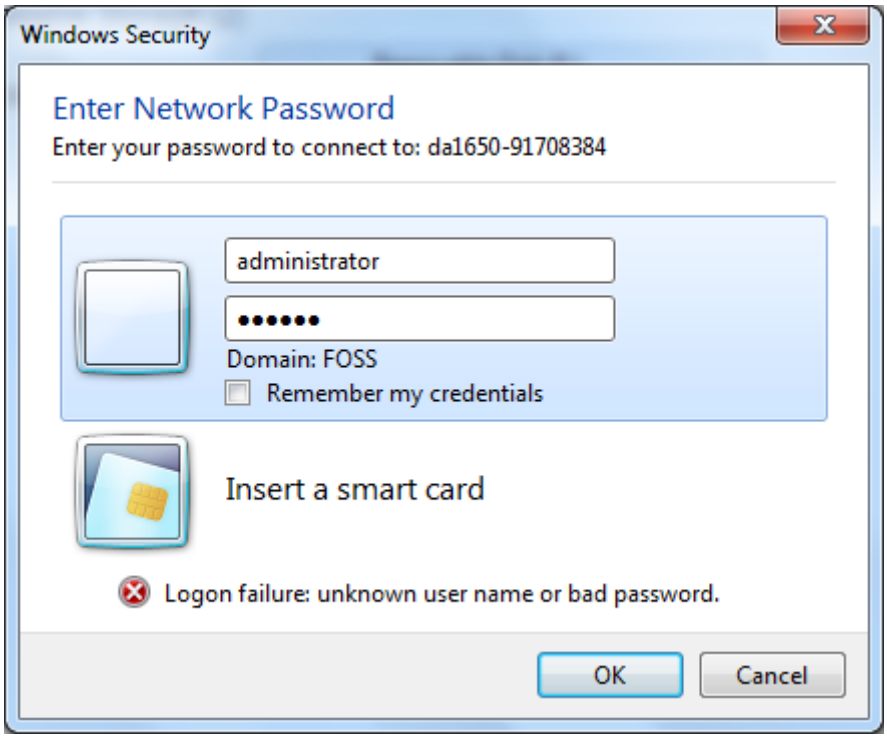

Fig. 3:3

5. You will now see a shared folder in the NIRS DA1650.

Open the folder "DA1650Setup.exe".

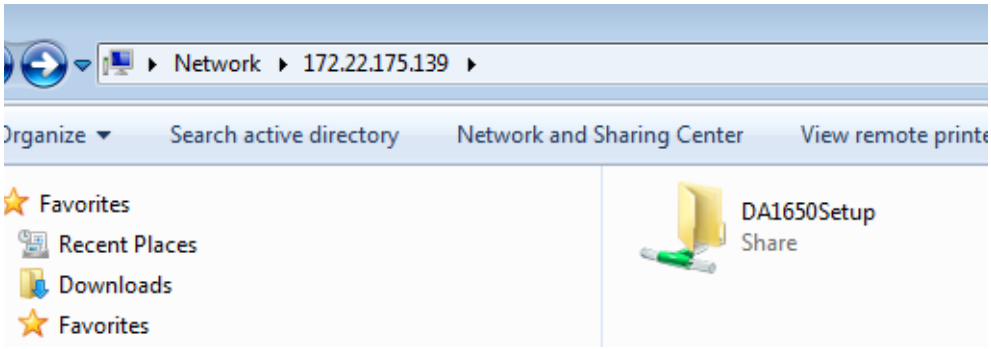

Fig. 3:4

6. Start installation via "setup.exe".

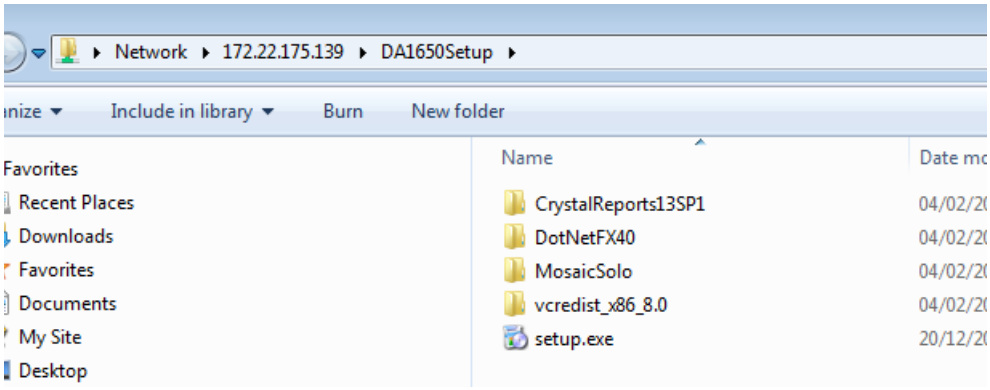

Fig. 3:5

7. Click Run.

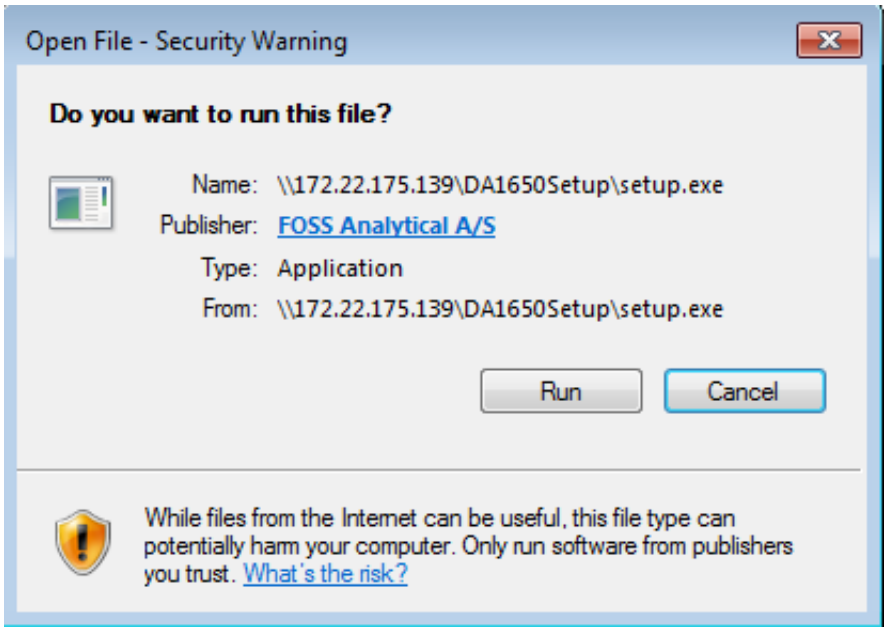

Fig. 3:6

Depending on whether you have had Mosaic installed before or not on this PC, you will see a number of components being installed.

At this stage you might get a request to install Crystal Reports Runtime. This happens if you don't have Crystal Reports installed or if you have an older version on your computer.

8. Click Accept.

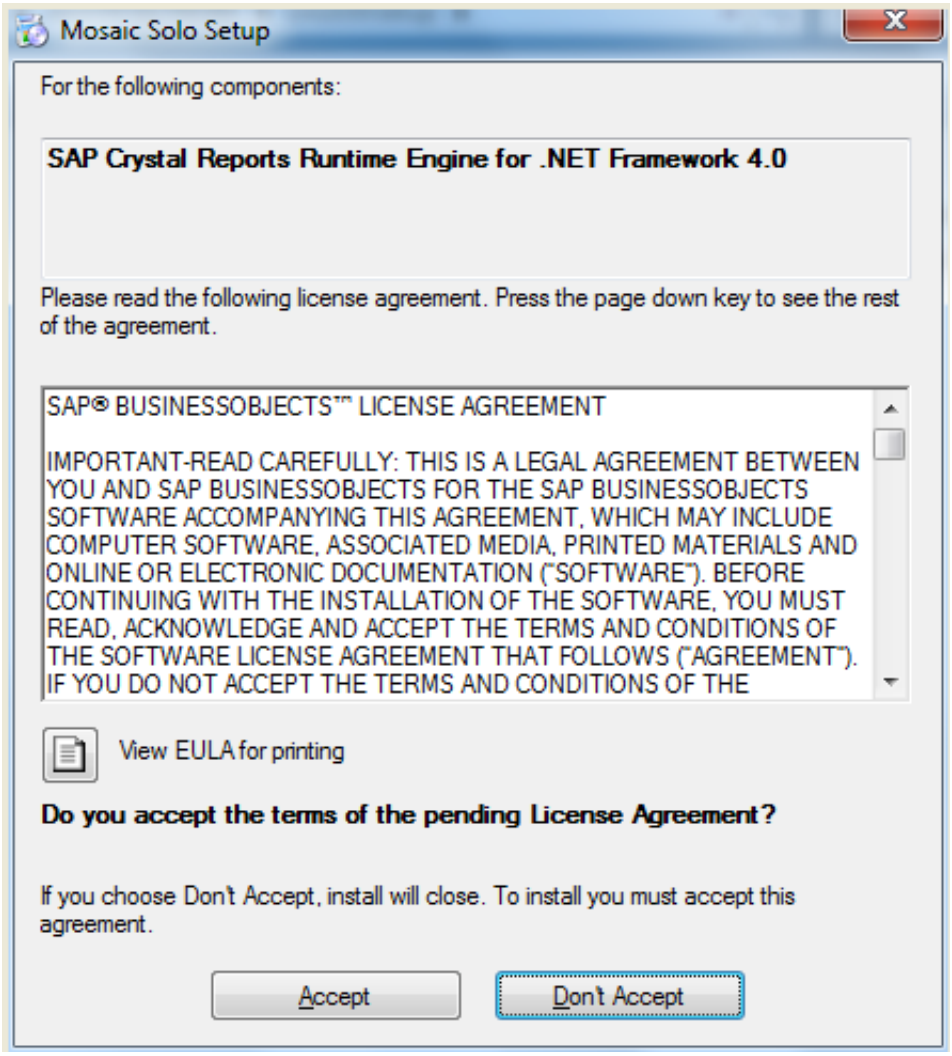

Fig. 3:7

9. Press Install to start installation

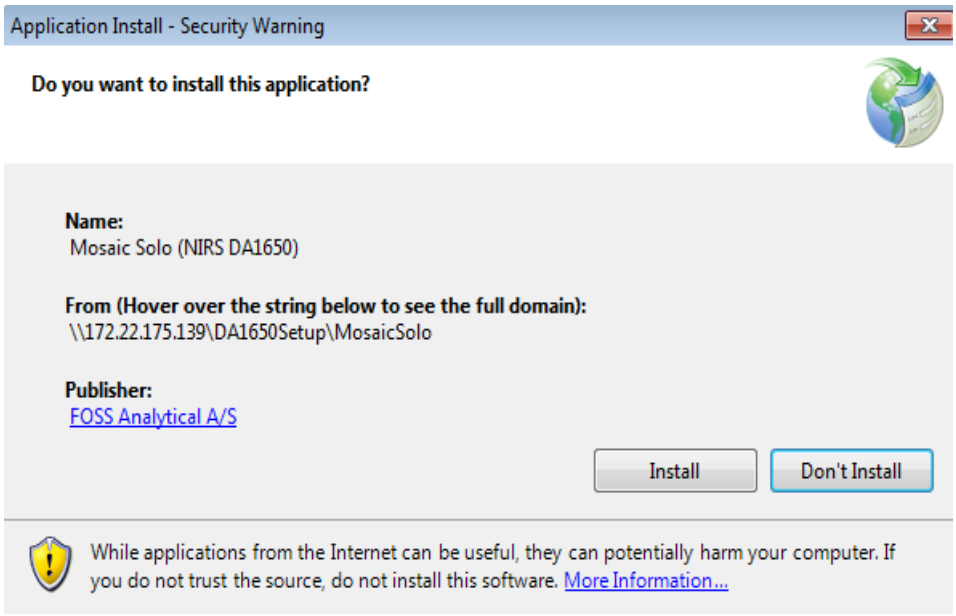

Fig. 3:8

The installation takes five to fifteen minutes depending on whether you need to have the Crystal Report Runtime installed or not.

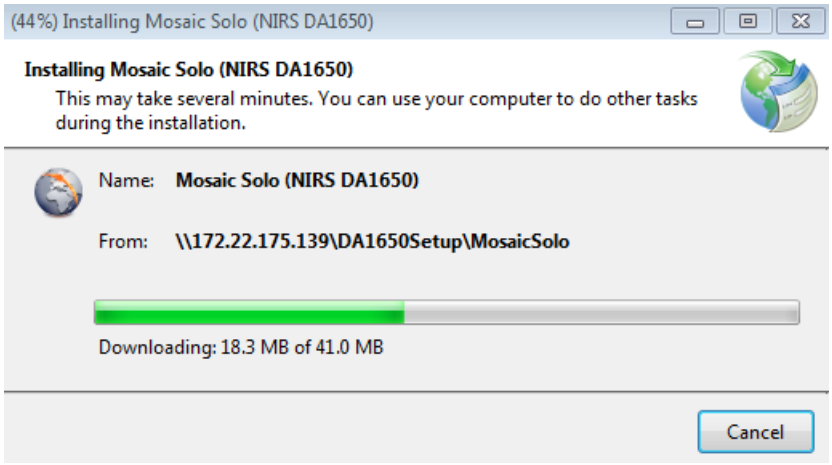

Fig. 3:9

After the installation, the Mosaic Solo will start automatically.

It can also be started via the icon which now should be on your PC desktop.

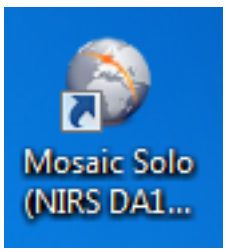

Fig. 3:10

If installation of Mosic Solo fails

In some cases, Windows 10 PC's are not able to connect to Windows Embedded 2009 instrument as the DA1650 / MeatScan / Olivia / Dairy. When this happens **SMBv1** needs to be enabled.

This is procedure to enable the **SMBv1** feature.

1. Navigate to: Control Panel\All Control Panel Items\Programs and Features.
2. Select 'Turn Windows feature on or off'.

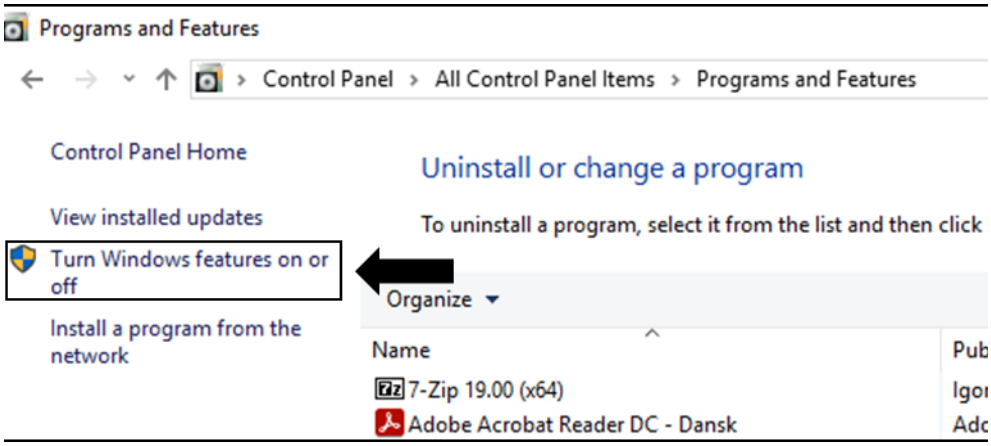

Fig. 3:11

3. When "Windows Features" pops up, scroll down and check the "SMB 1.0/CIFS File Sharing Support" and click on the OK button.

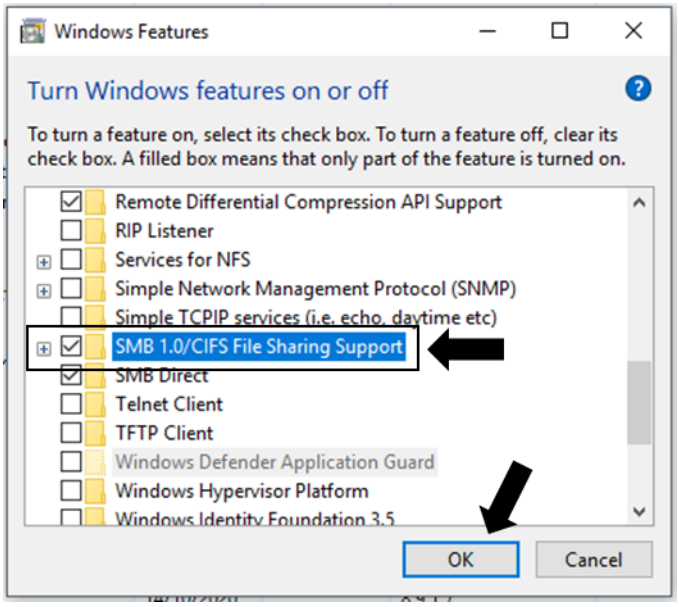

Fig. 3:12

4. Done.

3.5.2 Via Local Area Network

Connect 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 is entered (when prompted) first time ISIscan Nova is started.

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

3.5.3 Via switch / network hub

Connect 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 instrument).

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

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

3.6 Printer

Connecting a printer to the NIRS DA1650 is done via the USB port on the rear panel.

For ticket printers it is required to select a matching printer template to fit the paper size of the printer. Printer template selection is made in FossManager.

Depending on which type of printer to be used it may be required to install specific printer drivers into the embedded Windows software. Instructions for how to install new printer drivers are found in the Installation Guide which comes with the ISIscan Nova software.

Printing from ISIscan Nova

All reporting options in ISIscan Nova are configured from FossManager. Either contact the network administrator (FossManager Network) for your NIRS DA1650 for assistance or refer to the help files in Mosaic Solo for how to configure ISIscan Nova for printing/reporting.

4 Operating Instructions

4.1 Routine Start-up

1. Turn on the analyzer by pressing the On/Off switch placed at the rear of the instrument.

The analyser will now start up, initializing the software. This will take several minutes. Once the software is ready, the instrument will go through the start-up tests. The instrument is ready for analysis when the start-up test has succeeded.

Fig. 4:1

If the startup test fails you should create a diagnostic report to obtain and document the information about why it failed.

This report is created via the **Report** button in lower left-hand corner - select the built-in diagnostic report and press **Save**.

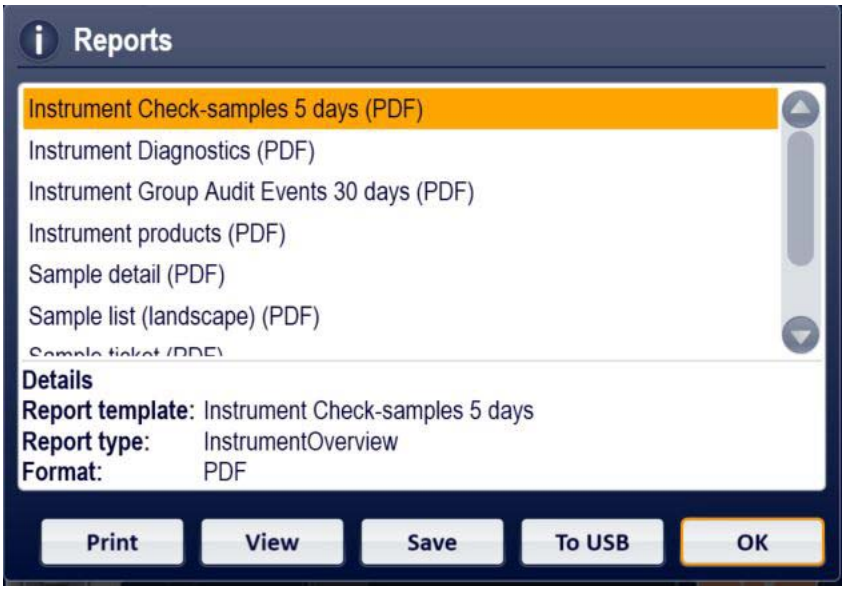

Fig. 4:2

The report is now stored as a pdf-file in the location specified in the **Configuration** view (see section 4.3.11 Configuration).

The most likely reason for selftest to fail is that the instrument is not warmed up properly. Please wait 5-10 minutes and repeat the selftest by going to the **Care** menu and select **Instrument Diagnostics.**

If the problem persists, please contact your local FOSS representative and also forward the diagnostic report to them.

You can still carry out analysis but every result will be highlighted in yellow, with a warning stating that the Startup test was not completed.

It is possible to interrupt the startup test before it is completed. This could be done when you just want to start the instrument in order to change configuration in FossManager or other actions that are not real analysis.

Fig. 4:3

You can still carry out analysis after cancelling the test but every result will be highlighted in yellow, with a warning stating that the Startup test was not completed.

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 on 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 form of pellets or samples having a wide range of particle sizes, care has to be taken to avoid segregation of small and large particles when filling the cup.

4.2.2 Analysing the Sample

1. Instrument should be warmed up 30 minutes prior to first analysis.
2. Choose the appropriate sample cup for the sample. See chapter 2 for information about the different cup types.
3. Carefully prepare your sample and fill the sample cup all way up. Sample types that tend to form voids if simply poured in should be compressed using the back of a spoon or similar.
4. Place the filled sample cup in the sample compartment and close the lid.

Fig. 4:4

5. Select product by pressing the **Select Product** icon. Choose product to analyse from the list of products. Press **Cancel** if you don not wish to change product.

Fig. 4:5

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

6. Select a product and press **Start** to initiate the analysis sequence.

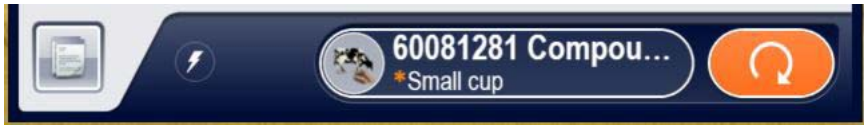

Fig. 4:6

The specific cup to use with the selected product can be indicated along with the product name. (This cup type indication can be enabled/disabled in the Operation profile in FossManager.)

7. Register sample information by clicking in the **ID** fields on the right hand side. These Sample ID fields and User Defined Fields can be configured in FossManager. They can there be enabled/disabled and set to be optional/ mandatory. If they are set to be mandatory they will automatically pop-up after the analysis has started.

Fig. 4:7

8. A progress indicator shows sample analysis progress.

Fig. 4:8

9. Once the analysis is complete, the result is displayed and the lid can be opened.

Fig. 4:9

10. Previous results can be viewed by scrolling backward/forward with the arrows in top right corner.

11. The results are presented on the screen and can be printed/reported via the **Reports** view. (Configuration of manual reports to be available in the **Reports** view is done in FossManager under **Instrument Settings**. For setting up automatic reporting or LIMS transfer, please refer to the on-line help in FossManager.)

4.2.3 Multi-cup Analysis

For some sample types it is desired to split a larger sample volume into sub-samples and report the results as the average of these sub-samples. This is support in NIRS DA1650 via the Multi-cup analysis. In the **Operation Profile** in FossManager you set the number of sub-samples (repetitions) for the product in question. In ISIscan Nova this is indicated together with the product name.

Fig. 4:10

Press **Start** to run the first cup and wait for the message to continue with the next cup/ sample. After scanning all cups the results are presented as the average of all sub-scans. Results of the individual cups are not presented.

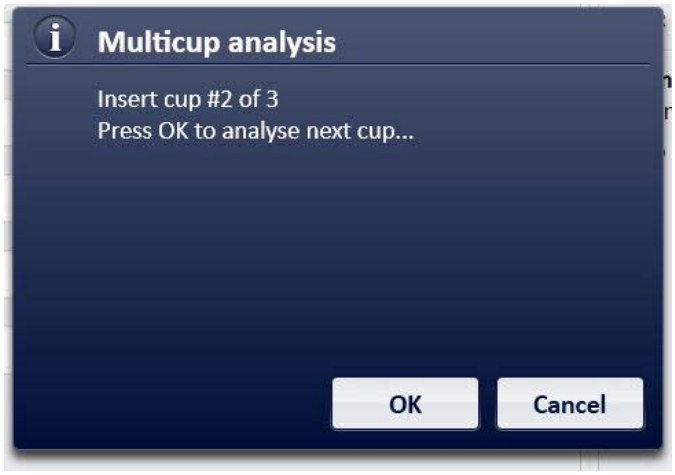

Fig. 4:11

4.2.4 Turning off the Analyser

When the instrument has been switched on, it takes about 30 minutes for it to warm up for the first analysis.

The instrument can be left switched on over night. If left unattended over a longer period of time (weekends/vacations), it is recommended to turn it off.

To turn off the analyser:

1. Go to the **Care** Menu.
2. Press **SHUT DOWN**.
3. Press **OK** to shut down instrument.

4.3 Care Menu

The **Care** view contains features not related to routine analysis. They are described on the following pages and you need to go through some of them during installation to ensure your instrument is configured correctly.

This is also the view you use for some regular or ad-hoc activities (e.g. database backup, instrument diagnostics, FossManager synchronisations for Networked instruments).

Fig. 4:12

Fig. 4:13

4.3.1 FossManager Synchronisation

This view looks different when software is installed in Network mode or Solo mode (see section 2.4.2 local configuration and the Installation Guide for information about the two modes).

FossManager synchronisation is only applicable if your instrument is installed in Network mode. This button is grayed out if the instrument is installed in Solo mode. (See section 2.4 for information about Network and Solo modes.)

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

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

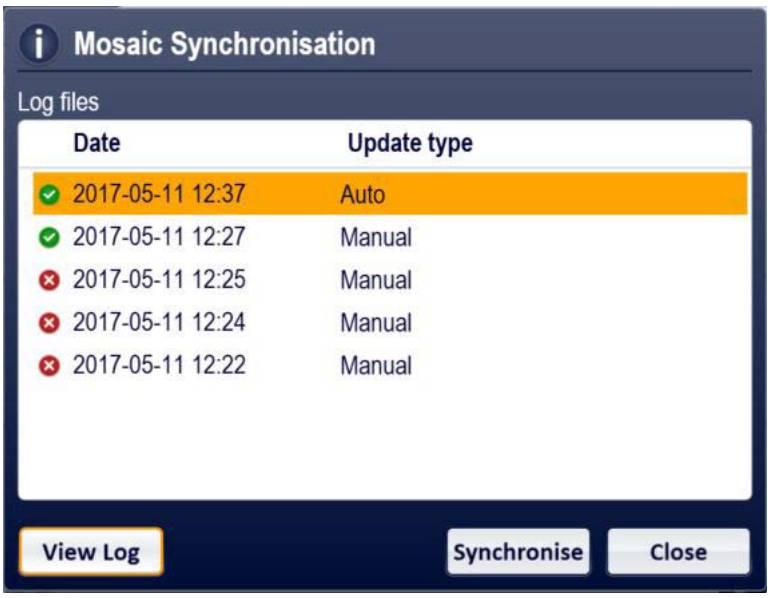

Fig. 4:14

Pressing **Update now** performs 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 (following settings in FossManager) and these will upload all relevant data to the FossConnect Server.

Automatic Updates are performed at certain intervals (following settings in FossManager) and these will download all available updates from the FossConnect server. These updates are not automatically activated, but the operator is alerted that there are new updates and given the options **Update now** or **Snooze**.

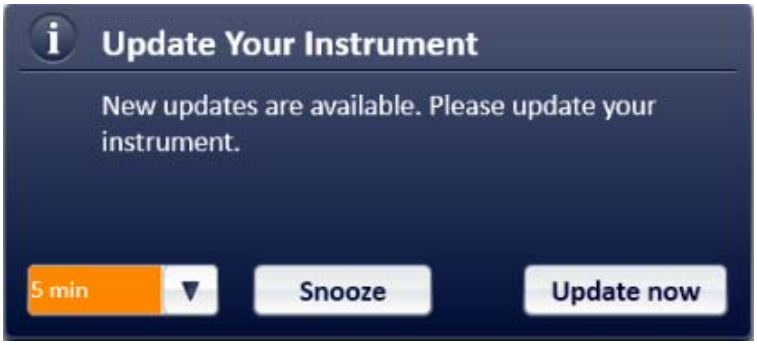

Fig. 4:15

4.3.2 Instrument Diagnostics

Running **Instrument Diagnostics** from the **Care** menu will carry out the same tests and with the same test limits as during the Start Up test.

After the **Instrument Diagnostics** is completed, you can create and store the Diagnostic Report in the same way as after the Start up test (see section 4.1 Routine Start-up).

4.3.3 Clean Screen

Activating the **CleanSscreen** menu will disable the touch sensitive display for a small period of time, allowing for a thorough cleaning of the screen without interference.

See chapter 5 “Maintenance” for cleaning guidelines.

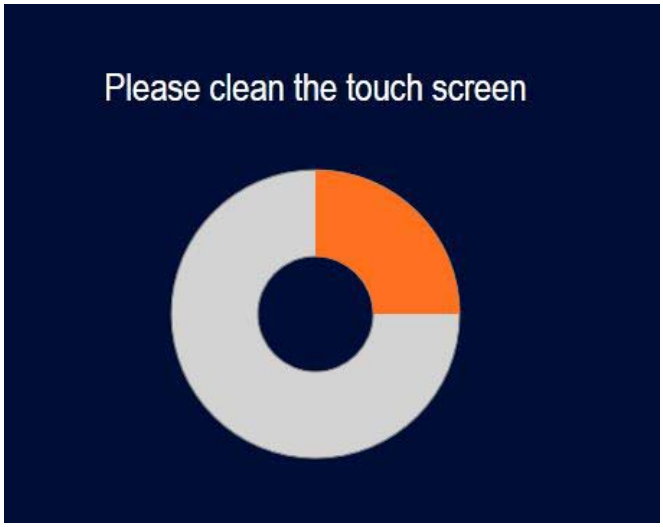

Fig. 4:16

4.3.4 Instrument Calibration

Instrument Calibration of NIRS DA1650 is a task normally carried out by a FOSS representative at the time of installation and/or at service or Preventive Maintenance visits. NIRS DA1650 is using DDA technology (diode array) which is very stable over time and insensitive against e.g. vibrations. The instrument calibration performed prior to delivery or at installation will therefore last a long time.

The required ERC and EWC tools for carrying out instrument calibration of NIRS DA1650 are therefore not included with the instrument. They can be purchased from FOSS for any customer wanting to do their own instrument calibrations.

Instrument Calibration in NIRS DA1650 is found in the **Care** menu and it includes two functions:

- **Intensity Correction**, using the ERC tool (external reference correction)
- **Instrument Calibration** using the EWC tool (external wavelength calibration)

Note: For instrument calibration it is important that the instrument is thoroughly warmed up and that is carried out in a stable environment. Recommendation is that the instrument should have been turned on for at least 2 hours before calibration.

USB KEY

With the ERC and EWC cups comes a matching USB key 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. These EWC/ERC keys must be connected to the instrument when requested by the software.

Intensity Correction

1. Place the ERC tool in the instrument with the help of the small cup holder. Insert the ERC USB key in the USB port on the back panel.
2. Select **Intensity Correction** and press **Calibrate**.

Fig. 4:17

3. Running instrument calibration requires you to enter the 4-digit password "1234" (preventing un-intentional start of the calibration sequence).

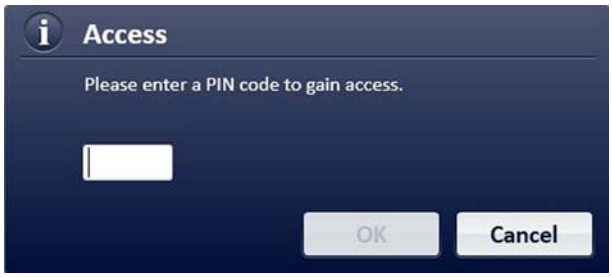

Fig. 4:18

4. If the ERC key is not properly connected to the instrument, a message will appear.

Fig. 4:19

5. Press **Continue** and wait for calibration to complete.

Instrument Calibration

1. Place the EWC tool in the instrument with the help of the small cup holder and close the lid.
2. Insert the EWC USB key in the USB port on the back panel.
3. Select **Instrument Calibration** and press **Calibrate**.

Fig. 4:20

4. Running instrument calibration requires you to enter the 4-digit password "1234" (preventing un-intentional start of the calibration sequence).

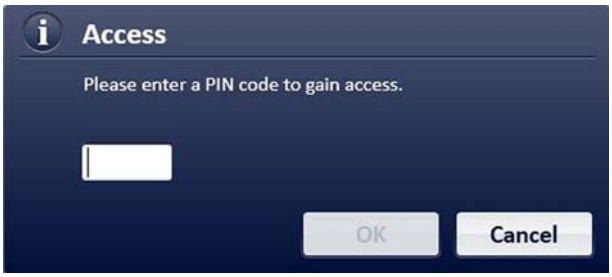

Fig. 4:21

5. If the EWC key is not properly connected to the instrument, a message will appear.

Fig. 4:22

6. Press **Continue** and wait for calibration to complete.

4.3.5 Maintenance

Maintenance view for:

- Manual backup of database (for automatic backup of database, see section 4.3.11 Configuration)
- Restore of existing database backup
- Deletion of samples

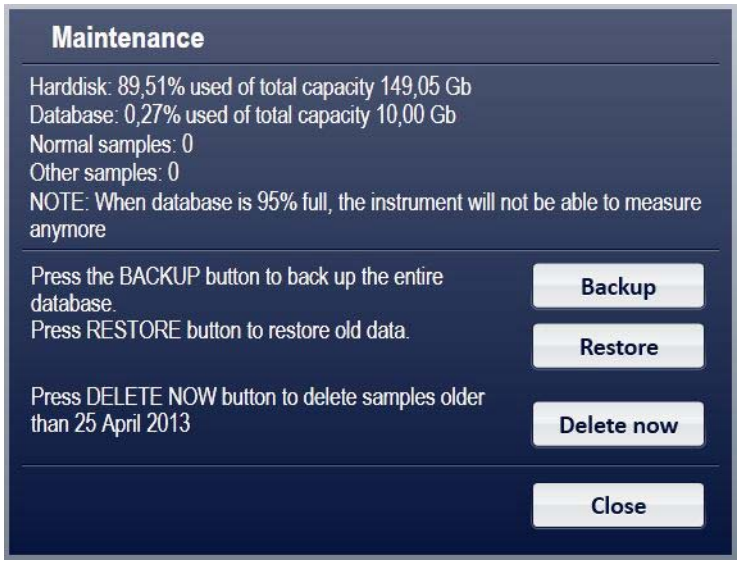

Fig. 4:23

Backup

Backup will create a backup file, e.g. DA1650_sn26090_v6.0_D20130325T115035 (name includes serial number, date and time) and save this to the destination as set in **Configuration** view (4.3.11).

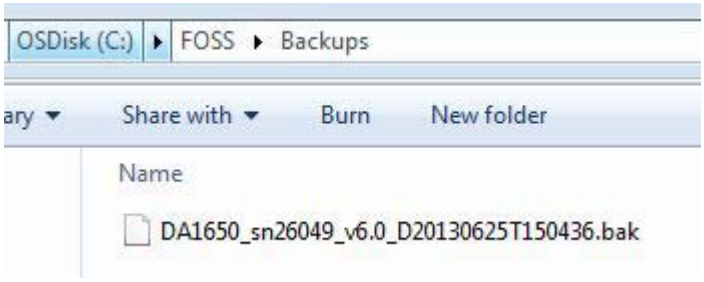

Fig. 4:24Example of database backup file

Fig. 4:25

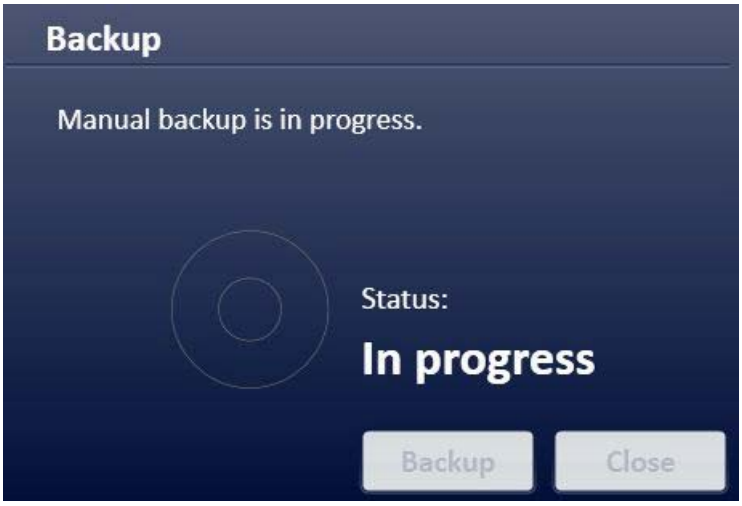

Fig. 4:26

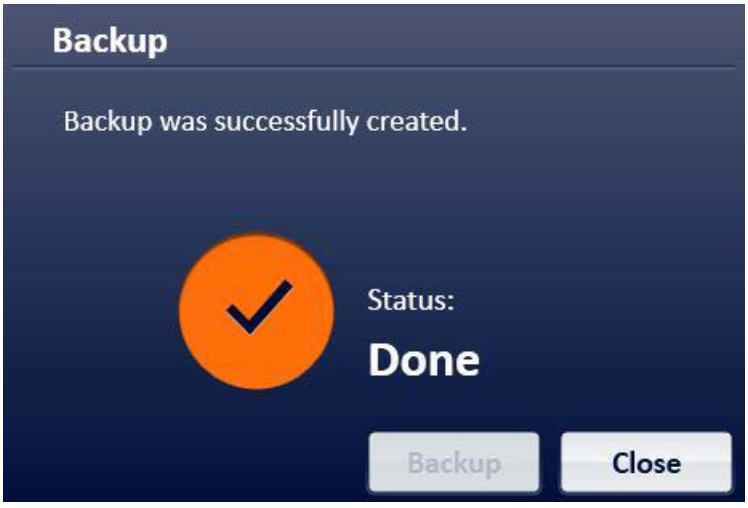

Fig. 4:27

Restore

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

1. Press **Restore**.

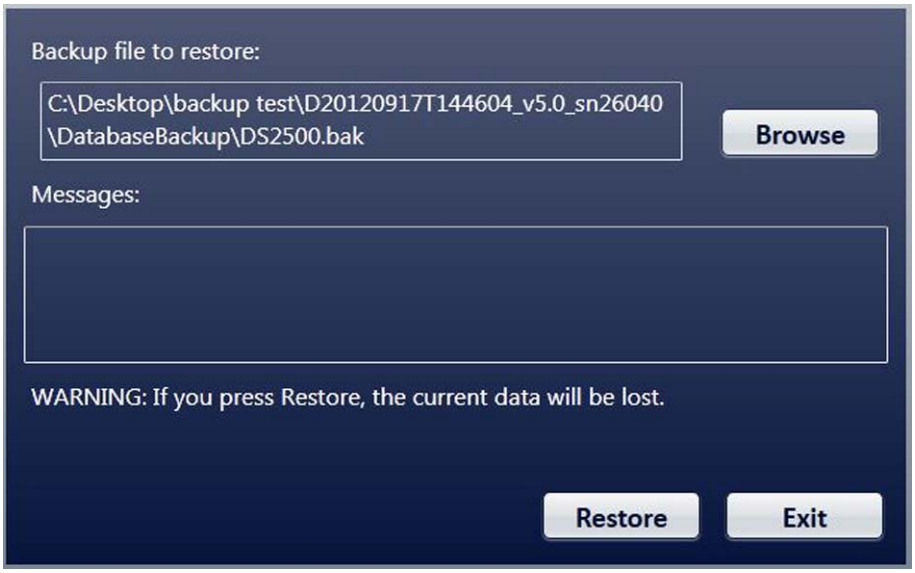

Fig. 4:28

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

2. Press **Yes** to continue.

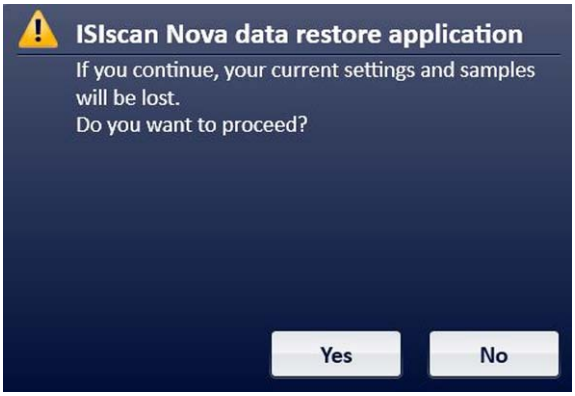

Fig. 4:29

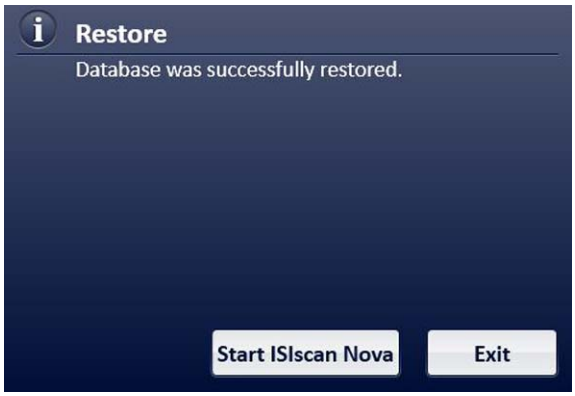

Fig. 4:30

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. (Default setting in FossManager is "older than 60 days".)

Pressing **Delete now** will prompt you for the PIN code "1234" (to avoide unintentional deletion).

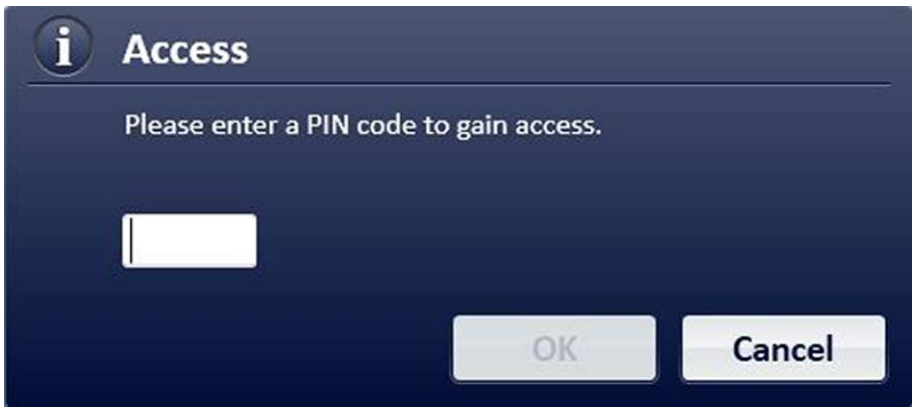

Fig. 4:31

4.3.6 Shut Down

Press **SHUT DOWN** to shut down the instrument.

4.3.7 Upgrade

NIRS DA1650 is delivered with the latest available software version (ISIscan Nova)

If at a later stage the software needs upgrading to a later version and/or configuration, this requires that a USB with the relevant software package is connected to the instrument. The Upgrade procedure can then be initiated locally on-site from the **Care** view in ISIscan Nova.

Please request the latest version of this USB and SW package when needed for on-site upgrades.

Note: Upgrade of ISIscan Nova will preserve all data and settings.

Fig. 4:32

4.3.8 Instrument Information

Instrument information contains e.g. serial number, software versions, IP-address etc.

If you need to report a problem it is recommended that you include this type of info when contacting the FOSS representative.

Fig. 4:33Example of instrument information

4.3.9 Remote Support

Remote Support is a tool to set up a TeamViewer session to enable a remote support session with a support engineer. An internet connection is required.

4.3.10 Export Logs

Export Logs is a command for collecting internal log-files from ISIscan Nova and Mosaic Solo

.

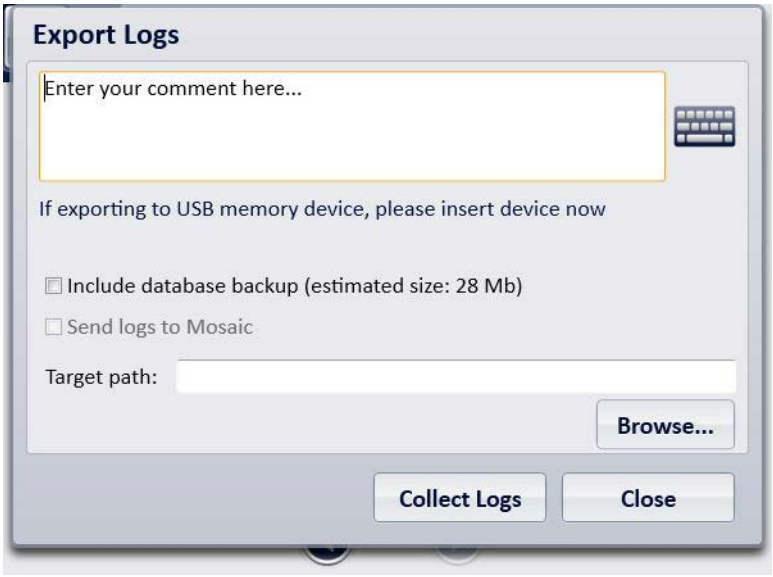

Fig. 4:34

Typically these log-files contain detailed and traceable information about the instruments 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.

Log files can be exported to the internal hard drive but the recommendation is to export them direct to a USB memory key so they can be forwarded via e-mail or archived elsewhere.

4.3.11 Configuration

The **Configuration** view contains settings which normally are done at time of installation but they can also be edited afterwards.

1. Press **Configuration**.

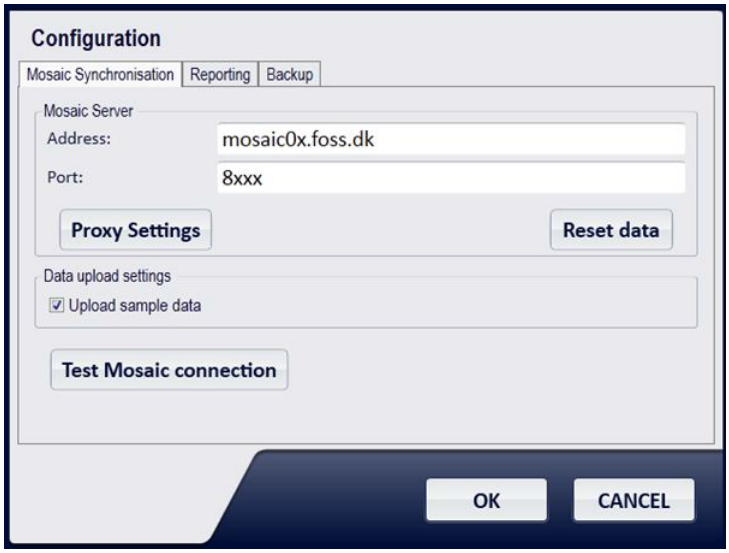

Fig. 4:35

On the **FossManager Configuration** tab you enter the Address and Port number for the FossManager Network server to be used for this particular instrument. This information will be provided to you by the Network manager or the FOSS representative at time of installation.

Test FossManager connection will test and verify if the connection to the FossConnect server can be established.

Should an incorrect address or port number be entered or the Internet connection does not allow for the Instrument to contact the server an error message will appear.

Fig. 4:36

Failure to connect to the FossManager Network server could be caused by a number of different reasons. E.g. Internet availability, firewalls in local IT-systems, blocked IP-address ranges and port numbers 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 sites IT system).

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

If the correct Address/Port number is entered and interconnection is OK, you will get the message “Connection to FossConnect server was successful” next to tbe button.

Fig. 4:37

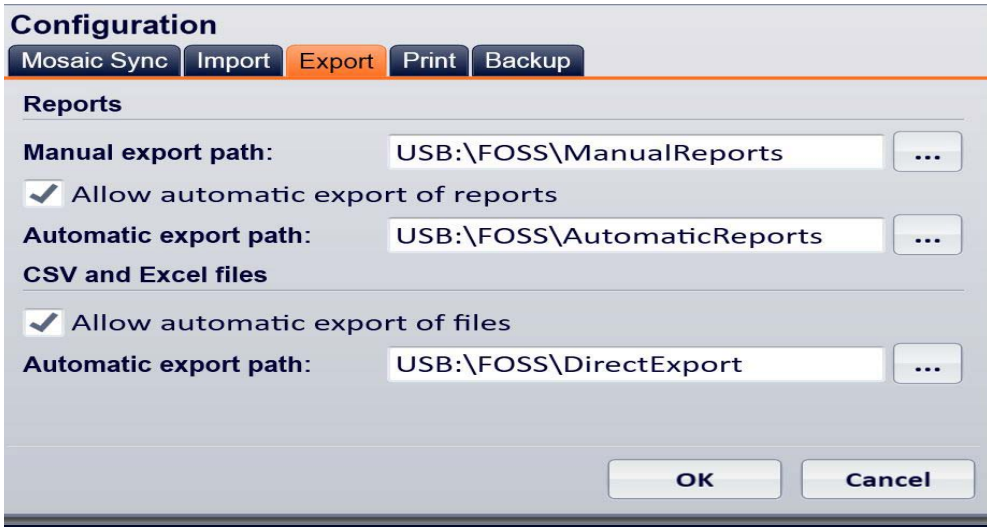

Fig. 4:38

On the **Reporting** tab you set the paths for Manual/Automatic reports and for LIMS export. If the NIRS DA1650 is not connected to a local network, then the recommendation is to set these paths to point to a USB memory connected to the instrument, allowing easy access to the reports and exported files.

Format of the reports and the frequency of the reporting is configured in FossManager and initiated manually via the **Report** button in the main view of ISIscan Nova.

On the **Backup** tab you set the destination path for storage of database backup. A backup of the database can be created automatically (based on the settings in this view) and it can be created manually in the menu **Care** / **Maintenance** (see section 4.3.5).

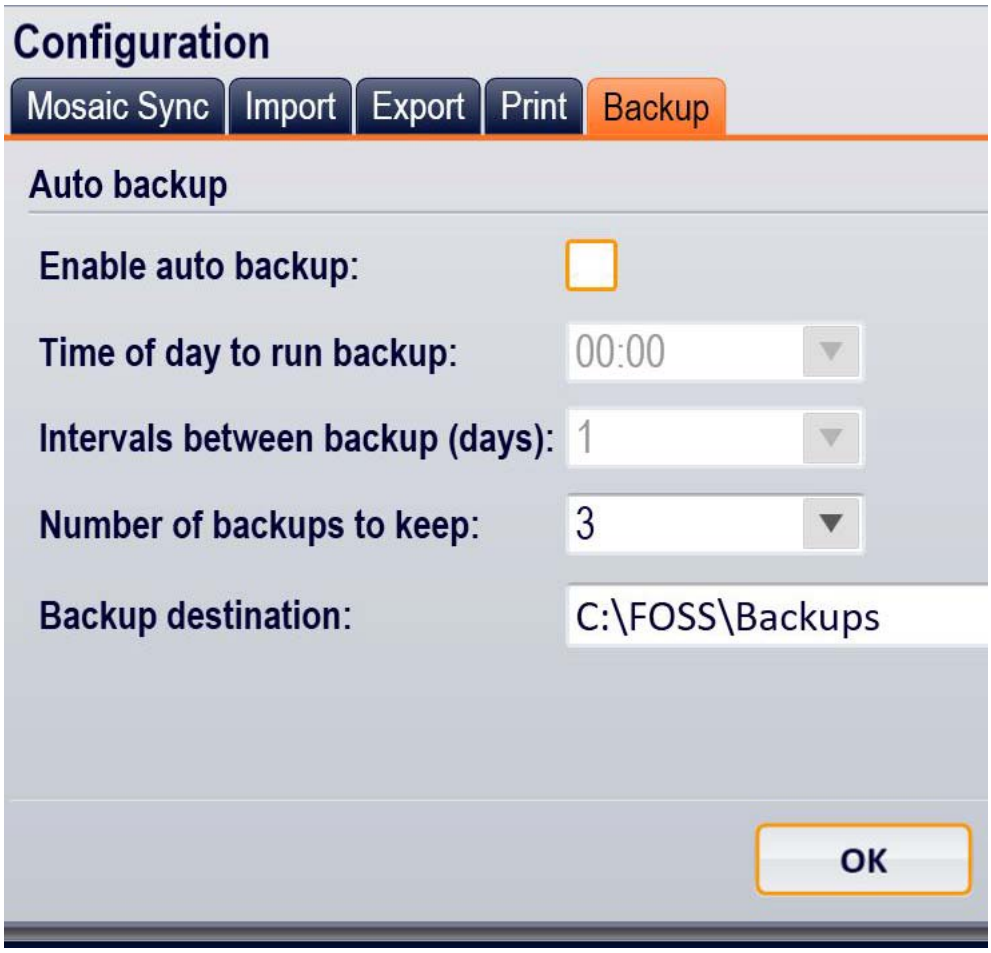

Fig. 4:39

4.4 Check Samples

4.4.1 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 info about the artificial FOSS Check Sample please see section 4.4.2 FOSS Check Sample.

A Check Sample (or Control Sample) is measured on a regular basis to validate the stability of the analyzer and everything around it that affects its performance (environment etc.). Frequency for the test 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. The check sample needs therefore 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 looking at how the results for the check sample changes.

Replacing the check sample with a new sample will most likely change the measured result(s) for it and 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 e.g. "Check Sample"

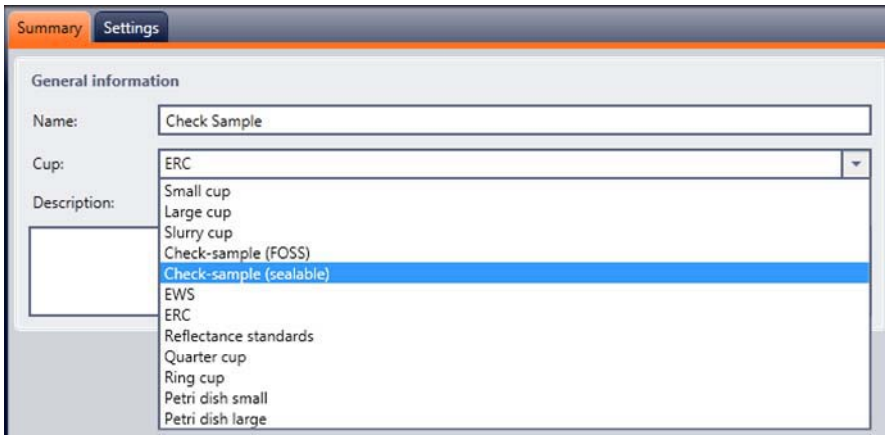

Fig. 4:40

3. Create a Product and call it e.g. Check Sample. 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. 4:41

4. If you are on a FossManager Network you can now set up an Update session in order to download the check sample Product to the instrument(s). If you are on Mosaic Solo 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 which are linked to the check sample product and compares these to the limits as 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 then 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 is 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

Running a check sample definition in ISIscan Nova is then required!

Running a Check Sample definition (ISIscan Nova)

The check sample definition will every time it is performed re-define 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. 4:42

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.

4. Press **Start** and enter pin code “1234” to run the check sample definition.

Fig. 4:43

5. 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.
6. 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. 4:44

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Press **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 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. 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 if results are still outside limits.

Samples can still be analyzed even after a failed check sample but they will be high-lighted 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 re-define 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.

4.4.2 FOSS Check Sample

This refers to the artificial FOSS check sample. For info about the empty check sample cell please see section 4.4.1 Check Sample.

The FOSS check sample supplied with NIRS DS2500 and NIRS DA1650 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 but the normal recommendation is to run daily check sample controls.

Running the check sample is done in ISIscan Nova just like you run a normal sample. 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 equation is delivered on a USB key together with the check sample. This equation will predict a specific distance in the check sample spectra and the results 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 create a check sample Product in FossManager.

1. Import the check sample prediction model from the USB coming with the check sample. The USB contains one prediction model for NIRS DS2500 and one prediction model for NIRS DA1650. During import of the prediction model you can create a new Parameter profile called "Distance" and link this to the model.
2. Create an Operation profile with Cup Type = "Check sample (FOSS)" and name it e.g. "Check Sample FOSS".

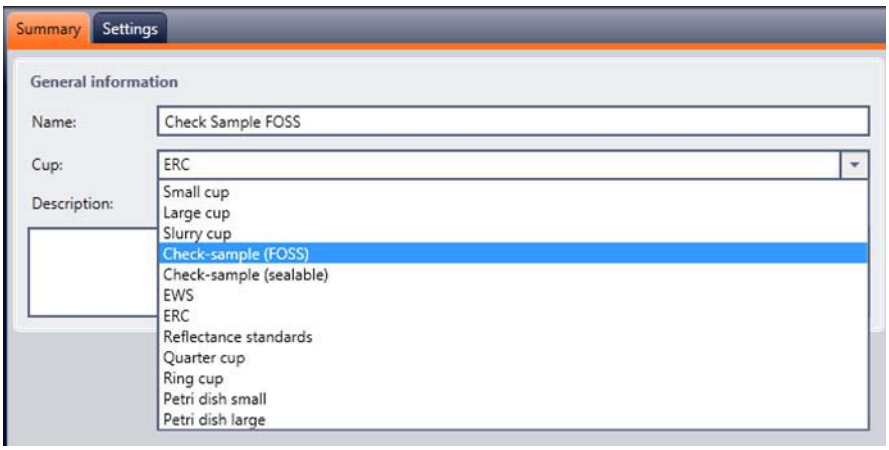

Fig. 4:45

3. Create a Product and call it e.g. Check Sample FOSS. 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.)

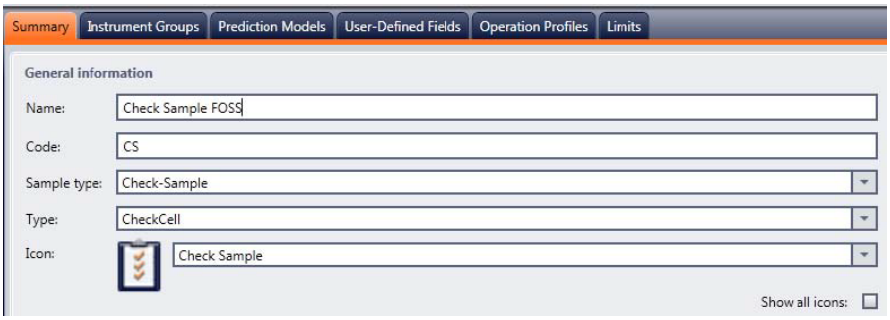

Fig. 4:46

4. If you are on a FossManager Network you can now set up an Update session in order to download the Check Sample product to the instrument(s). If you are on Mosaic Solo then 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:

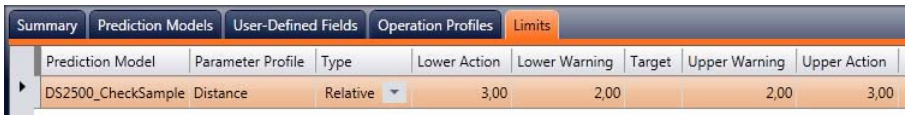

Fig. 4:47

Running a Check Sample definition (ISIscan Nova)

The check sample definition will every time it is performed re-define 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. 4:48

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.
4. Press Start to analyze 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. 4:49

2. Place the check sample in the instrument using the small cup holder.
3. Close the lid.

4. Press **Start** and enter pin code “1234” to run the check sample definition.

Fig. 4:50

5. 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.
6. 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 analyzed even after a failed check sample but they will be high-lighted 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 check 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 if 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 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.

5 Maintenance

A NIRS DA1650 requires little maintenance. The instrument enclosure is sealed to prevent contamination of critical modules, which keeps maintenance to a minimum.

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, except a diluted soap and water solution. Brush off excess dust from the lamp cooling flange.

Use 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 fingerprint from the sample presentation glass. Fat and protein etc from fingerprints may affect the analysis results. If necessarry, add a small amount of alcohol to a dry cloth and wipe off the sample presentation glass.

5.2 Cleaning the Touch Screen

During normal use, it may be necessary to clean the touch screen, for example if the screen stops responding to touch or if the screen is too greasy. This can be done without interrupting the routine operations of the instrument.

Procedure:

1. Go to the **Care** menu.
2. Press **CLEAN SCREEN**.
3. The screen will now make a 20 second countdown during which there is no response to touch, and during that period it can be cleaned.
4. Use a damp cloth to clean the screen.

As soon as the 20 seconds are over, the screen picture will re-appear and you can activate the "OK" button to return to the previous **Care** menu.

Note: Do not use any cleaning solution that contains abrasives, strong acid or strong base.

5.3 Cleaning the Sample Cups

Sample cups can be cleaned using warm water and normal detergents. If a thorough cleaning is required they can also be machine-washed or even auto-claved.

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

Between analyses, the sample cup can also just be cleaned using paper. 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 carry-over of sample.

5.4 Replacement of Lamp

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

Warning

The lamp module can be very warm if the operating temperature is high. 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 damages.

Replace the halogen lamp as follows:

1. Switch off the instrument. Disconnect from mains.
2. Unscrew the two screws **1** fastening the cover plate using the supplied 3 mm allen key.

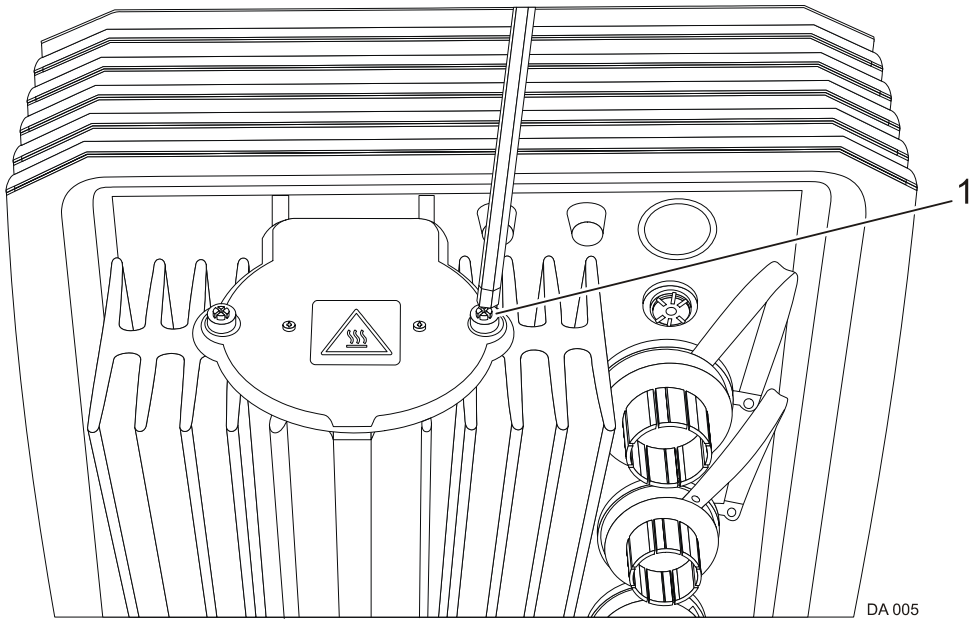

Fig. 5:1Cover plate to lamp assembly

3. Carefully turn the lamp assembly and remove it from the instrument.
4. Use the supplied flat bladed screwdriver to loosen the two screws holding the lamp cables.

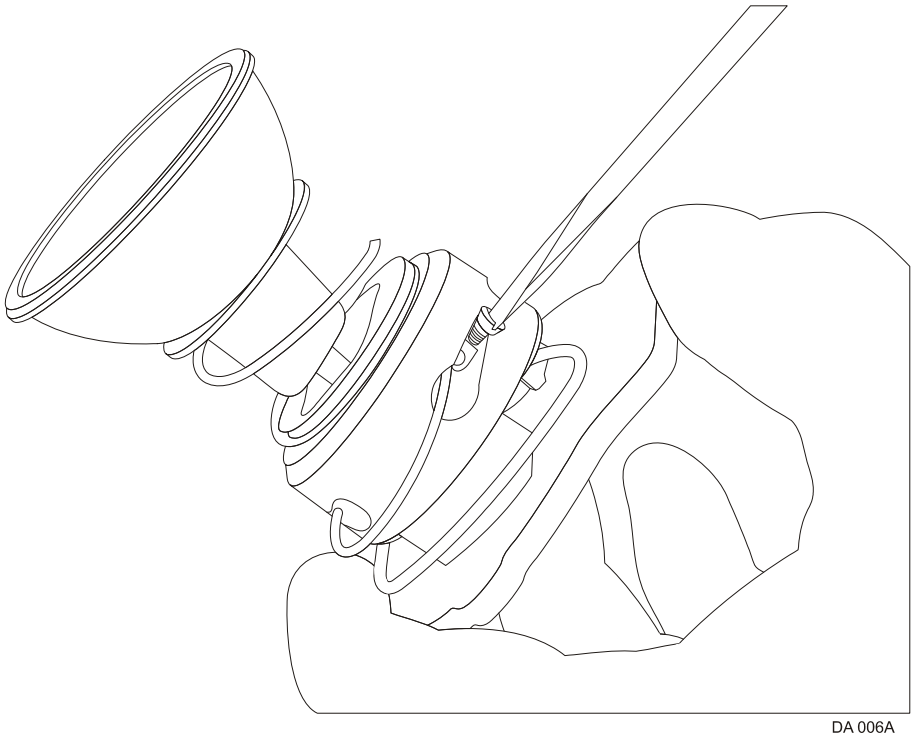

Fig. 5:2Removing lamp from cover plate

5. Fit the new lamp and assemble in reverse order.

Note: Push the cables in when you fit the lamp assembly back in place. Make sure the cables are not squeezed.

5.5 FOSS Preventive Maintenance Agreement

Apart from regular user maintenance, FOSS also recommends that preventive maintenance is performed at intervals according to the Preventive Maintenance Protocol (see the Owner's Guide). During this maintenance all critical components are replaced before they are worn out and have a negative impact on more complex and expensive parts. This will help prevent unexpected downtime and also ensure quality and consistency of results at the highest level. Contact your local FOSS representative for preventive 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 DA1650 analyzer 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 emphasize that under no circumstances should the user attempt to open the instrument cabinet and service any part besides 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.

When all recommendations have been checked, and if the instrument is still not operating, please contact your local FOSS service representative or your local authorized distributor.

To get a fast and accurate response when you are reporting a malfunction it is essential that you try to report and describe as much relevant and specific information as possible. Before calling for help, ask yourself 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 constant or is it occurring 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 un-satisfactory results there are other questions that are relevant too:

- Is it happening on all products or just one or some products?
- Is the instrument performing according to the application specification or not?
- Are the samples giving problems "normal" or extraordinary in any obvious way?
- Is the problem repeatable if I re-run the sample or re-pack the sample cup?

The Instrument Performance test and the consistent use of the Check Cell will prove your instrument performance from day to day. Results and data from these test can many times give a hint to where a problem origins from.

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
Display is black	Contact your FOSS representative
Touch screen doesn't work	Contact your FOSS representative

6.3 Error Messages

	Fault	Action
1	Too much light - Sample too light	Check sample cup
2	Too little light - Sample too dark	Check sample cup
3	Internal error: Inconsistent measurements	Please restart instrument. Contact your FOSS representative if problem persists
4	Internal error: Invalid measurement settings	Contact your network administrator for a new update session
5	Instrument temperature is too low	Re-start instrument. If problem persists contact FOSS
6	Instrument temperature is too high	Turn off instrument for minumum 15 minutes before re-starting. Contact your FOSS representative if problem persists
7	Lamp voltage is too low	Contact your FOSS representative
8	Lamp voltage is too high	Contact your FOSS representative
9	Lamp current is too low	Replace lamp. Contact your FOSS representative if problem persists
10	Lamp current is too high	Contact your FOSS representative
11	Sample cup cannot find start position	Check if sample cup is jammed
12	Sample cup motor cannot maintain speed	Check if sample cup is jammed
13	Sample cup has slipped during measurement	Check if sample cup is jammed
14	Spectrometer communication error	Contact your FOSS representative
15	Problem in light path	Contact your FOSS representative
16	Instrument is in the process of stabilising	Wait a minute
17	Instrument unable to keep detectors at required temperature	Turn off instrument for minumum 15 minutes before re-starting. Contact your FOSS representative if problem persists
18	Reference paddle cannot find start position	Contact your FOSS representative
19	Reference paddle motor cannot maintain speed	Contact your FOSS representative
20	Reference paddle has moved during measurement	Contact your FOSS representative
21	Reference paddle is possibly blocked	Contact your FOSS representative
22	Cannot communicate with RFID reader	Contact your FOSS representative
23	Cannot read RFID chip on sample cup	Check sample cup
24	DDA has not been calibrated	Contact your FOSS representative

7 Parts, Accessories and Consumables

See the Owner's Guide.

8 Technical Specifications

8.1 Technical Data

NIRS™ DA1650	
Dimensions (W x D x H)	230 x 530 x 280 mm
Weight	16 kg
Fuse	6.3 A
Power consumption	70 VA
Noise level	< 70 dB(A)
Degree of protection	IP 65

8.2 Installation Requirements

NIRS™ DA1650	
Voltage supply	100-240 V AC *), frequency 50-60 Hz, Class 1, protective earth
Ambient temperature	5-40 °C
Storage temperature	-20 °C 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 spectras)	0.19 G_{rms} at 10-150 Hz to IEC 60068-2-64 spectra 0.19 G_{rms} 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 Prformance Data

NIRS™ DA1650	
Measurement mode	Reflectance or transflectance (for liquids)
Wavelength range	1100-1650 nm
Detector	256 pixel InGaAs diode array
Optical bandwidth	10.44 ±0.5 nm
Number of data points	1100
Absorbance range	Up to 2 AU
Number of sub-samples	Default: 7 for analysis in Small Cup; 8 for analysis in Large Cup (can be set via FossManager)
Analysis time	1 minute for 8 sub-samples
Self-test	30 minutes at room temperature
Spectral resolution	0.5 nm/data point
Wavelength accuracy	<0.5 nm
Wavelength precision	<0.05 nm (standard deviation)
Wavelength temperature stability	<0.02 nm/ °C